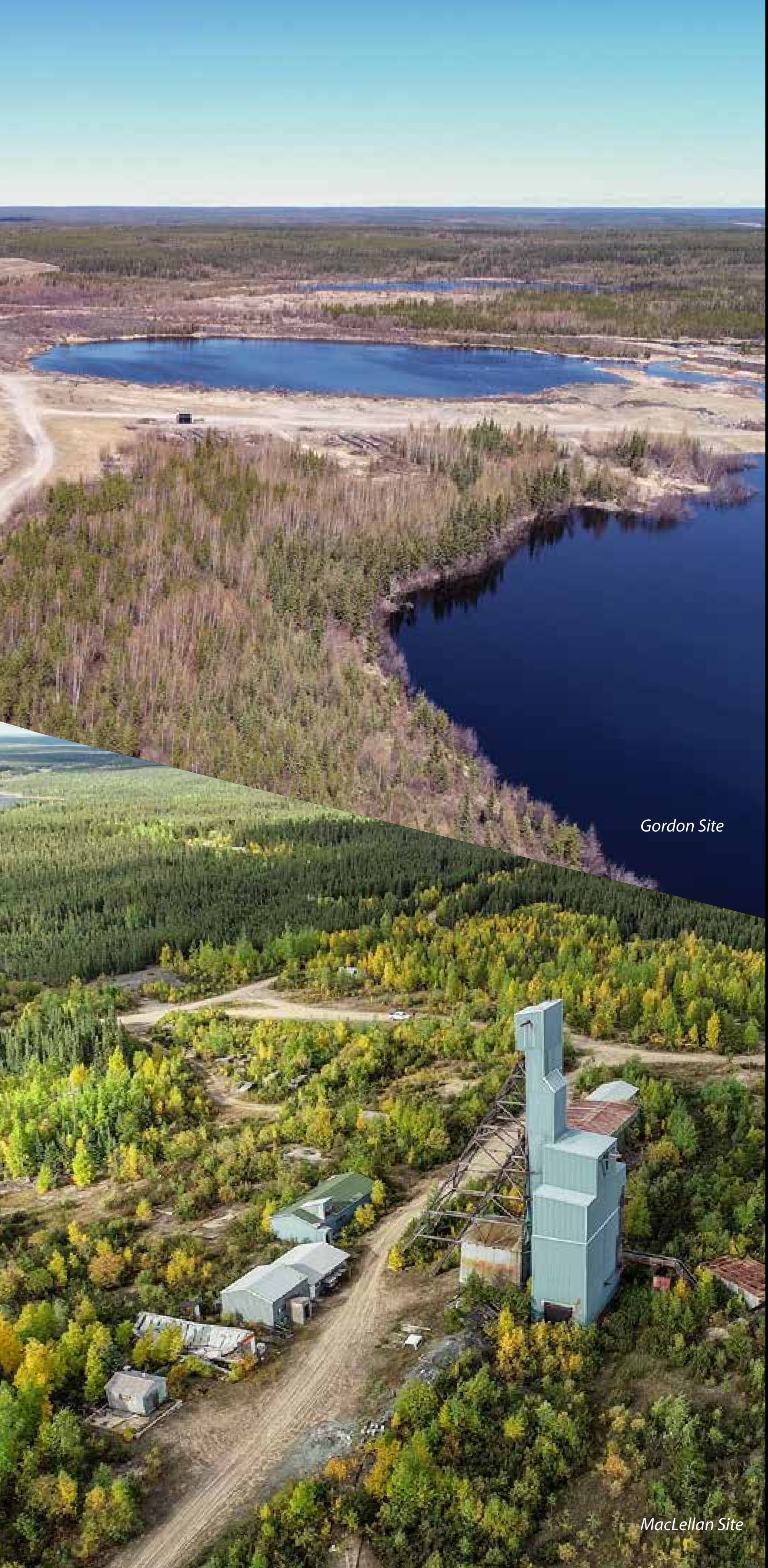

LYNN LAKE GOLD PROJECT

ENVIRONMENTAL IMPACT STATEMENT

MAY 2020

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Supporting Technical Modelling Reports

ALAMOS GOLD INC.

Stantec

Lynn Lake Gold Project, Air Quality Impact Assessment

Technical Modelling Report

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Abbreviations

°C	degrees Celsius
AAQC	Ambient Air Quality Criteria
ADMG	Air Dispersion Model Guideline
AEP	Alberta Environment and Parks
Alamos	Alamos Gold Inc.
amsl	above mean sea level
AQMS	Air Quality Management System
BMP	Best Management Practice
cm	centimetre
CAAQS	Canadian Ambient Air Quality Standards
CACs	Criteria Air Contaminants
CCME	Canadian Council for the Ministers of the Environment
CH_4	methane
CIP	carbon in pulp
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
COP	Conference of the Parties
DPM	diesel particulate matter
DPM_{10}	diesel particulate matter with an aerodynamic diameter less than 10 μm
$DPM_{2.5}$	diesel particulate matter with an aerodynamic diameter less than 2.5 μm
DTSP	diesel total suspended particulate
ECCC	Environment and Climate Change Canada

EIS	environmental impact statement
ENR	Northwest Territories Environment and Natural Resources
$FPM_{2.5}$	fugitive particulate matter with an aerodynamic diameter less than 2.5 µm
FPM_{10}	fugitive particulate matter with an aerodynamic diameter less than 10 µm
FSU	Feasibility Study Update
FTSP	fugitive total suspended particulate
GHG	greenhouse gas
$g/m^2/30$-day	gram per square metre per 30 days
g/VMT	gram per vehicle-mile travelled
HC	hydrocarbons
HCN	hydrogen cyanide
HFC	hydrofluorocarbons
km	kilometre
kph	kilometres per hour
kt	kilotonne
LAA	Local Assessment Area
LLGP/the Project	Lynn Lake Gold Project
LOM	life of mine
$\mu g/m^3$	microgram per cubic metre
$mg/dm^2/day$	milligram per square decimeter per day
mg/kg	milligram per kilogram
mg/L	milligram per litre
µm	micrometre
m	metre
mm	millimetre
m/s	metres per second

m^3/s	cubic metres per second
MCC	Manitoba Conservation and Climate
MOECC	Ontario Ministry of Environment and Climate Change
MRSA	mine rock storage area
MSD	Manitoba Sustainable Development (now Manitoba Conservation and Climate)
NaCN	sodium cyanide
NAPS	National Air Pollutant Surveillance
NIR	National Inventory Report
N_2O	nitrous oxide
NO_2	nitrogen dioxide
PAH	polycyclic aromatic hydrocarbons
PDA	Project Development Area
PFC	perfluorocarbons
PM	particulate matter
$PM_{2.5}$	fine particulate matter with an aerodynamic diameter less than 2.5 µm
PM_{10}	respirable particulate matter with an aerodynamic diameter less than 10 µm
PR	Provincial Road
RAA	Regional Assessment Area
ROM	run of mine
SAG	semi-autogeneous grinding
SF_6	sulfur hexafluoride
SOP	Standard Operating Procedure
SO_2	sulfur dioxide
TDR	Technical Data Report
TMF	tailings management facility

TMR	Technical Modelling Report
TSP	total suspended particulate
US EPA	United States Environmental Protection Agency
VC	valued component
VOC	volatile organic compounds
wad-CN	weak acid dissociable cyanide
WRAP	Western Regional Air Partnership
WRF	Weather Research and Forecasting
WRI	World Resource Institute

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: the 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and close/reclaim open pit gold mines at both these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle). The distance between the Gordon and MacLellan sites is approximately 57 km (by vehicle). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Air Quality Assessment has been completed to determine potential residual and cumulative changes to ambient air quality as a result of the Project (Maps 1 and 2, Appendix A). The Final EIS Guidelines for the Lynn Lake Gold Project (CEAA 2017) identify the Project components and residual effects to be included in the air quality assessment.

The air quality assessment estimates air emissions from the planned Project activities and uses an atmospheric dispersion model to predict the potential changes in ambient air quality associated with Project emissions. The GHGs assessment considers emissions of greenhouse gases (GHGs) expressed in the form of tonnes of carbon dioxide equivalent (CO_{2e}) and compares them to provincial and national emission totals.

The air quality assessment considers substances for which there are applicable ambient air quality criteria (AAQC) and standards adopted by the Manitoba Sustainable Development (MSD, now Manitoba Conservation and Climate [MCC]), the Ontario Ministry of the Environment and Climate Change (MOECC) and Environment and Climate Change Canada (ECCC). The predicted air quality changes are assessed relative to these criteria, presented in Section 2.1.

The primary pathway for the air contaminants to reach human and ecological receptors is via airborne dispersion and deposition during Project activities. As a result, the key objective of the air quality assessment is to provide predicted ambient concentrations and depositions due to Project emissions for the following Valued Components (VC) of the EIS:

- Surface Water – Project emissions and the deposition of these emissions may affect water quality of surrounding lakes and streams.
- Fish and Fish Habitat - Project emissions and the deposition of these emissions may affect water quality of surrounding lakes and streams and changes in water quality may affect the availability and suitability of fish habitat and affect the growth, survival, and health of fish.
- Vegetation and Wetlands - Project fugitive dust emissions and the deposition of these emissions on surrounding native plant communities may affect plant species diversity, community diversity and wetland functions.

- Wildlife and Wildlife Habitat – Project emissions and the associated ambient concentrations and deposition may increase the exposure of wildlife to air contaminants and affect wildlife health.

- Human Health - Project emissions and the associated ambient concentrations may increase the exposure of humans to air contaminants that may affect human health. The deposition of Project emissions to soil may affect soil quality which may, in turn, alter soil-related exposures for human receptors.

This report is presented in 13 sections. The purpose of the air quality assessment is provided in Section 1, along with a description of the substances of interest and assessment boundaries. The regulatory criteria used in the assessment is discussed in Section 2 and an overview of the regional setting is provided in Section 3. Project air emissions and Project GHG emissions are discussed in Sections 4 and 5, respectively. Section 6 contains environmental control and management procedures. Sections 7 and 8 present the assessment approach and dispersion modelling results, respectively. Model prediction uncertainty is discussed in Section 9 and concluding remarks are provided in Section 10. Lastly, references cited are listed in Section 11, following by Stantec's Quality Management section and the report limitations as Sections 12 and 13, respectively.

1.1 SUBSTANCES OF INTEREST

1.1.1 Substances of Interest for the Air Quality Assessment

The air quality assessment considers substances for which there are applicable AAQC and standards adopted by either provincial (Manitoba) or federal regulatory agencies. The air quality assessment includes the following substances:

- Nitrogen dioxide (NO_2).

- Carbon monoxide (CO).

- Sulphur dioxide (SO_2).

- Hydrogen Cyanide (HCN).

- Total suspended particulate matter (TSP) with an aerodynamic diameter less than 30 µm.

- Respirable particulate matter (PM_{10}) with an aerodynamic diameter less than 10 µm.

- Fine particulate matter ($PM_{2.5}$) with an aerodynamic diameter less than 2.5 µm.

- Total particulate deposition (dustfall).

- Metals (arsenic, cadmium, copper, lead, nickel, zinc).

The primary substances considered in the air quality assessment (NO_2, CO, SO_2, TSP, PM_{10}, $PM_{2.5}$ and lead) are defined by the United States Environmental Protection Agency (US EPA) as criteria air contaminants (CACs) because there are objectives, standards, or criteria governing their concentration in ambient air. Henceforth, these are collectively referred to as the applicable ambient air quality criteria (AAQC) or criteria.

1.1.2 Substances of Interest for the Human Health Assessment

Also considered in the air quality assessment are diesel particulate matter (DPM), individual volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and broader spectrum of metal species (seven metal species associated with diesel exhaust and 18 metal species contained in ore, mine rock, overburden and tailings). VOCs and PAHs emissions from the Project are associated entirely with diesel exhaust. Predicted ambient concentrations of these substances due to the Project are provided for the human health assessment .

1.1.3 Greenhouse Gases

The GHG assessment considers the following substances:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)

The GHG assessment considers the GHG substances that are known to be emitted by the Project. It is recognized that GHGs also include perfluorocarbons (PFC), hydrofluorocarbons (HFC), and sulfur hexafluoride (SF_6). These gases are expected to be released in insubstantial amounts or not at all, and therefore are not included in the GHG assessment.

1.2 ASSESSMENT BOUNDARIES

1.2.1 Spatial Boundaries

1.2.1.1 PDA

The proposed Project Development Area (PDA) encompasses the immediate area in which Project activities and components may occur plus a 30 m buffer and is the anticipated area of direct physical disturbance associated with construction and operation of the Project (i.e., the Project footprint). The PDA includes the access roads, the open pits, mine rock storage areas, overburden stockpiles, and ore stockpiles at the Gordon and MacLellan sites; and the TMF and ore milling and processing plant at the MacLellan site. The PDA does not include Provincial Road 391 (PR 391) that connects the Gordon and MacLellan sites because PR 391 is an existing public road that is not part of the Project footprint; however, PR 391 is included in the LAA/RAA described below. Truck traffic associated with ore haulage from the

Gordon site to the ore milling and processing plant at the MacLellan site will generate emissions. The extent of the PDA at the Gordon and MacLellan sites are shown on Map 3 in Appendix A.

1.2.1.2 LAA and RAA

The Local Assessment Area (LAA) and Regional Assessment Area (RAA) for air quality were established to comply with provincial regulatory requirements and to capture air quality effects of the specific components being assessed. The LAA is the maximum area where Project-specific environmental effects on air quality can be predicted or measured with a reasonable degree of accuracy and confidence. The LAA includes the PDA. The RAA represents the area within which cumulative effects on air quality are likely to occur, depending on the location of other past, present, or reasonably foreseeable future projects or activities.

Both the LAA and RAA are defined as a 50 km by 28 km area centered on the Project and include both the Gordon and MacLellan sites. This area of the modelling domain is large enough to predict ground-level concentrations for comparison with the relevant AAQC. The LAA and RAA are consistent with regulatory recommendations in the draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006). This modelling domain is used for both the LAA and RAA and is the area over which dispersion modelling was completed and the area over which graphical results of the air quality modelling are presented. Map 3 in Appendix A shows the LAA/RAA for air quality.

1.2.1.3 Project Boundary

The air quality assessment focuses on areas that are located outside industrial facility boundaries. A facility boundary is a fence line that indicates the region where public access is restricted. AAQC are only applied to areas where there is public access (i.e., on and beyond the facility boundary). Setting the facility boundary for a mine is less straightforward than for a fenced facility such as a pulp mill. In the instance of a fenced mill, the facility's physical fence line defines where public access is restricted. Mines are not generally fenced; however, public access is often discouraged or prohibited due to safety concerns.

For the air quality assessment, a "Project Boundary" was used to better represent the potential for public exposure and compliance with AAQC. The Project Boundary is defined as an outline around the PDA at the Gordon and MacLellan sites with a buffer of 300 m. The Project Boundary also includes PR 391 with a 300 m buffer on each side of the road. The selected Project Boundary agrees with the Manitoba Hunting Guide (MSD 2019a) which prohibits hunting within 300 m of any quarry or mineral mine. Local populations have been notified of the prohibited zone, therefore instances of members of the public being located within the hunting prohibited zone are expected to be infrequent and brief. The extent of the Project Boundary used in the air quality assessment is shown on Map 3 in Appendix A.

1.2.2 Temporal Boundaries

1.2.2.1 Project Phases

The temporal boundaries for the Project consist of the following phases:

- Construction – two years (Year -2, Year -1; scheduled to be carried out concurrently at both sites).
- Operation – 13 years (scheduled to be carried out from Year 1 through Year 6 at the Gordon site and from Year 1 through Year 13 at the MacLellan site).
- Decommissioning/closure – 5-6 years of active closure at each site followed by approximately 10 years of post-closure monitoring and approximately 50+ years of pit flooding at each site.

1.2.2.2 Selected Worst-Case Years for Project Construction and Operation

The worst-case years for Project construction and operation were assessed for air quality with the understanding that the other years will have a lower level of potential residual effects on air quality. The worst-case years of construction and operation coincide with the peak construction and production rate, respectively, that will result in the highest emissions of air contaminants. The worst-case year of construction was selected based on the most overlapping (e.g., coincidental) construction activities, the largest number of construction equipment units and the highest construction material movement. The worst-case year for operation was selected based on the highest production rate, largest number of mining equipment units and highest movement of overburden, mine rock and ore (measured in tonnes). The 12-month period from Q2 Year -2 to Q1 Year -1 was determined as the worst-case year of construction for both the Gordon and MacLellan sites. Year 2 was determined to be the worst-case year of operation for the Gordon site and Year 7 the worst-case year of operation for the MacLellan site.

2.0 REGULATORY CRITERIA

2.1 AMBIENT AIR QUALITY CRITERIA

The applicable regulatory criteria for this assessment include the Manitoba AAQC (MSD 2005), Ontario's AAQC (MOECC 2012), and the Canadian Ambient Air Quality Standards (CAAQS; CCME 2017). These are provided in Table 2-1. The Manitoba ambient air quality criteria include two concentration levels: Maximum Acceptable Level Concentrations and Maximum Desirable Level Concentrations; the most stringent Maximum Desirable Levels are used in the air quality assessment. There are no Manitoba AAQC for VOCs, PAHs and metals other than the six metal species included in the air quality assessment. Therefore, the model predicted ambient concentrations of VOCs, PAHs and metals due to the Project are provided for the human health assessment.

The CAAQS were developed as part of the Air Quality Management System (AQMS; CCME 2012a) with the objective of driving continuous improvement of air quality in Canada. The Canadian Council of Ministers of the Environment (CCME) describes the process for selecting monitoring stations, measuring pollutant concentrations and determining achievement of the CAAQS (CCME 2019; CCME 2012b). Determining achievement of the CAAQS is based upon the measured air quality concentrations at community monitoring stations with comparison to the CAAQS and assigning air quality status to one of four management levels (CCME 2019; CCME 2012b). The four air quality management levels require progressively more rigorous actions by jurisdictions as air quality approaches or exceeds the CAAQS, thereby allowing proactive management actions to be undertaken to reduce emissions and avoid exceedances of the CAAQS (CCME 2019).

The CCME guidance on determining achievement of the CAAQS (CCME 2019) states that: "*CAAQS were not developed as facility level regulatory standards. Rather, they are used by provinces and territories to guide air zone management actions intended to reduce ambient concentrations below the CAAQS and prevent CAAQS exceedances*". In this context, predicted ambient concentrations due to the Project are compared to the CAAQS for information purposes and do not imply compliance with the AAQC at the Project Boundary.

Table 2-1 Applicable Regulatory Criteria

Substance	Averaging Period	Manitoba Ambient Air Quality Criteria [a] (µg/m³)		Ontario Ambient Air Quality Criteria [b] (µg/m³)	Canadian Ambient Air Quality Standards [c] (µg/m³)
		Maximum Acceptable Level Concentration	Maximum Desirable Level Concentration		
Gaseous CAC					
NO_2	1-hour	**400**	—	400	**79 (42 ppb)** [d]
	24-hour	**200**	—	200	—
	Annual	100	**60**	—	**23 (12 ppb)** [e]
CO	1-hour	35,000	**15,000**	36,200	—
	8-hour	15,000	**6,000**	15,700	—
SO_2	1-hour	900	**450**	690	**170 (65 ppb)** [f]
	24-hour	300	**150**	275	—
	Annual	60	**30**	55	**10 (4.0 ppb)** [g]
Other Gaseous Species					
HCN	1-hour	**40**	—	—	—
	24-hour	—	—	**8**	—
	Annual	**3**	—	—	—
Particulate Matter CAC					
TSP	24-hour	**120**	—	120	—
	Annual	70 [h]	**60** [h]	60 [h]	—
PM_{10}	24-hour	**50**	—	50	—
$PM_{2.5}$	24-hour	30	—	30	**27** [i]
	Annual	—	—	—	**8.8** [j]
Dustfall	30-day	—	—	**7 g/m²**	—
	Annual	—	—	**4.6 g/m²** [h]	—
Metals					
Arsenic	24-hour	**0.3**	—	0.3	—

Table 2-1 Applicable Regulatory Criteria

Substance	Averaging Period	Manitoba Ambient Air Quality Criteria [a] (µg/m³)		Ontario Ambient Air Quality Criteria [b] (µg/m³)	Canadian Ambient Air Quality Standards [c] (µg/m³)
		Maximum Acceptable Level Concentration	Maximum Desirable Level Concentration		
Cadmium	24-hour	**2**	—	0.025	—
	Annual	—	—	0.005	—
Copper	24-hour	**50**	—	50	—
Lead	24-hour	**2**	—	0.5	—
	30-day	**0.7**	—	0.2	—
Nickel	24-hour	**2**	—	0.2	—
	Annual	—	—	0.04	—
Zinc	24-hour	**120**	—	120	—

NOTES:

[a] Manitoba Ambient Air Quality Criteria (MSD 2005)

[b] Ontario Ambient Air Quality Criteria (MOECC 2012)

[c] Canadian Ambient Air Quality Standards (CCME 2017)

[d] The 1-hour CAAQS for NO_2 is referenced to the three-year average of the annual 98th percentile of the NO_2 daily maximum 1-hour average concentrations (effective 2025) (CCME 2017).

[e] The annual CAAQS for NO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average NO_2 concentrations (effective 2025) (CCME 2017).

[f] The 1-hour CAAQS for SO_2 is referenced to the three-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations (effective 2025) (CCME 2017).

[g] The annual CAAQS for SO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average SO_2 concentrations (effective 2025) (CCME 2017).

[h] Annual geometric mean

[i] The CAAQS for 24-hour $PM_{2.5}$ is referenced to the annual 98th percentile of daily 24-hour average concentrations, averaged over three years (effective 2020) (CCME 2017).

[j] The CAAQS for annual $PM_{2.5}$ is referenced to the three-year mean of annual average concentrations (effective 2020) (CCME 2017).

"—" not available

Values in **BOLD** text represent the ambient air quality criteria that are used for the environmental assessment

2.2 INTERPRETATION OF PREDICTED CONCENTRATIONS AND DEPOSITIONS

The AAQC are developed for a time-averaging period (e.g., 1-hour, 24-hour) and have a specific statistical form referred to as a "metric" (e.g., 98th percentile, 99.9th percentile).

Based on the ADMG Ontario (MOECC 2016), certain extreme, rare, and transient meteorological conditions may be present in the data sets and may be considered as outliers that can be eliminated from the model results. When assessing model predicted 1-hour average concentrations, the eight highest meteorological hours in each modelled year are considered meteorological anomalies and the ninth highest value was used for comparison with the 1-hour AAQC. Similarly, when assessing predicted 24-hour average concentrations, the highest meteorological day in each modelled year is considered a meteorological anomaly and the second highest value is used for comparison with the 24-hour average AAQC.

The model predicted dustfall from the Project is compared to the Ontario AAQCs. The 30-day dustfall is expressed as an accumulated deposition over one month (mg/dm^2/30-day). Therefore, the 30-day dustfall AAQC is interpreted as a limit on the monthly average deposition for the worst month of the year. The annual dustfall is expressed as a geometric mean of the monthly accumulated depositions (mg/dm^2/30-day). Therefore, the annual dustfall AAQC is interpreted as a limit on the average monthly deposition for the year.

Compliance with the 24-hour CAAQS for $PM_{2.5}$ is based on the three-year average of the 98^{th} percentile annual value, which allows the highest seven predicted 24-hour average $PM_{2.5}$ concentrations in a year to be disregarded. For this assessment, the 8^{th} highest 24-hour average $PM_{2.5}$ concentration (equal to the 98^{th} percentile) for each year at a given location are used to determine compliance with the 24-hour CAAQS. The 8^{th} highest predicted 24-hour average $PM_{2.5}$ concentrations for each year are averaged over three years and the maximum of the three-year averages is compared to the 24-hour CAAQS.

Similarly, the 1-hour CAAQS for NO_2 and SO_2 are based on the three-year average of the 98^{th} percentile and 99^{th} percentile, respectively, of the daily maximum 1-hour concentration, which allows the highest seven and three predicted daily maximum 1-hour average concentrations in a year, respectively, to be disregarded. For this assessment, the 8^{th} highest daily 1-hour average NO_2 concentrations (equal to the 98^{th} percentile) for each year at a given location are used to determine compliance with the 1-hour NO_2 CAAQS. The 4^{th} highest daily 1-hour average SO_2 concentrations (equal to the 99^{th} percentile) for each year at a given location are used to determine compliance with the 1-hour SO_2 CAAQS.

The air quality assessment focuses on areas that are located outside industrial facility boundaries. A facility boundary is a fence line that indicates the region where public access is restricted. AAQC are only applied to areas where there is public access (i.e., on and beyond the facility boundary). For this assessment, a "Project Boundary" was used to better represent the potential for public exposure and compliance with AAQC. The Project Boundary for the air quality assessment is defined as an outline around the PDA at Gordon and MacLellan sites and PR 391 with a buffer of 300 m.

3.0 REGIONAL SETTING

3.1 GEOGRAPHICAL SETTING

The Project is in North Central Manitoba, approximately 322 km northwest of Thompson, 1,085 km northwest of Winnipeg (by vehicle), and 100 km east of Kinoosao, Saskatchewan (by vehicle). The Project is in a remote, sparsely populated and rugged region of the Churchill River Upland Ecoregion of the Boreal Shield Ecozone (Smith et al. 1998).

The surface topography in the ecoregion is partly related to the underlying bedrock structure and partly related to the glacial and postglacial history. The terrain consists of mostly hilly, till veneered bedrock, with intervening low areas of organic terrain. Topography slopes from a high of 450 m above mean sea level (amsl) in the west and northwest to a low of 260 m amsl in the southeast. Surface topography surrounding the Project is flat to gently undulating, with local relief generally averaging 10 to 25 m. Elevation ranges from 312 masl to 351 masl at the Gordon Site, and 323 masl to 379 masl at the MacLellan Site.

Numerous wetlands, lakes, rivers, and streams are found throughout the area due to impermeable bedrock and poorly drained soils. These waterbodies are a part of the Churchill River Watershed that drains into the Hudson Bay to the east.

Forestry and mining activities are primary resource uses occurring in northern Manitoba. Hunting, trapping, water-oriented recreation, including sport fishing, and tourism are important activities. There are two communities near the Project: Town of Lynn Lake and Black Sturgeon Reserve. These communities are connected by PR 391, which runs southeast from Lynn Lake to the Town of Leaf Rapids and the City of Thompson.

3.2 CLIMATE AND METEOROLOGY

Climate is defined as the weather conditions prevailing in an area in general or over a long time period and is described in terms of average and extreme weather conditions that occur over a 30-year period. These statistical summaries are referred to as Climate Normals. Climate Normals were obtained for the most recent 30-year period 1981 to 2010 from the Lynn Lake Airport climate station (ECCC 2019a) located approximately 7 km southwest of the Project. The climate data collected and analyzed at this station includes ambient air temperature and precipitation. Additional hourly wind data was obtained for 2015 to 2018 to provide a more refined understanding of local winds. Given the proximity of Lynn Lake Airport to the Project and the relatively uniform topographical and ground cover conditions, the meteorological conditions at the Lynn Lake Airport are expected to be representative of the LAA. The full assessment of climate and meteorology baseline conditions is presented in the Climate and Meteorology Baseline Technical Data Report (TDR; Stantec 2017a) and associated Validation TDR (Stantec 2020a).

The Project lies in the Reindeer Lake Ecodistrict of the Boreal Shield Ecozone. The Boreal Shield Ecozone occupies central Manitoba north and east of Lake Winnipeg, and south of the Taiga Shield Ecozone. The Boreal Shield Ecozone is extensively forested while the Taiga Shield Ecozone forms the transition from the Boreal Shield Ecozone to the south to the treeless Southern Arctic Ecozone to the north (Smith et al. 1998).

The Reindeer Lake Ecodistrict lies within a warmer, more humid subdivision of the Boreal Shield Ecozone. It has a strong continental climate which is characterized by long, cold winters and short, cool summers. In the Reindeer Lake Ecodistrict summers are cool and short on average, however warm days are quite common. Winters are long and cold. The mean annual temperature is about -3.1°C, average growing season is 136 days, and the number of growing degree-days is around 970 (Smith et al. 1998).

Mean annual precipitation in the Reindeer Lake Ecodistrict is about 480 mm, of which more than one-third falls as snow. Precipitation varies greatly from year to year and is highest during late spring through early summer. The average yearly moisture deficit (i.e., the difference between evaporation and precipitation) is nearly 60 mm (Smith et al., 1998).

The climate baseline assessment for the LAA is based on the 30-year Climate Normals data (1981 to 2010) from the Lynn Lake Airport climate station. The average and extreme monthly summaries of ambient temperature and precipitation are presented in Table 3-1.

The mean annual temperature for the 30-year interval is -3.2°C. The coldest monthly average temperature is -24°C (January) and the highest monthly average temperature is 16°C (July). The total annual precipitation is 478 mm, with 318 mm falling as rain, and the remainder as snow. July is the wettest month (85 mm, all as rain), while February is the driest month (16 mm, nearly all as snow). The total average snowfall is 208 cm, with the highest snowfall occurring in November (36 cm).

The hourly wind speed and direction data from Lynn Lake airport for 2015 to 2018 were analyzed. These data are summarized in Table 3-2 and Figure 3-1. Table 3-2 shows that the annual average wind speed is 3.7 m/s (13 kph) with little variation in monthly average winds over the year. The maximum hourly wind speed (13.9 m/s or 50 kph) was observed in June. Monthly average wind speeds are lowest in December and hourly maximum wind speeds are lowest in August. Winds are generally from the northwest in colder months, and easterly in the warmer months.

Figure 3-1 illustrates the annual wind speed and wind direction statistics for Lynn Lake Airport (2015-2018) in the form of a wind rose and a wind frequency distribution diagram. The wind rose illustrates that winds generally prevail from the northwest quadrant with the most frequent and strongest winds (> 6 m/s or 22 kph) originating from that direction. Easterly and southerly winds are also predominant. Southwesterly and northeasterly winds are less predominant and generally less frequently strong. Winds are between 2 m/s and 4 m/s (7 kph and 14 kph) occur 41% of the time. Calm winds (< 1 m/s or 3.6 kph) are not recorded at Lynn Lake Airport climate station.

3.3 BASELINE AMBIENT AIR QUALITY

The baseline ambient air quality was determined based on analysis of ambient air quality monitoring data from local monitoring of $PM_{2.5}$, PM_{10} and dustfall conducted during the air quality baseline field programs in 2015 and 2016 and from other more distant monitoring stations in Manitoba and the Northwest Territories for NO_2, SO_2 and CO, which were not measured during the field programs. The baseline ambient air quality concentrations used in other approved projects in Manitoba were also reviewed.

More detailed information about the local baseline ambient air quality monitoring programs is presented in the Air Quality Baseline TDR (Stantec 2017b) and associated Validation TDR (Stantec 2020b).

3.3.1 Local Baseline Monitoring Program

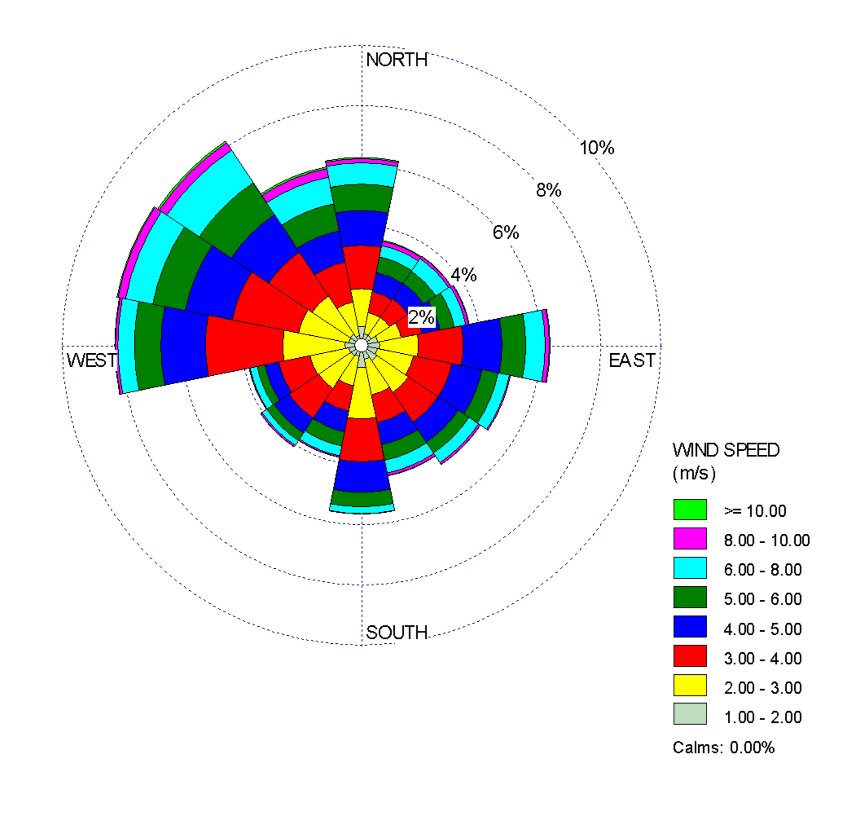
A local baseline ambient air quality monitoring program in 2015 and 2016 included data collection from two $PM_{2.5}$ and PM_{10} continuous monitoring stations and seven passive dustfall monitoring stations in the LAA. The monitoring program was conducted during summer months to coincide with snow-free conditions when exposed surfaces will generate the highest concentrations of ambient particulate matter (PM). During the first months of the monitoring program in 2015 (late June and early July), air emissions

Table 3-1 Baseline Climate Data Summary based on Lynn Lake Airport Climate Normals (1981-2010)

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly Average Max Temperature (°C)	-19	-14	-6.2	3.2	12	19	22	20	12	3.1	-8.4	-17	2.3
Monthly Average Temperature (°C)	-24	-20	-13	-3.1	5.6	13	16	15	7.7	-0.6	-13	-21	-3.2
Monthly Average Min Temperature (°C)	-29	-26	-20	-9.4	-0.8	6.6	10	9.0	3.0	-4.2	-17	-26	-8.6
Average Total Precipitation (mm)	20	16	20	24	37	62	85	69	61	38	27	19	478
Average Total Rainfall (mm)	0.2	0.1	1.4	4.5	27	61	85	69	57	12	0.8	0.1	318
Average Total Snowfall (cm)	28	24	25	24	10	1.3	0.1	0.1	3.5	31	36	26	208
Average of Snow on Ground (cm)	34	37	33	14	1.0	0	0	0	0	3.0	17	26	14
Source: Historical Climate Data (ECCC 2019a)													

Table 3-2 Monthly Average Wind Speed and Direction at Lynn Lake Airport (2015-2018)

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum Wind Speed (m/s)	12.8	13.3	14.4	11.4	11.9	13.9	12.8	9.7	12.8	11.9	12.8	10.3	14.4
Average Wind Speed (m/s)	3.6	3.9	3.9	3.8	4.1	4.1	3.6	3.5	3.5	3.8	3.3	3.1	3.7
Average Wind Direction	NW	WNW	WNW	S & N	E & N	E	E & W	W	NW & W	N & NW	W	WNW & NW	WNW
Source: Historical Climate Data (ECCC 2019a)													



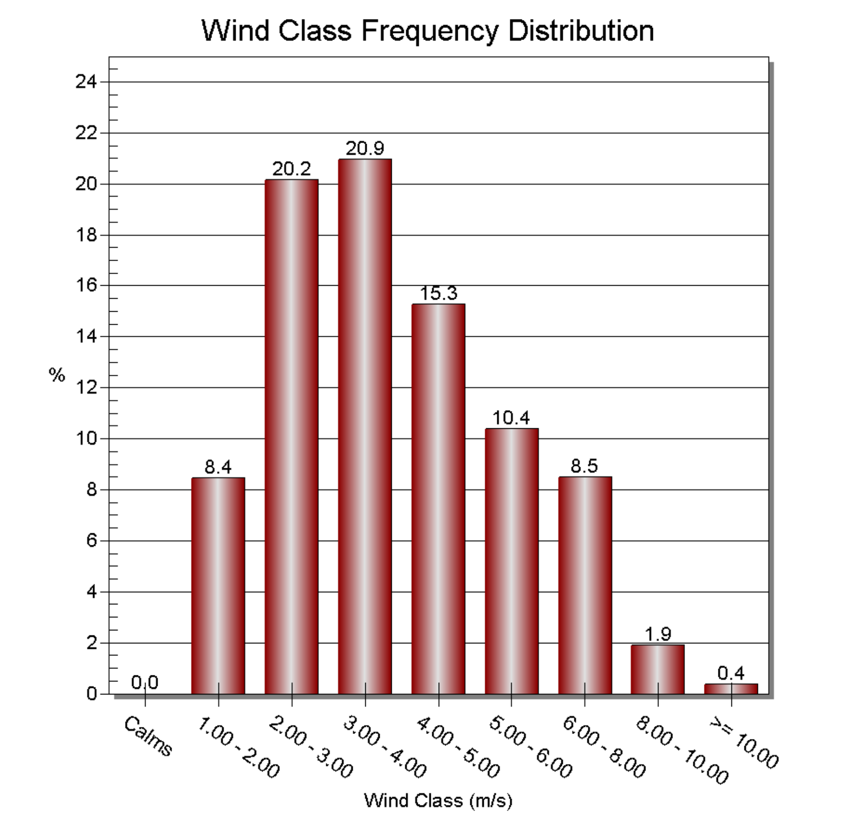


Figure 3-1 Wind Rose and Wind Frequency Distribution Diagram at Lynn Lake Airport, Manitoba (2015-2018)

from forest fires in northern Saskatchewan and Manitoba influenced the PM readings and the measurements of dustfall. Therefore, baseline levels for PM and dustfall were derived based only on the 2016 measurements.

Ambient concentrations of $PM_{2.5}$ and PM_{10} were measured at the MacLellan site during summer 2015 and 2016, and at Black Sturgeon Reserve during fall 2015. The monitoring location at the MacLellan site was selected due to its proximity to the community of Lynn Lake. The $PM_{2.5}$ and PM_{10} measurements at the MacLellan site were affected by forest fires in northern Manitoba and Saskatchewan in late June and early July 2015. The Black Sturgeon Reserve was added to the monitoring program to provide baseline data for that community, which is closer to the Gordon site. Monitoring of $PM_{2.5}$ and PM_{10} at Black Sturgeon Reserve occurred in late September and early October 2015 and therefore, the measurements were not biased by the forest fires in summer. The monitoring at Black Sturgeon Reserve was not continued in 2016 as the data collected during 2015 was considered sufficient to establish a baseline.

Monthly dustfall amounts in milligrams per square decimeter per day ($mg/dm^2/day$) were measured at four sites in summer 2015 (the MacLellan site, Burge Lake, Lynn Lake and Farley Lake). To gain additional understanding of baseline conditions along PR 391, three dustfall monitoring stations were added in summer 2016 to the existing four: Cockeram Lake, Westdal Lake and Black Sturgeon Reserve Road. Map 4 in Appendix A shows the locations of the baseline ambient air quality monitoring stations.

During one sampling period in summer 2015 and one sampling period in summer 2016, dustfall samples were analyzed for metals (33 metal species) to determine baseline metal deposition values that were used in the human health assessment.

In March 2016, three bulk snow samples were collected from the Gordon site and three bulk snow samples were collected from the MacLellan site. The locations of the snow collection sites are shown in Map 4 in Appendix A. The snow samples were analyzed to determine baseline snow surface loading rates for total metals deposition.

3.3.1.1 $PM_{2.5}$ Concentrations

The 24-hour $PM_{2.5}$ measurements at the MacLellan site and Black Sturgeon Reserve are summarized in Table 6-7. There were 67 complete days of $PM_{2.5}$ measurements (i.e., more than 18 hours in each 24-hour period) at the MacLellan site out of 113 total monitoring days in 2015, and 105 complete days out of 114 total monitoring days in 2016. The average and maximum $PM_{2.5}$ concentrations for the 67 complete days in 2015 are 11.4 and 99.4 $\mu g/m^3$, respectively. The average and maximum $PM_{2.5}$ concentrations for the 105 complete days in 2016 are 2.9 and 10.5 $\mu g/m^3$, respectively. There are 17 complete days of $PM_{2.5}$ measurements at Black Sturgeon Reserve out of 19 total monitoring days in 2015; the average and maximum $PM_{2.5}$ concentrations for these 17 days are 0.5 and 2.3 $\mu g/m^3$, respectively.

The results indicate that the maximum measured $PM_{2.5}$ concentrations at the MacLellan site during 2015 are greater than the CAAQS (27 $\mu g/m^3$). The maximum $PM_{2.5}$ concentrations recorded in 2015 occurred in July when the measurements were influenced by the forest fires in northern Manitoba and Saskatchewan. The average $PM_{2.5}$ concentrations measured during 2016 were in the 2 to 5 $\mu g/m^3$ range. The maximum measured values in 2016 are less than the CAAQS (27 µg/m³). The average $PM_{2.5}$ concentration at the MacLellan site for the 105 complete days in 2016 (2.9 µg/m³) was selected as a representative baseline $PM_{2.5}$ concentration in the LAA.

3.3.1.2 PM_{10} Concentrations

The 24-hour PM_{10} measurements at the MacLellan site and Black Sturgeon Reserve are summarized in Table 3-3. There were 56 complete days of PM_{10} measurements (i.e., more than 18 hours in each 24-hour period) at the MacLellan site out of 113 total monitoring days in 2015, and 59 complete days out of 114 total monitoring days in 2016. The average and maximum PM_{10} concentrations for the 56 complete days in 2015 are 15.8 and 103.2 µg/m³, respectively. The average and maximum PM_{10} concentrations for the 59 complete days in 2016 are 4.6 and 11.6 µg/m³, respectively. There are 17 complete days of PM_{10} measurements at Black Sturgeon Reserve out of 19 total monitoring days in 2015; the average and maximum PM_{10} concentrations for these 17 days are 0.8 and 3.1 µg/m³, respectively.

The maximum measured PM_{10} concentrations at the MacLellan site during 2015 are greater than the Manitoba AAQC (50 µg/m³). The maximum PM_{10} concentrations recorded in 2015 occurred during July, when the measurements were influenced by the forest fires in northern Manitoba and Saskatchewan. The average PM_{10} concentrations measured during 2016 were in the 3 to 10 µg/m³ range. The maximum measured values in 2016 are less than Manitoba AAQC (50 µg/m³). The average PM_{10} concentration at the MacLellan site for the 59 complete days in 2016 (4.6 µg/m³) was selected as a representative baseline PM_{10} concentration in the LAA.

Table 3-3 Summary of 24-hour Average $PM_{2.5}$ and PM_{10} Concentrations Measured during the Baseline Program 2015-2016

Year	Parameter	MacLellan Site				Black Sturgeon Reserve			
		Days [a]	Maximum [a] (µg/m³)	Mean [a] (µg/m³)	Median [a] (µg/m³)	Days [a]	Maximum (µg/m³)	Mean (µg/m³)	Median (µg/m³)
2015 [b]	$PM_{2.5}$	67	99.4	11.4	4.1	17	2.3	0.5	0.3
	PM_{10}	56	103.2	15.8	7.1	17	3.1	0.8	0.5
2016	$PM_{2.5}$	105	10.5	**2.9**	2.6	NA	NA	NA	NA
	PM_{10}	59	11.6	**4.6**	4.1	NA	NA	NA	NA

NOTES:
[a] Based on complete days with greater than 18 hours of monitoring data per day
[b] The 2015 measurements are affected by forest fires
NA – not available
Values in **BOLD** text represent the selected representative baseline ambient air concentrations for the LAA.

3.3.1.3 Dustfall

Three dustfall measurements were collected at each dustfall collection site in 2015 and in 2016; the first measurement during June to July, the second measurement during July to August and the third measurement during August to September.

Based on four dustfall collection sites in 2015 and three measurement periods, the average dustfall is 0.51 mg/dm²/day. The overall average and the individual measurements in 2015 are less than the AAQC, 7 g/m²/30-day (2.3 mg/dm²/day).

Based on seven dustfall collection sites in 2016 and three measurement periods, the average dustfall is 0.33 mg/dm²/day. The overall average and the individual measurements in 2016 are less than the AAQC, 7 g/m²/30-day (2.3 mg/dm²/day). The overall average dustfall measured at seven sites in 2016 (0.33 mg/dm²/day or 0.99 g/m²/30-day) was selected as a representative baseline dustfall in the LAA. The dustfall measurements in 2015 were not considered because they were influenced by regional forest fires and thus were not representative of a typical year.

Table 3-4 Summary of Dustfall Measured during the Baseline Program 2015-2016

Station	2015 Total Dustfall (mg/dm²/day)				2016 Total Dustfall (mg/dm²/day)			
	June-July	July-August	August-September	Mean	June-July	July-August	August-September	Mean
01 MacLellan Site	0.72	0.35	0.23	0.43	0.17	0.17	0.38	0.24
02 Lynn Lake	0.79	0.14	0.31	0.41	0.49	<0.10 [a]	0.29	0.29
03 Burge Lake	0.86	1.21	0.24	0.77	0.22	0.13	0.46	0.27
04 Farley Lake	0.94	0.19	0.14	0.42	0.57	0.11	0.26	0.31
06 Cockeram Lake	NA	NA	NA	NA	NA [b]	NA [c]	0.40	0.40
07 Black Sturgeon Reserve Road	NA	NA	NA	NA	0.64	0.73	0.28	0.55
08 Westdal Lake	NA	NA	NA	NA	0.48	0.23	0.14	0.28
Mean Monthly Dustfall	0.83	0.47	0.23	0.51	0.43	0.25	0.32	**0.33**

NOTES:

[a] The July-August result for Lynn Lake was below the detection limit. For the purposes of calculating a conservative overall average, the measured value was assumed to be equal to the detection limit (i.e., 0.10 mg/dm²/day).

[b] No data was collected at Cockeram Lake during June-July as the measurement unit fell over and hence did not collect valid data.

[c] The July-August value for Cockeram Lake was excluded from the results, as large insects contaminated the sample.

NA – not available

Value in **BOLD** text represents the selected representative baseline dustfall for the LAA.

3.3.2 Other Measurements

Local monitoring was complemented with ambient air quality data from other more distant monitoring locations in Manitoba and the Northwest Territories for NO_2, SO_2 and CO. The monitoring networks in Manitoba and the Northwest Territories are part of the National Air Pollution Surveillance (NAPS) program.

MCC operates five continuous air quality monitoring stations in Manitoba: two stations in Winnipeg (Ellen Street and Scotia Street) and one station in each of Brandon, Thompson and Flin Flon (MSD 2019b). The stations are located more than 200 km away from the Project. The closest monitoring stations to the Project are Thompson and Flin Flon, located approximately 230 km to the southeast and 240 km to the southwest of the Project, respectively. Both stations measure SO_2 but not NO_2 and CO. The Winnipeg Ellen Street station measures SO_2, NO_2 and CO. The Thompson station is most affected by industrial emissions from the Vale's mining operations and nickel smelter. Flin Flon is a mining city and copper and zinc mining by Hudson Bay Mining and Smelting is the major source of industrial emissions. However, the copper smelter shut down in June 2010, substantially reducing air emissions in the region. The Winnipeg Ellen Street station in Winnipeg, is located approximately 800 km south of the Project. Winnipeg is the only Census Metropolitan Area in Manitoba with almost 60% of the provincial population. The Winnipeg Ellen Street station is the most influenced by urban and traffic emissions (MSD 2016).

The Northwest Territories Environment and Natural Resources (ENR) operates four continuous ambient air quality monitoring stations in Fort Smith, Inuvik, Norman Wells and Yellowknife (ENR 2019). The Fort Smith station was selected for analysis because it is the southernmost station in the Northwest Territories, experiences similar meteorological conditions, and is in a similar remote location as the Project.

The Wanipigow Sand Extraction Project is in a remote area approximately 160 km northeast of Winnipeg and approximately 700 km southeast of the Project. The Wanipigow Sand Extraction project received its Environment Act Licence No. 3285 from MCC on May 16, 2019. The baseline concentrations from the Wanipigow Sand Extraction Project are largely based on monitoring data from the Winnipeg Ellen Street station except for SO_2 concentrations which are based on monitoring data from the Thompson station. The baseline ambient air concentrations used in that air quality assessment (AECOM 2018) were reviewed and compared with measured concentrations during the baseline monitoring program in 2015 and 2016 and with other historical measurements from Manitoba and the Northwest Territories.

The 90th percentile of hourly measurements for the most recent year (2018) with a complete data record (at least 75% complete) was selected to represent the baseline air quality for each substance of interest. The 90th percentile of measurements is considered adequate to account for uncertainties due the use of distant monitoring stations and the limited number of monitoring stations used for analysis. Baseline concentrations for averaging periods greater than one hour (8-hour, 24-hour, annual) were calculated from the hourly measurements after removing hourly values greater than the 90th percentile. Baseline concentrations based on monitoring data from Manitoba and Northwest Territories, and from the Wanipigow Sand Extraction Project are summarized and compared to the AAQC in Table 3-5.

The baseline ambient air quality concentrations from the monitoring stations in Manitoba and Northwest Territories are less than the Manitoba AAQC. The baseline gaseous concentration levels based on the four monitoring stations and the Wanipigow Sand Extraction Project range from 1% to 18% of Manitoba AAQC with the highest percentages associated with measured NO_2 concentrations at Winnipeg Ellen Street station and the highest SO_2 concentrations measured at Thompson station (Wanipigow Sand Extraction Project). The baseline PM concentrations range from 33% to 73% of the most stringent AAQC with the highest percentages associated with measured PM concentrations at Thompson station and Winnipeg Ellen Street station.

The Fort Smith station measured the lowest ambient concentrations compared to measurements from monitoring stations in Manitoba, except for the SO_2 concentrations, which were lowest at Winnipeg Ellen Street station. The Thompson and Flin Flon monitoring stations are the most influenced by industrial emissions and the Winnipeg Ellen Street station is the most influenced by urban and traffic emissions. The baseline concentrations based on measurements from the Fort Smith station are considered the most representative for the LAA as the station is in a similarly remote area with low population density and with similar meteorological and topographical conditions.

Table 3-5 Baseline Concentrations Derived from Continuous Monitoring Stations in Manitoba and Northwest Territories

Substance	Averaging Period	Baseline Concentration (µg/m³)					Manitoba Ambient Air Quality Criteria (µg/m³) [c]
		Winnipeg Ellen Street[a]	Thompson[a]	Flin Flon[a]	Fort Smith [a]	Wanipigow Sand Extraction Project [b]	
NO_2	1-hour	28.8	NA	NA	**7.5**	29.3	400
	24-hour	25.2	NA	NA	**5.6**	29.3	200
	Annual	10.8	NA	NA	**1.9**	10.9	60
CO	1-hour	696 [d]	NA	NA	**406**	277	15,000
	8-hour	665 [d]	NA	NA	**406**	275	6,000
SO_2	1-hour	2.6	2.6	4.4	**6.0**	23.6 [e]	450
	24-hour	2.6	2.6	4.4	**6.0**	23.6 [e]	150
	Annual	0.36	0.71	2.1	**1.5**	1.81 [e]	30
PM_{10}	24-hour	21.4	29.4	20.3	19.0 [f]	25.6	50
$PM_{2.5}$	24-hour	11.8	13.5	8.8 [g]	12.0	11.7	27
	Annual	5.0	3.9	3.7 [g]	6.4	NA	8.8

NOTES:

[a] Baseline concentration based on monitoring data from 2018 unless noted otherwise and the 90th percentile of hourly measurements. Baseline concentrations for averaging periods greater than one hour (8-hour, 24-hour, annual) are calculated from the hourly measurements after removing values greater than the 90th percentile.

[b] Baseline concentrations from the Wanipigow Sand Extraction Project - Environmental Act Proposal Application (AECOM 2018). Baseline concentration based on monitoring data from Winnipeg Ellen Street station for 2017 unless noted otherwise and the 90th percentile of measured hourly concentrations.

[c] Manitoba Ambient Air Quality Criteria (MSD, 2005) and CAAQS for $PM_{2.5}$

[d] Baseline concentration based on monitoring data from 2016 as the 2017 and 2018 data is less than 75% complete

[e] Baseline concentration based on 2017 monitoring data from Thompson station as the 2017 data from Winnipeg Ellen Street station is less than 75% complete

[f] Baseline concentration based on monitoring data from 2017 as the 2018 data is less than 75% complete

[g] Baseline concentration based on monitoring data from the year with the highest data completeness (2017, 62% complete) out of the three most recent years with data record (2016, 2017 and 2018) as the data completeness for all three years is less than 75%.

NA – not available

Value in **BOLD** text represents the selected representative baseline concentration for the LAA.

3.3.3 Summary of Baseline Ambient Air Quality Concentrations

The representative baseline ambient air concentrations selected for the Project are summarized in Table 3-6 and compared to the applicable AAQC. The baseline PM_{10} and $PM_{2.5}$ concentrations and dustfall were derived from the Project baseline ambient air quality monitoring program in 2016. The baseline TSP concentrations were estimated from the baseline PM_{10} concentration using a correlation proposed by Brooks et al. (1997) which suggests that ambient PM_{10} concentrations comprise approximately 44% of TSP. The 2015 and 2016 baseline monitoring programs did not measure ambient NO_2, SO_2 and CO concentrations because of the remote location of the Project and the absence of nearby industrial activities. The baseline concentrations of NO_2, CO and SO_2 were based on analysis of ambient air monitoring data from the Fort Smith continuous monitoring station in the Northwest Territories. The 90th percentile of hourly measurements from the most recent year with complete data record (2018) was selected to represent the baseline air quality level for each substance of interest. The baseline ambient concentrations of HCN, metals, VOCs and PAHs are assumed negligible because of the remote location of the Project and the absence of industrial activities in the LAA. The baseline metal deposition values were derived from analysis of metals composition in dustfall during the baseline ambient air monitoring program in 2016. The baseline metal deposition values were used in the human health assessment.

Table 3-6 indicates that the selected baseline ambient air concentrations are less than the AAQC. The baseline gaseous concentration levels range from 1.3% to 6.8% of Manitoba AAQC. Baseline PM concentrations and dustfall range from 8.8% to 33% of the most stringent AAQC with the highest percentages associated with ambient $PM_{2.5}$ concentrations. Overall, the existing air quality in the LAA can be characterized as very good.

Table 3-6 Summary of Baseline Ambient Air Quality Concentrations

Substance	Averaging Period	Baseline Concentration (µg/m³)	Manitoba AAQC [a] (µg/m³)	Percent of AAQC (%)
NO_2 [b]	1-hour	7.5	400	1.9
	24-hour	5.6	200	2.8
	Annual	1.9	60	3.2
CO [b]	1-hour	406	15,000	2.7
	8-hour	406	6,000	6.8
SO_2 [b]	1-hour	6.0	450	1.3
	24-hour	6.0	150	4.0
	Annual	1.5	30	5.0
TSP [c]	24-hour	10.5	120	8.8
	Annual	10.5	60	17.5
PM_{10} [d]	24-hour	4.6	50	9.2
$PM_{2.5}$ [d]	24-hour	2.9	27 [e]	10.7
	Annual	2.9	8.8 [e]	33.0

Table 3-6 Summary of Baseline Ambient Air Quality Concentrations

Substance	Averaging Period	Baseline Concentration (µg/m³)	Manitoba AAQC [a] (µg/m³)	Percent of AAQC (%)
Dustfall [d]	30-day	0.99 g/m²	7 g/m² [f]	14.3
	Annual	0.99 g/m²	4.6 g/m² [f]	14.3

NOTES:
[a] Manitoba Ambient Air Quality Criteria (MSD 2005)
[b] Baseline concentration based on monitoring data from Fort Smith station (2018) and the 90th percentile of hourly measurements. Baseline concentrations for averaging periods greater than one hour (8-hour, 24-hour, annual) were calculated from the hourly measurements after removing values greater than the 90th percentile.
[c] TSP background concentrations were estimated using the PM_{10} background concentration and correlation proposed by Brooks et al (1997)
[d] Baseline concentrations based on the local ambient air monitoring program (2016)
[e] Canadian Ambient Air Quality Standards (CCME 2017)
[f] Ontario Ambient Air Quality Criteria (MOECC 2012)

3.4 GREENHOUSE GASES

The existing GHG emissions are characterized by summarizing provincial and national inventory totals. The 2017 data (most recently available) for the province and Canada were used (ECCC 2019b).

According to the CEAA 2003 guidance, the Project GHG emissions should be compared to local, provincial, and federal GHG inventories. There are no local GHG emission inventories for the Lynn Lake area; therefore, project GHG emissions cannot be compared to local emissions.

The provincial and national GHG emissions (ECCC 2019c) are presented in Table 3-7. The emissions presented are for the latest year for which data has been published (2017). Manitoba GHG emissions accounted for 3% of the national GHG emissions.

Table 3-7 Provincial and National GHG Emissions (2017)

Parameter	Units	CO_2	CH_4	N_2O	Other GHGs [a] (expressed as CO_{2e})	Total (expressed as CO_{2e})
Manitoba GHG Emissions	kt/y	13,328	3,933	3,910	497	**21,668**
National GHG Emissions	kt/y	571,137	92,862	38,037	13,723	**715,760**
Manitoba contribution to National GHG Emissions	%	2.3%	4.2%	10.3%	3.6%	**3.0%**

NOTE:
[a] Other GHGs include sulphur hexafluoride, hydrofluorocarbons, perfluorocarbons, and nitrogen trifluoride.

SOURCE: ECCC NIR (ECCC 2019c)

4.0 PROJECT AIR EMISSIONS

4.1 EMISSION SOURCES

The sources of air emissions during Project construction and operation are typical for an open pit mine and gold ore processing. Emissions from decommissioning/closure will be similar to those from construction, but lower in magnitude. Project construction and operation will release three types of air emissions:

- Exhaust emissions from construction and mining equipment that include but are not limited to drills, excavators, bulldozers, graders, and haul trucks. The off-road equipment and vehicles consume diesel fuel and the products of combustion are released to the atmosphere. The exhaust emissions contain the by-products of diesel fuel combustion that include oxides of nitrogen (NO_X), sulphur dioxide (SO_2), carbon monoxide (CO), hydrocarbons (HC), DPM, PAHs and metals. DPM is respirable particulate matter that has an aerodynamic diameter less than 10 µm (PM_{10}). It is assumed that 97% of DPM is $PM_{2.5}$ or respirable particulate matter that has an aerodynamic diameter less than 2.5 µm, based on the US EPA NONROAD model documentation (US EPA 2010a).

- Explosives detonation emissions from blasting. Blasting emissions include explosives emissions (NO_X, CO and SO_2) from the detonation of ammonium nitrate fuel oil emulsion explosives.

- Fugitive dust emissions from drilling and blasting, surface disturbance activities, loading and unloading of material, haul roads, access roads and wind erosion result in PM emissions of various size ranges (e.g., TSP, PM_{10} and $PM_{2.5}$) that can also be deposited to off-site ground and water surfaces (i.e., dustfall). TSP includes larger particles, nominally up to 30 µm in diameter. The larger dust particles are removed near the disturbance area by gravitational settling and are the main contributor to dustfall. TSP, PM_{10} and $PM_{2.5}$ emissions are carried off-site by the wind; the smaller $PM_{2.5}$ and PM_{10} fractions tend to be transported further downwind than the TSP.

Additionally, the mill feed storage area and crushing plant, the ore milling and processing plant and the tailings management facility (TMF) at the MacLellan site are associated with the following emissions:

- PM emissions from dust collectors and wet scrubbers at the primary crusher, secondary crusher and the ore milling and processing plant gold room. The crushing plant conveyors and the fine ore stockpile are fully covered and therefore, fugitive dust emissions from these areas are not expected.

- Fugitive hydrogen cyanide (HCN) emissions from the CIP adsorption tanks due to volatilization losses of sodium cyanide (NaCN) used in the leach and adsorption train.

- Fugitive HCN emissions from the TMF pond due to natural degradation and volatilization of a residual amount of cyanide contained in tailings (a maximum of 10 mg/L, by design, of weak acid dissociable cyanide (wad-CN) in wastewater discharged to the TMF) after cyanide detoxification. After gold extraction, the cyanide used in the processing plant is extracted in the cyanide detoxification area before tailings are pumped to the TMF. The wastewater discharge to the TMF after cyanide detoxification treatment might contain up to a maximum of 10 mg/L of wad-CN by design (Ausenco Engineering Canada Inc. [Ausenco] 2019a), which has the potential to volatilize from the TMF pond in the form of gaseous HCN.

The project emission sources during construction and operation are discussed separately for the Gordon site and the MacLellan site in the following sections. Project emissions were estimated using Project description information (Stantec 2017d; Stantec 2017e; Ausenco 2018; Ausenco 2019a; Ausenco 2019b; Q'Pit Inc. 2019) as well as published emission factors.

Predicted ambient concentrations due to Project activities are combined with baseline concentrations, which account for other natural and anthropogenic emission sources not directly included in the dispersion model and are compared to relevant AAQC.

4.2 EMISSION BASES

Since the construction and mining equipment is not used 100% of the time and some construction and mining activities are not constant with time, emission rates are estimated for maximum short-term periods (i.e., hourly emission rates) and for daily average periods (i.e., daily emission rates). The primary mining equipment operates for an average of 15 hours per day and the supporting equipment operates for 8 hours per day (Q'Pit 2019). The maximum hourly emission rates assume that equipment and mining activities occur simultaneously at their maximum intensity for short periods of time (less than 24 hours). Daily average emission rates consider the actual operating hours per day for each equipment and mining activity. The assumptions used to estimate the maximum hourly emission rates and daily average emission rates are provided in Appendix C.

The emissions from mine activities are estimated for three emission bases:

- Hourly Emission Rates—the worst-case maximum emission rates that may occur during any given hour of the mine operation. For the estimation of maximum hourly emissions, a 100% utilization of the mine vehicle fleet is assumed.
- Daily Emission Rates—average daily emission rates considering actual daily mine fleet utilization.
- Annual Emission Rates—average annual emission rates considering actual annual mine fleet utilization.

Maximum hourly emission rates are modelled and compared to short-term AAQC based on averaging periods shorter than 24 hours (e.g., 1-hour, 3-hour, 8-hour). Daily emission rates are assessed against the 24-hour and 30-day AAQC; the annual emission rates are assessed against the annual AAQC.

The hourly, daily and annual emissions rates are expressed in units of grams per second (g/s) for modelling purposes. To illustrate the total emissions for those time intervals (hour, day, year) the emission summaries are presented in kilograms per hour (kg/h) for total hourly emissions, in kilograms per day (kg/d)—for total daily emissions, and in tonnes per year (t/y)—for total annual emissions.

4.3 GORDON SITE

4.3.1 Construction Emissions

The air emissions during construction and pre-production at the Gordon site are associated with the operation of the off-road construction and mining equipment and movement of construction material for the construction of the major components of the Project such as internal haul roads and stockpile pads. Emissions from construction are estimated for the worst-case year of construction that will result in the highest air emissions. The worst-case year of construction is selected based on the greatest intensity of concurrent (simultaneous) construction activities, the highest number of construction equipment units and highest construction material movement. The worst-case construction annual period for emissions from the Gordon site is Q2 Year -2 to Q1 Year -1. The following emissions due to construction activities are estimated for the worst-case construction year:

- Diesel combustion exhaust emissions from construction off-road equipment and haul trucks.
- Diesel combustion exhaust emissions from on-highway trucks and on-road vehicles.
- Fugitive dust and explosives detonation emissions from drilling and blasting.
- Mechanically generated dust by construction off-road equipment movement.
- Fugitive dust emissions from bulldozing and grading.
- Fugitive dust emissions from truck loading and unloading.
- Mechanically generated dust by truck traffic along haul roads and the access road.
- Fugitive dust emissions from wind erosion of stockpiles.

Diesel exhaust emissions from construction off-road equipment are based on the Canadian off-road compression-ignition engine emission standards (ECCC, 2005a). Emissions were conservatively estimated based on Tier 3 emission standards for off-road diesel engines assuming that the majority of the construction fleet will be rented and will include older equipment. Tier 4 emission standards are the most stringent emission standards for new manufactured equipment that came into effect in 2014. The estimated emissions based on Tier 3 standards are therefore conservative. If newer, Tier 4 off-road diesel equipment is used during construction the exhaust emissions would be lower.

Diesel exhaust emissions from on-highway trucks and other on-road vehicles travelling on the access road were estimated using emission factors for on-road vehicles derived using the US EPA Motor Vehicle Emission Simulator model version 2014a (MOVES2014a; US EPA 2015). Since MOVES2014a was originally developed for the United States, a surrogate US county and state (Hill County, Montana) was selected to represent the Project in terms of local meteorological conditions and vehicle populations. The model was run for a rural unrestricted road type that best represents the access road, for year 2018 to represent current vehicle populations and age distributions, separately for winter and summer, and with fuel formulations specific to Manitoba and Canada. Diesel exhaust emissions were estimated using the MOVES2014a emission factors in grams per vehicle-mile travelled (g/VMT) for each vehicle type, the number of vehicles round trips per day and the length of the road.

Blasting emissions include fugitive dust generated from the blast and explosives emissions (NO_X, CO and SO_2) from the detonation of ammonium nitrate fuel oil emulsion explosives.

Blasting emissions and fugitive dust emissions from construction activities and wind erosion were estimated using emission factors from various chapters of the US EPA AP-42 Fifth Edition Compilation of Air Pollutant Emission Factors (US EPA 1995a). A detailed description of construction emission calculations is provided in Appendix C.

A summary of annual emissions during the worst-case year of construction (Q2 Year -2 to Q1 Year -1) at Gordon site is provided in Table 4-1. Total annual emissions during construction are less than the annual emissions during operation (Table 4-4). The data in Table 4-1 indicate that, on an annual basis:

- Emissions of gaseous CACs (NO_X, CO, SO_2, DPM and VOC) during construction are 65% to 85% less than the corresponding annual emission totals during operation. The highest difference (85%) corresponds to NO_X emissions. The lower gaseous CAC emissions during construction are due to less off-road equipment units and less blasting activities during construction and pre-production, and no ore transported from Gordon site to the MacLellan site ore milling and processing plant during construction.
- Fugitive particulate matter emissions (TSP, PM_{10} and $PM_{2.5}$) during construction are 70% to 76% less than the corresponding annual emission totals during operation. The highest difference (76%) corresponds to PM_{10} and $PM_{2.5}$ emissions. The lower fugitive PM emissions during construction are due to less truck traffic along the haul roads and access road, less off-road equipment units and equipment movement at the site and no haul trucks transporting ore from Gordon site to the MacLellan site ore milling and processing plant during construction and pre-production.

4.3.2 Operation Emissions

Emissions during operation at the Gordon site are associated with diesel combustion exhaust from the mining equipment and fugitive dust emissions generated from mining activities and wind erosion. The Gordon site emissions include emissions associated with ROM ore haulage on PR 391. Emissions from operation are estimated for the worst-case year of mine operation that will result in the highest air emissions. The worst-case year is selected based on highest production rate, highest anticipated number of mining equipment units and highest anticipated material movement. The worst-case year for emissions from the Gordon site and ROM ore haulage on PR 391 is Year 2 of operation. The following emissions due to mining activities are estimated for Year 2:

- Diesel combustion exhaust emissions from mining off-road equipment and haul trucks.
- Diesel combustion exhaust emissions from on-highway trucks and on-road vehicles.
- Diesel combustion emissions from a permanent diesel generator.

- Fugitive dust and explosives detonation emissions from drilling and blasting.
- Mechanically generated dust by mining off-road equipment movement.
- Fugitive dust emissions from bulldozing and grading.
- Fugitive dust emissions from truck loading and unloading.
- Mechanically generated dust by truck traffic along haul roads and the access road.
- Mechanically generated dust by truck traffic along PR 391.
- Fugitive dust emissions from wind erosion of stockpiles.

Diesel exhaust emissions from mining off-road equipment are based on the Canadian off-road compression-ignition engine emission standards (ECCC 2005a). The Proponent will procure new mining equipment that complies with Tier 4 standards for off-road diesel engines and therefore, emissions were based on the Tier 4 standards. Emission speciation profiles for VOCs, PAHs and metals for off-road diesel equipment were derived using the US EPA MOVES model (MOVES2014a; US EPA 2015) and the integrated NONROAD2008 model. The MOVES2014a-NONROAD model uses a compilation of equipment of different ages up to the year that is modelled. Emissions were estimated for year 2018 to represent mining equipment that complies with Tier 4 emission standards for off-road diesel engines.

Diesel exhaust emissions from on-highway trucks and other on-road vehicles travelling on the access road and PR 391 were estimated using emission factors for on-road vehicles derived from the MOVES2014a model (US EPA 2015). The model was run for a rural unrestricted road type that best represents the access road and PR 391, for year 2018 to represent current vehicle populations and age distributions, separately for winter and summer, and with fuel formulations specific to Manitoba and Canada. Diesel exhaust emissions were estimated using the MOVES2014a emission factors in g/VMT for each vehicle type, the number of vehicles round trips per day and the length of the road.

A permanent diesel generator will provide power to the facilities at the Gordon site. Diesel exhaust emissions from the generator are based on manufacturer specifications. The diesel generator complies with Tier 3 emission standards for off-road diesel engines.

Blasting emissions and fugitive dust emissions from mining activities and wind erosion were estimated using emission factors from various chapters of the US EPA AP-42 Fifth Edition Compilation of Air Pollutant Emission Factors emission factors (US EPA 1995a). Emission speciation profiles for metals in fugitive dust are based on laboratory analysis of mine rock, ore, overburden and tailings samples collected during the geochemistry baseline program in 2015 and 2016. Details of the geochemistry baseline program are provided in the Geochemistry Baseline TDR (Stantec 2017c) and associated Validation TDR (Stantec 2020c). A detailed description of emission calculations is provided in Appendix C.

Summaries of hourly, daily and annual emission rates during the worst-case year of operation (Year 2) at the Gordon site and PR 391 are provided in Table 4-2, Table 4-3 and Table 4-4, respectively. The NO_X, CO, SO_2, DPM and VOC emissions are associated with combustion sources only. The maximum hourly emission rates assume that all equipment and mining activities occur simultaneously at their maximum intensity for short periods of time, while daily average emission rates consider the actual operating hours per day for each equipment and mining activity. The daily equivalent emissions rates are about 48% of the maximum hourly emission rates. Table 4-3 indicates that, on a daily basis:

- Most of the SO_2 emissions are associated with explosives detonation.
- Most of the NO_X, CO and DPM emissions are associated with mining off-road equipment exhaust and haul trucks on PR 391.
- Most of the VOC emissions are associated with mining off-road equipment exhaust.
- Most of the fugitive TSP, PM_{10} and $PM_{2.5}$ emissions are associated with the fugitive haul road dust emissions and fugitive dust generated by mining off-road equipment movement.

4.4 MACLELLAN SITE

4.4.1 Construction Emissions

Emissions during construction and pre-production at the MacLellan site are associated with the operation of the off-road construction and mining equipment, and movement of construction material for the construction of the major components of the Project such as internal haul roads, stockpile pads, processing plant infrastructure and the TMF. The emissions from construction are estimated for the worst-case year of construction that will result in the highest air emissions. The worst-case year of construction is selected based on the peak in the concurrent construction activities, the highest anticipated number of construction equipment units and highest anticipated construction material movement. The worst-case construction annual period for emissions from the MacLellan site is Q2 Year -2 to Q1 Year -1. The following emissions due to construction activities are estimated for the worst-case construction year:

- Diesel combustion exhaust emissions from construction off-road equipment and haul trucks.
- Diesel combustion exhaust emissions from on-highway trucks and on-road vehicles.
- Fugitive dust and explosives detonation emissions from drilling and blasting.
- Diesel combustion exhaust emissions and fugitive dust emissions from a mobile crushing plant.
- Mechanically generated dust by construction off-road equipment movement.
- Fugitive dust emissions from bulldozing and grading.
- Fugitive dust emissions from truck loading and unloading.

Table 4-1 Annual Emission Rates during Construction at Gordon Site (Q2 Year -2 to Q1 Year -1)

Emission Source	Annual Emission Rates [a] (t/y)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Diesel Exhaust Emissions from Construction Off-Road Equipment	15.2	36.5	0.069	0.585	0.585	0.568	-	-	-	2.36
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles	0.735	0.350	0.002	0.062	0.062	0.037	-	-	-	0.085
Drilling and Blasting [b]	11.2	47.6	1.40	-	-	-	5.43	2.83	0.841	-
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	-	-	-	-	-	-	316	90.1	9.01	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	51.3	13.3	2.71	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	5.09	2.41	0.365	-
Fugitive Dust Emissions from Haul Roads and Access Road [c]	-	-	-	-	-	-	147	41.8	4.18	-
Fugitive Dust Emissions from PR 391	-	-	-	-	-	-	5.07	1.01	0.249	-
Wind Erosion of Stockpiles [d]	-	-	-	-	-	-	0	0	0	-
Total Emissions	27.2	84.5	1.47	0.648	0.648	0.605	530	151	17.4	2.44

NOTES:

[a] Annual average emission rates based on the actual hours of operation per day for each construction activity

[b] Drilling occurs 5.3 hours per day and blasting occurs for 1 hour every 3 days.

[c] Fugitive dust emission rates for haul roads and the access road include 75% dust control efficiency due to water application in summer and 90% natural mitigation efficiency in winter. Summer is assumed six months, May to October.

[d] Wind erosion emissions represent emissions at hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Appendix C).

DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges

"-" not applicable

Table 4-2 Hourly Emission Rates during Operation at Gordon Site (Year 2)

Emission Source	Hourly Emission Rates [a] (kg/h)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Diesel Exhaust Emissions from Mining Off-Road Equipment	22.5	30.4	0.058	0.319	0.319	0.310	-	-	-	1.79
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles [b]	4.59	1.23	0.011	0.299	0.299	0.191	-	-	-	0.265
Diesel Generator	1.33	0.178	0.002	0.014	0.014	0.013	-	-	-	0.093
Drilling and Blasting [c]	256	1,089	32.0	-	-	-	30.1	29.8	2.37	-
Fugitive Dust Emissions from Mining Off-Road Equipment Movement	-	-	-	-	-	-	72.2	30.5	3.13	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	7.14	3.34	0.637	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	4.84	2.94	0.454	-
Fugitive Dust Emissions from Haul Roads and Access Road [d]	-	-	-	-	-	-	470	152	15.3	-
Fugitive Dust Emissions from PR 391	-	-	-	-	-	-	49.6	9.91	2.43	-
Wind Erosion of Stockpiles [e]	-	-	-	-	-	-	0	0	0	-
Total Emissions	285	1,120	32.1	0.632	0.632	0.514	633	228	24.3	2.15

NOTES:
[a] Maximum hourly emission rates
[b] Diesel exhaust emissions from on-highway trucks and on-road vehicles represent emissions during summer. Summer is assumed six months, May to October.
[c] Drilling occurs 13.6 hours per day and blasting occurs for 1 hour every 3 days.
[d] Fugitive dust emission rates for haul roads and the access road represent emissions during summer with applied dust control efficiency of 75% corresponding to water application. Summer is assumed six months, May to October.
[e] Wind erosion emissions represent emissions of hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Appendix C).
DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges
"-" not applicable

Table 4-3 Daily Emission Rates during Operation at Gordon Site (Year 2)

Emission Source	Daily Emission Rates [a] (kg/d)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Diesel Exhaust Emissions from Mining Off-Road Equipment	314	380	0.73	4.0	4.0	3.9	-	-	-	22.4
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles [b]	53.3	12.9	0.130	3.33	3.33	2.16	-	-	-	2.70
Diesel Generator	32.0	4.27	0.042	0.328	0.328	0.318	-	-	-	2.22
Drilling and Blasting [c]	256	1,089	32.0	-	-	-	37.6	37.2	10.1	-
Fugitive Dust Emissions from Mining Off-Road Equipment Movement	-	-	-	-	-	-	755	331	34.1	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	89.2	41.7	7.96	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	67.4	40.9	6.32	-
Fugitive Dust Emissions from Haul Roads and Access Road [d]	-	-	-	-	-	-	5,209	1,738	176	-
Fugitive Dust Emissions from PR 391	-	-	-	-	-	-	530	106	26.0	-
Wind Erosion of Stockpiles [e]	-	-	-	-	-	-	0	0	0	-
Total Emissions	656	1,486	32.9	7.68	7.68	6.38	6,688	2,295	261	27.3

NOTES:

[a] Daily average emission rates based on the actual hours of operation per day for each mining activity

[b] Diesel exhaust emissions from on-highway trucks and on-road vehicles represent emissions during summer. Summer is assumed six months, May to October.

[c] Drilling occurs 13.6 hours per day and blasting occurs for 1 hour every 3 days.

[d] Fugitive dust emission rates for haul roads and the access road represent emissions during summer with applied dust control efficiency of 75% corresponding to water application. Summer is assumed six months, May to October.

[e] Wind erosion emissions represent emissions of hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Appendix C).

DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges

“-“ not applicable

Table 4-4 Annual Emission Rates during Operation at Gordon Site (Year 2)

Emission Source	Annual Emission Rates [a] (t/y)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Diesel Exhaust Emissions from Mining Off-Road Equipment	113	137	0.261	1.45	1.45	1.40	-	-	-	8.05
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles	20.0	4.72	0.047	1.22	1.22	0.788	-	-	-	0.985
Diesel Generator	11.7	1.56	0.015	0.120	0.120	0.116	-	-	-	0.811
Drilling and Blasting [b]	31.2	133	3.91	-	-	-	6.49	6.45	3.22	-
Fugitive Dust Emissions from Mining Off-Road Equipment Movement	-	-	-	-	-	-	275	121	12.4	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	32.6	15.2	2.90	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	24.3	14.7	2.28	-
Fugitive Dust Emissions from Haul Roads and Access Road [c]	-	-	-	-	-	-	1336	446	45.1	-
Fugitive Dust Emissions from PR 391	-	-	-	-	-	-	101	20.1	4.94	-
Wind Erosion of Stockpiles [d]	-	-	-	-	-	-	0	0	0	-
Total Emissions	176	276	4.23	2.78	2.78	2.31	1,775	623	70.9	9.84

NOTES:

[a] Annual average emission rates based on the actual hours of operation per day for each mining activity

[b] Drilling occurs 13.6 hours per day and blasting occurs for 1 hour every 3 days.

[c] Fugitive dust emission rates for haul roads and the access road include 75% dust control efficiency due to water application in summer and 90% natural mitigation efficiency in winter. Summer is assumed six months, May to October.

[d] Wind erosion emissions represent emissions at hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Appendix C).

DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges

"-" not applicable

- Mechanically generated dust by truck traffic along haul roads and the access roads.
- Fugitive dust emissions from wind erosion of stockpiles.

Diesel exhaust emissions from construction off-road equipment are based on the Canadian off-road compression-ignition engine emission standards (ECCC 2005a). Emissions were conservatively estimated based on Tier 3 emission standards for off-road diesel engines assuming that the majority of the construction fleet will be rented and will include older equipment. The estimated emissions based on Tier 3 standard are therefore conservative. If newer, Tier 4 off-road diesel equipment is used during construction the exhaust emissions would be lower.

Diesel exhaust emissions from on-highway trucks and other on-road vehicles travelling on the access roads were estimated using emission factors for on-road vehicles derived from the MOVES2014a model (US EPA 2015). The model was run for a rural unrestricted road type that represents the access roads, for 2018 to represent current vehicle populations and age distributions, separately for winter and summer, and with fuel formulations specific to Manitoba and Canada. Diesel exhaust emissions were estimated using the MOVES2014a emission factors in g/VMT for each vehicle type, the number of vehicles round trips per day and the length of the road.

Blasting emissions and fugitive dust emissions from construction activities and wind erosion were estimated using emission factors from various chapters of the US EPA AP-42 Fifth Edition Compilation of Air Pollutant Emission Factors (US EPA 1995a). A detailed description of construction emission calculations is provided in Appendix C.

A summary of annual emissions during the worst-case year of construction at the MacLellan site is provided in Table 4-5. Total annual emissions during construction are less than the annual emissions during operation (Table 4-8). The data in Table 4-5 indicate that, on an annual basis:

- Emissions of gaseous CACs (NO_X, CO, SO_2 and VOC) during construction are 39% to 65% less than the corresponding annual emission totals during operation. The highest difference (65%) corresponds to NO_X emissions. The lower gaseous CAC emissions during construction are due to less off-road equipment units and less blasting activities during construction and pre-production.
- Emissions of DPM are approximately 20% higher than the corresponding annual emissions totals during operation. The higher DPM emissions during construction are due to the conservative assumption that construction off-road equipment will be mostly rented and will comply with older (Tier 3) Canadian emission standards for off-road diesel engines (ECCC 2005a). If newer (Tier 4) construction off-road equipment is used the DPM emissions during construction will be less. During operation, the Proponent will procure new mining equipment that complies with Tier 4 standards. The Tier 3 DPM emission standards are 5 to 20 times higher than the corresponding Tier 4 standards for engine power ranging from 75 hp to greater than 750 hp. For comparison, the Tier 3 NO_X emission standards are 1.7 to 11 times higher than the corresponding Tier 4 standards, for the same engine power range.
- Fugitive particulate matter emissions (TSP, PM_{10} and $PM_{2.5}$) during construction are 20% to 41% less than the corresponding annual emission totals during operation. The highest difference (41%)

corresponds to PM_{10} emissions. The lower fugitive PM emissions during construction are due to less truck traffic along the haul roads and access roads, and less off-road equipment units and equipment movement at the site during construction and pre-production.

4.4.2 Operation Emissions

Emissions during operation at the MacLellan site are associated with diesel combustion exhaust from the mining equipment, fugitive dust emissions generated from mining activities and wind erosion, fugitive dust emissions from the mill feed storage area and crushing plant, emissions from the ore milling and processing plant and the TMF. Emissions from operation are estimated for the worst-case year of mine operation that will result in the highest air emissions. The worst-case year is selected based on highest anticipated production rate, largest number of mining equipment units and highest material movement. The worst-case year for emissions from the MacLellan site is Year 7 of operation. The following emissions due to mining activities are estimated for Year 7:

- Diesel combustion exhaust emissions from mining off-road equipment and haul trucks.
- Diesel combustion exhaust emissions from on-highway trucks and on-road vehicles.
- Fugitive dust and explosives detonation emissions from drilling and blasting.
- Mechanically generated dust by mining off-road equipment movement.
- Fugitive dust emissions from bulldozing and grading.
- Fugitive dust emissions from truck loading and unloading.
- Mechanically generated dust by truck traffic along haul roads and the access roads.
- Fugitive dust emissions from wind erosion of stockpiles.
- PM emissions from the primary and secondary crushers.
- PM emissions from dust collectors at the ore milling and processing plant gold room.
- Fugitive dust emissions from wind erosion of the TMF dry banks.
- Fugitive HCN emissions from the processing plant leach and adsorption tanks.
- Fugitive HCN emissions from the TMF pond.

Diesel exhaust emissions from mining off-road equipment are based on the Canadian off-road compression-ignition engine emission standards (ECCC 2005a). The Proponent will procure new mining equipment that complies with Tier 4 standards and therefore, emissions are based on the Tier 4 standards. Emission speciation profiles for VOCs, PAHs and metals for off-road diesel equipment were derived using the US EPA MOVES model (MOVES2014a; US EPA, 2015) and the integrated NONROAD2008 model.

Emissions were estimated for year 2018 to represent mining equipment that complies with Tier 4 emission standards for off-road diesel engines.

Diesel exhaust emissions from on-highway trucks and other on-road vehicles travelling on the access roads were estimated using emission factors for on-road vehicles derived from the MOVES2014a model (US EPA 2015). The model was run for a rural unrestricted road type that best represents the access roads, for year 2018 to represent current vehicle populations and age distributions, separately for winter and summer, and with fuel formulations specific to Manitoba and Canada. Diesel exhaust emissions were estimated using the MOVES2014a emission factors in g/VMT for each vehicle type, the number of vehicles round trips per day and the length of the road.

Blasting and fugitive dust emissions from mining activities and wind erosion were estimated using emission factors from various chapters of the US EPA AP-42 Fifth Edition Compilation of Air Pollutant Emission Factors (US EPA 1995a). Emission speciation profiles for metals in fugitive dust are based on laboratory analysis of mine rock, ore, overburden and tailings samples collected during the geochemistry baseline program in 2015 and 2016. Details of the geochemistry baseline program are provided in the Geochemistry Baseline TDR (Stantec 2017c) and associated Validation TDR (Stantec 2020c).

PM emissions occur from the primary crusher dust collector, the secondary crusher wet scrubber and the dust collectors at the processing plant gold room. PM emissions from the dust collectors and the wet scrubber were estimated based on the dust loading (g/m^3), exhaust flow rate and the dust collection efficiency provided by Ausenco (2017).

Fugitive HCN emissions result from volatilization of sodium cyanide used in the processing plant leach and adsorption tanks, and from residual cyanide (after cyanide detoxification) in the TMF pond. HCN emissions from the processing plant and the TMF were estimated following the Australian Emission Manual for Gold Ore Processing (Australian Government 2006). A detailed description of emission calculations is provided in Appendix C.

Summaries of hourly, daily and annual emission rates during the worst-case year of operation (Year 7) at the MacLellan site are provided in Table 4-6, Table 4-7 and Table 4-8, respectively. The NO_X, CO, SO_2, DPM and VOC emissions are associated with combustion sources only. The maximum hourly emission rates assume that all equipment and mining activities occur simultaneously at their maximum intensity for short periods of time, while daily average emission rates consider the actual operating hours per day for each equipment and mining activity. The daily equivalent emissions rates are about 58% of the maximum hourly emission rates. Table 4-7 shows that, on a daily basis:

- Most of the SO_2 emissions are associated with explosives detonation.
- Most of the NO_X, CO and DPM emissions are associated with mining off-road equipment exhaust.
- Most of the VOC emissions are associated with mining off-road equipment exhaust.
- Most of the fugitive TSP, PM_{10} and $PM_{2.5}$ emissions are associated with the fugitive haul road dust emissions and fugitive dust generated by mining off-road equipment movement.

Table 4-5 Annual Emission Rates during Construction at MacLellan Site (Q2 Year -2 to Q1 Year -1)

Emission Source	Annual Emission Rates [a] (t/y)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Diesel Exhaust Emissions from Construction Off-Road Equipment	86.5	129	0.243	4.07	4.07	3.95	-	-	-	9.30
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles	0.990	0.465	0.003	0.067	0.067	0.042	-	-	-	0.083
Drilling and Blasting [b]	27.6	117	3.44	-	-	-	8.62	4.49	1.50	-
Mobile Crushing Plant	2.33	2.16	0.003	0.125	0.125	0.121	30.1	10.9	10.9	0.18
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	-	-	-	-	-	-	947	270	27.0	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	173	44.1	9.72	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	22.9	10.8	1.64	-
Fugitive Dust Emissions from Haul Roads and Access Roads [c]	-	-	-	-	-	-	1,191	339	33.9	-
Wind Erosion of Stockpiles [d]	-	-	-	-	-	-	0	0	0	-
Total Emissions	117	249	3.69	4.26	4.26	4.11	2,372	680	84.7	9.57

NOTES:

[a] Annual average emission rates based on the actual hours of operation per day for each construction activity

[b] Drilling occurs 9.7 hours per day and blasting occurs for 1 hour every 3 days.

[c] Fugitive dust emission rates for haul roads and the access road include 75% dust control efficiency due to water application in summer and 90% natural mitigation efficiency in winter. Summer is assumed six months, May to October.

[d] Wind erosion emissions represent emissions of hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Appendix C).

DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges

"-" not applicable

Table 4-6 Hourly Emission Rates during Operation at MacLellan Site (Year 7)

Emission Source	Hourly Emission Rates [a] (kg/h)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	50.9	60.5	0.116	0.657	0.657	0.638	-	-	-	3.58	-
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles [b]	0.602	0.191	0.002	0.039	0.039	0.025	-	-	-	0.040	-
Drilling and Blasting [c]	354	1506	44.3	-	-	-	49.0	48.4	3.74	-	-
Fugitive Dust Emissions from Mining Off-Road Equipment Movement	-	-	-	-	-	-	82.1	36.7	3.76	-	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	12.7	6.29	1.05	-	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	7.85	4.75	0.730	-	-
Fugitive Dust Emissions from Haul Roads and Access Roads [d]	-	-	-	-	-	-	627	219	22.2	-	-
Wind Erosion of Stockpiles [e]	-	-	-	-	-	-	0	0	0	-	-
Primary and Secondary Crushers	-	-	-	-	-	-	25.1	10.0	1.81	-	-
Ore Milling and Processing Plant	-	-	0.288	-	-	-	1.76	1.41	1.41	-	1.13
TMF [f]	-	-	-	-	-	-	8.24	4.12	0.618	-	2.62
Total Emissions	406	1,566	44.7	0.696	0.696	0.662	814	331	35.3	3.62	3.75

NOTES:
[a] Maximum hourly emission rates
[b] Diesel exhaust emissions from on-highway trucks and on-road vehicles represent emissions during summer. Summer is assumed six months, May to October.
[c] Drilling occurs 14.4 hours per day and blasting occurs for 1 hour every 3 days.
[d] Fugitive dust emission rates for haul roads and the access roads represent emissions during summer with applied dust control efficiency of 75% corresponding to water application. Summer is assumed six months, May to October.
[e] Wind erosion emissions represent emissions at hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Attachment B).
[f] Wind erosion emissions from TMF dry banks represent emissions at hourly average wind speed greater than 7.2 m/s. At wind speeds less than 7.2 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of tailings (US EPA 2006, Appendix C).
DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges
"-" not applicable

Table 4-7 Daily Emission Rates during Operation at MacLellan Site (Year 7)

Emission Source	Daily Emission Rates [a] (kg/d)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	803	889	1.70	9.76	9.76	9.47	-	-	-	52.4	-
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles [b]	6.01	1.54	0.014	0.363	0.363	0.234	-	-	-	0.313	-
Drilling and Blasting [c]	354	1,506	44.3	-	-	-	60.8	60.2	16.0	-	-
Fugitive Dust Emissions from Mining Off-Road Equipment Movement	-	-	-	-	-	-	863	414	42.6	-	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	160	78.9	13.2	-	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	117	71.0	10.9	-	-
Fugitive Dust Emissions from Haul Roads and Access Road [d]	-	-	-	-	-	-	8,802	3,157	320	-	-
Wind Erosion of Stockpiles [e]	-	-	-	-	-	-	0	0	0	-	-
Primary and Secondary Crushers	-	-	-	-	-	-	552	221	39.7	-	-
Ore Milling and Processing Plant	-	-	0.288	-	-	-	1.76	1.41	1.41	-	27.2
TMF [f]	-	-	-	-	-	-	198	98.9	14.8	-	62.9
Total Emissions	1,163	2,396	46.3	10.1	10.1	9.70	10,753	4,103	459	52.7	90.1

NOTES:
[a] Daily average emission rates based on the actual hours of operation per day for each mining activity
[b] Diesel exhaust emissions from on-highway trucks and on-road vehicles represent emissions during summer. Summer is assumed six months, May to October.
[c] Drilling occurs 14.4 hours per day and blasting occurs for 1 hour every 3 days.
[d] Fugitive dust emission rates for haul roads and the access roads represent emissions during summer with applied dust control efficiency of 75% corresponding to water application. Summer is assumed six months, May to October.
[e] Wind erosion emissions represent emissions at hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Attachment B).
[f] Wind erosion emissions from TMF dry banks represent emissions at hourly average wind speed greater than 7.2 m/s. At wind speeds less than 7.2 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of tailings (US EPA 2006, Appendix C).
DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges
"-" not applicable

Table 4-8 Annual Emission Rates during Operation at MacLellan Site (Year 7)

Emission Source	Emission Rates [a] (t/y)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	289	320	0.612	3.51	3.51	3.41	-	-	-	18.9	-
Diesel Exhaust Emissions from On-Highway Trucks and On-Road Vehicles	2.19	0.561	0.005	0.132	0.132	0.085	-	-	-	0.114	-
Drilling and Blasting [b]	43.2	184	5.40	-	-	-	10.5	10.4	5.07	-	-
Fugitive Dust Emissions from Mining Off-Road Equipment Movement	-	-	-	-	-	-	315	151	15.5	-	-
Fugitive Dust Emissions from Bulldozing and Grading	-	-	-	-	-	-	58.3	28.8	4.82	-	-
Fugitive Dust Emissions from Truck Loading and Unloading	-	-	-	-	-	-	42.0	25.6	3.93	-	-
Fugitive Dust Emissions from Haul Roads and Access Road [c]	-	-	-	-	-	-	2,257	810	82.1	-	-
Wind Erosion of Stockpiles [d]	-	-	-	-	-	-	0	0	0	-	-
Primary and Secondary Crushers	-	-	-	-	-	-	201	80.6	14.5	-	-
Ore Milling and Processing Plant	-	-	0.030	-	-	-	0.183	0.147	0.147	-	9.93
TMF [e]	-	-	-	-	-	-	72.2	36.1	5.41	-	23.0
Total Emissions	335	504	6.05	3.65	3.65	3.49	2,956	1,142	131	19.0	32.9

NOTES:

[a] Annual average emission rates based on the actual hours of operation per day for each mining activity

[b] Drilling occurs 14.4 hours per day and blasting occurs for 1 hour every 3 days.

[c] Fugitive dust emission rates for haul roads and the access road include 75% dust control efficiency due to water application in summer and 90% natural mitigation efficiency in winter. Summer is assumed six months, May to October.

[d] Wind erosion emissions represent emissions at hourly average wind speed greater than 16.4 m/s. At wind speeds less than 16.4 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of overburden (US EPA 2006, Attachment B).

[e] Wind erosion emissions from TMF dry banks represent emissions at hourly average wind speed greater than 7.2 m/s. At wind speeds less than 7.2 m/s, no wind erosion emissions are generated based on US EPA emission factor for wind erosion of tailings (US EPA 2006, Appendix C).

DTSP, DPM_{10}, $DPM_{2.5}$ – diesel particulate matter of different particle size ranges; FTSP, FPM_{10}, $FPM_{2.5}$ – fugitive particulate matter of different particle size ranges

"-" not applicable

- HCN emissions from the TMF are about twice the emissions from the processing plant.

5.0 PROJECT GHG EMISSIONS

The substantive sources of greenhouse (GHG) emissions during construction and operation are the mobile and stationary equipment exhausts, blasting using an ammonium nitrate fuel oil emulsion explosive and land clearing . These GHG emissions consist primarily of carbon dioxide (CO_2), with smaller amounts of methane (CH_4) and nitrous oxide (N_2O). Per the GHG Protocol (WRI 2013), the GHG emissions include direct emissions from the Project during construction and operation (i.e., Scope 1) as well as indirect emissions associated with the consumption of purchased electricity (Scope 2). Other indirect GHG emissions associated with upstream sources such as production of purchased materials and upstream transportation and distribution (i.e., Scope 3) are assumed to be negligible compared to direct Project GHG emissions. Therefore, the Scope 3 GHG emissions are not evaluated for this assessment and also it is an optional reporting category as per GHG Protocol (WRI 2013).

The US EPA NONROAD model (US EPA 2010a) was used to estimate the fuel consumption of construction and mining off-road equipment based on input information such as engine type, number of units, power rating, utilization factors and total operating hours. Diesel combustion emission factors from the ECCC National Inventory Report (ECCC 2019c) were used to estimate emissions from the construction and mining equipment and fuel consumption rates.

Diesel exhaust GHG emission factors for on-highway trucks transporting ore from the Gordon site to the MacLellan site ore milling and processing plant and on-highway trucks carrying fuel, explosives and consumables for the ore milling and processing plant and other on-road vehicles travelling on the access roads and PR 391 were derived from the US EPA MOVES model (MOVES2014a; US EPA 2015). The model was run for a rural unrestricted road type that best represents the access roads and PR 391, for year 2018 to represent current vehicle populations and age distributions, separately for winter and summer and with fuel formulations specific to Manitoba and Canada. Diesel exhaust emissions for on-road vehicles were estimated using the MOVES emission factors (g/VMT), the number of vehicles round trips per day and the length of the road.

The GHG emissions from explosives detonation were estimated using an emission factor (0.189 t CO_2/tonnes explosives) recommended by the Mining Association of Canada (2014).

The GHG emissions from land clearing were estimated using Manitoba-specific emission factors derived by Natural Resources Canada for deforestation activities in Manitoba (NRCan 2017) as part of the 2017 National Inventory Report (ECCC 2017). Emission factors were derived for four terrestrial ecozones in Manitoba. Based on the location of the Project, the emission factor for Boreal Shield West was used. The GHG emissions from land clearing were estimated from the emission factor for salvage uprooting and burn (85.6 t CO_{2e}/ha) and the area of land clearing (861 ha within MacLellan site and 187 ha within Gordon site) during the Project construction phase. The GHG emissions from land clearing were divided by the two years of Project construction to estimate an annual GHG emission contribution. This annual estimate does not include GHG emissions from decay of biomass after the land clearing activities assuming that merchantable timber will be transported out of the PDA and other cleared biomass will be open burnt.

Indirect GHG emissions are associated with electricity consumption at the MacLellan site. Electrical power for the Gordon site will be provided by on-site diesel generators. The indirect GHG emissions from electricity consumption at MacLellan site were calculated using the electricity consumption emission factor for Manitoba (2.1 g CO_{2e}/kWh) from the ECCC National Inventory Report (ECCC 2019c) and the estimated electricity usage at the MacLellan site during operation (16,900 kWh).

5.1 GORDON SITE

5.1.1 Construction Emissions

The maximum annual GHG emissions from the Gordon site construction are presented in Table 5-1. The Gordon site construction GHG emissions include emissions from heavy off-road equipment, on-highway trucks and vehicles, the stationary generator, blasting and land clearing. Approximately 16.0 kt CO_{2e} are estimated to be released during the worst-case year of construction (Q2 Year -2 to Q1 Year -1). Conservatively assuming continuous release of the worst-case year GHG emissions over the construction period (two years), the total GHG emissions during construction are estimated to be 32.0 kt CO_{2e}. On an annual basis, the Gordon site construction contributes approximately 0.074% and 0.002% to provincial and national GHG emission totals, respectively.

Table 5-1 Estimated GHG Emissions from Gordon Site Construction

Parameter	Units	CO_2	CH_4	N_2O	Total (expressed as CO_{2e})
Construction GHG Emissions	kt/y	15.8	0.0002	0.0006	**16.0**
Manitoba GHG Emissions [a]	kt/y	13,328	3,933	3,910	**21,668 [b]**
National GHG Emissions [a]	kt/y	571,137	92,862	38,037	**715,760 [b]**
Project construction contribution to Manitoba GHG Emissions	%	0.12%	0.00001%	0.00002%	**0.074%**
Project construction contribution to national GHG Emissions	%	0.003%	0.0000002%	0.0000016%	**0.002%**

NOTE:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019c)
[b] Provincial and national GHG emission totals include other fluorinated GHGs

5.1.2 Operation Emissions

The maximum annual GHG emissions from Gordon site operation are presented in Table 5-2. The Gordon site operation GHG emissions include emissions from heavy off-road equipment, on-highway trucks and vehicles, a diesel-fired electrical generator and blasting. Approximately 36.5 kt CO_{2e} are estimated to be released during the worst-case year of operation and corresponding ore haulage on PR 391 (Year 2).

Conservatively assuming continuous release of the worst-case year GHG emissions over the operational period (five years), the total GHG emissions during operation are estimated to be 183 kt CO_{2e}. On an annual basis, the Gordon site operation contributes approximately 0.17% and 0.005% to the provincial and national GHG emission totals, respectively.

Table 5-2 Estimated GHG Emissions from Gordon Site Operation

Parameter	Units	CO_2	CH_4	N_2O	Total (expressed as CO_{2e})
Operation GHG Emissions	kt/y	35.8	0.0009	0.0025	**36.5**
Manitoba GHG Emissions [a]	kt/y	13,328	3,933	3,910	**21,668** [b]
National GHG Emissions [a]	kt/y	571,137	92,862	38,037	**715,760** [b]
Project operation contribution to Manitoba GHG Emissions	%	0.27%	0.00002%	0.00006%	**0.17%**
Project operation contribution to national GHG Emissions	%	0.006%	0.000001%	0.000007%	**0.005%**

NOTE:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019c)
[b] Provincial and national GHG emission totals include other fluorinated GHGs

5.2 MACLELLAN SITE

5.2.1 Construction Emissions

The maximum annual GHG emissions from the MacLellan site construction are presented in Table 5-3. The MacLellan site construction GHG emissions include emissions from heavy off-road equipment, on-highway trucks and vehicles, blasting and land clearing. Approximately 64.6 kt CO_{2e} are estimated to be released during the worst-case year of construction (Q2 Year -2 to Q1 Year -1). Conservatively assuming continuous release of the worst-case year GHG emissions over the construction period (two years), the total GHG emissions during construction are estimated to be 129 kt CO_{2e}. On an annual basis, the MacLellan site construction contributes approximately 0.30% and 0.009% to provincial and national GHG emission totals, respectively.

Table 5-3 Estimated GHG Emissions from MacLellan Site Construction

Parameter	Units	CO_2	CH_4	N_2O	Total (expressed as CO_{2e})
Construction GHG Emissions	kt/y	63.9	0.0007	0.0022	**64.6**
Manitoba GHG Emissions [a]	kt/y	13,328	3,933	3,910	**21,668 [b]**
National GHG Emissions [a]	kt/y	571,137	92,862	38,037	**715,760 [b]**
Project construction contribution to Manitoba GHG Emissions	%	0.48%	0.00002%	0.00006%	**0.30%**
Project construction contribution to National GHG Emissions	%	0.011%	0.000001%	0.000006%	**0.009%**

NOTE:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019c)
[b] Provincial and national GHG emission totals include other fluorinated GHGs

5.2.2 Operation Emissions

The maximum annual GHG emissions from the MacLellan site operation are presented in Table 5-4. The MacLellan site operation GHG emissions include emissions from heavy off-road equipment, on-highway trucks and vehicles and blasting. Approximately 68.0 kt CO_{2e} are estimated to be released during the worst-case year of operation (Year 7). Conservatively assuming continuous release of the worst-case year GHG emissions over the operation period (13 years), the total GHG emissions during operation are estimated to be 884 kt CO_{2e}. On an annual basis, the MacLellan site operation contributes approximately 0.31% and 0.01% to the provincial and national emission totals, respectively.

The estimated total indirect GHG emissions from electricity consumption at the MacLellan site during operation is 0.311 kt CO_{2e}/year, which is less than 1% of the total direct annual GHG emissions (68 kt CO_{2e}/year). These GHG emissions are included into the annual GHG emissions totals for the Project in Table 5-4 Other indirect GHG emissions (i.e., Scope 3) are not accounted into the annual GHG emissions totals for the Project as they are assumed to be negligible compared to direct Project GHG emissions. Therefore, the Scope 3 GHG emissions are not evaluated for this assessment and also it is an optional reporting category as per GHG Protocol (WRI 2013).

Table 5-4 Estimated GHG Emissions from MacLellan Site Operation

Parameter	Units	CO_2	CH_4	N_2O	Total (expressed as CO_{2e})
Operation GHG Emissions	kt/y	66.7	0.0018	0.0055	**68.3**
Manitoba GHG Emissions [a]	kt/y	13,328	3,933	3,910	**21,668** [b]
National GHG Emissions [a]	kt/y	571,137	92,862	38,037	**715,760** [b]
Project operation contribution to Manitoba GHG Emissions	%	0.50%	0.00005%	0.00014%	**0.32%**
Project operation contribution to National GHG Emissions	%	0.01%	0.000002%	0.00001%	**0.01%**

NOTE:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019c)
[b] Provincial and national GHG emission totals include other fluorinated GHGs

6.0 ENVIRONMENTAL CONTROL AND MANAGEMENT PROCEDURES

Mitigation measures will be implemented to manage and reduce Project emissions during construction and operation. Ambient air quality and meteorology monitoring will be implemented to provide an understanding of meteorological conditions and off-site ambient concentrations, and to determine the need for additional mitigation. The monitoring systems will include the installation and operation of a meteorological tower (wind speed and wind direction, air temperature and relative humidity, total precipitation) and particulate matter (TSP, PM_{10}, $PM_{2.5}$) monitoring equipment. Based on the current wind conditions and measured ambient concentration levels, appropriate and effective mitigation options will be implemented to reduce Project emissions. This emissions mitigation management is referred to as “adaptive management”.

The mitigation measures associated with ambient air quality to reduce combustion emissions are also applicable to the mitigation of GHG emissions because combustion sources account for virtually all the GHG emissions associated with the Project construction and operation.

6.1 MITIGATION BY PROJECT DESIGN

Mitigation measures to reduce air and GHG emissions that are incorporated in the Project design include:

- Enclosure of the mill feed storage area and crushing plant conveyors and the fine ore stockpile to reduce fugitive dust emissions. PM emissions from the enclosed conveyors and fine ore stockpile are assumed negligible.
- Use of dust collection/control systems (e.g., baghouse) at the primary crusher and the processing plant gold room to reduce PM emissions. Use of a wet scrubber at the secondary crusher. The dust collection

efficiencies of the dust collectors and wet scrubber are considered in the calculation for the PM emissions.

- Optimization of haul roads and infrastructure to reduce transportation and haul distances.
- Optimization of the TMF to reduce the area of exposed dry surfaces to reduce the potential for windblown dust emissions.
- Enclosed leaching and adsorption processes at the ore milling and processing plant to reduce fugitive HCN emissions due to volatilization loses.
- Limited concentration of wad-cyanide (after cyanide detoxification) in water discharge to the TMF to 10 mg/L to reduce potential fugitive HCN emissions from the TMF pond surface.

6.2 BEST MANAGEMENT PRACTICES

Emission mitigation measures during Project construction and operation are based on standard BMPs for the reduction of air emissions from construction activities (ECCC 2005b) and mining activities (CEMI 2010).

The following BMPs will be implemented for the management and reduction of diesel exhaust emissions and associated air contaminants and GHGs from off-road equipment and vehicles during construction and operation at the Gordon and MacLellan sites:

- Engines and exhaust systems will be properly maintained to keep construction and mining equipment in good working condition.
- The concentration of sulphur in diesel fuel shall not exceed 15 mg/kg, as per the Sulphur in Diesel Fuel Regulations (SOR/2002-254 last amended on 2017-06-02; ECCC 2002) that came into effect in 2006 for on-road vehicles and in 2010 for off-road equipment. This sulphur concentration is used in the emissions quantification for the Project.
- Haul trucks and vehicle idling times will be reduced to the extent possible.
- Cold starts will be limited to the extent possible.

The following BMPs will be implemented for the management and reduction of fugitive dust emissions from construction and mining activities at the Gordon and MacLellan sites:

- On-site haul roads and access roads will be maintained in good condition, with regular inspections to monitor loose dust on the roads to reduce dust “track out” onto public roads.
- During dry periods, water will be applied to haul roads and access roads to reduce dust emissions. The application of water will be limited to non-freezing temperatures to avoid icing that can present a safety hazard. Watering is most effective immediately after application, and repeated watering several times

a day might be required, depending on the surface and meteorological conditions. A 75% control efficiency due to watering is applied to the quantified PM emissions from haul roads and access roads for the Project based on the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook (WRAP 2006).

- Chemical dust suppressants will be applied to haul roads as an alternative option to watering. While chemical dust suppressants can be more effective at controlling fugitive dust than watering, they are also more expensive. Therefore, chemical dust suppression will be applied on an as-needed basis during high wind conditions or if measured ambient PM concentrations are in exceedance of the Manitoba AAQC and if an increase of watering is determined ineffective or unfeasible at the time. Examples of suppressants include chlorides, petroleum products, liquid polymer emulsions, and agglomerating chemicals. These suppressants, if required, will be applied, as per the manufacturer's recommendations, to preclude unintended environmental effects.
- Haul truck speed on the on-site haul roads will be limited to 35 km/h (loaded) and 40 km/h (empty). Vehicle speed on the access roads will be limited to 40 km/h.
- Track-out of material to PR 391 will be reduced by dust sweeping and truck wheel washing stations prior to entering onto PR 391.
- Surfaces of topsoil and overburden stockpiles will be stabilized during extended periods between usage, by means of vegetating or covering the exposed surfaces.

Additional mitigation measures can be implemented on an as-required basis.

6.3 AIR QUALITY MONITORING AND ADAPTIVE MANAGEMENT

An Air Quality Management Plan (AQMP) will be created for Project construction and operation. The AQMP will specify the mitigation measures for the management and reduction of air emissions during Project construction and operation, the ambient air quality and meteorology monitoring program and the reporting requirements of monitoring results to Manitoba Conservation and Climate.

Ambient air quality and meteorology monitoring will include:

- Meteorological monitoring (wind speed and wind direction, air temperature and relative humidity, rain precipitation, snow depth).
- Ambient PM monitoring (TSP, PM_{10} and $PM_{2.5}$).

The results of the ambient PM monitoring will be used to assess the effectiveness of the dust mitigation measures and to evaluate the need for more rigorous dust mitigation.

For example, if the monitoring program indicates that ground-level TSP, PM_{10} and/or $PM_{2.5}$ concentrations are greater than the Manitoba AAQC, additional mitigation measures to reduce PM emissions will be implemented. Given that dust from the haul roads is the largest source of particulate emissions, more frequent road watering or an application of a dust suppressant could be implemented.

6.4 GREENHOUSE GAS MANAGEMENT PLAN

The purpose of the Greenhouse Gas Management Plan (GHGMP) will be to manage Project greenhouse gas (GHG) emissions in accordance with relevant GHG emissions management legislation. The GHGMP will also include policy updates, emission source descriptions, data management framework, effectiveness of mitigation, follow-up and monitoring for GHGs, based on provincial and federal reporting requirements.

7.0 ASSESSMENT APPROACH

The effects of Project emissions on ambient air quality are evaluated by using a numerical atmospheric dispersion model. Atmospheric dispersion models simulate the transport, dispersion, transformation, and deposition of emissions in the atmosphere. Dispersion models are used to predict ambient concentrations for a wide range of meteorological conditions and account for terrain influences.

7.1 SELECTED MODELS

For this assessment, the CALMET/CALPUFF® model system (Scire et al. 2000a; 2000b; 2011) was used to determine the effect of Project operation emissions on ambient air quality. The most recent model versions available at the time of the assessment were used:

- CALMET® version 6.5.0 (level 150223) – a diagnostic three-dimensional meteorological model.
- CALPUFF® version 7.2.1 (level 150618) – a numerical atmospheric dispersion model.

The modelling system was applied in accordance with the draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation, 2006) and in the absence of specific requirements in the Manitoba Guidelines, the modelling approach followed guidance from the ADMG for Ontario (MOECC 2016) and the Alberta Air Quality Model Guideline (AEP 2013).

The proposed dispersion modelling approach was described in an air quality dispersion modelling plan (Stantec 2017d), which was prepared for review by MCC and ECCC. Following submission, feedback was provided by MCC and incorporated in the air quality assessment by Stantec. In 2019, after minor changes to the layout of Project infrastructure and the corresponding letter to the Canadian Environmental Assessment Agency (now Impact Assessment Agency of Canada [IAAC]; Stantec 2019), the dispersion modelling plan was resubmitted for review and confirmation by MCC and ECCC. Following resubmission, additional feedback was provided by MCC and ECCC and incorporated in the air quality assessment by Stantec. The MCC and ECCC approved the air quality dispersion modelling plan on August 13, 2019 (MSD 2019c; ECCC 2019a). The air quality dispersion modelling plan (Stantec 2017e) and Stantec responses to MCC and ECCC comments (Stantec 2019) are provided in Appendix B.

7.2 CALMET METEOROLOGICAL MODEL

The CALMET® model (Scire et al. 2000a) was used to provide three-dimensional hourly meteorological data (winds, temperatures and turbulence) for a five-year period (2012-2016) required for the CALPUFF® transport, dispersion, and deposition model. The CALMET® model domain of 70 km by 48 km contains the LAA (50 km by 28 km) with a buffer of 10 km on each side to minimize potential computational boundary effects near the perimeter of the LAA. The CALMET® model domain is shown on Map 5 in Appendix A.

The CALMET® model used mesoscale meteorological data with a 12 km grid resolution created with the WRF mesoscale prognostic model and incorporated surface meteorological observations from Lynn Lake Airport. The CALMET® model was used to adjust the WRF initial guess field for the kinematic effects of terrain, slope flows, and terrain blocking effects using the finer scaled terrain data to produce a wind field with a horizontal resolution of 500 m. Details on the CALMET® model implementation are provided in Appendix D. All recommended default CALMET® options in the Alberta Air Quality Model Guideline (AEP 2013) were applied.

The CALMET® five-year meteorological data (2012-2016) is viewed as being representative of the wide range of weather conditions that could occur in the region. The wind rose derived for the Project from the CALMET® model indicates dominant winds from northwest which are in good agreement with the measured winds at the Lynn Lake Airport.

7.3 CALPUFF DISPERSION MODEL

The CALPUFF® atmospheric dispersion model (Scire et al. 2000b; 2011) was used to simulate the transport, dispersion and deposition of emissions during operation. As discussed in Section 4.0, construction and decommissioning/closure emissions were not modelled as they are less than the worst-case (peak production) year of operation and therefore, the effects on air quality will be less than operation.

The CALPUFF® model is a multi-layer, multi-species, non-steady state puff dispersion model that can simulate the effects of time and space-varying meteorological conditions on substance transport, transformation, and removal. CALPUFF® contains algorithms for near-source effects such as building downwash, transitional plume rise, partial plume penetration, as well as long-range effects such as chemical transformation, and pollutant removal (dry deposition and wet scavenging).

The CALPUFF® model domain coincides with the LAA (50 km by 28 km) and includes the Town of Lynn Lake and the Black Sturgeon Reserve (see Map 5, Appendix A). The extent of the CALPUFF® domain is sufficient to capture the overall predicted maximum concentrations of substances of interest for the worst-case operation emission scenario. Details on the CALPUFF® model implementation are provided in Appendix E. All recommended default CALPUFF® options in the Alberta Air Quality Model Guideline (AEP 2013) were applied.

7.3.1 Model Sources

Emission sources were modelled in CALPUFF® as one of the following types depending on the nature of the source and the emission release to the atmosphere. Different input parameters are used to represent the different source types:

- **Point source**: an industrial stack; parameters required for each stack include stack height, stack diameter, stack gas exit temperature and stack gas exit velocity.
- **Area source**: emission distributed over an area; parameters required for each area source include release height and initial vertical dimension (σ_z) which accounts for the initial vertical dispersion of the plume.
- **Volume source**: a single point of emission with initial vertical and horizontal dispersion; parameters required for each volume source include release height, and initial vertical (σ_z) and horizontal dimension (σ_y) which account for the initial vertical and horizontal dispersion of the plume.
- **Line source**: emission distributed along a line, such as a road; although CALPUFF® does not have a non-buoyant line source type, the line sources for this assessment were represented in CALPUFF® by multiple volume sources.

Since CALPUFF® does not have an algorithm to model open pit sources, the open pits were modelled as surface area sources with reduced PM emissions to account for the fraction of PM emissions retained in the open pit due to its depth, known as “pit retention”. Pit retention is the term used to describe the tendency for PM emissions released inside an open mine pit to remain inside the pit. The fraction of PM emissions that is retained in the open pit depends on the depth of the pit and the particle size (Winges 1986). A 50% pit retention for TSP emissions and 5% pit retention for PM_{10} emissions was applied based on recommendation in the Australian Emission Manual for Mining (Australian Government 2012). The fraction of $PM_{2.5}$ emissions retained in the open pits was estimated based on the original Winges equation (Winges 1981) assuming a pit depth of 150 m for Gordon site (Year 2) and 245 m for MacLellan site (Year 7). The calculated pit retention fraction of $PM_{2.5}$ emissions is 1% for the open pit at Gordon site and 2% for the open pit at MacLellan site. Details on the pit retention fractions used for PM emissions from the open pits at Gordon and MacLellan sites are provided in Appendix C. All emission sources in the open pit are modelled as a surface area source representing the open pit, including drilling and blasting emissions, diesel exhaust emissions from mining off-road equipment operating in the pit and fugitive dust emissions from mining off-road equipment movement, bulldozing, grading and truck loading.

A number of emission sources are modelled as multiple volume sources in the air dispersion model and are allocated at mine areas such as the MRSA, overburden stockpiles, ore stockpiles, and the ROM stockpile and primary crusher at MacLellan site. These include:

- Diesel exhaust emissions from mining off-road equipment.
- Mechanically generated dust emissions by mining off-road equipment movement.

- Fugitive dust emissions from bulldozing and grading.
- Fugitive dust emissions from truck loading and unloading.

Diesel exhaust emissions and mechanically generated dust emissions from supporting equipment are allocated to general areas at the truck stop and warehouse facilities at Gordon site and at the ore milling and processing plant at MacLellan site. The general areas are modelled as area sources in the air dispersion model.

Wind erosion emissions are generated when material is lifted from the surface of the stockpiles or exposed areas during a wind gust. The stockpiles and the TMF dry banks are treated as area sources for wind erosion emissions. These area sources are modelled with varying hourly emission rates depending on the wind speed.

Diesel exhaust emissions and mechanically generated dust emissions from haul trucks travelling along the haul roads are allocated along the length of the haul roads. Similarly, traffic emissions from on-highway trucks and on-road vehicles travelling on the access roads and PR 391 are allocated to the length of the access roads and PR 391. Traffic emissions, including diesel exhaust and mechanically generated dust emissions, are modelled as line sources in the air dispersion model.

The primary crusher dust collector stack, the secondary crusher wet scrubber stack and the gold room dust collector stacks at MacLellan site, and the diesel generator at Gordon site are modelled as point sources with their design stack parameters in the air dispersion model.

At the MacLellan site, fugitive HCN emissions result from volatilization of sodium cyanide used in the ore milling and processing plant leach and adsorption tanks, and from residual cyanide (after cyanide detoxification) in the TMF pond. The fugitive HCN emissions from the ore milling and processing plant were modelled as a volume source placed at leach tank. Fugitive HCN emissions from the TMF pond were modelled as an area source at the TMF pond surface.

Gordon Site

In total, 16 sources were created in CALPUFF® to model Gordon site operation emissions. Detailed source parameters for the modelled emissions sources are provided in Appendix E. The modelled emission sources for Gordon site operation are shown on Map 6 in Appendix A. These sources include:

- Three collocated open pit sources representing blasting (PIT_BL_G), haul roads (PIT_HR_G) and mining off-road equipment diesel exhaust and fugitive dust emissions (PIT_LB_G) in the open pit, respectively.
- Three groups of volume sources representing diesel exhaust emissions from mining off-road equipment, mechanically generated dust emissions by mining off-road equipment movement and fugitive dust emissions from bulldozing, grading and truck loading and unloading at the MRSA (MH_WR_G), the overburden stockpile (MH_OVB_G) and the ore stockpile (MH_LG_G). The volume

source groups include four volume sources representing the most probable locations of equipment and mining activities.

- One area source (GA_G) representing diesel exhaust and fugitive dust emissions from supporting equipment at the truck stop and warehouse general area of Gordon site.
- Three area sources representing wind erosion emissions from the MRSA, the overburden and ore stockpiles.
- One point source representing the diesel generator stack.
- Three line sources (consisting of multiple volume sources) representing diesel exhaust emissions and mechanically generated dust emissions from haul trucks along the haul roads from the open pit to the MRSA (HR_PWR_G), from the open pit to the overburden stockpile (HR_POB_G) and from the open pit to the ore stockpile (HR_PLG_G).
- One line source (consisting of multiple volume sources) representing diesel exhaust emissions and mechanically generated dust emissions from on-highway trucks and on-road vehicles along the access road to the Gordon site (AR_G).
- One line source (consisting of multiple volume sources) representing diesel exhaust emissions and mechanically generated dust emissions from haul trucks transporting ore from the Gordon site to the MacLellan site ore milling and processing plant and from other on-highway trucks carrying fuel, explosives and consumables for the ore milling and processing plant and on-road vehicles travelling on PR 391.

MacLellan Site

In total, 28 sources were created to model MacLellan site operation emissions. Detailed source parameters for the modelled emissions sources are provided in Appendix E. The modelled emission sources for MacLellan site operation are shown on Map 7 in Appendix A. These sources include:

- Three collocated open pit sources representing blasting (PIT_BL_M), haul roads (PIT_HR_M) and mining off-road equipment diesel exhaust and fugitive dust emissions (PIT_LB_M) in the open pit, respectively.
- Four groups of volume sources representing diesel exhaust emissions from mining off-road equipment, mechanically generated dust emissions by mining off-road equipment movement and fugitive dust emissions from bulldozing, grading and truck loading and unloading at the MRSA (MH_WR_M), the overburden stockpile (MH_OVB_M), the ore stockpile and ROM stockpile (MH_LG_M) and the primary crusher (MH_PC_M). The volume source groups include two to four volume sources representing the most probable locations of equipment and mining activities.

- One volume source (VPLANT) representing fugitive HCN emissions from the leach and adsorption tanks at the ore milling and processing plant.
- One area source (GA_M) representing diesel exhaust and fugitive dust emissions from supporting equipment at the general area of the MacLellan site.
- Seven area sources representing wind erosion emissions from the MRSA, the overburden, topsoil, ore and ROM stockpiles and from the TMF dry banks.
- Four point sources representing the primary crusher dust collector stack, the secondary crusher wet scrubber stack and the gold room dust collector stacks.
- Five line sources (consisting of multiple volume sources) representing diesel exhaust emissions and mechanically generated dust emissions from haul trucks along the haul roads from the open pit to the primary crusher (HR_PM_M), from the open pit to the MRSA (HR_PWR_M), from the open pit to the overburden stockpile (HR_POB_M), from the open pit to the ore stockpile (HR_PLG_M) and from the open pit to the ROM stockpile.
- Three line sources (consisting of multiple volume sources) representing diesel exhaust emissions and mechanically generated dust emissions from on-highway trucks and on-road vehicles along the access roads to the mill feed and processing plant (ARO_M), to the explosives facilities (AR_EM_M) and to the permanent work camp (AR_WC_M).

7.3.2 Receptors and Terrain

Ambient ground-level concentration and deposition patterns were predicted at receptor grid locations within the CALPUFF® model domain and outside the Project Boundary. A nested receptor grid with increased receptor density with proximity to the Project Boundary was created in the model domain following the spacing requirements in the Draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation, 2006) and the Air Dispersion Modelling Guideline for Ontario (MOECC 2016) as follows:

- 20 m spacing along the Project Boundary at the Gordon and MacLellan sites.
- 100 m spacing along the Project Boundary around the access roads to the Gordon and MacLellan sites.
- 250 m spacing along the Project Boundary around PR 391.
- 50 m spacing within 500 m of the Project Boundary.
- 100 m spacing within 1.3 km of the Project Boundary.
- 200 m spacing within 2.1 km of the Project Boundary.
- 500 m spacing within 6.9 km of the Project Boundary.

- 1,000 m spacing beyond 6.9 km of the Project Boundary.

The receptor grid consists of 14,997 receptor points. The receptor grid is shown on Map 8 in Appendix A.

In addition, concentrations and depositions were predicted at 203 human receptors and Potential Indigenous Receptor sites and at the Permanent Worker Camp to provide input to the human health assessment. Map 3 in Appendix A shows the locations of human receptors and Potential Indigenous Receptor sites in the LAA. A list of the 203 human receptors and Potential Indigenous Receptor sites and the permanent work camp location is provided in Appendix E.

Terrain elevations were estimated for the receptor locations based on an integrated Light Detection and Ranging (LiDAR) and Shuttle Radar Topography Mission (SRTM) digital elevation data. The LiDAR data is a high-resolution data set with an approximate spatial resolution of 5 m that was custom developed for the Gordon and MacLellan sites from aerial surveys. However, the LiDAR data covers only the Gordon and MacLellan sites. To use the high-resolution LiDAR data for the air quality assessment, the LiDAR data was integrated with US Geological Survey (USGS) SRTM data with a spatial resolution of approximately 30 m (USGS 2014) to cover the full extent of the LAA. The terrain elevations in the LAA based on the integrated LiDAR and SRTM data are shown on Map 9 in Appendix A.

7.3.3 Building Downwash Effects

Buildings or other solid structures may affect air flow near a source and cause building downwash effects (e.g., eddies on the downwind side), which have the potential to reduce plume rise and affect atmospheric dispersion. Building downwash effects may occur if the height of the stack is less than 2.5 times the height of an adjacent building. Adjacent buildings may also affect the stack if the stack is located in the building's region of influence defined as a distance of 5 times the lesser of the width or height of the crosswind face of the building.

Building downwash effects were considered for all stack emissions using the US EPA Building Profile Input Program (BPIP; US EPA 1995b). BPIP provides parameters that are used by the Plume Rise Model Enhancement (PRIME) downwash algorithms in CALPUFF®. Map 6 in Appendix A shows the locations of the buildings and stacks at the Gordon site. Map 7 in Appendix A shows the locations of the buildings and stacks at the MacLellan site. All buildings and structures, including tanks, that have potential to cause building downwash effects were included in the BPIP PRIME model. The dimensions of the buildings and structures considered in the dispersion model for Gordon and MacLellan sites are listed in Table 7-1.

Table 7-1 Buildings and Structures included in CALPUFF®

Building Description	Building ID	Length (m)	Width (m)	Height (m)
Gordon Site				
Generator	DGEN	15	12	3.5
Wash Bay/Truckstop Warehouse	WBAY	80	24	6
MacLellan Site				
Administration	ADMIN	25.2	65.1	3
Warehouse workshop	WAREH	12.5	25	6
Primary Crushing	PC	36	23	19.6
Secondary Crushing	SC	15	15	23
Grinding	GRIND	32.1	39.5	26
CIP	CIP	30	43	22
Reagents	REAGENT	15	42	15
Gold room	GR	12	18.6	8
Assay lab	ASSAY	10	14.7	3
Oxygen Plant	OP	24	10	4
Crushed Ore Stockpile Building	OS	100	100	30
Truck Shop	TSM	30.5	63.4	19.3
Truck Wash	TRWM	19.2	29.9	15.5
Pre-leach Thickener	PLT	32	32	9.0
Pre-aeration Tank	PAT	14.9	14.9	16.4
Leach Tank 1	LT1	14.9	14.9	16.4
Leach Tank 2	LT2	14.9	14.9	16.4
Leach Tank 3	LT3	14.9	14.9	16.4
Leach Tank 4	LT4	14.9	14.9	16.4
Process Water Tank	PRT	10	10	7.8
Fresh Water Tank	FRT	10	10	13
Cyanide Detox Tank	CDT	8.8	8.8	9.8

7.3.4 NO to NO_2 Conversion

NO_X is composed of NO and NO_2. Most of the NO_X emissions are in the form of NO which is converted in the atmosphere to NO_2 during reactions with ambient ozone (O_3). Due to the inert nature of NO, only NO_2 concentrations are regulated by the AAQC.

Atmospheric chemistry, including atmospheric transformation of NO to NO_2, was not simulated in CALPUFF®. NO_X was modelled as a trace specie without any chemical transformations. The Ozone

Limiting Method (OLM) was applied to the NO_X predictions to estimate the fraction of NO_2 that is contained in the NO_X plume.

The OLM method accounts for the oxidation of NO to NO_2 due to photochemical reactions in the atmosphere in the presence of ambient O_3. According to the OLM method, the conversion of NO to NO_2 is limited by the ambient concentration of O_3 in the atmosphere. It is assumed that 10% (by volume) of the NO_X emission release from the source is in the form of NO_2 and the remaining 90% is converted to NO_2 as follows:

- If 90% of NO_X concentration is less than the ambient O_3 concentration, then

  $[NO_2]= [NO_X]$(complete conversion).

- If 90% of NO_X concentration is greater than the ambient O_3 concentration, then

  $[NO_2]= 10\% [NO_X]+ [O_3]$ (limited conversion).

In the application of the OLM, the above relationships assume that all concentrations are expressed in parts per million (ppm).

As no on-site O_3 data is available, O_3 measurements from the Fort Smith monitoring station in Northwest Territories were used in the OLM conversion calculations. The Fort Smith station is considered the most representative for the LAA as the station is in a similarly remote area with low population density and with similar meteorological and topographical conditions. Hourly O_3 data from Fort Smith station was downloaded for the three-year period 2016 to 2018. An hourly time-series of O_3 values was compiled using the maximum measured O_3 concentration for each hour from the three-year period. Therefore, the hourly O_3 time-series used in the OLM conversion are conservative. The maximum O_3 concentration measured for the three-year period 2016 to 2018 was 71 ppb.

7.3.5 Particulate Matter Deposition

Dry deposition of PM is the process of settling of particles on the ground due to gravity and micro meteorological and atmospheric processes. Wet deposition is the depletion of particles from the atmosphere by rain or snow. Dry and wet deposition of total PM are modelled in CALPUFF®. PM deposition is also referred to as dustfall.

Different physical processes govern the settling of PM of different sizes. For larger PM (greater than 20 µm), dry deposition is caused mainly by gravitational settling, deposition of smaller PM is caused by micro meteorological and atmospheric processes. Wet deposition is proportional to the precipitation rate and a scavenging coefficient which depends on the particle size.

For deposition modelling, total PM is represented with a particle size distribution consisting of the following particle size categories:

- Particles with aerodynamic diameter smaller than 2.5 µm represented with a geometric mean aerodynamic diameter of 1.6 µm.

- Particles with aerodynamic diameter between 2.5 and 10 µm represented with a geometric mean aerodynamic diameter of 6.9 µm.
- Particles with aerodynamic diameter between 10 and 30 µm represented with a geometric mean aerodynamic diameter of 21.5 µm.

Emission rates for each particle size category are derived from particle size-specific emission factors representative of the various construction and mining activities.

Wet deposition fluxes due to precipitation scavenging are calculated in CALPUFF® using an empirical scavenging coefficient approach. The scavenging coefficients are specified as a function of the particle size and precipitation type (i.e., frozen vs. liquid precipitation). Total dustfall is estimated as the sum of modelled dry and wet deposition for each particle size category.

7.3.6 Atmospheric Chemistry and Formation of Secondary PM2.5

Atmospheric chemistry is not simulated in CALPUFF®. Thus, secondary formation of fine particulate matter ($PM_{2.5}$) from nitrates and sulphates is not modelled. The formation of secondary PM is not considered substantial compared to the amount of fugitive dust generated from the various construction and mining activities.

8.0 DISPERSION MODEL RESULTS

The maximum predicted ambient concentrations and dustfall for the substances of interest are predicted for the worst-case year of operation at Gordon site and ore haul on PR 391 (Year 2) and the worst-case year of operation at MacLellan site (Year 7). The model predicted 1-hour and 8-hour average concentrations are based on the maximum hourly emission rates. The model predicted 24-hour, monthly and average concentrations are based on the daily average emission rates that consider the actual operating hours per day for each mining activity.

Baseline concentrations are added to the model predicted maximum concentrations to account for other existing emission sources (natural and anthropogenic) that are not directly included in the model simulation. The model predicted maximum concentrations with the baseline contribution are compared to the Manitoba AAQC and the CAAQS. The CAAQS are reference values for regional air quality management and are applicable to measured ambient concentrations at human receptor locations away from the industrial facility boundaries. The maximum predicted concentrations in the LAA are compared to the CAAQS in this context and do not imply compliance with the AAQC at the Project Boundary. The maximum predicted concentrations are based on areas along and outside the Project Boundary (i.e., locations where public access is not restricted). The predicted maximum concentrations and dustfall are discussed separately for Gordon site and MacLellan site in the following sections. The corresponding concentration contour maps are presented in Appendix G. The colored contours represent concentrations greater than 10% of the respective AAQC or in case of the background concentration greater than 10% of the AAQC (e.g., annual TSP, $PM_{2.5}$ and dustfall) – greater than the background value. The concentration contour maps presented in Appendix G are limited to the substances and averaging periods for which maximum predicted concentrations are greater than 10% of the AAQC.

Additionally, a source contribution analysis was completed to determine the relative contribution of each emission source or source group to the maximum predicted concentrations at a specific location. The source contribution analysis identifies the most contributing emission sources to predicted high ambient concentrations and indicates the best target(s) for application of the most effective mitigation options.

The model predicted maximum ambient VOC, PAH and metal concentrations, and PAH and metal depositions are evaluated in the human health assessment.

8.1 GORDON SITE OPERATION

The model predicted maximum ground-level concentrations and dustfall from Gordon site operation are summarized in Table 8-1. These maximum predicted concentrations in Table 8-1 are presented for the following areas:

- An overall maximum in the LAA.
- Maximum predicted concentrations at human receptors.
- Maximum predicted concentrations within Black Sturgeon Reserve. Concentrations are predicted at 30 grid receptors spaced at 500 m to 1,000 m covering the Black Sturgeon Reserve and 30 discrete receptors in Black Sturgeon Reserve (i.e., 14 residences, 1 infrastructure receptor, 2 potential residences and 13 Potential Indigenous Receptors).
- Maximum predicted concentrations along PR 391. Concentrations are predicted at discrete receptors located along PR 391 with a buffer of 300 m from both sides of the road and spaced at 250 m.

The associated concentration and dustfall contours in the LAA, including human receptors, Black Sturgeon Reserve and PR 391, are presented in Map G-1 to Map G-25 in Appendix G.

The maximum 1-hour average NO_2, CO and SO_2 concentrations and 24-hour average TSP and PM_{10} concentrations are greater than the respective AAQC and the CAAQS. For the other gaseous and PM CACs, dustfall and metals, the maximum predicted values are less than the applicable AAQC. The highest model predicted concentrations from Gordon site operation for all substances of interest occur along the Project Boundary and reduce with increased distance from the boundary. Predicted HCN concentrations in Black Sturgeon Reserve and along PR 391 are associated entirely with air emissions from the ore milling and processing plant and the TMF at MacLellan site.

Maximum NO_2 Concentrations

The maximum predicted 1-hour NO_2 concentration, 459 µg/m³, is greater than the Manitoba AAQC (400 µg/m³). The maximum predicted 24-hour and annual NO_2 concentrations are 74.1 and 11.2 µg/m³, respectively and are less than the Manitoba AAQC and the annual CAAQS. The maximum predicted 1-hour average NO_2 concentration in the metric of the CAAQS (224 µg/m³) is greater than the 1-hour CAAQS

(79 µg/m³). The maximum predicted NO_2 concentrations at sensitive receptors for all averaging periods are less than the Manitoba AAQC. The maximum predicted NO_2 concentrations are greater than the 1-hour CAAQS at three sensitive receptors. The maximum predicted NO_2 concentrations in Black Sturgeon Reserve for all averaging periods are less than the applicable AAQC and CAAQS. The maximum predicted NO_2 concentrations along PR 391 for all averaging periods are less than the Manitoba AAQC. The maximum predicted NO_2 concentrations are greater than the 1-hour CAAQS along a segment of PR 391 with an approximate length of 5 km near MacLellan site (Map G-2). Along PR 391, values greater than the 1-hour CAAQS are predicted for less than 15 days in a year.

The maximum predicted 1-hour, 24-hour and annual NO_2 concentrations occur on the northeast Project Boundary near the open pit (Maps G-1, G-4 and G-5). The predicted NO_2 concentrations greater than the 1-hour Manitoba AAQC (400 µg/m³) occur for two hours per year and are limited to the northeast Project Boundary near the open pit. There are no sensitive receptors on or near the boundary at this location.

The model predicted NO_2 concentrations greater than the 1-hour CAAQS (79 µg/m³) extend approximately 2.3 km from the Gordon site boundary (Map G-2 and G-3). Along the Project Boundary, values greater than the 1-hour CAAQS are predicted for 99 days in a year, reducing to one day per year with increasing distance. There are three sensitive receptors (trapping areas) within this area.

Maximum CO Concentrations

The maximum predicted 1-hour CO concentration, 16,096 µg/m³, is greater than the Manitoba AAQC (15,000 µg/m³). The maximum predicted 8-hour CO concentration, 4,952 µg/m³, is less than the Manitoba AAQC (6,000 µg/m³). The maximum predicted CO concentrations at sensitive receptors for all averaging periods are less than the AAQC. The maximum predicted CO concentrations in Black Sturgeon Reserve and along PR 391 for all averaging periods are less than the AAQC.

The maximum predicted 1-hour and 8-hour CO concentrations occur on the northeast Project Boundary near the open pit (Maps G-6 and G-7). The predicted CO concentrations greater than the 1-hour Manitoba AAQC (15,000 µg/m³) occur for one hour per year and are limited to the northeast Project Boundary near the open pit. There are no sensitive receptors on or near the boundary at this location.

Maximum SO_2 Concentrations

The maximum predicted 1-hour SO_2 concentration, 460 µg/m³, is greater than the Manitoba AAQC (450 µg/m³). The maximum predicted 24-hour and annual SO_2 concentrations are 48.7 and 2.45 µg/m³, respectively and are less than the Manitoba AAQC and the annual CAAQS. The maximum predicted 1-hour average SO_2 concentration in the metric of the CAAQS (342 µg/m³) is greater than the 1-hour CAAQS (170 µg/m³) (Map G-9). The maximum predicted SO_2 concentrations at sensitive receptors for all averaging periods are less than the AAQC. The maximum predicted SO_2 concentrations in Black Sturgeon Reserve and along PR 391 for all averaging periods are less than the applicable AAQC and CAAQS.

The maximum predicted 1-hour, 24-hour and annual SO_2 concentrations occur on the northeast Project Boundary near the open pit (Maps G-8, G-11 and G-12). Predicted SO_2 concentrations greater than the

1-hour Manitoba AAQC (450 µg/m³) occur for one hour per year and are limited to the northeast Project Boundary near the open pit. There are no sensitive receptors on or near the boundary at this location.

The model predicted SO_2 concentrations greater than the 1-hour CAAQS (170 µg/m³) extend approximately 400 m from the Gordon northeast boundary (Map G-9 and G-10). Along the Project Boundary, values greater than the 1-hour CAAQS are predicted for 5 days in a year, reducing to one day per year with increasing distance. There are no sensitive receptors within this area.

Maximum HCN Concentrations

The maximum predicted 1-hour, 24-hour and annual HCN concentrations are 0.592 µg/m³, 0.196 µg/m³ and 0.014 µg/m³, respectively and are less than the Manitoba AAQC and the 24-hour Ontario AAQC. The maximum predicted HCN concentrations at sensitive receptors for all averaging periods are less than the ambient criteria. The maximum predicted HCN concentrations in Black Sturgeon Reserve and along PR 391 for all averaging periods are less than the AAQC.

The maximum predicted 1-hour, 24-hour and annual HCN concentrations occur along PR 391 near MacLellan site (Maps G-13, G-14 and G-15).

Maximum TSP Concentrations

The maximum predicted 24-hour TSP concentration, 606 µg/m³, is greater than the Manitoba AAQC (120 µg/m³). The maximum predicted annual TSP concentration,14.8 µg/m³, is less than the Manitoba AAQC. The maximum predicted TSP concentrations are greater than the Manitoba 24-hour AAQC at one sensitive receptor (trapping area). The maximum predicted TSP concentrations in Black Sturgeon Reserve for all averaging periods are less than the AAQC. The maximum predicted TSP concentrations are greater than the Manitoba 24-hour AAQC along a segment of PR 391 with an approximate length of 5 km near MacLellan site (Map G-16). Along PR 391, values greater than the 24-hour AAQC are predicted for less than 15 days in a year (Map G-17).

The maximum predicted 24-hour and annual TSP concentrations occur on the north and northeast Project Boundary, respectively, near the open pit (Maps G-16 and G-18). The model predicted TSP concentrations greater than the 24-hour Manitoba AAQC (120 µg/m³) extend approximately 2.2 km from the Gordon site boundary (Map G-17). Along the Project Boundary, values greater than the 24-hour AAQC are predicted for 73 days in a year, reducing to one day per year with increasing distance. There is one sensitive receptor (trapping area) within this area.

Maximum PM_{10} Concentrations

The maximum predicted 24-hour PM_{10} concentration, 361 µg/m³, is greater than the Manitoba AAQC (50 µg/m³). The maximum predicted PM_{10} concentrations are greater than the Manitoba 24-hour AAQC at three sensitive receptors (trapping areas). The maximum predicted 24-hour PM_{10} concentrations in Black Sturgeon Reserve are less than the AAQC. The maximum predicted PM_{10} concentrations are greater than the Manitoba 24-hour AAQC along a segment of PR 391 with an approximate length of 6 km near MacLellan site (Map G-19). Along PR 391, values greater than the 24-hour AAQC are predicted for less than 15 days in a year (G-20).

The maximum predicted 24-hour PM_{10} concentration occurs on the north Project Boundary near the open pit (Maps G-19). The model predicted PM_{10} concentrations greater than the 24-hour Manitoba AAQC (50 µg/m³) extend approximately 3.3 km from the Gordon site boundary (Map G-20). Along the Project Boundary, values greater than the 24-hour AAQC are predicted for 110 days in a year, reducing to one day per year with increasing distance. There are three sensitive receptors (trapping areas) within this area.

Maximum $PM_{2.5}$ Concentrations

The maximum predicted 24-hour and annual $PM_{2.5}$ concentrations are 23.5 µg/m³ and 6.87 µg/m³, respectively, and are less than the CAAQS. The maximum predicted $PM_{2.5}$ concentrations at sensitive receptors for all averaging periods are less than the AAQC. The maximum predicted $PM_{2.5}$ concentrations in Black Sturgeon Reserve and along PR 391 for all averaging periods are less than the AAQC.

The maximum predicted 24-hour and annual $PM_{2.5}$ concentrations occur on the northeast Project Boundary near the open pit (Maps G-21 and G-22).

Maximum Dustfall

The maximum predicted 30-day and annual average dustfall are 4.90 g/m²/30-day and 1.87 g/m²/30-day and are less than the Ontario AAQC. The maximum predicted 30-day and annual average dustfall at sensitive receptors are less than the dustfall criteria. The maximum predicted 30-day and annual average dustfall in Black Sturgeon Reserve and along PR 391 are less than the dustfall criteria.

The maximum predicted 30-day and annual dustfall occur on the east Project Boundary near the open pit (Maps G-23 and G-24).

Maximum Metal Concentrations

The maximum predicted metal concentrations for all averaging periods are less than the Manitoba AAQC. The maximum predicted metal concentrations at sensitive receptors for all averaging periods are also less than the Manitoba AAQC. The maximum predicted metal concentrations in Black Sturgeon Reserve and along PR 391 for all averaging periods are less than the AAQC.

The maximum predicted 24-hour and 30-day metal concentrations occur along PR 391 near the MacLellan site. The concentration contour map for arsenic (Map G-25) is included in Appendix G because maximum predicted concentrations for arsenic are greater than 10% of the AAQC. The maximum predicted concentrations for the other metals are less than 10% of the AAQC.

Table 8-1 Predicted Maximum Ground-Level Concentrations from Gordon Site Operation

Substance	Averaging Period	Existing/ Baseline Conditions (µg/m³)	Maximum Ground-level Concentration (µg/m³) (includes Baseline Conditions)						Ambient Air Quality Criteria [a] (µg/m³)
			Max. Value in LAA	Max. Value at Human Receptors	Max. Value in Black Sturgeon Reserve	Max. Value along PR 391	Max. No. of Exceedances per Year	% Max. Value of AAQC	
Gaseous CAC									
NO_2	1-hour [b]	7.5	**459**	180	94.0	251	2 h/y	**115%**	400
	1-hour [e]	7.5	**224**	**95.5**	28.8	**90.7**	99 d/y	**283%**	79 [d,e]
	24-hour [c]	5.6	74.1	34.0	14.2	57.0	0	37%	200
	Annual	1.9	11.2	3.61	2.27	4.39	0	19%	60
							0	49%	23 [d,f]
CO	1-hour [b]	406	**16,096**	6,040	1,153	7,747	1 h/y	**107%**	15,000
	8-hour	406	4,952	1,192	515	1,866	0	83%	6,000
SO_2	1-hour [b]	6.0	**460**	168	27.3	215	1 h/y	**102%**	450
	1-hour [g]	6.0	**342**	44.7	8.56	41.1	5 d/y	**201%**	170 [d,g]
	24-hour [c]	6.0	48.7	13.5	6.98	18.8	0	32%	150
	Annual	1.5	2.45	1.60	1.51	1.59	0	8%	30
							0	25%	10 [d,h]
Other Gaseous Species									
HCN	1-hour [b]	0	4.29	0.481	0.296	4.29	0	11%	40
	24-hour [c]	0	2.34	0.114	0.099	2.34	0	29%	8 [i]
	Annual	0	0.077	0.008	0.0081	0.077	0	3%	3
Particulate CAC									
TSP	24-hour [c]	10.5	**606**	**162**	24.3	**235**	73 d/y	**505%**	120
	Annual [j]	10.5	14.8	11.9	10.8	11.4	0	25%	60 [j]
PM_{10}	24-hour	4.6	**361**	**100**	15.4	**160**	110 d/y	**721%**	50

Table 8-1 Predicted Maximum Ground-Level Concentrations from Gordon Site Operation

Substance	Averaging Period	Existing/ Baseline Conditions (µg/m³)	Maximum Ground-level Concentration (µg/m³) (includes Baseline Conditions)						Ambient Air Quality Criteria [a] (µg/m³)
			Max. Value in LAA	Max. Value at Human Receptors	Max. Value in Black Sturgeon Reserve	Max. Value along PR 391	Max. No. of Exceedances per Year	% Max. Value of AAQC	
$PM_{2.5}$	24-hour [k]	2.9	23.5	8.45	3.71	9.19	0	87%	27 [d,k]
	Annual [l]	2.9	6.87	3.54	3.04	3.73	0	78%	8.8 [d,l]
Dustfall (g/m²/30-day)	30-day	0.99	4.90	1.72	1.10	2.09	0	70%	7
	Annual [j]	0.99	1.87	1.43	1.05	1.36	0	41%	4.6 [j]
Metals									
Arsenic	24-hour [c]	0	0.126	0.0106	0.00393	0.126	0	42%	0.3
Cadmium	24-hour [c]	0	0.00148	0.0000323	0.0000333	0.00148	0	0.1%	2
Copper	24-hour [c]	0	0.0456	0.0102	0.00104	0.0456	0	0.1%	50
Lead	24-hour [c]	0	0.0440	0.000923	0.00105	0.0440	0	2%	2
	30-day	0	0.00328	0.000139	0.00016	0.00328	0	0.5%	0.7
Nickel	24-hour [c]	0	0.0827	0.00676	0.00186	0.0827	0	4%	2
Zinc	24-hour [c]	0	0.267	0.0100	0.00568	0.267	0	0.2%	120

NOTES:

[a] Manitoba Ambient Air Quality Criteria (MSD 2005) unless otherwise noted

[b] The maximum 1-hour concentration after eliminating 8 highest meteorological hours in each year

[c] The maximum 24-hour concentration after eliminating the 1st highest meteorological day in each year

[d] CAAQS (CCME 2017)

[e] The 1-hour CAAQS for NO_2 is referenced to the three-year average of the annual 98th percentile of the NO_2 daily maximum 1-hour average concentrations (effective 2025) (CCME 2017).

[f] The annual CAAQS for NO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average NO_2 concentrations (effective 2025) (CCME 2017).

[g] The 1-hour CAAQS for SO_2 is referenced to the three-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations (effective 2025) (CCME 2017).

[h] The annual CAAQS for SO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average SO_2 concentrations (effective 2025) (CCME 2017).

[i] Ontario AAQC (MOECC 2012)

[j] Annual geometric mean

[k] The CAAQS for 24-hour $PM_{2.5}$ is referenced to the annual 98th percentile of daily 24-hour average concentrations, averaged over three years (effective 2020) (CCME 2017).

Table 8-1 Predicted Maximum Ground-Level Concentrations from Gordon Site Operation

Substance	Averaging Period	Existing/ Baseline Conditions (µg/m³)	Maximum Ground-level Concentration (µg/m³) (includes Baseline Conditions)						Ambient Air Quality Criteria [a] (µg/m³)
			Max. Value in LAA	Max. Value at Human Receptors	Max. Value in Black Sturgeon Reserve	Max. Value along PR 391	Max. No. of Exceedances per Year	% Max. Value of AAQC	

[l] The CAAQS for annual $PM_{2.5}$ is referenced to the three-year mean of annual average concentrations (effective 2020) (CCME, 2017).
Predicted maximum 1-hour and 8-hour average concentrations are based on maximum hourly emission rates.
Predicted maximum 24-hour, 30-day and annual average concentrations are based on daily average emission rates.
Values in **BOLD** exceed the ambient air quality criteria

8.1.2 Source Contribution Analysis

A source contribution analysis for the Gordon site was completed for the maximum predicted 24-hour average concentrations at the northeast Project Boundary near the open pit (413133 m E, 6307554 m N, UTM Zone 14) as this is the general location of the maximum predicted concentrations for most of the substances of interest. Only substances with maximum predicted concentrations greater than 10% of the AAQC were considered in the analysis. For NO_2, the NO_X concentrations were used to discount any artificial effects of the OLM conversion of NO_X to NO_2.

The emission sources were grouped into categories by common emission pathways, such as blasting and explosives detonation, mining equipment and material handling, wind erosion, diesel generator, haul roads, access roads and PR 391. Table 8-2 presents the seven source groups used in the source contribution analysis at Gordon site.

To understand the relative importance of emission sources to high predicted concentrations and to evaluate the most effective mitigation options, the maximum predicted "worst-day" (24-hour) concentrations for each source group was used without consideration of temporal overlap (the "worst-day" for one substance may not overlap with the "worst-day" for another substance).

Table 8-2 Source Groups for the Source Contribution Analysis at the Gordon Site

Source Group Description	Source ID
Blasting and Explosives Detonation [a]	BL
Mining Equipment and Material Handling [b]	ME
Wind Erosion [c]	WE
Diesel Generator [d]	DG
Haul Roads [b]	HR
Access Road [b]	AR
PR 391 [b]	PR 391

NOTES:
[a] Emission sources include detonation of ammonium nitrate fuel oil emulsion explosives and fugitive dust emissions
[b] Emission sources includes diesel exhaust emissions and fugitive dust emissions
[c] Emission sources include fugitive dust emissions
[d] Emission source includes diesel exhaust emissions

Figure 8-1 illustrates the relative contributions of the seven source groups to the maximum predicted 24-hour concentrations at the northeast Project Boundary at the Gordon site for each substance of interest. The source contribution analysis is presented for each substance of interest below.

NO_2 (NO_X)

The explosives detonation in the open pit is the largest contributor to the maximum predicted 24-hour NO_X concentrations at the northeast Project Boundary (BL: 79%) followed by haul trucks (HR: 14%) and other mining equipment (ME: 7%). Smaller contributors include the diesel generator (DG: 0.4%), the access road vehicles (AR: 0.1%) and the PR 391 vehicles (PR 391: 0.01%) with a combined contribution less than 1%. Wind erosion (WE) is not a source of NO_X emissions and therefore, has no contribution to predicted NO_X concentrations.

CO

The explosives detonation in the open pit is the largest contributor to the maximum predicted 24-hour CO concentrations at the northeast Project Boundary (BL: 94%) followed by haul trucks (HR: 4%) and other mining equipment (ME: 2%). Smaller contributors include the diesel generator (DG: 0.01%), the access road vehicles (AR: 0.01%) and the PR 391 vehicles (PR 391: 0.001%) with a combined contribution less than 1%. Wind erosion (WE) is not a source of CO emissions and therefore, has no contribution to predicted CO concentrations.

SO_2

The explosives detonation in the open pit is the sole largest contributor to the maximum predicted 24-hour SO_2 concentrations at the northeast Project Boundary (BL: 100%). The haul trucks (HR: 0.3%), the mining equipment (ME: 0.2%), the diesel generator (DG: 0.005%), the access road vehicles (AR: 0.002%) and the PR 391 vehicles (PR 391: 0.0003%) have a combined contribution of less than 1%. Wind erosion (WE) is not a source of SO_2 emissions and therefore, has no contribution to predicted SO_2 concentrations.

TSP

The haul roads are the largest contributor to the maximum predicted 24-hour TSP concentrations at the northeast Project Boundary (HR: 47%) followed by fugitive dust from mining equipment and material handling (ME: 42%), blasting (BL: 8%) and the access road (AR: 3%). The remaining three source groups – the diesel generator (DG: 0.03%), PR 391 (PR 391: 0.02%) and wind erosion (WE: 0.04%) have a combined contribution of less than 1%.

PM_{10}

The haul roads are the largest contributor to the maximum predicted 24-hour PM_{10} concentrations at the northeast Project Boundary (HR: 44%) followed by fugitive dust from mining equipment and material handling (ME: 40%), blasting (BL: 12%) and the access road (AR: 4%). The remaining three source groups - the diesel generator (DG: 0.05%), PR 391 (PR 391: 0.03%) and wind erosion (WE: 0.03%) have a combined contribution of less than 1%.

$PM_{2.5}$

The fugitive dust from mining equipment and material handling is the largest contributor to the maximum predicted 24-hour $PM_{2.5}$ concentrations at the northeast Project Boundary (ME: 48%) followed by haul roads (HR: 41%), blasting (BL: 7%) and the access road (AR: 4%). The remaining three source groups - the diesel generator (DG: 0.1%), PR 391 (PR 391: 0.1%) and wind erosion (WE: 0.1%) have a combined contribution of less than 1%.

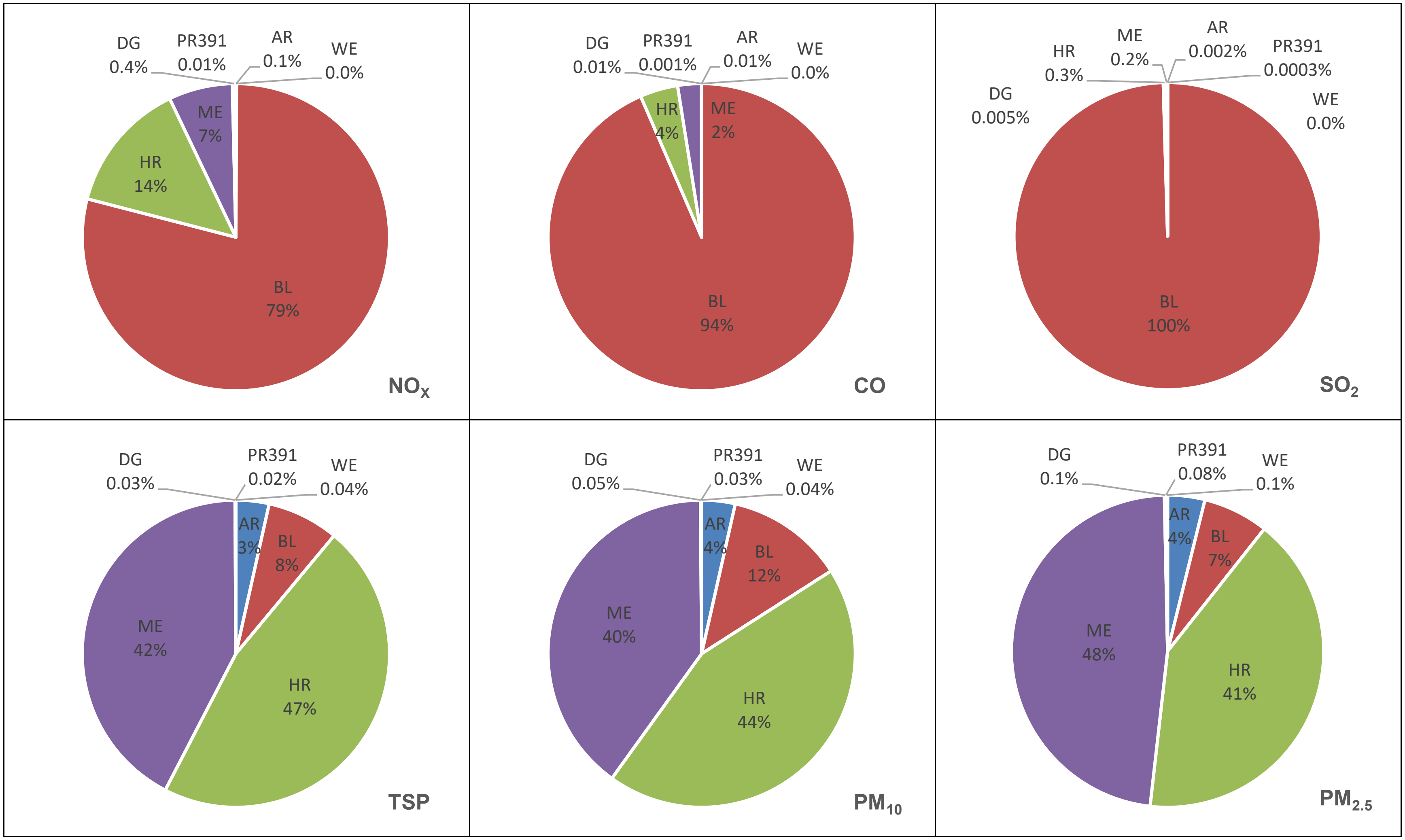


Figure 8-1 Source Contributions to Maximum Predicted 24-hour Concentrations at the Northeast Project Boundary at Gordon Site

8.2 MACLELLAN SITE OPERATION

The predicted maximum ground-level concentrations and dustfall from MacLellan site operation are summarized in Table 8-3. These maximum predicted concentrations in Table 8-3 are presented for the following areas:

- An overall maximum in the LAA.
- Maximum predicted concentrations at human receptors.

The associated concentration and dustfall contours in the LAA, including human receptors, are presented in Map G-1 to Map G-25 in Appendix G.

The maximum 1-hour average NO_2 concentrations and 24-hour average TSP and PM_{10} concentrations are greater than the respective AAQC and the CAAQS. For the other gaseous and particulate CACs, dustfall and metals, the maximum predicted values are less than the applicable AAQC. The highest predicted concentrations from MacLellan site operation for all substances of interest occur along the Project Boundary and reduce with increased distance from the boundary.

Maximum NO_2 Concentrations

The maximum predicted 1-hour NO_2 concentration, 404 µg/m³, is greater than the Manitoba AAQC (400 µg/m³). The maximum predicted 24-hour and annual NO_2 concentrations are 84.5 and 9.03 µg/m³, respectively, and are less than the Manitoba AAQC and the annual CAAQS. The maximum predicted 1-hour average NO_2 concentration in the metric of the CAAQS (146 µg/m³) is greater than the 1-hour CAAQS (79 µg/m³). The maximum predicted NO_2 concentrations at sensitive receptors for all averaging periods are less than the Manitoba AAQC. The maximum predicted NO_2 concentrations are greater than the 1-hour CAAQS at four sensitive receptors.

The maximum predicted 1-hour, 24-hour and annual NO_2 concentrations occur on the south and southwest Project Boundary near the ore milling and processing plant (Maps G-1, G-4 and G-5). The predicted NO_2 concentrations greater than the 1-hour Manitoba AAQC, 400 µg/m³, occur for one hour per year and are limited to the south Project Boundary near the ore milling and processing plant. There are no sensitive receptors on or near the boundary at this location.

The predicted NO_2 concentrations greater than the 1-hour CAAQS, 79 µg/m³, extend approximately 3.5 km from the MacLellan site boundary (Map G-2 and G-3). Along the Project Boundary, values greater than the 1-hour CAAQS are predicted for 79 days in a year, reducing to one day per year with increasing distance. There are four sensitive receptors (a youth camp, two trapping areas and a waste disposal site) within this area. The status of the youth camp is unknown because there were reports of a fire and it is unclear if the camp will be operational in the future.

Maximum CO Concentrations

The maximum predicted 1-hour and 8-hour CO concentrations are 13,328 μg/m³ and 4,144 μg/m³, respectively and are less than the Manitoba AAQC. The maximum predicted CO concentrations at sensitive receptors for all averaging periods are less than the AQC.

The maximum predicted 1-hour and 8-hour CO concentrations occur on the south and southwest Project Boundary, respectively, near the ore milling and processing plant (Maps G-6 and G-7).

Maximum SO_2 Concentrations

The maximum predicted 1-hour, 24-hour and annual SO_2 concentrations are 370 μg/m³, 39.0 μg/m³ and 1.95 μg/m³, respectively and are less than the Manitoba AAQC and the annual CAAQS. The maximum predicted 1-hour average SO_2 concentration in the metric of the CAAQS (147 μg/m³) is less than the 1-hour CAAQS (170 μg/m³) (Map G-9). The maximum predicted SO_2 concentrations at sensitive receptors for all averaging periods are less than the AAQC.

The maximum predicted 1-hour, 24-hour and annual SO_2 concentrations occur on the southwest Project Boundary near the ore milling and processing plant (Maps G-8, G-11 and G-12).

Maximum HCN Concentrations

The maximum predicted 1-hour, 24-hour and annual HCN concentrations are 14.4 μg/m³, 6.50 μg/m³ and 0.55 μg/m³, respectively and are less than the Manitoba AAQC and the 24-hour Ontario AAQC. The maximum predicted HCN concentrations at sensitive receptors for all averaging periods are less than the ambient criteria.

The maximum predicted 1-hour, 24-hour and annual HCN concentrations occur on the northwest Project Boundary near the TMF (Maps G-13, G-14 and G-15).

Maximum TSP Concentrations

The maximum predicted 24-hour TSP concentration, 513 μg/m³, is greater than the Manitoba AAQC (120 μg/m³). The maximum predicted annual TSP concentration, 14.2 μg/m³, is less than the Manitoba AAQC. The maximum predicted TSP concentrations are greater than the Manitoba 24-hour AAQC at three sensitive receptors (two trapping areas and a waste disposal site).

The maximum predicted 24-hour and annual TSP concentrations occur on the southwest Project Boundary near the ore milling and processing plant (Maps G-16 and G-18). The predicted TSP concentrations greater than the 24-hour Manitoba AAQC, 120 μg/m³, extend approximately 2.7 km from the MacLellan site boundary (Map G-17). Along the Project Boundary, values greater than the 24-hour AAQC are predicted for 64 days in a year, reducing to one day per year with increasing distance. There are three sensitive receptors (two trapping areas and a waste disposal site) within this area.

Maximum PM_{10} Concentrations

The maximum predicted 24-hour PM_{10} concentration, 315 µg/m³, is greater than the Manitoba AAQC (50 µg/m³). The maximum predicted PM_{10} concentrations are greater than the Manitoba 24-hour AAQC at five sensitive receptors (a youth camp, three trapping areas and a waste disposal site). The status of the youth camp is unknown because there were reports of a fire and it is unclear if the camp will be operational in the future.

The maximum predicted 24-hour PM_{10} concentration occurs on the southeast Project Boundary near the ore milling and processing plant (Map G-19). The predicted PM_{10} concentrations greater than the 24-hour Manitoba AAQC (50 µg/m³) extend approximately 4.2 km from the MacLellan site boundary (Map G-20). Along the Project Boundary, values greater than the 24-hour AAQC are predicted for 89 days in a year, reducing to one day per year with increasing distance. There are five sensitive receptors (a youth camp, three trapping areas and a waste disposal site) within this area. Currently, the youth camp is inactive.

Maximum $PM_{2.5}$ Concentrations

The maximum predicted 24-hour and annual $PM_{2.5}$ concentrations are 24.1 µg/m³ and 6.23 µg/m³ and are less than the CAAQS. The maximum predicted $PM_{2.5}$ concentrations at sensitive receptors for all averaging periods are less than the AAQC.

The maximum predicted 24-hour and annual $PM_{2.5}$ concentrations occur on the southwest Project Boundary near the ore milling and processing plant (Maps G-21 and G-22).

Maximum Dustfall

The maximum predicted 30-day and annual average dustfall are 5.51 g/m²/30-day and 1.97 g/m²/30-day and are less than the Ontario AAQC. The maximum predicted 30-day and annual average dustfall at sensitive receptors are less than the dustfall criteria.

The maximum predicted 30-day and annual dustfall occur on the southeast Project Boundary near the ore milling and processing plant. (Maps G-23 and G-24).

Maximum Metal Concentrations

The maximum predicted metal concentrations for all averaging periods are less than the Manitoba AAQC. The maximum predicted metal concentrations at sensitive receptors for all averaging periods are also less than the AAQC. The maximum predicted 24-hour and 30-day metal concentrations occurs on the southwest and south Project Boundary near the ore milling and processing plant. A concentration contour map is presented only for arsenic (Map G-25) because the maximum predicted concentrations for arsenic are greater than 10% of the AAQC. The maximum predicted concentrations for the other metals are less than 10% of the AAQC.

Table 8-3 Predicted Maximum Ground-Level Concentrations from MacLellan Site Operation

Substance	Averaging Period	Existing/ Baseline Conditions (µg/m³)	Maximum Ground-level Concentration (µg/m³) (includes Baseline Conditions)				Ambient Air Quality Criteria [a] (µg/m³)
			Max. Value in LAA	Max. Value at Human Receptors	Max. No. of Exceedances per Year	% Max. Value of AAQC	
Gaseous CAC							
NO_2	1-hour [b]	7.5	**404**	223	1 h/y	**101%**	400
	1-hour [e]	7.5	**146**	**91.5**	79 d/y	**185%**	79 [d,e]
	24-hour [c]	5.6	84.5	48.5	0	42%	200
	Annual	1.9	9.03	3.96	0	15%	60
					0	39%	23 [d,f]
CO	1-hour [b]	406	13,328	6,282	0	89%	15,000
	8-hour	406	4,144	1,445	0	69%	6,000
SO_2	1-hour [b]	6.0	370	173	0	82%	450
	1-hour [g]	6.0	147	36.2	0	86%	170 [d,g]
	24-hour [c]	6.0	39.0	15.7	0	26%	150
	Annual	1.5	1.95	1.60	0	7%	30
					0	20%	10 [d,h]
Other Gaseous Species							
HCN	1-hour [b]	0	14.4	7.15	0	36%	40
	24-hour [c]	0	6.50	2.92	0	81%	8 [i]
	Annual	0	0.55	0.22	0	18%	3
Particulate CAC							
TSP	24-hour [c]	10.5	**513**	**205**	64 d/y	**428%**	120
	Annual [j]	10.5	14.2	12.0	0	24%	60 [j]
PM_{10}	24-hour	4.6	**315**	**132**	89 d/y	**630%**	50
$PM_{2.5}$	24-hour [k]	2.9	24.1	8.40	0	89%	27 [d,k]
	Annual [l]	2.9	6.23	3.74	0	71%	8.8 [d,l]
Dustfall (g/m²/30-day)	30-day	0.33	4.85	1.36	0	69%	7
	Annual [j]	0.33	1.31	0.94	0	28%	4.6 [j]
Metals							
Arsenic	24-hour [c]	0	0.278	0.0969	0	93%	0.3
Cadmium	24-hour [c]	0	0.00314	0.00113	0	0.2%	2
Copper	24-hour [c]	0	0.10074	0.0394	0	0.2%	50
Lead	24-hour [c]	0	0.0984	0.0342	0	5%	2

Table 8-3 Predicted Maximum Ground-Level Concentrations from MacLellan Site Operation

Substance	Averaging Period	Existing/ Baseline Conditions (µg/m³)	Maximum Ground-level Concentration (µg/m³) (includes Baseline Conditions)				Ambient Air Quality Criteria [a] (µg/m³)
			Max. Value in LAA	Max. Value at Human Receptors	Max. No. of Exceedances per Year	% Max. Value of AAQC	
	30-day	0	0.0171	0.00383	0	2%	0.7
Nickel	24-hour [c]	0	0.176	0.0653	0	9%	2
Zinc	24-hour [c]	0	0.479	0.197	0	0.4%	120

NOTES:

[a] Manitoba AAQC (MSD 2005) unless otherwise noted

[b] The maximum 1-hour concentration after eliminating 8 highest meteorological hours in each year

[c] The maximum 24-hour concentration after eliminating the 1st highest meteorological day in each year

[d] CAAQS (CCME 2017)

[e] The 1-hour CAAQS for NO_2 is referenced to the three-year average of the annual 98th percentile of the NO_2 daily maximum 1-hour average concentrations (effective 2025) (CCME 2017).

[f] The annual CAAQS for NO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average NO_2 concentrations (effective 2025) (CCME 2017).

[g] The 1-hour CAAQS for SO_2 is referenced to the three-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations (effective 2025) (CCME 2017).

[h] The annual CAAQS for SO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average SO_2 concentrations (effective 2025) (CCME 2017).

[i] Ontario AAQC (MOECC 2012)

[j] Annual geometric mean

[k] The CAAQS for 24-hour $PM_{2.5}$ is referenced to the annual 98th percentile of daily 24-hour average concentrations, averaged over three years (effective 2020) (CCME 2017).

[l] The CAAQS for annual $PM_{2.5}$ is referenced to the three-year mean of annual average concentrations (effective 2020) (CCME 2017).

Predicted maximum 1-hour and 8-hour average concentrations are based on maximum hourly emission rates.

Predicted maximum 24-hour, 30-day and annual average concentrations are based on daily average emission rates.

Values in **BOLD** exceed the ambient air quality criteria

8.2.2 Source Contribution Analysis

A source contribution analysis for MacLellan site was completed for the maximum predicted 24-hour average concentrations at the permanent work camp (380916 m E, 6308622 m N, UTM Zone 14) because of its proximity to emission sources at the MacLellan site and because the permanent work camp is included in the human health assessment. Only the substances with maximum predicted concentrations greater than 10% of the AAQC were considered. For NO_2, the NO_X concentrations were used to discount any artificial effects of the OLM conversion of NO_X to NO_2.

The CAC and HCN emission sources were grouped into categories by common emission pathways, such as blasting and explosives detonation, mining equipment and material handling, wind erosion, ore milling and processing plant, TMF pond, haul roads, access roads and PR 391. Table 8-2 presents the eight source groups used in the source contribution analysis for CACs and HCN at MacLellan site.

Arsenic is the only metal with maximum predicted 24-hour concentrations greater than 10% of the AAQC at MacLellan site. The emission sources for arsenic (As) were grouped into diesel exhaust and five PM sources that contain As: mine rock, ore, overburden, road dust and tailings. Table 8-5 presents the six source groups used in the source contribution analysis for As at MacLellan site.

To understand the relative importance of emission sources to high predicted concentrations and to evaluate the most effective mitigation options, the maximum predicted "worst-day" (24-hour) concentrations for each source group were used without consideration of temporal overlap (the "worst-day" for one substance may not overlap with the "worst-day" for another substance).

Table 8-4 Source Groups for the Source Contribution Analysis of CACs and HCN at the MacLellan Site

Source Group Description	Source ID
Blasting and Explosives Detonation [a]	BL
Mining Equipment and Material Handling [b]	ME
Wind Erosion [c]	WE
Mill Feed Crushing Plant and Ore Milling and Processing Plant [d]	PP
TMF Pond [e]	TMF
Haul Roads [b]	HR
Access Roads [b]	AR
PR 391 [b]	PR 391

NOTES:
[a] Emission sources include explosives detonation emissions and fugitive dust emissions
[b] Emission sources includes diesel exhaust emissions and fugitive dust emissions
[c] Emission sources include fugitive dust emissions
[d] Emission sources include PM emissions from dust collectors and wet scrubbers and fugitive HCN emissions
[e] Emission sources include fugitive HCN emissions

Table 8-5 Source Groups for the Source Contribution Analysis of Arsenic at MacLellan Site

Source Group Description	Source ID
Diesel Exhaust [a]	DE
Mine Rock [b]	MR
Ore [c]	OR
Overburden [b]	OB
Road Dust [b]	RD
Tailings [b]	TMF

NOTES:
[a] Emission sources include diesel exhaust emissions
[b] Emission sources include fugitive dust emissions

[c] Emission sources include PM emissions from the mill feed crushing plant and the ore milling and processing plant, and fugitive dust emissions

Figure 8-2 illustrates the relative contributions of the eight source groups to the maximum predicted 24-hour CAC and HCN concentrations at the permanent work camp. Figure 8-3 illustrates the relative contributions of the six source groups to the maximum predicted 24-hour As concentrations at the permanent work camp. The source contribution analysis is presented for each substance of interest below.

NO_2 (NO_X)

The haul trucks are the largest contributor to maximum predicted 24-hour NO_X concentrations at the permanent work camp (HR: 48%) followed by explosives detonation (BL: 40%) and other mining equipment (ME: 12%). Smaller contributors include the access road vehicles (AR: 0.2%) and the PR 391 vehicles (PR 391: 0.07%) with a combined contribution of less than 1%. The ore milling and processing plant (PP) and wind erosion (WE) are not sources of NO_X emissions and therefore, have no contribution to predicted NO_X concentrations.

CO

The explosives detonation is the largest contributor to maximum predicted 24-hour CO concentrations at the permanent work camp (BL: 71%) followed by haul trucks (HR: 20%) and other mining equipment (ME: 9%). Smaller contributors include the access road vehicles (AR: 0.02%) and the PR 391 vehicles (PR 391: 0.01%) with combined contribution less than 1%. The ore milling and processing plant (PP) and wind erosion (WE) are not sources of CO emissions and therefore, have no contribution to predicted CO concentrations.

SO_2

The explosives detonation in the open pit is the largest contributor to maximum predicted 24-hour SO_2 concentrations at the permanent work camp (BL: 96%), followed by haul trucks (HR: 2%) and the ore milling and processing plant (PP: 1%). The other mining equipment (ME: 0.8%), the access road vehicles (AR: 0.01%) and the PR 391 vehicles (PR 391: 0.003%) have a combined contribution of less than 1%. Wind erosion (WE) is not a source of SO_2 emissions and therefore, has no contribution to predicted SO_2 concentrations.

HCN

The ore milling and processing plant is the largest contributor to maximum predicted 24-hour HCN concentrations at the permanent work camp (PP: 80%) followed by the TMF pond (TMF: 20%). The remaining source groups are not sources of HCN emissions and therefore, have no contribution to predicted HCN concentrations.

TSP

The haul roads are the largest contributor to maximum predicted 24-hour TSP concentrations at the permanent work camp (HR: 45%) followed by fugitive dust from mining equipment and material handling

(ME: 27%), the mill feed crushing plant and ore milling and processing plant (PP: 20%) and the access roads (AR: 6%). The remaining three source groups – blasting (BL: 1%), wind erosion (WE: 1%) and PR 391 (PR 391: 0.06%) have a combined contribution of less than 3%.

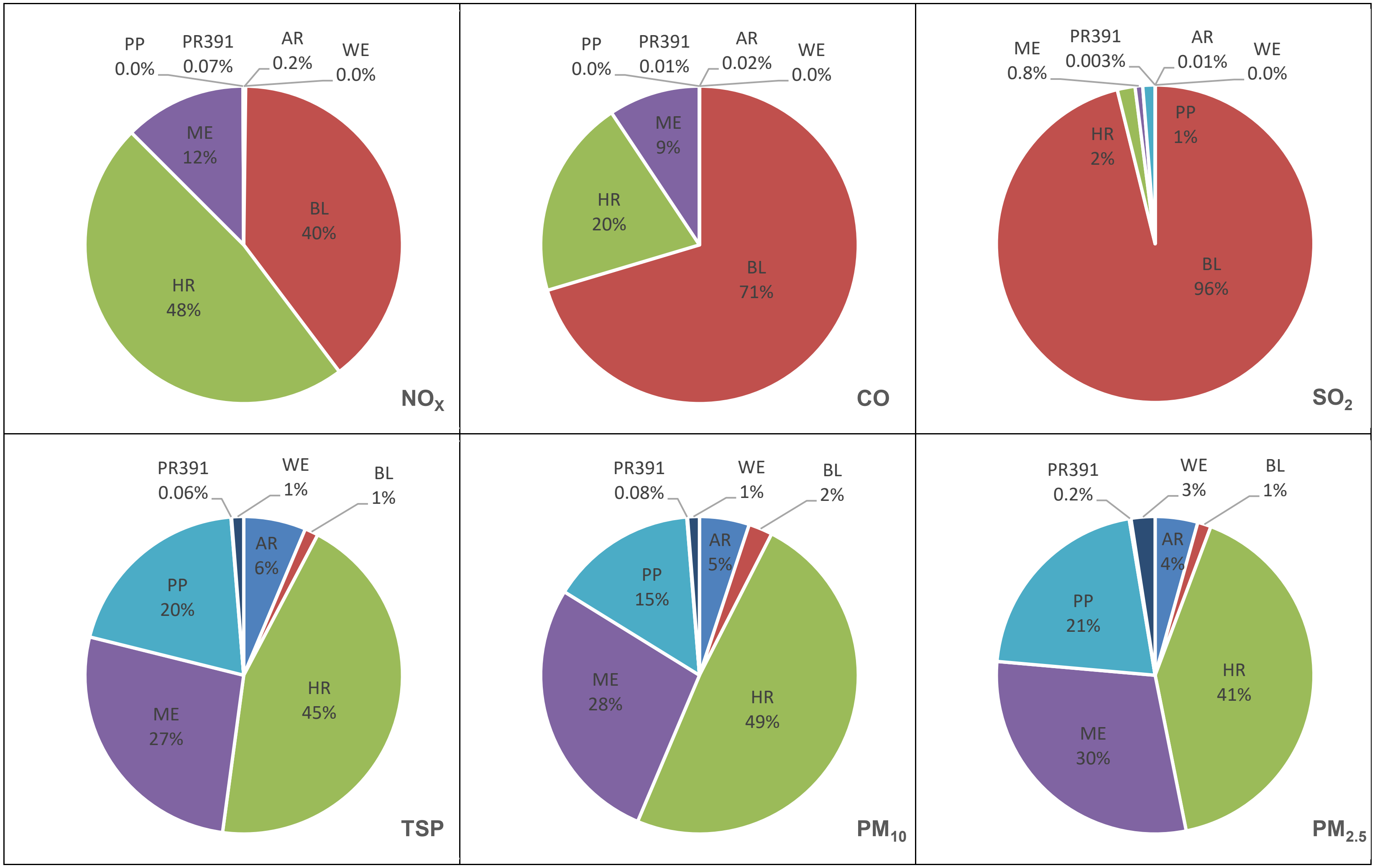


Figure 8-2 Source Contributions to Maximum Predicted 24-hour CAC Concentrations at the Permanent Work Camp at the MacLellan Site

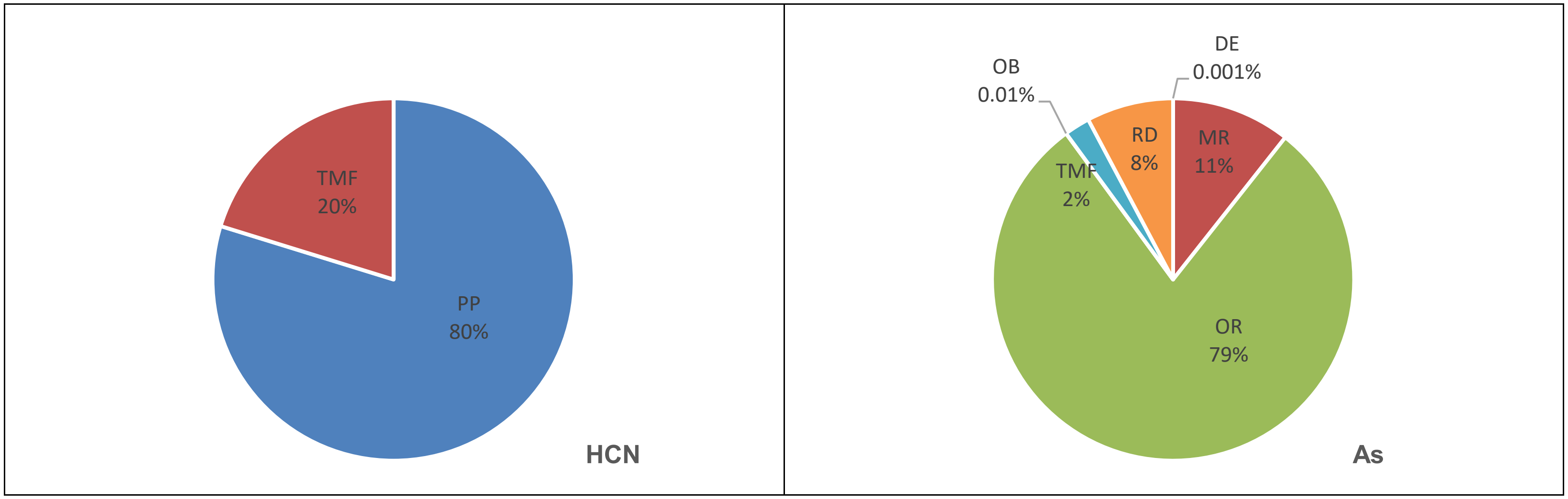


Figure 8-3 Source Contributions to Maximum Predicted 24-hour HCN and As Concentrations at the Permanent Work Camp at MacLellan Site

PM_{10}

The haul roads are the largest contributor to maximum predicted 24-hour PM_{10} concentrations at the permanent work camp (HR: 49%) followed by fugitive dust from mining equipment and material handling (ME: 28%), the mill feed crushing plant and ore milling and processing plant (PP: 15%) and the access roads (AR: 5%). The remaining three source groups - blasting (BL: 2%), wind erosion (WE: 1%) and PR 391 (PR 391: 0.08%) have a combined contribution of less than 3%.

$PM_{2.5}$

The haul roads are the largest contributor to maximum predicted 24-hour $PM_{2.5}$ concentrations at the permanent work camp (HR: 41%) followed by fugitive dust from mining equipment and material handling (ME: 30%), the mill feed crushing plant and ore milling and processing plant (PP: 21%) and the access roads (AR: 4%). The remaining three source groups - wind erosion (WE: 3%), blasting (BL: 1%) and PR 391 (PR 391: 0.2%) have a combined contribution of less than 4%.

As

Ore is the largest contributor to maximum predicted 24-hour As concentrations at the permanent work camp (OR: 79%) followed by mine rock (MR: 11%) and road dust (RD: 8%). The remaining three source groups – tailings (TMF: 2%), overburden (OB: 0.01%) and diesel exhaust (DE: 0.001%) have a combined contribution of less than 3%.

9.0 MODEL PREDICTION UNCERTAINTY

The air quality assessment depends on air quality simulation models to link emissions to air quality changes, and the model predictions depend on the representativeness of the source and emission inventory, the meteorological conditions used in the model, and the algorithms used to represent atmospheric physics and chemistry processes in the models.

9.1 EMISSION UNCERTAINTY

Diesel exhaust emissions from construction and mining off-road equipment are based on the Canadian emission standards for off-road compression-ignition engines (ECCC 2005) and published equipment load factors (US EPA 2010b). Therefore, the level of confidence associated with the estimation of gaseous CAC emissions (e.g., NO_X, CO, SO_2 and VOC) and DPM from these sources is high. The level of confidence for the estimation of emission rates for individual VOC, PAH and metal species is medium because emission factors for these species are derived using a transportation model (MOVES2014a) based on vehicle population distributions built into the model.

Fugitive TSP (and associated PM_{10} and $PM_{2.5}$) emission rates depend on the properties of the surface material, the occurrence and history of surface disturbances, and meteorological conditions. While the air quality assessment uses emission estimation algorithms developed by the US EPA, there is uncertainty associated with estimating these emissions. Particularly, fugitive road dust emissions estimated with the

US EPA emission factors have been found to substantially overpredict PM emissions. This overprediction results in overprediction of the associated ambient TSP, PM_{10} and $PM_{2.5}$ concentrations and dustfall deposition. Multiple investigators have found consistent overpredictions when comparing the predicted fugitive PM concentrations from air quality models to measured PM concentrations, typically by a factor of 2 to 6 (Pace 2005; Countess 2007; Pouliot et al. 2010).

Pace (2005) states that "*Most experts agree that this overestimation is due to a combination of shortcomings in the inventory-modelling process: 1) the multiplier used to "scale" or infer $PM_{2.5}$ from PM_{10} emissions in the inventory, 2) faulty emission factor algorithms, 3) imprecise or difficult to obtain activity data to apply these algorithms (including inability to account for the effect of actual meteorological conditions on emissions), and 4) modelling deficiencies (especially in the treatment of particles near their point of emissions)*".

Practitioners often reduce particulate matter emission rates by a factor between 2 to 6 to account for these issues. In this assessment, fugitive dust emissions estimated using the US EPA approach were used without reduction to obtain a first order understanding of potential magnitude, geographic extent, and frequency of the maximum concentrations in the LAA due to Project operation. Therefore, the PM concentration and deposition predictions should be interpreted as being conservative and overstated.

9.2 METEOROLOGY UNCERTAINTY

The application of five years of hourly meteorological data includes a wide range of conditions which reduces the level of uncertainty related to meteorology. The use of five years of meteorology data is consistent with the recommendations provided in the Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006). The CALMET® model domain for this assessment is relatively flat and therefore, large variations in meteorology across the domain are not expected. The level of confidence related to the meteorological data is rated as moderate to high.

9.3 MODEL UNCERTAINTY

In terms of the air quality model algorithms, the US Environmental Protection Agency (US EPA 2005) states:

> *"Models are reasonably reliable in estimating the magnitude of highest concentrations occurring sometime, somewhere within an area. For example, errors in highest estimated concentrations of ±10 to ±40% are found to be typical, i.e., certainly well within the often-quoted factor-of-two accuracy that has long been recognized for these models."*

In addition, they also state, "*it is desirable to quantify the accuracy or uncertainty associated with concentration estimates used in decision-making. Communications between modelers and decision-makers must be fostered and further developed*."

The US EPA (2005) indicates that the application of regulatory dispersion models is viewed as a best estimate approach and that this approach should be viewed as acceptable to the decision maker. MSD (2006) has issued guidelines for air dispersion modelling recognizing that the modelling is a best estimate approach and to provide consistency with respect to the application of models to assess projects in

Manitoba. The model approach that was used for this assessment is viewed as being a best-practice approach. The level of confidence related to the air dispersion model is rated as moderate to high.

9.4 OVERALL PREDICTION CONFIDENCE FOR CHANGES IN AIR QUALITY

The level of confidence is high for the estimated combustion emissions, the representativeness of the meteorological data, the selected model approach, and the overall effectiveness of the proposed mitigation measures. The prediction confidence associated with the estimation of fugitive dust emissions is medium to low. For this reason, an ambient air quality and meteorology monitoring program would be conducted during construction and operation to determine the effectiveness of fugitive dust mitigation.

10.0 SUMMARY AND CONCLUSIONS

An air quality assessment of the effects of NO_X, CO, SO_2, HCN, TSP, PM_{10}, $PM_{2.5}$ and six metal emissions from the Project was conducted. The air quality assessment evaluated Project emissions separately for the Gordon and MacLellan sites.

The baseline ambient concentrations and dustfall were derived from a combination of local ambient air quality monitoring for $PM_{2.5}$, PM_{10} and dustfall during summer 2015 and summer 2016 and from historical monitoring data from other more distant monitoring stations in Manitoba and Northwest Territories for NO_2, SO_2 and CO, which were not measured during the field programs. The Fort Smith station in Northwest Territories was considered the most representative for the LAA as the station is in a similarly remote area with low population density and with similar meteorological and topographical conditions. The baseline measurements show that baseline air quality in the LAA is very good.

Potential effects on ambient air quality associated with Project operation were evaluated using the CALPUFF® atmospheric dispersion model and the assessment was completed in accordance with the draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation, 2006) and guidelines from other provincial jurisdictions. The estimated emissions from Project construction were not modelled because the emissions during the worst-case year of construction were substantially less than emissions from the worst-case (peak production) year of operation at both sites, except for DPM emissions which were 20% higher than the corresponding emissions during operation. The higher DPM emissions during construction are due to the conservative assumption that construction off-road equipment will be mostly rented and will comply with older (Tier 3) Canadian emission standards for off-road diesel engines (ECCC 2005a). If newer (Tier 4) construction off-road equipment is used the DPM emissions during construction will be less. At the Gordon site the construction emissions were 65% to 85% less than the worst-case operation emissions. At the MacLellan site the construction emissions were 20% to 65% less than the worst-case operation emissions. Therefore, the effects on air quality will be less than operation.

The predicted maximum concentrations of gaseous substances (NO_2, CO, SO_2 and HCN) associated with emissions from the Project are below the Manitoba ambient air quality criteria (AAQC) except for maximum predicted 1-hour NO_2, CO and SO_2 concentrations at Gordon site and maximum predicted 1-hour NO_2

concentrations at MacLellan site. However, these occurrences are only predicted to occur on the Project Boundary, are limited to one to two hours per year and are not near sensitive receptors.

The air dispersion modelling indicates exceedances of the 24-hour TSP and PM_{10} AAQC. The predicted TSP and PM_{10} concentrations are strongly influenced by fugitive dust emissions associated with the haul roads. The TSP and PM_{10} predictions are conservative as it has been widely accepted that the US EPA emission factor for fugitive dust from unpaved roads overpredicts the ground-level concentrations by a factor of 2 to 6 (Pace 2005; Countess 2007; Pouliot et al. 2010).

An Air Quality Management Plan (AQMP) will be developed for Project construction and operation to monitor and manage the ambient air quality near the Project. The AQMG will include adaptive management recommendations to reduce fugitive dust emissions and evaluate the need for more rigorous dust mitigation. Monitoring will include meteorological monitoring (wind speed and direction, air temperature and relative humidity and rain precipitation) and ambient PM monitoring (TSP, PM_{10} and $PM_{2.5}$). If the monitoring program indicates that ground-level TSP, PM_{10} and/or $PM_{2.5}$ concentrations are greater than the AAQC, additional mitigation measures to reduce PM emissions will be implemented. Given that dust from the haul roads is the largest source of particulate emissions, more frequent road watering or an application of a dust suppressant will be implemented.

The GHG emissions from the Project construction (i.e., includes the MacLellan site and the Gordon site) are 80,617 tonnes CO_2e per year and are anticipated to be less than 0.011% of national emissions and less than 0.37% of the provincial emissions. The GHG emissions from the Project operation (i.e., includes the MacLellan site and the Gordon site) are 104,885 tonnes CO_2e per year and are anticipated to be less than 0.015% of national emissions and less than 0.48% of the provincial emissions.

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12.0 STANTEC QUALITY MANAGEMENT PROGRAM

This Technical Modelling Report, entitled **Lynn Lake Gold Project, Air Quality Impact Assessment** prepared for Alamos Gold Inc., dated March 11, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individual:

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Air Quality Scientist

Signature

This report was reviewed by the following individuals:

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Senior Associate, Environmental Services

Signature

Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC, PMP
Principal – Environmental Services

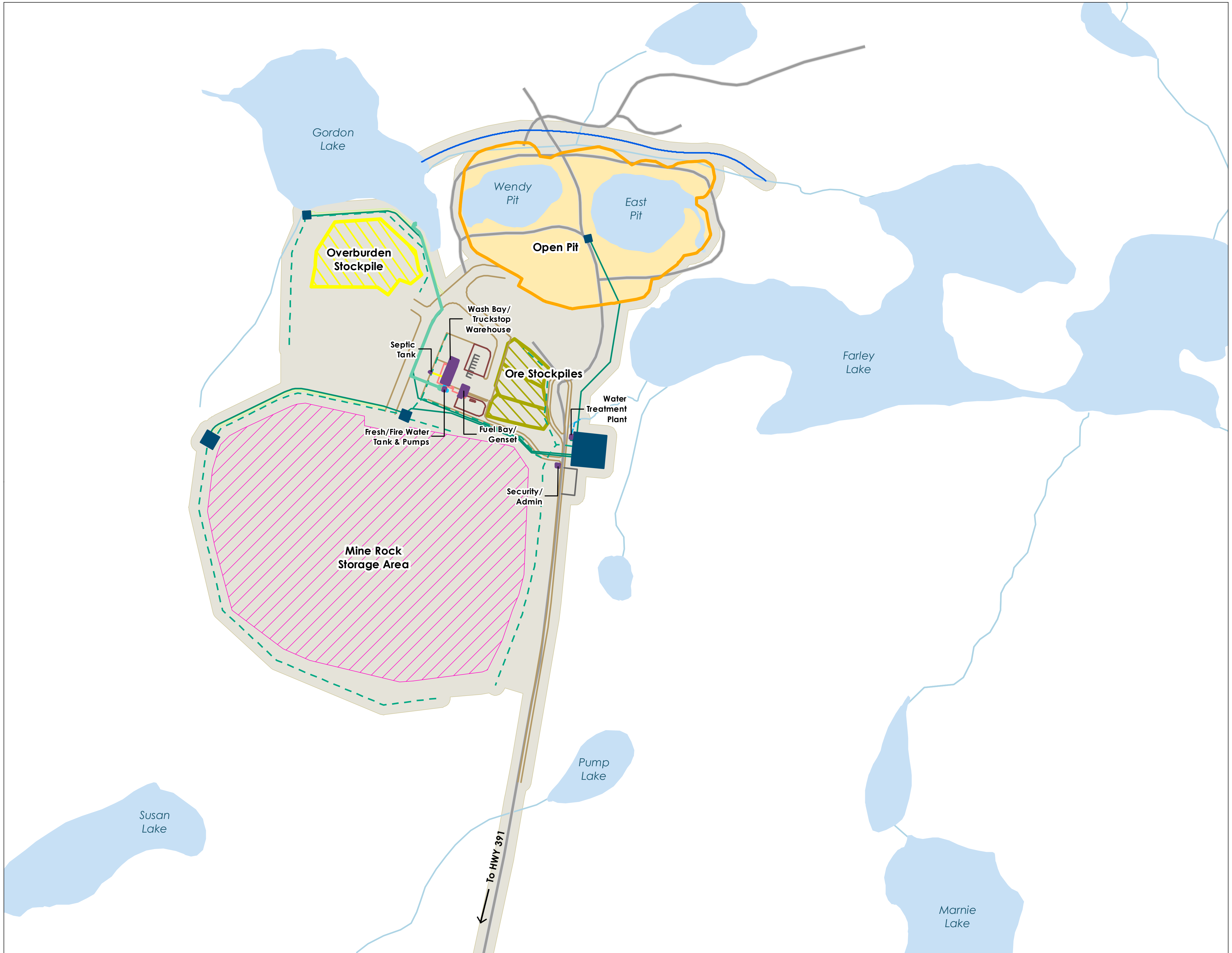
Signature

This report was independently reviewed by Jennifer McPhail, M.Eng., P.Eng., Associate

13.0 LIMITATIONS

This Technical Modelling Report entitled Lynn Lake Gold Project, Air Quality Impact Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Alamos Gold Inc. (the "Client") to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A MAPS



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Ditch
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:12,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake,
Manitoba

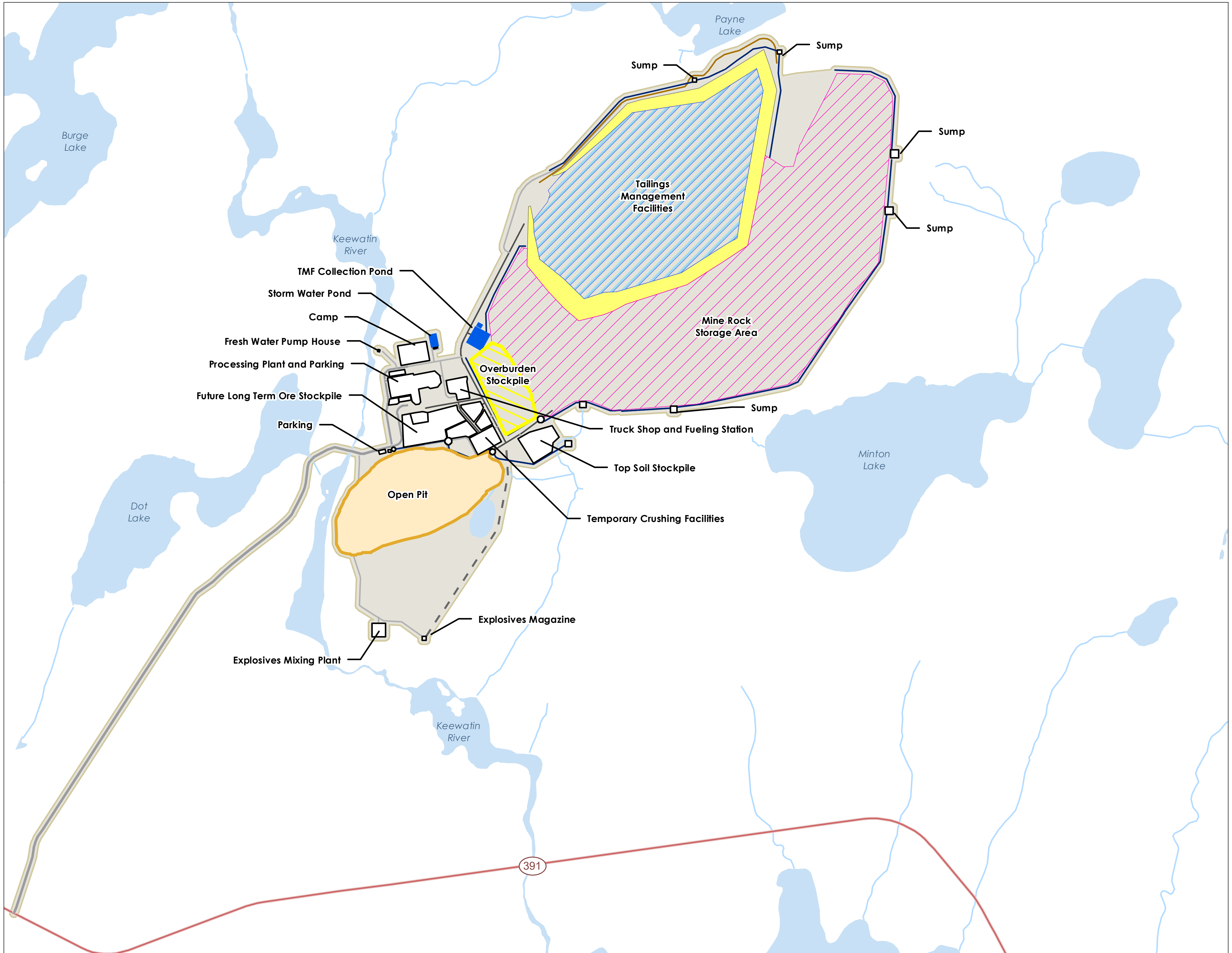
Prepared by ACampigotto on 2020-01-17
Technical Review by CAnseeuw on 2020-01-17
Senior GIS Review by GKroupa on 2020-01-17

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-1

Title
Project Development Area - Gordon site

G:\ GIS Project Folder\111473008 LLGP EA\figures\Ch2 Project Description\For Review\Map2-1 PD GordonDevelopment 20200117.mxd Revised: 2020-01-17 By: ACampigotto



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Alamos Gold Inc.

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Proposed Mine Rock Stockpile
- Proposed Overburden Stockpile
- Proposed Tailings Management Facilities
- Proposed Tailings Management Facilities Pond
- Other Proposed Ponds
- Other Proposed Areas
- Drainage Ditch
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Landbase

- Highway
- Existing Access Road
- Watercourse
- Waterbody

N

0 0.5 1 Kilometres

(At original document size of 11x17)
1:30,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

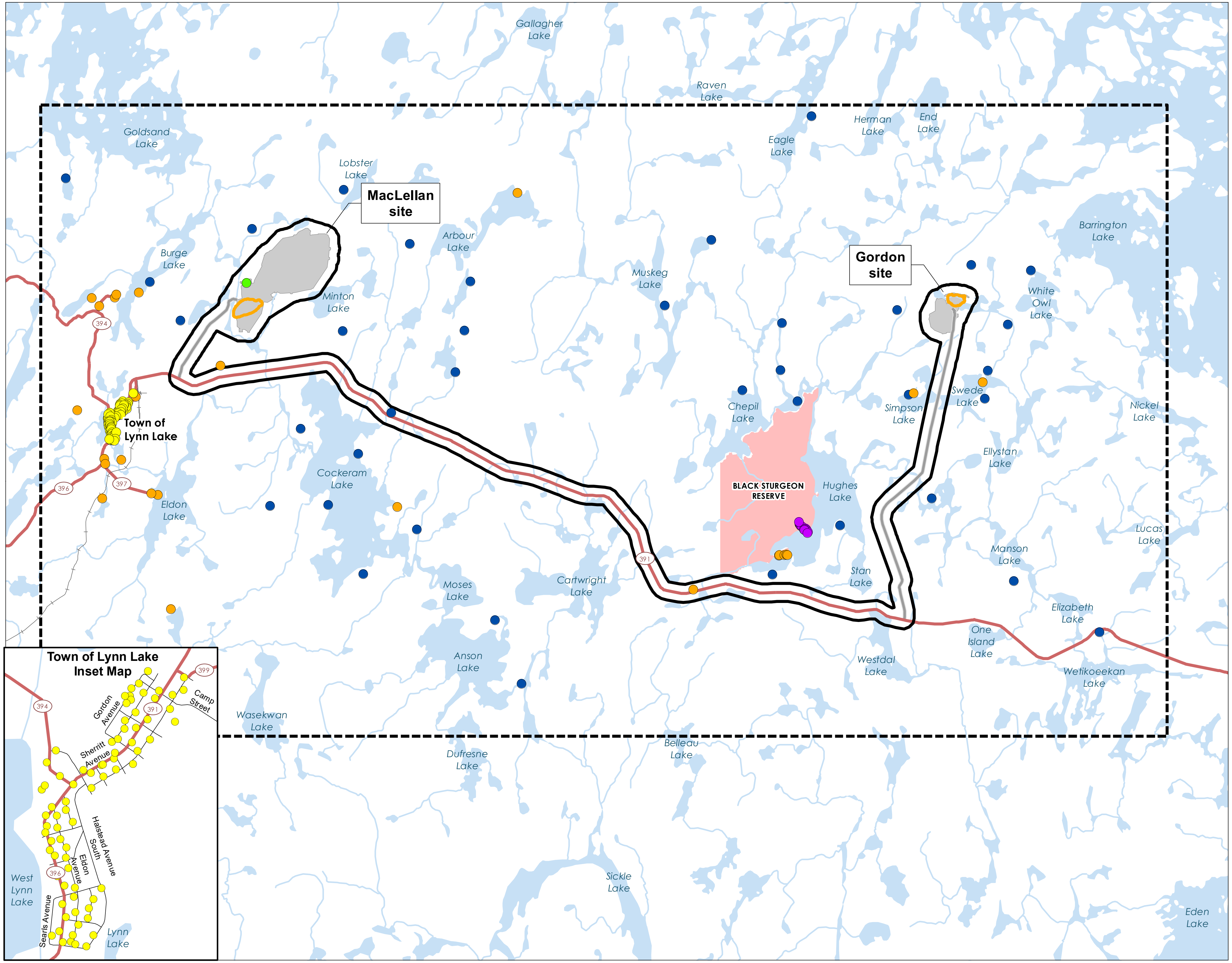
Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2019-12-03
Technical Review by CAnseeuw on 2019-12-03
Senior GIS Review by GKroupa on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-2

Title
Project Development Area - MacLellan site



Stantec

Alamos Gold Inc.

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- Project Boundary
- Air Quality Local Assessment Area (LAA)

Human Receptors
- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

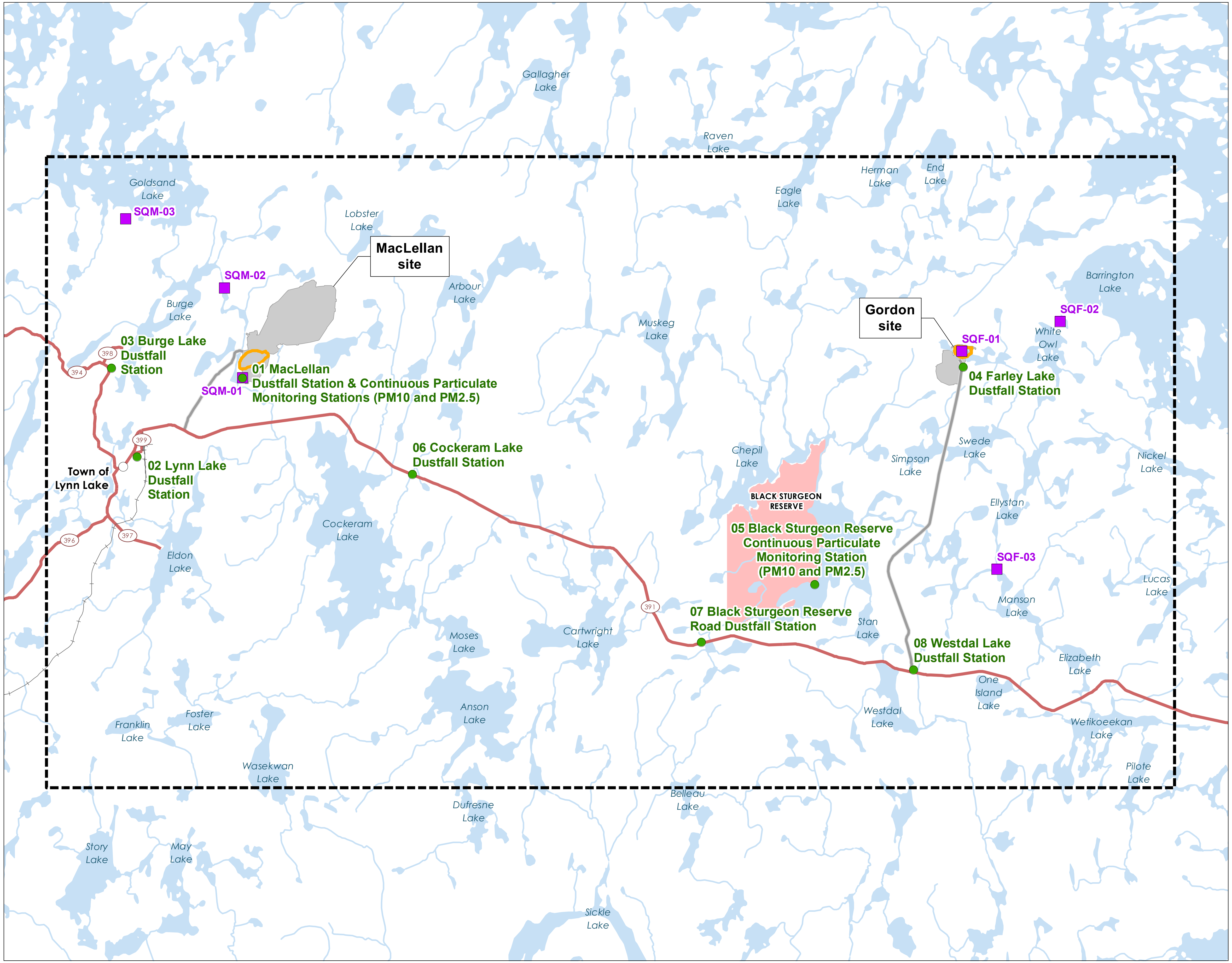
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by DJarratt on 2020-04-07
Senior GIS Review by GKroupa on 2020-04-07

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-3

Title
Air Quality Local Assessment Area and Human Receptor Locations



Stantec

Alamos Gold Inc.

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- Air Quality Local Assessment Area

Monitoring Locations
- Air Quality Monitoring Station

Sample Locations
- Snow Sample Location

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

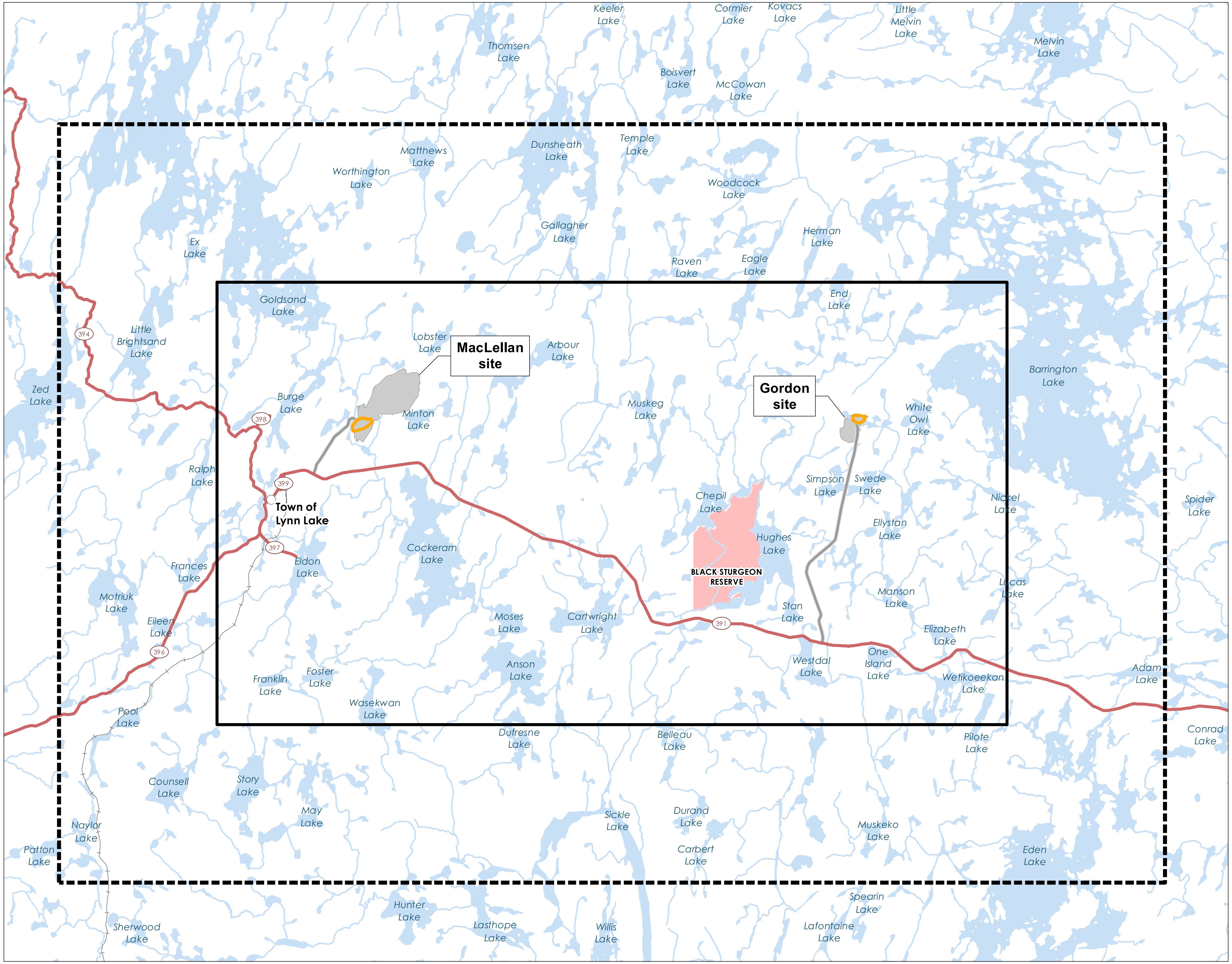
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2019-11-06
Technical Review by DJarratt on 2019-11-06
Senior GIS Review by GKroupa on 2019-12-16

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-4

Title
Ambient Air Quality Monitoring Locations



Stantec

ALAMOS GOLD INC.

Study Area

- Proposed Open Pit
- Project Development Area
- CALPUFF Model Domain
- CALMET Model Domain

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 4 8 Kilometres

(At original document size of 11x17)
1:250,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

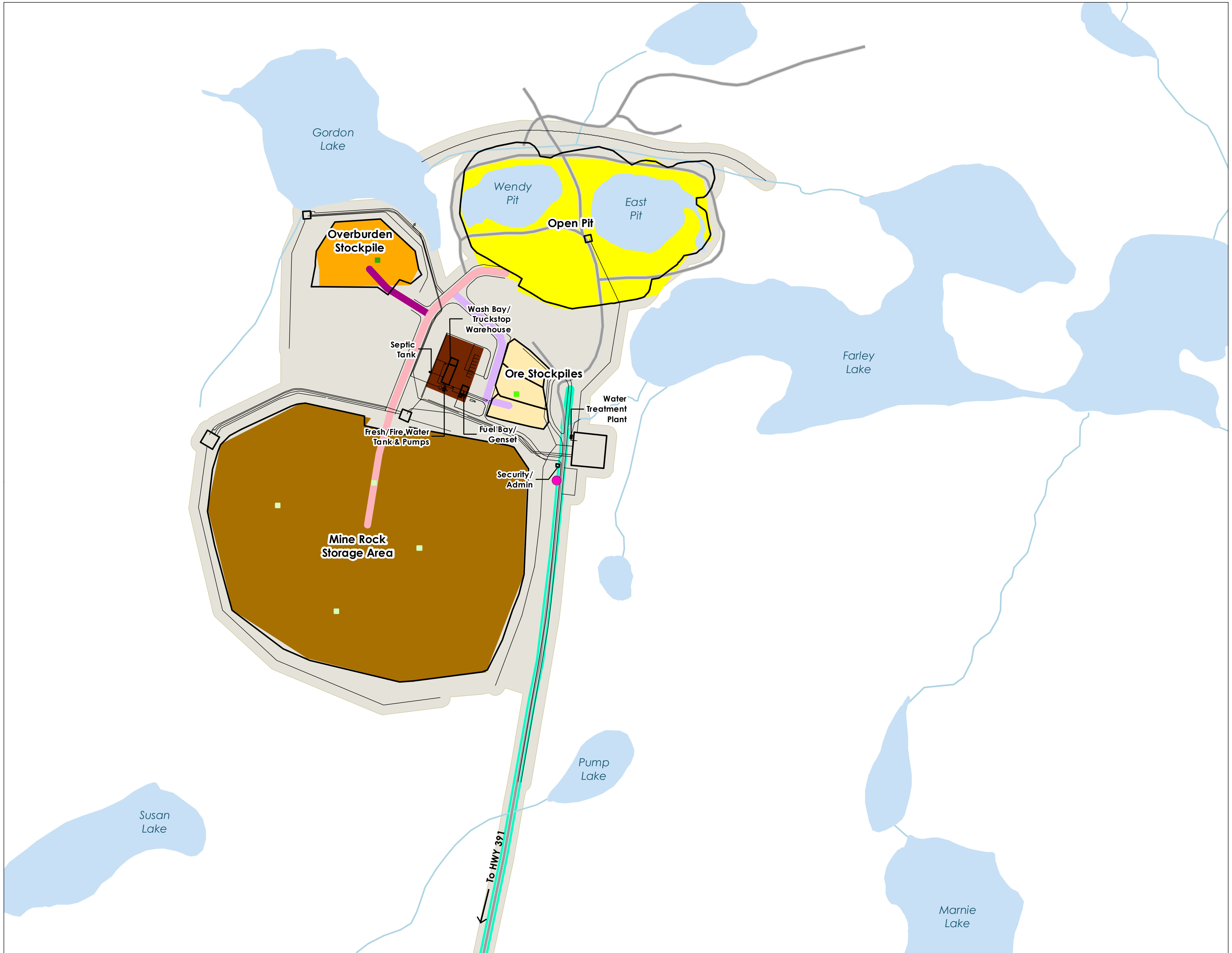
Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-5

Title
CALMET and CALPUFF Model Domains

G:\ GIS Project Folder\111473008 LLGP EA\figures\Ch6 Atmospheric Environment\TMR Report AQ\MapA-5 CALMET CALPUFF Domains.mxd Revised: 2020-01-23 By: ACampigotto



Stantec

Alamos Gold Inc.

Project Infrastructure

Infrastructure Features

Project Development Area

Emission Source Type

Point Source

Diesel Generator

Volume Source

Material Handling at MRSA

Material Handling at Ore Stockpile

Material Handling at Overburden Stockpile

Haul Road Source

Haul Road from the Open Pit to the MRSA

Haul Road from the Open Pit to the Ore Stockpile

Haul Road from the Open Pit to the Overburden Stockpile

Access Road Source

Access Road to Gordon Site

Open Pit Source

Open Pit at Gordon Site

Area Source

Ore Stockpile Wind Erosion

Overburden Wind Erosion

MRSA Wind Erosion

General Area

Landbase

Existing Access

Watercourse

Waterbody

N

0 250 500 Metres

(At original document size of 11x17) 1:12,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location

Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008

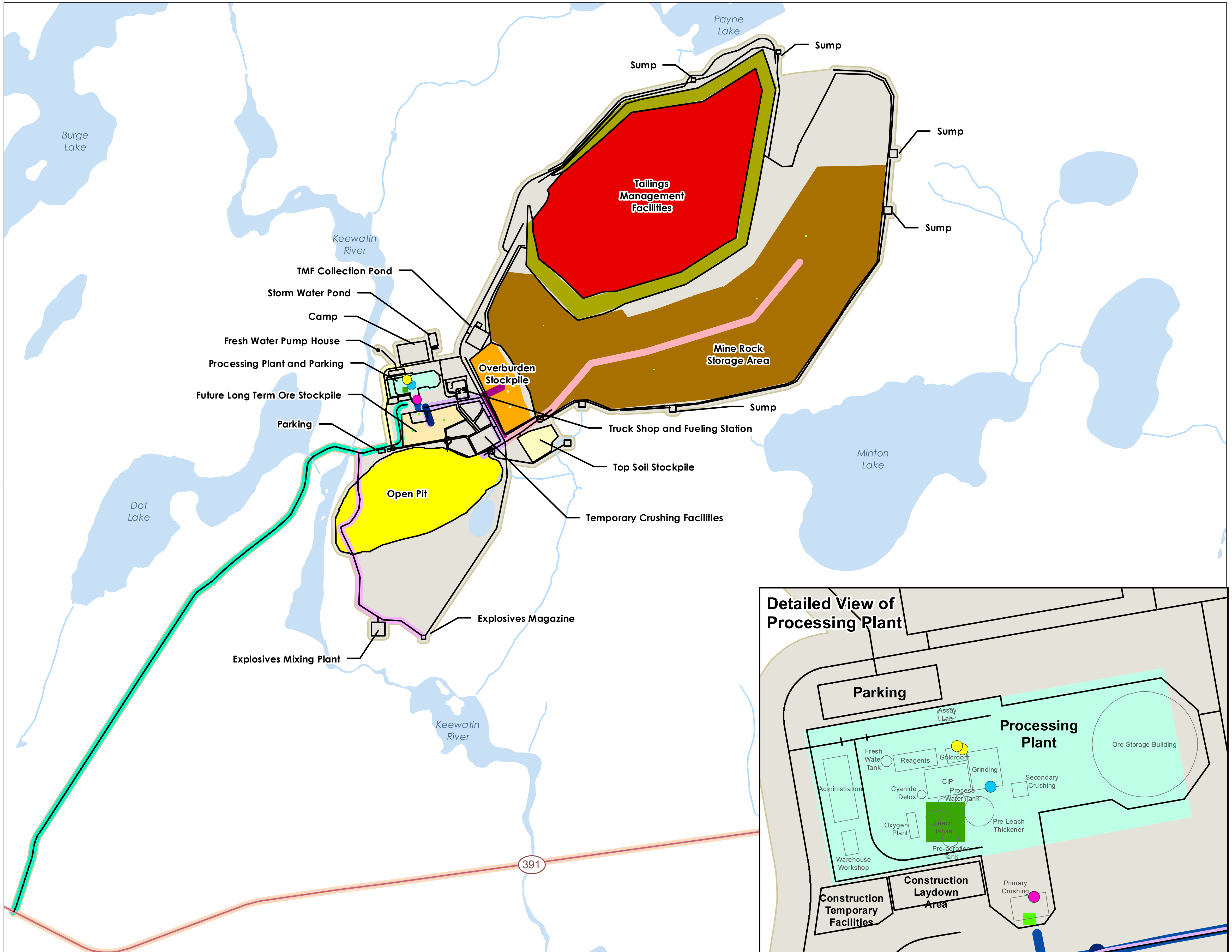
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

A-6

Title

Modelled Emission Sources for Gordon Site Operation



Stantec

Alamos Gold Inc.

Project Infrastructure

- Infrastructure Features
- Project Development Area

Emission Source Type

Point Source

- Gold Room Drying oven stack / Gold Room Dust Collector
- Primary Crusher Dust Collector
- Secondary Crusher Wet Scrubber

Volume Source

- Material Handling at Overburden Stockpile
- Material Handling at MRSA
- Material Handling at Primary Crusher
- Material Handling at Ore Stockpile
- Processing Plant NCN Fugitive Emissions

Haul Road Source

- Haul Road from the Open Pit to the MRSA
- Haul Road from the Open Pit to the Ore Stockpile
- Haul Road from the Open Pit to the Overburden Stockpile
- Haul Road from the Open Pit to the Primary Crusher
- Haul Road from the Ore Stockpile to the ROM Stockpile

Access Road Source

- Access Road to Mill at Maclellan Site
- Access Road to Explosives Facilities
- Access Road to Worker's Camp

PR 391 Source

- Provincial Road 391

Open Pit Source

- Open Pit at MacLellan

Area Source

- ROM Stockpile Wind Erosion
- Topsoil Stockpile Wind Erosion
- Ore Stockpile Wind Erosion
- Overburden Wind Erosion
- MRSA Wind Erosion
- TMF Dry banks Wind Erosion
- TMF Pond HCN Fugitive Emmissions
- General Area

N

0 0.5 1 Kilometres

(At original document size of 11x17)
1:30,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2019-11-21
Technical Review by IYankova on 2019-11-21
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project 111473008

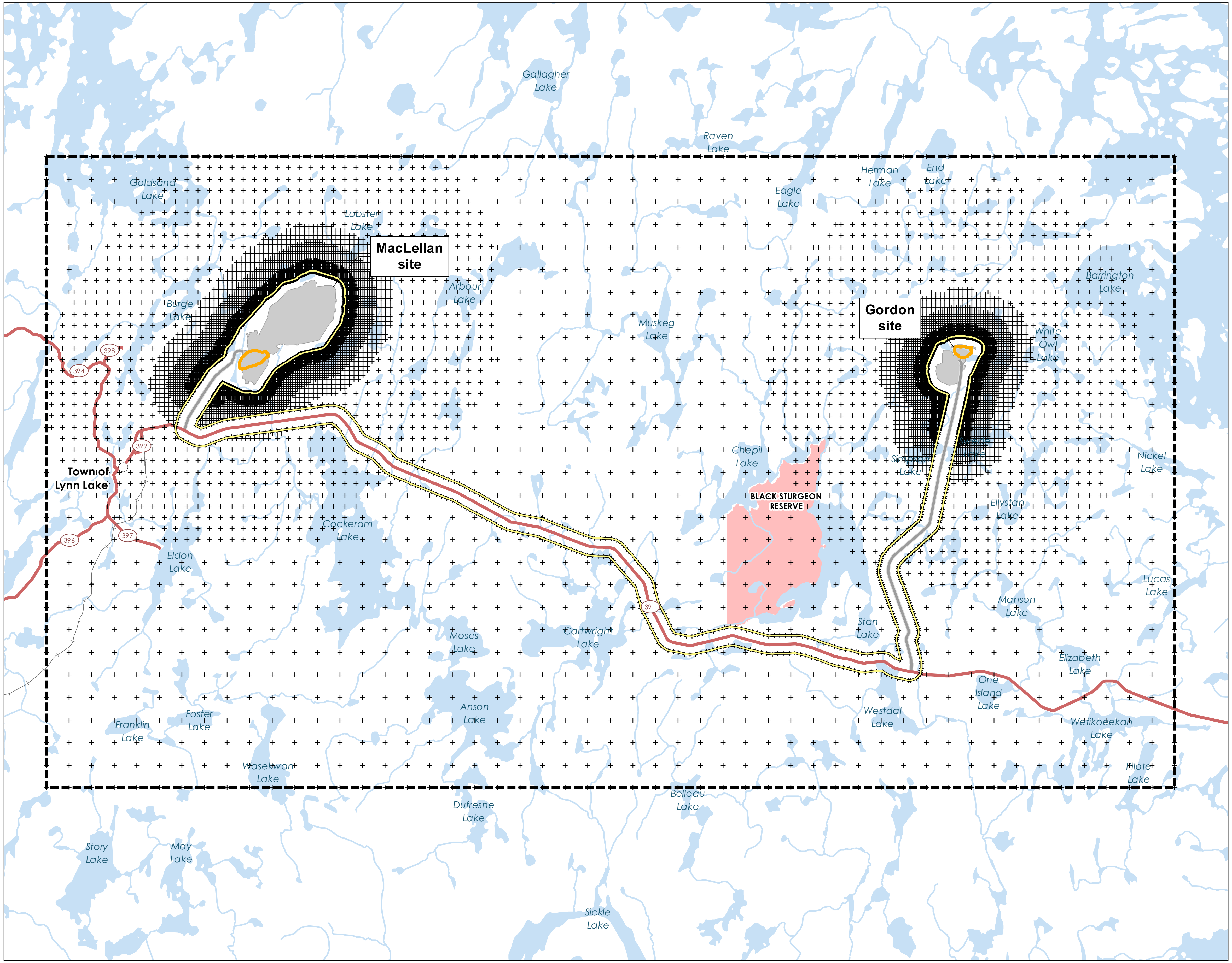
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

A-7

Title

Modelled Emission Sources for MacLellan Site Operation



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area (LAA)

Receptor Grid

- Receptor Points

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

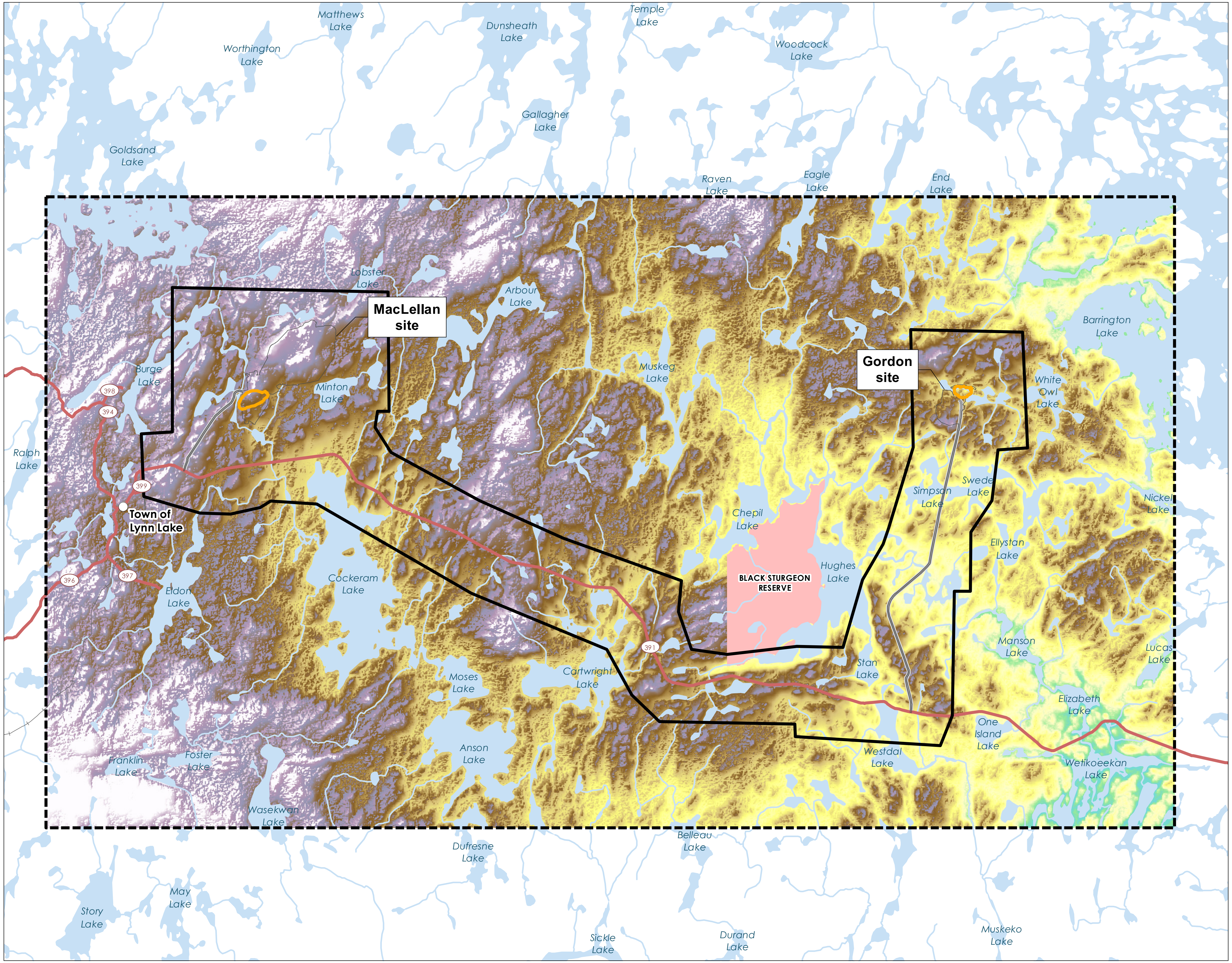
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-8

Title
Receptor Grid used in CALPUFF



Stantec

Alamos Gold Inc.

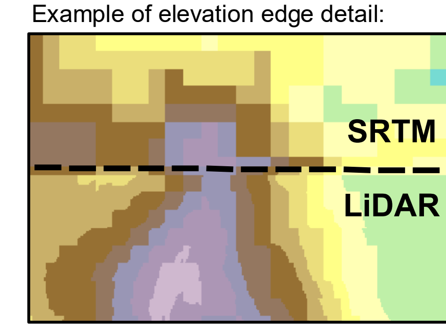
Study Area
- Proposed Open Pit
- Project Development Area
- Air Quality Local Assessment Area (LAA)

Survey Locations
- LiDAR Coverage

Ground Surface Elevation (masl)
- High : 400
- Low : 270

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

Example of elevation edge detail:



N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-9

Title
Terrain Elevations in the Air Quality LAA based on Integrated LiDAR and SRTM Digital Elevation Data

Appendix B CONCEPTUAL MODEL PLAN AND STANTEC RESPONSE MEMORANDUM TO MSD AND ECCC'S REVIEW COMMENTS

Stantec

Memo

To:	Eshetu Beshada, PhD, P.Eng. Manitoba Sustainable Development Environmental Approvals 160 – 123 Main Street Winnipeg, Manitoba, R3C 1A5	From:	Inna Yankova Air Quality Scientist Calgary (25th St) AB Office Daniel Jarratt Atmospheric Discipline Lead Calgary (25th St) AB Office
Project Number:	111473000	Date:	June 20, 2017

Reference: Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project

1.0 CONCEPTUAL MODEL PLAN

Project Name:	Lynn Lake Gold Project (LLGP, the "Project")
Company:	Alamos Gold Inc. (Alamos)
Location (m E, m N, UTM Zone):	396,775 m E; 6,302,500 m N, UTM Zone 14 (NAD83)
Air Quality Consultant:	Stantec Consulting Ltd. (Stantec)
Air Quality Consultant Contacts:	Inna Yankova, Air Quality Scientist Daniel Jarratt, Senior Air Quality Scientist, Atmospheric Discipline Lead
Project Overview:	The LLGP is the proposed redevelopment of two historical gold mines near Lynn Lake, Manitoba. The LLGP consists of two primary deposit sites: the MacLellan site and the Gordon site, located approximately 30 km apart. Alamos intends to construct (redevelop), operate and close/reclaim the gold mines at both historical sites. The MacLellan site was formerly operated as an underground gold and silver mine. The Gordon site was formerly operated as an open pit mine with two open pits (Wendy Pit and East Pit) with depths 60 m and 73 m, respectively. Alamos proposes to develop new open pits at both sites: an open pit with a depth of 360 m at MacLellan site, and an open pit with a depth of 200 m at Gordon site encompassing the two smaller historical open pits. The peak combined production rate from both mines will be approximately 27 megatonnes of total mine excavation per year (Mt/a), with a design mill feed rate of 7 kilotonnes per day (ktpd). The expected mine life is approximately 11 years in addition to the construction and preproduction period of two years. The mine operation is scheduled for 365 days per year

Reference: Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project

with two 10-hour shifts per day.

Alamos proposes to add new mine infrastructure at the MacLellan and Gordon sites. The MacLellan site will include a new open pit, low grade stockpiles, mine rock storage areas, Run-of-Mine (ROM) stockpiles, a central ore mining and processing plant, associated plant infrastructure, a new 2.6 km access road, and a Tailings Management Facility (TMF). Infrastructure at the Gordon site will be limited to the new open pit, low grade ore stockpiles, mine rock storage areas, and minor supporting infrastructure for equipment storage and maintenance. There will be no processing plant at the Gordon site; the ore will be transported to the MacLellan processing plant via Provincial Road (PR) 391 connecting both sites (Figure 1 in Attachment A). Power will be supplied to the mining operations at the Gordon site via a diesel-powered generator. Power will be provided to the MacLellan site via Manitoba Hydro.

Alamos has retained Stantec to conduct an environmental assessment (EA) of the proposed Project. Air Quality will be a Valued Component (VC) of the EA. The air quality assessment will be conducted in accordance with the draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006) using the CALMET-CALPUFF dispersion model.

This document is presented to inform Manitoba Sustainable Development about the proposed dispersion modelling approach for this air quality assessment. Approval of this dispersion modelling plan will provide Stantec and Alamos with assurance that the methodology proposed will meet Manitoba Sustainable Development requirements for environmental approvals.

Emission Sources:

The air quality assessment will be conducted for the worst-case year of mine operation meaning the operation that will result in maximum releases of air contaminants to the atmosphere. The worst-case year is selected using the maximum production rate, maximum material movement and maximum diesel fuel usage. The worst-case year for emissions from the Gordon site and ROM ore haulage on PR 391 is Year 3 of operation. Year 6 of operation is selected as the worst-case year for emissions from the MacLellan site, based on maximum production rate, material movement and diesel usage at the site. Year 3 emissions from the Gordon site and PR 391, and Year 6 emissions from the MacLellan site will be combined in one air dispersion model to conservatively represent worst-case emissions for the

Project.

The emission sources for the Project being assessed are typical for an open pit mine. Emissions from the following sources will be estimated and included in the air dispersion model:

- Drilling and blasting
- Diesel combustion exhaust emissions from off-road mining equipment and haul trucks
- Diesel combustion exhaust emissions from the generator at the Gordon site
- Fugitive dust emissions from operation of the off-road mining equipment
- Fugitive dust emissions from truck loading and unloading
- Fugitive dust emissions from material transfer on conveyors and stockpiles
- Mechanically generated dust emissions by haul trucks along mine haul roads
- Mechanically generated dust emissions by haul trucks on PR 391
- Mechanically generated dust emissions on access roads
- Fugitive dust emissions from wind erosion on stockpiles
- Fugitive dust emissions from wind erosion on TMF dry banks
- Emissions from three process plant stacks (e.g., baghouse at the primary crusher, wet scrubber at the secondary crusher, baghouse at the gold room)

Emission Estimation Methods:

Emissions for the Project will be based on engineering design and feasibility studies. The emission rates will be estimated using emission standards for off-road diesel engines and published emission factors. Emission factors will be primarily adopted from the U.S. EPA AP-42 emission factors database. It is assumed that a new mine fleet complying with Tier 4 emission standards (ECCC 2005) will be utilized for the Project. Tier 4 standards refer to the more stringent emission standards for off-road diesel engines that are manufactured in or after 2014.

Modelling Scenarios:

Project emissions will be modelled for two cases:

- Project Case: emissions from the Project alone, associated with Year 6 of operation for the MacLellan site, Year 3 of operation of the Gordon site and Year 3 of operation for haul truck traffic on PR 391.
- Application Case: emissions for the Project Case in addition to background ambient concentrations representing other natural and anthropogenic emissions sources that have not

been directly included in the dispersion modelling.

Air emissions from the Project during the construction and pre-production phase (2 years) will not be modelled because these are expected to be short term in duration, substantially lower in magnitude than operation (11 years), and not result in any substantive effects on air quality.

Substances of concern:

The air quality assessment will include the Criteria Air Contaminants (CACs) and total particulate deposition (i.e. dustfall). In addition, ambient concentrations and deposition of metals will be modelled and included in the assessments of human health and ecological risk, and vegetation, both separate VCs of the EA. The substances that will be included in the air dispersion model are as follows:

- Total suspended particulates (TSP), assumed to be comprised of particles with aerodynamic diameter less or equal to 30 µm
- Coarse particulate matter with particle aerodynamic diameter less or equal to 10 µm (PM_{10})
- Fine particulate matter with particle aerodynamic diameter less or equal to 2.5 µm ($PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Carbon monoxide (CO)
- Sulphur dioxide (SO_2)
- Total particulate deposition (i.e. dustfall)
- Metals
- Metals deposition

Particulate Matter (PM) will be divided into five PM substances: diesel PM, ore PM, waste rock PM, tailings PM and surface dust PM. The three PM substances will be modelled separately in the air dispersion model and will be evaluated separately in the human health environmental assessment. Polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds will not be included in the modelling because there are no substantial sources that would result in measurable air quality effects.

Model domain and receptors:

Figure 1 in Attachment 1 illustrates the proposed 50 km by 28 km study area and the location of the MacLellan and Gordon sites. For the assessment, the Project Development Area (PDA) boundary is defined as an outline around the active development areas at each mine site, with a buffer of 100 m. Public access will likely be restricted at the PDA boundary.

A nested grid of receptors following the spacing requirements in

Reference: Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project

the Draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006) and the Air Dispersion Modelling Guideline for Ontario (MOECC 2016) will be used in the model:

- 20 m spacing along the PDA boundary and in the areas of maximum impact
- 50 m spacing within 500 m of the PDA boundary
- 100 m spacing within 1.3 km of the PDA boundary
- 200 m spacing within 2.1 km of the PDA boundary
- 500 m spacing within 6.9 km of the PDA boundary
- 1,000 m spacing beyond 6.9 km of the PDA boundary

The locations of residences, traditional land use sites and vegetation samples will be included as special receptors in the dispersion model. Table 1 in Attachment 2 lists the 252 special receptors that will be included in the air dispersion model in addition to the locations in the nested receptor grid. Stantec can include additional special receptors identified by Manitoba Sustainable Development, if required.

Terrain characteristics:

The terrain within the 50 km by 28 km study area is relatively flat ranging from approximately 280 m above mean sea level (m ASL) in the southeast corner of the study area to 380 m ASL at the northwest corner of the study area. The Canadian Digital Elevation Model (CDEM) data obtained from GeoGratis (NRCan 2012) will be used to determine the terrain characteristics in the study area.

Dominant land cover:

The land cover within the study area is mostly comprised of forest and lakes, referred to as Undeveloped Rural (A4) and Water Surface (A5) land use types, respectively, based on Manitoba Sustainable Development's standard land use type classification (Manitoba Conservation 2006).

Existing ambient air quality:

The Project is located near Lynn Lake in Northern Manitoba. The closest ambient monitoring station is in Thompson Manitoba, located approximately 230 km southeast of Lynn Lake. The Thompson monitoring station measures SO_2, PM_{10} and $PM_{2.5}$. Due to lack of continuous monitoring near the Project, a field ambient monitoring program was conducted in the summer of 2015 and 2016. During the field program, measurements were made for: $PM_{2.5}$, PM_{10} and dustfall as well as metals in dustfall.

The monitoring results during the field program provide sufficient information to characterize the existing ambient concentrations of $PM_{2.5}$, PM_{10}, and dustfall, and metals deposition in the Project region because there are no large industrial sources nearby and ambient concentrations are relatively constant. Baseline ambient concentrations of the other substances of concern (NO_2, CO, SO_2 and metals) will be based on ambient monitoring in more distant (but like the Project setting) regions and on published reports for typical values in remote northern areas. Stantec is requesting guidance from Manitoba Sustainable Development on appropriate baseline data to be used for the Project.

Meteorological data: Stantec will create mesoscale meteorological data using the National Center for Atmospheric Research (NCAR) Weather Research and Forecasting (WRF) mesoscale model (NCAR, 2017) for the region around the Project with a spatial resolution of 12 km for a five-year period (2012-2016). This data will be used as input into the CALMET meteorological model (Scire, J.S. et. al 2000a) to provide site-specific 3-dimensional meteorology field with a finer horizontal grid spacing of 500 m for the CALPUFF dispersion model. The CALMET model domain will encompass the 50 km by 28 km CALPUFF model domain with a buffer of 10 km on each side. In addition to WRF data, CALMET will incorporate surface observations from one of the two Environment and Climate Change Canada (ECCC) Lynn Lake weather stations (nos. 5061645 and 5061649), whichever one has the most complete records. There are no upper air stations within the CALMET model domain. Therefore, upper air data from WRF will be used. The latest version of CALMET at the time of the assessment will be used, the most current is version 6.5.0. The meteorological modelling will follow the recommendations in the models' documentation.

Stantec has used mesoscale modelling data as input into CALMET for several years. In some jurisdictions in Canada, it has become the standard method for creating meteorological data for dispersion models (Ontario, Alberta, British Columbia, Saskatchewan) and has been accepted by the U.S. EPA (U.S. EPA 1998).

Dispersion model: Stantec will carry out the air dispersion modelling using the latest version of the CALPUFF model (Scire, J.S. et al. 2000b) at the time of the assessment, the most current is version 7.2.1. The CALPUFF model domain coincides with the study area (50 km by 28 km). The CALPUFF model setup will follow the recommendations of the Draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006). In the absence of specific requirements in the Manitoba Guidelines, the dispersion modelling will follow the Air Dispersion Modelling Guideline for Ontario (MOECC 2016) and the recommendations in the model documentation.

The latest version of the model at the time that the assessment starts will be used. If a newer version is released during the assessment, Stantec will discuss with Manitoba Sustainable Development if any remodelling is required using the updated version.

Ambient air quality criteria: Attachment 3 lists the Manitoba Ambient Air Quality Criteria (Manitoba Sustainable Development 2005) for the substances of concern. The Manitoba ambient objective for $PM_{2.5}$ is based on the former Canada-Wide Standard (CWS) of 30 µg/m³ for 24-hour averaging period. The CWS has been replaced by the Canadian Ambient Air Quality Standards (CAAQS). The new CAAQS for $PM_{2.5}$ (CCME 2012) are more stringent than the CWS. Therefore, the CAAQS for $PM_{2.5}$ are proposed for the assessment. Stantec understands that the CAAQS for SO_2 are intended for regional planning and management activities and do not represent air standard limits by individual facilities at the provincial level.

Six metals have Manitoba ambient criteria. Predicted ambient metal concentrations will be assessed against these criteria. Predicted concentrations for all metals will be provided for the human health and ecological risk assessment.

As dustfall does not have corresponding Manitoba criterion, the criteria from Ontario (MOECC 2012) are proposed. If Manitoba Sustainable Development has a preferred alternate criterion for dustfall, Stantec will provide model predicted results compared to that criterion.

2.0 CLOSURE

This conceptual modelling plan has been prepared based on Stantec's understanding of the Draft Guidelines for Air Dispersion Modelling in Manitoba and modelling guidance from other jurisdictions. Should you have any questions or require further information, please contact Daniel Jarratt at (403) 441-5064 or email Daniel.Jarratt@stantec.com.

3.0 REFERENCES

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Reference: Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project

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STANTEC CONSULTING LTD.

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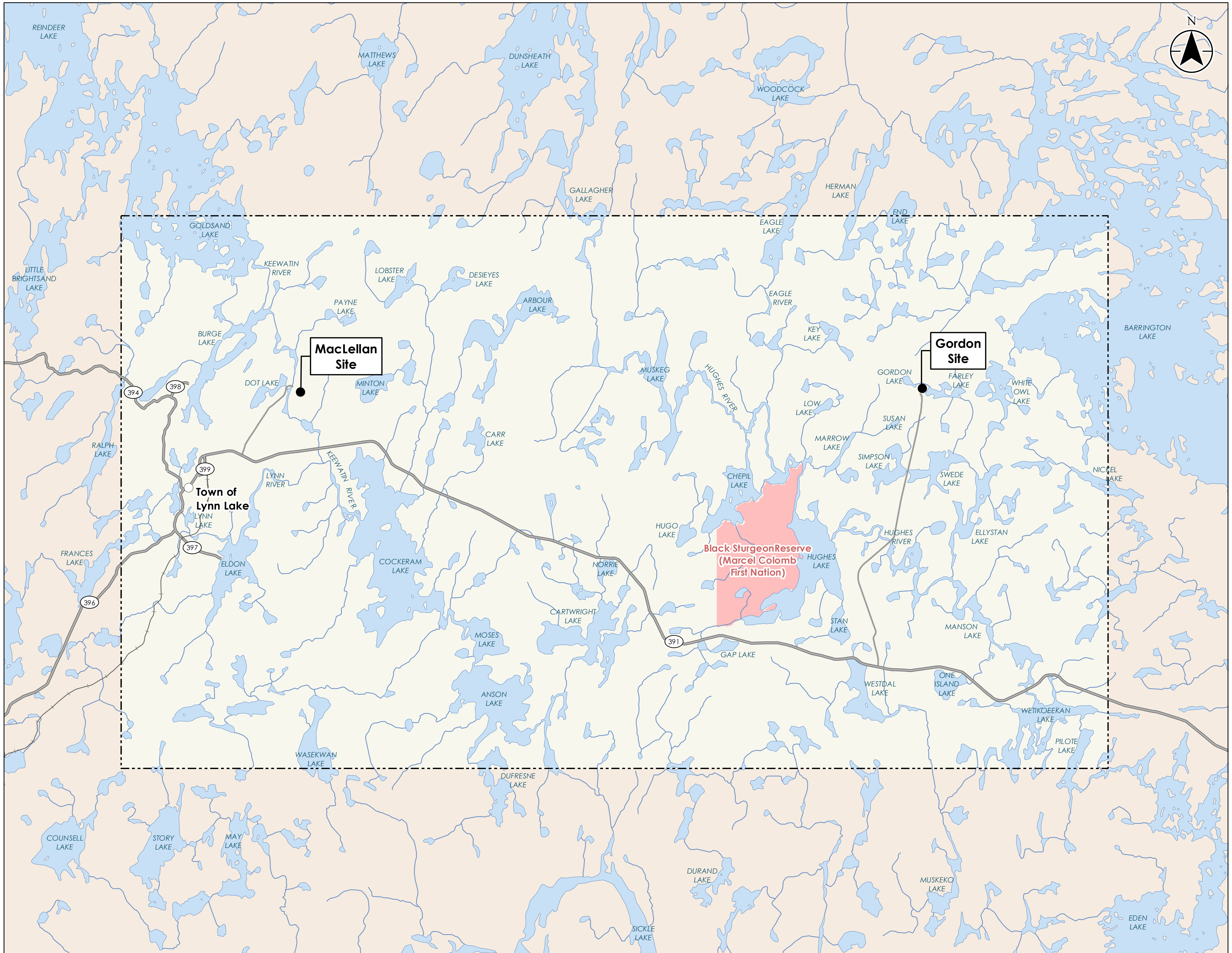
Attachments:
1. Figure 1: Proposed Study Area
2. Table 1: Proposed Special Receptors
3. Table 2: Proposed Ambient Air Quality Criteria

Reference: Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project

Attachment 1: Figure 1 Proposed Study Area



Stantec

Assessment Area

Air Quality Local Assessment Area

Landbase

Provincial Road

Access Road

Rail

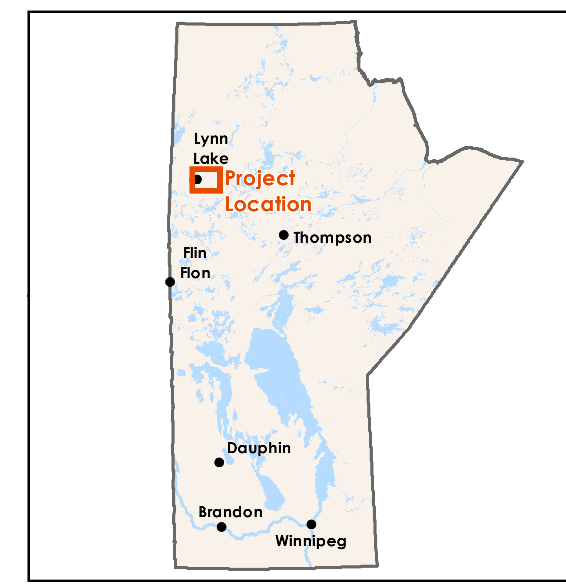
First Nation Reserve

0 5 10 Kilometres

1:200,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location 11440362

MacLellan and Gordon
Lynn Lake, Manitoba

Prepared by JH on 2017-06-02
Technical Review by XX on 2017-XX-XX

Client/Project

LYNN LAKE GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

Map No.

1

Title

Air Quality Study Area

Attachment 2: Table 1 Proposed Special Receptors

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
Vegetation Samples			
1	FHHERA21	409330	6301923
2	FHHERA34	407893	6302948
3	FHHERA40	414562	63022917
4	FHHERA43	417085	6303214
5	FHHERA66	410632	6305607
6	FHHERA70	413911	6305248
7	FHHERA75	418954	6305791
8	FHHERA78	407236	6305496
9	FHHERA101	415035	6306815
10	FHHERA105	419290	6306672
11	FHHERA137	406080	6309060
12	FHHERA141	410344	6309145
13	FHHERA144	413908	6309878
14	FHHERA162	416431	6310331
15	FHHERA166	404962	6312497
16	FHHERA188	41478	6312726
17	FHHERA190	414410	6313238
18	FHHERA194	418743	6313205
19	FHHERA200	409212	6313438
20	FHHERA213	407456	6314516
21	HWYHHERA2	390187	6301377
22	HWYHHERA6	394438	6300011
23	HWYHHERA10	398053	6298023
24	HWYHHERA14	400350	6294599
25	HWYHHERA18	404502	6294981
26	HWYHHERA22	408376	6294263
27	HWYHHERA26	410026	6295864
28	HWYHHERA30	409714	6299310
29	MHHERA45	376932	6301063
30	MHHERA9	381989	6300483
31	MHHERA36	378611	6302816

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
32	MHHERA36E	379477	6303157
33	MHHERA45	388467	6302633
34	MHHERA53	381149	6304313
35	MHHERA73	386153	6304361
36	MHHERA77	374793	6305769
37	MHHERA79	377597	6305736
38	MHHERA86	384353	6305388
39	MHHERA88	386235	6305375
40	MHHERA95	378374	6306635
41	MHHERA118	386442	6307800
42	MHHERA126	379460	6308751
43	MHHERA137	374663	6309785
44	MHHERA156	379284	6310443
45	MHHERA182	374792	6313166
46	MHHERA186	379479	6313137
47	MHHERA190	383284	6312859
48	MHHERA209	386858	6314038
49	MHHERA220	383247	6314640
Traditional Land Use – Fishing Camps			
50	Fishing Camp 1	407776	6319764
51	Fishing Camp 2	405321	6316731
52	Fishing Camp 3	405987	6316024
53	Fishing Camp 4	401539	6310530
54	Fishing Camp 5	399477	6307607
55	Fishing Camp 6	404680	6306823
56	Fishing Camp 7	404610	6304743
57	Fishing Camp 8	402911	6303847
58	Fishing Camp 9	405371	6303362
59	Fishing Camp 10	410297	6303662
60	Fishing Camp 11	413681	6303484
61	Fishing Camp 12	411326	6299050
62	Fishing Camp 13	418775	6293108

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
63	Fishing Camp 14	407246	6297860
64	Fishing Camp 15	404260	6295677
65	Fishing Camp 16	393110	6290821
66	Fishing Camp 17	391941	6293656
67	Fishing Camp 18	386085	6295685
68	Fishing Camp 19	384540	6298768
69	Fishing Camp 20	385862	6301026
70	Fishing Camp 21	383310	6302137
71	Fishing Camp 22	390169	6304646
72	Fishing Camp 23	390852	6308671
73	Fishing Camp 24	372879	6313259
74	Fishing Camp 25	376551	6319289
Traditional Land Use – Trap Line Hunting			
75	Trap Line 1	413807	6304727
76	Trap Line 2	414701	6306763
77	Trap Line 3	415713	6309172
Traditional Land Use – Trapping Areas			
78	Trapping Area 1	414971	6295395
79	Trapping Area 2	413079	6309406
80	Trapping Area 3	409795	6307422
81	Trapping Area 4	390569	6306510
82	Trapping Area 5	388472	6297663
83	Trapping Area 6	381958	6298715
84	Trapping Area 7	387332	6302850
85	Trapping Area 8	385174	6306484
86	Trapping Area 9	388163	6310354
87	Trapping Area 10	385216	6312748
88	Trapping Area 11	381162	6311003
89	Trapping Area 12	377971	6306944
Black Sturgeon First Nations Reserve			
90	Black Sturgeon Residence 1	405449	6297915
91	Black Sturgeon Residence 2	405476	6297892

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
92	Black Sturgeon Residence 3	405503	6297862
93	Black Sturgeon Residence 4	405527	6297835
94	Black Sturgeon Residence 5	405554	6297804
95	Black Sturgeon Residence 6	405654	6297680
96	Black Sturgeon Residence 7	405720	6297720
97	Black Sturgeon Residence 8	405738	6297698
98	Black Sturgeon Residence 9	405753	6297678
99	Black Sturgeon Residence 10	405765	6297660
100	Black Sturgeon Residence 11	405778	6297639
101	Black Sturgeon Residence 12	405794	6297623
102	Black Sturgeon Residence 13	405807	6297596
103	Black Sturgeon Residence 14	405827	6297573
104	Black Sturgeon Infrastructure	405437	6298012
105	Black Sturgeon Potential Residence 1	405679	6297661
106	Black Sturgeon Potential Residence 2	405817	6297522
Land Use Sites			
107	Remote Cottage 11	369323	6293527
108	Remote Cottage 10	366231	6291314
109	Remote Cottage 14	436562	6289876
110	Remote Cottage 15	436761	6289602
111	Remote Cottage 16	437776	6289936
112	Tourist Outcamp 2	441157	6291962
113	Remote Cottage 17	441511	6286668
114	Remote Cottage 18	441292	6286083
115	Remote Cottage 19	439319	6299708
116	Remote Cottage 20	426565	6296834
117	Remote Cottage 21	400748	6295006
118	Remote Cottage 22	387607	6298665
119	Remote Cottage 23	377549	6294139
120	Float Plane	376983	6299202
121	Commercial Lot 1	376799	6299188
122	Commercial Lot 2	376694	6299159

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
123	Admin Site	376689	6299266
124	Fish Farm	374507	6299054
125	Lagoon	375360	6300756
126	Warehouse Site	374586	6300810
127	Highway Maintenance Yard	374631	6300576
128	Recreation Site	375594	6303041
129	Dog Kennel	373388	6302975
130	Remote Cottage 24	370359	6299074
131	Remote Cottage 25	369544	6297326
132	Remote Cottage 26	369530	6297353
133	Snowmobile Club	369215	6295843
134	Remote Cottage 27	366750	6295828
135	Remote Cottage 28	366819	6296785
136	Remote Cottage 29	366838	6294974
137	Museum Site	375014	6302733
138	Communication Site	376000	6303558
139	Waste Disposal Site	379757	6304945
140	Recreation Site	371282	6308779
141	Remote Cottage 30	374038	6307948
142	Riding Stable	374369	6307586
143	Recreation Lot	375069	6307961
144	Recreation Lot	375124	6308103
145	Remote Cottage 31	375170	6307776
146	Youth Camp	376617	6308656
147	Park Vacation Home Lease 1	376141	6308197
148	Fire Hall	363363	6309670
149	Park Vacation Home Lease 2	363334	6309621
150	Park Vacation Home Permit	363308	6309685
151	Remote Cottage 32	363070	6309885
152	Remote Cottage 33	363371	6311798
153	Remote Cottage 34	368698	6313902
154	Remote Cottage 35	369095	6316074

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
155	Trapper Cabin	392947	6312606
156	Fish Camp	419319	6317142
157	Remote Cottage 36	394151	6325117
158	Remote Cottage 37	388293	6331936
159	Remote Cottage 38	366025	6327495
160	Remote Cottage 39	358394	6325328
161	Campground	354315	6330318
162	Remote Cottage 40	349391	6327650
163	Remote Cottage 41	360802	6335820
164	Remote Cottage 42	365341	6339182
165	Trapper Cabin	383811	6338069
166	Forestry	438598	6273641
167	Remote Cottage	425428	6289777
168	Remote Cottage 12	431992	6287988
169	Recreation Lot	404536	6296515
170	Recreation Lot	404567	6296539
171	Remote Cottage 1	404780	6296540
172	Remote Cottage 2	404865	6296553
173	Remote Cottage3	404882	6296556
174	Remote Cottage 4	404909	6296537
175	Remote Cottage	410520	6303728
176	Trapper Cabin	413593	6304211
Lynn Lake Special Receptors			
177	Lynn Lake Friendship Centre	375309	6303205
178	Marcel Colomb First Nation	374748	6302611
179	St. Simon's Church	374934	6301646
180	Lynn Lake Gospel Church	375219	6302737
181	St. Maria Goretti Catholic Church	374949	6302644
182	Misc. Commercial	375877	6303715
183	Lynn Lake Library	375129	6302766
184	Royal Canadian Mounted Police (RCMP)	375194	6302912
185	Town of Lynn Lake	375137	6302769

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
186	West Lynn Lake Heights School	374770	6302635
187	Lynn Lake Hospital	375423	6303359
188	Addictions Foundation-Manitoba	375314	6303179
189	The Bronx	375318	6303254
190	Lynn Lake Inn	375207	6302807
191	Residential 1 - Halstead Ave.	375653	6303322
192	Residential 2 - Halstead Ave.	375648	6303243
193	Residential 3 - Halstead Ave.	375580	6303211
194	Residential 4 - Halstead Ave.	375564	6303121
195	Residential 5 - Halstead Ave.	375436	6302927
196	Residential 6 - Halstead Ave.	375356	6302854
197	Residential 7 - Camp St.	375492	6303237
198	Residential 8 - Hales Ave.	375395	6303224
199	Residential 9 - Hales Ave.	375345	6303101
200	Residential 10 - Hales Ave.	375278	6303050
201	Residential 11 - Hales Ave.	375273	6302996
202	Residential 12 - Hales Ave.	375232	6302931
203	Residential 13 - Gordon Ave.	375365	6303283
204	Residential 14 - Gordon Ave.	375277	6303204
205	Residential 15 - Gordon Ave.	375286	6303157
206	Residential 16 - Highway 391	375469	6303189
207	Residential 17 - Highway 391	375419	6303054
208	Residential 18 - Highway 391	375347	6303003
209	Residential 19 - Highway 391	375322	6302908
210	Residential 20 - Highway 391	375213	6302842
211	Residential 21 - Highway 391	375062	6302716
212	Residential 22 - Halstead Ave.	375328	6302773
213	Residential 23 - Halstead Ave.	375140	6302694
214	Residential 24 - Halstead Ave.	375064	6302621
215	Residential 25 - Cobalt Pl	374840	6302860
216	Residential 26 - Silver St.	374781	6302783
217	Residential 27 - Silver St.	374865	6302698

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
218	Residential 28 - McVeigh Ave.	374902	6302534
219	Residential 29 - McVeigh Ave.	374901	6302479
220	Residential 30 - McVeigh Ave.	374946	6302404
221	Residential 31 - Sherritt Ave.	374812	6302500
222	Residential 32 - Sherritt Ave.	374774	6302444
223	Residential 33 - Sherritt Ave.	374781	6302380
224	Residential 34 - Sherritt Ave.	374771	6302337
225	Residential 35 - Sherritt Ave.	374811	6302282
226	Residential 36 - Sherritt Ave.	374799	6302227
227	Residential 37 - Sherritt Ave.	374833	6302191
228	Residential 38 - Sherritt Ave.	374847	6302060
229	Residential 39 - Sherritt Ave.	374891	6302000
230	Residential 40 - Sherritt Ave.	374880	6301883
231	Residential 41 - Sherritt Ave.	374901	6301799
232	Residential 42 - Sherritt Ave.	374862	6301713
233	Residential 43 - Sherritt Ave.	374884	6301641
234	Residential 44 - Edmon Ave.	374846	6302446
235	Residential 45 - Edmon Ave.	374849	6302370
236	Residential 46 - Edmon Ave.	374867	6302297
237	Residential 47 - Edmon Ave.	374906	6302242
238	Residential 48 - Edmon Ave.	374901	6302177
239	Residential 49 - Edmon Ave.	374918	6302113
240	Residential 50 - Edmon Ave.	374958	6301988
241	Residential 51 - Edmon Ave.	374953	6301930
242	Residential 52 - Edmon Ave.	374963	6301832
243	Residential 53 - Edmon Ave.	374980	6301752
244	Residential 54 - Edmon Ave.	374947	6301685
245	Residential 55 - Edmon Ave.	374964	6301630
246	Residential 56 - McVeigh Ave. S.	375078	6301915
247	Residential 57 - McVeigh Ave. S.	375047	6301857
248	Residential 58 - McVeigh Ave. S.	375043	6301793
249	Residential 59 - Halstead Ave. S.	375129	6301986

Table 1 Proposed Special Receptors

Receptor Number	Receptor Description	UTM Zone 14, NAD 83	
		Easting (m)	Northing (m)
250	Residential 60 - Halstead Ave. S.	375077	6301687
251	Residential 61 - Zinc St.	375032	6301616
252	Residential 62 - Zinc St.	374812	6301684

Attachment 3: Table 2 Proposed Ambient Air Quality Criteria

Table 2 Proposed Ambient Air Quality Criteria

Substance	Averaging Period	Manitoba Ambient Air Quality Criteria [a] (µg/m³)		Ontario Ambient Air Quality Criteria[b] (µg/m³)	Canadian Ambient Air Quality Standards [c] (µg/m³)
		Maximum Acceptable Level Concentration	Maximum Desirable Level Concentration		
Particulate CAC					
TSP	24-hour	**120**	—	120	—
	Annual [d]	**70**	60	60	—
PM_{10}	24-hour	**50**	—	50	—
$PM_{2.5}$	24-hour	30	—	30	**27** [e]
	Annual	—	—	—	**8.8** [f]
Dustfall	30-day	—	—	**7 g/m²**	—
	Annual	—	—	**4.6 g/m²**	—
Gaseous CAC					
NO_2	1-hour	**400**	—	400	—
	24-hour	**200**	—	200	—
	Annual	**100**	60	—	—
CO	1-hour	**35,000**	15,000	36,200	—
	8-hour	**15,000**	6,000	15,700	—
SO_2	1-hour	**900**	450	690	183 (or 70 ppb) [g]
	24-hour	**300**	150	275	—
	Annual	**60**	30	55	13 (or 5.0 ppb) [h]
Metals					
Arsenic	24-hour	**0.3**	—	0.3	—
Cadmium	24-hour	**2**	—	0.025	—
	Annual	—	—	0.005	—
Copper	24-hour	**50**	—	50	—
Lead	24-hour	**2**	—	0.5	—
	30-day	**0.7**	—	0.2	—
Nickel	24-hour	**2**	—	0.2	—
	Annual	—	—	0.04	—
Zinc	24-hour	**120**	—	120	—

NOTES:
[a] Manitoba Ambient Air Quality Criteria (Manitoba Sustainable Development 2005)
[b] Ontario Ambient Air Quality Criteria (MOECC 2012)

Table 2 Proposed Ambient Air Quality Criteria

Substance	Averaging Period	Manitoba Ambient Air Quality Criteria [a] (µg/m³)		Ontario Ambient Air Quality Criteria[b] (µg/m³)	Canadian Ambient Air Quality Standards [c] (µg/m³)
		Maximum Acceptable Level Concentration	Maximum Desirable Level Concentration		

[c] Canadian Ambient Air Quality Standards (CAAQS; (ECCC 2013))

[d] Annual geometric mean

[e] The CAAQS for 24-hour $PM_{2.5}$ is referenced to the annual 98th percentile of daily 24-hour average concentrations, averaged over three years (effective 2020) (CCME 2012).

[f] The CAAQS for annual $PM_{2.5}$ is referenced to the three-year mean of annual average concentrations (effective 2020) (CCME 2012).

[g] The 1-h CAAQS for SO_2 is referenced to the three-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations (effective 2020) (CCME 2016).

[h] The annual CAAQS for SO_2 is referenced to the arithmetic average over a single calendar year of all 1-hour average SO_2 concentrations (effective 2020) (CCME 2016).

"—" not available

Values in **BOLD** text represent the ambient air quality criteria that are proposed for the environmental assessment

Stantec

Memo

To:	Eshetu Beshada, PhD, P.Eng. Manitoba Sustainable Development (MSD) and Brian Asher, Environment and Climate Change Canada (ECCC)	From:	Inna Yankova, Yan Shen and Daniel Jarratt, Stantec Consulting Ltd.
File:	111473008	Date:	July 16, 2019

Reference: Comments on the Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project Environmental Assessment

The Atmospheric Environment team at Stantec Consulting Ltd. (Stantec) received comments from the Manitoba Sustainable Development (MSD) and Environment and Climate Change Canada (ECCC) on June 28, 2019 related to the air quality dispersion modelling plan (Modelling Plan) for the Environmental Assessment related to the proposed Lynn Lake Gold Project (LLGP, the “Project”) in Northern Manitoba.

This memorandum provides Stantec’s responses to the MSD and ECCC’s review comments.

1. **MSD Comment:**
   What is the rationale of using CALPUFF?

Stantec Response: The LLGP consists of two primary deposit sites: the MacLellan site and the Gordon site, located approximately 30 km apart. The proposed air quality study area encompasses the two mine sites with an extent of 50 km in the east-west directions by 28 km in the north-south directions.

The CALPUFF model (Scire et al. 2000) is a multi-layer, multi-species, non-steady state puff dispersion model that can simulate the effects of time and space-varying meteorological conditions on substance transport, transformation, and removal. CALPUFF contains algorithms for near-source effects such as building downwash, transitional plume rise, partial plume penetration, as well as long-range effects such as chemical transformation, and pollutant removal (dry deposition and wet scavenging).

CALPUFF was selected for the air quality assessment based on the following considerations:

- As a puff dispersion model, CALPUFF is better suited (compared to plume dispersion models such as AERMOD) to simulate long-range transport and dispersion in the relatively large study area (50 km by 28 km) and the potential overlapping effects of emissions from the two mine sites located approximately 30 km apart.
- CALPUFF can utilize a time varying 3-dimensional wind field.
- CALPUFF can estimate dry and wet deposition of gases and particulate matter (PM).
- CALPUFF has the capability to model multiple species in one model simulation.

Stantec has recently used CALPUFF in environmental impact assessments (EIA) for mining and construction projects, including the EIA for the Hope Bay gold mine project (TMAC Resources) in Nunavut and the EIA for the Springbank Off-Stream Reservoir construction project west of Calgary, Alberta for Alberta Transportation.

Reference: Comments on the Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project Environmental Assessment

2. **MSD Comment:**
   Will the modeled mesoscale meteorological data using WRF model be compared with any nearby observational data before input to CALMET meteorological model?

Stantec Response: A comparison is provided in Attachment A. The figures in Attachment A illustrate the similarities and small differences between the modeled mesoscale meteorological data using the WRF model and meteorological observations from the Lynn Lake Airport monitoring station operated by Environment and Climate Change Canada (ECCC) for five years (2012-2016).

3. **MSD Comment:**
   Upper air data might be available at The Pas, MB which is approximately 300 km south of Lynn Lake. Was this data being considered to validate the met data?

Stantec Response: The upper air data from the meteorological monitoring station in The Pas, MB are not planned to be used to validate the WRF and CALMET simulations for meteorology that will be used by CALPUFF to predict ground-level concentrations. The reasons are for this are provided below.

1. The La Pas upper air meteorological monitoring station is outside the LLGP EA air quality model domain.
2. The draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006) do not provide specific guidance for the use of upper air data and the CALMET model setup. Hence, the guidance provided in the Alberta Environment and Parks (AEP) Air Quality Model Guideline (AEP 2013) was followed with respect to the use of upper air data and the CALMET model setup. The AEP Air Quality Model Guideline requires all applications use MCLOUD=4 to calculate cloud cover data from the WRF model output (relative humidity and pressure fields at all WRF levels), therefore, for consistency, it would be more beneficial to use the upper air data from WRF model output.

4. **MSD Comment:**
   In the absence of representative air quality data in Manitoba, AQ suggests to use air quality data outside of the province that is comparable with Lynn Lake. (example, remote location and has similar meteorological and topographical conditions).

Stantec Response: Baseline ambient air concentrations of $PM_{2.5}$, PM_{10} and dustfall as well as baseline metals deposition will be derived based on ambient measurements taken during the field program in 2015 and 2016. Baseline ambient concentrations of NO_2, SO_2 and CO will be based on ambient monitoring data from more distant monitoring stations in a similar remote location and with similar meteorological and topographical conditions. The baseline ambient ground-level concentrations for NO_2, SO_2 and CO will be referenced from the Wanipigow Sand Extraction Project located in a remote area approximately 160 km northeast of Winnipeg and approximately 700 km southeast of the LLGP. The Wanipigow Sand Extraction project received its Environmental Act License No. 3285 from Manitoba Sustainable Development on May 16, 2019. The baseline concentrations for NO_2, SO_2 and CO will be included in the LLGP EA along with the rationale for the selection of the baseline concentrations.

5. **ECCC Comment:** Proposed Ambient Air Quality Criteria
   ECCC requests that predicted ambient concentrations around the project be compared to the most stringent standard available. The Canadian Ambient Air Quality Standards (CAAQS) for nitrogen dioxide were introduced in December 2017 and are more stringent than the Manitoba Ambient Air Quality Criteria proposed in Table 2 of the Conceptual Model Plan. ECCC requests Alamos compare predicted NO_2 concentrations to the 2025 CAAQS at the 1-hour (42 ppb) and annual (12 ppb) timeframes. Similarly, the CAAQS for sulphur dioxide in Table 2 is the 2020 version of the standard. Since the project is expected to be in operation beyond 2025, ECCC requests that the 2025 standards be used, 65 pb (1-hour) and 4 ppb (annual).

Stantec Response: The Canadian Ambient Air Quality Standards (CAAQS) were developed as part of the Air Quality Management System (AQMS; CCME 2012a) with the objective of driving continuous improvement of air quality in Canada. The Canadian Council of Ministers of the Environment (CCME) describes the process for selecting monitoring stations, measuring pollutant concentrations and determining achievement of the CAAQS (CCME 2012b, CCME 2012c). Determining achievement of the CAAQS is based upon using measured air quality concentrations at community monitoring stations and comparing the measured levels to the CAAQS and assigning air quality status to one of four management levels (CCME 2012b, CCME 2012c). The four air quality management levels require progressively more rigorous actions by jurisdictions as air quality approaches or exceeds the CAAQS, thereby ensuring proactive management actions are undertaken to reduce emissions and prevent exceedances of the CAAQS (CCME 2012b).

CCME guidance on determining achievement of the CAAQS states that the monitoring stations that are used to determine achievement and guiding air quality management efforts should be located in areas that reflect air quality where people live (CCME 2012c). The CCME has developed guidance for $PM_{2.5}$ (CCME 2012c), however, has not yet released the Guidance on determining achievement of the NO_2 CAAQS. The guidance for $PM_{2.5}$ states that the monitoring sites should not, however, be sited near or unduly influenced by a nearby emission source (CCME 2012c). For example, Section 3.2 of the Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone states that monitoring stations should not be located in close proximity to the fence line of an industrial facility or next to a major roadway (CCME 2012c).

The CCME's guidance suggests that the CAAQS are intended to be used in conjunction with results from the air quality modelling to predict the effect of the project on downwind locations such as communities and other sensitive receptors and are not intended to be used as standards to achieve compliance at the project fence line (e.g., perimeter). Following the CCME's guidance (CCME 2012b, CCME 2012c), the LLGP model predicted NO_2 and SO_2 concentrations at 203 human receptors out of 252 special receptors identified for the Project that represent communities, locations of residences and traditional land use sites will be compared to the 2025 CAAQS in the EA. The remaining 49 (252 – 203) special receptors are locations of vegetation samples.

6. **ECCC Comment:** Additional emission sources
Some additional combustion sources were not included in the list of emission sources, including light duty vehicles on haul roads and access roads, as well as incinerators. In addition, light duty vehicles are also a source of fugitive dust. ECCC requests that these additional emission sources be included in the model.

Stantec Response: In addition to the emission sources listed in the modelling plan, emissions from the following sources will be estimated and included in the dispersion model:

- Tailpipe exhaust emissions from light duty vehicles on haul roads and access roads
- Fugitive dust emissions generated by light duty vehicles traffic along the haul roads and access roads

There are no proposed incinerators for the Project.

7. **ECCC Comment:** Modelling Scenarios
The base case is not explicitly listed as one of the model scenarios. ECCC requests that Alamos clarify whether a base case will be modelled, and its predicted concentrations compared to the Project and Application cases.

Stantec Response: A Base Case will not be modelled as there are no existing or proposed industrial developments within the air quality study area. There were no existing substantial sources of air and noise emissions during the field program that Stantec conducted in 2015 and 2016. Due to the Project restart in 2019, Stantec inquired with the Town of Lynn Lake and received a confirmation letter (Town of Lynn Lake Letter, May 13, 2019) stating that there have been no new substantial sources of air and noise emissions (e.g. commercial, residential, industrial) since 2016.

The baseline ambient air quality will be characterized by representative ambient concentrations that will account for other more distant natural and anthropogenic sources that have not been directly modelled. For the Application Case, the baseline concentrations will be added to maximum model predicted concentrations for the Project and compared to the Manitoba Ambient Air Quality Criteria (MSD 2005).

8. **ECCC Comment:** Construction Emissions
Construction emissions were not included as a model scenario as the associated emissions were stated to be substantially lower than operational emissions. ECCC requests that emissions from construction be quantified and compared to project emissions to demonstrate that construction emissions do not need to be modeled.

Stantec Response: The mine plan for the Project includes two (2) years of construction and pre-production. Construction emissions will be estimated for the construction and pre-production year that will result in maximum releases of air contaminants to the atmosphere. In taking this conservative approach, the representative worst-case construction year will be selected upon consideration of the maximum diesel fuel usage, maximum material movement and maximum pre-production rate (e.g., tonnes of waste and overburden material moved). The total annual construction and pre-production emissions for the worst-case construction year will be compared with the total annual Project emissions to demonstrate that construction emissions do not need to be modelled.

The next two items are not in response to comments received from MSD and ECCC. These two additional points provide additional information about potential air quality modelling concerns that are associated with the latest version of the mine plan (e.g., inclusion of a worker's camp) and the proposed methodology for the determination of terrain characteristics for the air dispersion model.

9. **Stantec Comment:** Additional information regarding Substances of Concern

The original modelling plan lists the substances of concern that will be included in the air dispersion model that includes the Criteria Air Contaminants (CACs), dustfall, metals and metals deposition. One of the proposed changes to the Project is the construction of a worker's camp within the project development area (PDA) of the MacLellan site. The workers camp will be included as a special receptor for the human health risk assessment (HHRA) that will evaluate potential effects of changes to air quality and health health on off-duty workers living in the camp. The air quality assessment will expand the list of modelled substances to include individual volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) from tailpipe diesel exhaust to support the HHRA for the EA.

10. **Stantec Comment:** Additional information regarding Terrain Characteristics

The original modelling plan states that the Canadian Digital Elevation Model (CDEM) obtained from GeoGratis will be used to determine terrain characteristics in the study area. The CDEM data has a spatial resolution of approximately 30 m.

In 2015, ATLIS Geomatics was contracted by Stantec to conduct an aerial survey to acquire Light Detection and Ranging (LiDAR) data over Lynn Lake area of approximately 141 km². This LiDAR data set has a high spatial resolution of approximately 5 m and was used to extract in-pit and off-pit terrain elevations during the development of the mine plan for the Project. The LiDAR data, however, covers only the MacLellan and Gordon mine sites. In order to use the high-resolution LiDAR data for the air quality assessment, Stantec integrated the LiDAR data with Shuttle Radar Topography Mission (SRTM) data obtained from the U.S. Geological Survey (USGS) 3D Elevation Program. The SRTM data has spatial resolution of approximately 30 m and was integrated seamlessly with the LiDAR data. Initially, Stantec attempted to merge the LiDAR data with CDEM data but there were vertical differences of up to 10 m in some locations.

Stantec proposes to utilize the integrated LiDAR and SRTM data to determine terrain characteristics in the study area for the air quality assessments. The SRTM has the same spatial resolution as the CDEM and can be integrated seamlessly with the LiDAR data. Figure 1 in Attachment B shows the terrain elevations in the air quality study area based on the integrated LiDAR and SRTM digital elevation data.

Reference: Comments on the Air Quality Dispersion Modelling Plan for the Lynn Lake Gold Project Environmental Assessment

We trust that the information summarized in memorandum is sufficient for your approval of our proposed air dispersion modeling methods for the LLGP EA. If you have any questions or require additional information, please contact the undersigned.

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ATTACHMENT A

COMPARISON OF MODELLED MESOSCALE METEOROLOGICAL DATA TO NEARBY OBSERVATIONAL DATA

ATTACHMENT A: COMPARISON OF MODELED MESOSCALE METEOROLOGICAL DATA TO NEARBY OBSERVATIONAL DATA

The meteorological observations from the Environment and Climate Change Canada (ECCC) Lynn Lake Airport station were used to determine the representativeness of the mesoscale meteorological data, generated using the Weather Research and Forecasting (WRF) model. The coordinates of the ECCC Lynn Lake Airport station and nearest WRF grid point are provided in Table A-1. The selected WRF grid point is located approximately 5 km west of the ECCC Lynn Lake Airport station. Wind speed, wind direction and temperature data at the lowest vertical level in the model were extracted from WRF and compared to the ECCC Lynn Lake Airport observations for a five-year period (2012 to 2016).

Figure A-1 compares the wind roses generated for the ECCC Lynn Lake Airport to the WRF model predictions from the nearest WRF grid point. As shown, there is general agreement between the measured (ECCC) and predicted (WRF) wind roses, in that the predominant (most frequent) winds are from northwest, west, north and east. Further, the wind speed class frequency distributions are also in reasonable agreement, in that the most frequent wind speed class is 2.0 to 4.0 m/s.

Figure A-2 compares the monthly average surface air temperatures from the WRF model predictions to measurements at the ECCC Lynn Lake Airport station. The WRF model predictions show warm bias during November, December, January and February; however, there is a reasonable agreement with the ECCC Lynn Lake Airport observations throughout the five-year period.

Since the measured values and the WRF model predictions are in reasonable agreement at the Lynn Lake Airport station (within the CALMET model domain) and close to the Project site, the WRF model predictions are reasonably representative of meteorological conditions in the model domain. As a result, the simulated meteorological data from the CALMET model are suitable for use in the CALPUFF model to predict ground-level concentrations for the Lynn Lake Gold Project Environmental Assessment.

Table A-1 Coordinates of Lynn Lake Airport Surface Station (ECCC) and Nearest WRF Grid Point

Location Name	UTM east (m)	UTM north (m)	UTM zone	Latitude (N)	Longitude (W)
Lynn Lake A	373182	6303730	14	56.860	101.080
WRF cell	367986	6303445	14	56.856	101.165

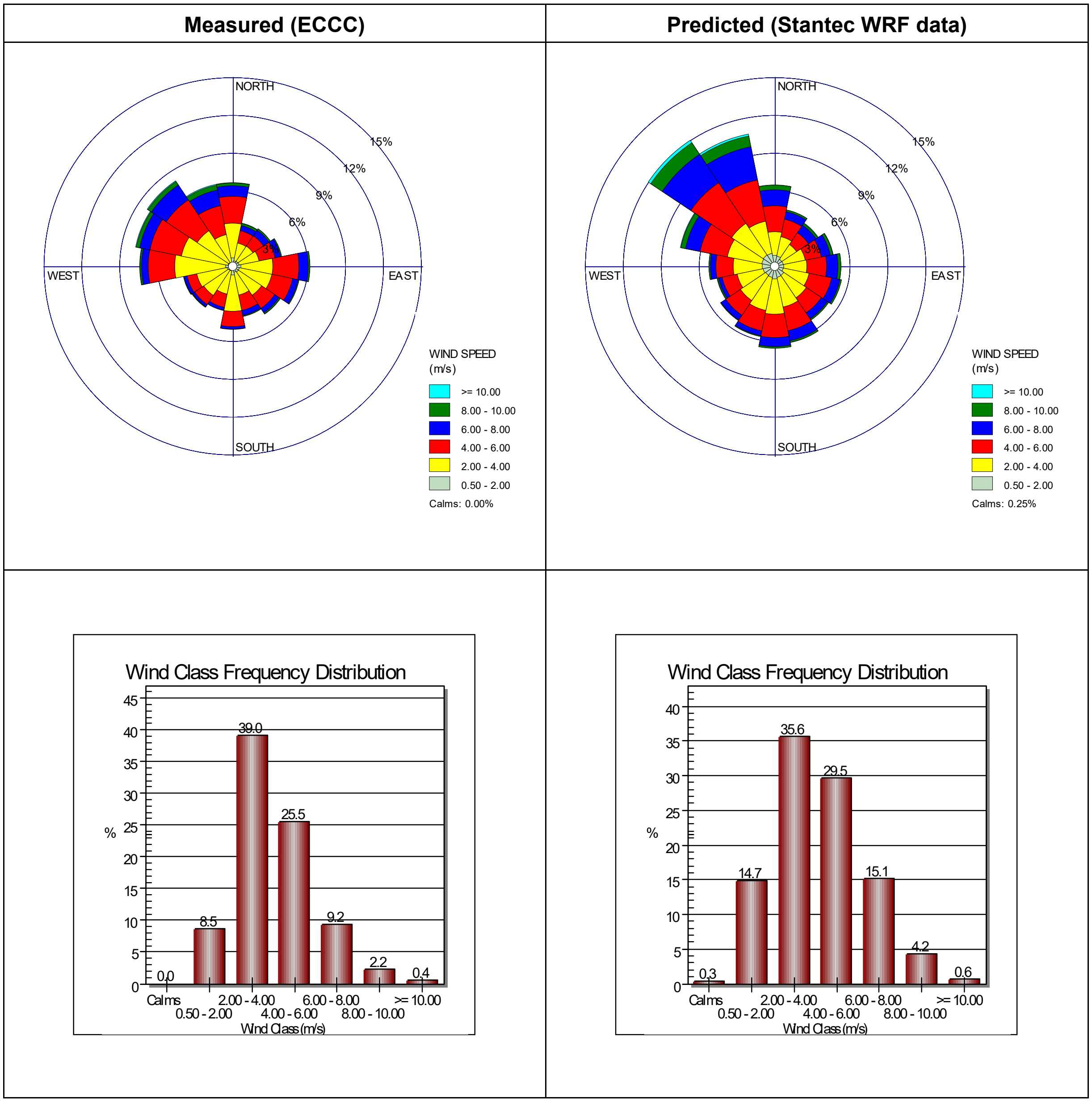


Figure A-1 **Comparison of Measured (ECCC) and Predicted (WRF) Surface Winds at the Lynn Lake Airport station (2012-2016)**

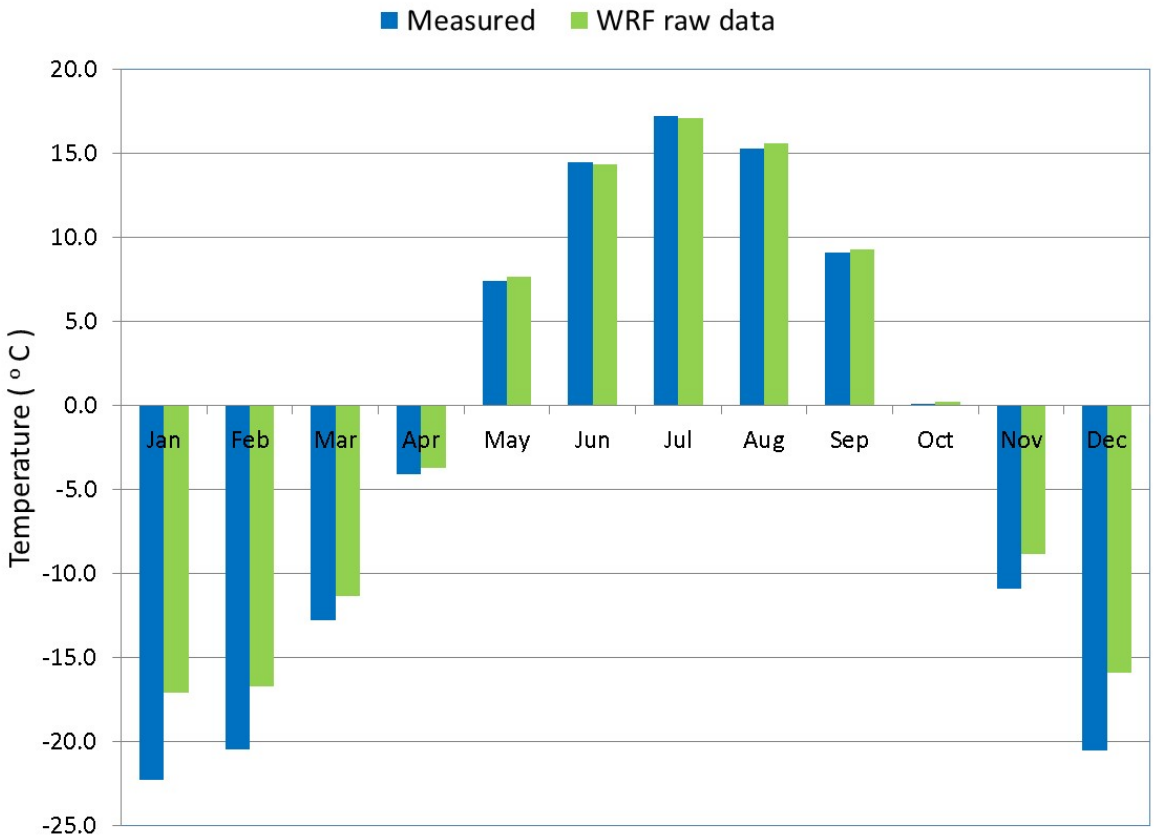
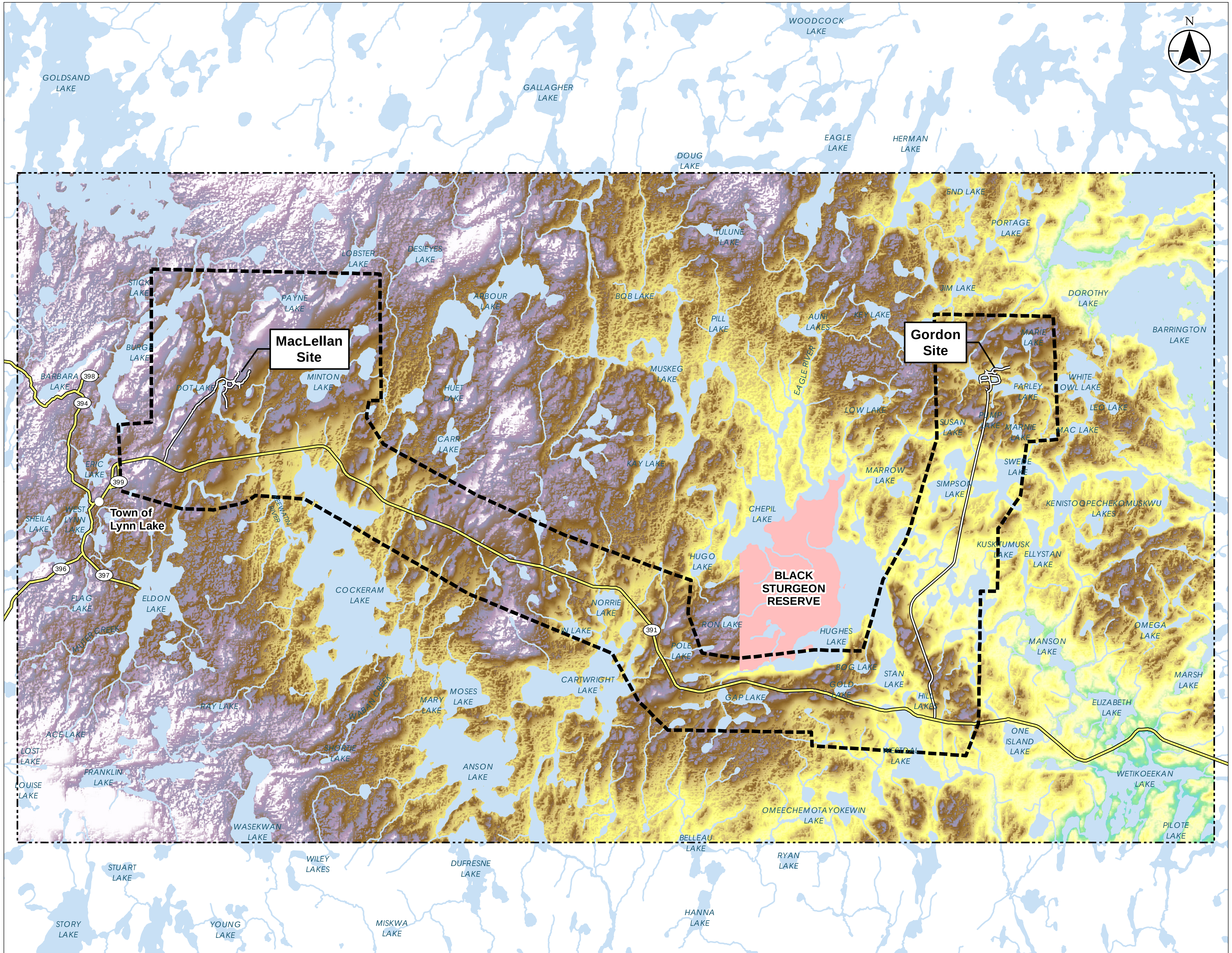


Figure A-2 **Comparison of Measured (ECCC) and Predicted (WRF) Monthly Average Air Temperature at the Lynn Lake Airport station (2012–2016)**

ATTACHMENT B

FIGURE 1. TERRAIN ELEVATIONS IN THE AIR QUALITY STUDY AREA BASED ON INTEGRATED LIDAR AND SRTM DIGITAL ELEVATION DATA



Stantec

Assessment Area

Air Quality Local Assessment Area

Survey Locations

LiDAR Coverage

Ground Surface Elevation (masl)

High : 400

Low : 270

Landbase

Existing Access Road

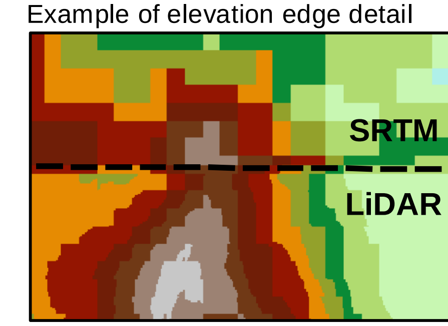
Provincial Road

Watercourse

Waterbody

First Nation Reserve

Example of elevation edge detail



0 4 8 Kilometres

1:165,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location 111473008
MacLellan and Gordon Site
Lynn Lake, Manitoba

Client/Project
LYNN LAKE GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

Map No.
1

Title
Terrain Elevations in the Air Quality Study Area based on Integrated LiDAR and SRTM Digital Elevation Data

Appendix C PROJECT AIR EMISSIONS

Stantec

Lynn Lake Gold Project (LLGP) Environmental Impact Assessment

Appendix C: Project Operation and Construction Emissions Inventory

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APPENDIX C
PROJECT OPERATION AND CONSTRUCTION EMISSIONS INVENTORY

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Abbreviations

%	percent
≥	greater than or equal to
<	less than
AN	ammonium nitrate
AU	Australia
BSFC	brake specific fuel consumption
CAC	criteria air contaminant
CEPA	Canadian Environmental Protection Act
CFR	Code of Federal Regulation
CO	carbon monoxide
CN	Cyanide
DEH	Department of the Environment and Heritage
DPM	diesel particulate matter
$DPM_{2.5}$	respirable particulate matter from diesel combustion (particles with aerodynamic diameter 2.5 microns or smaller)
DPM_{10}	inhalable particulate matter from diesel combustion (particles with aerodynamic diameter 10 microns or smaller)
DSEWPac	Department of Sustainability, Environment, Water, Population and Communities
DTSP	total suspended particulates from diesel combustion
ECCC	Environment and Climate Change Canada
EF	emission factor

FO	Fuel Oil
$FPM_{2.5}$	respirable particulate matter from fugitive dust emission (particles with aerodynamic diameter 2.5 microns or smaller)
FPM_{10}	inhalable particulate matter from fugitive dust emission (particles with aerodynamic diameter 10 microns or smaller)
FTSP	total suspended particulates from fugitive dust emissions
g	gram
gal	gallons
g/kW	grams per kilowatt
g/kW-hour	grams per kilowatt hour
g/L	grams per litre
g/m^3	grams per cubic metre
g/s	grams per second
g/VMT	grams pers vehicle miles travelled
ha	hectare
HC	Hydrocarbon
HCN	Hydrogen Cyanide
hp	horsepower
hr	Hour
kg	Kilogram
kg/d	kilogram per day
kg/h	kilogram per hour
kg/L	kilogram per Litre
kg/Mg	kilogram per megagram

kg/tonne	kilogram per tonne
km	Kilometre
km/hr	Kilometre per hour
kW	Kilowatt
L	Litre
LAA	Local Assessment Area
lb	Pound
lb/hp-hr	pound per horsepower hour
lb/VMT	Pound per vehicle mile travelled
LF	Load Factor
LLGP	Lynn Lake Gold Project
M	Moisture Content for Exposed Ground
m/s	metre per second
m^3/s	cubic metre per second
masl	metres above sea level
Mg	megagram (tonne)
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic metre
MOVES	Motor Vehicle Emission Stimulator
NaCN	Sodium Cyanide
NIR	National Inventory Report
NO_2	nitrogen dioxide
NO_x	nitrogen oxides

PAH	Polycyclic Aromatic Hydrocarbon
pH	Power of Hydrogen
Pit Retention %	Percentage of Emission Retained in Pit
PM	particulate matter
$PM_{2.5}$	respirable particulate matter (particles with aerodynamic diameter 2.5 microns or smaller)
PM_{10}	inhalable particulate matter (particles with aerodynamic diameter 10 microns or smaller)
Project	Lynn Lake Gold Mine
s	second
S	sulphur
SO_2	sulphur dioxide
TSF	Tailings Storage Facility
TSP	total suspended particulates
ton	short ton
t	metric tonnes
TMF	Tailings Management Facility
t/y	tonnes per year
U	Average Annual Wind Speed
u*	Friction Velocity
UF	Utilization Factor
US EPA	United States Environmental Protection Agency
Ut*	Threshold Friction Velocity
V%	Volatilization rate

VKT	vehicle kilometre travelled
VOC	Volatile Organic Compounds
y	year

Appendix C PROJECT OPERATION AND CONSTRUCTION EMISSIONS INVENTORY

C.1 INTRODUCTION

To assess the air quality effects associated with the Lynn Lake Gold Mine (the Project) construction and operation, an emissions inventory described in this Appendix is used in combination with a dispersion model to predict air contaminant concentrations at ground level in the Local Assessment Area (LAA) due to Project emissions.

C.1.1 SUBSTANCES OF INTEREST

The air quality assessment focuses on criteria air contaminants (CACs) that can potentially cause harm to human health, the environment, and property. These substances are called CACs because the Manitoba Government, and Environment and Climate Change Canada have ambient air quality criteria, guidelines, or standards for these substances. CACs of interest for this Project are:

- sulphur dioxide (SO_2)
- nitrogen oxides (NO_X)
- carbon monoxide (CO)
- particulate matter with aerodynamic diameter less or equal to 2.5 µm ($PM_{2.5}$)
- particulate matter with aerodynamic diameter less or equal to 10 µm (PM_{10})
- total suspended particulates with aerodynamic diameter less or equal to 30 µm (TSP)
- volatile organic compounds (VOC)
- Hydrogen Cyanide (HCN)

The gaseous CACs (NO_X, SO_2, CO, VOC), $PM_{2.5}$, PM_{10}, and TSP are associated with exhaust emissions from mining equipment. Fugitive dust emissions from surface disturbance activities result in particulate matter emissions of various sizes (e.g. $FPM_{2.5}$, FPM_{10}, and FTSP). Although not considered a CAC, total particulate matter deposition (dustfall) is a criteria often evaluated for mining operations for the accumulation of particulate matter on soils. HCN emissions will occur from the carbon-in-pulp adsorption tanks due to volatilization losses of sodium cyanide (NaCN) used in the leach and adsorption train.

This air quality assessment includes specific VOC, polycyclic aromatic hydrocarbon (PAH) and metal substances. VOCs and PAHs result from mining equipment exhaust. Trace amounts of metals are in mining equipment exhaust and are also carried on windblown dust. Emission rates have been estimated for ten (10) VOCs, sixteen (16) PAH compounds and twenty (20) metal substances. Of these, there are ambient air quality criteria for 7 VOCs, 2 PAHs and 6 metals which are considered for air quality assessment and the others were included as requested for the human health assessment. The predicted concentrations and depositions for the 10 VOC, 16 PAHs, and 20 metal substances are provided to the human health assessment team.

C.1.2 DISPERSION MODEL CONTEXT

Maximum representative hourly and daily average substance emission rates are required for the dispersion model assessment. Ambient concentration predictions associated with maximum hourly emission rates were compared to short-term ambient criteria based on averaging periods shorter than a day (e.g., 1-hour, 8-hour). Ambient concentration predictions associated with daily average emission rates were compared to ambient criteria based on averaging periods greater than 8-hour (e.g., 24-hour, 30-day and annual).

C.1.3 EMISSION FACTOR AND EMISSION RATE UNITS

In the following sections, emission factors and emission rates are presented in mixed metric and imperial units because most emission factors used for emission estimation originate from the US EPA AP-42 Fifth Edition Compilation of Air Pollutant Emission Factors (US EPA, 1998), which are in imperial units.

The emissions from mine activities are estimated for three emissions scenarios:

- Hourly Emission Rates—the worst-case maximum emission rates that may occur during any given hour of the mine operation. For the estimation of maximum hourly emissions, a 100% utilization of the mine vehicle fleet is assumed.
- Daily Emission Rates—average daily emission rates considering actual daily mine fleet utilization which will be less than 100%.
- Annual Emission Rates—average annual emission rates considering actual annual mine fleet utilization which will be less than 100%

The emissions summaries are presented in metric units (e.g., g/s, kg/d, and t/y). The emissions summaries presented in the following sections show the maximum hourly and daily average emission rates in units of grams per second (g/s) for direct input to the dispersion model.

To illustrate the total emissions for those time intervals (hour, day, year) the emission summaries are presented in kilograms per hour (kg/h) for total hourly emissions, in kilograms per day (kg/d)—for total daily emissions, and in tonnes per year (t/y)—for total annual emissions.

C.2 EMISSION FACTORS

This section presents the emission factors for heavy duty diesel engines, explosive detonations, power generation, the temporary mobile crushing plant and fugitive dust emissions as well as the emission rate calculation methodology for point sources associated with the Project. The temporary mobile crushing plant is used only during Project construction.

C.2.1 DIESEL EXHAUST EMISSIONS: CRITERIA AIR CONTAMINANT EMISSION FACTORS

C.2.1.1 Off-Road Diesel Exhaust Emission Factors

Exhaust emissions from off-road diesel equipment are based on the Canadian off-road compression-ignition engine emission standards (ECCC, 2005) developed under the authority of the Canadian Environmental Protection Act (CEPA). The Canadian Off-Road Compression-Ignition Engine Emission Regulations (ECCC, 2005) mirror the corresponding U.S. Code of Federal Regulation (CFR; (US EPA, 2016a)). Emission standards are set forth in a tiered approach, depending on the engine manufacture year. Prior to 1996, off-road engines were not regulated. The first emission standards, known as Tier 1 standards, began to be phased in by power rating in 1996. Tier 2 standards began in 2001, Tier 3 standards in 2006 and Tier 4 standards in 2014. Table C-1 shows the off-road diesel engine emission standards by engine power rating and engine tier (ECCC, 2005/US EPA, 2016a). The off-road diesel engine emission standards (ECCC, 2005) specific to engine power rating and corresponding to Tier 3 equipment are applied as emission factors for NO_X, CO, PM, and VOC. Where emission standards are provided for combined NO_X and HC emissions (NO_X+HC), the pollutant-specific emission standards for NO_X and HC are based on the recommended split in the NONROAD model documentation for Tier 2 and Tier 3 engines (US EPA, 2010a, Table 8). VOC emission factors are calculated based on the NMHC emission factor. NMHC emission factor is calculated by subtracting the methane (CH_4) fraction from the total hydrocarbons (THC) (CH_4 is assumed to be 9.8% of HC emissions). VOC emission factor is calculated by applying a VOC-to-NMHC ratio of 1.233, based on the MOVES2014a/ NONROAD model speciation profiles (US EPA, 2016b, Table 10). All particulate matter emissions are assumed to be smaller than 10 microns (PM_{10}) and 97% of the PM is assumed to be smaller than 2.5 microns ($PM_{2.5}$) (US EPA, 2010a).

The mining equipment ranges in power rating from 24 hp (trailer mounted pressure washer) to 1500 hp (ore haul truck). The emissions estimates for off-road mining equipment owned by Lynn Lake Gold Project (LLGP) used Tier 4 emission factors (highlighted in brown color in Table C-1) as this equipment is confirmed to be Tier 4 and the estimates for equipment that will be rented used Tier 3 emission factors for conservatism as it could be Tier 3 or 4 (highlighted in grey color in Table C-1).

Table C-1 US EPA/Canada CEPA Tier 1, 2, 3 and 4 NOx, CO and PM Emission Standards for Off-Road Heavy-Duty Diesel Engines

Engine Power (hp)	Tier	Model Year	Emission Factors (g/hp-hr)					
			HC+NOx	NOx [a]	HC [a]	CO	PM	VOC [b]
≥11 to <25	Tier 1	2000-2004	7.1	-	-	4.9	0.60	-
	Tier 2	2005–2007	5.6	5.0	0.60	4.9	0.60	0.66
	Tier 4 final	2013+	5.6	5.0	0.60	4.9	0.30	0.66
≥25 to <50	Tier 1	1999–2003	7.1	-	-	4.1	0.60	-
	Tier 2	2004–2007	5.6	5.0	0.60	4.1	0.45	0.67
	Tier 4 transitional	2008–2012	5.6	-	-	4.1	0.22	-
	Tier 4 final	2013+	3.5	3.3	0.20	4.1	0.02	0.22
≥50 to <75	Tier 1	1998–2003	-	6.9	-	-	-	-
	Tier 2	2004–2007	5.6	5.2	0.40	3.7	0.30	0.44
	Tier 3	2008–2012	3.5	3.3	0.20	3.7	0.30	0.22
	Tier 4 transitional	2008–2012	3.5	-	-	3.7	0.22	-
	Tier 4 final	2013+	3.5	3.3	0.20	3.7	0.02	0.22
≥75 to <100	Tier 1	1998–2003	-	6.9	-	-	-	-
	Tier 2	2004–2007	5.6	5.2	0.40	3.7	0.30	0.44
	Tier 3	2008–2011	3.5	3.3	0.20	3.7	0.30	0.22
	Tier 4 transitional	2012–2013	-	0.30	0.14	-	0.01	0.16
	Tier 4 final	2014+	3.5	0.30	0.14	3.7	0.01	0.15
≥100 to <175	Tier 1	1997–2000	-	6.9	1.0	-	-	-
	Tier 2	2003–2006	4.9	4.5	0.40	3.7	0.22	0.44
	Tier 3	2007–2011	3.0	2.8	0.20	3.7	0.22	0.22
	Tier 4 transitional	2012–2013	-	0.30	0.14	-	0.01	0.16
	Tier 4 final	2014+	-	0.30	0.14	3.7	0.01	0.15
≥175 to <300	Tier 1	1996–2002	-	6.9	1.0	8.5	0.40	1.11
	Tier 2	2003–2005	4.9	4.5	0.40	2.6	0.15	0.44
	Tier 3	2006–2010	3.0	2.8	0.20	2.6	0.15	0.22
	Tier 4 transitional	2011–2013	-	-	0.14	-	0.01	0.16
	Tier 4 final	2014+	-	0.30	0.14	2.6	0.01	0.15
≥300 to <600	Tier 1	1996–2000	-	6.9	1.0	8.5	0.40	1.11
	Tier 2	2001–2005	4.8	4.5	0.30	2.6	0.15	0.33
	Tier 3	2006-2010	3.0	2.8	0.20	2.6	0.15	0.22
	Tier 4 transitional	2011–2013	0.30	0.30	0.14	2.6	0.01	0.16
	Tier 4 final	2014+	0.30	0.30	0.14	2.6	0.01	0.15
≥600 to <750	Tier 1	1996–2001	-	6.9	1.0	8.5	0.40	1.11

Table C-1 US EPA/Canada CEPA Tier 1, 2, 3 and 4 NOx, CO and PM Emission Standards for Off-Road Heavy-Duty Diesel Engines

Engine Power (hp)	Tier	Model Year	Emission Factors (g/hp-hr)					
			$HC+NO_X$	NO_x [a]	HC [a]	CO	PM	VOC [b]
	Tier 2	2002–2005	4.8	4.5	0.30	2.6	0.15	0.33
	Tier 3	2006-2010	3.0	2.8	0.20	2.6	0.15	0.22
	Tier 4 transitional	2011–2013	0.30	0.3	0.14	2.6	0.01	0.16
	Tier 4 final	2014+	0.30	0.3	0.14	2.6	0.01	0.15
≥750	Tier 1	2000–2005	-	6.9	1.0	8.5	0.40	1.11
	Tier 2	2006–2010	4.8	4.5	0.30	2.6	0.15	0.33
	Tier 4 transitional	2011–2014	-	2.6	0.30	2.6	0.07	0.16
	Tier 4 final	2015+	-	2.6	0.14	2.6	0.03	0.16

NOTES:

[a] Pollutant-specific NO_X and HC emission standards for Tier 2 and Tier 3 engines derived based on the recommended split of ($HC+NO_X$) emission standard in the NONROAD model documentation (US EPA, 2010a, Table 8).

[b] VOC emission standards derived from the HC emission standard, by subtracting the CH_4 fraction (assumed to be 9.8%) of HC emissions and applying a VOC-to-NMHC ratio of 1.233, based on the MOVES2014a/NONROAD model speciation profiles (US EPA, 2016b, Table 10).

(grey shading) Emission standards used for the Tier 3 equipment

(tan shading) Emission standards used for the Tier 4 equipment

"-"= not available

SOURCES:

Canadian Off-Road Compression-Ignition Engine Emission Regulations (ECCC, 2005)

Nonroad Compression-Ignition Engines - Exhaust Emission Standards (US EPA, 2016a)

The US EPA NONROAD model (US EPA, 2005) calculates the SO_2 emission factors based on the sulphur content in diesel fuel and equipment-specific fuel consumption rates. The Sulphur in Diesel Fuel Regulations (ECCC, 2002) set a maximum limit of 15 mg/kg for sulphur contained in off-road diesel fuels in Canada effective 2010. The sulphur content of the diesel fuel can vary but cannot exceed the 15 mg/kg limit; this assessment conservatively uses the maximum limit. The emission factor for SO_2 is converted to g/L using the density of diesel (0.85 kg/L).

The SO_2 emission factor is calculated using the following equation:

$$EF\ (g/L) = Sulphur\ Content\left(\frac{mg}{kg}\right) \times Conversion\ Factor\left(2\,\frac{S}{SO_2}\right) \times Unit\ Conversion\left(\frac{g}{1000mg}\right) \times Diesel\ Density\ (0.85\,\frac{kg}{L})$$

Equation C-1

where

EF - Emission factor (g/L)

Sulphur Content	-	Sulphur content in off-road diesel fuel (mg/kg) assumed equal to the maximum suplhur limit (15 mg/kg) based on the Sulphur in Diesel Regulations (ECCC, 2002).
Conversion Factor (2)	-	Conversion factor equal to the ratio of molecular weights of SO_2 and S: SO_2/S=64/32=2.
Diesel Density	-	Density of diesel fuel (0.85 kg/L).

The fuel consumption for each piece of mining equipment is calculated using the following equation:

$$Fuel\ Consumption\ (L/hr) = Engine\ Power\ (hp) \times BSFC\ \left(\frac{lb\ diesel}{hp\ hr}\right) \times Unit\ Conversion\ \left(\frac{kg}{2.205\ lb}\right) \times \frac{1}{Diesel\ Density\ (0.85\ \frac{kg}{L})}$$

Equation C-2

where

Engine Power	-	Power rating of equipment (hp)
BSFC	-	Brake Specific Fuel Consumption (BSFC) by engine power rating (lb diesel/hp-hr) based on US EPA NONROAD model documentation (US EPA, 2010a, Table A4)
Diesel Density	-	Density of diesel fuel (0.85 kg/L).

Brake specific fuel consumption (BSFC) by engine power rating is obtained from the US EPA NONROAD model documentation (US EPA, 2010a, Table A4). The BSFC provides fuel consumption for each type of equipment in relation to the power rating of the equipment (lb fuel/hp-hr).

C.2.1.2 On-Road Diesel Exhaust Emission Factors

Emissions factors for on-road diesel equipment are derived from the MOVES2014a model for a rural unrestricted road type, including winter and summer seasons. Since MOVES2014a was originally developed for the United States, it does not include Canadian provinces. Therefore, a surrogate US county and state (Hill County, Montana) was selected to represent the Project location in terms of local meteorological conditions. The model was run for a rural unrestricted road type that best represents the provincial, access and haul roads, for winter and summer seasons. The emission factors for each equipment type and substance are listed in Table C-2. The MOVES2014a emission factors are expressed in units of grams per vehicle-miles traveled (g/VMT).

Table C-2 US EPA MOVES 2014 Emission Factors for On-Road Diesel Engines

Equipment Type	Season	Emission Factors (g/VMT)									
		SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Passenger Car	Summer	2.50E-03	9.30E-02	1.43E+00	2.56E-02	2.56E-02	5.77E-03	—	—	—	1.88E-02
	Winter	2.46E-03	9.79E-02	1.24E+00	2.56E-02	2.56E-02	5.77E-03	—	—	—	1.83E-02
Single Unit Short-haul Truck	Summer	7.37E-03	2.22E+00	9.28E-01	2.13E-01	2.13E-01	1.24E-01	—	—	—	2.60E-01
	Winter	7.25E-03	2.39E+00	9.28E-01	2.13E-01	2.13E-01	1.24E-01	—	—	—	2.60E-01
Single Unit Long-haul Truck	Summer	6.80E-03	1.81E+00	7.99E-01	2.00E-01	2.00E-01	1.05E-01	—	—	—	2.32E-01
	Winter	6.68E-03	1.96E+00	7.99E-01	2.00E-01	2.00E-01	1.05E-01	—	—	—	2.32E-01
Combination Short-haul Truck	Summer	1.40E-02	4.81E+00	1.14E+00	3.02E-01	3.02E-01	1.82E-01	—	—	—	2.23E-01
	Winter	1.38E-02	5.17E+00	1.14E+00	3.02E-01	3.02E-01	1.82E-01	—	—	—	2.23E-01
Combination Long-haul Truck	Summer	1.49E-02	6.02E+00	1.44E+00	3.81E-01	3.81E-01	2.48E-01	—	—	—	2.74E-01
	Winter	1.46E-02	6.47E+00	1.44E+00	3.81E-01	3.81E-01	2.48E-01	—	—	—	2.74E-01

NOTES:
For the MOVES2014a model, winter is assumed 6 months: November to April and summer is assumed 6 months: May to October.

C.2.2 EXPLOSIVE DETONATION EMISSION FACTORS

Explosive detonations during blasting result in emissions. The substantive air contaminants emitted from ammonium nitrate fuel oil emulsion explosives detonation used by the Project are NO_x, CO, and SO_2. US EPA Explosives Detonation emission factors for the substances considered are listed in Table C-3 in units of kilograms per megagram (kg/Mg) (US EPA 1980).

Table C-3 NO_x, CO and SO_2 Emission Factors for Ammonium Nitrate Fuel Oil Emulsion Explosives Detonation

Activity	Emission Factor (kg/Mg) [a]		
	NO_x	CO	SO_2
Explosive Detonation	8	34	1

NOTE:
[a] US EPA AP-42 emission factor rating D
SOURCE:
US EPA AP-42 Table 13.3-1 (1980)

C.2.3 FUGITIVE EMISSION FACTORS

C.2.3.1 Fugitive Dust Emission Factors

Table C-4 contains a summary of the emission factors used in calculating the fugitive dust emissions from project activities (e.g., drilling, blasting, unpaved road dust, etc.). Emission factors are given for total suspended particulate matter (TSP), inhalable particulate matter (PM_{10}), and respirable particulate matter ($PM_{2.5}$) with the applicable particle size multiplier. The table summarizes applied parameters to the individual project activities.

Table C-4 also presents an emission factor rating. Each emission factor is assigned a confidence rating based on the performance of the estimated values to test data representative of the source of air emission. The ratings suggest the likely variability of the calculated values to actual site conditions. The following list represents the emission factor rating from A to E as described by the US EPA AP-42:

- A — Excellent. Factor is developed from A- and B-rated source test data taken from many randomly chosen facilities in the industry population. The source category population is sufficiently specific to minimize variability.
- B — Above average. Factor is developed from A- or B-rated test data from a "reasonable number" of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with an A rating, the source category population is sufficiently specific to minimize variability.

- C — Average. Factor is developed from A-, B-, and/or C-rated test data from a reasonable number of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with the A rating, the source category population is sufficiently specific to minimize variability.
- D — Below average. Factor is developed from A-, B- and/or C-rated test data from a small number of facilities, and there may be the reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source population.
- E — Poor. Factor is developed from C- and D-rated test data, and there may be the reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population.

Table C-4 Emission Factors for Major Sources of Fugitive Dust Emissions

#	Project Activity	Emission Factor				Particle Size Multiplier (k_1, k_2, k_3, k_4)	Parameters	Emission Factor Rating	Reference
		FTSP	FPM_{10}	$FPM_{2.5}$	Units				
1	Drilling	0.59	0.31	0.31	Kg/hole	—	—	E_f(TSP, PM_{10}) = C	Australian Government - Department of Sustainability, Environment, Water, Population and Communities. National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Mining (NPI, 2016).
2	Blasting	$0.00022(A)^{1.5}$	0.52×E_f (TSP)	0.03×E_f (TSP)	kg/blast	—	A = area	E_f(TSP) = C E_f(PM_{10}, $PM_{2.5}$) = D	US EPA AP-42 11.9 Western Surface Coal Mining (US EPA 1998)
3	Truck loading	$k1(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$	$k2(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$	$k3(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$	kg/tonne	k1 = 0.74 k2 = 0.35 k3 = 0.053 U = 3.3 m/s M = 3.4%	U = Average Annual Wind Speed M = Moisture content for Exposed Ground	E_f(TSP, PM_{10}, $PM_{2.5}$) = A	US EPA AP-42 11.13.2.4 Aggregate Handling and Storage Piles Crushed Stone Processing and Pulverized Minerals Processing (US EPA 2006b)
4	Truck unloading	$k1(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$	$k2(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$	$k3(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$	kg/tonne	k1 = 0.74 k2 = 0.35 k3 = 0.053	U = Average Annual Wind Speed M = Moisture content for Exposed Ground	E_f(TSP, PM_{10}, $PM_{2.5}$) = A	US EPA AP-42 13.2.4 Aggregate Handling and Storage Piles Crushed Stone Processing and Pulverized Minerals Processing (US EPA 2006b)
5	Unpaved roads	$E_f = k1\left(\frac{silt\%}{12}\right)^{0.7}\left(\frac{W}{3}\right)^{0.45}$	$E_f = k2\left(\frac{silt\%}{12}\right)^{0.9}\left(\frac{W}{3}\right)^{0.45}$	$E_f = k3\left(\frac{silt\%}{12}\right)^{0.9}\left(\frac{W}{3}\right)^{0.45}$	lb/VMT	k1 = 4.9 k2 = 1.5 k3 = 0.15	Silt% = 8.4 W = mean vehicle weight	E_f(TSP, PM_{10}, $PM_{2.5}$) = B	US EPA AP-42 13.2.2 Unpaved Roads (US EPA 2006a)
7	Paved roads	$k1(sL)^{0.91} \times (W)^{1.02}$	$k2(sL)^{0.91} \times (W)^{1.02}$	$k3(sL)^{0.91} \times (W)^{1.02}$	lb/VMT	k1 = 0.011 k2 = 0.0022 k3 = 0.00054	sL = 0.6 g/m^2 W = mean vehicle weight	E_f(TSP, PM_{10}) = A E_f($PM_{2.5}$) = D	US EPA AP-42 13.2.1 Paved Roads (US EPA 2011)
8	Bulldozing	$5.7(silt\%)^{1.2}/(M)^{1.3}$	$0.75(silt\%)^{1.5}/(M)^{1.4}$	k_3×E(TSP)	lb/hr	k3 = 0.105	Silt = 6.9% M = moisture = 7.9%	E_f(TSP) = B E_f(PM_{10}, $PM_{2.5}$) = D	US EPA AP-42 11.9 Western Surface Coal Mining (US EPA 1998)
9	Grading	$0.040(S)^{2.5}$	$0.6x0.051(S)^{2.0}$	$0.031x0.040(S)^{2.5}$	lb/VMT	—	S = speed in kph	E_f(TSP) = C E_f(PM_{10}, $PM_{2.5}$) = D	US EPA AP-42 11.9 Western Surface Coal Mining (US EPA 1998)
10	Wind erosion	$58(u^* - u_t^*)^2 + 25(u^* - u_t^*) * k1$	$58(u^* - u_t^*)^2 + 25(u^* - u_t^*) * k2$	$58(u^* - u_t^*)^2 + 25(u^* - u_t^*) * k2$	g/m²/disturbance	k1 = 1 k2 = 0.5 k3 = 0.075	u* = friction velocity, cm/s ut* = threshold friction velocity, m/s	N/A	US EPA AP-42 13.2.5 Industrial Wind Erosion (US EPA 2006c)
11	Primary crusher	30	12	2.2	g/m^3	—	—	—	Provided by Ausenco
12	Secondary crusher	30	12	2.2	g/m^3	—	—	—	Provided by Ausenco
13	Drying Oven	9.8	5.9	5.9	kg/Mg	—	—	E_f(TSP, PM_{10}) = C	US EPA AP-42 11.24 Metallic Minerals Processing (US EPA 1995)
14	Induction Furnace	10	10	10	g/m^3	—	—	—	Provided by Ausenco

C.2.3.2 Fugitive Hydrogen Cyanide Emission Factors

Table C-5 and Table C-6 contain a summary of the emission factors used in calculating the fugitive hydrogen cyanide emissions from the processing plant (leaching and desorption) and the tailings management facility (TMF). Hydrogen Cyanide emission factors and the parameters such as volatilization rate of cyanide were obtained from the Australian Government Department of the Environment and Heritage (DEH) National Inventory Report Emission estimation technique manual (NPI, 2006)

Table C-5 Emission Factors for Fugitive Hydrogen Cyanide Emissions from the Processing Plant

Activity	HCN Emission Factor [a]
	%
Hydrogen Cyanide from Leaching	1
Hydrogen Cyanide from Desorption	1

NOTE:
[a] % based on NaCN feed rate
SOURCE:
Emission factors are obtained from NPI 2006

Table C-6 Emission Factors for Fugitive Hydrogen Cyanide Emissions from the TMF

Activity	HCN Emission Factor [a, b]
	g/m^3
Hydrogen Cyanide from Tailings Management Facilities	$C_{CN} * V\%/100$

NOTES:
C_{CN} = Cyanide concentration in water entering the TSF, (g CN / m^3)
V% = Volatilization rate of cyanide (%) depending on the pH of the water to the TSF
[a] pH of the water is assumed to be 8.5 based on information from Q'Pit (Q'Pit, 2019)
[b] C_{CN} was based on the design specification
SOURCE:
Emission factor is calculated based on NPI 2006 methodology

C.2.4 POWER GENERATOR EMISSION FACTORS

NO_X, CO, PM and VOC emission factors for the diesel power generator at Gordon were based on the manufacturer's specifications whereas the SO_2 emission factors were calculated based on the sulphur content (15 mg/kg) in diesel fuel and equipment-specific fuel consumption rates as shown in Equation C-1 and Equation C-2. The emission factors for the CACs are listed in Table C-7.

Table C-7 Power Generator Emission Factor

Equipment	Make	Model	Emission Factors (g/hp-hr)						
			SO_2[a]	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	VOC
Diesel Generator	MTU	6R 1600 DS300	2.54E-02	3.90E+00	5.20E-01	4.00E-02	4.00E-02	3.88E-02	2.71E-01

NOTES:
[a] SO_2 emission factor is in g/L
Both power generators are 300 kW each

C.2.5 TEMPORARY MOBILE CRUSHING PLANT

C.2.5.1 Diesel Exhaust Emission Factor from Mobile Crushing Plant

The temporary mobile crushing plant results in emissions. Exhaust emission emitted from the operation of temporary mobile crusher are SO_2, NO_x, CO, $DPM_{2.5}$, DPM_{10}, DTSP, and VOC. Exhaust emission factors for the temporary mobile crusher are derived using the NONROAD model documentation (US EPA, 2010a) and are shown in Table C-8. The details on how these emission factors are derived are explained in Section C.2.1.1.

Table C-8 Exhaust Emission Factors from Temporary Mobile Crusher

Activity	Manufacturer [a]	Model [a]	Engine Power [a]	Emission Factor [b] (g/hp-hr) \[c]						
			hp	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	VOC
Temporary Mobile Crusher	Patriot	P400	400	0.025	2.800	2.600	0.150	0.150	0.146	0.220

NOTES:
[a] Manufacturer make, model and power rating were assumed based on a similar project.
[b] Emission factor is derived from Canadian Off-Road Compression-Ignition Engine Emission Regulations (ECCC, 2005) and additional information can be found in Section C.2.1.1 of this report.
[c] SO_2 emission factor is in g/L

C.2.5.2 Fugitive Dust Emission Factor from Mobile Crushing Plant

US EPA crushed stone processing and pulverized mineral processing fugitive dust emission factors were used to calculate the fugitive dust emission from the temporary mobile crusher. The US EPA emission factor is summarized in Table C-29.

Table C-9 Fugitive Dust Emission Factors from Temporary Mobile Crusher

Activity	Emission Factor [a] (kg/Mg)		
	FTSP [b]	FPM_{10} [b]	$FPM_{2.5}$ [b, c]
Temporary Mobile Crusher	0.018	0.007	0.007

NOTES:

[a] US EPA AP-42 Table 11.19.2-1 (2004)

[b] Uncontrolled emission factor from tertiary crushing, screening, and conveyor transfer point at loading and unloading are accounted

[c] $FPM_{2.5}$ emission factor for uncontrolled equipment is not available hence conservatively assumed FPM_{10} = $FPM_{2.5}$

C.3 OPERATION EMISSIONS INVENTORY

C.3.1 WORST-CASE YEAR AND EMISSION SOURCES

The operation phase has been evaluated by quantifying emissions for a “worst-case” year of operation at both Gordon and MacLellan. The worst-case years of operation coincide with the peak production rate that will result in the highest emissions. The worst-case year for the operation was selected based on the highest production rate, the largest number of mining equipment units and the highest movements of overburden, mine rock and ore measured in tonnes. Year 7 the worst-case year of operation for the MacLellan site and Year 2 was determined to be the worst-case year of operation for the Gordon site. The following air emissions were estimated for the worst-case operation year:

- Diesel combustion exhaust emissions from mining off-road equipment and haul trucks
- Diesel combustion exhaust emissions from on-highway trucks and on-road vehicles
- Diesel combustion emissions from a permanent diesel generator
- Fugitive dust and explosives detonation emissions from drilling and blasting
- Mechanically generated dust by mining off-road equipment movement
- Fugitive dust emissions from bulldozing and grading
- Fugitive dust emissions from truck loading and unloading
- Mechanically generated dust by truck traffic along haul roads and the access road
- Mechanically generated dust by truck traffic along PR 391
- Fugitive dust emissions from wind erosion of stockpiles.

- PM emissions from the primary and secondary crushers
- PM emissions from dust collectors at the ore milling and processing plant gold room
- Fugitive dust emissions from wind erosion of the TMF dry banks
- Fugitive HCN emissions from the processing plant leach and adsorption tanks
- Fugitive HCN emissions from the TMF pond.

The emissions from the worst-case year of operation at MacLellan site Year 7 and Gordon site Year 2 were estimated and are discussed in this report.

C.3.2 GENERAL ASSUMPTIONS

The following general and operational assumptions were used to estimate Project operation emissions due to combustion sources:

- Purchased mining equipment at MacLellan and Gordon comply with Tier 4 emission standards.
- Rental mining equipment at MacLellan and Gordon are assumed to comply with Tier 3 emission standards.
- Power ratings (hp) for off-road and on-road equipment are based on manufacturer's specifications using typical mining equipment manufacturers and models.
- Utilization (load) factors for off-road construction equipment from the US EPA NONROAD model (US EPA, 2010).
- Assumed no pit retention (refer to Section C.1.3.3 for additional information) for diesel exhaust PM based on professional judgement and to be conservative .

The following general and operational assumptions were used to estimate Project operation fugitive dust emissions:

- Seventy-five percent dust control efficiency on haul roads during the summer, corresponding to the expected control efficiency achievable from the application of water twice daily (US EPA, 2006a). Summer is assumed to be May to October.
- Ninety percent natural mitigation efficiency on haul roads during winter (Golder Associates, 2012). Winter is assumed to be November to April.
- Eleven percent dust natural mitigation efficiency on paved roads during summer (calculated based on the equation from US EPA 2011 and the measured precipitation data).
- Ninety-seven percent dust natural mitigation efficiency on paved roads during winter (calculated based on the equation from US EPA 2011 and the measured precipitation data).

- Fugitive dust control not applied during bulldozing and grading, off-road equipment in transition, truck loading and unloading, and material transfer to and from the temporary topsoil and overburden stockpiles.
- Fugitive dust emissions from water trucks is assumed to be zero because of the wet road surface due to water application based on professional judgement .

C.3.3 EMISSION RATES

C.3.3.1 CAC Emissions from Diesel Engines

C.3.3.1.1 Off-Road Diesel Exhaust Emissions

The off-road equipment which will be used at MacLellan and Gordon sites during Year 7 and Year 2 are presented in Table C-10 and the equipment is divided into five categories as follows:

- Open Pit Mining
- Overburden Removal
- Drilling & Blasting
- Stockpile Rehandling
- Maintenance and Other Supporting Equipment

Table C-1 summarizes the parameters used to calculate the off-road diesel exhaust emissions at MacLellan and Gordon. Table C-11 summarizes the hourly and daily CAC emission rates during Year -7 and Year 2 at MacLellan and Gordon, respectively. Emission rate totals are given per equipment type. The rates were determined using Equation C-3 (NO_x, CO, TSP, PM_{10}, $PM_{2.5}$, VOC) and Equation C-4 (SO_2), the emission factors listed in Table C-1, and the equipment parameters in Table C-10.

Emissions of NO_X, CO, PM and VOC for each off-road equipment type are determined as follows:

$$ER_h\ (g/s) = Number\ of\ Units \times Engine\ Power\ (hp) \times Emission\ Factor\ \left(\frac{g}{hp\ hr}\right) \times Engine\ Load\ Factor\ (\%) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-3

where

ER_h	-	Hourly emission rate (g/s)
Number of Units	-	Number of Equipment
Engine Power	-	Power rating of equipment (hp)

Emission Factor	-	Canadian off-road compression-ignition engine emission standards (g/hp-hour) based on Tier 3 engines (ECCC, 2005)
Load Factor	-	Equipment load factor (%) by equipment type based on US EPA NONROAD model documentation (US EPA, 2010b). Defined as the fraction of actual engine output relative to maximum rated power, taking into account that engines are operating somewhere between idle speed and full power.

The engine power rating associated with each piece of equipment is sourced from the manufacturer's information.

The engine load factor (LF) is a measure of the fraction of actual engine output relative to maximum rated power. Equipment engine load factors from the NONROAD model documentation (US EPA, 2010b) are used to calculate project emissions. An 80% LF is used for haul trucks, which is truck utilization, accounting for time for loading/unloading and breaks for operators.

Emissions of SO_2 for each off-road equipment type are determined using the following equation, assuming that all diesel sulphur is oxidized:

$$ER_h\,(g/s) = Number\ of\ Units \times Fuel\ Consumption\left(\frac{L\ diesel}{hr}\right) \times Emission\ Factor\left(\frac{g}{L}\right) \times Unit\ Conversion\left(\frac{hr}{3600\,s}\right)$$

Equation C-4

where

ER_h	-	Hourly emission rate (g/s)
Number of Units	-	Number of Equipment
Fuel Consumption	-	Fuel consumption of equipment (L/hr)
Emission Factor	-	SO_2 emission factor per litre of fuel consumption (g/L).

C.3.3.1.2 On-Road Diesel Exhaust Emissions

On-road diesel exhaust emissions were estimated using the MOVES emission factors (g/VMT) and the number of vehicle round trips per hour (and day) and the length of the road. Table C-12 summarizes the parameters used to calculate the on-road diesel exhaust emissions and Table C-13 summarizes the hourly and daily CAC emission rates. Emission rate totals are given per equipment type.

The emission rates were determined using Equation C-5, the emission factors listed in Table C-2, and the equipment parameters in Table C-12.

On-road equipment emission rates are determined using the following equation:

$$ER_h\ (g/s) = Road\ Length\ (km) \times Round\ Trip\ Factor(2) \times Number\ of\ Trips \left(\frac{trips}{hr}\right) \times Emission\ Factor\ \left(\frac{g}{VMT}\right) \times Unit\ Conversion\ \left(0.621\frac{m}{km}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-5

where

ER_h	-	Hourly emission rate (g/s)
Road Length	-	Haul road length (km)
Number of Trips	-	Number of trips per truck per hour (trips/hr)
Round Trip Factor (2)	-	A factor of 2 accounting for a round trip distance
Emission Factor	-	Substance-specific emission factor based on MOVES2014 (g/VMT).

Table C-10 Off-Road Equipment Parameters for CAC Emission Rate

Activity and Equipment Description	Manufacturer	Model	Number of Units	Engine Power, hp	Operating Hours per Day, hr/d	BSFC, lb fuel/hp-hr	Fuel Consumption, L/h	Load Factor, %	Emission Standard Tier
MacLellan Site (Year 7)									
Open Pit Mining									
Hydraulic Shovel	Komatsu	PC3000-8 Front Shovel	2	1,260	17.0	0.367	248	53%	Tier 4
Wheel Loader (13 m^3)	CAT	993K High Lift	1	1,039	20.2	0.367	205	48%	Tier 4
Ore Haul Truck (136 t)	Komatsu	HD1500	18	1,500	16.0	0.367	296	59%	Tier 4
Motor Grader (215 kW)	CAT	16M3	1	290	12.5	0.367	57	59%	Tier 4
Motor Grader (178 kW)	CAT	14M3	1	238	12.5	0.367	47	59%	Tier 4
Crawler Dozer (450 kW)	CAT	D375-8	2	636	13.9	0.367	125	58%	Tier 4
Wheel Dozer (370 kW)	CAT	834K	1	496	11.1	0.367	98	59%	Tier 4
Water truck (60,000 L)	CAT	HD605-8	1	724	5.6	0.367	143	59%	Tier 4
Overburden Removal									
Hydraulic Excavator (3.75 m^3)	Komatsu	PC650LC-11	1	436	1.8	0.367	86	53%	Tier 4
Crawler Dozer (264 kW)	CAT	D155AX-8	1	354	12.5	0.367	70	58%	Tier 4
Articulated Truck (30t)	Komatsu	HM300-5	1	332	5.8	0.367	65	57%	Tier 4
Drilling & Blasting									
Production HP Drill	Atlas Copco with CAT C27 engine	PV235	3	800	14.4	0.367	158	43%	Tier 4
8 Hyd Track Drill	Atlas Copco with CAT C15 engine	FlexiRoc D65	2	540	9.0	0.367	106	43%	Tier 4
Excavator Mounted Rock Drill	CAT 374 excavator with mounted HEM drill	374 FL	1	472	5.6	0.367	93	43%	Tier 4
Excavator Mounted Hydraulic Hammer	CAT 374 excavator with mounted hammer HP 8000 ABF	374 FL	1	472	2.1	0.367	93	43%	Tier 4
Blasthole Stemmer	CAT	262D	1	74	5.6	0.408	16	43%	Tier 3
Forklift/Telehandler	Dieci Americas	Hercules 190.10	1	168	5.6	0.367	33	59%	Tier 4
Stockpile Rehandling									
Wheel Loader (260 kW)	CAT	980M	1	412	8.5	0.367	81	48%	Tier 4
Maintenance and Other Supporting Equipment									
Rough-Terrain Crane (110 t)	Tadano Mantis	GR1200XL	2	270	2.8	0.367	53	43%	Tier3/Tier4
Hydraulic Excavator (36 t)	Komatsu	PC360LC-11	1	271	2.8	0.367	53	53%	Tier 4
Skid-Steer Loader	Takeuchi	TL10V2	1	74	5.6	0.408	16	21%	Tier 4
Portable Air Compressor (5-6m^3)	Atlas Copco	XATS 250 KD7 iT4	1	74	3.3	0.408	16	43%	Tier 4
Flameless Air Mobile Heater	Aerotech Herman Nelson	BT 700K	1	99	3.3	0.408	22	43%	Tier 4
Trailer-Mounted Pressure Washer	NorthStar Trailer with Honda Engine	TMPW	1	24	3.3	0.408	5	43%	Tier 4
Portable Dewatering Pump (4-inch)	Goldwin	CD103M	1	41	13.9	0.408	9	43%	Tier 4
Portable Dewatering Pump (8-inch)	Goldwin	CM225M	1	99	13.9	0.408	22	43%	Tier 4
Dewatering Pump	Goldwin	CM225M	3	99	16.7	0.408	22	43%	Tier 4
Heavy-Duty Light Tower (4 x 1000 W)	Atlas Copco	HiLight V5+	28	4	12.0	0.408	1	43%	Tier 4
Gordon Site (Year 2)									
Open Pit Mining									

Table C-10 Off-Road Equipment Parameters for CAC Emission Rate

Activity and Equipment Description	Manufacturer	Model	Number of Units	Engine Power, hp	Operating Hours per Day, hr/d	BSFC, lb fuel/hp-hr	Fuel Consumption, L/h	Load Factor, %	Emission Standard Tier
Hydraulic Shovel	Komatsu	PC3000-8 Front Shovel	1	1,260	17.0	0.367	248	53%	Tier 4
Wheel Loader (13 m^3)	CAT	993K High Lift	1	1,039	15.1	0.367	205	48%	Tier 4
Ore Haul Truck (136 t)	Komatsu	HD1500	7	1,500	14.3	0.367	296	59%	Tier 4
Motor Grader (215 kW)	CAT	16M3	1	290	12.5	0.367	57	59%	Tier 4
Crawler Dozer (450 kW)	CAT	D375-8	1	636	13.9	0.367	125	58%	Tier 4
Wheel Dozer (370 kW)	CAT	834K	1	496	11.1	0.367	98	59%	Tier 4
Water truck (60,000 L)	CAT	HD605-8	1	724	5.6	0.367	143	59%	Tier 4
Drilling & Blasting									
Production HP Drill	Atlas Copco with CAT C27 engine	PV235	2	800	13.6	0.367	158	43%	Tier 4
8 Hyd Track Drill	Atlas Copco with CAT C15 engine	FlexiRoc D65	1	540	5.0	0.367	106	43%	Tier 4
Excavator Mounted Rock Drill	CAT 374 excavator with mounted HEM drill	374 FL	1	472	5.6	0.367	93	43%	Tier 4
Blasthole Stemmer	CAT	262D	1	74	5.6	0.408	16	43%	Tier 3
Forklift/Telehandler	Dieci Americas	Hercules 190.10	1	168	5.6	0.367	33	59%	Tier 4
Overburden Removal									
Hydraulic Excavator (3.75 m^3)	Komatsu	PC650LC-11	1	436	2.8	0.367	86	53%	Tier 4
Crawler Dozer (264 kW)	CAT	D155AX-8	1	354	12.5	0.367	70	58%	Tier 4
Articulated Truck (30t)	Komatsu	HM300-5	1	332	1.9	0.367	65	57%	Tier 4
Stockpile Rehandle									
Wheel Loader (260 kW)	CAT	980M	1	412	13.2	0.367	81	48%	Tier 4
Maintenance and Other Supporting Equipment									
Rough-Terrain Crane (110 t)	Tadano Mantis	GR1200XL	1	270	2.8	0.367	53	43%	Tier 3
Hydraulic Excavator (36 t)	Komatsu	PC360LC-11	1	271	2.8	0.367	53	53%	Tier 4
On-Highway Class 8 Dump Truck	Freightliner 114SD with Cummins ISX12 engine	114SD	1	500	6.9	0.367	99	80%	Tier 4
Heavy-Duty Light Tower (4 x 1000 W)	Atlas Copco	HiLight V5+	12	4	12.0	0.408	1	43%	Tier 4
Flameless Air Mobile Heater	Aerotech Herman Nelson	BT 700K	1	99	3.3	0.408	22	43%	Tier 4
Portable Dewatering Pump (4-inch)	Goldwin	CD103M	1	41	13.9	0.408	9	43%	Tier 4
Portable Dewatering Pump (8-inch)	Goldwin	CM225M	1	99	13.9	0.408	22	43%	Tier 4
Dewatering Pump	Goldwin	CM225M	2	99	16.7	0.408	22	43%	Tier 4

Table C-11 Off-Road Equipment CAC Emission Rates

Activity and Equipment Description	Hourly CAC Emission Rates (g/s) [a, b]										Daily CAC Emission Rates (g/s) [a, c]									
	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
MacLellan Site (Year 7)																				
Open Pit Mining																				
Hydraulic Shovel	1.85E-03	9.65E-01	9.65E-01	1.11E-02	1.11E-02	1.08E-02	—	—	—	5.71E-02	1.31E-03	6.83E-01	6.83E-01	7.89E-03	7.89E-03	7.65E-03	—	—	—	4.05E-02
Wheel Loader (13 m^3)	6.92E-04	3.60E-01	3.60E-01	4.16E-03	4.16E-03	4.03E-03	—	—	—	2.13E-02	5.84E-04	3.04E-01	3.04E-01	3.51E-03	3.51E-03	3.40E-03	—	—	—	1.80E-02
Ore Haul Truck (136 t)	2.21E-02	1.15E+01	1.15E+01	1.33E-01	1.33E-01	1.29E-01	—	—	—	6.81E-01	1.48E-02	7.68E+00	7.68E+00	8.87E-02	8.87E-02	8.60E-02	—	—	—	4.55E-01
Motor Grader (215 kW)	2.37E-04	1.43E-02	1.24E-01	7.13E-04	7.13E-04	6.92E-04	—	—	—	7.32E-03	1.24E-04	7.43E-03	6.44E-02	3.71E-04	3.71E-04	3.60E-04	—	—	—	3.81E-03
Motor Grader (178 kW)	1.95E-04	1.17E-02	1.01E-01	5.85E-04	5.85E-04	5.68E-04	—	—	—	6.01E-03	1.01E-04	6.09E-03	5.28E-02	3.05E-04	3.05E-04	2.96E-04	—	—	—	3.13E-03
Crawler Dozer (450 kW)	1.02E-03	6.15E-02	5.33E-01	3.07E-03	3.07E-03	2.98E-03	—	—	—	3.16E-02	5.92E-04	3.56E-02	3.08E-01	1.78E-03	1.78E-03	1.73E-03	—	—	—	1.83E-02
Wheel Dozer (370 kW)	4.06E-04	2.44E-02	2.11E-01	1.22E-03	1.22E-03	1.18E-03	—	—	—	1.25E-02	1.88E-04	1.13E-02	9.78E-02	5.65E-04	5.65E-04	5.48E-04	—	—	—	5.80E-03
Water truck (60,000 L)	5.93E-04	3.56E-02	3.09E-01	1.78E-03	1.78E-03	1.73E-03	—	—	—	1.83E-02	1.37E-04	8.24E-03	7.14E-02	4.12E-04	4.12E-04	4.00E-04	—	—	—	4.23E-03
Overburden Removal																				
Hydraulic Excavator (3.75 m^3)	3.21E-04	1.93E-02	1.67E-01	9.63E-04	9.63E-04	9.34E-04	—	—	—	9.89E-03	2.45E-05	1.47E-03	1.28E-02	7.37E-05	7.37E-05	7.15E-05	—	—	—	7.56E-04
Crawler Dozer (264 kW)	2.85E-04	1.71E-02	1.48E-01	8.56E-04	8.56E-04	8.30E-04	—	—	—	8.78E-03	1.48E-04	8.91E-03	7.72E-02	4.46E-04	4.46E-04	4.32E-04	—	—	—	4.57E-03
Articulated Truck (30t)	2.63E-04	1.58E-02	1.37E-01	7.89E-04	7.89E-04	7.65E-04	—	—	—	8.10E-03	6.32E-05	3.80E-03	3.29E-02	1.90E-04	1.90E-04	1.84E-04	—	—	—	1.95E-03
Drilling & Blasting																				
Production HP Drill	1.43E-03	7.45E-01	7.45E-01	8.60E-03	8.60E-03	8.34E-03	—	—	—	4.41E-02	8.59E-04	4.47E-01	4.47E-01	5.16E-03	5.16E-03	5.01E-03	—	—	—	2.65E-02
8 Hyd Track Drill	6.44E-04	3.87E-02	3.35E-01	1.94E-03	1.94E-03	1.88E-03	—	—	—	1.99E-02	2.42E-04	1.45E-02	1.26E-01	7.26E-04	7.26E-04	7.04E-04	—	—	—	7.45E-03
Excavator Mounted Rock Drill	2.82E-04	1.69E-02	1.47E-01	8.46E-04	8.46E-04	8.20E-04	—	—	—	8.68E-03	6.52E-05	3.92E-03	3.39E-02	1.96E-04	1.96E-04	1.90E-04	—	—	—	2.01E-03
Excavator Mounted Hydraulic Hammer	2.82E-04	1.69E-02	1.47E-01	8.46E-04	8.46E-04	8.20E-04	—	—	—	8.68E-03	2.44E-05	1.47E-03	1.27E-02	7.34E-05	7.34E-05	7.12E-05	—	—	—	7.54E-04
Blasthole Stemmer	4.93E-05	2.93E-02	3.28E-02	2.66E-03	2.66E-03	2.58E-03	—	—	—	1.95E-03	1.14E-05	6.78E-03	7.60E-03	6.16E-04	6.16E-04	5.98E-04	—	—	—	4.52E-04
Forklift/Telehandler	1.38E-04	8.26E-03	1.02E-01	4.13E-04	4.13E-04	4.01E-04	—	—	—	4.24E-03	3.18E-05	1.91E-03	2.36E-02	9.56E-05	9.56E-05	9.27E-05	—	—	—	9.82E-04
Stockpile Rehandle																				
Wheel Loader (260 kW)	2.74E-04	1.65E-02	1.43E-01	8.24E-04	8.24E-04	7.99E-04	—	—	—	8.46E-03	9.75E-05	5.86E-03	5.08E-02	2.93E-04	2.93E-04	2.84E-04	—	—	—	3.01E-03
Maintenance and Other Supporting Equipment																				
Rough-Terrain Crane (110 t)	3.22E-04	1.00E-01	1.68E-01	5.32E-03	5.32E-03	5.16E-03	—	—	—	1.21E-02	3.73E-05	1.16E-02	1.94E-02	6.16E-04	6.16E-04	5.97E-04	—	—	—	1.40E-03
Hydraulic Excavator (36 t)	1.99E-04	1.20E-02	1.04E-01	5.98E-04	5.98E-04	5.81E-04	—	—	—	6.14E-03	2.31E-05	1.39E-03	1.20E-02	6.93E-05	6.93E-05	6.72E-05	—	—	—	7.11E-04
Skid-Steer Loader	2.41E-05	1.43E-02	1.60E-02	9.54E-05	9.54E-05	9.25E-05	—	—	—	9.54E-04	5.57E-06	3.31E-03	3.71E-03	2.21E-05	2.21E-05	2.14E-05	—	—	—	2.21E-04
Portable Air Compressor (5-6m^3)	4.91E-05	2.92E-02	3.27E-02	1.94E-04	1.94E-04	1.89E-04	—	—	—	1.94E-03	6.82E-06	4.05E-03	4.54E-03	2.70E-05	2.70E-05	2.62E-05	—	—	—	2.70E-04
Flameless Air Mobile Heater	6.57E-05	3.55E-03	4.38E-02	1.77E-04	1.77E-04	1.72E-04	—	—	—	1.82E-03	9.12E-06	4.93E-04	6.08E-03	2.46E-05	2.46E-05	2.39E-05	—	—	—	2.53E-04
Trailer-Mounted Pressure Washer	1.56E-05	1.40E-02	1.38E-02	8.42E-04	8.42E-04	8.17E-04	—	—	—	1.85E-03	2.16E-06	1.95E-03	1.91E-03	1.17E-04	1.17E-04	1.13E-04	—	—	—	2.57E-04
Portable Dewatering Pump (4-inch)	2.72E-05	1.62E-02	2.01E-02	1.08E-04	1.08E-04	1.05E-04	—	—	—	1.08E-03	1.57E-05	9.35E-03	1.16E-02	6.23E-05	6.23E-05	6.05E-05	—	—	—	6.23E-04
Portable Dewatering Pump (8-inch)	6.57E-05	3.55E-03	4.38E-02	1.77E-04	1.77E-04	1.72E-04	—	—	—	1.82E-03	3.80E-05	2.05E-03	2.53E-02	1.03E-04	1.03E-04	9.96E-05	—	—	—	1.05E-03
Dewatering Pump	1.97E-04	1.06E-02	1.31E-01	5.32E-04	5.32E-04	5.16E-04	—	—	—	5.46E-03	1.37E-04	7.39E-03	9.12E-02	3.70E-04	3.70E-04	3.58E-04	—	—	—	3.79E-03
Heavy-Duty Light Tower (4 x 1000 W)	7.47E-05	3.50E-02	3.50E-02	4.04E-04	4.04E-04	3.92E-04	—	—	—	2.07E-03	3.74E-05	1.75E-02	1.75E-02	2.02E-04	2.02E-04	1.96E-04	—	—	—	1.04E-03

Table C-11 Off-Road Equipment CAC Emission Rates

Activity and Equipment Description	Hourly CAC Emission Rates (g/s) [a, b]										Daily CAC Emission Rates (g/s) [a, c]									
	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Gordon Site (Year 2)																				
Open Pit Mining																				
Hydraulic Shovel	9.26E-04	4.82E-01	4.82E-01	5.57E-03	5.57E-03	5.40E-03	—	—	—	2.86E-02	6.56E-04	3.41E-01	3.41E-01	3.94E-03	3.94E-03	3.82E-03	—	—	—	2.02E-02
Wheel Loader (13 m^3)	6.92E-04	3.60E-01	3.60E-01	4.16E-03	4.16E-03	4.03E-03	—	—	—	2.13E-02	4.35E-04	2.26E-01	2.26E-01	2.61E-03	2.61E-03	2.53E-03	—	—	—	1.34E-02
Ore Haul Truck (136 t)	8.59E-03	4.47E+00	4.47E+00	5.16E-02	5.16E-02	5.01E-02	—	—	—	2.65E-01	5.11E-03	2.66E+00	2.66E+00	3.07E-02	3.07E-02	2.98E-02	—	—	—	1.58E-01
Motor Grader (215 kW)	2.37E-04	1.43E-02	1.24E-01	7.13E-04	7.13E-04	6.92E-04	—	—	—	7.32E-03	1.24E-04	7.43E-03	6.44E-02	3.71E-04	3.71E-04	3.60E-04	—	—	—	3.81E-03
Crawler Dozer (450 kW)	5.12E-04	3.07E-02	2.66E-01	1.54E-03	1.54E-03	1.49E-03	—	—	—	1.58E-02	2.96E-04	1.78E-02	1.54E-01	8.89E-04	8.89E-04	8.63E-04	—	—	—	9.13E-03
Wheel Dozer (370 kW)	4.06E-04	2.44E-02	2.11E-01	1.22E-03	1.22E-03	1.18E-03	—	—	—	1.25E-02	1.88E-04	1.13E-02	9.78E-02	5.65E-04	5.65E-04	5.48E-04	—	—	—	5.80E-03
Water truck (60,000 L)	5.93E-04	3.56E-02	3.09E-01	1.78E-03	1.78E-03	1.73E-03	—	—	—	1.83E-02	1.37E-04	8.24E-03	7.14E-02	4.12E-04	4.12E-04	4.00E-04	—	—	—	4.23E-03
Drilling & Blasting																				
Production HP Drill	9.54E-04	4.97E-01	4.97E-01	5.73E-03	5.73E-03	5.56E-03	—	—	—	2.94E-02	5.41E-04	2.81E-01	2.81E-01	3.25E-03	3.25E-03	3.15E-03	—	—	—	1.67E-02
8 Hyd Track Drill	3.22E-04	1.94E-02	1.68E-01	9.68E-04	9.68E-04	9.38E-04	—	—	—	9.93E-03	6.73E-05	4.04E-03	3.50E-02	2.02E-04	2.02E-04	1.96E-04	—	—	—	2.08E-03
Excavator Mounted Rock Drill	2.82E-04	1.69E-02	1.47E-01	8.46E-04	8.46E-04	8.20E-04	—	—	—	8.68E-03	6.52E-05	3.92E-03	3.39E-02	1.96E-04	1.96E-04	1.90E-04	—	—	—	2.01E-03
Blasthole Stemmer	4.93E-05	2.93E-02	3.28E-02	2.66E-03	2.66E-03	2.58E-03	—	—	—	1.95E-03	1.14E-05	6.78E-03	7.60E-03	6.16E-04	6.16E-04	5.98E-04	—	—	—	4.52E-04
Forklift/Telehandler	1.38E-04	8.26E-03	1.02E-01	4.13E-04	4.13E-04	4.01E-04	—	—	—	4.24E-03	3.18E-05	1.91E-03	2.36E-02	9.56E-05	9.56E-05	9.27E-05	—	—	—	9.82E-04
Overburden Removal																				
Hydraulic Excavator (3.75 m^3)	3.21E-04	1.93E-02	1.67E-01	9.63E-04	9.63E-04	9.34E-04	—	—	—	9.89E-03	3.71E-05	2.23E-03	1.93E-02	1.11E-04	1.11E-04	1.08E-04	—	—	—	1.14E-03
Crawler Dozer (264 kW)	2.85E-04	1.71E-02	1.48E-01	8.56E-04	8.56E-04	8.30E-04	—	—	—	8.78E-03	1.48E-04	8.91E-03	7.72E-02	4.46E-04	4.46E-04	4.32E-04	—	—	—	4.57E-03
Articulated Truck (30t)	2.63E-04	1.58E-02	1.37E-01	7.89E-04	7.89E-04	7.65E-04	—	—	—	8.10E-03	2.04E-05	1.23E-03	1.06E-02	6.14E-05	6.14E-05	5.96E-05	—	—	—	6.30E-04
Stockpile Rehandle																				
Wheel Loader (260 kW)	2.74E-04	1.65E-02	1.43E-01	8.24E-04	8.24E-04	7.99E-04	—	—	—	8.46E-03	1.51E-04	9.07E-03	7.86E-02	4.53E-04	4.53E-04	4.40E-04	—	—	—	4.65E-03
Maintenance and Other Supporting Equipment																				
Rough-Terrain Crane (110 t)	1.61E-04	9.03E-02	8.39E-02	4.84E-03	4.84E-03	4.69E-03	—	—	—	7.10E-03	1.86E-05	1.05E-02	9.70E-03	5.60E-04	5.60E-04	5.43E-04	—	—	—	8.21E-04
Hydraulic Excavator (36 t)	1.99E-04	1.20E-02	1.04E-01	5.98E-04	5.98E-04	5.81E-04	—	—	—	6.14E-03	2.31E-05	1.39E-03	1.20E-02	6.93E-05	6.93E-05	6.72E-05	—	—	—	7.11E-04
On-Highway Class 8 Dump Truck	5.55E-04	3.33E-02	2.89E-01	1.67E-03	1.67E-03	1.62E-03	—	—	—	1.71E-02	1.61E-04	9.65E-03	8.36E-02	4.82E-04	4.82E-04	4.68E-04	—	—	—	4.95E-03
Heavy-Duty Light Tower (4 x 1000 W)	3.20E-05	1.50E-02	1.50E-02	1.73E-04	1.73E-04	1.68E-04	—	—	—	8.88E-04	1.60E-05	7.50E-03	7.50E-03	8.65E-05	8.65E-05	8.39E-05	—	—	—	4.44E-04
Flameless Air Mobile Heater	6.57E-05	3.55E-03	4.38E-02	1.77E-04	1.77E-04	1.72E-04	—	—	—	1.82E-03	9.12E-06	4.93E-04	6.08E-03	2.46E-05	2.46E-05	2.39E-05	—	—	—	2.53E-04
Portable Dewatering Pump (4-inch)	2.72E-05	1.62E-02	2.01E-02	1.08E-04	1.08E-04	1.05E-04	—	—	—	1.08E-03	1.57E-05	9.35E-03	1.16E-02	6.23E-05	6.23E-05	6.05E-05	—	—	—	6.23E-04
Portable Dewatering Pump (8-inch)	6.57E-05	3.55E-03	4.38E-02	1.77E-04	1.77E-04	1.72E-04	—	—	—	1.82E-03	3.80E-05	2.05E-03	2.53E-02	1.03E-04	1.03E-04	9.96E-05	—	—	—	1.05E-03
Dewatering Pump	1.31E-04	7.10E-03	8.75E-02	3.55E-04	3.55E-04	3.44E-04	—	—	—	3.64E-03	9.12E-05	4.93E-03	6.08E-02	2.46E-04	2.46E-04	2.39E-04	—	—	—	2.53E-03

NOTES:

[a] Hourly and daily emission rates are for the number of equipment presented in Table C-10

[b] SO_2 hourly emission rates were calculated using Equation C-4 (as shown in Section C.1.3.1.1) and other substances emission rates were calculated using Equation C-3 (as shown in Section C.1.3.1.1)

[c] Daily emission rates were calculated using the hourly emission rate and equipments operating hours per day

Table C-12 On-Road Equipment Parameters for CAC Emission Rate

Activity	Truck Description	MOVES Vehicle Type	Road Length	Number of Round Trips	
			km	trips/d	trips/h
MacLellan Site (Year 7)					
Haul Roads					
Haul Road from Low Grade Ore Stockpile to ROM Stockpile	On-Highway Class 8 Dump Truck	Single Unit Short-haul Truck	0.136	138	20
Access Roads					
Access Road to Explosive Magazine at MacLellan Site	Explosives Delivery Truck (20 t)	Single Unit Long-haul Truck	6.4	2	1
	Pick up 3/4 ton	Passenger Truck	6.4	4	1
Access Road to Workers Camp at MacLellan Site	Crew Change Vehicle	School Bus	5.6	2	1
	Pick up 3/4 ton	Passenger Truck	5.6	4	1
Old Access Road at MacLellan Site	Highway Haul Truck	Combination Long-haul Truck	5.3	131	9
	Lube/Fuel Truck (20,000 L)	Single Unit Short-haul Truck	5.3	2	1
	Welding Service Truck	Single Unit Short-haul Truck	5.3	2	1
	Super B Train Fuel Truck (40,000 L)	Combination Long-haul Truck	5.3	2	1
	Grinding Media Delivery Truck (40 t)	Combination Long-haul Truck	5.3	0.3	1
	Reagents Delivery Truck (20 t)	Single Unit Long-haul Truck	5.3	1	1
	Pick up 3/4 ton	Passenger Truck	5.3	12	3
	Small Water Truck (15,000 L)	Single Unit Short-haul Truck	5.3	2	1
Gordon Site (Year 2)					
Access Roads					
Access Road Segment 1 at Gordon Site	Highway Haul Truck	Combination Long-haul Truck	3.7	131	9
	Lube/Fuel Truck (20,000 L)	Single Unit Short-haul Truck	3.7	2	1
	Welding Service Truck	Single Unit Short-haul Truck	3.7	2	1
	Explosives Delivery Truck (14 t)	Single Unit Long-haul Truck	3.7	1	1
	Super B Train Fuel Truck (40,000 L)	Combination Long-haul Truck	3.7	2	1
	Crew Change Vehicle	School Bus	3.7	2	1
	Pick up 3/4 ton	Passenger Truck	3.7	16	4
	Small Water Truck (15,000 L)	Single Unit Short-haul Truck	3.7	2	1
Access Road Segment 2 at Gordon Site	Highway Haul Truck	Combination Long-haul Truck	11.1	131	9
	Lube/Fuel Truck (20,000 L)	Single Unit Short-haul Truck	11.1	2	1
	Welding Service Truck	Single Unit Short-haul Truck	11.1	2	1
	Explosives Delivery Truck (14 t)	Single Unit Long-haul Truck	11.1	1	1
	Super B Train Fuel Truck (40,000 L)	Combination Long-haul Truck	11.1	2	1
	Crew Change Vehicle	School Bus	11.1	2	1
	Pick up 3/4 ton	Passenger Truck	11.1	16	4
	Small Water Truck (15,000 L)	Single Unit Short-haul Truck	11.1	2	1
Provincial Road 391					

Table C-12 On-Road Equipment Parameters for CAC Emission Rate

Activity	Truck Description	MOVES Vehicle Type	Road Length	Number of Round Trips	
			km	trips/d	trips/h
Provincial Road 391	Highway Haul Truck	Combination Long-haul Truck	1.5	131	9
	Explosives Delivery Truck (14 t)	Single Unit Long-haul Truck	1.5	2	1
	Super B Train Fuel Truck (40,000 L)	Combination Long-haul Truck	1.5	2	1
	Grinding Media Delivery Truck (40 t)	Combination Long-haul Truck	1.5	0.3	1
	Reagents Delivery Truck (20 t)	Single Unit Long-haul Truck	1.5	1	1

Table C-13 Off-Road Equipment CAC Emission Rates

Truck Description	Hourly CAC Emission Rates (g/s) [a, b]										Daily CAC Emission Rates (g/s) [a, c]									
	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
MacLellan Site (Year 7)																				
Haul Roads																				
On-Highway Class 8 Dump Truck	6.76E-06	2.23E-03	8.65E-04	1.99E-04	1.99E-04	1.16E-04	—	—	—	2.66E-04	1.95E-06	6.46E-04	2.50E-04	5.76E-05	5.76E-05	3.35E-05	—	—	—	7.71E-05
Access Roads																				
Explosives Delivery Truck (20 t)	1.47E-05	4.32E-03	1.76E-03	4.42E-04	4.42E-04	2.32E-04	—	—	—	5.63E-04	1.23E-06	3.60E-04	1.47E-04	3.68E-05	3.68E-05	1.93E-05	—	—	—	4.69E-05
Pickup 3/4 ton	1.06E-05	2.14E-03	3.02E-03	1.40E-04	1.40E-04	8.51E-05	—	—	—	3.12E-04	1.84E-06	3.72E-04	5.24E-04	2.44E-05	2.44E-05	1.48E-05	—	—	—	5.42E-05
Crew Change Vehicle	1.44E-05	9.60E-03	3.01E-03	7.08E-04	7.08E-04	5.15E-04	—	—	—	1.10E-03	1.20E-06	8.00E-04	2.51E-04	5.90E-05	5.90E-05	4.30E-05	—	—	—	9.16E-05
Pickup 3/4 ton	9.26E-06	1.87E-03	2.64E-03	1.23E-04	1.23E-04	7.44E-05	—	—	—	2.73E-04	1.61E-06	3.25E-04	4.58E-04	2.13E-05	2.13E-05	1.29E-05	—	—	—	4.74E-05
Highway Haul Truck	2.30E-04	1.02E-01	2.27E-02	6.01E-03	6.01E-03	3.91E-03	—	—	—	4.75E-03	1.45E-04	6.39E-02	1.42E-02	3.77E-03	3.77E-03	2.45E-03	—	—	—	2.98E-03
Lube/Fuel Truck (20,000 L)	1.31E-05	4.34E-03	1.68E-03	3.86E-04	3.86E-04	2.25E-04	—	—	—	5.18E-04	1.09E-06	3.61E-04	1.40E-04	3.22E-05	3.22E-05	1.88E-05	—	—	—	4.31E-05
Welding Service Truck	1.31E-05	4.34E-03	1.68E-03	3.86E-04	3.86E-04	2.25E-04	—	—	—	5.18E-04	1.09E-06	3.61E-04	1.40E-04	3.22E-05	3.22E-05	1.88E-05	—	—	—	4.31E-05
Super B Train Fuel Truck (40,000 L)	2.65E-05	1.17E-02	2.61E-03	6.91E-04	6.91E-04	4.49E-04	—	—	—	5.46E-04	1.69E-06	7.49E-04	1.67E-04	4.42E-05	4.42E-05	2.87E-05	—	—	—	3.49E-05
Grinding Media Delivery Truck (40 t)	2.65E-05	1.17E-02	2.61E-03	6.91E-04	6.91E-04	4.49E-04	—	—	—	5.46E-04	3.24E-07	1.43E-04	3.18E-05	8.44E-06	8.44E-06	5.48E-06	—	—	—	6.67E-06
Reagents Delivery Truck (20 t)	1.21E-05	3.54E-03	1.45E-03	3.62E-04	3.62E-04	1.90E-04	—	—	—	4.61E-04	5.52E-07	1.62E-04	6.61E-05	1.65E-05	1.65E-05	8.69E-06	—	—	—	2.11E-05
Pickup 3/4 ton	2.61E-05	5.27E-03	7.43E-03	3.45E-04	3.45E-04	2.10E-04	—	—	—	7.68E-04	4.53E-06	9.16E-04	1.29E-03	5.99E-05	5.99E-05	3.64E-05	—	—	—	1.33E-04
Small Water Truck (15,000 L)	1.31E-05	4.34E-03	1.68E-03	3.86E-04	3.86E-04	2.25E-04	—	—	—	5.18E-04	1.09E-06	3.61E-04	1.40E-04	3.22E-05	3.22E-05	1.88E-05	—	—	—	4.31E-05
Gordon Site (Year 2)																				
Access Roads																				
Highway Haul Truck	1.62E-04	7.16E-02	1.59E-02	4.22E-03	4.22E-03	2.74E-03	—	—	—	3.34E-03	1.02E-04	4.49E-02	1.00E-02	2.65E-03	2.65E-03	1.72E-03	—	—	—	2.09E-03
Lube/Fuel Truck (20,000 L)	9.22E-06	3.05E-03	1.18E-03	2.72E-04	2.72E-04	1.58E-04	—	—	—	3.64E-04	7.68E-07	2.54E-04	9.84E-05	2.26E-05	2.26E-05	1.32E-05	—	—	—	3.03E-05
Welding Service Truck	9.22E-06	3.05E-03	1.18E-03	2.72E-04	2.72E-04	1.58E-04	—	—	—	3.64E-04	7.68E-07	2.54E-04	9.84E-05	2.26E-05	2.26E-05	1.32E-05	—	—	—	3.03E-05
Explosives Delivery Truck (14 t)	8.50E-06	2.49E-03	1.02E-03	2.55E-04	2.55E-04	1.34E-04	—	—	—	3.24E-04	3.54E-07	1.04E-04	4.24E-05	1.06E-05	1.06E-05	5.57E-06	—	—	—	1.35E-05
Super B Train Fuel Truck (40,000 L)	1.86E-05	8.23E-03	1.83E-03	4.86E-04	4.86E-04	3.15E-04	—	—	—	3.84E-04	1.36E-06	6.01E-04	1.34E-04	3.55E-05	3.55E-05	2.30E-05	—	—	—	2.80E-05
Crew Change Vehicle	9.48E-06	6.33E-03	1.98E-03	4.67E-04	4.67E-04	3.40E-04	—	—	—	7.25E-04	7.90E-07	5.28E-04	1.65E-04	3.89E-05	3.89E-05	2.83E-05	—	—	—	6.04E-05

Table C-13 Off-Road Equipment CAC Emission Rates

Truck Description	Hourly CAC Emission Rates (g/s) [a, b]										Daily CAC Emission Rates (g/s) [a, c]									
	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	SO_2	NO_X	CO	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Pickup 3/4 ton	2.44E-05	4.94E-03	6.96E-03	3.23E-04	3.23E-04	1.96E-04	—	—	—	7.20E-04	4.24E-06	8.58E-04	1.21E-03	5.61E-05	5.61E-05	3.41E-05	—	—	—	1.25E-04
Small Water Truck (15,000 L)	9.22E-06	3.05E-03	1.18E-03	2.72E-04	2.72E-04	1.58E-04	—	—	—	3.64E-04	7.68E-07	2.54E-04	9.84E-05	2.26E-05	2.26E-05	1.32E-05	—	—	—	3.03E-05
Highway Haul Truck	4.87E-04	2.15E-01	4.79E-02	1.27E-02	1.27E-02	8.26E-03	—	—	—	1.00E-02	3.06E-04	1.35E-01	3.01E-02	7.97E-03	7.97E-03	5.18E-03	—	—	—	6.30E-03
Lube/Fuel Truck (20,000 L)	2.77E-05	9.17E-03	3.55E-03	8.17E-04	8.17E-04	4.76E-04	—	—	—	1.09E-03	2.31E-06	7.64E-04	2.96E-04	6.81E-05	6.81E-05	3.96E-05	—	—	—	9.12E-05
Welding Service Truck	2.77E-05	9.17E-03	3.55E-03	8.17E-04	8.17E-04	4.76E-04	—	—	—	1.09E-03	2.31E-06	7.64E-04	2.96E-04	6.81E-05	6.81E-05	3.96E-05	—	—	—	9.12E-05
Explosives Delivery Truck (14 t)	2.56E-05	7.48E-03	3.06E-03	7.66E-04	7.66E-04	4.02E-04	—	—	—	9.75E-04	1.06E-06	3.12E-04	1.27E-04	3.19E-05	3.19E-05	1.68E-05	—	—	—	4.06E-05
Super B Train Fuel Truck (40,000 L)	5.60E-05	2.48E-02	5.51E-03	1.46E-03	1.46E-03	9.49E-04	—	—	—	1.15E-03	4.09E-06	1.81E-03	4.03E-04	1.07E-04	1.07E-04	6.93E-05	—	—	—	8.43E-05
Crew Change Vehicle	2.85E-05	1.91E-02	5.97E-03	1.40E-03	1.40E-03	1.02E-03	—	—	—	2.18E-03	2.38E-06	1.59E-03	4.98E-04	1.17E-04	1.17E-04	8.52E-05	—	—	—	1.82E-04
Pickup 3/4 ton	7.35E-05	1.49E-02	2.09E-02	9.73E-04	9.73E-04	5.91E-04	—	—	—	2.17E-03	1.28E-05	2.58E-03	3.64E-03	1.69E-04	1.69E-04	1.03E-04	—	—	—	3.76E-04
Small Water Truck (15,000 L)	2.77E-05	9.17E-03	3.55E-03	8.17E-04	8.17E-04	4.76E-04	—	—	—	1.09E-03	2.31E-06	7.64E-04	2.96E-04	6.81E-05	6.81E-05	3.96E-05	—	—	—	9.12E-05
Provincial Road 391																				
Highway Haul Truck	3.25E-03	1.38E+00	3.17E-01	8.41E-02	8.41E-02	5.46E-02	—	—	—	6.64E-02	2.04E-03	8.64E-01	1.99E-01	5.28E-02	5.28E-02	3.43E-02	—	—	—	4.17E-02
Explosives Delivery Truck (14 t)	1.71E-04	4.77E-02	2.02E-02	5.07E-03	5.07E-03	2.66E-03	—	—	—	6.45E-03	1.42E-05	3.97E-03	1.69E-03	4.22E-04	4.22E-04	2.22E-04	—	—	—	5.38E-04
Super B Train Fuel Truck (40,000 L)	3.74E-04	1.58E-01	3.65E-02	9.66E-03	9.66E-03	6.28E-03	—	—	—	7.64E-03	2.73E-05	1.16E-02	2.66E-03	7.06E-04	7.06E-04	4.59E-04	—	—	—	5.58E-04
Grinding Media Delivery Truck (40 t)	3.74E-04	1.58E-01	3.65E-02	9.66E-03	9.66E-03	6.28E-03	—	—	—	7.64E-03	4.56E-06	1.93E-03	4.45E-04	1.18E-04	1.18E-04	7.67E-05	—	—	—	9.33E-05
Reagents Delivery Truck (20 t)	1.71E-04	4.77E-02	2.02E-02	5.07E-03	5.07E-03	2.66E-03	—	—	—	6.45E-03	7.79E-06	2.18E-03	9.24E-04	2.31E-04	2.31E-04	1.22E-04	—	—	—	2.95E-04

NOTES:

[a] Hourly and daily emission rates were calculated using the parameters presented in Table C-12

[b] Hourly emission rates were calculated using Equation C-5 (as shown in Section C.1.3.1.2) for all substances

[c] Daily emission rates were calculated using Equation C-5 (as shown in Section C.1.3.1.2) but uses the trips per day instead of tips per hour and respective unit conversion

C.3.3.2 Explosive Detonation Emissions

Ammonium nitrate fuel oil emulsion explosives will be used for the blasting. Table C-14 summarizes the hourly and daily CAC detonation emission rates for Year 7 and Year 2 at MacLellan and Gordon, respectively. The emission rates were determined using Equation C-6 (SO_2, NO_x and CO) and detonation emission factors in Table C-3. Based on the information provided by LLGP, blasting will occur every third day and the duration of blasting will be approximately one hour.

Emissions of SO_2, NO_X and CO from the explosives detonation are determined from:

$$\begin{aligned} ER_h\ (g/s) &= Number\ of\ holes\ per\ blast \left(\frac{holes}{blast}\right) \times Blast\ per\ hour \left(\frac{blast}{hr}\right) \\ &\times Explosive\ Usage \left(\frac{kg\ of\ explosives}{hole}\right) \times Unit\ Conversion \left(\frac{tonnes}{1000\ kg}\right) \\ &\times Emission\ Factor \left(\frac{kg}{tonnes\ of\ explosives}\right) \times Unit\ Conversion \left(\frac{1000\ g}{kg}\right) \\ &\times Unit\ Conversion \left(\frac{hr}{3600\ s}\right) \end{aligned}$$

Equation C-6

where

ER_h	-	Hourly emission rate (g/s)
Explosive Usage	-	Amount of explosives used per hole (kg/hole)
Emission Factor	-	US EPA emission factors for Explosives Detonation (kg/tonnes of explosives) (US EPA 1980)

Table C-14 Explosive Detonation Emission Rates

Activity Description	Hourly CAC Emission Rates (g/s) [a]			Daily CAC Emission Rates (g/s) [b, c]		
	SO_2	NO_X	CO	SO_2	NO_X	CO
MacLellan Site (Year 7)						
Open Pit						
Explosives Detonation	1.23E+01	9.84E+01	4.18E+02	1.23E+01	9.84E+01	4.18E+02
Gordon Site (Year 2)						
Open Pit						
Explosives Detonation	8.89E+00	7.11E+01	3.02E+02	8.89E+00	7.11E+01	3.02E+02

NOTES:

[a] Hourly emission rates were calculated using the Equation C-6 (as shown in Section 1.3.2)

[b] Daily emission rates were calculated using the Equation C-6 (as shown in Section 1.3.2) but use number of blasts per day and the respective conversion factor

[c] Blasting occurs every third day between 7 pm and 8 pm

C.3.3.3 Fugitive Emissions

C.3.3.3.1 Fugitive Dust Emission

There are various mining activities that create fugitive dust including TSP, PM_{10} and $PM_{2.5}$ emissions. The mining activities are summarized into the following categories:

- Drilling
- Blasting
- Truck loading
- Truck unloading
- Unpaved road dust
- Paved road dust
- Bulldozing
- Grading
- Wind erosion
- Primary Crusher
- Secondary Crusher
- Drying Oven
- Induction Furnace

Daily and annual emission rates from all of the above activities were calculated using the emission rates listed in Table C-4. The fugitive TSP, PM_{10} and $PM_{2.5}$ emission rates from the above activities are calculated using the Equation C-7 and Equation C-10 to Equation C-18. The source-specific parameters and fugitive TSP, PM_{10} and $PM_{2.5}$ emission rates for MacLellan, Gordon and Provincial Road sources are summarized in Table C-15, Table C-16 and Table C-17, respectively.

Fugitive TSP, PM_{10} and $PM_{2.5}$ emission rates for each activity were determined using the below equations:

Drilling:

$$ER_h\ (g/s) = Number\ of\ Holes\ Drilled\left(\frac{hole}{hr}\right) \times (1 - Pit\ Retention\%) \times\ Emission\ Factor\ \left(\frac{kg}{hole}\right) \times Unit\ Conversion\ \left(\frac{1000\ g}{kg}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-7

Where:

ER_h	-	Hourly emission rate (g/s)
Pit Retention %	-	Percentage of emissions retained in the pit
Emission Factor	-	Particle size-specific emission factor (kg/hole).

The percentage of PM emissions that are retained in the open pit depends on the depth of the pit and the particle size (Winges 1986). A 50% pit retention for TSP emissions and 5% pit retention for PM_{10} emissions was applied based on the recommendations in the Australian Emission Manual for Mining (NPI 2012). The fraction of $PM_{2.5}$ emissions retained in the open pits were estimated based on the original Winges equation as shown in Equation C-8 and Equation C-9 (Winges 1981) assuming a pit depth of 245 m for MacLellan site (Year 7) and 150 m for Gordon site (Year 2). The calculated pit retention fraction of $PM_{2.5}$ emissions is 2% for the open pit at the MacLellan site and 1% for the open pit at the Gordon site.

$$Es = \frac{1}{\left(1 + \left(\frac{U_d\left(\frac{m}{s}\right)}{K\left(\frac{m^2}{s}\right)}\right) \times H\ (m)\right)} \times 100$$

Equation C-8

Where:

E_s	-	Percentage of emission escaped from the pit
U_d	-	Deposition velocity (m/s)
K	-	Eddy diffusivity (m^2/s)
H	-	Depth of the pit (m)

$$Er = 1 - Es$$

Equation C-9

Where:

E_r	-	Percentage of emission retained in the pit or Pit Retention %

Blasting:

$$ER_h\ (g/s) = Number\ of\ Blast\left(\frac{blast}{hr}\right) \times (1 - Pit\ Retention\%) \times\ Emission\ Factor\ \left(\frac{kg}{blast}\right) \times Unit\ Conversion\ \left(\frac{1000\ g}{kg}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-10

Where:

ER_h	-	Hourly emission rate (g/s)
Pit Retention %	-	Percentage of emissions retained in the pit
Emission Factor	-	Particle size-specific emission factor (kg/blast).

Bulldozing and Grading:

$$ER_h\ (g/s) = Number\ of\ Units \times Utilization\ Factor\ (\%) \times (1 - Pit\ Retention\%) \times Emission\ Factor\ \left(\frac{lb}{hr}\right) \times Unit\ Conversion\ \left(\frac{kg}{2.205\ lb}\right) \times Unit\ Conversion\ \left(\frac{1000\ g}{kg}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-11

where

ER_h	-	Hourly emission rate (g/s)
Number of Units	-	Number of Equipment
Utilization Factor (UF)	-	Utilization factor defined as the ratio of net operating time versus gross operating time. The utilization factor accounts for the intermittent bulldozing during the operating hours. The utilization factor is assumed to equal to the equipment load factor (LF) which is based on US EPA NONROAD model documentation (US EPA, 2010b).
Pit Retention %	-	Percentage of emissions retained in the pit
Emission Factor	-	Particle size-specific emission factor for bulldozing of overburden (lb/hr).

Material Loading and Unloading:

$$ER_h\ (g/s) = Material\ \left(\frac{tonne}{hr}\right) \times (1 - Pit\ Retention\%) \times Emission\ Factor\ \left(\frac{kg}{tonne}\right) \times Unit\ Conversion\ \left(\frac{1000\ g}{kg}\right) \times Unit\ Conversion\ \left(\frac{hr}{3{,}600\ s}\right)$$

Equation C-12

where:

ER_h	-	Hourly emission rate (g/s)
Material	-	Loaded/unloaded material (tonne/hr)
Pit Retention %	-	Percentage of emissions retained in the pit
Emission Factor	-	Particle size-specific emission factor

Off-Road Equipment Transition:

$$ER_h\ (g/s) = Number\ of\ Units \times Utilization\ Factor\ (\%) \times Average\ Speed\ \left(\frac{km}{hr}\right) \times (1 - Pit\ Retention\ (\%)) \times Emission\ Factor\ \left(\frac{lb}{VMT}\right) \times Unit\ Conversion\ \left(281.9 \frac{g/VKT}{lb/VMT}\right) \times \left(\frac{hr}{3{,}600\ s}\right)$$

Equation C-13

Where:

ER_h	-	Hourly emission rate (g/s)
Number of Units	-	Number of Equipment
Utilization Factor (UF)	-	Utilization factor defined as the ratio of net operating time versus gross operating time. The utilization factor accounts for the intermittent bulldozing during the

		operating hours. The utilization factor is assumed equal to the equipment load factor (LF) which is based on US EPA NONROAD model documentation (US EPA, 2010b).
Average Speed	-	Average speed of the equipment (km/hr)
Pit Retention %	-	Percentage of emissions retained in the pit
Emission Factor	-	Particle size-specific emission factor (lb/VMT).

Unpaved Road Dust:

$$ER_h\ (g/s) = Road\ Length\ (km) \times Round\ Trip\ Factor(2) \times Number\ of\ Trips \left(\frac{trips}{hr}\right) \times (1 - Pit\ Retention\ (\%)) \times Emission\ Factor\ \left(\frac{lb}{VMT}\right) \times (1 - Control\ Efficiency\ (\%)) \times Unit\ Conversion\ \left(281.9 \frac{g/VKT}{lb/VMT}\right) \times Unit\ Conversion\ \left(\frac{hr}{3{,}600\ s}\right)$$

Equation C-14

Where:

ER_h	-	Hourly emission rate (g/s)
Road Length	-	Haul road length (km)
Round Trip Factor (2)	-	A factor of 2 accounting for a round trip distance
Number of Trips	-	Number of trips per truck per hour (trips/hr)
Pit Retention %	-	Percentage of emissions retained in the pit
Emission Factor	-	Particle size-specific emission factor (lb/VMT).
Control Efficiency	-	Control efficiency (%). Assumed 75% control efficiency in summer corresponding to watering twice daily (US EPA, 2006a) and 90% natural mitigation efficiency in winter (Golder Associates, 2012).

Paved Road Dust:

$$ER_h\ (g/s) = Road\ Length\ (km) \times Round\ Trip\ Factor(2) \times Number\ of\ Trips \left(\frac{trips}{hr}\right) \times Emission\ Factor\ \left(\frac{lb}{VMT}\right) \times Unit\ Conversion\ \left(281.9 \frac{g/VKT}{lb/VMT}\right) \times Unit\ Conversion \left(\frac{hr}{3{,}600\ s}\right) \times (1 - Natural\ Mitigation\ Efficiency\ (\%))$$

Equation C-15

Where:

ER_h	-	Hourly emission rate (g/s)
Road Length	-	Haul road length (km)
Round Trip Factor (2)	-	A factor of 2 accounting for a round trip distance
Number of Trips	-	Number of trips per truck per hour (trips/hr)
Emission Factor	-	Particle size-specific emission factor (lb/VMT).

Natural Mitigation Efficiency	-	97% natural mitigation efficiency in winter and 11% in summer were calculated based on the equation from US EPA AP-42 (US EPA 2011) and the number of days with measurable precipitation.

Wind Erosion:

$$ER_h\ (g/s) = Disturbed\ Area\ (m^2) \times Number\ of\ Disturbances\ per\ hour\ \left(\frac{disturbance}{hr}\right) \times Emission\ Factor\ \left(\frac{g}{m^2}\right) \times Unit\ Conversion \left(\frac{hr}{3{,}600\ s}\right)$$

Equation C-16

where:

ER_h	-	Hourly emission rate (g/s)
Disturbed Area	-	Assumed disturbed area (100 m^2) of the stockpile.
Number of Disturbances	-	Number of disturbances per hour equal to the number of truck loadings per hour.
Emission Factor	-	Particle size-specific emission factor for wind erosion (g/m^2/disturbance)

Primary Crusher, Secondary Crusher, and Induction Furnace Dust Collector:

$$ER_h\ (g/s) = Volumetric\ Flow\ Rate \left(\frac{m^3}{hr}\right) \times Inlet\ Dust\ Concentration \left(\frac{g}{m^3}\right) \times\ (1 - Control\ Efficiency\%) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-17

where:

ER_h	-	Hourly emission rate (g/s)
Volumetric Flow Rate	-	Amount of dust sent to dust collector based on the design specification
Inlet Dust Concentration	-	Amount of size-specific particles present in one cubic metre (g/m^3) based on the design specification
Control Efficiency	-	Assumed 98% of control efficiency for dust collectors based on the design specification

Drying Oven:

$$ER_h\ (g/s) = Number\ of\ Batches\ \left(\frac{\#}{day}\right) \times Metal\ Sludge\ Feed\ Rate \left(\frac{kg}{batch}\right) \times\ Unit\ Conversion\ \left(\frac{tonne}{1000\ kg}\right) \times Emission\ Factor\ \left(\frac{kg}{tonne}\right) /\ operating\ hours \left(\frac{hr}{day}\right) \times\ Unit\ Conversion\ \left(\frac{1000\ g}{kg}\right) \times\ Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-18

where:

ER_h	-	Hourly emission rate (g/s)
Number of Batches	-	Number of batches per day
Metal Sludge Feed Rate	-	Material processed per each batch
Operating hours	-	Equipment operating hours per day (hr/day)

Table C-15 Particulate Matter Emission Rates and Parameters for Equipment at MacLellan

Activity Type	Activity Description	Parameters for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
Drilling	Blasthole Drilling	Number of Holes per hour = 3	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	-	2.46E-01	2.45E-01	2.53E-01	1.48E-01	1.47E-01	1.52E-01
Blasting	Blasting	Blasted Area = 5760 m^2 Number of Holes per blast = 213 Explosives Usage = 207.9 kg/hole	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	-	1.34E+01	1.32E+01	7.85E-01	1.34E+01	1.32E+01	7.85E-01
Truck Loading	Truck Overburden Loading in Open Pit	Material Transfer Rate = 382 t/h	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	-	5.07E-02	4.55E-02	7.11E-03	1.22E-02	1.10E-02	1.71E-03
	Truck Loading in Open Pit	Material Transfer Rate = 4719 t/h	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	-	6.25E-01	5.62E-01	8.78E-02	4.18E-01	3.75E-01	5.86E-02
	Truck Loading at Low Grade Ore Stockpile	Material Transfer Rate = 397 t/h	-	-	1.05E-01	4.97E-02	7.53E-03	3.04E-02	1.44E-02	2.18E-03
Truck Unloading	Truck Unloading at Overburden Stockpile	Material Transfer Rate = 382 t/h	-	-	1.01E-01	4.79E-02	7.26E-03	2.44E-02	1.15E-02	1.75E-03
	Truck Unloading at Waste Rock Stockpile	Material Transfer Rate = 4103 t/h	-	-	1.09E+00	5.14E-01	7.79E-02	7.26E-01	3.44E-01	5.20E-02
	Truck Unloading at Mill	Material Transfer Rate = 474 t/h	-	-	1.26E-01	5.95E-02	9.01E-03	8.40E-02	3.97E-02	6.01E-03
	Truck Unloading at Low Grade Ore Stockpile	Material Transfer Rate = 141 t/h	-	-	3.74E-02	1.77E-02	2.68E-03	2.50E-02	1.18E-02	1.79E-03
	Truck Unloading from Gordon to ROM stockpile	Material Transfer Rate = 182 t/h	-	-	4.82E-02	2.28E-02	3.45E-03	3.03E-02	1.43E-02	2.17E-03
Unpaved Road Dust	Haul Road from Open Pit to Overburden Stockpile	Road Length = 0.7 km Number of Round Trips = 14 trips/h Number of Round Trips = 79 trips/d	Summer Control Efficiency =75%	-	5.06E+00	1.44E+00	1.44E-01	1.22E+00	3.47E-01	3.47E-02
	Haul Road in Open Pit	Road Length = 2.7 km Number of Round Trips = 33 trips/h Number of Round Trips = 526 trips/d	Summer Control Efficiency =75%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	4.38E+01	2.37E+01	2.45E+00	2.92E+01	1.58E+01	1.63E+00
	Haul Road from Open Pit to Waste Rock Stockpile	Road Length = 2.9 km Number of Round Trips = 29 trips/h Number of Round Trips = 457 trips/d	Summer Control Efficiency =75%	-	8.17E+01	2.33E+01	2.33E+00	5.45E+01	1.55E+01	1.55E+00
	Haul Road from Open Pit to Mill	Road Length = 1 km Number of Round Trips = 3 trips/h Number of Round Trips = 53 trips/d	Summer Control Efficiency =75%	-	3.27E+00	9.31E-01	9.31E-02	2.18E+00	6.22E-01	6.22E-02
	Haul Road from Open Pit to Low Grade Ore Stockpile	Road Length = 1.2 km Number of Round Trips = 1 trips/h Number of Round Trips = 16 trips/d	Summer Control Efficiency =75%	-	1.13E+00	3.22E-01	3.22E-02	7.55E-01	2.15E-01	2.15E-02
	Haul Road from Low Grade Ore Stockpile to ROM Stockpile	Road Length = 0.14 km Number of Round Trips = 20 trips/h Number of Round Trips = 138 trips/d	Summer Control Efficiency =75%	-	9.91E-01	2.82E-01	2.82E-02	2.87E-01	8.17E-02	8.17E-03

Table C-15 Particulate Matter Emission Rates and Parameters for Equipment at MacLellan

Activity Type	Activity Description	Parameters for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
	Access Road to Explosive Magazine at MacLellan Site	Road Length = 6.4 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	-	2.18E+00	6.22E-01	6.22E-02	1.82E-01	5.18E-02	5.18E-03
		Road Length = 6.4 km Number of Round Trips = 1 trips/h Number of Round Trips = 4 trips/d	Summer Control Efficiency =75%	-	1.25E+00	3.56E-01	3.56E-02	2.17E-01	6.19E-02	6.19E-03
	Access Road to Workers Camp at MacLellan Site	Road Length = 5.6 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	-	1.80E+00	5.13E-01	5.13E-02	1.50E-01	4.28E-02	4.28E-03
		Road Length = 5.6 km Number of Round Trips = 1 trips/h Number of Round Trips = 4 trips/d	Summer Control Efficiency =75%	-	1.09E+00	3.12E-01	3.12E-02	1.90E-01	5.41E-02	5.41E-03
	Old Access Road at MacLellan Site	Road Length = 5.3 km Number of Round Trips = 9 trips/h Number of Round Trips = 131 trips/d	Summer Control Efficiency =75%	-	1.88E+01	5.37E+00	5.37E-01	1.18E+01	3.37E+00	3.37E-01
		Road Length = 5.3 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	-	1.79E+00	5.10E-01	5.10E-02	1.49E-01	4.25E-02	4.25E-03
		Road Length = 5.3 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	-	1.69E+00	4.82E-01	4.82E-02	1.41E-01	4.02E-02	4.02E-03
		Road Length = 5.3 km Number of Round Trips = 1 trips/h Number of Round Trips = 1.5 trips/d	Summer Control Efficiency =75%	-	2.46E+00	7.01E-01	7.01E-02	1.57E-01	4.48E-02	4.48E-03
		Road Length = 5.3 km Number of Round Trips = 1 trips/h Number of Round Trips = 0.3 trips/d	Summer Control Efficiency =75%	-	2.41E+00	6.87E-01	6.87E-02	2.95E-02	8.40E-03	8.40E-04
		Road Length = 5.3 km Number of Round Trips = 1 trips/h Number of Round Trips = 1 trips/d	Summer Control Efficiency =75%	-	1.79E+00	5.10E-01	5.10E-02	8.17E-02	2.33E-02	2.33E-03
		Road Length = 5.3 km Number of Round Trips = 3 trips/h Number of Round Trips = 12 trips/d	Summer Control Efficiency =75%	-	3.08E+00	8.77E-01	8.77E-02	5.34E-01	1.52E-01	1.52E-02
Off-Road Equipment Transition	Hydraulic Shovel	Number of Equipment = 2 Operating hours = 17 h/d Average Speed = 1.2 km/h	Load Factor =53%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	1.48E+00	8.03E-01	8.28E-02	1.05E+00	5.69E-01	5.87E-02
	Wheel Loader (13 m^3)	Number of Equipment = 1 Operating hours = 20.2 h/d Average Speed = 11.9 km/h	Load Factor =48%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	4.92E+00	2.67E+00	2.75E-01	4.15E+00	2.25E+00	2.32E-01
	Hydraulic Excavator (3.75 m^3)	Number of Equipment = 1 Operating hours = 1.8 h/d Average Speed = 3 km/h	Load Factor =53%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	9.97E-01	5.40E-01	5.57E-02	7.63E-02	4.13E-02	4.26E-03

Table C-15 Particulate Matter Emission Rates and Parameters for Equipment at MacLellan

Activity Type	Activity Description	Parameters for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
	Production HP Drill	Number of Equipment = 3 Operating hours = 14.4 h/d Average Speed = 2.5 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	1.91E+00	1.03E+00	1.07E-01	1.15E+00	6.21E-01	6.40E-02
	8 Hyd Track Drill	Number of Equipment = 2 Operating hours = 9 h/d Average Speed = 1.6 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	5.49E-01	2.97E-01	3.07E-02	2.06E-01	1.12E-01	1.15E-02
	Excavator Mounted Rock Drill	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 2.1 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	6.00E-01	3.25E-01	3.35E-02	1.39E-01	7.53E-02	7.76E-03
	Excavator Mounted Hydraulic Hammer	Number of Equipment = 1 Operating hours = 2.1 h/d Average Speed = 2.1 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	6.00E-01	3.25E-01	3.35E-02	5.21E-02	2.82E-02	2.91E-03
	Blasthole Stemmer	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 12.5 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	9.15E-01	4.96E-01	5.11E-02	2.12E-01	1.15E-01	1.18E-02
	Forklift/Telehandler	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 11.5 km/h	Load Factor =59%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	2.43E+00	1.32E+00	1.36E-01	5.63E-01	3.05E-01	3.14E-02
	Wheel Loader (260 kW)	Number of Equipment = 1 Operating hours = 8.5 h/d Average Speed = 13.3 km/h	Load Factor =48%	-	5.63E+00	1.60E+00	1.60E-01	2.00E+00	5.70E-01	5.70E-02
	Hydraulic Excavator (36 t)	Number of Equipment = 1 Operating hours = 2.8 h/d Average Speed = 4.2 km/h	Load Factor =53%	-	2.14E+00	6.10E-01	6.10E-02	2.48E-01	7.06E-02	7.06E-03
	Skid-Steer Loader	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 7.7 km/h	Load Factor =21%	-	6.16E-01	1.76E-01	1.76E-02	1.43E-01	4.06E-02	4.06E-03
Bulldozing	Crawler Dozer (450 kW)	Number of Equipment =2 Operating hours = 13.9 h/d	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	Load Factor = 58%	2.88E-01	1.05E-01	5.93E-02	1.67E-01	6.05E-02	3.43E-02
	Wheel Dozer (370 kW)	Number of Equipment =1 Operating hours = 11.1 h/d	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 2%	Load Factor = 59%	1.46E-01	5.32E-02	3.01E-02	6.78E-02	2.46E-02	1.40E-02
	Crawler Dozer (264 kW)	Number of Equipment =1 Operating hours = 12.5 h/d	-	Load Factor = 58%	2.88E-01	5.50E-02	3.02E-02	1.50E-01	2.87E-02	1.57E-02

Table C-15 Particulate Matter Emission Rates and Parameters for Equipment at MacLellan

Activity Type	Activity Description	Parameters for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
Grading	Motor Grader (215 kW)	Number of Equipment =1 Operating hours = 12.5 h/d Average Speed =11.4 km/h	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 2%	Load Factor = 59%	1.40E+00	7.67E-01	8.53E-02	7.32E-01	4.00E-01	4.45E-02
	Motor Grader (178 kW)	Number of Equipment =1 Operating hours = 12.5 h/d Average Speed =11.4 km/h	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 2%	Load Factor = 59%	1.40E+00	7.67E-01	8.53E-02	7.32E-01	4.00E-01	4.45E-02
Wind Erosion	Overburden Stockpile	Operating hours =5.8	Number of Disturbance =13.5 per hour Disturbed Area = 151,756 m^2	Wind Speed Category = 6	3.16E+00	1.58E+00	2.37E-01	7.60E-01	3.80E-01	5.70E-02
	Topsoil Stockpile	Operating hours =24	Number of Disturbance =1 per hour	Wind Speed Category = 6	2.34E-01	1.17E-01	1.76E-02	2.34E-01	1.17E-01	1.76E-02
	Waste Rock Stockpile	Operating hours =16	Number of Disturbance =28.1 per hour Disturbed Area = 2,622,566 m^2	Wind Speed Category = 6	6.59E+00	3.30E+00	4.94E-01	4.40E+00	2.20E+00	3.30E-01
	Low Grade Ore Stockpile	Operating hours =16	Number of Disturbance =2.1 per hour Disturbed Area = 85,831 m^2	Wind Speed Category = 6	5.03E-01	2.51E-01	3.77E-02	3.36E-01	1.68E-01	2.52E-02
	ROM Stockpile	Operating hours =15.1	Number of Disturbance =5.8 per hour Disturbed Area = 2,471 m^2	Wind Speed Category = 6	1.35E+00	6.77E-01	1.02E-01	8.50E-01	4.25E-01	6.37E-02
	TMF Dry Banks (Area 1)	Operating hours =24	Number of Disturbance =1 per hour Disturbed Area = 181,995 m^2	Wind Speed Category = 2	2.08E+01	1.04E+01	1.56E+00	2.08E+01	1.04E+01	1.56E+00
				Wind Speed Category = 3	7.89E+01	3.95E+01	5.92E+00	7.89E+01	3.95E+01	5.92E+00
				Wind Speed Category = 4	1.71E+02	8.56E+01	1.28E+01	1.71E+02	8.56E+01	1.28E+01
				Wind Speed Category = 5	2.56E+02	1.28E+02	1.92E+01	2.56E+02	1.28E+02	1.92E+01
				Wind Speed Category = 6	3.62E+02	1.81E+02	2.72E+01	3.62E+02	1.81E+02	2.72E+01
	TMF Dry Banks (Area 2)	Operating hours =24	Number of Disturbance =1 per hour Disturbed Area = 189,711 m^2	Wind Speed Category = 2	2.17E+01	1.09E+01	1.63E+00	2.17E+01	1.09E+01	1.63E+00
				Wind Speed Category = 3	8.23E+01	4.11E+01	6.17E+00	8.23E+01	4.11E+01	6.17E+00
				Wind Speed Category = 4	1.78E+02	8.92E+01	1.34E+01	1.78E+02	8.92E+01	1.34E+01
				Wind Speed Category = 5	2.67E+02	1.33E+02	2.00E+01	2.67E+02	1.33E+02	2.00E+01
				Wind Speed Category = 6	3.78E+02	1.89E+02	2.83E+01	3.78E+02	1.89E+02	2.83E+01

Table C-15 Particulate Matter Emission Rates and Parameters for Equipment at MacLellan

Activity Type	Activity Description	Parameters for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
	TMF Dry Banks (Area 3)	Operating hours =24	Number of Disturbance =1 per hour Disturbed Area = 131,451 m^2	Wind Speed Category = 2	1.50E+01	7.52E+00	1.13E+00	1.50E+01	7.52E+00	1.13E+00
				Wind Speed Category = 3	5.70E+01	2.85E+01	4.28E+00	5.70E+01	2.85E+01	4.28E+00
				Wind Speed Category = 4	1.24E+02	6.18E+01	9.27E+00	1.24E+02	6.18E+01	9.27E+00
				Wind Speed Category = 5	1.85E+02	9.24E+01	1.39E+01	1.85E+02	9.24E+01	1.39E+01
				Wind Speed Category = 6	2.62E+02	1.31E+02	1.96E+01	2.62E+02	1.31E+02	1.96E+01
Primary Crusher	Primary Jaw Crusher - Dust Collector	Volumetric Flow Rate =18700 m^3/h Mill Feed Rate = 7500 t/d Operating hours =22 h/d	Control Efficiency =98%	Inlet Dust Loading: TSP = 30 g/m^3 PM_{10} = 12 g/m^3 $PM_{2.5}$ = 2.2 g/m^3	3.12E+00	1.25E+00	2.24E-01	2.86E+00	1.14E+00	2.06E-01
Secondary Crusher	Secondary Cone Crusher - Wet Scrubber	Volumetric Flow Rate =23100 m^3/h Mill Feed Rate = 7500 t/d Operating hours =22 h/d	Control Efficiency =98%	Inlet Dust Loading: TSP = 30 g/m^3 PM_{10} = 12 g/m^3 $PM_{2.5}$ = 2.2 g/m^3	3.85E+00	1.54E+00	2.77E-01	3.53E+00	1.41E+00	2.54E-01
Drying Oven	Drying Oven Fume Hood Stack	Operating Hours = 1 h/d Operating Hours = 104 d/y Batches per day = 1	Metal Sludge Feed Rate = 90 kg/batch	-	2.44E-01	2.44E-01	2.44E-01	1.02E-02	1.02E-02	1.02E-02
Induction Furnace	Electric Induction Furnace - Dust Collector	Volumetric Flow Rate =4400 m^3/h Operating Hours = 1 h/d Operating Hours = 104 d/y	Control Efficiency =98%	Inlet Dust Loading: TSP = 10 g/m^3 PM_{10} = 10 g/m^3 $PM_{2.5}$ = 10 g/m^3	2.44E-01	2.44E-01	2.44E-01	1.02E-02	1.02E-02	1.02E-02

NOTE:

[a] Parameters used for emission calculation are obtained from the Q'Pit mine plan or provided by Ausenco or estimated using the data by Q'Pit or Ausenco

Table C-16 Particulate Matter Emission Rates and Parameters for Equipment at Gordon

Activity Type	Activity Description	Parameter for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
Drilling	Blasthole Drilling	Number of Holes per hour = 2	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 2%	—	1.64E-01	1.64E-01	1.71E-01	9.28E-02	9.27E-02	9.66E-02
Blasting	Blasting	Blasted Area = 4164 m^2 Number of Holes per blast = 154 Explosives Usage = 207.9 kg/hole	Pit Retention Time: TSP = 50% PM10 = 5% $PM_{2.5}$ = 1%	—	8.21E+00	8.11E+00	4.88E-01	8.21E+00	8.11E+00	4.88E-01
Truck Loading	Truck Overburden Loading in Open Pit	Material Transfer Rate = 151 t/h	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 1%	—	2.00E-02	1.79E-02	2.83E-03	4.80E-03	4.32E-03	6.81E-04
	Truck Loading in Open Pit	Material Transfer Rate = 3048 t/h	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$ = 1%	—	4.04E-01	3.63E-01	5.73E-02	2.40E-01	2.16E-01	3.41E-02
	Truck Loading at Low Grade Ore Stockpile	Material Transfer Rate = 273 t/h	—	—	7.23E-02	3.42E-02	5.18E-03	4.54E-02	2.15E-02	3.25E-03
Truck Unloading	Truck Unloading at Overburden Stockpile	Material Transfer Rate = 151 t/h	—	—	3.99E-02	1.89E-02	2.86E-03	9.61E-03	4.54E-03	6.88E-04
	Truck Unloading at Waste Rock Stockpile	Material Transfer Rate = 2609 t/h	—	—	6.92E-01	3.27E-01	4.95E-02	4.11E-01	1.95E-01	2.95E-02
	Truck Unloading at Low Grade Ore Stockpile	Material Transfer Rate = 439 t/h	—	—	1.16E-01	5.51E-02	8.34E-03	6.92E-02	3.27E-02	4.96E-03
Unpaved Road Dust	Haul Road from Open Pit to Overburden Stockpile	Road Length = 0.5 km Number of Round Trips = 5.5 trips/h Number of Round Trips = 32 trips/d	Summer Control Efficiency =75%	—	1.50E+00	4.28E-01	4.28E-02	3.61E-01	1.03E-01	1.03E-02
	Haul Road in Open Pit	Road Length = 1.9 km Number of Round Trips = 21 trips/h Number of Round Trips = 303 trips/d	Summer Control Efficiency =75%	Pit Retention Time: TSP = 50% PM10 = 5% $PM_{2.5}$ = 1%	1.92E+01	1.04E+01	1.09E+00	1.14E+01	6.19E+00	6.46E-01
	Haul Road from Open Pit to Waste Rock Stockpile	Road Length = 0.95 km Number of Round Trips = 18 trips/h Number of Round Trips = 259 trips/d	Summer Control Efficiency =75%	—	1.69E+01	4.82E+00	4.82E-01	1.01E+01	2.87E+00	2.87E-01
	Haul Road from Open Pit to Low Grade Ore Stockpile	Road Length = 0.68 km Number of Round Trips = 3.1 trips/h Number of Round Trips = 44 trips/d	Summer Control Efficiency =75%	—	2.04E+00	5.83E-01	5.83E-02	1.22E+00	3.47E-01	3.47E-02
	Access Road Segment 1 at Gordon Site	Road Length = 3.7 km Number of Round Trips = 8.7 trips/h Number of Round Trips = 131 trips/d	Summer Control Efficiency =75%	—	1.32E+01	3.77E+00	3.77E-01	8.31E+00	2.37E+00	2.37E-01
		Road Length = 3.7 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	—	1.26E+00	3.58E-01	3.58E-02	1.05E-01	2.99E-02	2.99E-03
		Road Length = 3.7 km Number of Round Trips = 1 trips/h	Summer Control Efficiency =75%	—	1.19E+00	3.39E-01	3.39E-02	9.90E-02	2.82E-02	2.82E-03

Table C-16 Particulate Matter Emission Rates and Parameters for Equipment at Gordon

Activity Type	Activity Description	Parameter for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
		Number of Round Trips = 2 trips/d								
		Road Length = 3.7 km Number of Round Trips = 1 trips/h Number of Round Trips = 1 trips/d	Summer Control Efficiency =75%	—	1.15E+00	3.28E-01	3.28E-02	4.80E-02	1.37E-02	1.37E-03
		Road Length = 3.7 km Number of Round Trips = 1 trips/h Number of Round Trips = 1.8 trips/d	Summer Control Efficiency =75%	—	1.73E+00	4.93E-01	4.93E-02	1.26E-01	3.60E-02	3.60E-03
		Road Length = 3.7 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	—	1.19E+00	3.38E-01	3.38E-02	9.90E-02	2.82E-02	2.82E-03
		Road Length = 3.7 km Number of Round Trips = 3.8 trips/h Number of Round Trips = 16 trips/d	Summer Control Efficiency =75%	—	2.88E+00	8.22E-01	8.22E-02	5.01E-01	1.43E-01	1.43E-02
	Access Road Segment 2 at Gordon Site	Road Length = 11.1 km Number of Round Trips = 8.7 trips/h Number of Round Trips = 131 trips/d	Summer Control Efficiency =75%	—	3.98E+01	1.14E+01	1.14E+00	2.50E+01	7.12E+00	7.12E-01
		Road Length = 11.1 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	—	3.78E+00	1.08E+00	1.08E-01	3.15E-01	8.98E-02	8.98E-03
		Road Length = 11.1 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	—	3.58E+00	1.02E+00	1.02E-01	2.98E-01	8.49E-02	8.49E-03
		Road Length = 11.1 km Number of Round Trips = 1 trips/h Number of Round Trips = 1 trips/d	Summer Control Efficiency =75%	—	3.47E+00	9.88E-01	9.88E-02	1.44E-01	4.12E-02	4.12E-03
		Road Length = 11.1 km Number of Round Trips = 1 trips/h Number of Round Trips = 1.8 trips/d	Summer Control Efficiency =75%	—	5.20E+00	1.48E+00	1.48E-01	3.80E-01	1.08E-01	1.08E-02
		Road Length = 11.1 km Number of Round Trips = 1 trips/h Number of Round Trips = 2 trips/d	Summer Control Efficiency =75%	—	3.57E+00	1.02E+00	1.02E-01	2.98E-01	8.48E-02	8.48E-03
		Road Length = 11.1 km Number of Round Trips = 3.8 trips/h Number of Round Trips = 16 trips/d	Summer Control Efficiency =75%	—	8.67E+00	2.47E+00	2.47E-01	1.51E+00	4.29E-01	4.29E-02
Off-Road Equipment Transition	Hydraulic Shovel	Number of Equipment = 1 Operating hours = 17 h/d Average Speed = 1.2 km/h	Load Factor =53%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	7.41E-01	4.01E-01	4.18E-02	5.24E-01	2.84E-01	2.96E-02

Table C-16 Particulate Matter Emission Rates and Parameters for Equipment at Gordon

Activity Type	Activity Description	Parameter for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
	Wheel Loader (13 m^3)	Number of Equipment = 1 Operating hours = 15.1 h/d Average Speed = 11.9 km/h	Load Factor =48%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	4.92E+00	2.67E+00	2.78E-01	3.10E+00	1.68E+00	1.75E-01
	Production HP Drill	Number of Equipment = 2 Operating hours = 13.6 h/d Average Speed = 2.5 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	1.27E+00	6.89E-01	7.18E-02	7.21E-01	3.91E-01	4.07E-02
	8 Hyd Track Drill	Number of Equipment = 1 Operating hours = 5 h/d Average Speed = 1.6 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	2.74E-01	1.49E-01	1.55E-02	5.73E-02	3.11E-02	3.24E-03
	Excavator Mounted Rock Drill	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 2.1 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	6.00E-01	3.25E-01	3.39E-02	1.39E-01	7.53E-02	7.84E-03
	Blasthole Stemmer	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 6.3 km/h	Load Factor =43%	Pit Retention Time: TSP = 50% PM10 = 5% PM2.5 = 1%	4.57E-01	2.48E-01	2.58E-02	1.06E-01	5.74E-02	5.98E-03
	Forklift/Telehandler	Number of Equipment = 1 Operating hours = 5.6 h/d Average Speed = 11.5 km/h	Load Factor =59%	Pit Retention Time: TSP = 50% PM10 = 5% $PM_{2.5}$= 1%	2.43E+00	1.32E+00	1.37E-01	5.63E-01	3.05E-01	3.18E-02
	Hydraulic Excavator (3.75 m^3)	Number of Equipment = 1 Operating hours = 2.8 h/d Average Speed = 3 km/h	Load Factor =53%	—	1.99E+00	5.68E-01	5.68E-02	2.31E-01	6.58E-02	6.58E-03
	Wheel Loader (260 kW)	Number of Equipment = 1 Operating hours = 13.2 h/d Average Speed = 13.3 km/h	Load Factor =48%	—	5.63E+00	1.60E+00	1.60E-01	3.10E+00	8.83E-01	8.83E-02
	Hydraulic Excavator (36 t)	Number of Equipment = 1 Operating hours = 2.8 h/d Average Speed = 4.2 km/h	Load Factor =43%	—	1.74E+00	4.95E-01	4.95E-02	2.01E-01	5.73E-02	5.73E-03
Bulldozing	Crawler Dozer (450 kW)	Number of Equipment =1 Operating hours = 13.9 h/d	Load Factor =58%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	1.44E-01	5.23E-02	2.99E-02	8.33E-02	3.02E-02	1.73E-02
	Wheel Dozer (370 kW)	Number of Equipment =1 Operating hours = 11.1 h/d	Load Factor =59%	Pit Retention Time: TSP = 50% PM_{10} = 5% $PM_{2.5}$= 1%	1.46E-01	5.32E-02	3.05E-02	6.78E-02	2.46E-02	1.41E-02
	Crawler Dozer (264 kW)	Number of Equipment =1 Operating hours = 12.5 h/d	Load Factor =58%	—	2.88E-01	5.50E-02	3.02E-02	1.50E-01	2.87E-02	1.57E-02
Grading	Motor Grader (215 kW)	Number of Equipment =1	Load Factor =59%	—	1.40E+00	7.67E-01	8.62E-02	7.32E-01	4.00E-01	4.49E-02

Table C-16 Particulate Matter Emission Rates and Parameters for Equipment at Gordon

Activity Type	Activity Description	Parameter for Emission Rate Calculation [a]			Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
		Operating hours = 12.5 h/d Average Speed =11.4 km/h								
Wind Erosion	Overburden Stockpile	Operating hours =14.3	Number of Disturbances =0.4 per hour Disturbed Area = 51,948 m^2	Wind Speed Category = 6	9.79E-02	4.89E-02	7.34E-03	5.82E-02	2.91E-02	4.37E-03
	Waste Rock Stockpile	Operating hours =14.3	Number of Disturbances =17.9 per hour Disturbed Area = 634,282 m^2	Wind Speed Category = 6	4.19E+00	2.10E+00	3.14E-01	2.49E+00	1.25E+00	1.87E-01
	Low Grade Ore Stockpile	Operating hours =14.3	Number of Disturbance =3 per hour Disturbed Area = 23,505m^2	Wind Speed Category = 6	7.05E-01	3.53E-01	5.29E-02	4.19E-01	2.10E-01	3.15E-02

NOTES:

[a] Parameters used for emission calculation are obtained from the Q'Pit mine plan or provided by Ausenco or estimated using the data by Q'Pit or Ausenco

Hourly emission rates were calculated using the Equation C-7 and Equation C-10 to Equation C-18 (as shown in Section 1.3.3.1)

Daily emission rates were calculated using the Equation C-7 and Equation C-10 to Equation C-18 (as shown in Section 1.3.3.1) but uses trips per day instead of trips hours

Table C-17 Particulate Matter Emission Rates and Parameters for Equipment on Provincial Road

Activity Type	Activity Description	Truck Description	Parameter for Emission Rate Calculation [a]		Hourly Emission Rates (g/s)			Daily Emission Rates (g/s)		
					FTSP	FPM_{10}	$FPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$
Paved Road Dust	Provincial Road 391 (Year 2)	Highway Haul Truck	Road Length =36.7 km Number of Round Trips =8.7 trips/h Number of Round Trips =8.7 trips/d	Natural Mitigation Efficiency = 11%	9.42E+00	1.88E+00	4.63E-01	5.91E+00	1.18E+00	2.90E-01
		Highway Haul Truck	Road Length =36.7 km Number of Round Trips =8.7 trips/h Number of Round Trips =8.7 trips/d	Natural Mitigation Efficiency = 97%	3.18E-01	6.35E-02	1.56E-02	1.99E-01	3.99E-02	9.78E-03
		Explosives Delivery Truck (14 t)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 11%	5.76E-01	1.15E-01	2.83E-02	4.80E-02	9.61E-03	2.36E-03
		Explosives Delivery Truck (14 t)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 97%	1.94E-02	3.89E-03	9.54E-04	1.62E-03	3.24E-04	7.95E-05
		Super B Train Fuel Truck (40,000 L)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 11%	1.68E+00	3.36E-01	8.26E-02	1.23E-01	2.46E-02	6.03E-03
		Super B Train Fuel Truck (40,000 L)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 97%	5.67E-02	1.13E-02	2.78E-03	4.14E-03	8.28E-04	2.03E-04
		Grinding Media Delivery Truck (40 t)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 11%	1.38E+00	2.76E-01	6.79E-02	1.69E-02	3.38E-03	8.29E-04
		Grinding Media Delivery Truck (40 t)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 97%	4.66E-02	9.32E-03	2.29E-03	5.69E-04	1.14E-04	2.79E-05
		Reagents Delivery Truck (20 t)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 11%	7.03E-01	1.41E-01	3.45E-02	3.21E-02	6.42E-03	1.58E-03
		Reagents Delivery Truck (20 t)	Road Length =36.7 km Number of Round Trips =1 trips/h Number of Round Trips =1 trips/d	Natural Mitigation Efficiency = 97%	2.37E-02	4.74E-03	1.16E-03	1.08E-03	2.16E-04	5.31E-05

NOTES:
[a] Parameters used for emission calculation are obtained from the Q'Pit mine plan or provided by Ausenco or estimated using the data by Q'Pit or Ausenco
Hourly emission rates were calculated using the Equation C-15 (as shown in Section 1.3.3.1)
Daily emission rates were calculated using the Equation C-15 (as shown in Section 1.3.3.1) but uses trips per day instead of trips per hour and the respective unit conversion

C.3.3.3.2 Fugitive Hydrogen Cyanide Emissions

Table C-18 summarizes the parameters used for hourly and daily hydrogen cyanide (HCN) emission rates from the processing plant and TMF. The emission rates from leaching and desorption were determined using Equation C-19, the emission factors listed in Table C-5, and the parameters in Table C-18. The emission rates from the TMF were determined using Equation C-20, the emission factors listed in Table C-6, and the parameters in Table C-18. As per Australian NPI manual (NPI 2006), the sodium cyanide which is used during leaching bonds with the gold to form Au $(CN)_2^-$ complex. During this process, the cyanide is carried through the system in a dissolved form to TSF and are released as gaseous hydrogen cyanide.

Leaching and Desorption HCN emissions are determined from:

$$ER_h\ (g/s) = Feed\ Rate\ \left(\frac{kg}{hr}\right) \times Emission\ Factor\ (\%)\ \times Unit\ Conversion\ \left(\frac{1000\ g}{kg}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-19

where

ER_h	-	Hourly emission rate (g/s)
Feed Rate	-	Sodium Cyanide Feed Rate based on the design specification
Emission Factor	-	1% of the total cyanide added to the circuit is lost through HCN volatilization across all tanks (NPI 2006)

TMF HCN emissions are determined from:

$$ER_h\ (g/s) = Water\ Discharge\ Rate\ \left(\frac{m^3}{hr}\right) \times Emission\ Factor\ \left(\frac{g}{m^3}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-20

where

ER_h	-	Hourly emission rate (g/s)
Feed Rate	-	Sodium Cyanide Feed Rate based on the design specification
Emission Factor	-	Emission factor for HCN emission from TMF (g/m^3) based on the design specification

Table C-18 Parameters and Emission Rate for Fugitive Hydrogen Cyanide

Activity Description	NaCN Feed Rate	Water Discharge Rate to TMF	NaCN Content in Discharge Water	NaCN Volatilization	Hourly HCN Emission Rates (g/s)	Daily HCN Emission Rates (g/s)
	kg/h	m³/h	mg/L	%	g/s	g/s
MacLellan Site (Year 7)						
Processing Plant						
Hydrogen Cyanide from Leaching	112	—	—	—	3.10E-01	3.10E-01
Hydrogen Cyanide from Desorption	1.63	—	—	—	4.53E-03	4.53E-03
Hydrogen Cyanide from TMF	—	374.4	10.0	70%	7.28E-01	7.28E-01
NOTE: Hourly and Daily emission rates are the same as it is a continuous operation						

C.3.3.4 CAC Emissions from Power Generator

The emission rates for the diesel power generator (genset) were determined using Equation C-3 (NO_x, CO, TSP, PM_{10}, $PM_{2.5}$, VOC) and Equation C-4 (SO_2). Table C-7 summarizes the emission factors used to calculate the diesel genset emissions and Table C-19 summarizes the hourly and daily emission rates.

Table C-19 Parameters and Emission Rate for Power Generator

Equipment	Engine Power, kW	Hourly and Daily Emission Rate, g/s						
		SO_2	NO_x	CO	DTSP	DPM_{10}	$DPM_{2.5}$	VOC
Diesel Generator	300	4.91E-04	3.70E-01	4.94E-02	3.80E-03	3.80E-03	3.69E-03	2.57E-02
NOTE: Hourly and Daily emission rates are the same as it is a continuous operation								

C.3.4 EMISSION RATE SUMMARY

Table C-20, Table C-21, and Table C-22 summarize the hourly emission rates for the Project,

MacLellan and Gordon, respectively. Similarly, Table C-23, Table C-24 and Table C-25 summarize the daily emission rates for the Project, MacLellan and Gordon, respectively.

Figure C-3 to Figure C-11 shows the Project, MacLellan and Gordon site hourly and daily emission rates for SO_2, NO_x, CO, DTSP, DPM_{10}, $DPM_{2.5}$, FTSP, FPM_{10}, $FPM_{2.5}$, VOC and HCN. These figures also show the emission contributions from applicable source categories for each species.

Table C-20 Hourly Emission Rates during Operation at both MacLellan (Year 7) and Gordon (Year 2) Sites

Emission Source	Hourly Emission Rates [a] (kg/h)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	73.4	91.0	0.173	0.977	0.977	0.947	0	0	0	5.37	0
Diesel Exhaust Emissions from Mining On-Road Equipment	5.19	1.42	0.0130	0.338	0.338	0.216	0	0	0	0.305	0
Diesel Generator	1.33	0.178	0.00177	0.0137	0.0137	0.0133	0	0	0	0.0925	0
Drilling and Blasting	610	2594	76.3	0	0	0	79.1	78.2	6.11	0	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	154	67.2	6.89	0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	19.9	9.63	1.68	0	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	12.7	7.69	1.18	0	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	1097	371	37.5	0	0
Fugitive Dust Emissions from PR 391	0	0	0	0	0	0	49.6	9.91	2.43	0	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0	0
Primary and Secondary Crushers	0	0	0	0	0	0	25.1	10.0	1.81	0	0
Ore Milling and Processing Plant	0	0	0.288	0	0	0	1.76	1.41	1.41	0	1.13
TMF	0	0	0	0	0	0	8.24	4.12	0.618	0	2.62
Total Emissions	**690**	**2687**	**76.8**	**1.33**	**1.33**	**1.18**	**1,448**	**559**	**59.7**	**5.77**	**3.75**

NOTE:
[a] Maximum hourly emission rates

Table C-21 Hourly Emission Rates during Operation at MacLellan Site (Year 7)

Emission Source	Hourly Emission Rates [a] (kg/h)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	50.9	60.5	0.116	0.657	0.657	0.638	0	0	0	3.58	0
Diesel Exhaust Emissions from Mining On-Road Equipment	0.602	0.191	0.002	0.0391	0.0391	0.0248	0	0	0	0.0401	0
Drilling and Blasting	354	1506	44.3	0	0	0	49.0	48.4	3.74	0	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	82.1	36.7	3.76	0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	12.7	6.29	1.05	0	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	7.85	4.75	0.730	0	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	627	219	22.2	0	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0	0
Primary and Secondary Crushers	0	0	0	0	0	0	25.1	10.0	1.81	0	0
Ore Milling and Processing Plant	0	0	0.288	0	0	0	1.76	1.41	1.41	0	1.13
TMF	0	0	0	0	0	0	8.24	4.12	0.618	0	2.62
Total Emissions	**406**	**1,566**	**44.7**	**0.696**	**0.696**	**0.662**	**814**	**331**	**35.3**	**3.62**	**3.75**

NOTE:
[a] Maximum hourly emission rates

Table C-22 Hourly Emission Rates during Operation at Gordon Site (Year 2)

Emission Source	Hourly Emission Rates [a] (kg/h)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	22.5	30.4	0.0579	0.319	0.319	0.310	0	0	0	1.79	0
Diesel Exhaust Emissions from Mining On-Road Equipment	4.59	1.23	0.0115	0.299	0.299	0.191	0	0	0	0.265	0
Diesel Generator	1.33	0.178	0.00177	0.0137	0.0137	0.0133	0	0	0	0.0925	0
Drilling and Blasting	256	1089	32	0	0	0	30.1	29.8	2.37	0	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	72.2	30.5	3.13	0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	7.14	3.34	0.637	0	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	4.84	2.94	0.454	0	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	470	152	15.3	0	0
Fugitive Dust Emissions from PR 391	0	0	0	0	0	0	49.6	9.91	2.43	0	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0	0
Total Emissions	**285**	**1120**	**32.1**	**0.632**	**0.632**	**0.514**	**633**	**228**	**24.3**	**2.15**	**0.00**

NOTE:
[a] Maximum hourly emission rates

Table C-23 Daily Emission Rates during Operation at both MacLellan (Year 7) and Gordon (Year 2) Site

Emission Source	Daily Emission Rates [a] (kg/d)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	1,117	1,269	2.43	13.8	13.8	13.4	0	0	0	74.8	0
Diesel Exhaust Emissions from Mining On-Road Equipment	59.3	14.5	0.144	3.70	3.70	2.39	0	0	0	3.01	0
Diesel Generator	32.0	4.27	0.0424	0.328	0.328	0.318	0	0	0	2.22	0
Drilling and Blasting	610	2,594	76.3	—	—	—	98.4	97.4	26.1	0	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	1,618	745	76.6	0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	249	121	21.2	0	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	184	112	17.2	0	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	14,011	4,895	496	0	0
Fugitive Dust Emissions from PR 391	0	0	0	0	0	0	530	106	26	0	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0	0
Primary and Secondary Crushers	0	0	0	0	0	0	552	221	39.7	0	0
Ore Milling and Processing Plant	0	0	0.288	0	0	0	1.76	1.41	1.41	0	27.2
TMF	0	0	0	0	0	0	198	98.9	14.8	0	62.9
Total Emissions	**1,819**	**3,882**	**79.2**	**17.8**	**17.8**	**16.1**	**17,441**	**6,397**	**719**	**80.0**	**90.1**

NOTE:
[a] Daily average emission rates based on the actual hours of operation per day for each mining activity

Table C-24 Daily Emission Rates during Operation at MacLellan Site (Year 7)

Emission Source	Daily Emission Rates [a] (kg/d)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	803	889	1.70	9.76	9.76	9.47	0	0	0	52.4	0
Diesel Exhaust Emissions from Mining On-Road Equipment	6.01	1.54	0.0141	0.363	0.363	0.234	0	0	0	0.313	0
Drilling and Blasting	354	1,506	44.3	0	0	0	60.8	60.2	16.0	0	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	863	414	42.6	0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	160	78.9	13.2	0	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	117	71.0	10.9	0	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	8802	3157	320	0	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0	0
Primary and Secondary Crushers	0	0	0	0	0	0	552	221	39.7	0	0
Ore Milling and Processing Plant	0	0	0.288	0	0	0	1.76	1.41	1.41	0	27.2
TMF	0	0	0	0	0	0	198	98.9	14.8	0	62.9
Total Emissions	**1,163**	**2,396**	**46.3**	**10.1**	**10.1**	**9.70**	**10753**	**4103**	**459**	**52.7**	**90.1**

NOTE:
[a] Daily average emission rates based on the actual hours of operation per day for each mining activity

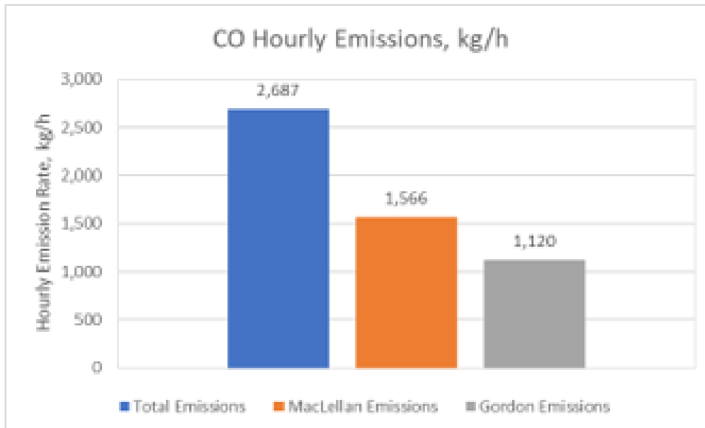
Table C-25 Daily Emission Rates during Operation at Gordon Site (Year 2)

Emission Source	Daily Emission Rates [a] (kg/d)										
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC	HCN
Diesel Exhaust Emissions from Mining Off-Road Equipment	314	380	0.725	4.02	4.02	3.90	0	0	0	22.4	0
Diesel Exhaust Emissions from Mining On-Road Equipment	53.3	12.9	0.13	3.33	3.33	2.16	0	0	0	2.70	0
Diesel Generator	32.0	4.27	0.0424	0.328	0.328	0.318	0	0	0	2.22	0
Drilling and Blasting	256	1,089	32	0	0	0	37.6	37.2	10.1	0	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	755	331	34.1	0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	89.2	41.7	7.96	0	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	67.4	40.9	6.32	0	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	5,209	1,738	176	0	0
Fugitive Dust Emissions from PR 391	0	0	0	0	0	0	530	106	26.0	0	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0	0
Primary and Secondary Crushers	0	0	0	0	0	0	0	0	0	0	0
Ore Milling and Processing Plant	0	0	0	0	0	0	0	0	0	0	0
TMF	0	0	0	0	0	0	0	0	0	0	0
Total Emissions	**656**	**1,486**	**32.9**	**7.68**	**7.68**	**6.38**	**6,688**	**2,295**	**261**	**27.3**	**0.0**

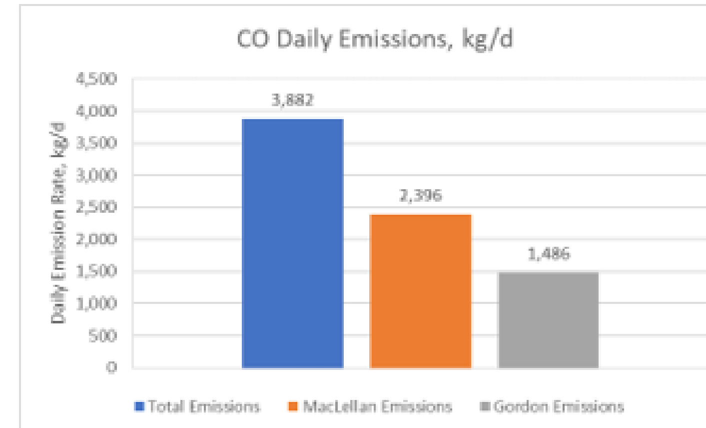
NOTE:
[a] Daily average emission rates based on the actual hours of operation per day for each mining activity

Figure C-1 Hourly and Daily NO_x Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

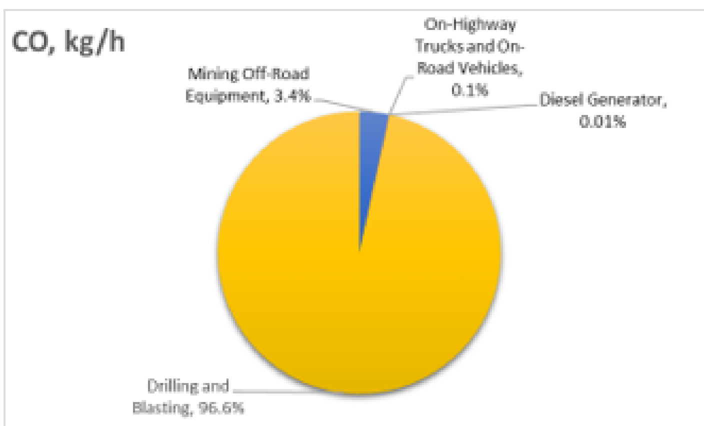
Hourly Emission, kg/h

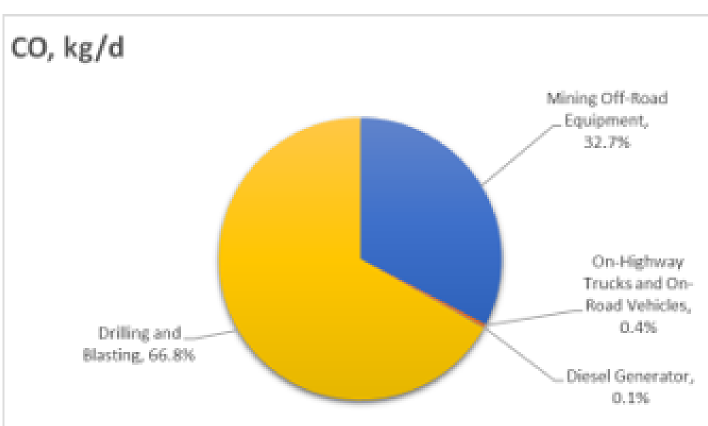


Daily Emission, kg/d

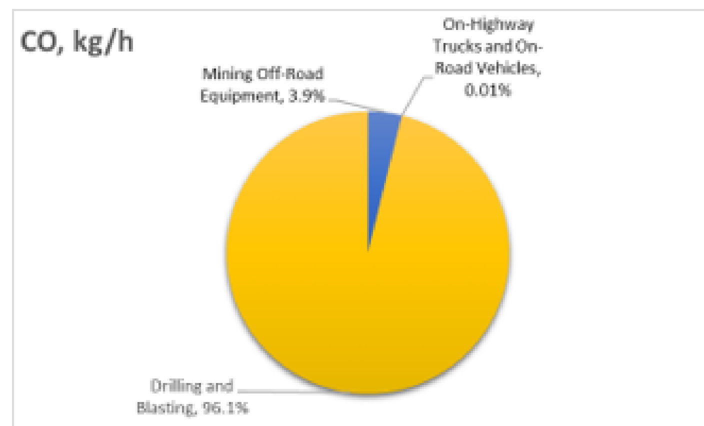


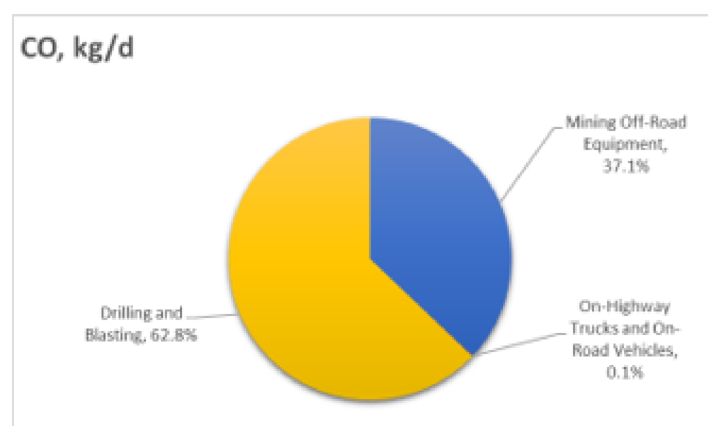
Total Emissions: (MacLellan + Gordon)



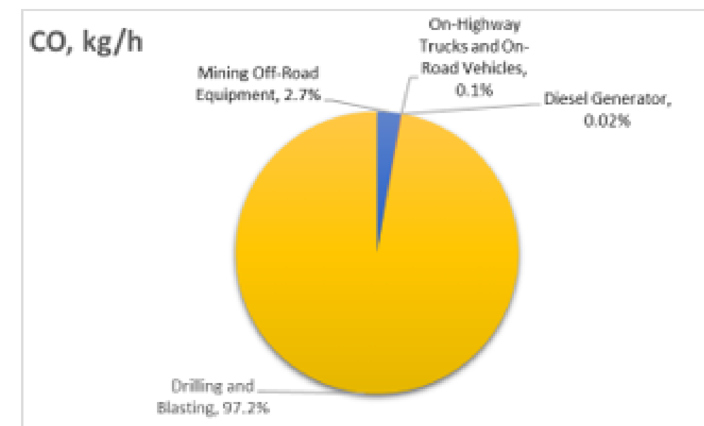


MacLellan Emissions:





Gordon Emissions:



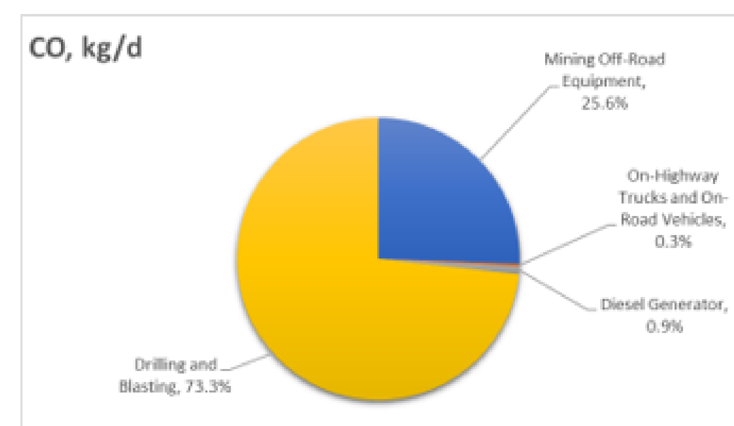


Figure C- 2 Hourly and Daily CO Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

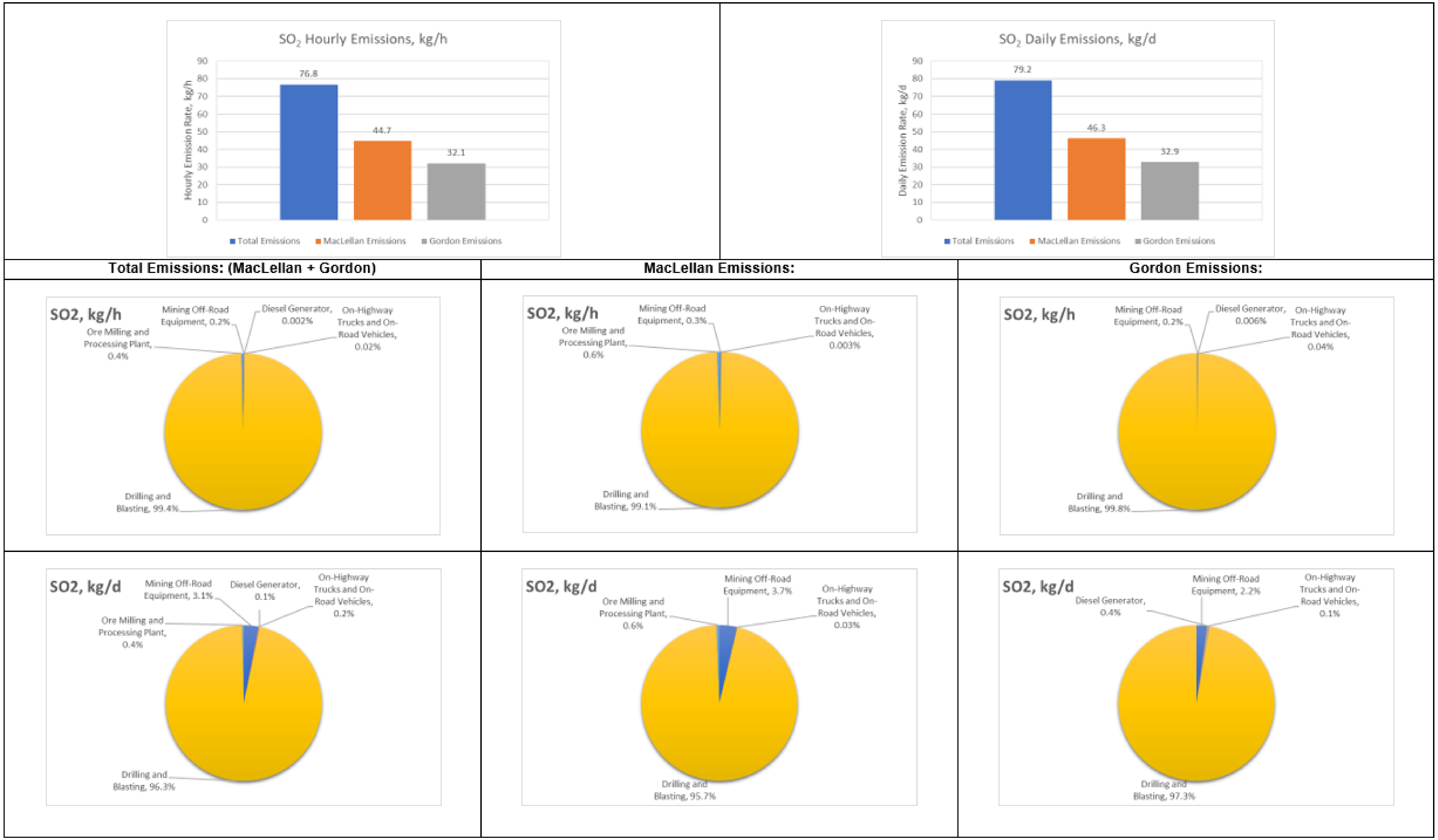


Figure C-3 Hourly and Daily SO_2 Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

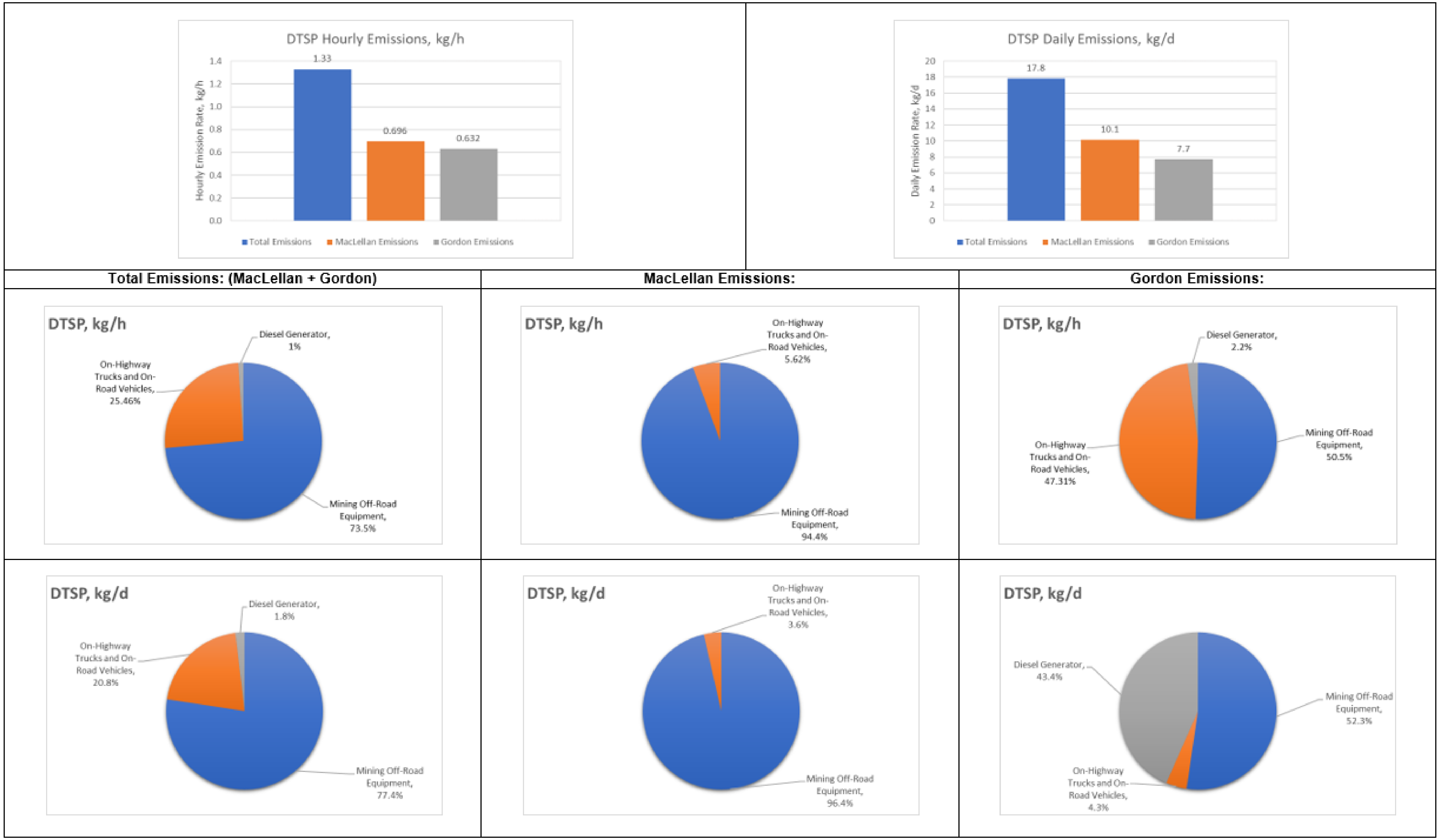


Figure C-4 Hourly and Daily DTSP Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

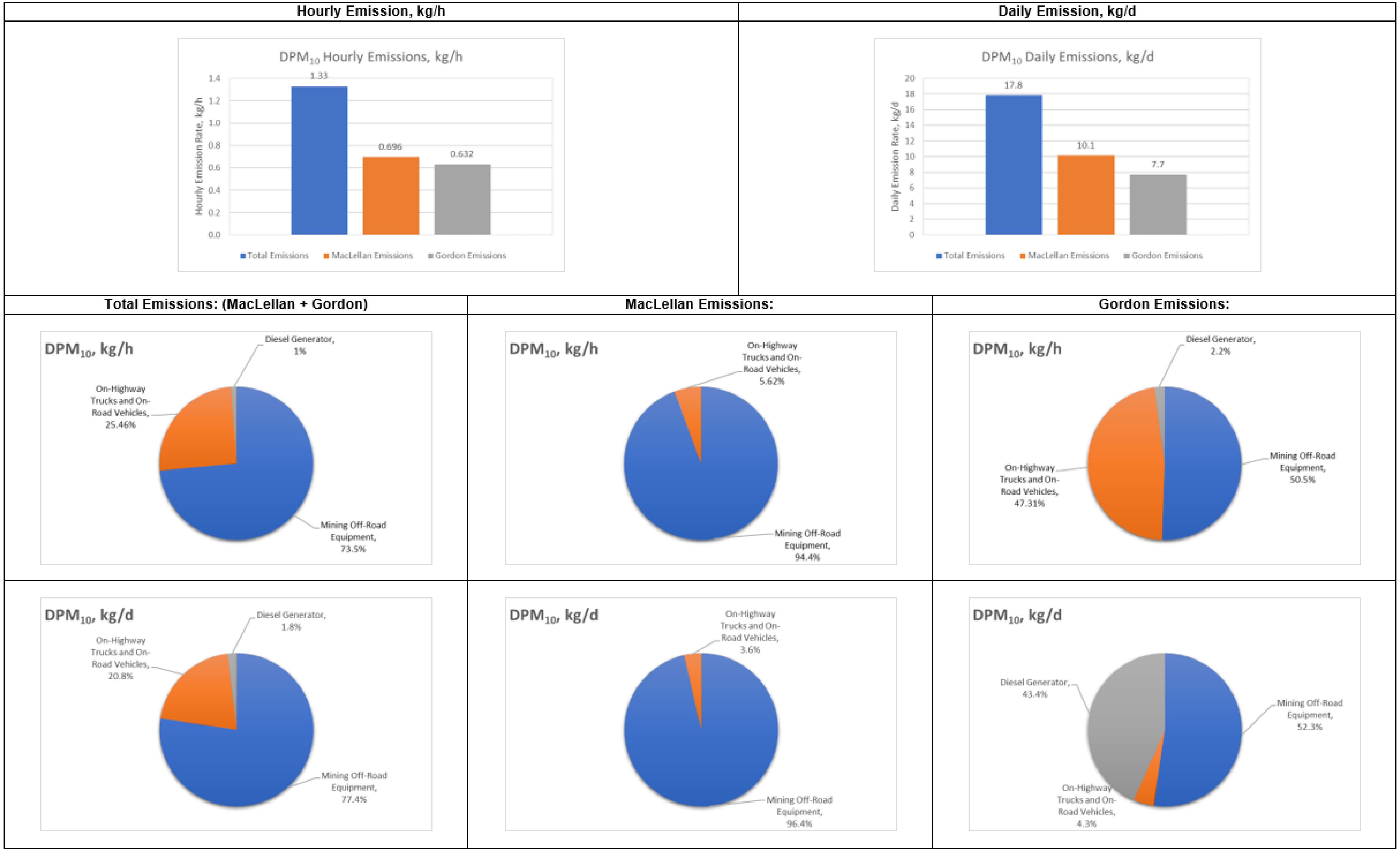


Figure C-5 Hourly and Daily DPM10 Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

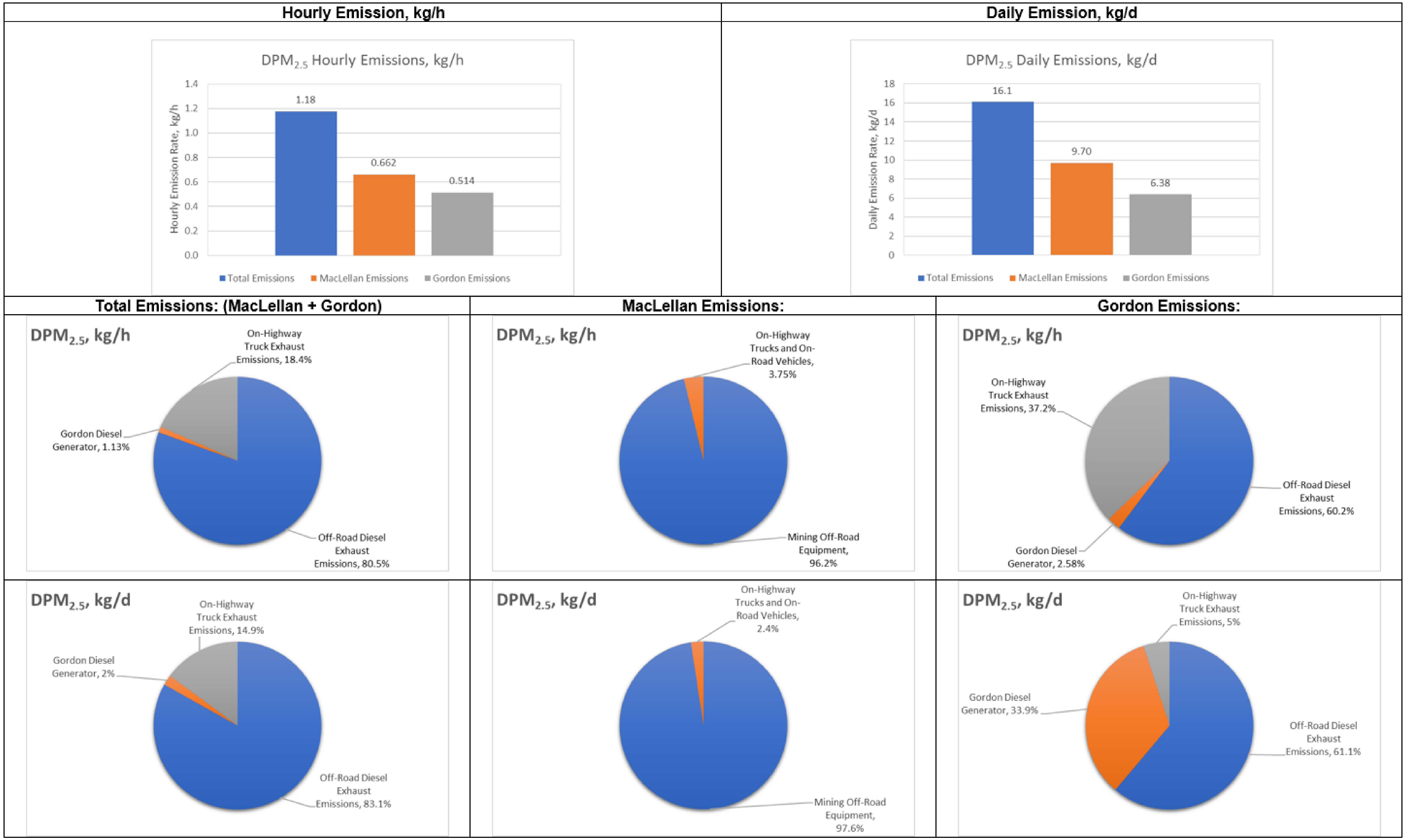


Figure C-6 Hourly and Daily DPM2.5 Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

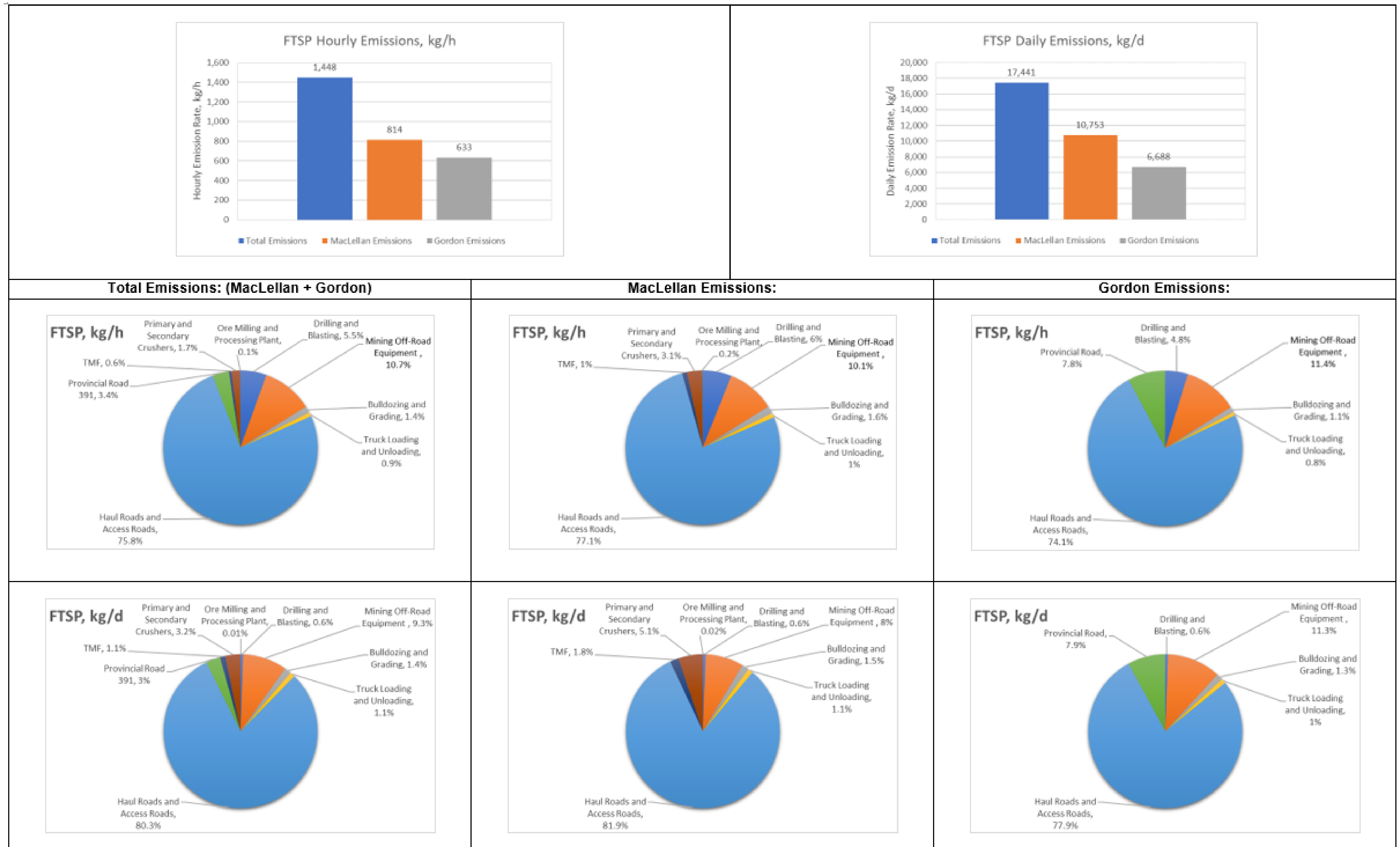
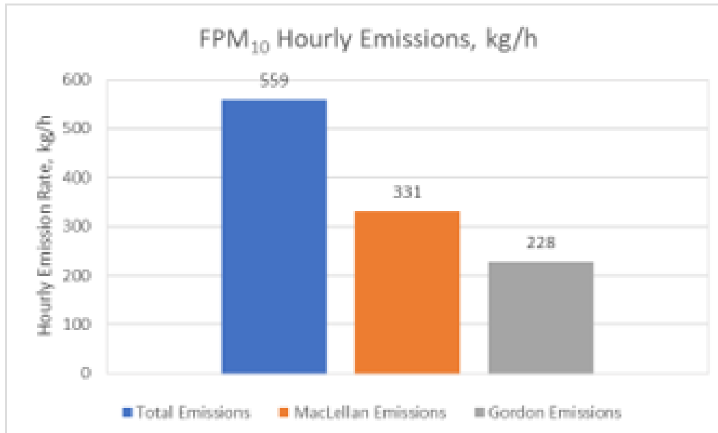
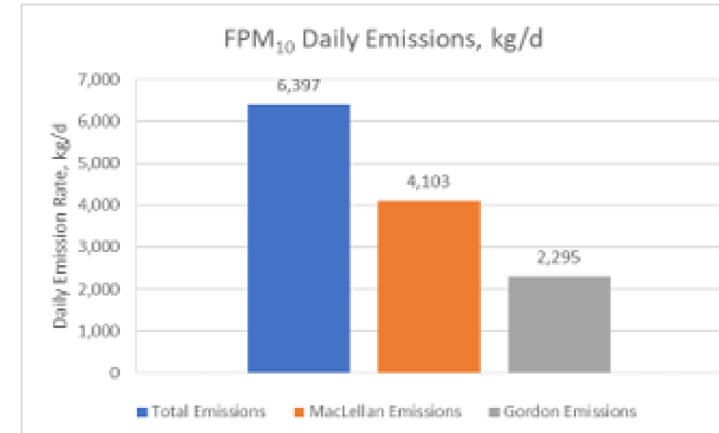
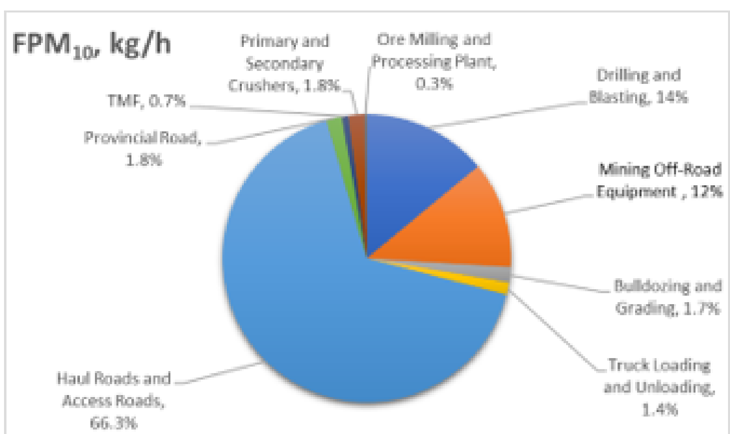


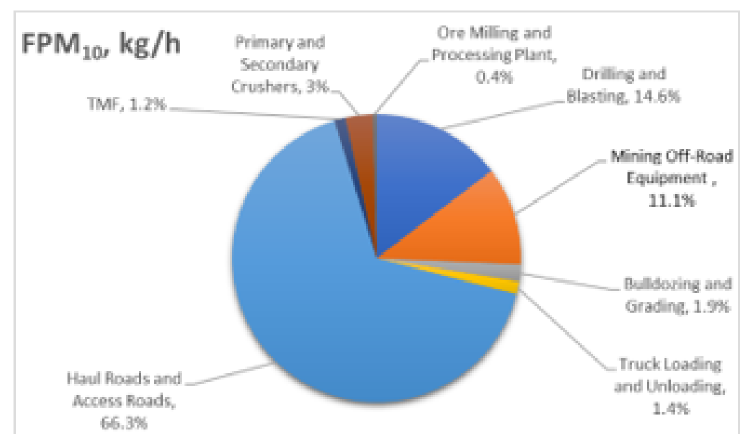
Figure C-7 Hourly and Daily FTSP Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

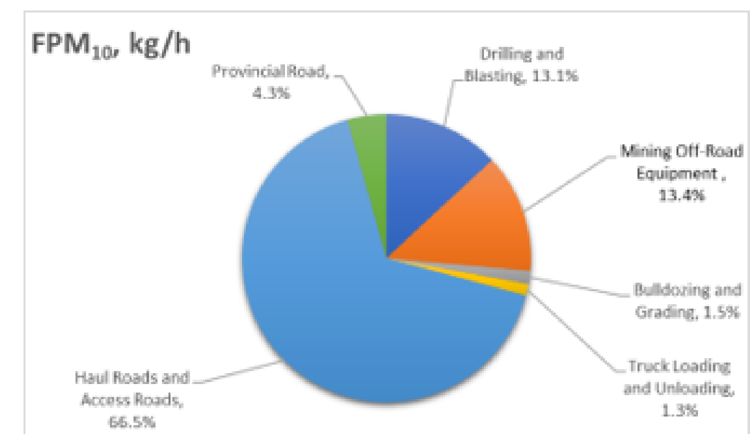


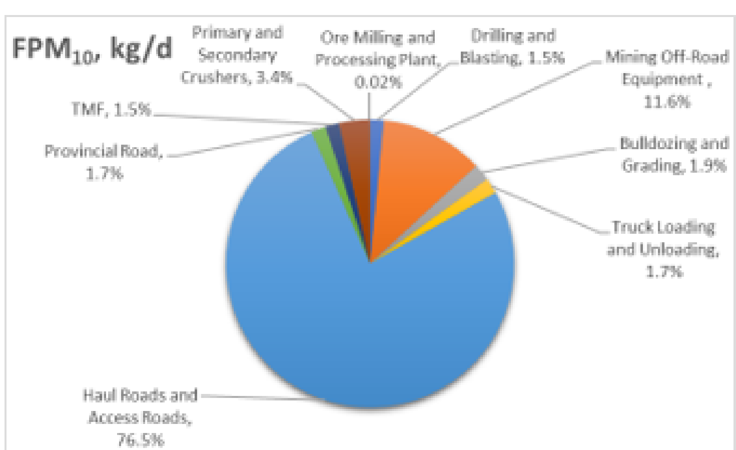


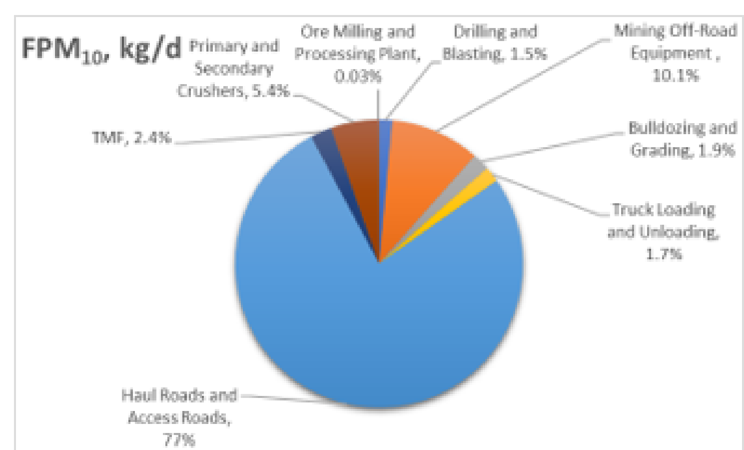
Total Emissions: (MacLellan + Gordon)	MacLellan Emissions:	Gordon Emissions:











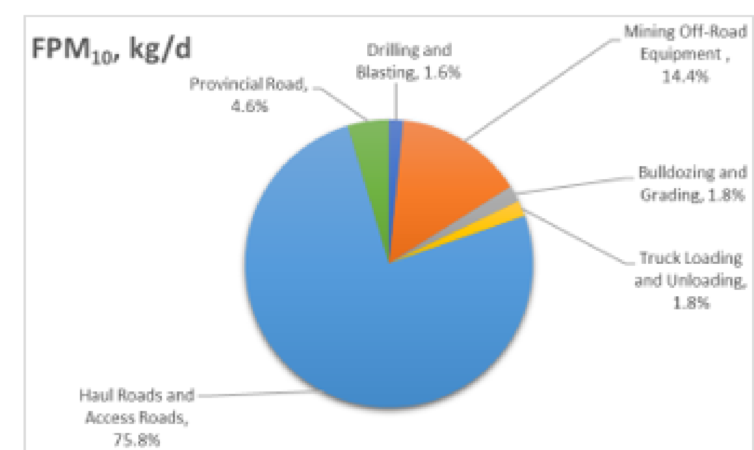


Figure C-8 Hourly and Daily FPM10 Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

Figure C-9 Hourly and Daily FPM2.5 Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

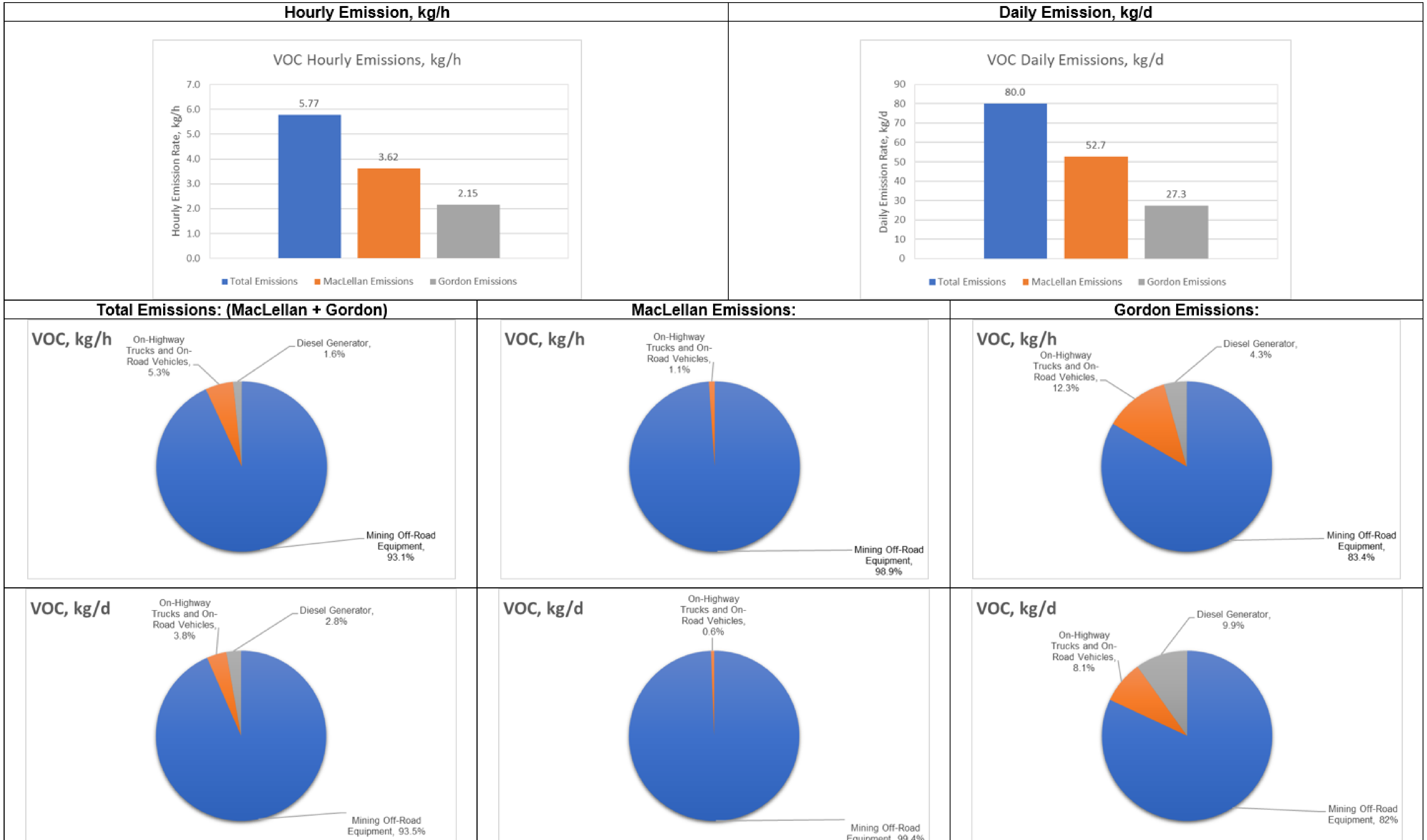
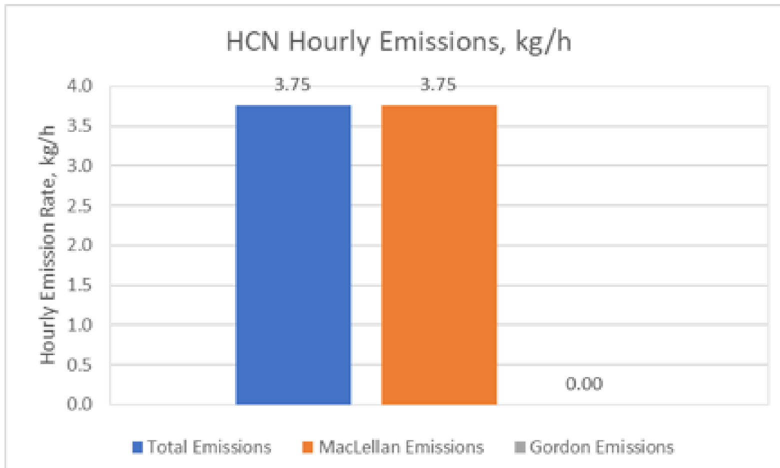
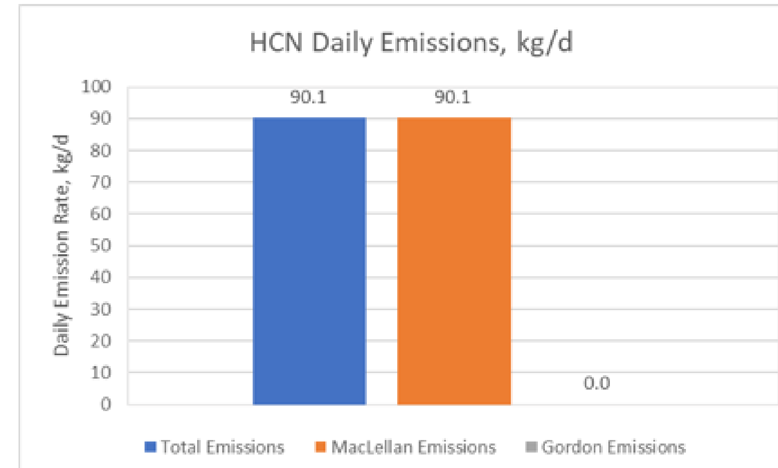


Figure C-10 Hourly and Daily VOC Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

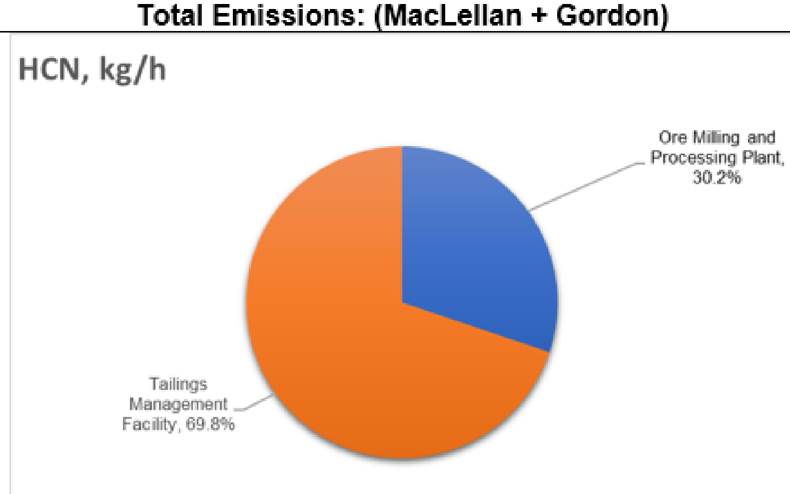
Hourly Emission, kg/h

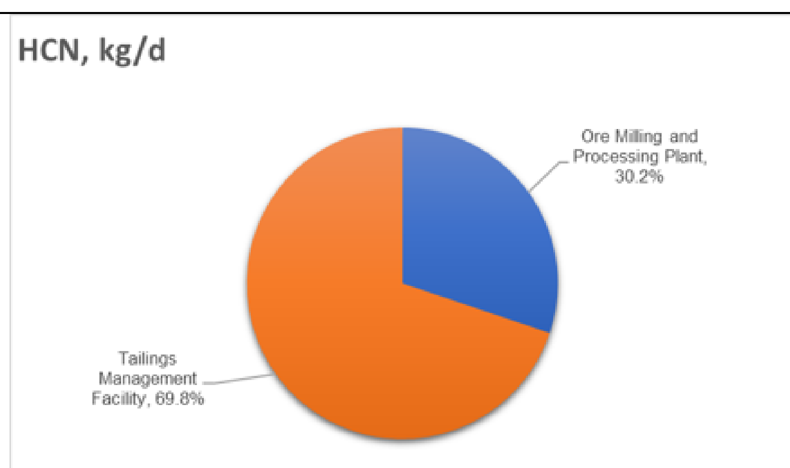


Daily Emission, kg/d

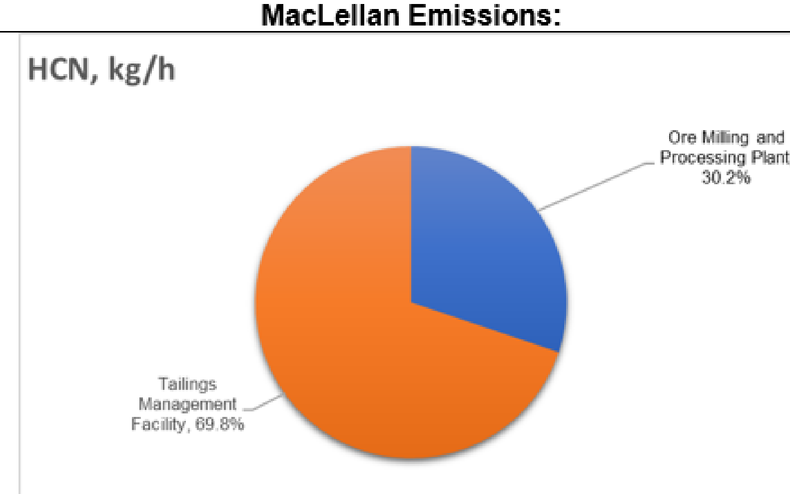


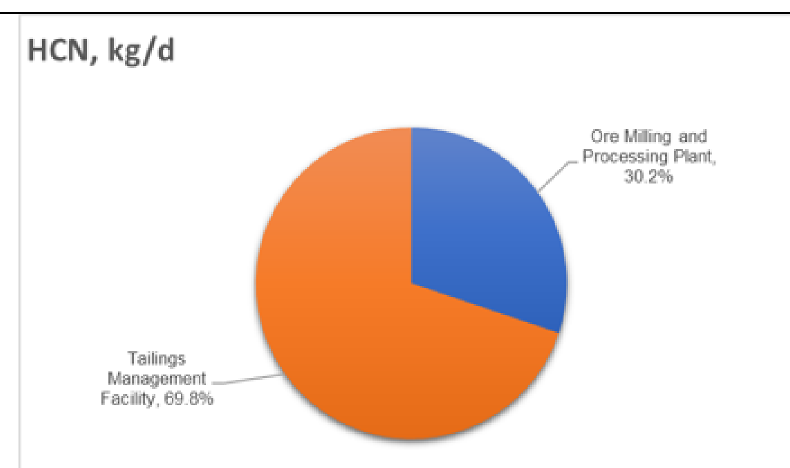
Total Emissions: (MacLellan + Gordon)





MacLellan Emissions:





Gordon Emissions:

Not Applicable

Not Applicable

Figure C-11 Hourly and Daily HCN Emission Rates during Operation at MacLellan (Year 7) and Gordon Site (Year 2)

C.4 CONSTRUCTION EMISSIONS INVENTORY

C.4.1 WORST-CASE YEAR AND EMISSION SOURCES

There are two years in the Project construction phase (defined as Year -2 and Year -1 in reference to the overall Project timeline). Project construction starts in year -2 with works such as road construction, mine platforms, processing plant construction, TMF construction, and preproduction. The worst-case year of construction was selected based on the most overlapping construction activities, the largest number of construction equipment units and the highest construction material movement. The 12-month period from Q2 Year -2 to Q1 Year -1 was determined as the worst-case year of construction for both the Gordon and MacLellan sites.

The annual construction emissions are estimated for SO_2, NO_x, CO, $DPM_{2.5}$, DPM_{10}, DTSP, $FPM_{2.5}$, FPM_{10}, FTSP and VOC and are then compared to the annual operation emissions. The following air emissions were estimated for the worst-case construction year:

- Diesel combustion exhaust emissions from construction off-road equipment and haul trucks
- Diesel combustion exhaust emissions from on-highway trucks and on-road vehicles
- Fugitive dust and explosives detonation emissions from drilling and blasting
- Diesel combustion exhaust emission and fugitive dust from mobile crushing plant
- Mechanically generated dust by construction off-road equipment movement
- Fugitive dust emissions from bulldozing and grading
- Fugitive dust emissions from truck loading and unloading
- Mechanically generated dust by truck traffic along haul roads and the access road
- Fugitive dust emissions from wind erosion of stockpiles.
- The estimated air emissions from the worst-case year from the above-identified activities are discussed below.

C.4.2 GENERAL ASSUMPTIONS

The following general assumptions were used to estimate Project construction emissions due to combustion sources:

- Mine preproduction equipment at MacLellan and Gordon site comply with Tier 4 emission standards.
- Equipment used for road construction, mine platforms, processing plant construction and TMF construction at MacLellan site assumed to comply with Tier 3 emission standards.
- Equipment used for road construction and mine platforms at Gordon site assumed to comply with Tier 3 emission standards (as per Ausenco).
- Power ratings (hp) for off-road and on-road equipment are based on manufacturer's specifications using assumed manufacturers and models.
- Utilization (load) factors for off-road construction equipment from the US EPA NONROAD model (US EPA, 2010b).
- Assumed no pit retention for diesel exhaust PM.
- Assumed 10 hours per shift and 1 shift per day for the activities associated with road construction, mine platforms, processing plant construction, and TMF construction (as per Ausenco).
- Assumed Gordon construction equipment equal to 20% of MacLellan processing plant construction equipment based on professional judgement.
- Assumed 43% load factor for the mobile crusher based on similar equipment load factor from US EPA NONROAD model (US EPA, 2010b).

The following general and operational assumptions were used to estimate Project construction fugitive dust emissions:

- Seventy-five percent dust control efficiency on haul roads during the summer, corresponding to the expected control efficiency achievable from the application of water twice daily (US EPA, 2006a). Summer is assumed to be May to October.
- Ninety percent natural mitigation efficiency on haul roads during winter (Golder Associates, 2012). Winter is assumed to be November to April.
- Eleven percent dust natural mitigation efficiency on paved roads during summer (calculated based on the equation from US EPA 2011 and the measured precipitation data).
- Ninety-seven percent dust natural mitigation efficiency on paved roads during winter (calculated based on the equation from US EPA 2011 and the measured precipitation data).
- Fugitive dust control not applied during bulldozing and grading, off-road equipment in transition, truck loading and unloading, and material transfer to and from the temporary topsoil and overburden stockpiles.

- Fugitive dust emissions from water trucks are assumed to be zero because of the wet road surface due to water application based on professional judgement .
- Assumed no pit retention for fugitive dust PM based on professional judgement and to be conservative.
- Assumed Gordon construction equipment equal to 20% of MacLellan processing plant construction equipment based on professional judgement.

C.4.3 EMISSION RATES

The list of off-road equipment, on-road equipment and their operating hours which are used for road construction, mine platforms, processing plant construction and TMF construction were provided by Ausenco. Tier 3 emission factors were used for these equipment conservatively as it is possible, they could be Tier 3 or 4. The list of off-road equipment, on-road equipment and their operating hours for the mine preproduction were provided by Q'Pit (Q'Pit 2019) and for these equipment Tier 4 emission factor was used.

The methodology used to calculate the construction phase air emissions from diesel exhaust, explosive detonation and fugitive dust are the same as what was used for operation emission. The methodologies associated with diesel exhaust, explosive detonation and fugitive dust are discussed in Section C.3.3.1, Section C.3.3.2 and Section C.3.3.3, respectively. The list of equipment and the parameters which are used for calculating the off-road and on-road equipment worst-case year construction emission are shown in Table C-26 and Table C-27

The methodology used to calculate the diesel exhaust and fugitive dust emission from the temporary mobile crushing plant is discussed below.

C.4.3.1 Diesel Exhaust Emission from Mobile Crushing Plant

The emission rates for the temporary mobile crusher were determined using Equation C-3 (NO_x, CO, TSP, PM_{10}, $PM_{2.5}$, VOC) and Equation C-4 (SO_2).

C.4.3.2 Fugitive Dust Emission from Mobile Crushing Plant

The fugitive dust emission rates for the temporary mobile crusher were determined using Equation C-21.

$$ER_h\ (g/s) = Feed\ Rate\left(\frac{tonnes}{hr}\right) \times Emission\ Factor\left(\frac{kg}{Mg\ or\ tonnes}\right) \times Unit\ Conversion\ \left(\frac{hr}{3600\ s}\right)$$

Equation C-21

where:

ER_h	-	Hourly emission rate (g/s)
Feed Rate	-	Amount of aggregate to the mobile crusher is based on the design specification
Emission Factor	-	US EPA AP-42 Table 11.19.2-1 Particle size-specific emission factor (kg/Mg of aggregate).

Table C-26 Worst -Case Year Construction Phase Off-Road Equipment Parameters

Activity and Equipment Description	Manufacturer	Model	Number of Units	Engine Power	Operating Hours per Day	Operating Days per year	BSFC	Fuel Consumption (Calculated)	Load Factor	Emission Standard Tier
				hp	h/d	d/y	lb fuel/hp-hr	L/h	%	
MacLellan Site										
Road Construction, Mine Platforms and Processing Plant construction [a]										
700 Dozer	John Deere	700K LGP	2	130	10.0	249	0.367	26	58%	Tier 3
D6 Dozer	CAT	D6	4	215	10.0	193	0.367	42	58%	Tier 3
D7 Dozer	CAT	D7E	2	238	10.0	193	0.367	47	58%	Tier 3
D8 Dozer	CAT	D8T	2	347	10.0	157	0.367	68	58%	Tier 3
D9 Dozer	CAT	D9T	1	441	10.0	162	0.367	87	58%	Tier 3
815 Packer	CAT	815K	1	248	10.0	260	0.367	49	43%	Tier 3
15 ton SD Packer	CAT	CB15	3	142	10.0	153	0.367	28	43%	Tier 3
10T Packer	CAT	CB10	2	131	10.0	153	0.367	26	43%	Tier 3
Plate Packer	CAT	CB1.7	2	25	10.0	130	0.408	5	43%	Tier 3
1000 lb Plate Packer	Wacker Neuson	DPU6555	1	13	10.0	56	0.408	3	43%	Tier 3
Jumping Jack Packer	Wacker Neuson	0	1	4	10.0	56	0.408	1	43%	Tier 3
980 site Loader	CAT	980M	1	412	10.0	175	0.367	81	48%	Tier 3
966 site Loader	CAT	966	1	235	10.0	120	0.367	46	48%	Tier 3
Zoom Boom	Bobcat	TL30.70	1	100	10.0	202	0.408	22	21%	Tier 3
16 Grader	CAT	16M3	1	290	10.0	96	0.367	57	59%	Tier 3
135 Excavator	John Deere	135	1	88	10.0	116	0.408	19	53%	Tier 3
300 Excavator	John Deere	300G LC	2	223	10.0	169	0.367	44	53%	Tier 3
400 Excavator	Komatsu	400	3	306	10.0	276	0.367	60	53%	Tier 3
850 Excavator	John Deere	850D LC	1	532	10.0	177	0.367	105	53%	Tier 3
30t Rock Truck	CAT	730	1	329	10.0	193	0.367	65	57%	Tier 3
40t Rock Truck	CAT	745C	6	511	10.0	149	0.367	101	57%	Tier 3
65t Rock Truck	CAT	775G	5	825	10.0	103	0.367	162	57%	Tier 3
Rock Drill	Atlas Copco with CAT C15 engine	FlexiRoc D65	1	540	10.0	25	0.367	106	43%	Tier 3
TMF**Construction [a]**										
D6/850 Dozer	CAT	D6	4	215	10.0	228	0.367	42	58%	Tier 3
D7 Dozer	CAT	D7E	1	238	10.0	200	0.367	47	58%	Tier 3
D8 Dozer	CAT	D8T	2	347	10.0	112	0.367	68	58%	Tier 3
980 Loader	CAT	980M	2	412	10.0	10	0.367	81	48%	Tier 3
Zoom Boom	Bobcat	TL30.70	2	100	10.0	40	0.408	22	53%	Tier 3
14 Grader	CAT	14M3	1	238	10.0	360	0.367	47	59%	Tier 3
300 Excavator	John Deere	300G LC	2	223	10.0	233	0.367	44	53%	Tier 3
400 excavators	Komatsu	400	2	306	10.0	344	0.367	60	53%	Tier 3

Table C-26 Worst -Case Year Construction Phase Off-Road Equipment Parameters

Activity and Equipment Description	Manufacturer	Model	Number of Units	Engine Power	Operating Hours per Day	Operating Days per year	BSFC	Fuel Consumption (Calculated)	Load Factor	Emission Standard Tier
				hp	h/d	d/y	lb fuel/hp-hr	L/h	%	
40T articulated truck	CAT	745C	8	511	10.0	227	0.367	101	57%	Tier 3
Hand Drill	Secoroc	PP100	2	15	10.0	60	0.408	3	43%	Tier 3
Grout Mixer	ChemGrout	CG-680 Series	1	37	10.0	190	0.408	8	43%	Tier 3
25 kW Generator	Doosan	Towable Generator	2	34	10.0	113	0.408	7	43%	Tier 3
50 kW Generator	Wacker Neuson	Towable Generator	4	75	10.0	365	0.408	16	43%	Tier 3
Lightplant	Atlas Copco	HiLight V5+	2	4	10.0	213	0.408	1	43%	Tier 3
Portable Air Compressors	Atlas Copco	XATS 250 KD7 iT4	5	74	10.0	210	0.408	16	43%	Tier 3
Mine Preproduction [b]										
65t Backhoe	Komatsu	PC650LC-11	2.1	436	8.1	360	0.367	86	53%	Tier 4
65t Backhoe	Komatsu	PC650LC-11	1.4	436	8.6	360	0.367	86	53%	Tier 4
65t Backhoe	Komatsu	PC650LC-11	0	436	0.0	360	0.367	86	53%	Tier 4
CAT 993 or Equivalent	CAT	993K High Lift	1	1,039	4.9	360	0.367	205	48%	Tier 4
Wheel Loader (260 kW)	CAT	980M	1	412	7.6	360	0.367	81	48%	Tier 4
38t Articulated Trucks	CAT	745C	8	511	9.8	360	0.367	101	57%	Tier 4
Primary Trucks (144t Truck)	Komatsu	HD1500	2	1,500	5.7	360	0.367	296	57%	Tier 4
8 Hyd Track Drill	Atlas Copco with CAT C15 engine	FlexiRoc D65	1	540	9.7	360	0.367	106	43%	Tier 4
9 215 kW Motor Grader	CAT	16M3	1	290	6.3	360	0.367	57	59%	Tier 4
10 178 kW Motor Grader	CAT	14M3	1	238	12.5	360	0.367	47	59%	Tier 4
150kW - 20 t Dozer	CAT	D6T XL	1	207	9.4	360	0.367	41	58%	Tier 4
11 264 kW Crawler Dozer	CAT	D155AX-8	2	354	12.5	360	0.367	70	58%	Tier 4
14 450 kW Crawler Dozer	CAT	D375-8	2	636	12.2	360	0.367	125	58%	Tier 4
12 370 kW Wheel Dozer	CAT	834K	1	496	2.8	360	0.367	98	59%	Tier 4
36 t Hydraulic Excavator	Komatsu	PC360LC-11	1	271	2.8	360	0.367	53	53%	Tier 4
110 t Rough-Terrain Crane	Tadano Mantis	GR1200XL	1	270	2.8	360	0.367	53	43%	Tier 4
90 t Rough-Terrain Crane	Tadano Mantis	GRT8100	1	275	2.1	360	0.367	54	43%	Tier 4
Hydraulic Breaker - 36 t Excavator Mounted	Komatsu	PC360LC-11	1	271	1.6	360	0.367	53	53%	Tier 4
Blasthole Stemmer	CAT	262D	1	74	5.6	360	0.408	16	43%	Tier 4
On-Highway Class 8 Dump Truck	Freightliner 114SD with Cummins ISX12 engine	114SD	2	500	6.1	360	0.367	99	80%	Tier 4
12 t Telescopic Forklift	Dieci Americas	Hercules 190.10	1	175	5.6	360	0.367	34	59%	Tier 4
Skid-Steer Loader	Takeuchi	TL10V2	1	74	5.6	360	0.408	16	21%	Tier 4
Heavy-Duty Light Tower	Atlas Copco	HiLight V5+	6	4	10.2	360	0.408	1	43%	Tier 4

Table C-26 Worst -Case Year Construction Phase Off-Road Equipment Parameters

Activity and Equipment Description	Manufacturer	Model	Number of Units	Engine Power	Operating Hours per Day	Operating Days per year	BSFC	Fuel Consumption (Calculated)	Load Factor	Emission Standard Tier
				hp	h/d	d/y	lb fuel/hp-hr	L/h	%	
5-6m3 Portable Air Compressor	Atlas Copco	XATS 250 KD7 iT4	1	74	3.3	360	0.408	16	43%	Tier 4
Flameless Air Mobile Heater	Aerotech Herman Nelson	BT 700K	1	99	3.3	360	0.408	22	43%	Tier 4
Trailer-Mounted Pressure Washer	NorthStar Trailer with Honda Engine	TMPW	1	24	3.3	360	0.408	5	43%	Tier 4
Portable 4-inch Dewatering Pump	Goldwin	CD103M	1	41	13.9	360	0.408	9	43%	Tier 4
Portable 8-inch Dewatering Pump	Goldwin	CM225M	1	99	10.4	360	0.408	22	43%	Tier 4
Gordon Site [c]										
Mine Preproduction [b]										
65t Backhoe	Komatsu	PC650LC-11	2	436	5.0	360	0.367	86	53%	Tier 4
65t Backhoe	Komatsu	PC650LC-11	1	436	2.8	360	0.367	86	53%	Tier 4
CAT 993 or Equivalent	CAT	993K High Lift	1	1,039	2.1	360	0.367	205	48%	Tier 4
Wheel Loader (260 kW)	CAT	980M	1	412	0.0	360	0.367	81	48%	Tier 4
38t Articulated Trucks	CAT	745C	6	511	5.7	360	0.367	101	57%	Tier 4
Primary Trucks (144t Truck)	Komatsu	HD1500	1	1,500	4.0	360	0.367	296	57%	Tier 4
8 Hyd Track Drill	Atlas Copco with CAT C15 engine	FlexiRoc D65	1	540	5.3	360	0.367	106	43%	Tier 4
9 215 kW Motor Grader	CAT	16M3	1	290	3.1	360	0.367	57	59%	Tier 4
10 178 kW Motor Grader	CAT	14M3	1	238	6.3	360	0.367	47	59%	Tier 4
150kW - 20 t Dozer	CAT	D6T XL	1	207	6.3	360	0.367	41	58%	Tier 4
11 264 kW Crawler Dozer	CAT	D155AX-8	1	354	9.4	360	0.367	70	58%	Tier 4
14 450 kW Crawler Dozer	CAT	D375-8	1	636	10.4	360	0.367	125	58%	Tier 4
12 370 kW Wheel Dozer	CAT	834K	1	496	2.8	360	0.367	98	59%	Tier 4
36 t Hydraulic Excavator	Komatsu	PC360LC-11	1	271	2.1	360	0.367	53	53%	Tier 4
110 t Rough-Terrain Crane	Tadano Mantis	GR1200XL	2	270	2.1	360	0.367	53	43%	Tier 4
Blasthole Stemmer	CAT	262D	1	74	4.2	360	0.408	16	43%	Tier 4
On-Highway Class 8 Dump Truck	Freightliner 114SD with Cummins ISX12 engine	114SD	1	500	5.2	360	0.367	99	80%	Tier 4
Wheel Loader (260 kW)	CAT	980M	1	412	0.0	360	0.367	81	48%	Tier 4
12 t Telescopic Forklift	Dieci Americas	Hercules 190.10	1	175	4.2	360	0.367	34	59%	Tier 4
Heavy-Duty Light Tower	Atlas Copco	HiLight V5+	8	4	6.9	360	0.408	1	43%	Tier 4
Flameless Air Mobile Heater	Aerotech Herman Nelson	BT 700K	1	99	2.5	360	0.408	22	43%	Tier 4
Portable 4-inch Dewatering Pump	Goldwin	CD103M	1	41	10.4	360	0.408	9	43%	Tier 4
Portable 8-inch Dewatering Pump	Goldwin	CM225M	1	99	6.9	360	0.408	22	43%	Tier 4

NOTES:
[a] List of off-road equipment and their operating hours were provided by Ausenco
[b] List of off-road equipment and their operating hours were provided by Q'Pit
[c] Assumed 20% of MacLellan site road construction, mine platforms and processing plant construction will be emitted at Gordon for road construction and mine platforms

Table C-27 Worst -Case Year Operation Phase On-Road Equipment Parameters

Activity	Truck Description	MOVES Vehicle Type	Road Length	Number of Round Trips		Operating Days per year
			km	trips/d	trips/h	d/y
MacLellan Site						
Haul Roads						
Tridem Trailer/Hwy Tractor	Tridem Trailer/Hwy Tractor	Combination Long-haul Truck	2.0	171	17	155
Access Roads						
Road Construction, Mine Platforms and Processing Plant construction [a]						
Old Access Road at MacLellan Site	Lowbed	Combination Long-haul Truck	5.3	5	1	179
	Water truck	Single Unit Short-haul Truck	5.3	2	1	137
	Powder Truck	Single Unit Long-haul Truck	5.3	2	1	16
	Crew Van	School Bus	5.3	2	1	338
	1 Ton Truck	Passenger Truck	5.3	6	1	257
	1/2 Ton Truck	Passenger Truck	5.3	16	2	350
	Service Truck	Single Unit Short-haul Truck	5.3	2	1	338
	Fuel Truck	Single Unit Short-haul Truck	5.3	2	1	338
TMF**Construction [a]**						
Old Access Road at MacLellan Site	Lowbed	Combination Long-haul Truck	5.3	5	1	360
	Water truck	Single Unit Short-haul Truck	5.3	4	1	333
	Fuel truck	Single Unit Short-haul Truck	5.3	2	1	360
	HVAC Truck	Single Unit Short-haul Truck	5.3	8	1	185
	Mechanic Truck	Single Unit Short-haul Truck	5.3	2	1	540
	Concrete Mixer Truck	Single Unit Short-haul Truck	5.3	10	1	208
	Service Truck	Single Unit Short-haul Truck	5.3	4	1	363
	1/2 T Truck	Passenger Truck	5.3	26	3	344
	1 T Truck	Passenger Truck	5.3	10	1	298
	Crew Van/Bus	School Bus	5.3	4	1	270
Mine Preproduction [b]						
Old Access Road at MacLellan Site	15kl Water Truck	Single Unit Short-haul Truck	5.3	2	1	360
	Lube & Fuel Truck	Single Unit Short-haul Truck	5.3	2	1	360
	Field Welding Service Truck	Single Unit Short-haul Truck	5.3	2	1	360
	Explosives Contractor Equipment	Single Unit Long-haul Truck	5.3	2	1	360
	Crew Change Vehicle	School Bus	5.3	2	1	360
	Mine Pickup Trucks	Passenger Truck	5.3	20	5	360

Table C-27 Worst -Case Year Operation Phase On-Road Equipment Parameters

Activity	Truck Description	MOVES Vehicle Type	Road Length	Number of Round Trips		Operating Days per year
			km	trips/d	trips/h	d/y
Gordon Site [c]						
Access Roads						
Mine Preproduction [b]						
Access Road Segment 1 at Gordon Site	15kl Water Truck	Single Unit Short-haul Truck	3.7	2	1	360
	Lube & Fuel Truck	Single Unit Short-haul Truck	3.7	2	1	360
	Field Welding Service Truck	Single Unit Short-haul Truck	3.7	2	1	360
	Explosives Contractor Equipment	Single Unit Long-haul Truck	3.7	2	1	360
	Crew Change Vehicle	School Bus	3.7	2	1	360
	Mine Pickup Trucks	Passenger Truck	3.7	10	4	360
Access Road Segment 2 at Gordon Site	15kl Water Truck	Single Unit Short-haul Truck	11.1	2	1	360
	Lube & Fuel Truck	Single Unit Short-haul Truck	11.1	2	1	360
	Field Welding Service Truck	Single Unit Short-haul Truck	11.1	2	1	360
	Explosives Contractor Equipment	Single Unit Long-haul Truck	11.1	2	1	360
	Crew Change Vehicle	School Bus	11.1	2	1	360
	Mine Pickup Trucks	Passenger Truck	11.1	10	4	360
Provincial Road 391 [d]						
Provincial Road 391 - Segment 1 to 5 during Winter	Powder Truck	Single Unit Long-haul Truck	36.7	2	1	181
Provincial Road 391 - Segment 1 to 5 during Winter	Fuel Truck	Single Unit Short-haul Truck	36.7	2	1	181
Provincial Road 391 - Segment 1 to 5 during Winter	Fuel truck	Single Unit Short-haul Truck	36.7	2	1	181
Provincial Road 391 - Segment 1 to 5 during Winter	Concrete Mixer Truck	Single Unit Short-haul Truck	36.7	4	1	181
Provincial Road 391 - Segment 1 to 5 during Summer	Powder Truck	Single Unit Long-haul Truck	36.7	2	1	184
Provincial Road 391 - Segment 1 to 5 during Summer	Fuel Truck	Single Unit Short-haul Truck	36.7	2	1	184
Provincial Road 391 - Segment 1 to 5 during Summer	Fuel truck	Single Unit Short-haul Truck	36.7	2	1	184
Provincial Road 391 - Segment 1 to 5 during Summer	Concrete Mixer Truck	Single Unit Short-haul Truck	36.7	4	1	184

NOTES:
[a] List of on-road equipment and their operating hours were provided by Ausenco
[b] List of on-road equipment and their operating hours were provided by Q'Pit
[c] Assumed 20% of MacLellan site road construction, mine platforms and processing plant construction will be emitted at Gordon for road construction and mine platforms
[d] Emission from provincial road 391 are reported under Gordon Site emissions and is consistent with operation emissions

C.4.4 EMISSION RATE SUMMARY

Table C-28, Table C-29, and Table C-30 summarize the maximum annual construction emission for the Project, MacLellan site and Gordon site, respectively.

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Table C-28 Annual Emission Rate during Construction at both MacLellan and Gordon Sites

Emission Source	Annual Emission Rates [a] (t/y)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Construction Off-Road Equipment	102	166	0.312	4.66	4.66	4.52	0	0	0	11.7
On-Highway Trucks and On-Road Vehicles	1.73	0.815	0.00508	0.129	0.129	0.0791	0	0	0	0.168
Drilling and Blasting	38.7	165	4.84	0	0	0	14.0	7.33	2.35	0
Mobile Crushing Plant	2.33	2.16	0.00335	0.125	0.125	0.121	30.1	10.9	10.9	0.183
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	1,263	360	36.0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	224	57.4	12.4	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	28.0	13.2	2.01	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	1,337	381	38.1	0
Fugitive Dust Emissions from PR 391	0	0	0	0	0	0	5.07	1.01	0.249	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0
Total Emissions	**145**	**333**	**5.16**	**4.91**	**4.91**	**4.72**	**2,902**	**831**	**102**	**12.0**

NOTES:

[a] Annual average emission rates based on the actual hours of operation per day for each construction activity

Table C-29 Annual Emission Rate during Construction at MacLellan Site

Emission Source	Annual Emission Rates [a] (t/y)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Construction Off-Road Equipment	86.5	129	0.243	4.07	4.07	3.95	0	0	0	9.30
On-Highway Trucks and On-Road Vehicles	0.990	0.465	0.00280	0.0667	0.0667	0.0421	0	0	0	0.0831
Drilling and Blasting	27.6	117	3.44	0	0	0	8.62	4.49	1.50	0
Mobile Crushing Plant	2.33	2.16	0.00335	0.125	0.125	0.121	30.1	10.9	10.9	0.183
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0.00	0	0	0	947	270	27.0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	173	44.1	9.72	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	22.9	10.8	1.64	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	1,191	339	33.9	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0
Total Emissions	**117**	**249**	**3.69**	**4.26**	**4.26**	**4.11**	**2,372**	**680**	**84.7**	**9.57**

NOTES:

[a] Annual average emission rates based on the actual hours of operation per day for each construction activity

Table C-30 Annual Emission Rate during Construction at Gordon Site

Emission Source	Annual Emission Rates [a] (t/y)									
	NO_X	CO	SO_2	DTSP	DPM_{10}	$DPM_{2.5}$	FTSP	FPM_{10}	$FPM_{2.5}$	VOC
Construction Off-Road Equipment	15.2	36.5	0.0688	0.585	0.585	0.568	0	0	0	2.36
On-Highway Trucks and On-Road Vehicles	0.735	0.350	0.00228	0.0623	0.0623	0.0370	0	0	0	0.0853
Drilling and Blasting	11.2	47.6	1.40	0	0	0	5.43	2.83	0.841	0
Fugitive Dust Emissions from Construction Off-Road Equipment Movement	0	0	0	0	0	0	316	90.1	9.0	0
Fugitive Dust Emissions from Bulldozing and Grading	0	0	0	0	0	0	51.3	13.3	2.71	0
Fugitive Dust Emissions from Truck Loading and Unloading	0	0	0	0	0	0	5.09	2.41	0.365	0
Fugitive Dust Emissions from Haul Roads and Access Roads	0	0	0	0	0	0	147	41.8	4.18	0
Fugitive Dust Emissions from PR 391	0	0	0	0	0	0	5.07	1.01	0.249	0
Wind Erosion of Stockpiles	0	0	0	0	0	0	0	0	0	0
Total Emissions	**27.2**	**84.5**	**1.47**	**0.648**	**0.648**	**0.605**	**530**	**151**	**17.4**	**2.44**

NOTES:
[a] Annual average emission rates based on the actual hours of operation per day for each construction activity

C.5 COMPARISON OF CONSTRUCTION AND OPERATION EMISSION INVENTORY

The maximum annual construction and operation emission from the Project, MacLellan and Gordon site are summarized in Table C-31. The findings are summarized below:

Project Emissions:

- Emissions of gaseous CACs (NO_X, CO, SO_2, and VOC) during construction are 50% to 72% less than the corresponding annual emission totals during operation. The highest difference (72%) corresponds to NO_X emissions.
- Emissions of DPM are approximately 25% lesser than the corresponding annual emissions totals during operation. The highest difference (24%) corresponds to TSP and PM_{10} emissions.
- Fugitive particulate matter emissions (TSP, PM_{10}, and $PM_{2.5}$) during construction are 39% to 53% less than the corresponding annual emission totals during operation. The highest difference (53%) corresponds to PM_{10} emissions.

MacLellan Emissions:

- Emissions of gaseous CACs (NO_X, CO, SO_2, and VOC) during construction are 39% to 65% less than the corresponding annual emission totals during operation. The highest difference (65%) corresponds to NO_X emissions.
- Emissions of DPM are approximately 20% higher than the corresponding annual emissions totals during operation. DPM emission during construction is higher because of the use of Tier 3 emission factor for off-road equipment.
- Fugitive particulate matter emissions (TSP, PM_{10}, and $PM_{2.5}$) during construction are 20% to 41% less than the corresponding annual emission totals during operation. The highest difference (41%) corresponds to PM_{10} emissions.

Gordon Emissions:

- Emissions of gaseous CACs (NO_X, CO, SO_2, and VOC) during construction are 65% to 85% less than the corresponding annual emission totals during operation. The highest difference (85%) corresponds to NO_X emissions.
- Emissions of DPM are approximately 77% less than the corresponding annual emissions totals during operation. The highest difference (77%) corresponds to TSP and PM_{10} emissions.
- Fugitive particulate matter emissions (TSP, PM_{10}, and $PM_{2.5}$) during construction are 70% to 76% less than the corresponding annual emission totals during operation. The highest difference (76%) corresponds to PM_{10} and $PM_{2.5}$ emissions.

Table C-31 Comparison of Worst-Case Year Annual Construction and Operation Emission

Substance	Project Emission [a]			MacLellan Emission [a]			Gordon Emission [a]		
	Construction [b]	Operation [b]	Percent Difference	Construction [b]	Operation [c]	Percent Difference	Construction [b]	Operation [d]	Percent Difference
	tonnes/year		%	tonnes/year		%	tonnes/year		%
NO_X	145	511	-72%	117	335	-65%	27.2	176	-85%
CO	333	780	-57%	249	504	-51%	84.5	276	-69%
SO_2	5.16	10.3	-50%	3.69	6.05	-39%	1.47	4.23	-65%
DPM_{30}	4.91	6.43	-24%	4.26	3.65	17%	0.648	2.78	-77%
DPM_{10}	4.91	6.43	-24%	4.26	3.65	17%	0.648	2.78	-77%
$DPM_{2.5}$	4.72	5.80	-19%	4.11	3.49	18%	0.605	2.31	-74%
FPM_{30}	2,902	4,731	-39%	2,372	2,956	-20%	530	1,775	-70%
FPM_{10}	831	1,765	-53%	680	1,142	-41%	151	623	-76%
$FPM_{2.5}$	102	202	-50%	84.7	131	-36%	17.4	70.9	-76%
VOC	12.0	28.8	-58%	9.57	19.0	-50%	2.44	9.84	-75%

NOTES:
[a] Compared annual emission from construction and operation emission.
[b] Emission from 12-month period from Q2 Year -2 to Q1 Year -1
[c] Emission from 12-month period from Year 7
[d] Emission from 12-month period from Year 2

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Appendix D CALMET METEOROLOGICAL MODEL

Lynn Lake Gold Project (LLGP) Environmental Impact Assessment

Appendix D: Air Quality Technical Modeling Report: Meteorology/ CALMET

Prepared for:

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APPENDIX D
METEOROLOGY/CALMET

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Appendix D METEOROLOGY/CALMET

D.1 INTRODUCTION

This appendix provides an overview of the meteorological information used for the dispersion modelling completed as part of the Lynn Lake Mine Project (the Project) assessment. Also provided are the technical details and options that were used to apply the CALMET model for the assessment.

Meteorology determines the transport and dispersion of industrial emissions, and hence plays an important role in determining air quality downwind of emission sources. For the air quality assessment, meteorological data for the five-year period from 2012 to 2016 were used to define transport and dispersion parameters. The selection of a five-year period is consistent with the Manitoba Conservation (MC) Guidelines for Air Dispersion Modeling in Manitoba (MC 2006), that requires data for a five-year period when using meteorological data for dispersion modeling. However, Manitoba Conservation (MC) Guidelines for Air Dispersion Modeling in Manitoba don't provide guidelines for model (e.g. CALMET) setup, therefore, Alberta Environment and Parks (AEP) Air Quality Model Guideline (AEP 2013) has been used as guidelines for CALMET options and set up.

Meteorological characteristics vary with time (e.g., season and time of day) and location (e.g., height above ground, terrain features, and land cover properties). Historically, meteorological data measured at one location have been used and extrapolated to reflect conditions across the model domain. For large model domains, this approach fails to recognize that meteorological conditions for any given hour can vary significantly across the domain due to terrain and geophysical differences. Curvilinear airflow can also result from mesoscale and synoptic-scale weather patterns.

Meteorological models are used to provide spatially and temporally varying wind and temperature fields across a model domain to overcome some of the limitations associated with the use of single station measurements. The CALMET meteorological pre-processing program is used to provide temporally and spatially varying meteorological parameters required by the CALPUFF model.

The CALMET pre-processor is available from the website of the model developer (i.e., Exponent Inc. - http://www.src.com/calpuff/calpuff1.htm). At the time of this assessment, the most recent Exponent version of CALMET was Version 6.5.0 level 150223, released June 22, 2015. The corresponding current U.S. EPA version of CALMET is Version 5.8.5, level 151214. Consistent with the AEP Air Quality Model Guideline, Version 6.5.0 was adopted.

D.2 MODEL DOMAIN

D.2.1 Boundaries

The model domain adopted for this assessment extends from 50.8806 degrees latitude to 51.2275 degrees latitude (resulting in a north south extent of 48 km), and from 114.7326 degrees longitude to 114.1426 degrees longitude (resulting in an east west extent of 70 km), as shown in Map D-1. The study domain covers a 3,360 km^2 area, the extents of which are provided in Table D-1. A horizontal grid spacing of 500 m was selected for the CALMET simulation. The study area therefore corresponds to 140 rows by 96 columns. With this grid spacing, it was possible to maximize run time and file size efficiencies while still capturing terrain feature influences on wind flow patterns.

To simulate transport and dispersion processes, it is important to simulate the representative vertical profiles of wind direction, wind speed, temperature, and turbulence intensity within the atmospheric boundary layer (i.e., the layer within about 2,000 m above the Earth's surface). To capture this vertical structure, twelve vertical layers were selected. CALMET defines a vertical layer as the midpoint between two faces (i.e., thirteen faces correspond to twelve layers, with the lowest layer always being ground level or 10 m). The vertical faces used in this study are 0 m, 20 m, 40 m, 80 m, 120 m, 280 m, 520 m, 880 m, 1,320 m, 1,820 m, 2,380 m, 3,000 m, and 4,000 m.

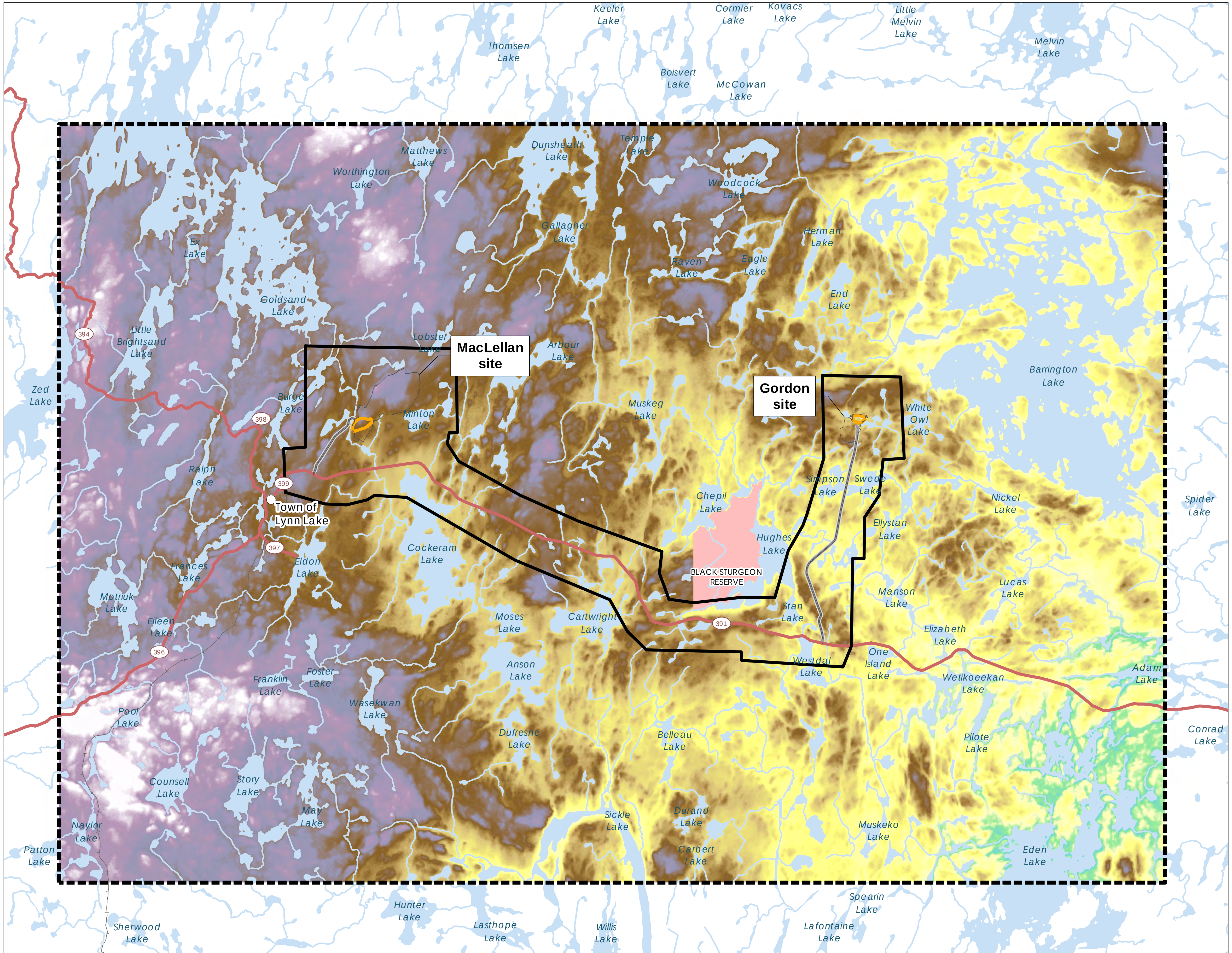
Table D-1 Model Domain (70 km by 48 km) Coordinates (UTM Zone 14; NAD 83)

Domain Corner	Easting (m)	Northing (m)
Southwest	361775	6278500
Northwest	361775	6326500
Northeast	431775	6326500
Southeast	431775	6278500

D.2.2 Topography

The valley and elevated terrain features in the model domain affect surface wind flow patterns. The terrain data used to define these features were obtained from a terrain dataset integrated from Light Detection and Ranging (LiDAR) 5 m resolution data over the project area and U.S. Geological Survey (USGS) Shuttle Radar Topography Mission (SRTM) 30 m resolution data over rest area of CALMET model domain. These data are more than sufficient for air quality assessment purposes for this Project.

A general overview of the terrain in the model domain is presented in Map D-1. Broadly speaking, the higher elevations are towards the west of the domain, and the lowest elevations are near the east portion of the domain.



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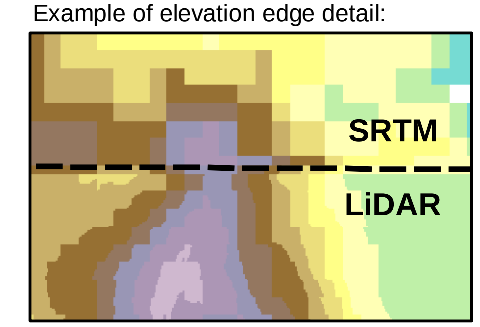
Study Area
- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Survey Locations
- LiDAR Coverage

Ground Surface Elevation (masl)
- High : 421
- Low : 263

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

Example of elevation edge detail:



N

0 4 8 Kilometres

(At original document size of 11x17)
1:10,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
D-1

Title
Terrain Elevations in the CALMET Model Domain based on Integrated LiDAR and SRTM Digital Elevation Data

G:_GIS_Project_Folder\111473008_LLGP_EA\figures\Ch6_Atmospheric_Environment\TMR Report AQ\MapD-1_TerrainElevations_CALMET.mxd Revised: 2020-01-23 By: ACampigotto

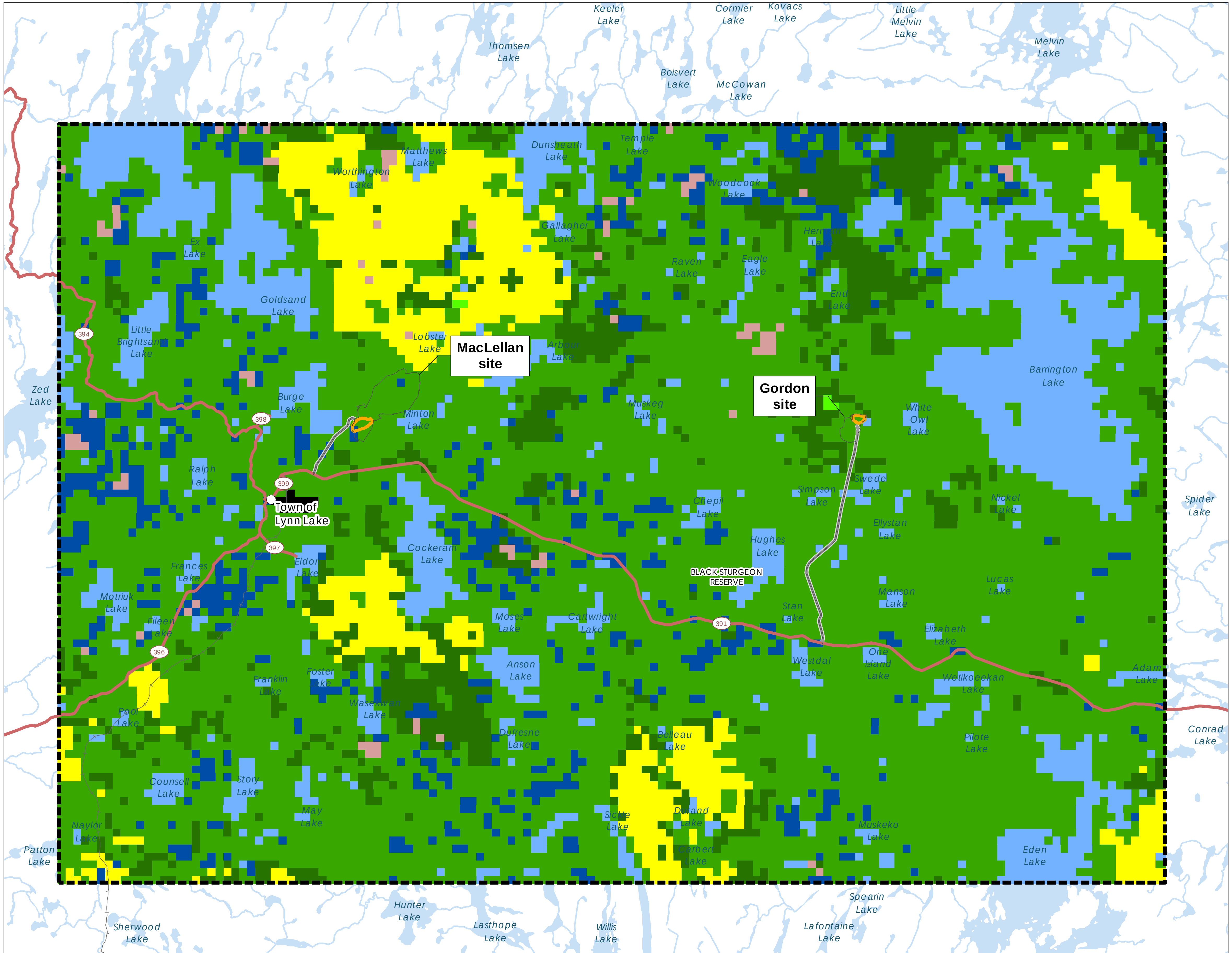
D.2.3 Land-Cover Types

The North American land-cover data (Commission for Environmental Cooperation 2016) is used to initialize land-cover categories in the CALMET model. The 2005 North American land-cover dataset was produced as part of the North American Land Change Monitoring System (NALCMS), a trilateral effort between the Canada Centre for Remote Sensing, the United States Geological Survey, and three Mexican organizations including the National Institute of Statistics and Geography, National Commission for the Knowledge and Use of the Biodiversity, and the National Forestry Commission of Mexico. This dataset has a 250 m resolution.

For this assessment, the 2005 North American land-cover data were extracted and then converted into the fractional land-use format accepted by the CALMET MAKEGEO pre-processor. MAKEGEO creates the geophysical data file (GEO.DAT) for CALMET. The 250 m resolution data were grouped on a 500 m grid basis and the land-cover type assigned to the larger grid cell is based on the dominant land-cover type for that grid cell.

The mapping from the North American land-cover dataset to the CALMET land-use categories is contained in Table D-2. Tables D-3 to D-6 describe the seasonal values for surface roughness (z_0), albedo, Bowen ratio, soil heat flux, anthropogenic heat flux, and leaf area index (LAI) defined according to the Guidelines for AEP Air Quality Model Guideline (AEP 2013) and the CALMET User Guide (Scire et al. 2000).

Land-cover in the CALMET Domain is mainly evergreen forest (see Map D-2 for the land cover on a 500 m resolution basis). Based on the 500 m resolution data, the domain is comprised of 63.2% evergreen forest, 13.9% water, 8.3% mixed forest, 7.9% shrub rangeland, 5.9% wetland, 0.9% rangeland, and 0.1% barren land.



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Study Area

- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Land Use Class

- Rangeland
- Shrub Rangeland
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Water
- Wetland
- Barren Land

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008

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Lynn Lake Gold Project

Map No.

D-2

Title

Land Use Classes within the CALMET Model Domain

Table D-2 Mapping from the North American Land-cover Data to CALMET Land-Use Categories

Land Cover Code	Land Cover Type	CALMET Code	CALMET Land Use Category
1	Temperate or sub-polar needleleaf forest	42	Evergreen Forest Land
2	Sub-polar taiga needleleaf forest	42	Evergreen Forest Land
3	Tropical or sub-tropical broadleaf evergreen forest	42	Evergreen Forest Land
4	Tropical or sub-tropical broadleaf deciduous forest	41	Deciduous Forest Land
5	Temperate or sub-polar broadleaf deciduous forest	41	Deciduous Forest Land
6	Mixed forest	43	Mixed Forest Land
7	Tropical or sub-tropical shrubland	32	Shrub Rangeland
8	Temperate or sub-polar shrubland	32	Shrub Rangeland
9	Tropical or sub-tropical grassland	30	Rangeland
10	Temperate or sub-polar grassland	30	Rangeland
11	Sub-polar or polar shrubland-lichen-moss	80	Tundra
12	Sub-polar or polar grassland-lichen-moss	80	Tundra
13	Sub-polar or polar barren-lichen-moss	80	Tundra
14	Wetland	60	Wet Land
15	Cropland	20	Agricultural Land
16	Barren lands	70	Barren Land
17	Urban	10	Urban or Build-up
18	Water	50	Water
19	Snow and Ice	90	Snow or Ice

Table D-3 Land-cover Characterization and Associated Geophysical Parameters for the Winter Season

NALCMS Code	Surface Roughness (m)	Albedo	Bowen Ratio	Soil Heat Flux (fraction)	Anthropogenic Heat Flux (W/m^2)	Leaf Area Index	CALMET Code	CALMET Land Cover Type
1	0.900	0.130	2.000	0.100	0.000	4.500	42	Evergreen Forest
2	0.900	0.130	2.000	0.100	0.000	4.500	42	
3	0.900	0.130	2.000	0.100	0.000	4.500	42	
4	0.550	0.210	2.000	0.100	0.000	0.100	41	Deciduous Forest
5	0.550	0.210	2.000	0.100	0.000	0.100	41	
6	1.200	0.170	2.000	0.100	0.000	2.300	43	Mixed Forest
7	0.050	0.250	1.000	0.150	0.000	0.500	32	Shrub Rangeland
8	0.050	0.250	1.000	0.150	0.000	0.500	32	
9	0.150	0.750	2.000	0.100	0.000	0.800	30	Rangeland
10	0.150	0.750	2.000	0.100	0.000	0.800	30	
11	0.200	0.300	0.500	0.150	0.000	0.000	80	Tundra
12	0.200	0.300	0.500	0.150	0.000	0.000	80	
13	0.200	0.300	0.500	0.150	0.000	0.000	80	
15	0.150	0.750	2.000	0.100	0.000	0.800	20	Agricultural Land
16	0.150	0.450	6.000	0.150	0.000	0.050	70	Barren Land
17	1.000	0.180	1.500	0.250	16.000	0.200	10	Urban or Build-up
18	0.001	0.750	0.000	1.000	0.000	0.000	50	Water

NOTES:
Winter = November, December, January, February, March and April
W/m^2 = watts per square metre

Table D-4 Land-cover Characterization and Associated Geophysical Parameters for the Spring Season

NALCMS Code	Surface Roughness (m)	Albedo	Bowen Ratio	Soil Heat Flux (fraction)	Anthropogenic Heat Flux (W/m²)	Leaf Area Index	CALMET Code	CALMET Land Cover Type
1	0.900	0.110	1.500	0.100	0.000	5.200	42	Evergreen Forest
2	0.900	0.110	1.500	0.100	0.000	5.200	42	
3	0.900	0.110	1.500	0.100	0.000	5.200	42	
4	0.750	0.150	1.500	0.100	0.000	1.000	41	Deciduous Forest
5	0.750	0.150	1.500	0.100	0.000	1.000	41	
6	1.200	0.130	1.500	0.100	0.000	3.300	43	Mixed Forest
7	0.050	0.250	1.000	0.150	0.000	0.500	32	Shrub Rangeland
8	0.050	0.250	1.000	0.150	0.000	0.500	32	
9	0.220	0.200	0.400	0.100	0.000	2.200	30	Rangeland
10	0.220	0.200	0.400	0.100	0.000	2.200	30	
11	0.200	0.300	0.500	0.150	0.000	0.000	80	Tundra
12	0.200	0.300	0.500	0.150	0.000	0.000	80	
13	0.200	0.300	0.500	0.150	0.000	0.000	80	
15	0.220	0.200	0.400	0.100	0.000	2.200	20	Agricultural Land
16	0.300	0.300	3.000	0.150	0.000	0.050	70	Barren Land
17	1.000	0.180	1.500	0.250	14.000	0.200	10	Urban or Build-up
18	0.001	0.100	0.000	1.000	0.000	0.000	50	Water

NOTES:
Spring = May
W/m² = watts per square metre

Table D-5 Land-cover Characterization and Associated Geophysical Parameters for the Summer Season

NALCMS Code	Surface Roughness (m)	Albedo	Bowen Ratio	Soil Heat Flux (fraction)	Anthropogenic Heat Flux (W/m^2)	Leaf Area Index	CALMET Code	CALMET Land Cover Type
1	0.800	0.080	1.400	0.100	0.000	5.200	42	Evergreen Forest
2	0.800	0.080	1.400	0.100	0.000	5.200	42	
3	0.800	0.080	1.400	0.100	0.000	5.200	42	
4	1.050	0.150	0.600	0.100	0.000	3.400	41	Deciduous Forest
5	1.050	0.150	0.600	0.100	0.000	3.400	41	
6	1.150	0.120	0.900	0.100	0.000	4.500	43	Mixed Forest
7	0.050	0.250	1.000	0.150	0.000	0.500	32	Shrub Rangeland
8	0.050	0.250	1.000	0.150	0.000	0.500	32	
9	0.500	0.200	0.400	0.100	0.000	2.800	30	Rangeland
10	0.500	0.200	0.400	0.100	0.000	2.800	30	
11	0.200	0.300	0.500	0.150	0.000	0.000	80	Tundra
12	0.200	0.300	0.500	0.150	0.000	0.000	80	
13	0.200	0.300	0.500	0.150	0.000	0.000	80	
15	0.500	0.200	0.400	0.100	0.000	2.800	20	Agricultural Land
16	0.300	0.280	4.000	0.150	0.000	0.050	70	Barren Land
17	1.000	0.180	1.500	0.250	8.000	0.200	10	Urban or Build-up
18	0.001	0.100	0.000	1.000	0.000	0.000	50	Water

NOTES:
Summer = June, July, and August
W/m^2 = watts per square metre

Table D-6 Land-cover Characterization and Associated Geophysical Parameters for the Fall Season

NALCMS Code	Surface Roughness (m)	Albedo	Bowen Ratio	Soil Heat Flux (fraction)	Anthropogenic Heat Flux (W/m^2)	Leaf Area Index	CALMET Code	CALMET Land Cover Type
1	0.900	0.080	1.400	0.100	0.000	4.700	42	Evergreen Forest
2	0.900	0.080	1.400	0.100	0.000	4.700	42	
3	0.900	0.080	1.400	0.100	0.000	4.700	42	
4	0.950	0.150	0.600	0.100	0.000	0.100	41	Deciduous Forest
5	0.950	0.150	0.600	0.100	0.000	0.100	41	
6	1.150	0.120	0.900	0.100	0.000	2.300	43	Mixed Forest
7	0.050	0.250	1.000	0.150	0.000	0.500	32	Shrub Rangeland
8	0.050	0.250	1.000	0.150	0.000	0.500	32	
9	0.320	0.200	0.400	0.100	0.000	0.300	30	Rangeland
10	0.320	0.200	0.400	0.100	0.000	0.300	30	
11	0.200	0.300	0.500	0.150	0.000	0.000	80	Tundra
12	0.200	0.300	0.500	0.150	0.000	0.000	80	
13	0.200	0.300	0.500	0.150	0.000	0.000	80	
15	0.320	0.200	0.400	0.100	0.000	0.300	20	Agricultural Land
16	0.300	0.280	6.000	0.150	0.000	0.050	70	Barren Land
17	1.000	0.180	1.500	0.250	12.000	0.200	10	Urban or Build-up
18	0.001	0.100	0.000	1.000	0.000	0.000	50	Water

NOTES:
Fall = September and October
W/m^2 = watts per square metre

D.1 METEOROLOGICAL MEASUREMENTS

Meteorological data include a wide range of parameters: ambient air temperature, precipitation, relative humidity, visibility, solar radiation, wind, severe weather, and thermal inversions. Selected parameters at the nearby Environment and Climate Change Canada (ECCC) Lynn Lake Airport climate station are reviewed.

D.1.1 Ambient Air Temperature

Table D-7 summarizes the historical monthly and annual mean air temperatures at the Lynn Lake Airport for the period of 1981 to 2010. The annual average ambient temperature is 3.1°C at this station.

Table D-7 Historical Monthly and Annual Mean Daily Temperatures at Lynn Lake Airport (1981 to 2010)

Month	Mean Daily Temperature (°C)
January	-24.3
February	-20.3
March	-13
April	-3.1
May	5.6
June	12.9
July	16.2
August	14.7
September	7.7
October	-0.6
November	-12.5
December	-21.4
ANNUAL	-3.2
SOURCE: National Climate Data and Information Archive http://climate.weather.gc.ca/climate_normals/index_e.html	

D.1.2 Precipitation

Table D-8 summarizes monthly mean total precipitation, rainfall, and snowfall at the Lynn Lake Airport. The average total precipitation at the Lynn Lake Airport was 477.9 mm/y. The driest months are during the winter, while the wettest month is in July.

Table D-8 Mean Monthly and Annual Total Precipitation, Rainfall, and Snowfall at Lynn Lake Airport (1981 to 2010)

Month	Total Precipitation (mm)	Total Rainfall (mm)	Snowfall (cm)
January	20.3	0.2	27.6
February	16.3	0.1	23.5
March	19.8	1.4	24.6
April	24.1	4.5	23.9
May	37.3	26.7	10.4
June	61.8	60.6	1.3
July	85.4	85.3	0.1
August	68.8	68.7	0.1
September	61	57.4	3.5
October	37.6	12.2	31.3
November	26.8	0.8	36
December	18.8	0.1	26
Annual	477.9	317.9	208.1

D.2 CALMET INPUT DATA

The CALMET model requires the input of surface and upper air meteorological fields. For this application, CALMET was run in Hybrid mode by using surface observations and WRF model output for the period of January 1, 2012, to December 31, 2016. There are no upper air stations within or nearby the CALMET domain.

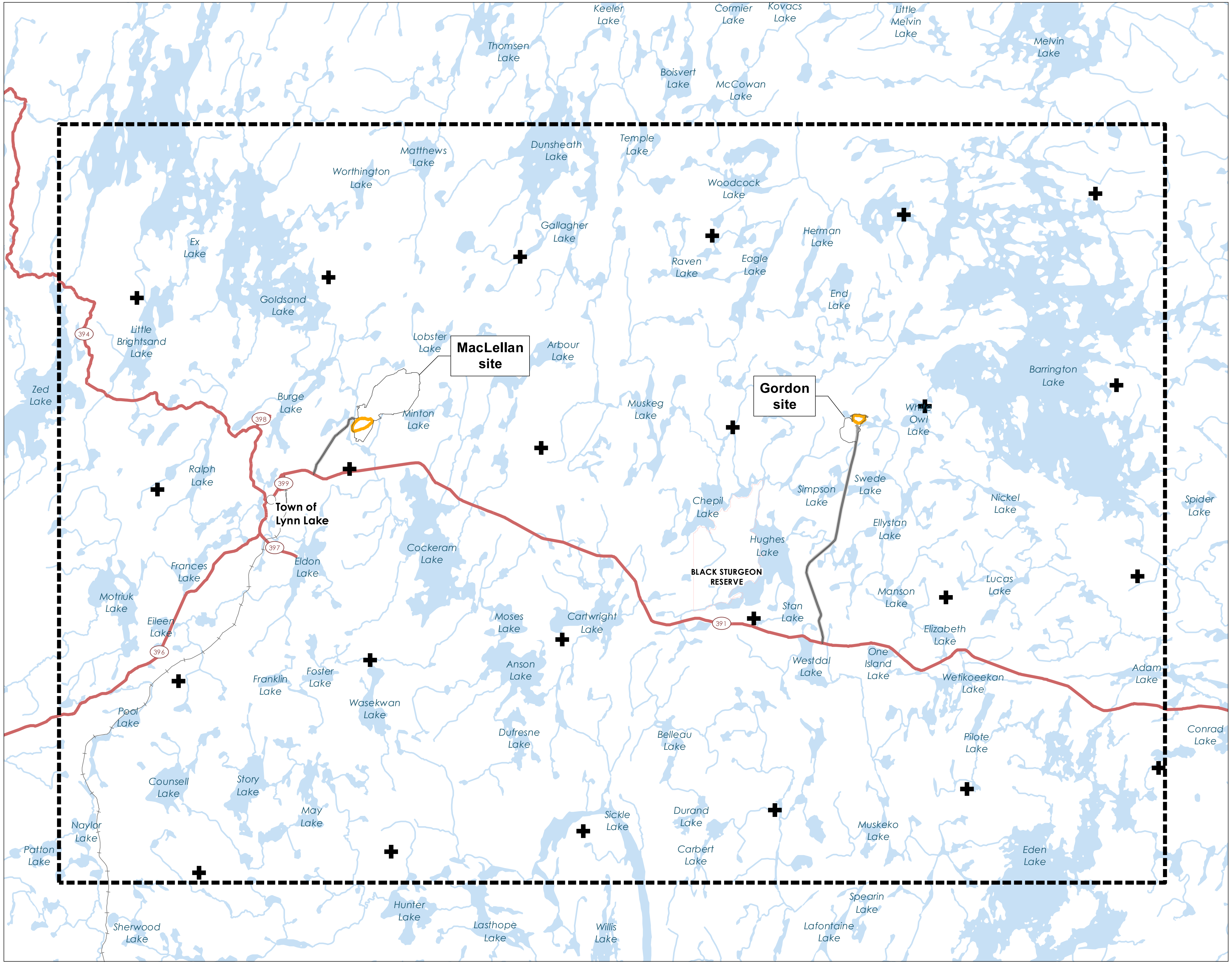
D.2.1 WRF 12km Data

For this assessment, 12 km grid resolution WRF model data was generated by Stantec for the years 2012 to 2016 and incorporated into the CALMET processing. Map D-3 shows the WRF grid point locations based on 12 km grid resolution within the CALMET model domain.

D.2.2 Surface Observations

For this assessment, there is one hourly surface meteorological station within CALMET domain (shown in Map D-4). The CALMET construct was enhanced by surface meteorological data available at Lynn Lake Airport station. Surface temperature, relative humidity, wind speed and wind direction are the four meteorological parameters included in CALMET modeling.

Figure D-1 shows a wind rose for the Lynn Lake station for the years 2012 to 2016. There is not an overly dominant prevailing wind direction on an annual basis, with similar percent of west, northwest, north, south, and east winds (5 to 7 % of the time for each direction), likely attributable to the local topography near this station.



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Survey Locations

- WRF 12km Grid Points

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 4 8 Kilometres

(At original document size of 11x17)
1:250,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

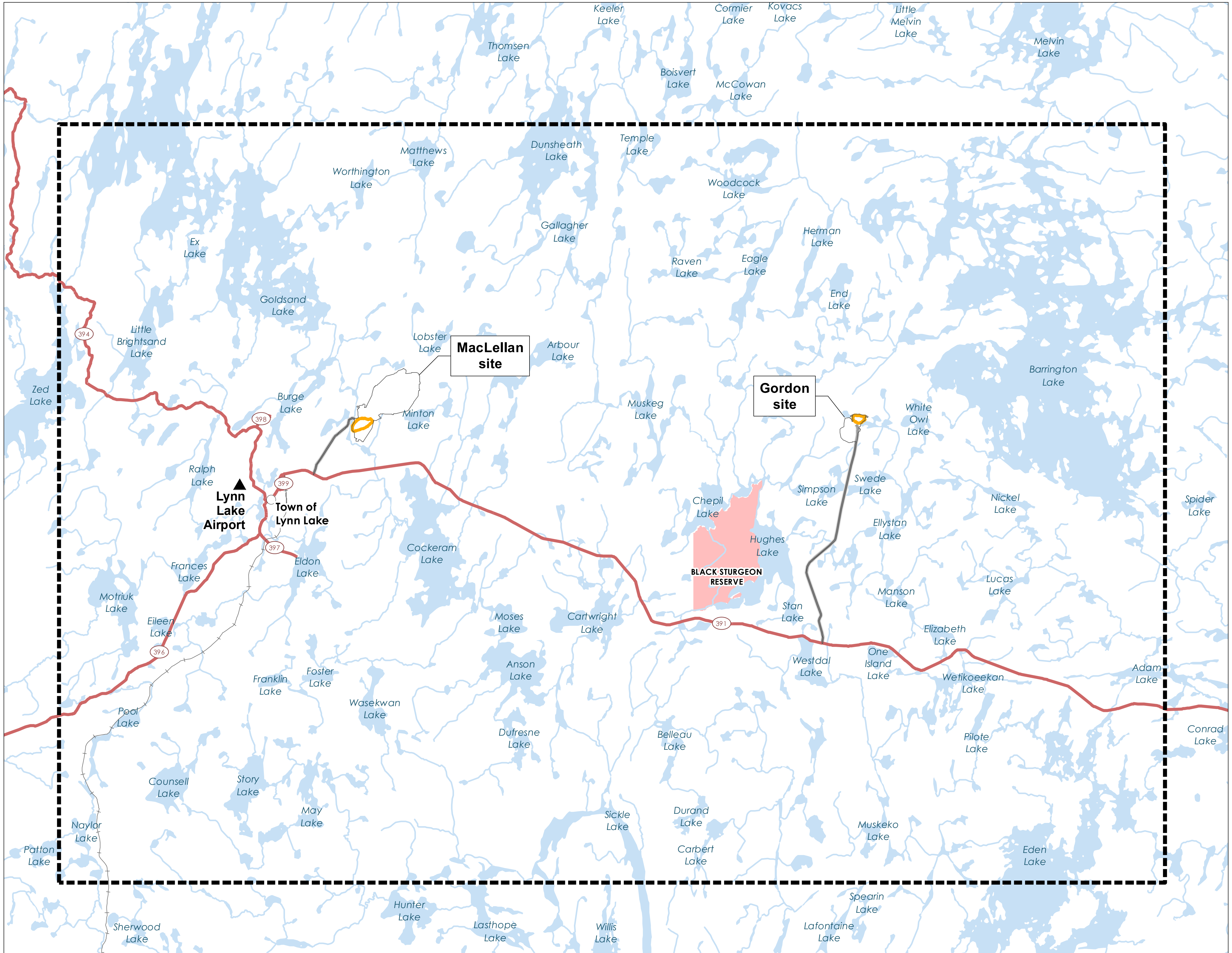
Map No.

D-3

Title

Locations of the 12 km Resolution WRF Grid Points within the CALMET Model Domain

V:\GIS_Project_Folder\111473008_LLGP_EA\figures\Ch4_Atmospheric_Environment\TMR_Report_AQ\MapD-3_WRF12kmGridPoints_CALMET.mxd Revised: 2020-01-23 By: ACampigotto



Stantec

Alamos Gold Inc.

Study Area
- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Survey Locations
- Meteorological Station

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 4 8 Kilometres

(At original document size of 11x17)
1:250,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxx on 2019-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
D-4

Title
Location of the Surface Meteorological Station used within the CALMET Model Domain

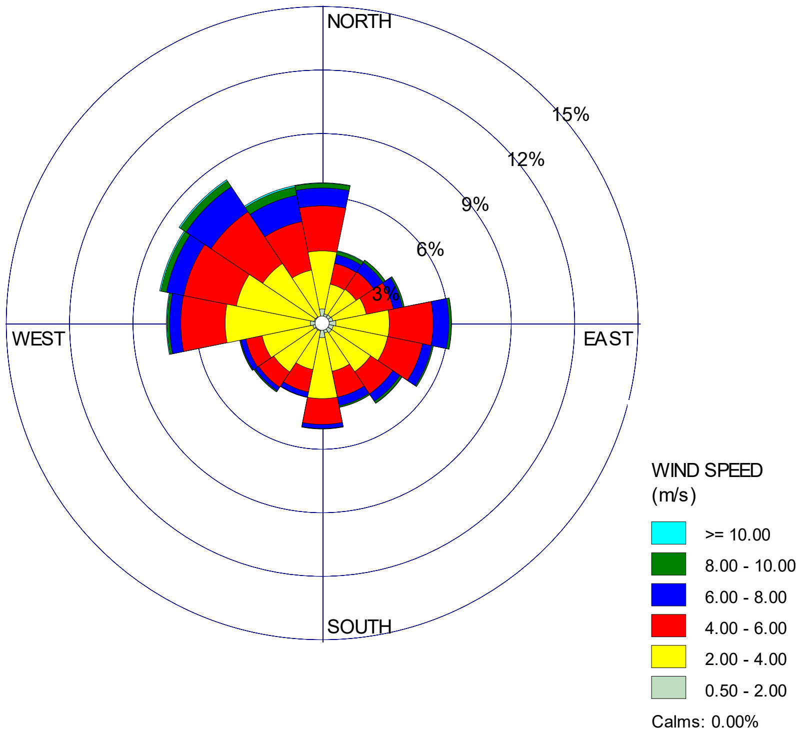


Figure D-1 Measured Wind Rose at Lynn Lake station for the years 2012 to 2016

D.3 WRF DATA QAQC

The meteorological observations from the ECCC Lynn Lake Airport station were used to determine the representativeness of the mesoscale meteorological data, generated using the WRF model. The coordinates of the Lynn Lake Airport station and nearest WRF grid point are provided in Table D-9. The selected WRF grid point is located approximately 5 km west of the Lynn Lake Airport station. Wind speed, wind direction and temperature data at the lowest vertical level in the model were extracted from WRF and compared to the Lynn Lake Airport observations for a five-year period (2012 to 2016).

Figure D-2 compares the wind roses generated for the Lynn Lake Airport to the WRF model predictions from the nearest WRF grid point. As shown, there is general agreement between the measured and WRF predicted wind roses, in that the predominant (most frequent) winds are from northwest, west, north and east. Further, the wind speed class frequency distributions are also in reasonable agreement, in that the most frequent wind speed class is 2.0 to 4.0 m/s.

Figure D-3 compares the monthly average surface air temperatures from the WRF model predictions to measurements at the Lynn Lake Airport station. The WRF model predictions show warm bias during November, December, January and February; however, there is a reasonable agreement with the ECCC Lynn Lake Airport observations throughout the five-year period.

Since the measured values and the WRF model predictions are in reasonable agreement at the Lynn Lake Airport station (within the CALMET model domain) and close to the Project site, the WRF model predictions are reasonably representative of meteorological conditions in the model domain.

Table D-9 Coordinates of Lynn Lake Airport Surface Station and Nearest WRF Grid Point

Location Name	UTM east (m)	UTM north (m)	UTM zone	Latitude (N)	Longitude (W)
Lynn Lake Airport	373182	6303730	14	56.860	101.080
WRF cell	367986	6303445	14	56.856	101.165

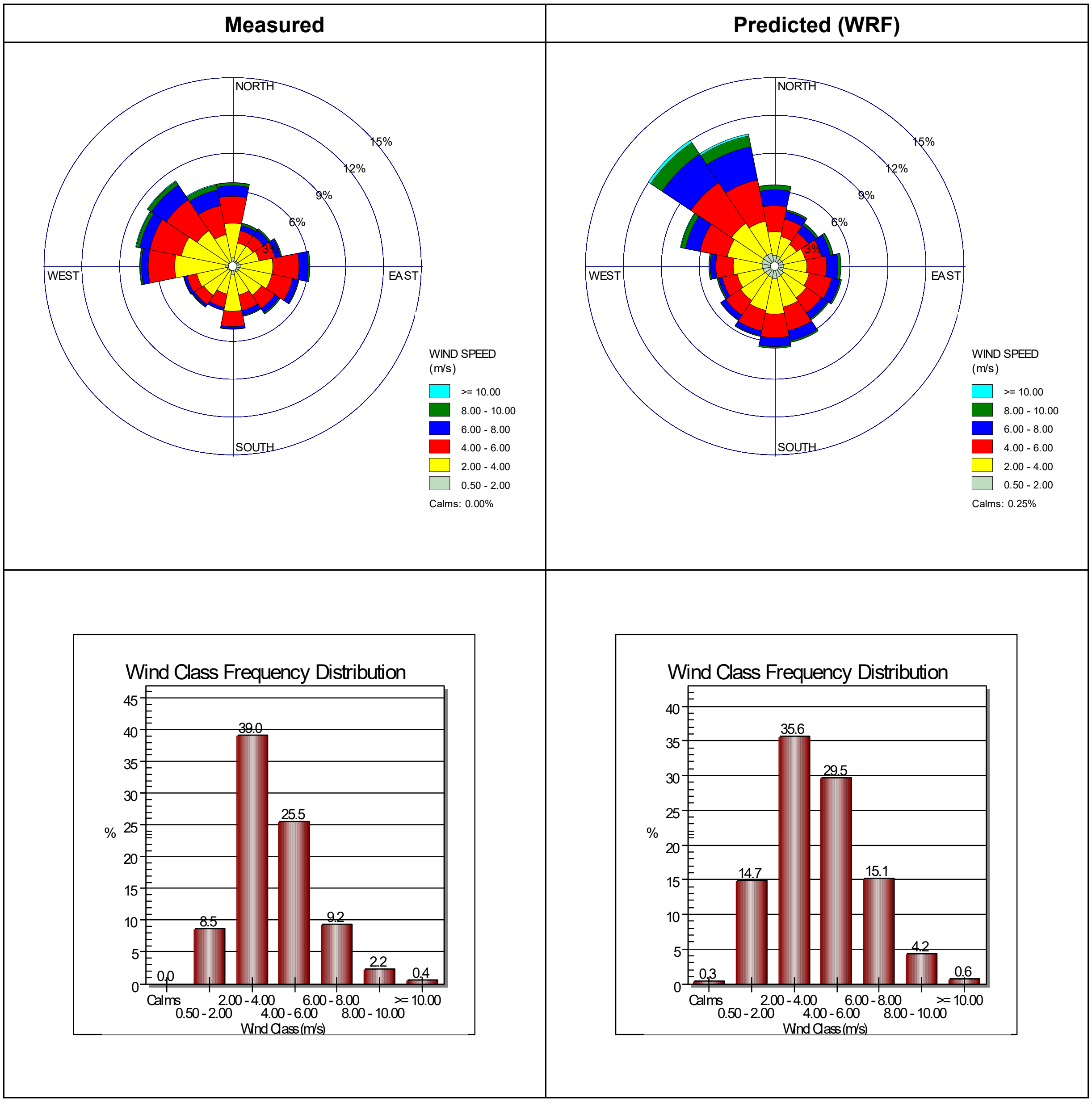


Figure D-2 Comparison of Measured and Predicted (WRF) Surface Winds at the Lynn Lake Airport station (2012-2016)

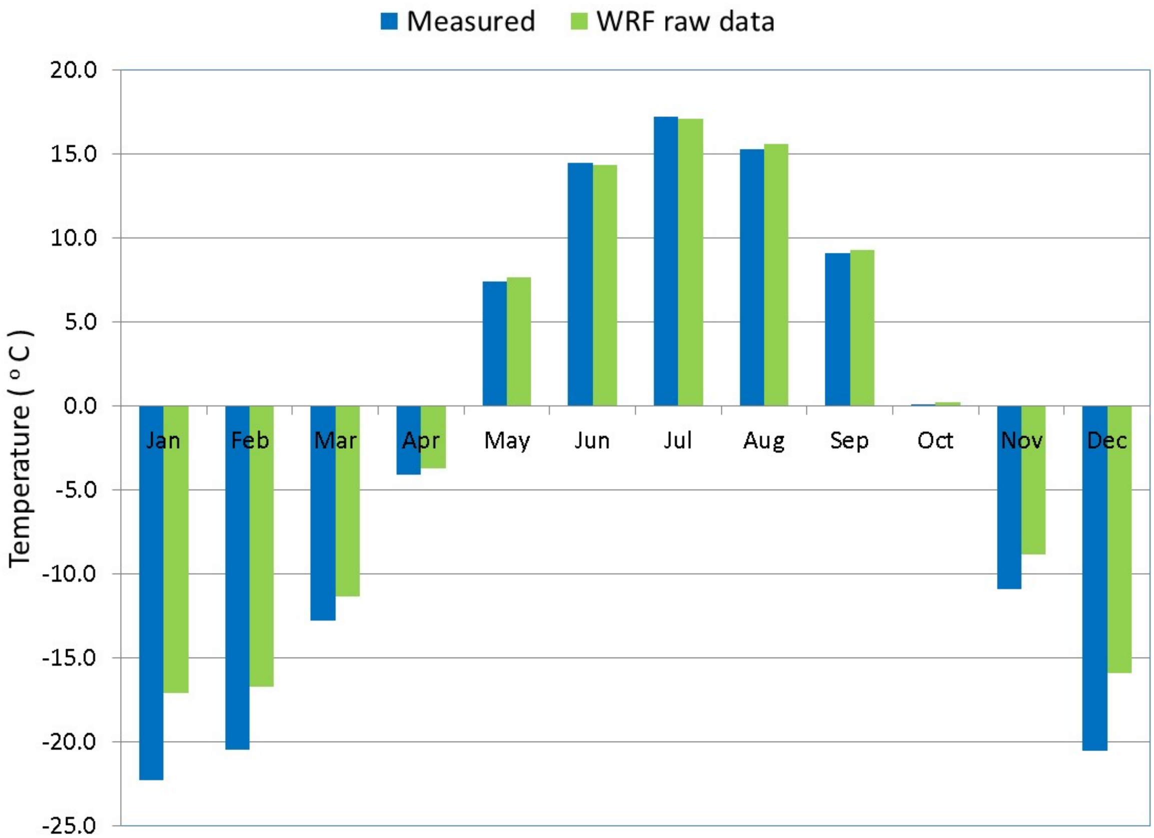


Figure D-3 Comparison of Measured and Predicted (WRF) Monthly Average Air Temperature at the Lynn Lake Airport station (2012–2016)

D.4 CALMET PREDICTIONS

To assess the value of the WRF-CALMET model approach for this assessment, the CALMET surface and elevated wind, surface temperature, mixing height, and PG stability class data were extracted for the Gordon and MacLellan Sites for analysis.

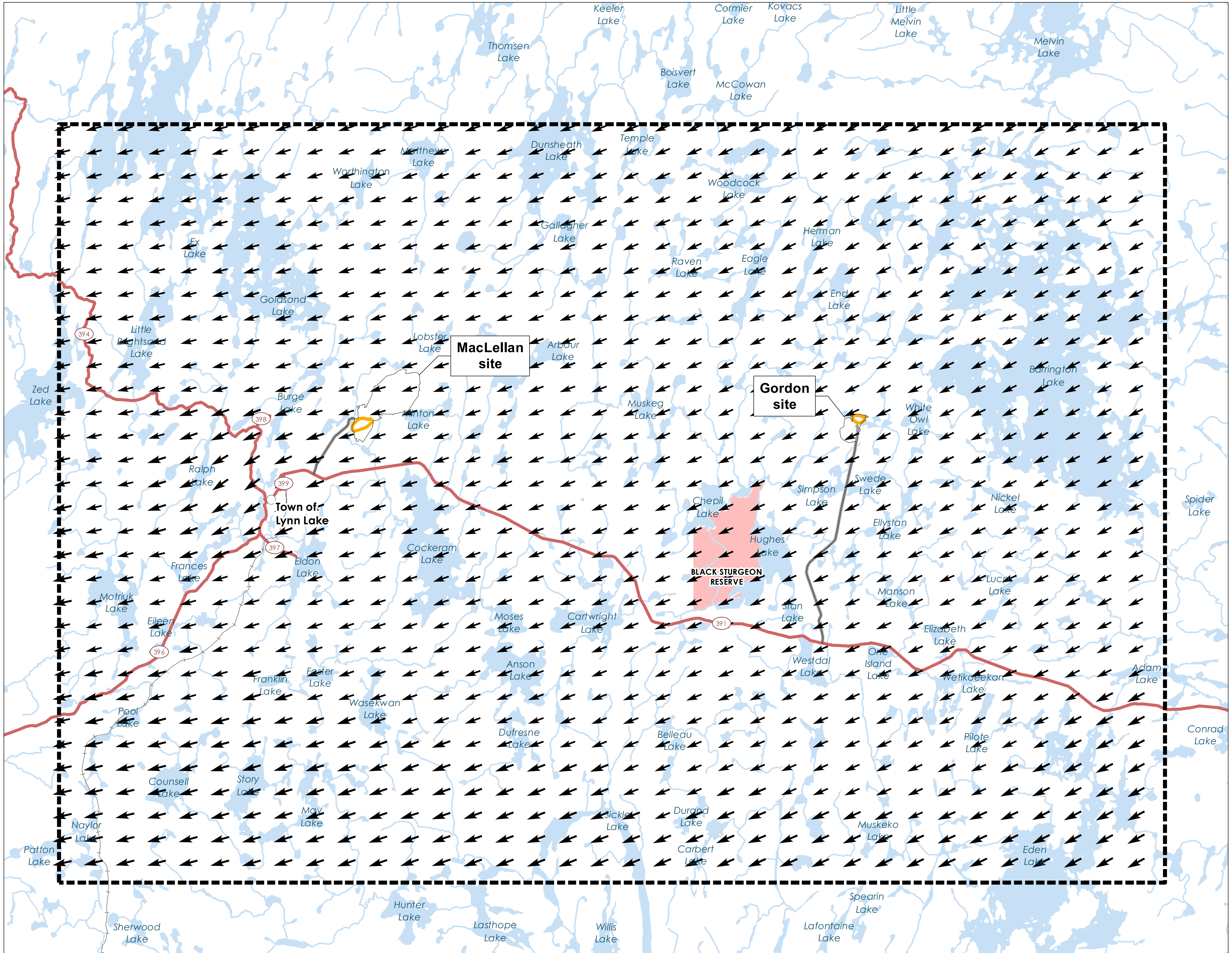
D.4.1 Predicted Surface Winds Field

The CALMET model can provide surface wind vector plots for all the grid points across a model domain. Three plots were generated to represent unstable, stable, and neutral conditions for the near-field model domain. The three sample wind vector plots are described below:

- Map D-5 shows the wind field as a vector plot at 1500 LST on July 5, 2016, for convective (i.e., unstable) conditions (PG class B). Winds in the east part of the domain are mainly from northeast, whereas those in the west part of the domain tend to be easterly. The predicted winds at the Project site are mainly from the northeast.

- Map D-6 shows the wind field as a vector plot at 0800 LST on January 6, 2016, for stable conditions (PG class F). Winds are mainly from the northwest and north across most of the domain. The predicted winds at the Project site are mainly from the northwest.
- Map D-7 shows the wind field as a vector plot at 2200 LST on December 13, 2016, for high wind speed (i.e., neutral) conditions. Under these conditions, winds are mainly from the northwest across most of the domain. The predicted winds at the Project site are mainly from the northwest.

The vector plots were not selected to represent a specific meteorological condition; they are provided to show the variability of the airflow that can occur over the 50 km by 50 km area during any given hour. Departures of the predicted vector plots from the actual wind field for a given hour are to be expected given the nature of modelling and the relatively low density of actual observations across the region. The predicted values, however, are preferable to assuming a homogeneous wind field across the domain for each hour, based on the local terrain influences that are reflected in the measured data.



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Survey Locations

- Predicted Surface Wind

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 4 8 Kilometres

(At original document size of 11x17)
1:250,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

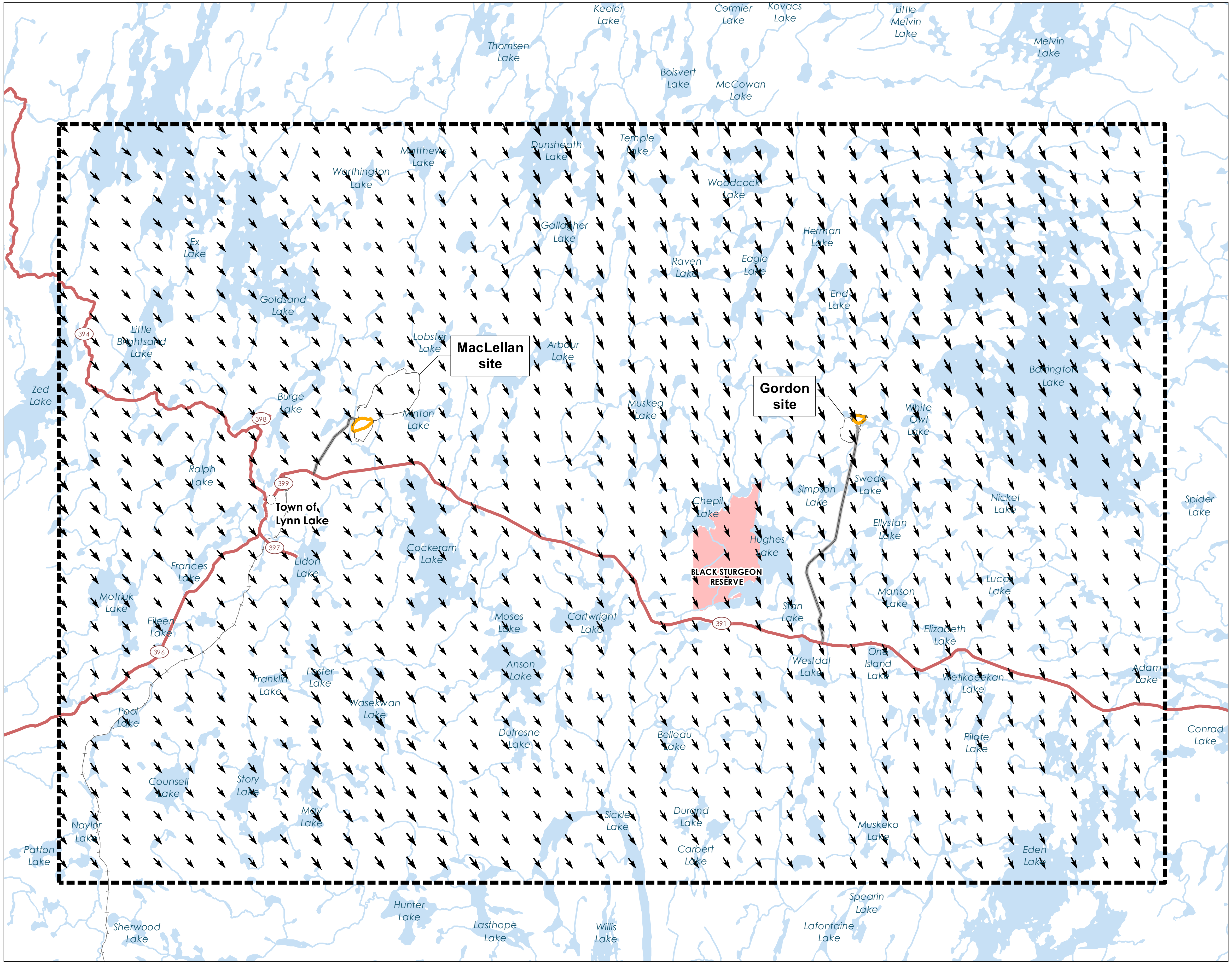
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
D-5

Title
Predicted Surface Wind Field for Unstable Conditions (1500 LST July 5, 2016)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Survey Locations

- Predicted Surface Wind

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 4 8 Kilometres

(At original document size of 11x17)
1:250,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

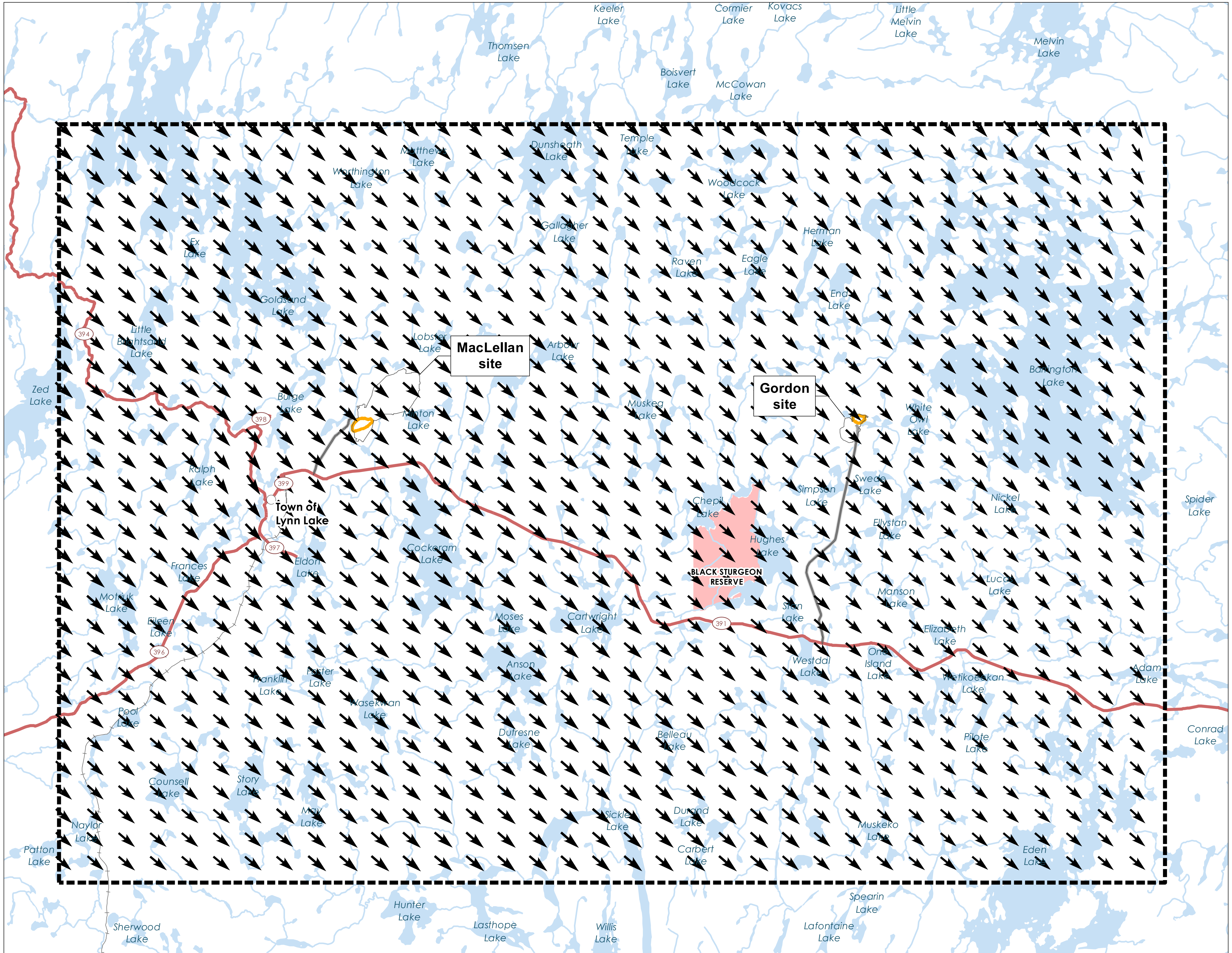
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
D-6

Title
Predicted Surface Wind Field for Stable Conditions (0800 LST January 6, 2016)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- CALMET Model Domain

Survey Locations

- Predicted Surface Wind

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 4 8 Kilometres

(At original document size of 11x17)
1:250,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada
3. Ground surface elevation is a combination of LiDAR and SRTM

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-01-23
Technical Review by IYankova on 2020-01-23
Senior GIS Review by XXxxxxxx on 2019-xx-xx

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
D-7

Title
Predicted Surface Wind Field for High Wind Conditions (2200 LST December 13, 2016)

D.4.2 Predicted Winds at Project Sites

Figures D-4 and D-5 show wind roses predicted by CALMET for the two Project sites at various elevations above the ground (i.e., 10 m, 60 m, 100 m and 200 m). The results indicate:

- At all four levels, winds are mainly from northwest, west, and north. Higher winds are mainly from northwest.
- Wind speed increases with increasing height above the ground.

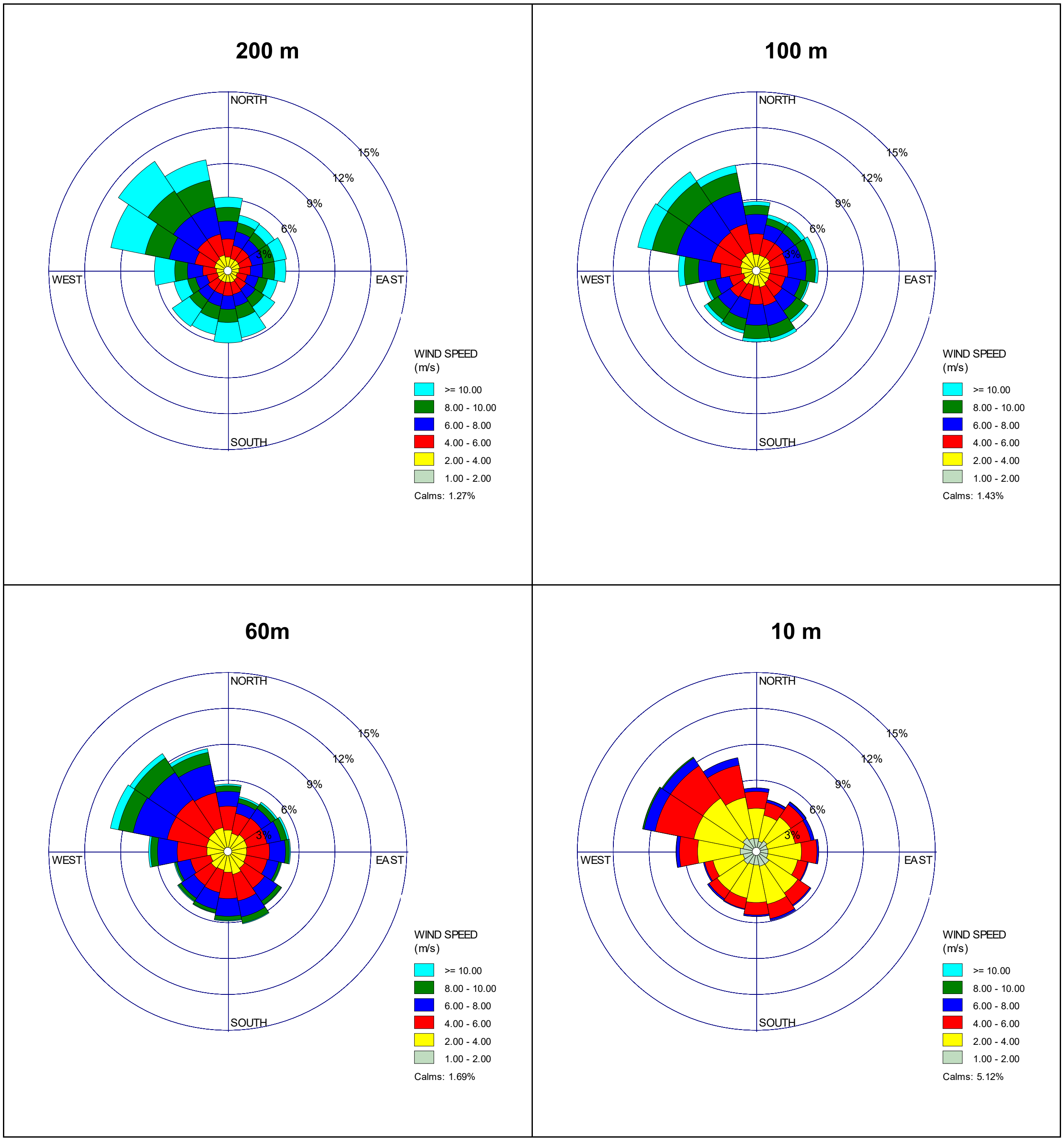


Figure D-4 Predicted Elevated Level Wind Roses for the Gordon Site (2012 to 2016)

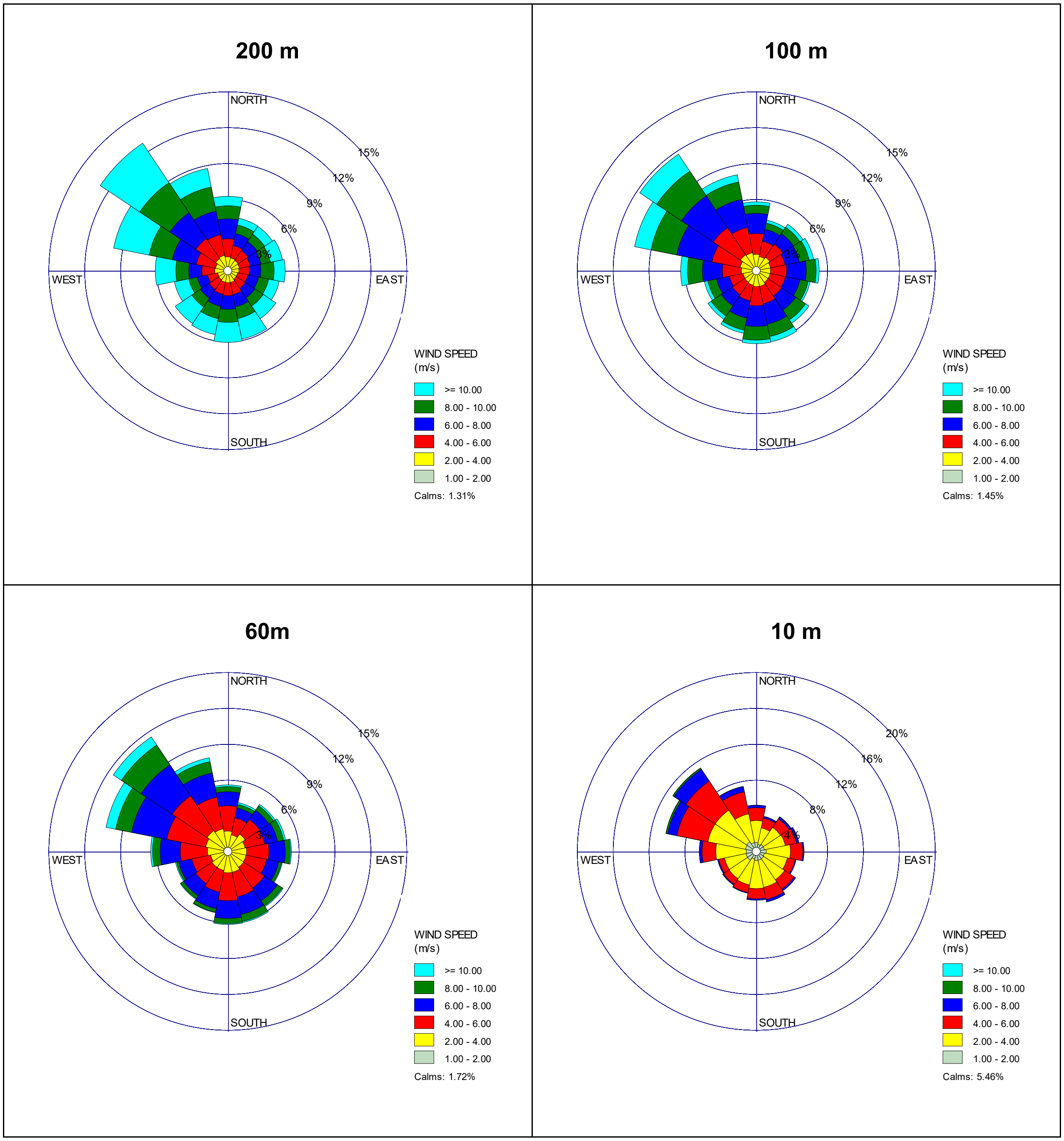


Figure D-5 Predicted Elevated Level Wind Roses for the MacLellan Site (2012 to 2016)

D.4.3 Predicted Surface Temperatures

Figures D-6 and D-7 show the monthly average surface temperatures predicted by CALMET for the Gordon and MacLellan sites, respectively. The predicted monthly temperatures indicate reasonable seasonal surface temperature variations (i.e., compare with Table D-7).

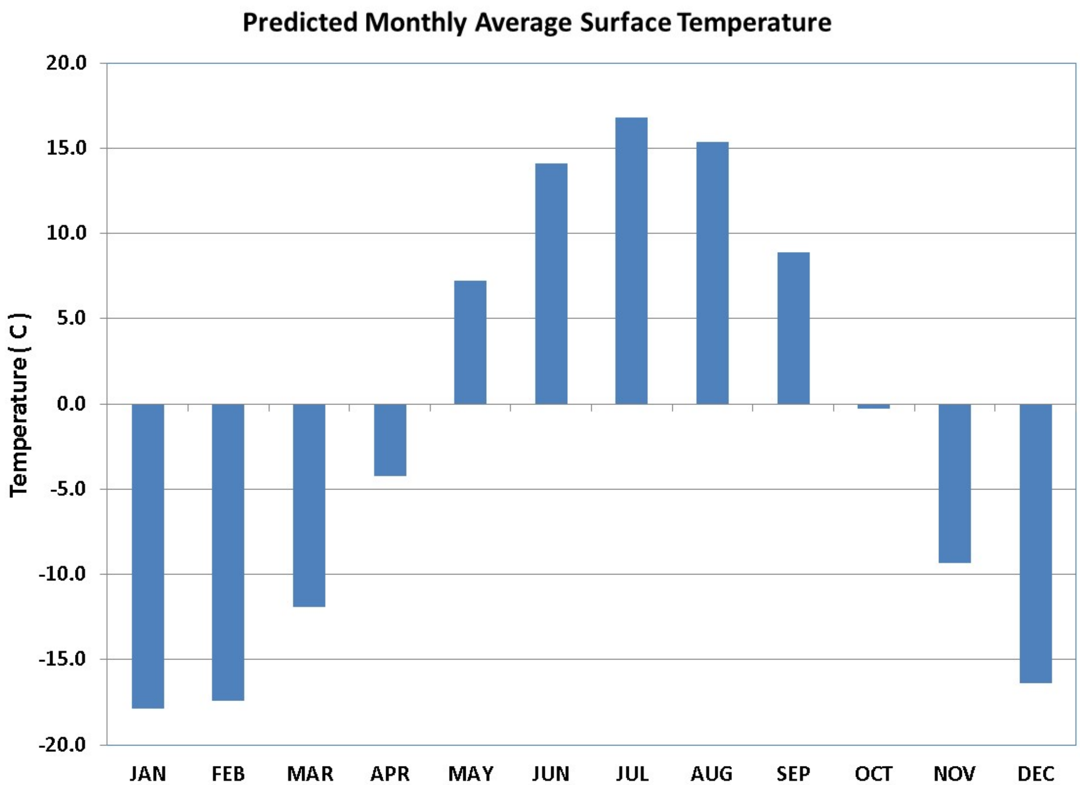


Figure D-6 Predicted Monthly Average Surface Temperatures for the Gordon Site (2012 to 2016)

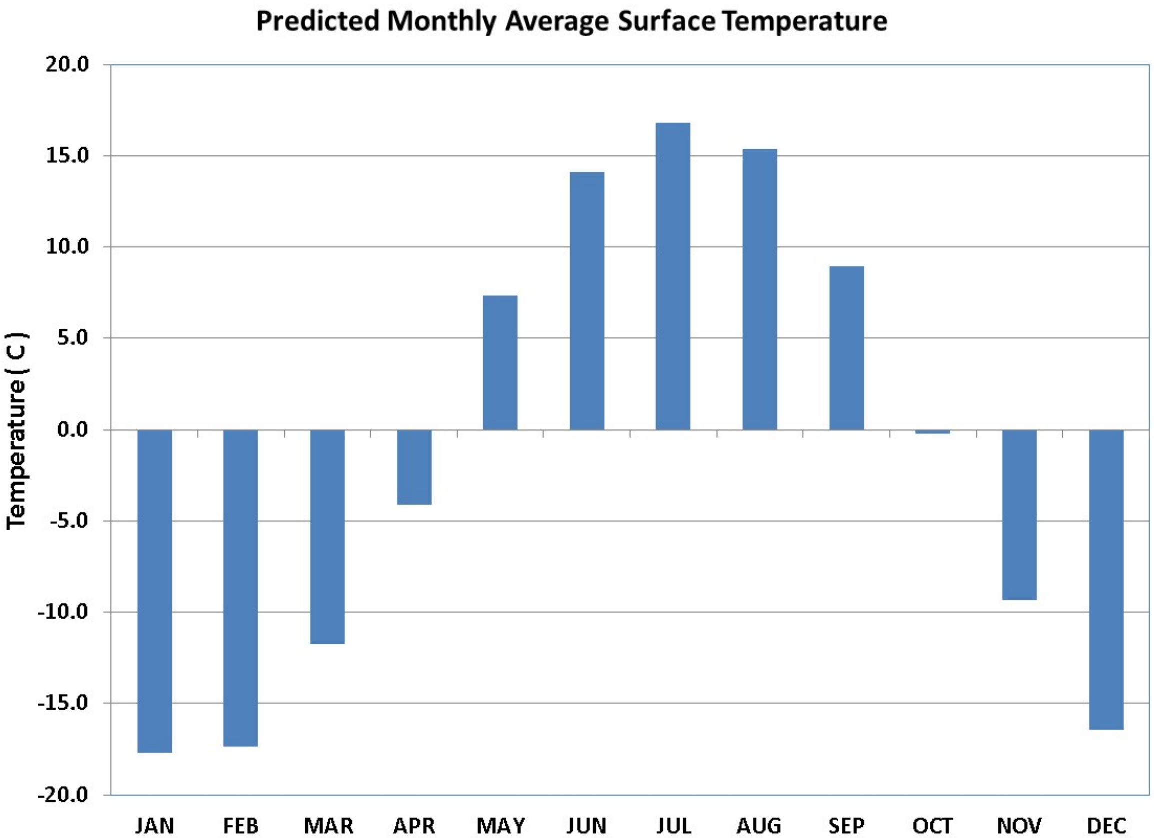


Figure D-7 Predicted Monthly Average Surface Temperatures for the MacLellan Site (2012 to 2016)

D.4.4 Predicted Mixing Heights

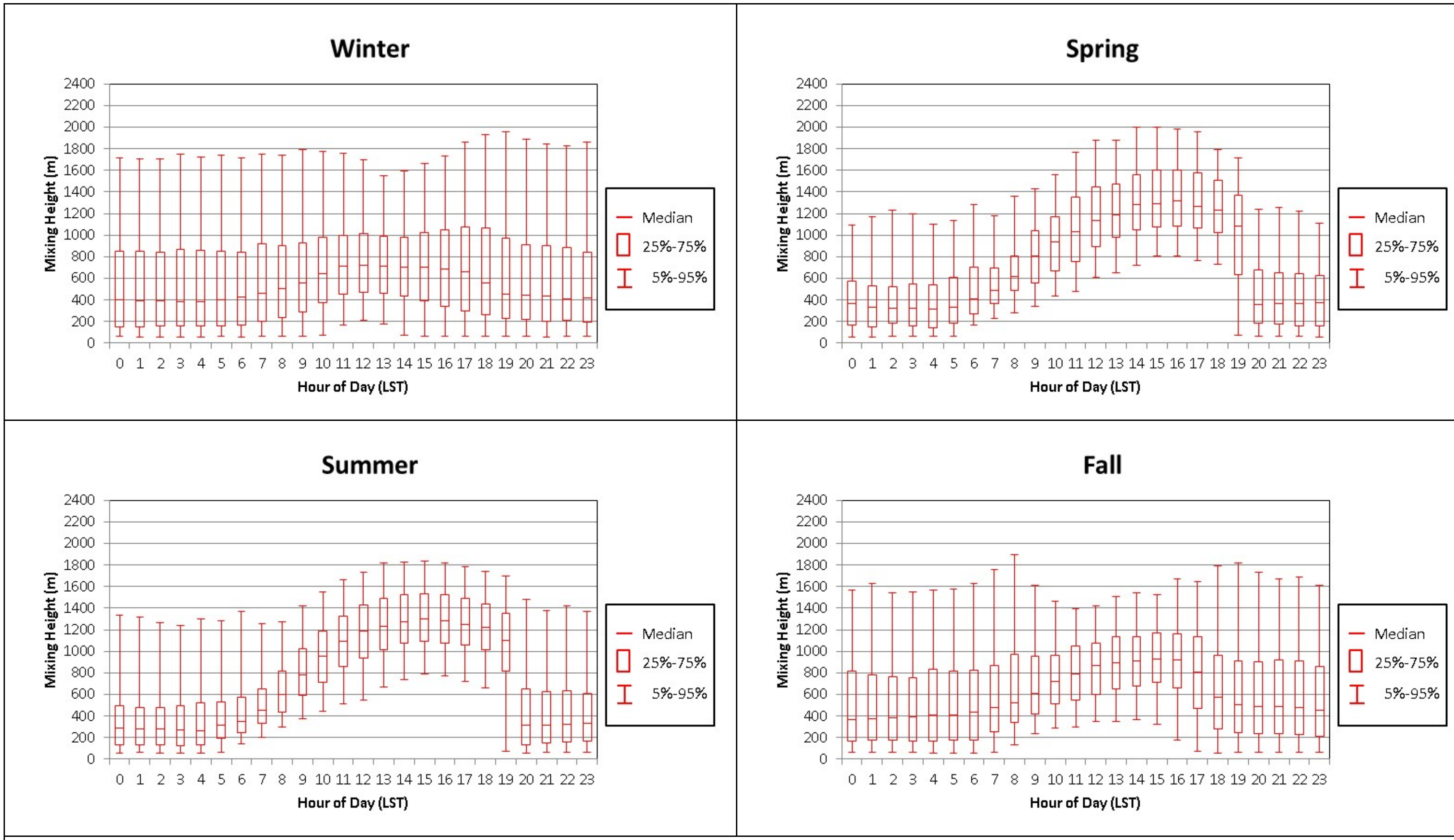
The presence of an elevated inversion can trap effluents discharged into the atmosphere in the layer between the surface and the base of the inversion layer; this can increase ground-level ambient concentrations relative to the absence of an inversion layer. Mixing heights are usually the highest (i.e., in the 1,000 m to 2,000 m range) during daytime periods that are characterized by strong solar heating, and the lowest (i.e., about 100 m) during the night. High wind speeds can also produce well-mixed layers.

For this assessment, the CALMET post-processor was used to extract the mixing heights from CALMET output files, and the mixing height predictions for the Gordon and MacLellan Sites are provided in Figures D-8 and D-9, respectively. The results show:

- Winter: The maximum median values are about 800 m and 793 m at Gordon and MacLellan Sites, respectively.

- Spring: The maximum median afternoon values are about 1,342 m and 1,273 m at Gordon and MacLellan Sites, respectively.
- Summer: The maximum median afternoon values are about 1,310 m and 1,236 m at Gordon and MacLellan Sites, respectively.
- Fall: The maximum median afternoon values are about 941 m and 909 m at Gordon and MacLellan Sites, respectively.

The minimum values for each season are predicted to occur during the night. During the night, the mixing height tends to be determined by mechanical mixing processes, with higher wind speeds resulting in a deeper mixed layer. The convective mixing process dominates during the day, leading to maximum mixed layer depths during the afternoon. The CALMET model, as applied, sets the minimum mixing height to 50 m.



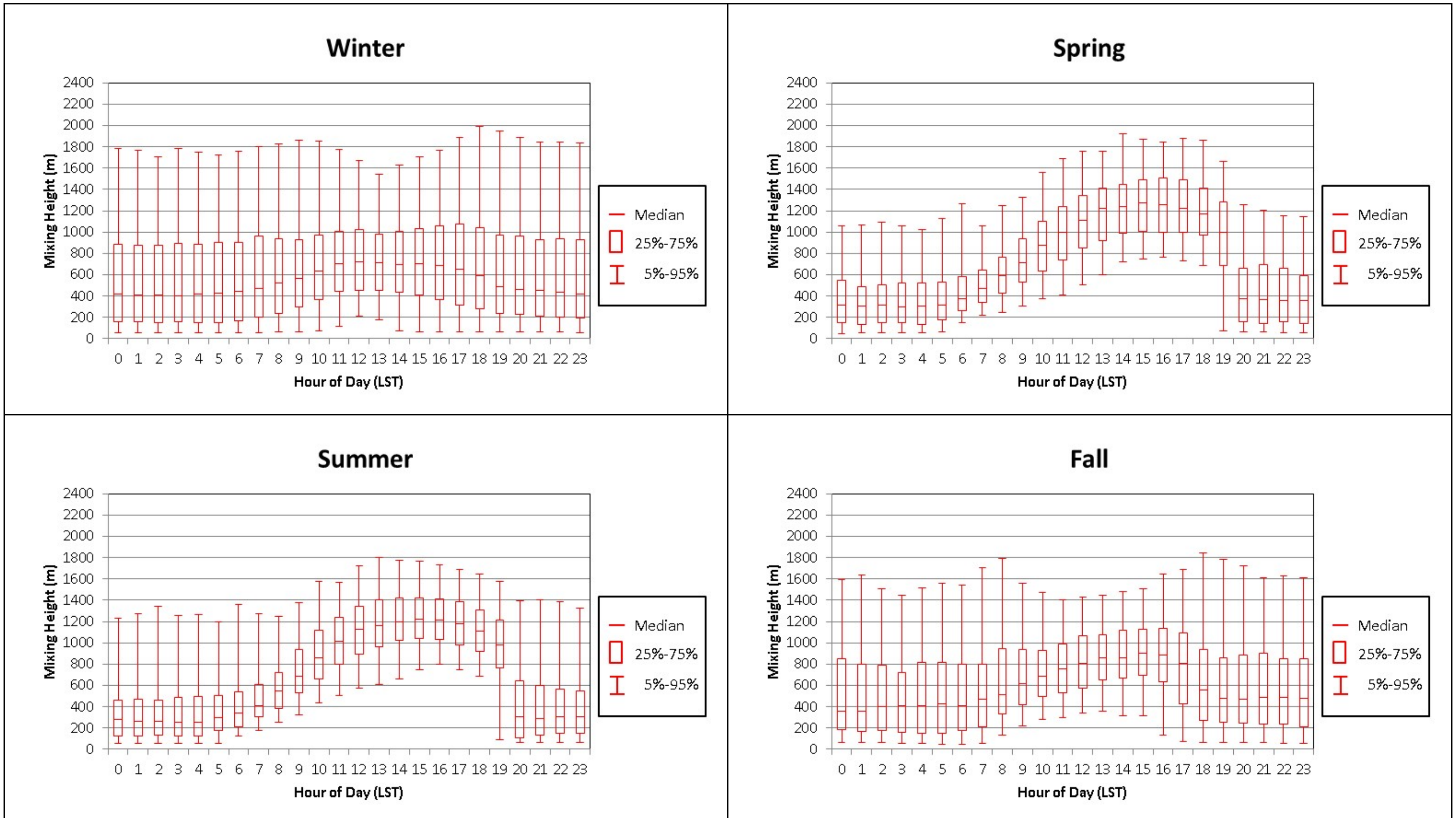
NOTE: **Winter**: November, December, January, February, March, and April.

Summer: June, July, and August.

Spring: May.

Fall: September and October

Figure D-8 Predicted Mixing Heights for Different Seasons and Times of Day for the Gordon Site (2012 to 2016)



NOTE: **Winter**: November, December, January, February, March, and April.

Summer: June, July, and August.

Spring: May.

Fall: September and October

Figure D-9 Predicted Mixing Heights for Different Seasons and Times of Day for the MacLellan Site (2012 to 2016)

D.2.4 Predicted Atmospheric Stability Class

Atmospheric dispersion is caused by atmospheric turbulence, which can be related to atmospheric stability. Meteorologists define six stability classes (referred to as the Pasquill Gifford [PG] classes):

- Stability classes A, B and C occurs during the day, when solar radiation heats the ground. The air next to the ground is heated and tends to rise, enhancing vertical motions. This is referred to as an unstable atmosphere.
- Stability classes E and F occur during the night, when the ground cools due to long-wave radiation losses. The air next to the ground cools, suppressing vertical motions. This is referred to as a stable atmosphere.
- Stability class D is associated with completely overcast conditions (day or night) when there is no net heating or cooling of the ground, transitional periods between stable and unstable conditions, or during high wind speed periods (winds greater than 6 m/s [or 22 km/h]). This is referred to as a neutral atmosphere.

Stability classes undergo a significant daily variation, and they have a seasonal dependence. Stability classes can be determined from routine airport observations using the method devised by Turner (1963). A stability classification algorithm is also included in the CALMET model, this approach is based on the Turner approach using wind speed and cloud cover information for each grid point in the domain.

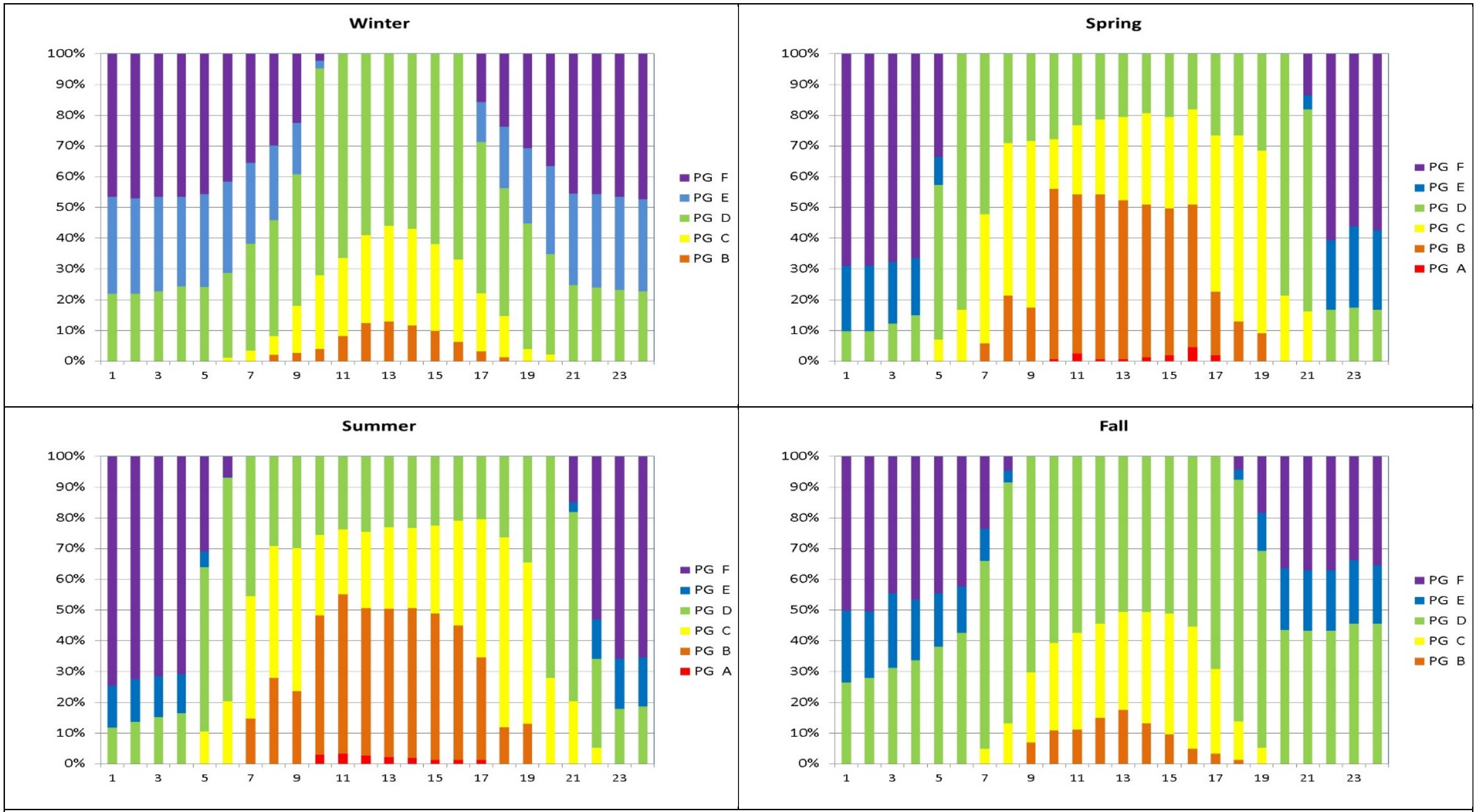
Table D-10 compares the stability class frequency distributions based on the CALMET model predictions for the Project Site. Figures D-10 and D-11 presented the frequency distributions of predicted seasonal PG stability classes on a diurnal basis for the Gordon and MacLellan Sites, respectively. Unstable conditions are more frequent during the summer, and during daytime periods. Stable conditions are more frequent during nighttime periods.

Table D-10 Predicted Stability Class Frequency Distributions (%) at the Project Site (2012 to 2016)

PG Class	Gordon Site	MacLellan Site
A	0.3	0.3
B	8.7	8.6
C	15.8	15.5
D	36.7	38.4
E	13.0	13.0
F	25.5	24.4
Total	0.3	0.3

NOTE:
PG – Pasquill-Gifford.

Figure D-10 Seasonal Frequency of Predicted PG Stability Class for the Gordon Site (2012 to 2016)



NOTE: **Winter**: November, December, January, February, March, and April.

Summer: June, July, and August.

Spring: May.

Fall: September and October

Figure D-11 Seasonal Frequency of Predicted PG Stability Class for the MacLellan Site (2012 to 2016)

D.1 CALMET MODEL OPTIONS

The input parameters for the CALMET control file used for the assessment are provided in Tables D-11 to D-18. The AEP Air Quality Model Guideline (AEP 2013) indicates that default assumptions and switches are to be used. Although not specified in the Model Guideline, it is assumed that the default values are defined in the CALMET user manual (Scire et al. 2000). The Model Guideline also indicates some specific values that are to be used instead of the default values; the AEP values are highlighted by orange shading in the tables. All AEP recommended default switch selections were applied. The default values and the values adopted for this assessment are identified in the tables.

Table D-11 Input Groups in the CALMET Control File

Input Group	Description	Applicable to Project
0	Input and output file names	Yes
1	General run control parameters	Yes
2	Grid control parameters	Yes
3	Output Options	Yes
4	Meteorological data options	Yes
5	Wind Field Options and Parameters	Yes
6	Mixing Height, Temperature and Precipitation Parameters	Yes
7	Surface meteorological station parameters	Yes
8	Upper air meteorological station parameters	No
9	Precipitation parameters	No

Table D-12 CALMET Model Options Groups 0 and 1

Parameter	Default	Project	Comment
Input Group 0: Input and Output File Names			
NUSTA	-	0	Number of upper air stations
NOWSTA	-	0	Number of overwater meteorological stations
MM3D	-	60	Number of WRF.DAT files (one for each month)
NIGF	-	0	Number of IGF-CALMET.DAT files
Input Group 1: General Run Control Parameters			
IBYR	-	2012	Starting year
IBMO	-	1	Starting month
IBDY	-	1	Starting day
IBHR	-	0	Starting hour
IBSEC	-	0	Starting second
IEYR	-	2017	Ending year
IEMO	-	1	Ending month
IEDY	-	1	Ending day
IEHR	-	0	Ending hour
IESEC	-	0	Ending second
ABTZ	-	UTC-0600	UTC time zone
NSECDT	3,600	3,600	Length of modeling time-step (seconds)
IRTYPE	1	1	Run type = 1 computes wind fields and micro-meteorological fields. Run type = 1 required for CALPUFF.
LCALGRD	T	T	LCALGRD = 1 stores the special data fields required by CALPUFF.
ITEST	2	2	Flag to stop run after SETUP phase
MREG	-	0	Test options specified to see if they conform to regulatory values 0 = NO checks are made

Table D-13 CALMET Model Options Group 2: Grid control parameters

Parameter	Default	Project	Comment
PMAP	UTM	UTM	Map projection
IUTMZN	-	14	UTM Zone
UTMHEM	N	N	Hemisphere for UTM projection
DATUM	WGS-84	NAR-C	The NORTH AMERICAN 1983 GRS 80 Spheroid datum is used for output coordinates to be consistent with the applied CDED terrain data
NX	-	140	Number of X grid cells
NY	-	96	Number of Y grid cells
DGRIDKM	-	0.5	Horizontal grid spacing (km)
XORIGKM	-	361.775	Reference coordinate of SW corner of grid cell (1,1) -X coordinate (km)
YORIGKM	-	6278.500	Reference coordinate of SW corner of grid cell (1,1) -Y coordinate (km)
NZ	-	12	Vertical grid definition: Number of vertical layers as per the AEP Model Guideline.
ZFACE	-	0, 20, 40, 80, 120, 280, 520, 880, 1320, 1820, 3000 and 4000	Vertical grid definition: Cell face heights (m) as per the AEP Model Guideline.

Table D-14 CALMET Model Options Group 3: Output Options

Parameter	Default	Project	Comment
Disk Output:			
LSAVE	T	T	Save meteorological fields in the unformatted output files
IFORMO	1	1	Unformatted output file suitable for input into CALPUFF is generated
Line Printer Output:			
LPRINT	F	F	LPRINT = F, do not print meteorological fields
IPRINF	1	1	Print intervals (h); used only if LPRINT = T.
IUVOUT (NZ)	NZ*0	12*0	Specify which layers of U, V wind component to print
IWOUT (NZ)	NZ*0	12*0	Specify which level of the w wind component to print
ITOUT (NZ)	NZ*0	12*0	Specify which levels of the 3-D temperature field to print
Meteorological fields to print:			
Variable		**0 = don't print 1 = print**	**Comment**
STABILITY		1	PGT stability; used only if LPRINT = T.
USTAR		0	Friction velocity; used only if LPRINT = T.
MONIN		0	Monin-Obukhov length; used only if LPRINT = T.
MIXHT		1	Mixing height; used only if LPRINT = T.
WSTAR		0	Convective velocity scale; used only if LPRINT = T.
PRECIP		1	Precipitation rate; used only if LPRINT = T.
SENSHEAT		0	Sensible heat flux; used only if LPRINT = T.
CONVZI		0	Convective mixing height; used only if LPRINT = T.
Testing and debug print options for micrometeorological module:			
LDB	F	F	Print input meteorological data and internal variables
NN1	1	1	First time step for which debug data are printed
NN2	1	1	Last time step for which debug data are printed
LDBCST	F	F	Print distance to land internal variables
Testing and debug print options for wind field module:			
Variable		**0 = don't write 1 = write**	**Comment**
IOUTD	0	0	Control variable for writing the test/debug wind fields to disk files
NZPRN2	1	1	Number of levels to print, starting at surface,
IPR0	0	0	Print the interpolated wind components
IPR1	0	0	Print the terrain adjusted surface wind components
IPR2	0	0	Print the smoothed wind components and the initial divergence fields
IPR3	0	0	Print the final wind speed and direction

Table D-14 CALMET Model Options Group 3: Output Options

Parameter	Default	Project	Comment
IPR4	0	0	Print the final divergence fields
IPR5	0	0	Print the winds after kinematic effects are added
IPR6	0	0	Print the winds after the Froude number adjustment is made
IPR7	0	0	Print the winds after slope flows are added
IPR8	0	0	Print the final wind field components

Table D-15 CALMET Model Options Group 4: Meteorological Data Options

Parameter	Default	Project	Comment
NOOBS	0 or 1 or 2	1	Use surface and overwater stations (no upper air observations) as per AEP Model Guideline
Number of Surface & Precipitation Meteorological Stations:			
NSSTA	-	1	Number of surface stations used
NPSTA	-	-1	Precipitation stations not used
Cloud Data Options:			
ICLDOUT	-	Not applicable	output a CLOUD.DAT file (yes or no) 1=yes
MCLOUD	4	4	Use AEP WRF gridded cloud data as per AEP Model Guideline preference.
File Formats:			
IFORMS	2	2	Used free-formatted surface meteorological data file
IFORMP	2	Not applicable	Precipitation data file format
IFORMC	2	Not applicable	Cloud data file format

Table D-16 CALMET Model Option Group 5: Wind Field Options and Parameters

Parameter	Default	Project	Comment
Wind Field Model Options:			
IWFCOD	1	1	Model selection variables
IFRADJ	1	1	Compute Froude number adjustment
IKINE	0	0	Compute kinematic effects
IOBR	0	0	Use O'Brien procedure for adjustment of the vertical velocity
ISLOPE	1	1	Compute slope flow effects
IEXTRP	-4	1	no extrapolation is done
ICALM	0	0	Extrapolate surface winds even if calm
BIAS	NZ*0	12*0	Layer-dependent biases modifying the weights of surface and upper air stations Zero BIAS leaves weights unchanged
RMIN2	4	4	Minimum distance from nearest upper air station to surface station for which extrapolation of surface winds at surface station will be allowed
IPROG	14	14	Use gridded prognostic wind field model output fields as input to the diagnostic wind field model. Set to 14 as WRF gridded model data was used as the main input to CALMET model for this assessment. As per the AEP Model Guideline.
ISTEPPGs	3600	3600	Time step (seconds) of the prognostic model input data
IGFMET	0	0	Use coarse CALMET fields as initial guess fields
Radius of Influence Parameters:			
LVARY	F	F	Use varying radius of influence
RMAX1	6	6	Maximum radius of influence over land in the surface layer (km)
RMAX2	24	Not Applicable	Maximum radius of influence over land aloft (km)
RMAX3	24	Not Applicable	Maximum radius of influence over water
Other Wind Field Input Parameters:			
RMIN	0.1	0.1	Minimum radius of influence used in the wind field interpolation (km)
TERRAD	-	3	Radius of influence of terrain features (km) based on local topographic conditions near the Project Site
R1	-	2	Relative weighting of the first guess field and observations in the surface layer (km)
R2	6	Not Applicable	Relative weighting of the first guess field and observations in the layers aloft (km)
RPROG	-	0	Relative weighting parameter of the prognostic wind field data (km)
DIVLIM	5.0E-6	5.0E-6	Maximum acceptable divergence in the divergence minimization procedure

Table D-16 CALMET Model Option Group 5: Wind Field Options and Parameters

Parameter	Default	Project	Comment
NITER	50	50	Maximum number of iterations in the divergence minimization procedure
NSMTH (NZ)	2, (MXNZ-1)*4	2, 11*4	Number of passes in the smoothing procedure For NZ level 1, the CALMET default value 2 was used for the Project. For other levels, value 4 was used as CALMET input 12km WRF data already provided spatial wind fields
NINTR2	99	12*99	Maximum number of stations used in each layer for the interpolation of data to a grid point
CRITFN	1.0	1.0	Critical Froude number
ALPHA	0.1	0.1	Empirical factor controlling the influence of kinematic effects
FEXTR2(NZ)	NZ*0.0	12*0	Multiplicative scaling factor for extrapolation of surface observations to upper layers
Barrier Information:			
NBAR	0	0	Number of barriers to interpolation of the wind fields (The barrier option is not used)
KBAR	NZ	12	Level (1 to NZ) up to which barriers apply For this project, NZ=12
XBBAR	-	0	X coordinate of beginning of each barrier
YBBAR	-	0	Y coordinate of beginning of each barrier
XEBAR	-	0	X coordinate of ending of each barrier
YEBAR	-	0	Y coordinate of ending of each barrier
Diagnostic Module Data Input Options:			
IDIOPT1	0	0	Surface temperature (0 = compute internally from hourly surface observation)
ISURFT	-	-1	use 2-D spatially varying surface temperatures
IDIOPT2	0	0	Domain-averaged temperature lapse (0 = compute internally from hourly surface observation)
IUPT	-	Not Applicable	Not applicable since no upper air stations are used
ZUPT	200	200	Depth through which the domain-scale lapse rate is computed (m)
IDIOPT3	0	0	Domain-averaged wind components
IUPWND	-1	Not Applicable	Not applicable since no upper air stations are used
ZUPWND	1., 1000	Not Applicable	Bottom and top of layer through which domain-scale winds are computed (m). Not applicable since it is only used if IDIOPT3 = 0, NOOBS > 0 and IUPWND > 0
IDIOPT4	0	0	Observed surface wind components for wind field module
IDIOPT5	0	Not Applicable	Observed upper air wind components for wind field module
Lake Breeze Information:			
LLBREZE	F	F	Lake breeze module is not used

Table D-16 CALMET Model Option Group 5: Wind Field Options and Parameters

Parameter	Default	Project	Comment
NBOX	-	0	Number of lake breeze regions
XG1	-	0	X Grid line 1 defining the region of interest
XG2	-	0	X Grid line 2 defining the region of interest
YG1	-	0	Y Grid line 1 defining the region of interest
YG2	-	0	Y Grid line 2 defining the region of interest
XBCST	-	0	X Point defining the coastline in kilometres (Straight line)
YBCST	-	0	Y Point defining the coastline in kilometres (Straight line)
XECST	-	0	X Point defining the coastline in kilometres (Straight line)
YECST	-	0	Y Point defining the coastline in kilometres (Straight line)
NLB	-	0	Number of stations in the region
METBXID	-	0	Station ID’s in the region

Table D-17 CALMET Model Option Group 6: Mixing Height, Temperature and Precipitation Parameters

Parameter	Default	Project	Comment
Empirical Mixing Height Constants:			
CONSTB	1.41	1.41	Neutral, mechanical equation
CONSTE	0.15	0.15	Convective mixing height equation
CONSTN	2400	2400	Stable mixing height equation
CONSTW	0.16	0.16	Over water mixing height equation
FCORIO	1.0E-4	1.0E-04	Absolute value of Coriolis parameter
Spatial Averaging of Mixing Heights:			
IAVEZI	1	1	Conduct spatial averaging
MNMDAV	1	1	Maximum search radius in averaging (grid cells)
HAFANG	30	30	Half-angle of upwind looking cone for averaging
ILEVZI	1	1	Layer of winds used in upwind averaging
Convective Mixing Heights Options:			
IMIXH	1	1	Method to compute the convective mixing height (Maul-Carson)
THRESHL	0.0	0.0	Threshold buoyancy flux required to sustain convective mixing height growth overland (W/m^3)
THRESHW	0.05	0.05	Threshold buoyancy flux required to sustain convective mixing height growth overwater (W/m^3)
IZICRLX	1	1	Flag to allow relaxation of convective mixing height to equilibrium value when 0<QH<THRESHL (overland) or 0<QH<THRESHW (overwater)

Table D-17 CALMET Model Option Group 6: Mixing Height, Temperature and Precipitation Parameters

Parameter	Default	Project	Comment
TZICRLX	800	800	Relaxation time of convective mixing height to equilibrium value Used only if IZICRLX = 1 and TZICRLX must be >= 1.
ITWPROG	0	0	Option for overwater lapse rates used in convective mixing height growth (1=use prognostic lapse rates)
ILUOC3D	16	16	Land use category ocean in 3D.DAT datasets
Other Mixing Height Variables:			
DPTMIN	0.001	0.001	Minimum potential temperature lapse rate in the stable layer above the current convective mixing height (K/m)
DZZI	200	200	Depth of layer above current convective mixing height through which lapse rate is computed (m)
ZIMIN	50	50	Minimum overland mixing height (m)
ZIMAX	3,000	4,000	Maximum overland mixing height (m) Increased to 4000 m to consistent with AEP recommended model layers which the highest ZFACE is 4000 m
ZIMINW	50	50	Minimum overwater mixing height (m)
ZIMAXW	3,000	4,000	Maximum overwater mixing height (m) Increased to 4000 m to consistent with AEP recommended model layers which the highest ZFACE is 4000 m
Overwater Surface Fluxes Method and Parameters:			
ICOARE	10	10	Overwater surface fluxes method Set to 10 means COARE with no wave parameterization
DSHELF	0	0	Coastal/Shallow water length scale (km)
IWARM	0	0	COARE warm layer computation
ICOOL	0	0	COARE cool skin layer computation
Relative Humidity Parameters:			
IRHPROG	1	1	Use the WRF gridded relative humidity data as per the AEP Model Guideline.
Temperature Parameters:			
ITPROG	-	2	No surface or upper air observations Use the WRF gridded surface temperature data as per the AEP Model Guideline.
IRAD	1	1	Interpolation type
TRADKM	24	24	Radius of influence for temperature interpolation (km) to be set at two times the WRF 12 km resolution as per the AEP Model Guideline
NUMTS	5	Not Applicable	Maximum number of stations to include in temperature interpolation
IAVET	1	1	Conduct spatial averaging of temperatures (1 = yes)

Table D-17 CALMET Model Option Group 6: Mixing Height, Temperature and Precipitation Parameters

Parameter	Default	Project	Comment
TGDEFB	-0.0098	-0.0098	Default temperature gradient below the mixing height over water (K/m)
TGDEFA	-0.0045	-0.0045	Default temperature gradient above the mixing height over water (K/m)
JWAT1	-	55	Beginning land use categories for temperature interpolation over water
JWAT2	-	55	Ending land use categories for temperature interpolation over water
Precipitation Interpolation Parameters:			
NFLAGP	2	Not Applicable	Method of interpolation
SIGMAP	100	Not Applicable	Radius of Influence (km) Not Applicable for this project as no precipitation station data were used
CUTP	0.01	Not Applicable	Minimum Precipitation rate cut-off (mm/h)

Table D-18 CALMET Model Option Group 7: Surface Meteorological Station Parameters

Name	ID	X coordinate (km)	Y coordinate (km)	Time zone	Anemometer Height
LYNL	71078	373.182	6303.730	6	10
NOTES: LYNL LYNN LAKE AIRPORT					

D.2 REFERENCES

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Appendix E CALPUFF ATMOSPHERIC DISPERSION MODEL

Lynn Lake Gold Project (LLGP) Environmental Impact Assessment

Appendix E: Air Quality Technical Modeling Report: CALPUFF

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APPENDIX E
CALPUFF

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Abbreviations

%	percent
$\mu g/m^3$	micrograms per cubic metre
µm	microns
AAQO	Ambient Air Quality Objectives
AQMG	Alberta Air Quality Model Guideline
ARM	ambient ratio method
BCMOE	British Columbia Ministry of Environment
CAC	criteria air contaminant
CO	carbon monoxide
CTDM	Complex Terrain Dispersion Model
ESRD	Alberta Environment and Sustainable Resource Development
$g/m^2/s$	gram per square metre per second
g/m^3	gram per cubic metre
g/s	gram per second
h	hour
ID	identification
ISC	Industrial Source Complex
K	Kelvin
km	kilometre
LAA	local assessment area
m	metre

m/s	metre per second
MOECC	Ministry of Environment and Climate Change
MP	McElroy-Pooler
MST	mountain standard time
NAD 83	North American Datum of 1983
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
O_3	ozone
OLM	ozone limiting method
PAH	polycyclic aromatic hydrocarbons
PDF	Probability Distribution Function
PG	Pasquill-Gifford
PM	particulate matter
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particles less than or equal to 10 microns in diameter
ppb	parts per billion by volume
RIVAD	Regional Impact in Visibility and Acid Deposition
SO_2	sulphur dioxide
SO_4^{2-}	Sulphate
SW	Southwest
TCM	total conversion method
the Project	Lynn Lake Gold Mine Project

TSP	total suspended particulate
US EPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
VOC	volatile organic compound
σ_v	Standard deviation of lateral velocity
σ_w	Standard deviation of vertical velocity

Appendix E CALPUFF

E.1 INTRODUCTION

Ambient air quality models are used to predict air quality changes (i.e., changes to ambient concentrations or deposition) associated with current and future emission scenarios. This section discusses the selection and application of the primary dispersion model that was used for the Lynn Lake Gold Project (the Project) air quality assessment.

E.1.1 Model Types

Air quality simulation (or dispersion) models provide a scientific means of relating industrial and community emissions to air quality changes, by using mathematical equations to simulate transport, dispersion, transformation, and deposition processes in the atmosphere. Dispersion models can address a wide range of distance scales (hundreds of metres to hundreds of kilometres) and time scales (minutes to years). Typically, there are two modelling levels-of-effort:

- **Screening models** that estimate maximum short-term (1-hour) average concentrations for a wide range of pre-selected meteorological conditions. These models are typically limited to single sources and downwind distances of less than 10 km (e.g., the US Environmental Protection Agency [US EPA] SCREEN3 and AERSCREEN models).
- **Refined models** that use sequential hourly meteorological data for a one to five-year period (8,760 hours to 43,800 hours, respectively). These models can address multiple sources, and predict hourly average concentrations for all source, meteorology, and receptor combinations. The hourly concentrations can be used to predict concentrations for averaging periods that are factors of 24 (i.e., 2, 3, 4, 6, 8, or 12 h), or for longer periods (i.e., seasonal or annual). Some refined models can also account for chemical transformation and deposition processes.

Regulatory agencies rely on dispersion models as part of the approval process for a variety of industrial projects. Numerous models are available to predict ambient air quality changes and the appropriate selection depends on project-specific circumstances. In response to the regulatory use of these models, formal guidelines regarding the selection and application of these models have been developed (e.g., Manitoba Conservation (2006); Ontario Ministry of the Environment and Climate Change (MOECC) 2016; US EPA 2005a; British Columbia Ministry of Environment (BC MOE 2015); Alberta Environment and Sustainable Resource Development [ESRD] 2013).

E.1.2 Model Input/Output Files

The application of a dispersion model requires the preparation of input files and the analysis of output files. The input files include the following:

- control/option information to identify the model run, to select the available technical features, and to control the output options specific to the selected model
- source data that identify the locations, emission characteristics (e.g., stack height), and emission rates (e.g., oxides of nitrogen [NO_X] emission rate) for each source
- terrain elevations and surface characteristics to account for terrain influences on airflow and turbulence
- surface characteristics to provide the deposition properties for the vegetation canopy
- meteorological data on an hourly basis to characterize airflow and turbulence in the region

The output files can include:

- a summary file to identify the model run and to provide an overview of the run inputs
- hourly predicted concentration files for each receptor and meteorological combination
- hourly predicted deposition files for each receptor and meteorological combination

Presentation and graphical software are used to re-format the model predictions and to provide concentrations and deposition contour plots that can be superimposed over base maps to illustrate predictions within the modelled domain.

E.2 MODEL SELECTION

E.2.1 Requirements

For the Project assessment, the selected model should have the ability to account for:

- multiple point, area, and volume sources
- flat and elevated terrain features
- multiple species in one model simulation
- wet, dry, gaseous, and particulate deposition processes

These features are required to predict ambient concentrations and deposition. Furthermore, the model selection and application needs to be consistent with the Manitoba Air Quality Model Guideline (AQMG) (Manitoba Conservation 2006).

E.2.2 Selected Model

Based on the review of the AQMG, the CALPUFF model (Version 7.2.1, Level 150618) was selected since it can be used to model multiple species, multiple source types and provides deposition outputs. CALPUFF has two options with respect to meteorological data:

- The simple mode assumes a uniform meteorological field over the model domain during a given hour. However, CALPUFF has the advantage of allowing the plume trajectories to vary from hour-to-hour in a systematic manner as the wind direction varies from hour-to-hour. This becomes more important to include when the model is applied to larger domains.
- The CALMET mode allows for three-dimensionally varying meteorological fields over the model domain during a given hour.

For this assessment, the CALPUFF model with the three-dimensional CALMET meteorological data fields was selected (see Appendix D).

E.2.3 CALPUFF Model Assumptions

The CALPUFF model (Scire et al. 2000) is a multi-layer, multi-species, non-steady state puff dispersion model that can simulate the effects of time and space-varying meteorological conditions on substance transport, transformation, and removal. CALPUFF contains algorithms for near-source effects such as building downwash, transitional plume rise, partial plume penetration, as well as longer-range effects such as chemical transformation, and pollutant removal (wet scavenging and dry deposition). It can accommodate arbitrarily varying point source and area source emissions. Most of the algorithms contain options to treat physical processes at differing levels of detail depending on the requirements for the particular model application:

- **Atmospheric Dispersion**: several options are provided in CALPUFF for the computation of dispersion coefficients:
  - similarity theory to estimate σ_v and σ_w from surface heat and momentum fluxes provided by CALMET
  - Pasquill-Gifford (PG) or McElroy-Pooler (MP) dispersion coefficients
  - dispersion equations based on the Complex Terrain Dispersion Model (CTDM)
  - hourly values of direct turbulence measurements (σ_v and σ_w)
- **Chemical Transformation**: CALPUFF includes options to parameterize chemical transformation effects using the five species scheme (SO_2, SO_4^{2-}, NO_X, nitric acid [HNO_3], and NO_3^-) employed in the MESOPUFF II model, a modified six-species scheme (SO_2, SO_4^{2-}, NO, NO_2, HNO_3, and NO_3^-) adapted from the RIVAD/ARM3 (Regional Impact in Visibility and Acid Deposition/Acid Rain Mountain Mesocale Model) method, a set of user specified, diurnally-varying transformation rates, or ISORROPIA, an inorganic aerosol thermodynamic equilibrium model that can be used to improve the nitric acid/nitrate aerosol partition.

- **Dry Deposition**: A full resistance model is provided to calculate dry deposition rates of gases and particulate matter as a function of geophysical parameters, meteorological conditions, and substance properties. Options are provided to allow user-specified, diurnally varying deposition velocities to be used for one or more pollutants instead of the resistance model (e.g., for sensitivity testing) or to bypass the dry deposition model completely.
- **Wet Deposition**: An empirical scavenging coefficient approach is used in CALPUFF to compute the depletion and wet deposition fluxes due to precipitation scavenging. The scavenging coefficients are specified as a function of the pollutant and precipitation type (i.e., frozen vs. liquid precipitation).

The following section describes the application of the CALPUFF model specific to the Lynn Lake Gold Mine Project assessment.

E.3 MODEL APPLICATION

E.3.1 Model Domain

The CALPUFF model requires the user to define the area where emissions sources are characterized, the meteorological conditions are characterized, and the locations where the air quality changes are to be predicted. The CALPUFF model domain for this Project is a 28 km by 50 km area, which is further divided into two halves; a 14 km by 25 km area surrounding MacLellan mine site and 14 km by 25 km area surrounding Gordon mine site. This study area includes the communities of Lynn Lake and Black Sturgeon Reserve. The model domain also includes provincial highway 391 which will be used by trucks to transport material from Gordon mine site to the processing plant at Maclellan site. This area is also referred to as the Local Assessment Area (LAA). Table E-1 provides the corners of the LAA.

Table E-1 Local Assessment Area Coordinates (UTM Zone 14; NAD 83)

	Easting (m)	Northing (m)
Model Domain		
Southwest Corner	371775	6288500
Northwest Corner	371775	6316500
Northeast Corner	421775	6316500
Southeast Corner	421775	6288500

E.3.2 Receptor Locations

Two types of receptors within the model domain are defined; gridded Cartesian receptor points and discrete receptor locations.

1. Gridded Cartesian Receptors

A nested grid of receptors following the spacing requirements in the Draft Guidelines for Air Dispersion Modelling in Manitoba (Manitoba Conservation 2006) and the Air Dispersion Modelling Guideline for Ontario (MOECC 2016) is used in the model. The receptors are based on the following spacing:

- 20 m spacing along the Project boundary at Gordon and MacLellan sites
- 100 m spacing along the Project boundary around the access roads to Gordon and MacLellan sites
- 250 m spacing along the Project boundary around PR391.
- 50 m spacing within 500 m of the Project boundary
- 100 m spacing within 1.3 km of the Project boundary
- 200 m spacing within 2.1 km of the Project boundary
- 500 m spacing within 6.9 km of the Project boundary
- 1,000 m spacing beyond 6.9 km of the Project boundary

The grid density is the greatest nearest to the Project as that is where highest concentrations would occur. More distant from the Project, the resolution is sufficient to determine the additive effects of the Project emissions with emissions from other sources. Gridded receptors with a 250-m spacing within the Project fenceline are also included. These receptors are used to plot isopleths within the fenceline but were not used to determine maximum predicted concentrations within the assessment area.

The above indicated spacing is depicted in Map A-8 in Appendix A and the Project centric receptor grid is viewed as being sufficient to provide an indication of the magnitude and spatial concentrations due to Project emissions. The described grid consists of 16,101 receptor points.

2. Discrete Receptors

In addition to gridded receptors, 242 discrete locations corresponding to specific sites of interest (e.g., residences, businesses, traditional land use sites, permanent worker camps etc.) are included. Map A-3 of Appendix A shows the locations and Table E-2 provides the coordinates of these discrete receptors.

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
1	15829	FHHERA21	Vegetation Sample	409330	6301923
2	15830	FHHERA34	Vegetation Sample	407893	6302948
3	15831	FHHERA40	Vegetation Sample	414562	6302917
4	15832	FHHERA43	Vegetation Sample	417085	6303214
5	15833	FHHERA66	Vegetation Sample	410632	6305607
6	15834	FHHERA70	Vegetation Sample	413911	6305248
7	15835	FHHERA75	Vegetation Sample	418954	6305791
8	15836	FHHERA78	Vegetation Sample	407236	6305496
9	15837	FHHERA101	Vegetation Sample	415035	6306815
10	15838	FHHERA105	Vegetation Sample	419290	6306672
11	15839	FHHERA137	Vegetation Sample	406080	6309060
12	15840	FHHERA141	Vegetation Sample	410344	6309145
13	15841	FHHERA144	Vegetation Sample	413908	6309878
14	15842	FHHERA162	Vegetation Sample	416431	6310331
15	15843	FHHERA166	Vegetation Sample	404962	6312497
16	15844	FHHERA188	Vegetation Sample	411478	6312726
17	15845	FHHERA190	Vegetation Sample	414410	6313238
18	15846	FHHERA194	Vegetation Sample	418743	6313205
19	15847	FHHERA200	Vegetation Sample	409212	6313438
20	15848	FHHERA213	Vegetation Sample	407456	6314516
21	15849	HWYHHERA2	Vegetation Sample	390187	6301377
22	15850	HWYHHERA6	Vegetation Sample	394438	6300011
23	15851	HWYHHERA10	Vegetation Sample	398053	6298023
24	15852	HWYHHERA14	Vegetation Sample	400350	6294599
25	15853	HWYHHERA18	Vegetation Sample	404502	6294981
26	15854	HWYHHERA22	Vegetation Sample	408376	6294263
27	15855	HWYHHERA26	Vegetation Sample	410026	6295864
28	15856	HWYHHERA30	Vegetation Sample	409714	6299310
29	15857	MHHERA45	Vegetation Sample	376932	6301063
30	15858	MHHERA9	Vegetation Sample	381989	6300483
31	15859	MHHERA36	Vegetation Sample	378611	6302816
32	15860	MHHERA36E (east of tailings)	Vegetation Sample	379477	6303157
33	15861	MHHERA45	Vegetation Sample	388467	6302633
34	15862	MHHERA53	Vegetation Sample	381149	6304313

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
35	15863	MHHERA73	Vegetation Sample	386153	6304361
36	15864	MHHERA77	Vegetation Sample	374793	6305769
37	15865	MHHERA79	Vegetation Sample	377597	6305736
38	15866	MHHERA86	Vegetation Sample	384353	6305388
39	15867	MHHERA88	Vegetation Sample	386235	6305375
40	15868	MHHERA95	Vegetation Sample	378374	6306635
41	15869	MHHERA118	Vegetation Sample	386442	6307800
42	15870	MHHERA126	Vegetation Sample	379460	6308751
43	15871	MHHERA137	Vegetation Sample	374663	6309785
44	15872	MHHERA156	Vegetation Sample	379284	6310443
45	15873	MHHERA182	Vegetation Sample	374792	6313166
46	15874	MHHERA186	Vegetation Sample	379479	6313137
47	15875	MHHERA190	Vegetation Sample	383284	6312859
48	15876	MHHERA209	Vegetation Sample	386858	6314038
49	15877	MHHERA220	Vegetation Sample	383247	6314640
50	15878	Potential Indigenous Receptor 1	Potential Indigenous Receptor	405987	6316024
51	15879	Potential Indigenous Receptor 2	Potential Indigenous Receptor	401539	6310530
52	15880	Potential Indigenous Receptor 3	Potential Indigenous Receptor	399477	6307607
53	15881	Potential Indigenous Receptor 4	Potential Indigenous Receptor	404680	6306823
54	15882	Potential Indigenous Receptor 5	Potential Indigenous Receptor	404610	6304743
55	15883	Potential Indigenous Receptor 6	Potential Indigenous Receptor	402911	6303847
56	15884	Potential Indigenous Receptor 7	Potential Indigenous Receptor	405371	6303362
57	15885	Potential Indigenous Receptor 8	Potential Indigenous Receptor	410297	6303662
58	15886	Potential Indigenous Receptor 9	Potential Indigenous Receptor	413681	6303484
59	15887	Potential Indigenous Receptor 10	Potential Indigenous Receptor	411326	6299050
60	15888	Potential Indigenous Receptor 11	Potential Indigenous Receptor	418775	6293108
61	15889	Potential Indigenous Receptor 12	Potential Indigenous Receptor	407246	6297860
62	15890	Potential Indigenous Receptor 13	Potential Indigenous Receptor	404260	6295677
63	15891	Potential Indigenous Receptor 14	Potential Indigenous Receptor	393110	6290821
64	15892	Potential Indigenous Receptor 15	Potential Indigenous Receptor	391941	6293656
65	15893	Potential Indigenous Receptor 16	Potential Indigenous Receptor	386085	6295685
66	15894	Potential Indigenous Receptor 17	Potential Indigenous Receptor	384540	6298768
67	15895	Potential Indigenous Receptor 18	Potential Indigenous Receptor	385862	6301026
68	15896	Potential Indigenous Receptor 19	Potential Indigenous Receptor	383310	6302137

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
69	15897	Potential Indigenous Receptor 20	Potential Indigenous Receptor	390169	6304646
70	15898	Potential Indigenous Receptor 21	Potential Indigenous Receptor	390852	6308671
71	15899	Potential Indigenous Receptor 22	Potential Indigenous Receptor	372879	6313259
72	15900	Potential Indigenous Receptor 23	Potential Indigenous Receptor	413807	6304727
73	15901	Potential Indigenous Receptor 24	Potential Indigenous Receptor	414701	6306763
74	15902	Potential Indigenous Receptor 25	Potential Indigenous Receptor	415713	6309172
75	15903	Potential Indigenous Receptor 26	Potential Indigenous Receptor	414971	6295395
76	15904	Potential Indigenous Receptor 27	Potential Indigenous Receptor	413079	6309406
77	15905	Potential Indigenous Receptor 28	Potential Indigenous Receptor	409795	6307422
78	15906	Potential Indigenous Receptor 29	Potential Indigenous Receptor	390569	6306510
79	15907	Potential Indigenous Receptor 30	Potential Indigenous Receptor	388472	6297663
80	15908	Potential Indigenous Receptor 31	Potential Indigenous Receptor	381958	6298715
81	15909	Potential Indigenous Receptor 32	Potential Indigenous Receptor	387332	6302850
82	15910	Potential Indigenous Receptor 33	Potential Indigenous Receptor	385174	6306484
83	15911	Potential Indigenous Receptor 34	Potential Indigenous Receptor	388163	6310354
84	15912	Potential Indigenous Receptor 35	Potential Indigenous Receptor	385216	6312748
85	15913	Potential Indigenous Receptor 36	Potential Indigenous Receptor	381162	6311003
86	15914	Potential Indigenous Receptor 37	Potential Indigenous Receptor	377971	6306944
87	15915	Black Sturgeon Reserve Residence 1	Black Sturgeon Reserve	405449	6297915
88	15916	Black Sturgeon Reserve Residence 2	Black Sturgeon Reserve	405476	6297892
89	15917	Black Sturgeon Reserve Residence 3	Black Sturgeon Reserve	405503	6297862
90	15918	Black Sturgeon Reserve Residence 4	Black Sturgeon Reserve	405527	6297835
91	15919	Black Sturgeon Reserve Residence 5	Black Sturgeon Reserve	405554	6297804
92	15920	Black Sturgeon Reserve Residence 6	Black Sturgeon Reserve	405654	6297680
93	15921	Black Sturgeon Reserve Residence 7	Black Sturgeon Reserve	405720	6297720
94	15922	Black Sturgeon Reserve Residence 8	Black Sturgeon Reserve	405738	6297698
95	15923	Black Sturgeon Reserve Residence 9	Black Sturgeon Reserve	405753	6297678
96	15924	Black Sturgeon Reserve Residence 10	Black Sturgeon Reserve	405765	6297660
97	15925	Black Sturgeon Reserve Residence 11	Black Sturgeon Reserve	405778	6297639
98	15926	Black Sturgeon Reserve Residence 12	Black Sturgeon Reserve	405794	6297623
99	15927	Black Sturgeon Reserve Residence 13	Black Sturgeon Reserve	405807	6297596

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
100	15928	Black Sturgeon Reserve Residence 14	Black Sturgeon Reserve	405827	6297573
101	15929	Black Sturgeon Reserve Infrastructure	Black Sturgeon Reserve	405437	6298012
102	15930	Black Sturgeon Reserve Potential Residence 1	Black Sturgeon Reserve	405679	6297661
103	15931	Black Sturgeon Reserve Potential Residence 2	Black Sturgeon Reserve	405817	6297522
104	15932	RC21	Remote Cottage	400748	6295006
105	15933	RC22	Remote Cottage	387607	6298665
106	15934	RC23	Remote Cottage	377549	6294139
107	15935	FP1	Float Plane	376983	6299202
108	15936	AS1	Admin Site	376689	6299266
109	15937	FF1	Fish Farm	374507	6299054
110	15938	LG1	Lagoon	375360	6300756
111	15939	WS1	Warehouse Site	374586	6300810
112	15940	HY1	Highway Maintenance Yard	374631	6300576
113	15941	RS1	Recreation Site	375594	6303041
114	15942	DK1	Dog Kennel	373388	6302975
115	15943	MS1	Museum Site	375014	6302733
116	15944	CL3	Communication Site	376000	6303558
117	15945	WDS1	Waste Disposal Site	379757	6304945
118	15946	RC30	Remote Cottage	374038	6307948
119	15947	RB1	Riding Stable	374369	6307586
120	15948	RL1	Recreation Lot	375069	6307961
121	15949	RL2	Recreation Lot	375124	6308103
122	15950	RC31	Remote Cottage	375165	6307773
123	15951	Potential Indigenous Receptor 38	Potential Indigenous Receptor	376617	6308656
124	15952	TC1	Trapper Cabin	392947	6312606
125	15953	RL1 - Hughes Lk	Recreation Lot	404536	6296515
126	15954	RL2 - Hughes Lk	Recreation Lot	404567	6296539
127	15955	RC1 - Hughes Lk	Remote Cottage	404780	6296540
128	15956	RC2 - Hughes Lk	Remote Cottage	404865	6296553
129	15957	RC3 - Hughes Lk	Remote Cottage	404882	6296556
130	15958	RC4 - Hughes Lk	Remote Cottage	404909	6296537

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
131	15959	RC	Remote Cottage	410520	6303728
132	15960	TC3	Trapper Cabin	413593	6304211
133	15961	PVHL-BLW9	Park Vacation Home Lease	375357	6307936
134	15962	PVHP-BLW19	Park Vacation Home Permit	375537	6308191
135	15963	PVRL-BLE9	Park Vacation Home Permit Recreation Lot	376478	6308281
136	15964	PVHL-HL1	Park Vacation Home Lease	404517	6296520
137	15965	PVHL-HL10	Park Vacation Home Lease	404777	6296556
138	15966	PVHL-HL13	Park Vacation Home Lease	404879	6296569
139	15967	PVHL-HL14	Park Vacation Home Lease	404912	6296550
140	15968	COMM-EL6	Commercial	376685	6299148
141	15969	COMM-EL8	Commercial	376733	6299115
142	15970	COMM-EL9	Commercial	376761	6299098
143	15971	COMM-EL3	Commercial	376599	6299199
144	15972	COMM-EL4	Commercial	376631	6299181
145	15973	COMM-EL1	Commercial	376744	6298872
146	15974	COMM-EL14	Commercial	376638	6299280
147	15975	COMM-EL16	Commercial	376738	6299214
148	15976	COMM-EL18	Commercial	376841	6299148
149	15977	SP-EL4	Seaplane	376788	6299014
150	15978	SP-EL5	Seaplane	376829	6299043
151	15979	COMM-EL7	Garden	376907	6299096
152	15980	COMM-EL8AB	Commercial	376927	6299175
153	15981	RC	Remote Cottage	404226	6296453
154	15982	RC	Remote Cottage	404241	6296309
155	15983	RC	Remote Cottage	403629	6296307
156	15984	RC-Burge	Remote Cottage	376126	6308197
157	15985	LynnLakeR2	Two Family Dwelling	374940	6302606
158	15986	LynnLakeC2	Commercial - Service	375235	6302715
159	15987	LynnLakeR1	One Family Dwelling	375526	6303044
160	15988	LynnLakeR2	Two Family Dwelling	375560	6303339
161	15989	LynnLakeR2	Two Family Dwelling	375209	6303027
162	15990	IS	Ind	375787	6301800
163	15991	Lynn Lake Friendship Centre	Aboriginal Services	375309	6303205

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
164	15992	Marcel Colomb First Nation	Aboriginal Services	374748	6302611
165	15993	St. Simon's Church	Churches	374934	6301646
166	15994	Lynn Lake Gospel Church	Churches	375219	6302737
167	15995	St. Maira Goretti Catholic Church	Churches	374949	6302644
168	15996	Misc. Commercial	Commercial	375877	6303715
169	15997	Lynn Lake Library	Government	375129	6302766
170	15998	Royal Canadian Mounted Police (RCMP)	Government	375194	6302912
171	15999	Town of Lynn Lake	Government	375137	6302769
172	16000	West Lynn Lake Heights School	Institutional	374770	6302635
173	16001	Lynn Lake Hospital	Hospital and Health	375423	6303359
174	16002	Addictions Foundation-Manitoba	Hospital and Health	375290	6303212
175	16003	The Bronx	Hotel & Accommodations	375318	6303254
176	16004	Lynn Lake Inn	Hotel & Accommodations	375188	6302783
177	16005	Residential 1 - Halstead Ave.	Residence	375653	6303322
178	16006	Residential 2 - Halstead Ave.	Residence	375648	6303243
179	16007	Residential 3 - Halstead Ave.	Residence	375580	6303211
180	16008	Residential 4 - Halstead Ave.	Residence	375564	6303121
181	16009	Residential 5 - Halstead Ave.	Residence	375436	6302927
182	16010	Residential 6 - Halstead Ave.	Residence	375356	6302854
183	16011	Residential 7 - Camp St.	Residence	375492	6303237
184	16012	Residential 8 - Hales Ave.	Residence	375395	6303224
185	16013	Residential 9 - Hales Ave.	Residence	375345	6303101
186	16014	Residential 10 - Hales Ave.	Residence	375278	6303050
187	16015	Residential 11 - Hales Ave.	Residence	375273	6302996
188	16016	Residential 12 - Hales Ave.	Residence	375232	6302931
189	16017	Residential 13 - Gordon Ave.	Residence	375365	6303283
190	16018	Residential 14 - Gordon Ave.	Residence	375277	6303204
191	16019	Residential 15 - Gordon Ave.	Residence	375286	6303157
192	16020	Residential 16 - Highway 391	Residence	375469	6303189
193	16021	Residential 17 - Highway 391	Residence	375419	6303054
194	16022	Residential 18 - Highway 391	Residence	375347	6303003
195	16023	Residential 19 - Highway 391	Residence	375322	6302908
196	16024	Residential 20 - Highway 391	Residence	375213	6302842

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
197	16025	Residential 21 - Highway 391	Residence	375062	6302716
198	16026	Residential 22 - Halstead Ave.	Residence	375328	6302773
199	16027	Residential 23 - Halstead Ave.	Residence	375140	6302694
200	16028	Residential 24 - Halstead Ave.	Residence	375064	6302621
201	16029	Residential 25 - Cobalt Pl	Residence	374840	6302860
202	16030	Residential 26 - Silver St.	Residence	374781	6302783
203	16031	Residential 27 - Silver St.	Residence	374865	6302698
204	16032	Residential 28 - McVeigh Ave.	Residence	374902	6302534
205	16033	Residential 29 - McVeigh Ave.	Residence	374901	6302479
206	16034	Residential 30 - McVeigh Ave.	Residence	374946	6302404
207	16035	Residential 31 - Sherritt Ave.	Residence	374812	6302500
208	16036	Residential 32 - Sherritt Ave.	Residence	374774	6302444
209	16037	Residential 33 - Sherritt Ave.	Residence	374781	6302380
210	16038	Residential 34 - Sherritt Ave.	Residence	374771	6302337
211	16039	Residential 35 - Sherritt Ave.	Residence	374811	6302282
212	16040	Residential 36 - Sherritt Ave.	Residence	374799	6302227
213	16041	Residential 37 - Sherritt Ave.	Residence	374833	6302191
214	16042	Residential 38 - Sherritt Ave.	Residence	374847	6302060
215	16043	Residential 39 - Sherritt Ave.	Residence	374891	6302000
216	16044	Residential 40 - Sherritt Ave.	Residence	374880	6301883
217	16045	Residential 41 - Sherritt Ave.	Residence	374901	6301799
218	16046	Residential 42 - Sherritt Ave.	Residence	374862	6301713
219	16047	Residential 43 - Sherritt Ave.	Residence	374884	6301641
220	16048	Residential 44 - Edmon Ave.	Residence	374846	6302446
221	16049	Residential 45 - Edmon Ave.	Residence	374849	6302370
222	16050	Residential 46 - Edmon Ave.	Residence	374867	6302297
223	16051	Residential 47 - Edmon Ave.	Residence	374906	6302242
224	16052	Residential 48 - Edmon Ave.	Residence	374901	6302177
225	16053	Residential 49 - Edmon Ave.	Residence	374918	6302113
226	16054	Residential 50 - Edmon Ave.	Residence	374958	6301988
227	16055	Residential 51 - Edmon Ave.	Residence	374953	6301930
228	16056	Residential 52 - Edmon Ave.	Residence	374963	6301832
229	16057	Residential 53 - Edmon Ave.	Residence	374980	6301752
230	16058	Residential 54 - Edmon Ave.	Residence	374947	6301685

Table E-2 Locations of Discrete Receptors

No.	Model ID	Name	Description	UTM Easting (m)	UTM Northing (m)
231	16059	Residential 55 - Edmon Ave.	Residence	374964	6301630
232	16060	Residential 56 - McVeigh Ave. S.	Residence	375078	6301915
233	16061	Residential 57 - McVeigh Ave. S.	Residence	375047	6301857
234	16062	Residential 58 - McVeigh Ave. S.	Residence	375043	6301793
235	16063	Residential 59 - Halstead Ave. S.	Residence	375129	6301986
236	16064	Residential 60 - Halstead Ave. S.	Residence	375077	6301687
237	16065	Residential 61 - Zinc St.	Residence	375032	6301616
238	16066	Residential 62 - Zinc St.	Residence	374812	6301684
239	16067	Proposed Work Camp Accommodation 1	Proposed Residence	375030	6303065
240	16068	Proposed Work Camp Accommodation 2	Proposed Residence	375076	6303125
241	16069	Proposed Work Camp Accommodation 3	Proposed Residence	375126	6303192
242	16070	Permanent Work Camp	Work Camp	380916	6308622

E.3.3 Meteorology

The CALMET meteorological model is used to provide representative wind, temperature, and turbulence fields. Five years (2012 to 2016) of hourly CALMET input files were prepared and used for this assessment. The meteorological inputs reflect seasonal variations in the land cover properties. The CALMET modelling is described in detail in Appendix D.

E.3.4 Dispersion

The CALPUFF model offers several dispersion options. Manitoba AQMG and Ontario AQMG do not provide specific guidance for selection of dispersion options. Ontario AQMG refers to US EPA Interagency Work group on Air Quality Modelling (IWAQM) Phase 2 report (US EPA 1998) or any more recent recommendations for guidance on selecting dispersion options. US EPA model recommendations (US EPA 1998) are specific to long range transport and in many cases not appropriate for the assessment where primary objective is near project predictions. CALPUFF model options recommended by Alberta and BC model guideline were used to select dispersion model options for current assessment. The following identifies the dispersion options that were selected for this assessment:

- The selection of the similarity scaling approach to estimate σ_v and σ_w is viewed as using a more up-to-date understanding of dispersion in the boundary layer than the historical discrete PG dispersion approach. The similarity approach treats dispersion as a continuous function, whereas the PG approach considers discrete classes. For this reason, MDISP = 2 (Input group 2) was used to select the similarity approach.

- The Probability Distribution Function (PDF) approach accounts for downdrafts and updrafts that occur under convective conditions. The PDF approach increases the predicted concentrations resulting from stacks under convective conditions. For this assessment MPDF = 1 (PDF assumed) was selected.
- Vertical wind shear accounts for the enhanced dispersion that can happen when the wind direction changes with increasing height above the ground. If vertical wind shear is adopted (MSHEAR = 1), the ambient predicted concentrations can be larger than if vertical wind shear is not simulated (MSHEAR = 0). Scire (2009, pers. comm.), the developer of the CALPUFF model, indicates that there may be some problems with the vertical wind shear algorithms, and he recommends that MSHEAR = 0 be adopted until the issue can be further explored and evaluated. For this reason, the default MSHEAR = 0 (Input group 2) was selected.

This discussion has been provided to indicate the selection of the dispersion details can have an influence on the model predictions. The options that were selected are considered appropriate for the Project and conform with best practice guidance.

E.3.5 Chemical Transformation and Formation of Secondary $PM_{2.5}$

The formation of secondary particulate matter is not considered significant compared to fugitive dust generated from mining activities. Therefore, chemical transformation of NO_x/SO_2 and secondary formation of fine particulate matter was not modelled for this assessment. Therefore, for this assessment MCHEM = 0 was selected.

E.3.6 NO to NO_2 Conversion

Oxides of nitrogen (NO_X) are comprised of nitric oxide (NO) and nitrogen dioxide (NO_2). Only NO_2 concentrations are regulated by the ambient air quality criteria. Therefore, it is important to be able to estimate the portion of predicted ground-level concentrations of NO_X comprised of NO_2. For this current study, the Ozone Limiting Method (OLM) was applied. The OLM is the alternative if adequate monitoring data of NO/NO_2 ratios are not available.

The OLM assumes that the conversion of NO to NO_2 in the atmosphere is limited by the ambient O_3 concentration in the atmosphere. The approach assumes that 10 percent (on a volume basis) of the NO_x is converted to NO_2 prior to discharge into the atmosphere. For the remaining NO_x, the following is adopted:

- If 0.9 (NO_x) is greater than the ambient O_3 concentration then NO_2 = 0.1 (NO_x) + O_3. For this case, the conversion of NO_X to NO_2 is not complete.

- If 0.9 (NO_x) is less than the ambient O_3 concentration then
  NO_2 = 0.1 (NO_x) + 0.9 (NO_x) =NO_x. This is equivalent to the total conversion approach, since there is sufficient O_3 to effect the complete conversion.

As no onsite ozone data is available, ozone measurements from Fort Smith monitoring station in Northwest Territories were used in the OLM conversion. The Fort Smith station is considered the most representative for the LAA as the station is in a similarly remote area with low population density and with similar meteorological and topographical conditions. Hourly ozone data from Fort Smith station was downloaded for the three-year period 2016 to 2018. Hourly time-series of ozone values were compiled using the maximum measured ozone concentration for each hour from the three-year period. Therefore, the hourly ozone time-series used in the OLM conversion are conservative. The maximum ozone concentration measured for the three-year period from 2016 to 2018 was 71 ppb.

E.3.7 Building Downwash

Buildings or other solid facility structures may affect the flow of air in the vicinity of a source and cause building downwash effects due to eddies on the downwind side. These eddies have potential to reduce plume rise and affect dispersion. For this assessment, point sources are potentially affected by building downwash.

Building downwash effects were considered for all stack emissions using the US EPA Building Profile Input Program (BPIP; US EPA 1995a). BPIP provides parameters that are used by the Plume Rise Model Enhancement (PRIME) downwash algorithms in CALPUFF®. Map A-6 in Appendix A shows the locations of the buildings and stacks at the MacLellan site. Map A-7 in Appendix A shows the locations of the buildings and stacks at the Gordon site. All buildings and structures, including tanks, that have potential to cause building downwash effects were included in the BPIP PRIME model. The dimensions of the buildings and structures considered in the dispersion model for Gordon and MacLellan sites are listed in Table E-3.

Table E-3 Locations of Discrete Receptors

Building Description	Building ID	Length (m)	Width (m)	Height (m)
Gordon Site				
Generator	DGEN	15	12	3.5
Wash Bay/Truckstop Warehouse	WBAY	80	24	6
MacLellan Site				
Administration	ADMIN	25.2	65.1	3
Warehouse workshop	WAREH	12.5	25	6
Primary Crushing	PC	36	23	19.6
Secondary Crushing	SC	15	15	23
Grinding	GRIND	32.1	39.5	26
CIP	CIP	30	43	22

Table E-3 Locations of Discrete Receptors

Building Description	Building ID	Length (m)	Width (m)	Height (m)
Reagents	REAGENT	15	42	15
Gold room	GR	12	18.6	8
Assay lab	ASSAY	10	14.7	3
Oxygen Plant	OP	24	10	4
Crushed Ore Stockpile Building	OS	100	100	30
Truck Shop	TSM	30.5	63.4	19.3
Truck Wash	TRWM	19.2	29.9	15.5
Pre-leach Thickener	PLT	32	32	9.0
Pre-aeration Tank	PAT	14.9	14.9	16.4
Leach Tank 1	LT1	14.9	14.9	16.4
Leach Tank 2	LT2	14.9	14.9	16.4
Leach Tank 3	LT3	14.9	14.9	16.4
Leach Tank 4	LT4	14.9	14.9	16.4
Process Water Tank	PRT	10	10	7.8
Fresh Water Tank	FRT	10	10	13
Cyanide Detox Tank	CDT	8.8	8.8	9.8

E.3.8 Deposition Calculation Approach

1. Deposition Parameters

Deposition is comprised of dry and wet removal mechanisms. The dry and wet deposition rates depend on the phase of the compound being deposited (e.g., vapour or particle), and other physical and chemical properties of the compound. For this assessment, deposition is required to predict the following:

- Deposition of dustfall (dry and wet deposition of total suspended particulate (TSP)) to compare against Ontario ambient air quality criteria for dustfall.
- Deposition of metals, PAH (Polycyclic aromatic hydrocarbon) and VOC (Volatile organic compound) as these compounds can have potential adverse effects on environmental health, and on human health. Metals, PAH and VOC concentrations were not modelled directly but were calculated from Total VOC and particulate matter modelling results and estimated emission rates of various metals, PAH and VOC compounds considered. The concentrations of individual compounds were calculated based on the ratio of total emissions to emissions of those compounds specifically.

Table E-4 provides a list of the CAC compound groups associated with the Project, and provides the associated deposition assumptions. Table E-4 also indicates which compounds are vapour or particle phase dominated. All metals are assumed to be associated with the particulate matter phase, except mercury which exist in both vapour and particle phase and is associated with both total VOC and particulate matter. All individual VOCs are associated with the total VOC (vapour phase). PAH species exist in atmosphere in both vapour phase and particle phase and are associated with both total VOC and particulate matter.

Particulate matter (PM) was divided into three size ranges (i.e., 0 to 2.5 µm, 2.5 to 10 µm, and 10 to 30 µm) to account for larger particles being deposited close to the emission sources and smaller particles travelling further downwind prior to being deposited. The deposition values predicted with each size fraction were summed to calculate the total deposition.

For dry deposition, the compound groups are discussed in terms of the deposition options that are available in the CALPUFF model:

- For gaseous VOC and HCN, dry deposition velocity rate is provided as an input using an external file. For these compounds, a constant deposition velocity of 0.5 cm/s (0.005 m/s) was selected (Tables C-23) as per US EPA guidance (US EPA 2005b).
- For vapour mercury, dry deposition is based on a user-specified dry deposition velocity of 2.9 cm/s (0.029 m/s) as per US EPA guidance (US EPA 2005b).
- For PM size based fractions, dry deposition is calculated using the CALPUFF internal particle-phase resistance sub-model. Geometric mass mean diameters and standard deviations for PM size based fractions are listed in Table E-24 at the end of this appendix, and are based on the US EPA guidance document (US EPA 2005b).

The calculation of wet deposition requires wet scavenging coefficients that vary with substance phase (i.e., gas or particle) and form of the precipitation (i.e., liquid (rain) or solid (snow)). The CALPUFF model assumes the scavenging coefficient approach for both gases and particles. The following assumptions are made relative to these parameters:

- For VOC and HCN compounds, the wet scavenging coefficients listed in Table E-24 at the end of this appendix are used; and these are based on the US EPA's Human Health Risk Assessment guidance document (US EPA 2005b).
- For particle size fractions, the scavenging coefficients listed in Table E-24 at the end of this attachment are used; and these are based on US EPA (1995).

Table E-4 Deposition Assumptions

Compound	Percent Vapour	Percent Particle	Dry Deposition
Common Air Contaminants			
SO_2	100	0	Deposition mot modelled
NOx	100	0	Deposition mot modelled
CO	100	0	Deposition mot modelled

Table E-4 Deposition Assumptions

Compound	Percent Vapour	Percent Particle	Dry Deposition
VOC1	100	0	Gas Phase Resistance Model
VOC2 (Surrogate for Gas Phase Mercury)	100	0	Gas Phase Resistance Model
HCN	100	0	Gas Phase Resistance Model
$PM_{2.5}$ (Combustion product)	0	100	Particle Phase Resistance Model
$PM_{2.5}$ to PM_{10} range (Combustion product)	0	100	Particle Phase Resistance Model
PM_{10} to TSP (Combustion product)	0	100	Particle Phase Resistance Model
$PM_{2.5}$ (Fugitive dust)	0	100	Particle Phase Resistance Model
$PM_{2.5}$ to PM_{10} range (Fugitive dust)	0	100	Particle Phase Resistance Model
PM_{10} to TSP (Fugitive dust)	0	100	Particle Phase Resistance Model

E.3.9 Source Parameters

Project emission sources are identified, characterized, and quantified in Appendix C. Depending on the nature of the source types, they can be described as one of the following: point source, Area source, line source or volume source. Differing input parameters are used to represent the source types relevant to the LAA. The locations of all sources are shown in Map A-6 and A-7 in Appendix A.

1. Point Sources

Industrial stacks are treated as point sources. Parameters required for each stack include: stack location, stack base elevation, stack height, stack diameter, stacks gas exit temperature, stack gas exit velocity, and substance emissions rates. There are four stacks associated with processing plant at the MacLellan site and one stack associated with diesel generator at the Gordon site. Parameters to represent these stacks are provided in Table E-5 and further discussed in Appendix C. The industrial stack emission rates are assumed to be constant and continuous.

2. Regional Highways

Traffic emissions from provincial highway 391 (PR391) in the LAA are modelled as line sources and the line sources are represented by multiple volume sources. The US EPA memorandum on haul road emissions (US EPA 2012) and AERMOD guidance document (US EPA 2004) were used to derive appropriate volume source parameters. Highway volume source parameters are provided in Table E-6. Key features include:

- Highway PR391 from Gordon access road to MacLellan access road was selected to represent the main traffic corridor in the LAA. Emissions from this section of highway include general traffic and haul trucks travelling between Gordon and MacLellan site.

- The volume source spacing and the number of individual volume sources to represent each highway segment varies with distance from the mining areas and nearby residential receptors. A smaller spacing (i.e., 50 m) is used to represent highway segments near the Town of Lynn Lake and Black Sturgeon Reserve, and a larger spacing (i.e., 100 m) is used to represent highway segments more distant from the Project, Town of Lynn Lake and Back Sturgeon Reserve.
- The volume source height (VH = 3.5 m) and the top of the plume height (VP = 3.5 m), and the emission release height (RH = VP/2 = 1 .75 m) are related to the dimensions of a typical vehicle. The width of the volume source (PW) is related to the width of the highway and spacing between volume sources (25m - 50 m).
- The turbulence generated by the vehicle wake zone is represented by initial lateral and vertical dimensions referred to a Sy and Sz, respectively. The Sy and Sz values are based on the recommendations provided in the AERMOD model user's guide (US EPA 2004).

This approach mimics an initial well mixed plume associated with vehicle wake zones. The approach, however, does not calculate concentrations for distances less than the volume spacing distance. This disadvantage is not a limitation since locations of interest are further downwind. Emission rates associated with highway sources are discussed and provided in Appendix C Emissions. The emission rates are assumed to be continuous and vary with season (the winter period being November to February, and the summer period being March to October).

3. Volume Sources – Loading/unloading, Bulldozing and Fugitive Emissions from Processing Area Equipment

Emissions from truck loading and unloading, bulldozing and fugitive emissions from processing plant are represented as volume sources. Associated volume source parameters are provided in Table E-7. Table E-8 provides location and base elevation of each sub-volume source. Key features include:

- There are eight Project activities associated with these operations. Each activity is represented by 1 to 4 individual volume sources, depending on the activity.
- The volume source height (VH), the top of plume height (PH), and the emission release height (RH) are related to the dimensions of the dominant piece of equipment. The width of the volume source (PW) is also related to the dimensions of the equipment or the dimensions of the activity.
- The PH and RH are also based on the width and height of the piece of equipment used for the dominant operation.
- Initial Sy and Sz values are calculated based on AERMOD model user's guide (US EPA 2004).

Emission rates associated with the Project sources are discussed and provided in Appendix C.

4. Haul Road Sources

Haul roads are line sources represented as multiple volume sources, similar to highway emission sources. Associated volume source parameters are provided in Table E-9. Key features include:

- Five haul roads are associated with the MacLellan mining area and three haul roads are associated with Gordon mining area. Depending on the length of each haul road, 3 to 44 volume sources represent each haul road, with a volume source spacing of 68 m. Source spacing was calculated based on width of haul road (see Table E-9 footnote).
- The volume source height (VH), the top of plume height (PH), and the emission release height (RH) are related to the dimensions of the associated haul trucks. The width of the volume source (PW) is related to the width of the haul road (RW = 28m) (US EPA 2012).
- The turbulence generated by the vehicle wake zone is represented by initial lateral and vertical dimensions referred to a Sy and Sz, respectively. The Sy and Sz values are based on the recommendations provided in the AERMOD model user's guide (US EPA 2004).

Emission rates associated with the haul roads are discussed and provided in Appendix C. The SO_2, NO_2, CO, VOC and diesel particulate matter emission rates are modelled as continuous emissions and fugitive particulate matter emissions are modelled with seasonal emissions rates (Winter months are November to April and summer months are May to October).

5. **Access Road Sources**

Access roads are line sources represented as multiple volume sources, similar to highway emission sources. Associated volume source parameters are provided in Table E-10. Key features include:

- Three access roads are associated with the MacLellan mining area and two access roads are associated with Gordon mining area. Depending on the length of each access road, 75 to 129 volume sources represent each access road, with a volume source spacing of 50 or 100 m.
- The volume source spacing and the number if individual volume sources to represent each access road varies with distance from the mining areas. A smaller spacing (i.e., 50 m) is used to represent access road segments near the mining areas, and a larger spacing (i.e., 100 m) is used to represent access road segments more distant from the mining areas.
- The volume source height (VH), the top of plume height (PH), and the emission release height (RH) are related to the dimensions of the associated haul trucks. The width of the volume source (PW) is related to the width of the access road (RW = 25m) (US EPA 2012).
- The turbulence generated by the vehicle wake zone is represented by initial lateral and vertical dimensions referred to a Sy and Sz, respectively. The Sy and Sz values are based on the recommendations provided in the AERMOD model user's guide (US EPA 2004).

Emission rates associated with the access roads are discussed and provided in Appendix C. The SO_2, NO_2, CO, VOC and diesel particulate matter emission rates are modelled as continuous emissions and fugitive particulate matter emissions are modelled with seasonal emissions rates (Winter months are November to April and summer months are May to October).

6. Stockpiles

The mining operations will require overburden, waste rock, low grade ore, and topsoil stockpiles. Wind erosion emissions from the stockpiles are represented by area sources. Table E-11 shows area source parameters used for the stockpiles and Table E-12 provides locations of the area sources. The fugitive emission rates for each hour depend on the wind speed for that hour. The wind speed profile and scaling factors used to model wind erosion emissions from stockpiles are provided in Table E-13. Fugitive emissions from stockpiles only occur if wind speed is above 16.4 m/s. Emission rates associated with the stockpiles are further discussed and provided in Appendix C.

7. Tailing Management Facility (TMF) and General Operations Area

Tailings management facility pond is a source of HCN emissions through evaporation and TMF banks are source of fugitive dust emissions by wind erosion. Emissions from equipment operating in area around the processing plant at MacLellan site and around operations buildings at Gordon site are modelled as area sources. Table E-14 shows area source parameters used for the TMF and general operations areas and Table E-15 provides locations of the area sources. The wind erosion fugitive emission rates from TMF banks for each hour depend on the wind speed for that hour. The wind profile and scaling factors used to model wind erosion emissions from tailing management facility are provided in Table E-16. Fugitive particulate emissions from TMF banks only occur if wind speed is above 7.2 m/s. More detailed descriptions of emissions are provided in Appendix C

8. Open Mining Pits

The main activities within the open pits that result in emissions are haul roads within the pit area, loading and bulldozing, and open pit blasting. These emissions sources are modelled as area sources. Table E-17 shows the area source parameters used for the open pit sources and Table E-18 provides locations of open pit mining areas.

- The vehicle height (VH), the top of plume height (PH), and the emission release height (RH) are related to the dimensions of the associated haul trucks.
- Release height of blasting emissions is based on assumed plume height of 10 m.
- Blasting will occur between 7 pm and 8 pm on Sunday, Monday and Thursday of each week.
- Open pit retention calculation is used to adjust emission rate of fugitive emissions from the open pit (detail below).

Emission rates associated with the open pit haul roads are discussed and provided in Appendix C. The SO_2, NO_2, CO, VOC and diesel particulate matter emission rates are modelled as continuous emissions and fugitive particulate matter emissions are modelled with seasonal emissions rates (Winter months are November to April and summer months are May to October). Emissions from loading and bulldozing are modelled as continuous sources.

Since CALPUFF® does not have an algorithm to model open pit sources, the open pits were modelled as surface area sources with reduced PM emissions to account for the fraction of PM emissions retained in the open pit due to its depth, known as “pit retention”. Pit retention is the term used to describe the tendency for PM emissions released inside an open mine pit to remain inside the pit. The fraction of PM emissions that is retained in the open pit depends on the depth of the pit and the particle size (Winges 1986). A 50% pit retention for TSP emissions and 5% pit retention for PM_{10} emissions was applied based on recommendation in the Australian Emission Manual for Mining (Australian Government 2012). The fraction of $PM_{2.5}$ emissions retained in the open pits was estimated based on the original Winges equation (Winges 1981) assuming a pit depth of 150 m for Gordon site (Year 2) and 245 m for MacLallan site (Year 7). The calculated pit retention fraction of $PM_{2.5}$ emissions is 1% for the open pit at Gordon site and 2% for the open pit at MacLellan site. Details on the pit retention fractions used for PM emissions from the open pits at Gordon and MacLellan sites are provided in Appendix C. All emission sources in the open pit are modelled as surface area sources representing the open pit, including drilling and blasting emissions, diesel exhaust emissions from mining off-road equipment operating in the pit and fugitive dust emissions from mining off-road equipment movement, bulldozing, grading and truck loading.

Table E-5 Point Source Parameters

Model Source ID	Source Description	Operations	Source Parameters						
			UTM Easting	UTM Northing	Base Elevation	Stack Height	Stack Diameter	Exit Temperature	Exit Velocity
			m E	m N	m	m	m	K	m/s
PCDC	Primary Crusher Dust Collector	ML	380953	6308254	355.0	21.60	0.66	288	15.18
SCWS	Secondary Crusher Wet Scrubber	ML	380908	6308366	351.5	29.60	0.73	288	15.33
GRDO	Gold Room Drying Oven Stack	ML	380880	6308404	351.5	10.00	0.32	293	15.20
GRDC	Gold Room Dust Collector	ML	380874	6308407	351.5	10.00	0.32	293	15.20
DGEN	Diesel Generator at Gordon site	GD	412317	6307067	318.7	6.50	0.20	713	38.20

NOTES:
Location based on UTM Zone 14, NAD 83
Stacks are modelled as point sources
ML – MacLellan
GD - Gordon

Table E-6 Source Parameters for Regional Highway Sources

Model Source ID	Source Description	Temporal Variation	Source Parameters										
			UTM Easting	UTM Northing	Base Elevation	VH and PH	PW	RH	Volume Spacing	Sy	Sz	Length of Road Segment	Number of Sub-Volumes
			m E	m N	m	m	m	m	m	m	m	m	#
PR391_S1	Provincial Road 391 - Segment 1	Monthly (May to October; November to April)	382144	6304770	323	3.5	25	1.75	50	23.3	1.63	1,501	31
PR391_S2	Provincial Road 391 - Segment 2	Monthly (May to October; November to April)	383680	6304984	315	3.5	50	1.75	100	46.5	1.63	19,844	199
PR391_S3	Provincial Road 391 - Segment 3	Monthly (May to October; November to April)	399408	6295011	333	3.5	25	1.75	50	23.3	1.63	7,520	151
PR391_S4	Provincial Road 391 - Segment 4	Monthly (May to October; November to April)	406766	6294329	325	3.5	50	1.75	100	46.5	1.63	3,500	36
PR391_S5	Provincial Road 391 - Segment 5	Monthly (May to October; November to April)	377918	6304338	348	3.5	50	1.75	50	23.3	1.63	4,350	88

NOTES:
Location based on UTM Zone 14, NAD 83
Vehicle Height (VH) = Top of plume height (PH) = 3.5 m
Release Height (RH) = 1/2 x VH = 1.75 m
Plume Width (PW) = 25 m to 50 m
Initial Vertical Dimension (Sz) = PH/2.15
Initial Vertical Dimension (Sy) = Volume spacing/2.15
UTM easting and northing represent starting point of the road segment

Table E-7 Source Parameters for Project Volume Sources

Model Source ID	Source Description	Mine Area	Temporal Variation	Source Parameters					
				PH	PW	RH	Sy [c]	Sz [d]	Number of Sub-Volumes
				m	m	m	m	m	#
MH_OVB_M [a]	Material Unloading& Bulldozing at Overburden Stockpile at MacLellan Site	ML	Continuous	9.64	12.50	4.82	2.91	4.48	4
MH_WR_M [a]	Material Unloading& Bulldozing at Waste Rock Stockpile at MacLellan Site	ML	Continuous	9.64	12.50	4.82	2.91	4.48	4
MH_PC_M [a]	Material Unloading& Bulldozing at Mill (Primary Crusher and ROM Stockpile) at MacLellan Site	ML	Continuous	9.64	12.50	4.82	2.91	4.48	2
MH_LG_M [a]	Material Unloading& Bulldozing at Low Grade Ore Stockpile at MacLellan Site	ML	Continuous	9.64	12.50	4.82	2.91	4.48	2
MH_WR_G [a]	Material Unloading& Bulldozing at Waste Rock Stockpile at Gordon Site	GD	Continuous	9.64	12.50	4.82	2.91	4.48	4
MH_LG_G [a]	Material Unloading& Bulldozing at Low Grade Ore Stockpile at Gordon Site	GD	Continuous	9.64	12.50	4.82	2.91	4.48	1
MH_OVB_G [a]	Material Unloading& Bulldozing at Overburden Stockpile at Gordon Site	GD	Continuous	9.64	12.50	4.82	2.91	4.48	1
VPLANT [b]	Processing Plant Tanks for HCN fugitive emissions	ML	Continuous	16.40	40.00	16.40	9.30	7.63	1

NOTES:
[a] Vehicle Height (VH) = 5.67 (based on height of truck CAT 785D)
Top of plume height (PH) = 1.7 x VH (US EPA 2012)
Release Height (RH) = 1/2 x PH = 4.82 m
Plume Width (PW) = Vehicle width (VW) + 6 (based on width of truck CAT 785D; VW = 6.5 m)
US EPA (2012)
[b] VPLANT plume height is based on tank height; Plume width is based on tank farm area; release height is based on tank height
[c] Initial Vertical Dimension (Sz) = PH/2.15
[d] Initial Vertical Dimension (Sy) = PW/4.3
UTM easting and northing is provided for the first sub-volume source.
ML – MacLellan mining area
GD – Gordon mining area

Table E-8 Source Locations for Project Volume Sources

Model ID of Sub-Volume Source	Source Description	UTM Easting	UTM Northing	Base Elevation
		m E	m N	m
MH_OVB_M1	Material Unloading & Bulldozing at Overburden Stockpile at MacLellan Site	381661	6308198	372
MH_OVB_M2		381644	6308318	370
MH_OVB_M3		381579	6308421	369
MH_OVB_M4		381498	6308546	370
MH_WR_M1	Material Unloading & Bulldozing at Waste Rock Stockpile at MacLellan Site	381913	6308813	365
MH_WR_M2		382762	6308481	382
MH_WR_M3		383536	6309022	357
MH_WR_M4		383907	6309498	355
MH_PC_M1	Material Unloading & Bulldozing at Mill (Primary Crusher and ROM Stockpile) at MacLellan Site	380950	6308228	369
MH_PC_M2		380968	6308140	369
MH_LG_M1	Material Unloading & Bulldozing at Low Grade Ore Stockpile at MacLellan Site	380917	6308019	373
MH_LG_M2		381163	6308099	373
MH_WR_G1	Material Unloading & Bulldozing at Waste Rock Stockpile at Gordon Site	411648	6306668	345
MH_WR_G2		411469	6306990	349
MH_WR_G3		411900	6306860	367
MH_WR_G4		411763	6307058	364
MH_LG_G	Material Unloading & Bulldozing at Low Grade Ore Stockpile at Gordon Site	412195	6307328	332
MH_OVB_G	Processing Plant Building for HCN fugitive emissions	411773	6307736	327
VPLANT	Processing Plant Building for HCN fugitive emissions	380861	6308329	352

Table E-9 Source Parameters for Haul Roads

Source ID	Description	Mine Area	Temporal Variation	UTM Easting	UTM Northing	Base Elevation	PH	PW	RH	Inter-Volume Distance	Sy [c]	Sz [c]	Length of Road	Number of Sub-Vol-umes
				m E	m N	m	m	m	m	m	m	m	m	#
HR_POB_M [a]	Haul Road from Open Pit to Overburden Stockpile at MacLellan Site	ML	Monthly (May to October; November to April)	381463	6307831	332	9.64	34	4.82	68	31.6	4.48	743	12
HR_PWR_M [a]	Haul Road from Open Pit to Waste Rock Stockpile at MacLellan Site	ML	Monthly (May to October; November to April)	381463	6307831	332	9.64	34	4.82	68	31.6	4.48	2924	44
HR_PM_M [a]	Haul Road from Open Pit to Mill at MacLellan Site	ML	Monthly (May to October; November to April)	381463	6307831	332	9.64	34	4.82	68	31.6	4.48	1009	16
HR_PLG_M [a]	Haul Road from Open Pit to Low Grade Ore Stockpile at MacLellan Site	ML	Monthly (May to October; November to April)	381463	6307831	332	9.64	34	4.82	68	31.6	4.48	1156	18
HR_LGROM_M [b]	Haul Road from Low Grade Ore Stockpile to ROM Stockpile at MacLellan Site	ML	Monthly (May to October; November to April)	381058	6308052	369	5.95	34	2.98	68	31.6	2.77	136	3
HR_PWR_G [a]	Haul Road from Open Pit to Waste Rock Stockpile at Gordon Site	GD	Monthly (May to October; November to April)	412162	6307696	295	9.64	34	4.82	68	31.6	4.48	952	15
HR_PLG_G [a]	Haul Road from Open Pit to Low Grade Ore Stockpile at Gordon Site	GD	Monthly (May to October; November to April)	412162	6307696	295	9.64	34	4.82	68	31.6	4.48	677	11

Table E-9 Source Parameters for Haul Roads

Source ID	Description	Mine Area	Temporal Variation	UTM Easting	UTM Northing	Base Elevation	PH	PW	RH	Inter-Volume Distance	Sy [c]	Sz [c]	Length of Road	Number of Sub-Volumes
				m E	m N	m	m	m	m	m	m	m	m	#
HR_POB_G [a]	Haul Road from Open Pit to Overburden Stockpile at Gordon Site	GD	Monthly (May to October; November to April)	412162	6307696	295	9.64	34	4.82	68	31.6	4.48	544	9

NOTES:

Location based on UTM Zone 14, NAD 83

[a] Vehicle Height (VH) = 5.67 m (CAT 785D mining truck). Top of plume Height (PH) = 1.7 x VH = 9.64 m. Release Height (RH) = 1/2 x PH = 4.82 m. Road Width (RW) = 25 m for haul roads. Plume Width (PW) = RW + 6 m. PW = 34 m for haul roads. Volume source separation distance = 68 m (double of plume width) US EPA (2012).

[b] Vehicle Height (VH) = 3.50 m (Peterbilt 367 mining truck). Top of plume Height (PH) = 1.7 x VH = 5.95 m. Release Height (RH) = 1/2 x PH = 2.98 m. Road Width (RW) = 25 m for haul roads. Plume Width (PW) = RW + 6 m. PW = 34 m for haul roads. Volume source separation distance = 68 m (double of plume width) US EPA (2012).

[c] Initial Vertical Dimension (Sz) = PH/2.15

Initial Vertical Dimension (Sy) = PW/4.3

UTM easting and northing is provided for the first sub-volume source.

ML – MacLellan mining area

GD – Gordon mining area

Table E-10 Source Parameters for Access Roads

Source ID	Unit Description	Mine Area	Temporal Variation	Source Parameters										
				UTM Easting	UTM Northing	Base Elevation	PH	PW	RH	Inter-Volume Distance	Sy	Sz	Length of Road	Number of Sub-Volumes
				m E	m N	m	m	m	m	m	m	m	m	#
AR_WC_M [a]	Access Road to Worker's Camp at Maclellan Site	ML	Continuous/ Seasonal	377884	6304355	348	3.40	25	1.70	50	23.3	1.58	5594	113
AR_EM_M [b]	Access Road to Explosive Magazine at Maclellan Site	ML	Continuous/ Seasonal	377884	6304355	348	5.95	25	2.98	50	23.3	2.77	6400	129
ARO_M [b]	Access Road to Mill at Maclellan Site	ML	Continuous/ Seasonal	377884	6304355	348	5.95	25	2.98	50	23.3	2.77	5250	106
AR1_G [b]	Access Road Segment 1 at Gordon Site	GD	Continuous/ Seasonal	412358	6307342	321	5.95	25	2.98	50	23.3	2.77	3689	75
AR2_G [b]	Access Road Segment 2 at Gordon Site	GD	Continuous/ Seasonal	411647	6303676	300	5.95	50	2.98	100	46.5	2.77	11097	112

NOTES:

Location based on UTM Zone 14, NAD 83

[a] Vehicle Height (VH) = 3.50 m (Peterbilt 367 mining truck). Top of plume Height (PH) = 1.7 x VH = 5.95 m. Release Height (RH) = 1/2 x PH = 2.98 m. Plume Width = half of intervolume distance. Volume source separation distance = 50 -100 m (double of plume width) US EPA (2012).

[b] Vehicle Height (VH) = 3.50 m (Pick-up truck). Top of plume Height (PH) = 1.7 x VH = 3.40 m. Release Height (RH) = 1/2 x PH = 1.70 m. Plume Width = half of intervolume distance of 50m. Volume source separation distance = 50 m (double of plume width) US EPA (2012).

[c] Initial Vertical Dimension (Sz) = PH/2.15
Initial Lateral Dimension (Sy) = Inter-volume distance/2.15

UTM easting and northing is provided for the first sub-volume source.

ML – MacLellan mining area

GD – Gordon mining area

Table E-11 Source Parameters for Stockpile Area Sources

Model ID	Source Description	Mine Area	Temporal Variation	Source Parameters			
				Release Height	Initial Vertical Dimension	Area	Number of Sub-Areas
				m	m	m²	#
WE_OVB_M	Overburden Stockpile Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 16.4 m/s	20.0	1	151756	5
WE_WR_M	Waste Rock Stockpile Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 16.4 m/s	30.0	1	2622566	11
WE_LG1_M	Low Grade Ore Stockpile 1 Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 16.4 m/s	20.0	1	37014	2
WE_LG2_M	Low Grade Ore Stockpile 2 Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 16.4 m/s	20.0	1	48818	2
WE_ROM_M	ROM Stockpile Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 16.4 m/s	20.0	1	2471	1
WE_TS_M	Top Soil Stockpile Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 16.4 m/s	20.0	1	50036	3
WE_OVB_G	Overburden Stockpile Wind Erosion at Gordon site	GD	Variable, Only When Wind Speed is > 16.4 m/s	10.0	1	51948	3
WE_WR_G	Waste Rock Stockpile Wind Erosion at Gordon site	GD	Variable, Only When Wind Speed is > 16.4 m/s	26.7	1	634282	7
WE_LG_G	Low Grade Ore Stockpiles Wind Erosion at Gordon site	GD	Variable, Only When Wind Speed is > 16.4 m/s	10.0	1	23505	3

NOTES:
[a] Stockpile is modelled as area source
[b] Effective release height is 2/3rd stockpile height.
ML – MacLellan mining area
GD – Gordon mining area

Table E-12 Location of for Stockpile Area Sources

Source Description	Source ID	Sub-Area No.	Sub-Area ID	Corner 1		Corner 2		Corner 3		Corner 4		Base Elevation
				Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	m
Overburden Stockpile Wind Erosion	WE_OVB_M	1	WE_OVB_M1	381627	6307996	381593	6308050	381791	6308183	381818	6308108	344
Overburden Stockpile Wind Erosion	WE_OVB_M	2	WE_OVB_M2	381601	6308055	381544	6308165	381759	6308252	381791	6308183	344
Overburden Stockpile Wind Erosion	WE_OVB_M	3	WE_OVB_M3	381555	6308170	381470	6308333	381727	6308381	381759	6308252	344
Overburden Stockpile Wind Erosion	WE_OVB_M	4	WE_OVB_M4	381470	6308333	381386	6308491	381550	6308676	381727	6308381	344
Overburden Stockpile Wind Erosion	WE_OVB_M	5	WE_OVB_M5	381386	6308491	381352	6308556	381514	6308691	381550	6308676	344
Waste Rock Stockpile Wind Erosion	WE_WR_M	1	WE_WR_M1	381517	6308705	381482	6308911	381636	6309227	381847	6309202	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	2	WE_WR_M2	381595	6308655	381517	6308705	381847	6309202	381977	6309040	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	3	WE_WR_M3	381812	6308298	381595	6308655	381977	6309040	382174	6308858	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	4	WE_WR_M4	381952	6308133	381851	6308133	381812	6308298	382174	6308857	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	5	WE_WR_M5	382146	6308255	381952	6308133	382174	6308857	382516	6308942	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	6	WE_WR_M6	382253	6308254	382146	6308255	382517	6308943	382555	6308876	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	7	WE_WR_M7	382424	6308187	382253	6308254	382555	6308876	382780	6308943	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	8	WE_WR_M8	383197	6308261	382424	6308186	382785	6308953	383043	6309038	346

Table E-12 Location of for Stockpile Area Sources

Source Description	Source ID	Sub-Area No.	Sub-Area ID	Corner 1		Corner 2		Corner 3		Corner 4		Base Elevation
				Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	m
Waste Rock Stockpile Wind Erosion	WE_WR_M	9	WE_WR_M9	383809	6308395	383197	6308261	383043	6309037	383275	6309118	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	10	WE_WR_M10	383809	6308395	383274	6309118	383512	6309283	384455	6309313	346
Waste Rock Stockpile Wind Erosion	WE_WR_M	11	WE_WR_M11	383512	6309284	383990	6310024	384526	6310036	384455	6309313	346
Ore Stockpile Wind Erosion	WE_LG1_M	1	WE_LG1_M1	380844	6307899	380964	6307919	380893	6308153	380832	6308142	354
Ore Stockpile Wind Erosion	WE_LG1_M	2	WE_LG1_M2	380964	6307920	380918	6308073	381030	6308092	381037	6307931	354
Ore Stockpile Wind Erosion	WE_LG2_M	1	WE_LG2_M1	381037	6307932	381027	6308159	381130	6308186	381176	6307955	354
Ore Stockpile Wind Erosion	WE_LG2_M	2	WE_LG2_M2	381162	6308029	381131	6308186	381248	6308218	381304	6308096	354
ROM Stockpile wind erosion	WE_ROM_M	1	WE_ROM_M1	380936	6308158	380991	6308167	380998	6308123	380944	6308114	355
Topsoil Stockpile Wind Erosion	WE_TS_M	1	WE_TS_M1	381829	6307775	381714	6307960	381787	6308003	381973	6307864	333
Topsoil Stockpile Wind Erosion	WE_TS_M	2	WE_TS_M2	381973	6307864	381787	6308003	381865	6308032	381980	6307932	333
Topsoil Stockpile Wind Erosion	WE_TS_M	3	WE_TS_M3	381980	6307932	381865	6308032	381971	6308061	382026	6307973	333
Overburden Stockpile Wind Erosion	WE_OVB_G	1	WE_OVB_G1	411585	6307761	411642	6307851	411782	6307860	411887	6307763	318
Overburden Stockpile Wind Erosion	WE_OVB_G	2	WE_OVB_G2	411596	6307707	411585	6307760	411887	6307763	411898	6307709	318
Overburden Stockpile Wind Erosion	WE_OVB_G	3	WE_OVB_G3	411596	6307654	411596	6307707	411898	6307709	411871	6307659	318
Waste Rock Stockpile Wind Erosion	WE_WR_G	1	WE_WR_G1	411256	6306976	411296	6307176	411542	6307302	411651	6307279	331

Table E-12 Location of for Stockpile Area Sources

Source Description	Source ID	Sub-Area No.	Sub-Area ID	Corner 1		Corner 2		Corner 3		Corner 4		Base Elevation
				Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	m
Waste Rock Stockpile Wind Erosion	WE_WR_G	2	WE_WR_G2	411332	6306672	411257	6306977	411651	6307279	411753	6307255	331
Waste Rock Stockpile Wind Erosion	WE_WR_G	3	WE_WR_G3	411560	6306525	411332	6306672	411737	6307234	411860	6307205	331
Waste Rock Stockpile Wind Erosion	WE_WR_G	4	WE_WR_G4	411840	6306455	411560	6306525	411870	6307229	412074	6307191	331
Waste Rock Stockpile Wind Erosion	WE_WR_G	5	WE_WR_G5	411973	6306541	411840	6306455	412074	6307191	412182	6307169	331
Waste Rock Stockpile Wind Erosion	WE_WR_G	6	WE_WR_G6	412038	6306524	411973	6306541	412182	6307169	412229	6307108	331
Waste Rock Stockpile Wind Erosion	WE_WR_G	7	WE_WR_G7	412102	6306483	412038	6306524	412229	6307108	412214	6306772	331
Low Grade Ore Stockpile Wind Erosion	WE_LG_G	1	WE_LG_G1	412102	6307265	412130	6307355	412287	6307281	412278	6307222	326
Low Grade Ore Stockpile Wind Erosion	WE_LG_G	2	WE_LG_G2	412130	6307355	412152	6307423	412276	6307350	412287	6307281	326
Low Grade Ore Stockpile Wind Erosion	WE_LG_G	3	WE_LG_G3	412152	6307423	412178	6307503	412298	6307402	412276	6307350	326

NOTES:
Location based on UTM Zone 14, NAD 83

Table E-13 Stockpiles Emission Scaling Factors by Wind Speed Category for Wind Erosion Emissions

Wind Speed Category	Hourly Wind Speed (m/s)		CALPUFF Scaling Factor
	Lower Limit	Upper Limit	
1	0	8	0
2	8	9	0
3	9	10	0
4	10	11	0
5	11	16.4	0
6	16.4	—	1

NOTES:
Based on threshold friction velocity 1.02 m/s for overburden

Table E-14 Source Parameters for Tailing Management Facility and Supporting Equipment General Area Sources

Model ID	Source Description	Mine Area	Temporal Variation	Source Parameters			
				Release Height	Initial Vertical Dimension	Area	Number of Sub-Areas
				m	m	m²	#
WE_TMF1_M	TMF Dry Banks Area 1 Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 7.2 m/s	0.50	1.0	181995	3
WE_TMF2_M	TMF Dry Banks Area 2 Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 7.2 m/s	0.50	1.0	189711	3
WE_TMF3_M	TMF Dry Banks Area 3 Wind Erosion at MacLellan site	ML	Variable, Only When Wind Speed is > 7.2 m/s	0.50	1.0	131451	3
TMF_M	TMF Pond for HCN emissions	ML	Continuous	0.50	3.0	1824360	4
GA_M	General Area supporting equipment	ML	Continuous	2.55	2.4	57171	1
GA_G	General Area supporting equipment	GD	Continuous	2.55	2.4	21838	1

NOTES:
General area release parameters are based on dimensions of a bulldozer
ML – MacLellan mining area
GD – Gordon mining area

Table E-15 Location of Tailing Management Facility and Supporting Equipment General Area Sources

Source Description	Source ID	Sub-Area No.	Sub-Area ID	Corner 1		Corner 2		Corner 3		Corner 4		Base Elevation
				Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	m
TMF Dry Bank Area Wind Erosion	WE_TMF1_M	1	WE_TMF1_M1	381829	6309624	381877	6309327	381782	6309278	381790	6309590	369
TMF Dry Bank Area Wind Erosion	WE_TMF1_M	2	WE_TMF1_M2	382175	6308863	381782	6309279	381877	6309326	382336	6308905	369
TMF Dry Bank Area Wind Erosion	WE_TMF1_M	3	WE_TMF1_M3	382335	6308906	382212	6309020	382955	6309223	382995	6309135	369
TMF Dry Bank Area Wind Erosion	WE_TMF2_M	1	WE_TMF2_M1	382995	6309134	382954	6309222	383376	6309485	383455	6309429	369
TMF Dry Bank Area Wind Erosion	WE_TMF2_M	2	WE_TMF2_M2	383459	6309429	383375	6309484	383577	6310607	383679	6310614	369
TMF Dry Bank Area Wind Erosion	WE_TMF2_M	3	WE_TMF2_M3	383679	6310614	383577	6310607	383498	6310866	383581	6310916	369
TMF Dry Bank Area Wind Erosion	WE_TMF3_M	1	WE_TMF3_M1	383125	6310526	383088	6310623	383498	6310866	383526	6310774	369
TMF Dry Bank Area Wind Erosion	WE_TMF3_M	2	WE_TMF3_M2	383125	6310526	382582	6310440	382543	6310509	383088	6310623	369
TMF Dry Bank Area Wind Erosion	WE_TMF3_M	3	WE_TMF3_M3	382582	6310440	382065	6309991	382049	6310013	382543	6310509	369
TMF pond for HCN vapour emissions	TMF_M	1	TMF_M1	383373	6309491	383120	6310523	383524	6310771	383572	6310608	363
TMF pond for HCN vapour emissions	TMF_M	2	TMF_M2	382952	6309225	382584	6310438	383120	6310523	383373	6309491	363
TMF pond for HCN vapour emissions	TMF_M	3	TMF_M3	382211	6309022	382066	6309985	382584	6310438	382952	6309227	363
TMF pond for HCN vapour emissions	TMF_M	4	TMF_M4	381829	6309622	382066	6309985	382209	6309023	381878	6309329	363
General Area for supporting equipment	GA_M	1	GA_M1	380751	6308269	380721	6308422	381085	6308486	381112	6308334	352
General Area for supporting equipment	GA_G	1	GA_G1	411918	6307351	411982	6307511	412096	6307466	412039	6307303	329

Table E-16 Tailings Management Facility Emission Scaling Factors by Wind Speed Category for Wind Erosion Emissions

Wind Speed Category	Hourly Wind Speed (m/s)		CALPUFF Scaling Factor
	Lower Limit	Upper Limit	
1	0	7.2	0
2	7.2	8	0.057
3	8	9	0.218
4	9	10	0.472
5	10	11	0.706
6	11	—	1

NOTES:

Based on threshold friction velocity 0.35 m/s for tailings

Table E-17 Source Parameters for Mine Open Pit Area Sources

Source ID	Unit Description	Mine Site	Temporal Variation	Release Height	Initial Vertical Dimension	Average Pit Depth	Pit Area (model)	Pit Retention Algorithm Applied for PM?	Number of Sub-Areas
				m	m	m	m^2		#
PIT_HR_M [a]	Open Pit Haul Road at MacLellan site	ML	Monthly (May to October; November to April)	5	4.65	245	654142	YES	8
PIT_LB_M [a]	Open Pit Loading& Bulldozing at MacLellan site	ML	Continuous	5	4.65	245	654142	YES	8
PIT_BL_M [b]	Open Pit Blasting at MacLellan site	ML	Monday, Thursday and Sunday, 11 am to 12 pm	5	4.65	245	654142	YES	8
PIT_HR_G [a]	Open Pit Haul Road at Gordon site	GD	Monthly (May to October; November to April)	5	4.65	150	280042	YES	8
PIT_LB_G [a]	Open Pit Loading& Bulldozing at Gordon site	GD	Continuous	5	4.65	150	280042	YES	8
PIT_BL_G [b]	Open Pit Blasting at Gordon site	GD	Monday, Thursday and Sunday, 11 am to 12 pm	5	4.65	150	280042	YES	8

NOTES:

[a] Vehicle Height (VH) = 5.67 m (CAT 785D mining truck). Top of plume Height (PH) = 1.7 x VH ~ 10 m. Release Height (RH) = 1/2 x PH = 5 m.

[b] Assumed blast plume height = 10 m

[c] Initial Vertical Dimension (Sz) = PH/2.15

ML – MacLellan mining area

GD – Gordon mining area

Table E-18 Location of Mine Open Pit Area Sources

Source Description	Source ID	Sub-Area No.	Sub-Area ID	Corner 1		Corner 2		Corner 3		Corner 4		Base Elevation
				Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)	m
PIT	PIT_HR_M	1	PIT_HR_M1	380448	6307080	380333	6307160	380334	6307360	380438	6307575	330
PIT	PIT_HR_M	2	PIT_HR_M2	380601	6307101	380448	6307080	380438	6307575	380584	6307717	330
PIT	PIT_HR_M	3	PIT_HR_M3	380905	6307209	380601	6307101	380584	6307716	380779	6307853	330
PIT	PIT_HR_M	4	PIT_HR_M4	381033	6307240	380905	6307209	380779	6307853	380922	6307889	330
PIT	PIT_HR_M	5	PIT_HR_M5	381327	6307394	381033	6307240	380922	6307889	381152	6307885	330
PIT	PIT_HR_M	6	PIT_HR_M6	381478	6307565	381327	6307394	381152	6307885	381339	6307812	330
PIT	PIT_HR_M	7	PIT_HR_M7	381569	6307615	381479	6307565	381339	6307812	381491	6307863	330
PIT	PIT_HR_M	8	PIT_HR_M8	381604	6307709	381569	6307615	381506	6307815	381575	6307783	330
PIT	PIT_HR_G	1	PIT_HR_G1	412078	6307724	412024	6307874	412038	6308013	412167	6308043	319
PIT	PIT_HR_G	2	PIT_HR_G2	412204	6307665	412079	6307723	412167	6308044	412339	6308044	319
PIT	PIT_HR_G	3	PIT_HR_G3	412197	6307643	412339	6308044	412482	6308043	412309	6307593	319
PIT	PIT_HR_G	4	PIT_HR_G4	412308	6307593	412481	6308043	412553	6308021	412359	6307582	319
PIT	PIT_HR_G	5	PIT_HR_G5	412359	6307582	412565	6308040	412606	6308050	412518	6307610	319
PIT	PIT_HR_G	6	PIT_HR_G6	412519	6307609	412607	6308049	412661	6308014	412623	6307629	319
PIT	PIT_HR_G	7	PIT_HR_G7	412624	6307628	412661	6308015	412733	6308011	412725	6307760	319
PIT	PIT_HR_G	8	PIT_HR_G8	412725	6307760	412733	6308013	412762	6307991	412791	6307798	319

E.3.10 Interpretation of Predictions

1. Hourly and Daily Emission Rates

For this assessment, each emission source was modelled separately with CALPUFF model using 1 g/s emission rate. CALUFF postprocessor CALSUM was then used to combine model results from all emission sources by scaling the actual emission rate of each source for each contaminant.

MacLellan and Gordon mining operations emissions are calculated for both hourly and daily emission rates, as discussed in Appendix C. CALSUM was used to combine all emission source separately for hourly and daily emissions rate scenarios. Model results based on hourly emission rates were used to determine 1-hour and 8-hour average predicted concentrations. Model results based on daily emission rates were used to determine 24-hour and annual average predicted concentrations.

2. Comparison to Ambient Air Quality Objectives

The Manitoba AQMG does not specify any methodology on how to compare predicted concentrations against the ambient air quality objectives. In absence of any direction on interpretation of results, the Ontario air dispersion modelling guideline (MOECC 2016) methodology was used.

The Ontario guideline states that in modelling applications using regional or local meteorological data sets, certain extreme, rare and transient meteorological conditions may be present in the data sets that may be considered outliers. For shorter averaging periods, such as 1-hour concentrations, the meteorological conditions for the eight hours with the highest 1-hour average predicted concentrations in each single meteorological year are considered as anomalies and may be discarded. The highest concentration after elimination of these forty meteorological anomalies over the five-year period from the modelling results is compared against the ambient air quality criteria.

For assessment of 24-hour average concentrations, the highest 24-hour average predicted concentration in each single meteorological year may be discarded. For annual concentrations, the highest annual concentrations in the 5-year period will be considered, without removal of any meteorological anomalies.

3. Contour Concentration and Deposition Plots

Ambient concentration and deposition predictions are displayed as contour plots superimposed over base maps for the local assessment area (LAA). The concentration contour plots are based on the maximum values from the five-year simulation period. In preparing these contour plots, a grid spacing of 200 m was adopted for the LAA contour plots. This may result in some “smoothing” of the contours. However, tabular results are also provided which precisely represent the results at the discrete receptors based on the emissions estimates and model outputs with no smoothing or other manipulation.

E.4 SUMMARY AND CONCLUSIONS

The CALPUFF dispersion model (most recent Version 7.2.1, Level 150618) was selected as the primary air quality assessment tool to predict ambient concentrations and deposition for the air quality assessment. The following are adopted for the application of the model:

- 16,343 gridded and sensitive receptor points to assess criteria air contaminant (CAC), VOC, PAH and metal concentrations, and TSP and metal deposition for the 28 km by 50 km LAA.
- Five years of meteorological data for the period January 2012 to December 2016 to represent the wide range of weather conditions that could occur. The CALMET model (see Appendix D) was used to provide the meteorological data for the CALPUFF model.
- The OLM was selected to estimate ambient NO_2 concentrations from the predicted NO_X values.
- The CALPUFF model was applied to MacLellan and Gordon emissions using the source and emission inventory information described in Appendix C.

The approach and input parameters were selected to determine air quality changes due to the Project.

E.5 CALPUFF MODEL OPTIONS

For the purposes of organization, the CALPUFF control file defines 20 input groups as identified in Table E-19. The input parameters for the CALPUFF control file used in this modelling assessment are provided in Tables E-20 to E-27. The Manitoba and Ontario AQMG does not provide guidance on assumptions and switches to be used. Alberta and British Columbia AQMG were used to set up CALPUFF model input file. In absence of specific guidance, the default values are assumed to be those defined in the CALPUFF user manual (Scire et al. 2000). These non-default values are highlighted by orange shading in the following tables. The default values and the values adopted for this updated assessment are identified in the tables.

Table E-19 Input Groups in the CALPUFF Control File

Input Group	Description	Applicable to Project?
0	Input and output file names	Yes
1	General run control parameters	Yes
2	Technical options	Yes
3	Species list	Yes
4	Map projection and grid control parameters	Yes
5	Output options	Yes
6	Sub grid scale complex terrain inputs	No
7	Dry deposition parameters for gases	Yes
8	Dry deposition parameters for particles	Yes
9	Miscellaneous dry deposition for parameters	Yes
10	Wet deposition parameters	Yes
11	Chemistry parameters	No
12	Misc. dispersion and computational parameters	Yes
13	Point source parameters	Yes
14	Area source parameters	Yes
15	Line source parameters	No
16	Volume source parameters	Yes
17	Flare source control parameters	No
18	Road emissions parameters	No
19	Emission rate scale-factor tables	Yes

Table E-20 CALPUFF Model Options Groups 1 and 2

Input Group 1: General Run Control Parameters

Parameter	Default	Project	Comments
METRUN	0	0	All model periods in met file(s) will be run
IBYR	-	2012	Starting year
IBMO	-	1	Starting month
IBDY	-	1	Starting day
IBHR	-	0	Starting hour
IEYR	-	2016	Ending year
IEMO	-	1	Ending month
IEDY	-	1	Ending day
IEHR	-	0	Ending hour
ABTZ		UTC-0600	Base time zone (6 = CST)
NSPEC	5	12	Number of chemical species
NSE	3	12	Number of chemical species to be emitted
ITEST	2	2	Program is executed after SETUP phase
MRESTART	0	0	Do not read or write a restart file during run
NRESPD	0	0	File updated every 24 periods
METFM	1	1	CALMET binary file (CALMET.MET)
MPRFFM	1	1	Meteorological Profile Data Format
AVET	60	60	Averaging time in minutes
PGTIME	60	60	PG Averaging time in minutes
IOUTU	1	1	Output units for binary concentration and flux files written in Dataset v2.2 or later formats. 1 = mass - g/m^3 (concentration) or $g/m^2/s$ (deposition)

Input Group 2: Technical Options

Parameter	Default	Project	Comments
MGAUSS	1	1	Gaussian distribution used in near field
MCTADJ	3	3	Partial plume path terrain adjustment
MCTSG	0	0	Scale-scale complex terrain not modelled
MSLUG	0	0	Near-field puffs not modelled as elongated
MTRANS	1	1	Transitional plume rise modelled
MTIP	1	1	Stack tip downwash used

Table E-20 CALPUFF Model Options Groups 1 and 2

Input Group 2: Technical Options (cont'd)

Parameter	Default	Project	Comments
MRISE	1	1	Method used to compute plume rise for point sources not subject to building downwash 1 = Briggs plume rise
MTIP_FL	0	0	No stack-tip downwash for flare sources
MRISE_FL	2	2	Plume rise module for flare sources; 2=Numerical plume rise
MBDW	1	2	PRIME Method is used to simulate building downwash as per the BC and Alberta AQMG
MSHEAR	0	0	Vertical wind shear is not modelled
MSPLIT	0	0	Puff splitting not used as per the AQMG
MCHEM	1	0	Chemical Transformation not modelled
MAQCHEM	0	0	Aqueous phase transformation not modelled
MLWC	1	1	Liquid Water Content flag (Used only if MAQCHEM = 1)
MWET	1	1	Wet removal modelled
MDRY	1	1	Dry deposition modelled
MTILT	0	0	Gravitational settling (plume tilt) modelled for fugitive dust
MDISP	3	2	Dispersion coefficients from internally calculated sigma v, sigma w using micrometeorological variables (u*, w*, L, etc.) as per the AQMG 9 (as per the BC and Alberta AQMG)
MTURBVW	3	3	Use both σ_v and σ_w from PROFILE.DAT to compute σ_y and σ_z (n/a)
MDISP2	3	3	PG dispersion coefficients for rural areas (computed using ISCST3 approximation) and MP coefficients in urban areas when measured turbulence data is missing
MTAULY	0	0	Draxler default 617.284 (s)
MTAUADV	0	0	No turbulence advection
MCTURB	1	1	Standard CALPUFF subroutines
MROUGH	0	0	PG σ_y and σ_z is not adjusted for roughness
MPARTL	1	1	Partial plume penetration of elevated inversion
MPARTLBA	1	1	Partial plume penetration of elevated inversion modelled for the buoyant area sources (as per the BC and Alberta AQMG)
MTINV	0	0	Strength of temperature inversion computed from default gradients
MPDF	0	1	The probability density function (PDF) to be used for dispersion under convective conditions as per the BC and Alberta AQMG

Table E-20 CALPUFF Model Options Groups 1 and 2

Input Group 2: Technical Options (cont'd)

Parameter	Default	Project	Comments
MSGTIBL	0	0	Sub-grid TIBL module not used for shoreline
MBCON	0	0	Boundary concentration conditions not modelled
MSOURCE	0	0	Individual source contributions not saved
MFOG	0	0	Do not configure for FOG model output
MREG	1	0	Do not test options specified to see if they conform to regulatory values as per the AQMG

Table E-21 CALPUFF Model Options Groups 3 and 4

Input Group 3: Species List-Chemistry Options

CSPEC	Modelled[1]	Emitted[2]	Dry Deposition[3]	Output Group Number
SO_2	1	1	0	0
NOx	1	1	0	0
CO	1	1	0	0
VOC1	1	1	3	0
VOC2	1	1	3	0
HCN	1	1	3	0
$PM_{2.5}$ (Combustion product)	1	1	2	0
$PM_{2.5}$ to PM_{10} range (Combustion product)	1	1	2	0
PM_{10} to TSP (Combustion product)	1	1	2	0
$PM_{2.5}$ (Fugitive dust)	1	1	2	0
$PM_{2.5}$ to PM_{10} range (Fugitive dust)	1	1	2	0
PM_{10} to TSP (Fugitive dust)	1	1	2	0

NOTES:

[1] 0=no, 1=yes

[2] 0=no, 1=yes

[3] 0=none, 1=computed-gas, 2=computed particle, 3=user-specified

VOC was modelled twice – VOC1 was used for simulating PAH concentration and deposition and VOC2 for simulating mercury (gaseous form) concentration and deposition because PAH and gaseous mercury have different dry and wet deposition parameters.

Input Group 4: Map Projection and Grid Control Parameters

Parameter	Default	Project	Comments
PMAP	UTM	UTM	Universal Transverse Mercator
FEAST	0	0	False Easting (km) at the projection origin
FNORTH	0	0	False Northing (km) at the projection origin
IUTMZN	-	14	UTM zone
UTMHEM	N	N	Northern Hemisphere for UTM projection
DATUM	WGS-84	NAR-C	NAR-C is applicable for this assessment. WGS-84 is just the datum for TRC demo case along with the CALPUFF release.
NX	-	140	Number of X grid cells in meteorological grid
NY		96	Number of Y grid cells in meteorological grid
NZ	No default	12	Vertical grid definition: Number of vertical layers as per the AEP Model Guideline.

Table E-22 CALPUFF Model Options Groups 3 and 4

Input Group 4: Map Projection and Grid Control Parameters (cont'd)

DGRIDKM	-	0.5	Grid spacing (km) to match CALMET (see Appendix C)
ZFACE	No default	0, 20, 40, 80, 120, 280, 520, 880, 1320, 1820, 2380, 3000 and 4000	Vertical grid definition: Cell face heights (m)
XORIGKM	-	361.775	Reference X coordinate for SW corner of grid cell (1,1) of meteorological grid (km)
YORIGKM	-	6278.500	Reference Y coordinate for SW corner of grid cell (1,1) of meteorological grid (km)
IBCOMP	-	1	X index of lower left corner of the computational grid
JBCOMP	-	1	Y index of lower left corner of the computational grids
IECOMP	-	140	X index of the upper right corner of the computational grid
JECOMP	-	96	Y index of the upper right corner of the computational grid
LSAMP	T	F	Sampling grid is not used
IBSAMP	-	1	X index of lower left corner of the sampling grid
JBSAMP	-	1	Y index of lower left corner of the sampling grid
IESAMP	-	140	X index of upper right corner of the sampling grid
JESAMP	-	96	Y index of upper right corner of the sampling grid
MESHDN	1	1	Nesting factor of the sampling grid

Table E-23 CALPUFF Model Option Group 5

Input Group 5: Output Option

Parameter	Default	Project	Comments
ICON	1	1	Output file CONC.DAT containing concentrations is created
IDRY	1	1	Output file DFLX.DAT containing dry fluxes is created
IWET	1	1	Output file WFLX.DAT containing wet fluxes is created
IT2D	0	0	2D Temperature
IRHO	0	0	Density
IVIS	1	0	Output file containing relative humidity data is not created
LCOMPRS	T	T	Do not perform data compression in output file
IQAPLOT	1	1	Create a standard series of output files (e.g., locations of sources, receptors, grids ...) suitable for plotting
IMFLX	0	0	Do not calculate mass fluxes across specific boundaries
IPFTRAK	0	0	Puff locations and properties reported to PFTRAK.DAT file for postprocessing
IMBAL	0	0	Mass balances for each species are not reported hourly
INRISE	0	0	Create a file with plume properties for each rise increment, for each model timestep
ICPRT	0	0	Do not print concentration fields to the output list file
IDPRT	0	0	Do not print dry flux fields to the output list file
IWPRT	0	0	Do not print wet flux fields to the output list file
ICFRQ	1	72	Concentration fields are printed to output list file every 24-hour
IDFRQ	1	72	Dry flux fields are printed to output list file every 24-hour
IWFRQ	1	72	Wet flux fields are printed to output list file every 24-hour
IPRTU	1	3	Units for line printer output are in µg/m^3 for concentration and µg/m^2/s for deposition
IMESG	2	2	Messages tracking the progress of run are written on screen
LDEBUG	F	F	Logical value for debug output
IPFDEB	1	1	First puff to track
NPFDEB	1	1	Number of puffs to track
NN1	1	1	Meteorological period to start output
NN2	10	10	Meteorological period to end output

Table E-22 CALPUFF Model Option Group 5

Input Group 5: Output Option (cont'd)

Species	Concentrations Printed (0= no, 1 = yes)		Dry Fluxes Printed (0 = no, 1 = yes)		Wet Fluxes Printed (0 = no, 1 = yes)		Mass Flux	
	Printed	Saved to Disk	Printed	Saved to Disk	Printed	Saved to Disk	Printed	Saved to Disk
SO_2	0	1	0	1	0	1	0	1
NOx	0	1	0	1	0	1	0	1
CO	0	1	0	1	0	1	0	1
VOC1	0	1	0	1	0	1	0	1
VOC2	0	1	0	1	0	1	0	1
HCN	0	1	0	1	0	1	0	1
$PM_{2.5}$ (Combustion product)	0	1	0	1	0	1	0	1
$PM_{2.5}$ to PM_{10} range (Combustion product)	0	1	0	1	0	1	0	1
PM_{10} to TSP (Combustion product)	0	1	0	1	0	1	0	1
$PM_{2.5}$ (Fugitive dust)	0	1	0	1	0	1	0	1
$PM_{2.5}$ to PM_{10} range (Fugitive dust)	0	1	0	1	0	1	0	1
PM_{10} to TSP (Fugitive dust)	0	1	0	1	0	1	0	1

Table E-24 CALPUFF Model Option Groups 6 and 7

Input Group 6: Sub-Grid Scale Complex Terrain Inputs

Parameter	Default	Project	Comments
NHILL	0	0	Number of terrain features
NCTREC	0	0	Number of special complex terrain receptors
MHILL	-	2	Hill data created by OPTHILL & input below in Subgroup (6b); Receptor data in Subgroup (6c)
XHILL2M	1	1	Conversion factor for changing horizontal dimensions to metres
ZHILL2M	1	1	Conversion factor for changing vertical dimensions to metres
XCTDMKM	-	0	X origin of CTDM system relative to CALPUFF coordinate system (km)
YCTDMKM	-	0	Y origin of CTDM system relative to CALPUFF coordinate system (km)

Input Group 7: Dry Deposition Parameters for Gases [a]

Species	Dry deposition Velocity (m/s)	Comments
VOC1	0.005	PAH dry deposition velocity
VOC2	0.029	Dry deposition of gaseous mercury
HCN	0.005	-

NOTE:
[a] Dry deposition velocities were provided as external file to CALPUFF model input (VD.dat)

Table E-25 CALPUFF Model Option Groups 8, 9, 10, and 11

Input Group 8: Dry Deposition Parameters for Particles

Species	Default	Project	Comments
$PM_{2.5}$ (Combustion product)	-	1.6	Geometric mass mean diameter of PM [µm]
$PM_{2.5}$ (Combustion product)	-	0.0	Geometric standard deviation of PM [µm]
$PM_{2.5}$ to PM_{10} range (Combustion product)	-	6.9	Geometric mass mean diameter of PM [µm]
$PM_{2.5}$ to PM_{10} range (Combustion product)	-	0.0	Geometric standard deviation of PM [µm]
PM_{10} to TSP (Combustion product)	-	21.5	Geometric mass mean diameter of PM [µm]
PM_{10} to TSP (Combustion product)	-	0.0	Geometric standard deviation of PM [µm]
$PM_{2.5}$ (Fugitive dust)	-	1.6	Geometric mass mean diameter of PM [µm]
$PM_{2.5}$ (Fugitive dust)	-	0.0	Geometric standard deviation of PM [µm]
$PM_{2.5}$ to PM_{10} range (Fugitive dust)	-	6.9	Geometric mass mean diameter of PM [µm]
$PM_{2.5}$ to PM_{10} range (Fugitive dust)	-	0.0	Geometric standard deviation of PM [µm]
PM_{10} to TSP (Fugitive dust)	-	21.5	Geometric mass mean diameter of PM [µm]
PM_{10} to TSP (Fugitive dust)	-	0.0	Geometric standard deviation of PM [µm]
NOTES: Geometric mass mean diameter and geometric standard deviation pf different size fractions are derived from US EPA (2005b)			

Input Group 9: Miscellaneous Dry Deposition Parameters

Parameters	Default	Project	Comments
RCUTR	30	30	Reference cuticle resistance (s/cm)
RGR	10	10	Reference ground resistance (s/cm)
REACTR	8	8	Reference pollutant reactivity
NINT	9	9	Number of particle size intervals for effective particle deposition velocity
IVEG	1	1	Vegetation in non-irrigated areas is active and unstressed

Table E-26 CALPUFF Model Option Groups 8, 9, 10, and 11

Input Group 10: Wet Deposition Parameters

Species	Default	Project	Comments
VOC1	-	1.7E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	6.0E-05	Scavenging coefficient for frozen precipitation [s^{-1}]
VOC2	-	2.0E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	7.0E-05	Scavenging coefficient for frozen precipitation [s^{-1}]
HCN	-	1.7E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	6.0E-05	Scavenging coefficient for frozen precipitation [s^{-1}]
$PM_{2.5}$ (Combustion product)	-	6.0E-05	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	2.0E-05	Scavenging coefficient for frozen precipitation [s^{-1}]
$PM_{2.5}$ to PM_{10} range (Combustion product)	-	4.2E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	1.4E-04	Scavenging coefficient for frozen precipitation [s^{-1}]
PM_{10} to TSP (Combustion product)	-	6.6E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	2.2E-04	Scavenging coefficient for frozen precipitation [s^{-1}]
$PM_{2.5}$ (Fugitive dust)	-	6.0E-05	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	2.0E-05	Scavenging coefficient for frozen precipitation [s^{-1}]
$PM_{2.5}$ to PM_{10} range (Fugitive dust)	-	4.2E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	1.4E-04	Scavenging coefficient for frozen precipitation [s^{-1}]
PM_{10} to TSP (Fugitive dust)	-	6.6E-04	Scavenging coefficient for liquid precipitation [s^{-1}]
	-	2.2E-04	Scavenging coefficient for frozen precipitation [s^{-1}]
NOTES: VOC and PM size fractions scavenging coefficients are from US EPA (1995)			

Input Group 11: Chemistry Parameters

NA	Chemical Transformation not modelled

Table E-27 CALPUFF Model Option Group 12

Input Group 12: Diffusion/Computational Parameters

Parameters	Default	Project	Comments
SYTDEP	550	550	Horizontal size of a puff in metres beyond which the time dependent dispersion equation of Heffter (1965) is used
MHFTSZ	0	0	Do not use Heffter formulas for sigma z
JSUP	5	5	Stability class used to determine dispersion rates for puffs above boundary layer
CONK1	0.01	0.01	Vertical dispersion constant for stable conditions
CONK2	0.1	0.1	Vertical dispersion constant for neutral/stable conditions
TBD	0.5	0.5	Use ISC transition point for determining the transition point between the Schulman-Scire (Schulman et al., 1998) to Huber-Snyder Building Downwash scheme
ISIGMAV	1	1	Sigma-v is read for lateral turbulence data
IMIXCTDM	0	0	Predicted mixing heights are used
XMXLEN	1	1	Maximum length of emitted slug in meteorological grid units
XSAMLEN	1	1	Maximum travel distance of slug or puff in meteorological grid units during one sampling unit
MXNEW	99	99	Maximum number of puffs or slugs released from one source during one time step
MXSAM	99	99	Maximum number of sampling steps during one time step for a puff or slug
NCOUNT	2	2	Number of iterations used when computing the transport wind for a sampling step that includes transitional plume rise
SYMIN	1	1	Minimum sigma y in metres for a new puff or slug
SZMIN	1	1	Minimum sigma z in metres for a new puff or slug
SZCAP_M	5.0E06	5.0E06	Maximum sigma z in metres to avoid numerical problem in calculating time or distance

Stability Class	Parameter			
	SVMIN		SWMIN	
	Minimum turbulence (σ_v) (m/s)		Minimum turbulence (σ_v) (m/s)	
	Land	Water	Land	Water
A	0.5	0.37	0.2	0.2
B	0.5	0.37	0.12	0.12
C	0.5	0.37	0.08	0.08
D	0.5	0.37	0.06	0.06
E	0.5	0.37	0.03	0.03
F	0.5	0.37	0.016	0.016

Table E-28 CALPUFF Model Option Group 12

Input Group 12: Diffusion/Computational Parameters

<table>
<tr><th>Parameters</th><th>Default</th><th>Project</th><th colspan="2">Comments</th></tr>
<tr><td>CDIV</td><td>0.0, 0.0</td><td>0.0, 0.0</td><td colspan="2">Divergence criteria for dw/dz in met cells</td></tr>
<tr><td>NLUTBIL</td><td>4</td><td>4</td><td colspan="2">Search radius for nearest land and water cells used in the subgrid TIBL module</td></tr>
<tr><td>WSCALM</td><td>0.5</td><td>0.5</td><td colspan="2">Minimum wind speed allowed for non-calm conditions (m/s)</td></tr>
<tr><td>XMAXZI</td><td>3000</td><td>3000</td><td colspan="2">Maximum mixing height in metres</td></tr>
<tr><td>XMINZI</td><td>50</td><td>50</td><td colspan="2">Minimum mixing height in metres</td></tr>
<tr><td rowspan="11">TKCAT</td><td>265</td><td>265</td><td>Temperature class 1</td><td rowspan="11">Temperatures (K) used for defining upper bound of categories for emissions scale-factors; 11 upper bounds (K) are entered; the 12th class has no upper</td></tr>
<tr><td>270</td><td>270</td><td>Temperature class 2</td></tr>
<tr><td>275</td><td>275</td><td>Temperature class 3</td></tr>
<tr><td>280</td><td>280</td><td>Temperature class 4</td></tr>
<tr><td>285</td><td>285</td><td>Temperature class 5</td></tr>
<tr><td>290</td><td>290</td><td>Temperature class 6</td></tr>
<tr><td>295</td><td>295</td><td>Temperature class 7</td></tr>
<tr><td>300</td><td>300</td><td>Temperature class 8</td></tr>
<tr><td>305</td><td>305</td><td>Temperature class 9</td></tr>
<tr><td>310</td><td>310</td><td>Temperature class 10</td></tr>
<tr><td>315</td><td>315</td><td>Temperature class 11</td></tr>
<tr><td rowspan="5">WSCAT (Erosion from tailing management facility)</td><td>1.54</td><td>7.2</td><td colspan="2">wind speed category 1 [m/s]</td></tr>
<tr><td>3.09</td><td>8.0</td><td colspan="2">wind speed category 2 [m/s]</td></tr>
<tr><td>5.14</td><td>9.0</td><td colspan="2">wind speed category 3 [m/s]</td></tr>
<tr><td>8.23</td><td>10.0</td><td colspan="2">wind speed category 4 [m/s]</td></tr>
<tr><td>10.80</td><td>11.0</td><td colspan="2">wind speed category 5 [m/s]</td></tr>
<tr><td rowspan="5">WSCAT (Erosion from stockpiles)</td><td>1.54</td><td>8.0</td><td colspan="2">wind speed category 1 [m/s]</td></tr>
<tr><td>3.09</td><td>9.0</td><td colspan="2">wind speed category 2 [m/s]</td></tr>
<tr><td>5.14</td><td>10.0</td><td colspan="2">wind speed category 3 [m/s]</td></tr>
<tr><td>8.23</td><td>11.0</td><td colspan="2">wind speed category 4 [m/s]</td></tr>
<tr><td>10.80</td><td>16.4</td><td colspan="2">wind speed category 5 [m/s]</td></tr>
</table>

Input Group 12: Diffusion/Computational Parameters (cont'd)

Stability Class	Parameter	
	PLX0	PPC (see text)
	Wind speed profile exponent	Plume path coefficient
A	0.07	0.5
B	0.07	0.5
C	0.10	0.5
D	0.15	0.5
E	0.35	0.35
F	0.55	0.35

Parameters	Default	Project	Comments
PTG0	0.020	0.020	Potential temperature gradient for E stability [K/m]
	0.035	0.035	Potential temperature gradient for F stability [K/m]
SL2PF	10	10	Slug-to-puff transition criterion factor equal to sigma y/length of slug
FCLIP	0.0	0.0	No extrapolation of receptor-specific puff/slug properties
NSPLIT	3	Not used	Number of puffs that result every time a puff is split
IRESPLIT	0,0,0,0,0,0,0,0,0,0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0	0,0,0,0,0,0,0,0,0,0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0	Time(s) of day when split puffs are eligible to be split once again
ZISPLIT	100	100	Minimum allowable last hour's mixing height for puff splitting
ROLDMAX	0.25	0.25	Maximum allowable ratio of last hour's mixing height and maximum mixing height experienced by the puff for puff splitting
NSPLITH	5	5	Number of puffs that result every time a puff is horizontally split
SYSPLITH	1	1	Minimum sigma-y of puff before it may be horizontally split
SHSPLITH	2	2	Minimum puff elongation rate due to wind shear before it may be horizontally split
CNSPLITH	1.0E-7	1.0E-7	Minimum concentration of each species in puff before it may be horizontally split
EPSSLUG	1.00E-04	1.00E-04	Fractional convergence criterion for numerical SLUG sampling iteration
EPSAREA	1.00E-06	1.00E-06	Fractional convergence criterion for numerical AREA sampling iteration
DRISE	1.0	1.0	Trajectory step length for numerical rise
HTMINBC	500	500	Minimum height (m) to which boundary condition puffs are mixed as they are emitted (MBCON=2 ONLY)
RSAMPBC	10	10	Search radius (km) about a receptor for sampling nearest boundary condition puff.
MDEPBC	1	Not used	Concentration is NOT adjusted for depletion

Table E-29 CALPUFF Model Option Groups 13, 14, and 15

Input Group 13: Point Source Parameters

Parameters	Default	Project	Comments
NPT1	-	Varies by scenario	Number of point sources with constant stack parameters or variable emission rate scale factors
IPTU	1	1	Units for point source emission rates are g/s
NSPT1	0	0	Number of source-species combinations with variable emissions scaling factors
NPT2	-	0	Number of point sources with variable emission parameters provided in external file
NOTES: Point source parameters are given in Table E-4.			

Input Group 14: Area Source Parameters

Parameters	Default	Project	Comments
NAR1	-	Varies by scenario	Number of polygon area sources
IARU	1	1	Units for area source emission rates are $g/m^2/s$
NSAR1	0	Varies by scenario	Number of source species combinations with variable emissions scaling factors
NAR2	-	0	Number of buoyant polygon area sources with variable location and emission parameters
NOTES: Area source parameters are given in Tables E-10, E-13 and E-16			

Table E-26 CALPUFF Model Option Groups 13, 14, and 15 (cont'd)

Input Group 15: Line Source Parameters

Parameters	Default	Project	Comments
NLN2	-	0	No line sources modelled
NLINES	-	0	Number of buoyant line sources
ILNU	1	1	Units for line source emission rates is g/s
NSLN1	0	0	Number of source-species combinations with variable emissions scaling factors
MXNSEG	7	7	Maximum number of segments used to model each line
NLRISE	6	6	Number of distance at which transitional rise is computed
XL	-	0.1	Average line source length (m)
HBL	-	0.1	Average height of line source height (m)
WBL	-	0.1	Average building width (m)
WML	-	25	Average line source width (m)
DXL	-	0.1	Average separation between buildings (m)
FPRIMEL	-	50	Average buoyancy parameter (m^4/s^3)

Table E-30 CALPUFF Model Option Groups 16, 17, 18, 19 and 20

Input Group 16: Volume Source Parameters

Parameter	Default	Project	Comments
NVL1	-	Varies by scenario	Number of volume sources
IVLU	1	1	Units for volume source emission rates is grams per second
NSVL1	0	Varies by scenario	Number of source-species combinations with variable emissions scaling factors
NVL2	0	0	No volume source with variable location and emissions
NOTE: Volume source parameters are given in Tables E-5, E-7, E-8 and E-9			

Input Group 17: Flare Source Parameters

Parameter	Default	Project	Comments
NFL2	-	0	Number of flare sources defined in FLEMARB.DAT

Input Group 18: Road Source Parameters

Parameter	Default	Project	Comments
NRD1	-	0	Number of road sources
NRD2	-	0	Number of road-links with arbitrarily time-varying emission parameters
NSFRDS	0	Varies by scenario	Number of road links and species combinations with variable emission-rate scale-factors

Input Group 19: Emission Rate Scale-factor Tables

Parameter	Default	Project	Comments
NSFTAB	-	Varies by scenario	Number of emission scale-factors

Input Group 20: Discrete Receptor Information

Parameter	Default	Project	Comments
NREC	-	-	See Section C.3.2.
NOTE: Receptors are shown on Map A-8 of Appendix A.			

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Appendix F PROJECT GHG EMISSIONS

Stantec

Lynn Lake Gold Project - Environmental Impact Assessment

Appendix F: Greenhouse Gas Emissions for Construction and Operation

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APPENDIX F
GREENHOUSE GAS EMISSIONS FOR CONSTRUCTION AND OPERATION

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LIST OF TABLES

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Abbreviations

%	percent
AN	ammonium nitrate
BSFC	brake specific fuel consumption
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
ECCC	Environment and Climate Change Canada
EF	emission factor
FO	Fuel Oil
g	gram
GHGs	greenhouse gases
GWP	global warming potential
ha	hectare
HFCs	hydrofluorocarbons
hp	horsepower
hr	hour
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram
kg/L	kilogram per liter
km	kilometer
kWh	Kilowatt-hour
L	liter
LF	Load Factor

LLGP	Lynn Lake Gold Project
L/hour	liters per hour
m	miles
MOVES	Motor Vehicle Emission Stimulator
NIR	National Inventory Report
N_2O	nitrous oxide
PFCs	perfluorocarbons
Project	Lynn Lake Gold Mine
Q'Pit	Q'Pit Inc.
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
TMF	tailings management facility
Scope 1	direct emissions
Scope 2	indirect emissions related to electricity
Scope 3	Other non-electricity related indirect emissions
SF_6	sulphur hexachloride
t	metric tonnes
t/y	tonnes per year
VMT	vehicle miles travelled

Appendix F GREENHOUSE GAS EMISSIONS FOR CONSTRUCTION AND OPERATION

F.1 INTRODUCTION

This appendix includes information on greenhouse gases (GHGs) generated by the Lynn Lake Gold Project (the Project). There are six main greenhouse gases potentially associated with the Project including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexachloride (SF_6) out of which only CO_2, CH_4, and N_2O will be emitted by the Project.

The GHG Protocol classifies the GHG emissions into the three following categories (WRI 2013):

Direct GHG emissions (Scope 1): Emissions released from sources that are owned or controlled by the Project.

Indirect GHG emissions (Scope 2): Emissions from the purchased electricity generated offsite by sources owned or controlled by another entity.

Other Indirect GHG emissions (Scope 3): Emissions from other indirect activities (except electricity) generated offsite by that are owned or controlled by another entity. Upstream sources such as production and processing of purchased materials and transportation are assumed to be negligible compared to direct GHG emissions and would not be greatly influenced by the Project. Therefore, Scope 3 is not evaluated for this assessment and it is an optional reporting category as per GHG Protocol (WRI 2013).

Emissions from each of these specific GHGs have been estimated and multiplied by their 100-year global warming potential (GWP) so they can be reported as carbon dioxide equivalents (CO_2e). CO_2e is the standardized way to report GHGs.

The GWP (IPCC 2012) of these GHGs applied in this assessment are as follows:

- CO_2 = 1.0
- CH_4 = 25
- N_2O = 298

On this basis, carbon dioxide equivalents for the Project are calculated as:

CO_2e = (mass CO_2 x 1.0) + (mass CH_4 x 25) + (mass N_2O x 298)

This appendix includes the following GHG inventory related information:

- details on the scope of activities during each Project phase (Construction and Operation)

- description of methods used to assess potential effects of the project on GHG emissions during construction and operation
- construction and operation GHG emissions summaries
- comparison to provincial and national GHG emissions

F.2 GHG POLLUTION PRICING ACT

The Government of Canada passed the *Greenhouse Gas Pollution Pricing Act* on June 21, 2018 implementing a federal carbon pricing system for provinces and territories which do not have a carbon pricing system or have a system that does not meet the federal benchmark requirements (Government of Canada, 2020). This federal pricing system has two key parts:

- a charge on fossil fuels which will be administered by Canada Revenue Agency (CRA), and
- output-based pricing system (OBPS) for industrial facilities which will be administered by Environment and Climate Change Canada (ECCC).

The charge on the fossil fuel and OBPS will be implemented starting April 1, 2019 with future increases effective as of April each following year and January 1, 2019 respectively. The Project purchases and consumes diesel fuel during the construction and operation phase hence the mine operator will be paying these charges, as required by the *Greenhouse Gas Pollution Pricing Act*. The charge for fossil fuel increases each year based on the carbon pollution pricing. The fuel charges for diesel in Manitoba in 2019 is 0.0537 $/litre, 2020 is 0.0805 $/litre, 2021 is 0.1073 $/litre, and 2022 is 0.1341 $/litre. The objective of applying the fuel charge at higher rates over time is to encourage reductions in GHG emissions and support clean growth, while keeping costs low for Canadians and Canadian businesses.

F.3 PROJECT PHASES

F.3.1 CONSTRUCTION PHASE

There are two years in the Project construction phase (defined as Year -2 and Year -1 in reference to the overall Project timeline). Project construction starts in year -2 with works such as road construction, mine platforms, processing plant construction, tailings management facility (TMF) construction, and preproduction. The worst-case year of construction was selected based on the most overlapping construction activities, the largest number of construction equipment units and the highest construction material movement. The 12-month period from Q2 Year -2 to Q1 Year -1 (i.e., Q2 2021 to Q1 2022) was determined as the worst-case year of construction for both the Gordon and MacLellan sites. The GHG emissions from this worst-case year were estimated for the construction phase and are described in this report.

The sources of direct (Scope 1) GHG emissions during construction are:

- Off-Road equipment
  - Diesel combustion in off-road equipment (CO_2, CH_4, N_2O)
- On-Road Equipment
- Diesel combustion in on-road equipment (CO_2, CH_4, N_2O)Blasting
  - Explosives (CO_2)
- Land Clearing
  - Salvage, uprooting and burning (CO_2e)

F.3.2 OPERATION PHASE

The operation GHG emissions have been assessed by quantifying GHG emissions for a “worst case” year of operation at both Gordon and MacLellan. The worst-case years of operation coincide with the peak production rate (for overburden, mine rock and ore) that will result in the highest GHG emissions. The worst-case year for operation was selected based on the highest overburden, mine rock and ore production rate, the largest number of mining equipment units and the highest movements of overburden, mine rock and ore measured in tonnes. Year 2 was determined to be the worst-case year of operation for the Gordon site and Year 7 the worst-case year of operation for the MacLellan site. The GHG emissions from the worst-case year of operation at the Gordon site (Year 2) and the MacLellan site (Year 7) were estimated and are described in this report .

The sources of direct (Scope 1) GHG emissions during operation are:

- Off-Road equipment
  - Diesel combustion in off-road equipment (CO_2, CH_4, N_2O)
- On-Road Equipment
  - Diesel combustion in on-road equipment (CO_2, CH_4, N_2O)
- Blasting
  - Explosives (CO_2)

The sources of indirect (Scope 2) GHG emissions during operation are:

- Electricity
  - Electricity Consumption (CO_2e)

NOTE: The GHGs emission from decommissioning of the Project have not been estimated as these activities are expected to be substantially lower GHG emissions than the annual GHG emissions from construction or operation phases.

F.4 METHODS

F.4.1 DIRECT GHG EMISSIONS

Direct GHG emissions (Scope 1) are emissions released from sources that are owned or controlled by the Project (WRI 2013). These emissions sources include the off-road and on-road equipment, blasting and land clearing.

F.4.1.1 Off-Road Combustion Equipment

GHG emissions from off-road equipment are from hydraulic shovels, loaders, articulated trucks, graders, dozers, excavators, forklifts, backhoes, cranes, pumps, drills, generators, crushers, air compressors, pressure washers, light towers, etc. The list of off-road equipment and their operating hours for the mine preproduction and operation were provided by the mine planning subcontractor, Q'Pit Inc.(Q'Pit, Q'Pit 2019) whereas the list of off-road equipment and their operating hours used for the processing plant and tailings management facility constructions were provided by the mine planning contractor, Ausenco (Ausenco 2019a and Ausenco 2019b). Off-road diesel exhaust GHG emissions were estimated based on the National Inventory Report (NIR) off-road diesel combustion emission factors (Environment and Climate Change Canada (ECCC) 2019a), fuel consumption rate and operating hours. Equation F-1 was used to determine the emission rates. The emission factors from NIR are presented in Table F-1. The fuel consumption was estimated using Equation F-2.

The GHG emissions from off-road equipment are calculated using the following equation:

$$\begin{aligned} Emission\ (tonnes/year) &= Number\ of\ Units \times Fuel\ Consumption\ Rate\left(\frac{L}{hour}\right) \\ &\times Emission\ Factor\left(\frac{g}{L}\right) \times Annual\ Operating\ hours\left(\frac{hour}{year}\right) \\ &\times Load\ Factor\ (\%) \times Unit\ Conversion\left(\frac{tonnes}{10^6 g}\right) \end{aligned}$$

Equation F-1

where

Emission	-	Annual emission rate (tonnes/year or t/y)
Number of Units	-	Number of each type of equipment
Fuel Consumption Rate	-	Hourly fuel consumption of equipment (L/hour)
Emission Factor	-	off-road diesel combustion emission factor (ECCC, 2019a)

Operating hours	-	Equipment operating hours per year (hour/year)
Load Factor	-	Equipment load factor (%) by equipment type based on US EPA NONROAD model documentation (US EPA 2010a). Defined as the fraction of actual engine output relative to maximum rated power, taking into account that engines are operating somewhere between idle speed and full power.

Table F-1 Off-Road Diesel Combustion GHG Emission Factors

Equipment Description	CO_2	CH_4	N_2O
	(g/L)		
Off-road Diesel Equipment	2,681	0.073	0.227

NOTES:
[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).

The fuel consumption for each off-road equipment is calculated using the following equation:

$$Fuel\ Consumption\ (L/hour) = Engine\ Power\ (hp) \times BSFC\ \left(\frac{lb\ diesel}{hp\ hr}\right) \times Unit\ Conversion\ \left(\frac{kg}{2.205\ lb}\right) \times \frac{1}{Diesel\ Density\ (0.85\ \frac{kg}{L})}$$

Equation F-2

where

Engine Power	-	The power rating of equipment (hp)
BSFC	-	Brake Specific Fuel Consumption (BSFC) by engine power rating (lb diesel/hp-hour) based on US EPA NONROAD model documentation (US EPA 2010b, Table A4)
Diesel Density	-	Density of diesel fuel (0.85 kg/L).

F.4.1.2 On-Road Diesel Combustion Equipment

GHG emissions from on-road equipment are from on-highway haul trucks, pick up trucks, water trucks, fuel trucks, reagent trucks, welding trucks, crew change vehicles, etc. The list of on-road equipment and their operating hours for the mine preproduction and operation were provided by Q'Pit (Q'Pit 2019) whereas the list of on-road equipment/operating hours used for processing plant and tailings management facility construction were provided by Ausenco (Ausenco 2019a and Ausenco 2019b). On-road diesel exhaust GHG emissions were estimated based on the MOVES2014a model derived emission factors, road length, number of trips per day and operating hours.

Emission factors for the on-road diesel equipment were derived from the MOVES2014a model for a rural unrestricted road type, including winter and summer seasons. Since MOVES2014a was originally developed for the United States, a surrogate US county and state (Hill County, Montana) was selected to represent the Project in terms of local meteorological conditions. The model was run for a rural unrestricted road type that represents the provincial, access and haul roads, for winter and summer seasons. The emission factors derived from the MOVES2014a model are presented inTable F-2 and Equation F-3 was used to determine the emission rate.

The GHG emissions from on-road equipment are calculated using the following equation:

$$Emission\ (tonnes/year) = Road\ Length\ (km) \times Round\ Trip\ Factor(2) \times Number\ of\ Trips \left(\frac{trips}{day}\right) \times Annual\ Operating\ days \left(\frac{day}{year}\right) \times Emission\ Factor\ \left(\frac{g}{VMT}\right) \times Unit\ Conversion\ \left(0.621\frac{m}{km}\right) \times Unit\ Conversion\ \left(\frac{tonnes}{10^6 g}\right)$$

Equation F-3

where

Emission	-	Annual emission rate (tonnes/year)
Road Length	-	Road length (km)
Number of Trips	-	Number of trips per equipment per day (trips/day)
Round Trip Factor (2)	-	A factor of 2 accounting for a round trip distance
Operating days	-	Equipment operating days per year (days/year)
Emission Factor	-	Species-specific emission factor based on MOVES2014a (g/VMT)

Table F-2 On-Road Diesel Combustion GHG Emission Factors

Equipment Description	CO_2	CH_4	N_2O
	(g/VMT)		
Winter [a, b]			
Passenger Truck	590	0.0214	0.00146
School Bus	862	0.0261	0.00191
Single Unit Short-haul Truck	856	0.0391	0.00191
Single Unit Long-haul Truck	790	0.0393	0.00191
Combination Long-haul Truck	1714	0.0353	0.00191
Summer [a, c]			
Passenger Truck	599	0.0218	0.00146
School Bus	880	0.0261	0.00191
Single Unit Short-haul Truck	870	0.0391	0.00191
Single Unit Long-haul Truck	805	0.0393	0.00191

Table F-2 On-Road Diesel Combustion GHG Emission Factors

Equipment Description	CO_2	CH_4	N_2O
	(g/VMT)		
Combination Long-haul Truck	1743	0.0353	0.00191

NOTES:
[a] Emission factors derived from MOVES2014a (US EPA 2015)
[b] Winter is assumed 6 months: November to April
[c] Summer is assumed 6 months: May to October.

F.4.1.3 Blasting

Packaged gel emulsion products will be used for blasting during construction and the ammonium nitrate fuel oil emulsion explosives will be used during operation. During operation, all the explosives will bemanufactured at the MacLellan site. The amount of explosives consumed and the number of holes per blast during mine preproduction and operation is provided by Q'Pit (Q'Pit 2019). For processing plant construction, it was assumed that 20% of the mine preproduction blasting explosives will be used.

During operation, the Project will use an ammonium nitrate fuel oil emulsion for blasting and it was assumed that the same type of explosives will be used during construction. Blasting GHG emissions were estimated based on Mining Association of Canada (MAC) blasting emission factors (MAC, 2014), number of holes per blast, number of blasts in a year, and explosives consumption per blast. Equation F-4 was used to determine the emission rate and the emission factors from MAC are presented in Table F-3.

The GHG emissions from blasting are calculated using the following equation:

$$\begin{aligned} &Emission\ (tonnes/year) \\ &\quad = \left(Number\ of\ holes\ per\ blast \times Explosive\ Usage \left(\frac{kg\ of\ explosives}{hole}\right)\right. \\ &\quad \times Annual\ blasting\ days \left(\frac{day}{year}\right) \times Emission\ Factor \left(\frac{kg}{kg\ of\ explosives}\right)\Bigg) \\ &\quad / \left(Unit\ Conversion \left(\frac{tonnes}{1000\ kg}\right)\right) \end{aligned}$$

Equation F-4

where

Emission	-	Annual emission rate (tonnes/year)
Explosive Usage	-	Amount of explosives used per hole (kg explosives/hole)
Emission Factor	-	MAC emission factor (kg CO_2/kg of explosives)

Table F-3 Blasting GHG Emission Factor

Activity Description	CO_2	CH_4	N_2O
	kg/kg of Explosives		
Explosives Detonation	0.189	—	—

NOTES
[a] MAC emission factors (MAC 2014)
“—"Indicates no emission factor is available.

F.4.1.4 Land Clearing

Land clearing will involve the removal of trees and other vegetation. The estimated area to be clearedof 1,049 ha was obtained from the documents provided by Ausenco of which 187 ha is associated with Gordon site and 861 ha is for MacLellan site. The cleared biomass is assumed to be open burnt with no salvage.

Land clearing and burning GHG emissions were estimated using Manitoba-specific emission factors, salvageable merchantable timber, and the vegetated area. The emission factors were derived by Natural Resources Canada (NRCan) for deforestation activities in Manitoba (NRCan 2017) as part of the 2017 National Inventory Report. Emission factors were derived for four terrestrial ecozones in Manitoba. Based on the location of the Project, the emission factor for Boreal Shield West was used for this assessment. The emission factors are based on salvage uprooting and burning activities. The emissions from land clearing activities are conservatively assumed to be non biogenic and added to the Project emissions.The GHG emission from decay of biomass are not included for this assessment as the objective would be to burn the majority of biomass material cleared leaving negligible amounts of residual material to decay.. Equation F-5 was used to determine the emission rate and the emission factors from NRCan are presented inTable F-4

GHG emissions from land clearing were divided by the two years of Project construction to estimate an annual GHG emission contribution.

The GHG emissions from land clearing are calculated using the following equation:

$$Emission\ (tonnes) = Land\ Cleared\ Area\ (ha) \times Emission\ Factor\ \left(\frac{tonnes\ of\ CO2e}{ha}\right)$$

Equation F-5

where

Emission	-	Total emission from land clearing (tonnes)
Emission Factor	-	Land Clearing emission factor (salvage uprooting and burn) for Boreal Shield West ecoregion (tonnes CO_2e/ha)

Table F-4 Land Clearing GHG Emission Factor

Activity Description	CO_2	CH_4	N_2O	CO_2e
	tonnes/ha			
Land Clearing [a]	—	—	—	85.6

NOTES
[a] NRCAN emission factors (NRCan 2017)
[a] Emission factor includes both biogenic CO_2 and non biogenic CO_2, CH_4 and N_2O
"—"Indicates no emission factor is available.

The land clearing activities such as biomass clearing and burning impacts the forest's natural carbon sinks and will lose the GHG sequestration over time. As per Manitoba Sustainable Development (MSD), the forests make up about 26.3 million hectares of land which is about 48% of the province's total land area (MSD 2019). The total land clearing area for the Project is 1,049 ha or approximately 0.004% of the Manitoba's forest. Therefore, the loss of carbon sequestration from land clearing required for the Project would be negligible in comparison to the total carbon sequestration capacity.

F.4.2 INDIRECT GHG EMISSIONS

Indirect GHG emissions (Scope 2) are emissions from the consumption of purchased electricity that are generated offsite by sources owned or controlled by another entity (WRI 2013).

F.4.2.1 Electricity Consumption

The project will purchase electricity from Manitoba Hydro for the MacLellan site. The electricity demand for the Gordon site will be supplied by the onsite diesel generator, therefore no Scope 2 emissions are associated withthe Gordon site. BBA Inc. (BBA) stated that the average electricity demand for the MacLellan site is 16,900 kWh (BBA 2019). The Scope 2 GHG estimate assumes that the MacLellan site will be operating throughout the year (24 hours a day, 7 days a week). The Manitoba Hydro electricity consumption at the MacLellan site will commence only during operation of the Project.

The indirect GHG emissions were estimated based on the ECCC NIR Manitoba specific electricity consumption emission factors (ECCC 2019a) and the Project's annual electricity consumption. Equation F-6 was used to determine the emission rate and the emission factors from NIR are presented in Table F-5.

The indirect GHG emissions from electricity consumption are calculated using the following equation:

$$Emission\ (tonnes/year) = Annual\ Consumption\left(\frac{kWh}{year}\right) \times Emission\ Factor\ \left(\frac{g\ CO2\ eq}{kWh}\right)) / (Unit\ Conversion\ \left(\frac{tonnes}{10^6\ g}\right))$$

Equation F-6

where

Emission	-	Annual emission rate (tonnes/year)
Annual Consumption	-	Annual Electricity Consumption (kWh/year)
Emission Factor	-	ECCC electricity consumption emission factor for Manitoba (g CO_2 eq/kWh)

Table F-5 Electricity Consumption GHG Emission Factor

Activity Description	CO_2	CH_4	N_2O	CO_2e
	(g/kWh)			
Electricity Consumption [a]	—	—	—	2.1

NOTES

[a] ECCC emission factors provided in Table A13-8 of the National Inventory Report (ECCC 2019a).

"—"Indicates no emission factor is available.

F.5 EMISSIONS SUMMARY

The total GHG emissions calculated from the above activities during the construction and operation phases are presented in the following subsections.

F.5.1 CONSTRUCTION

The maximum annual GHG emissions during the Project construction (i.e., Q2 2021 to Q1 2022) are presented in Table F- 6. The Project construction phase emissions from off-road diesel equipment, on-road diesel equipment, explosives detonation, and land clearing activities are approximately 80,617 tonnes/year during the peak construction year. As shown in Figure F-1, the GHG emissions from Gordon and MacLellan site for the 12-month period from Q2 Year -2 to Q1 Year -1 (i.e., Q2 2021 to Q1 2022) are 19.9% and 80.1% of the total annual emissions, respectively. During the construction phase, about 55.7% of the GHG emissions are from activities associated with land clearing followed by off-road equipment (42.4%), explosives detonation (1.1%) and on-road equipment (0.7%)(see Figure F- 2).

Table F-6 Summary of Worst-Case Year Construction GHG Emissions (Gordon and MacLellan Sites)

Activity	CO_2 (tonnes/year)	CH_4 (tonnes/year)	N_2O (tonnes/year)	CO_2e (tonnes/year)
Off-Road Equipment [a]	33,341	0.908	2.82	**34,204**
On-Road Equipment [b]	598	0.0214	0.00118	**599**
Explosives Detonation [c]	916	—	—	**916**
Land Clearing [d]	—	—	—	**44,899**
Total	**34,854**	**0.929**	**2.82**	**80,617**

NOTES:

[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).

[b] Based on MOVES2014a derived emission factors (US EPA 2015)

[c] Based on MAC emission factors (MAC 2014)

[d] Based on NRCAN emission factors (NRCan 2017)

“—" Indicates no emission factor is available.

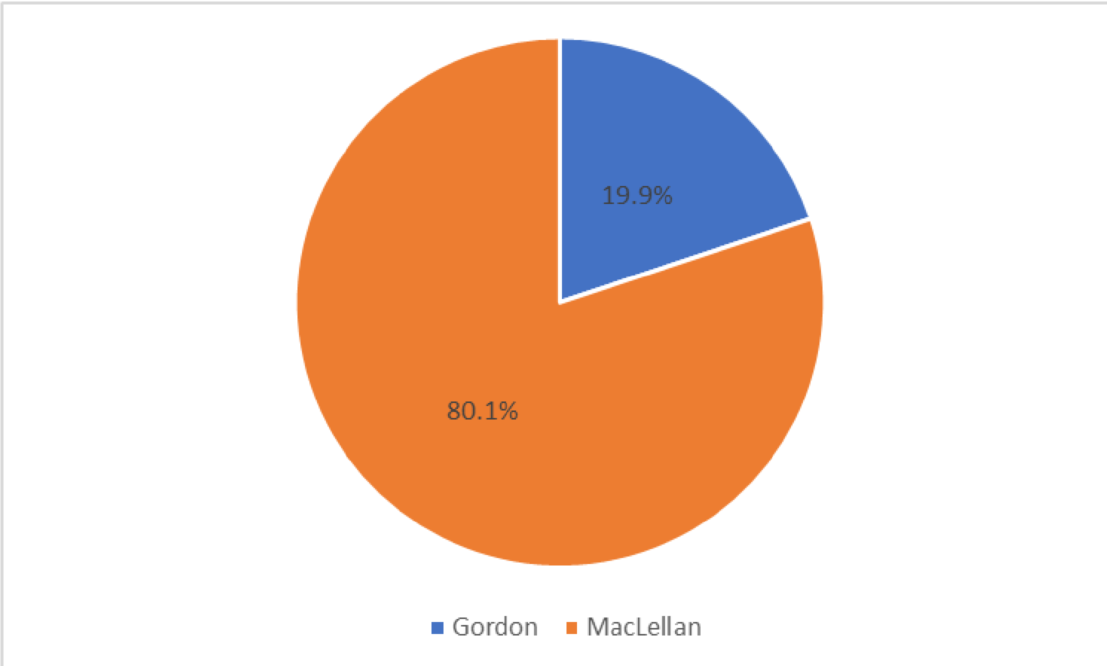

Figure F-1 Project Worst-Case Year Construction GHG Emission Breakdown by Site

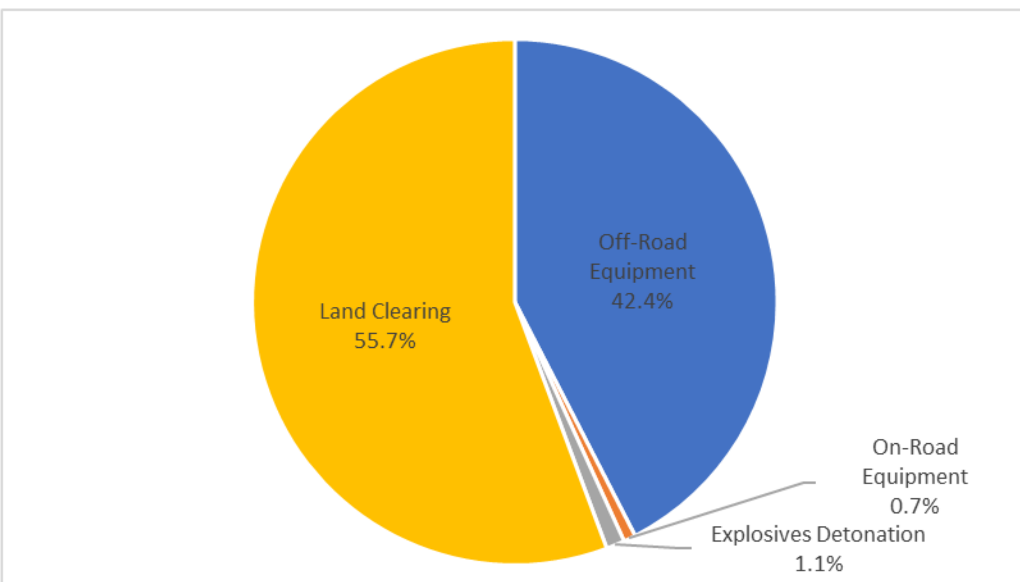

Figure F-2 Project Worst-Case Year Construction GHG Emission Breakdown by Activity

F.5.1.1 Gordon Site Construction GHG Emissions

The maximum annual GHG emissions during the Gordon site construction are presented in Table F-7. The construction emissions from off-road diesel equipment, on-road diesel equipment, explosives detonation, and land clearing activities are approximately 16,024 tonnes/year. As shown in Figure F-3, about 50.1% of the GHG emissions for the 12-month period (i.e., Q2 2021 to Q1 2022) are from activities associated with land clearing followed by off-road equipment (46.6%), explosives detonation (1.7%) and on-road equipment (1.7%).

Table F-7 Summary of Gordon Site Worst-Case Year Construction GHG Emissions

Activity	CO_2 (tonnes/year)	CH_4 (tonnes/year)	N_2O (tonnes/year)	CO_2e (tonnes/year)
Off-Road Equipment [a]	7,280	0.198	0.62	**7,468**
On-Road Equipment [b]	269	0.0112	0.000587	**269**
Explosives Detonation [c]	265	0.00000	0.0000	**265**
Land Clearing [d]	—	—	—	**8,021**
Total	**7,813**	**0.209**	**0.62**	**16,024**

NOTES:

[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).

[b] Based on MOVES2014a derived emission factors (US EPA 2015)

[c] Based on MAC emission factors (MAC 2014)

[d] Based on NRCAN emission factors (NRCan 2017)

"—" Indicates no emission factor is available.

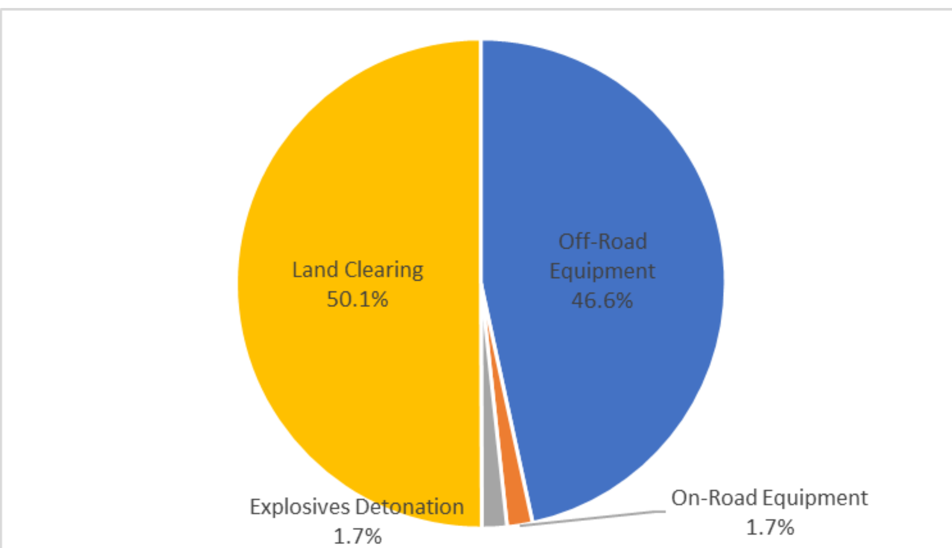

Figure F-3 Gordon Site Worst-Case Year Construction GHG Emission Breakdown by Activity

F.5.1.2 MacLellan Site Construction GHG Emissions

The maximum annual GHG emissions during the MacLellan site construction are presented in Table F-8. The construction GHG emission from off-road diesel equipment, on-road diesel equipment, explosives detonation and land clearing activities are approximately 64,594 tonnes/year. As shown in Figure F-4, about 57.1% of the GHG emissions for the 12-month period (i.e., Q2 2021 to Q1 2022) are from activities associated with land clearing followed by off-road equipment (41.4%), explosives detonation (1.0%) and on-road equipment (0.5%).

Table F-8 Summary of MacLellan Site Worst-Case Year Construction GHG Emissions

Activity	CO_2 (tonnes/year)	CH_4 (tonnes/year)	N_2O (tonnes/year)	CO_2e (tonnes/year)
Off-Road Equipment [a]	26,061	0.710	2.21	**26,736**
On-Road Equipment [b]	329	0.0103	0.000598	**329**
Explosives Detonation [c]	651	—	—	**651**
Land Clearing [d]	—	—	—	**36,878**
Total	**27,040**	**0.720**	**2.21**	**64,594**

NOTES:

[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).

[b] Based on MOVES 2014a derived emission factors (US EPA 2015)

[c] Based on MAC emission factors (MAC 2014)

[d] Based on NRCAN emission factors (NRCan 2017)

"—" Indicates no emission factor is available.

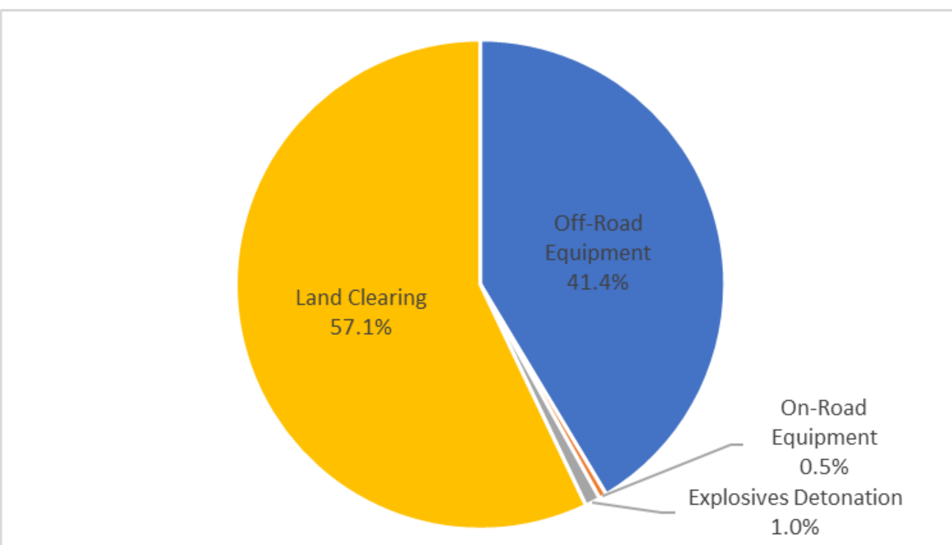

Figure F-4 MacLellan Site Worst-Case Year Construction GHG Emission Breakdown by Activity

F.5.2 OPERATION

The maximum annual GHG emissions during Project operation are presented in Table F-9. The operation GHG emission from off-road diesel equipment, on-road diesel equipment, and explosives detonation activities are approximately 104,885 tonnes/year. This includes the indirect GHG emissions are approximately 311 tonnes/year which are from the purchase of electricity for the MacLellan Site.

As shown in Figure F-5, the GHG emissions from Gordon (Year 2) and MacLellan (Year 7) site are 34.8% and 65.2%, respectively. During operation, about 92.2% of the GHG emissions are from activities associated with off-road equipment followed by on-road equipment (5.8%), explosives detonation (1.7%) and electricity consumption (0.3%) (see Figure F-6).

Table F-9 Summary of Operation Peak Annual Direct GHG Emissions (Gordon and MacLellan Sites)

Activity	CO_2 (tonnes/year)	CH_4 (tonnes/year)	N_2O (tonnes/year)	CO_2e (tonnes/year)
Off-Road Equipment [a]	94,258	2.57	7.98	**96,700**
On-Road Equipment [b]	6,109	0.130	0.00704	**6,114**
Explosives Detonation [c]	1,759	—	—	**1,759**
Electricity Consumption [d]	—	—	—	**311**
Total	**102,126**	**2.70**	**7.99**	**104,885**

NOTES:

[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).

[b] Based on MOVES 2014a derived emission factors (US EPA 2015)

[c] Based on MAC emission factors (MAC 2014)

[d] Based on ECCC emission factors provided in Table A13-8 of the National Inventory Report (ECCC 2019a).

"—" Indicates no emission factor is available.

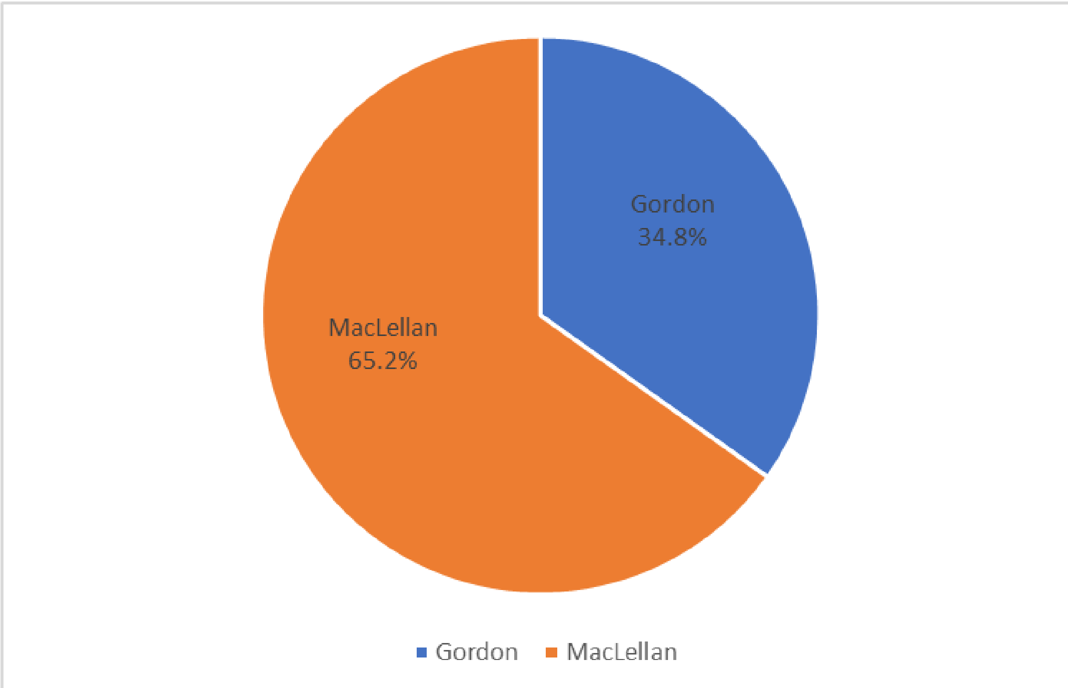

Figure F-5 Project Operation GHG Emissions Breakdown by Site

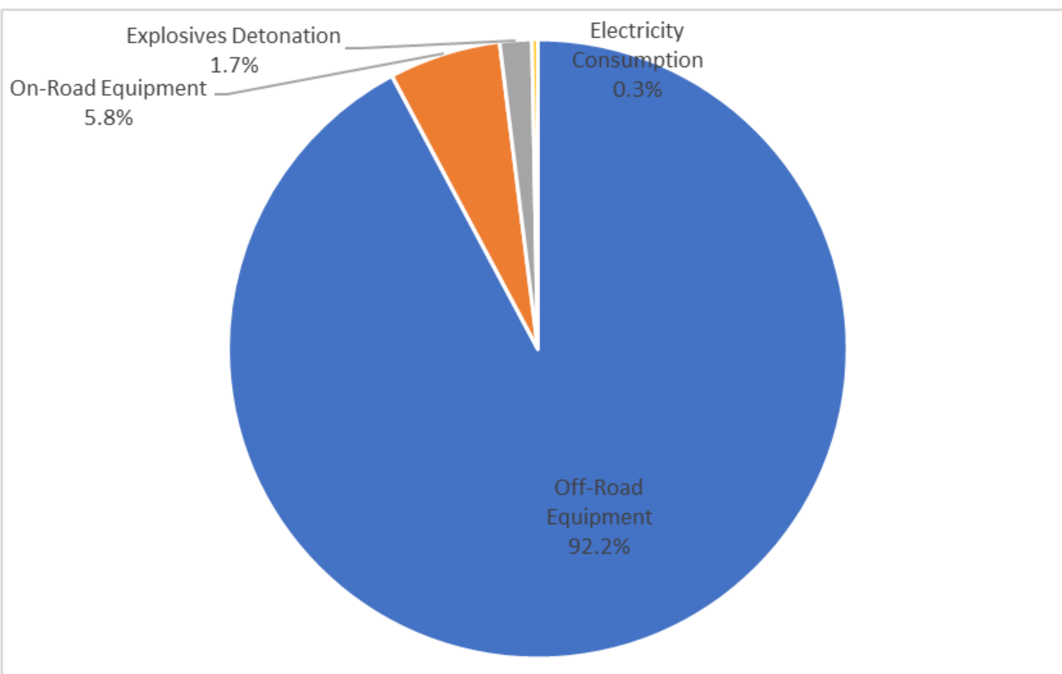

Figure F-6 Project Operation GHG Emission Breakdown by Activity

F.5.2.1 Gordon Site Operation GHG Emissions

The maximum annual GHG emissions during the Gordon site operation (Year 2) are presented in Table F-10. The operation GHG emission from off-road diesel equipment, on-road diesel equipment, and explosives detonation activities are approximately 36,546 tonnes/year. As shown in Figure F-7, about 82.9% of the operation GHG emissions at Gordon site (Year 2) are from activities associated with off-road equipment followed by on-road equipment (15.1%) and explosives detonation (2.0%). The annual GHG emissons from the 300 kW diesel generator at the Gordon site (1,976 tonnes CO_2e) are included in the off-road equipment category.

Table F-10 Summary of Gordon Site Worst-Case Year Operation GHG Emissions

Activity	**CO_2 (tonnes/year)**	**CH_4 (tonnes/year)**	**N_2O (tonnes/year)**	**CO_2e (tonnes/year)**
Off-Road Equipment [a]	29,531	0.804	2.50	**30,296**
On-Road Equipment [b]	5,507	0.116	0.00630	**5,512**
Explosives Detonation [c]	738	—	—	**738**
Electricity Consumption [d]	—	—	—	—
Total	**35,776**	**0.920**	**2.51**	**36,546**

NOTES:

[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).

[b] Based on MOVES 2014a derived emission factors (US EPA 2015)

[c] Based on MAC emission factors (MAC 2014)

[d] Gordon site does not import electricity during operation hence no indirect emissions. 300 kW diesel generator emissions are included under the off-road equipment.

"—" Indicates no emission factor is available.

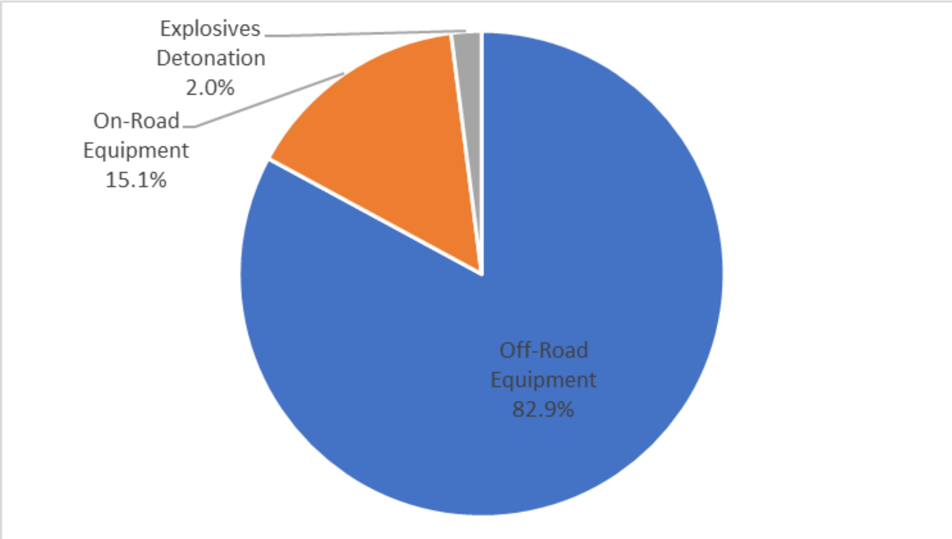

Figure F-7 Gordon Site Operation Site GHG Emissions Breakdown by Activity

F.5.2.2 MacLellan Site Operation GHG Emissions

The maximum annual GHG emissions during the MacLellan site operation (Year 7) are presented in Table F-11. The operation GHG emissions from off-road diesel equipment, on-road diesel equipment and explosives detonation activities are approximately 68,339 tonnes/year. As shown in Figure F-8, about 97.2% of the operation GHG emissions at the MacLellan site (Year 7) are from activities associated with off-road equipment followed by explosives detonation (1.5%), on-road equipment (0.9%) and electricity consumption (0.5%).

Table F-11 Summary of MacLellan Site Worst-Case Year Operation GHG Emissions

Activity	CO_2 (tonnes/year)	CH_4 (tonnes/year)	N_2O (tonnes/year)	CO_2e (tonnes/year)
Off-Road Equipment [a]	64,727	1.76	5.48	**66,405**
On-Road Equipment [b]	601	0.0136	0.000745	**602**
Explosives Detonation [c]	1,021	—	—	**1,021**
Electricity Consumption [d]	—	—	—	**311**
Total	**66,350**	**1.78**	**5.48**	**68,339**

NOTES:
[a] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019a).
[b] Based on MOVES 2014a derived emission factors (US EPA 2015)
[c] Based on MAC emission factors (MAC 2014)
[d] Based on ECCC emission factors provided in Table A13-8 of the National Inventory Report (ECCC 2019a).

Activity	CO_2 (tonnes/year)	CH_4 (tonnes/year)	N_2O (tonnes/year)	CO_2e (tonnes/year)
"—" Indicates no emission factor is available.				

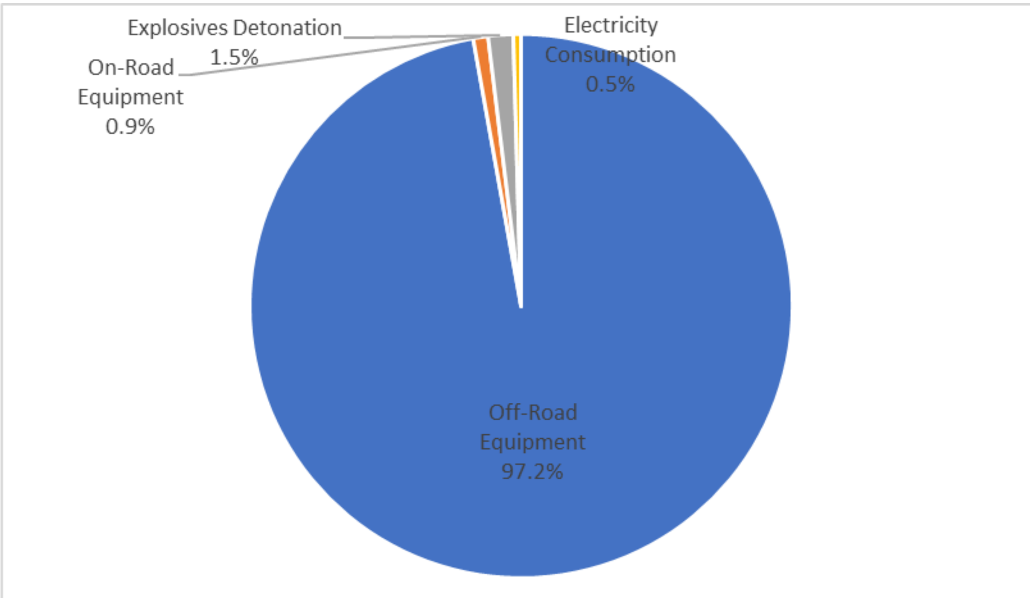

Figure F-8 MacLellan Site Worst-Case Year Operation GHG Emissions Breakdown by Activity

The overall GHG emissions from the expected lifetime of the Project operation were projected using the emissions intensity calculated from the worst-case year operation for the Gordon Site (Year 2) and the MacLellan Site (Year 7). The emission intensity is calculated based on the worst-case year emissions from both Gordon and MacLellan site and their respective mined tonnes from each site. The projected GHG emissions from both Gordon and MacLellan sites are shown in Table F-12 and Figure F 9. Gordon and MacLellan sites operation emissions over the lifetime of the Project are approximately 618,944 tCO_2e and 132,713 tCO_2e, respectively. The average annual GHG emissions from Gordon and MacLellan sites are 26,543 tCO_2e and 47,611 tCO_2e over the lifetime of the each mine site.

Table F-12 Projected Operation GHG Emissions Over the Life Time of the Project

Year	Gordon Site Emissions, tCO_2e [a]	MacLellan Site Emissions, tCO_2e [b]
1	31,351	33,379
2	36,546	38,235
3	32,420	43,621
4	24,784	53,403
5	7,613	59,474
6	0	68,030
7	0	68,028
8	0	65,568
9	0	59,476
10	0	55,347
11	0	42,964
12	0	26,958
13	0	4,462
Total	**132,713**	**618,944**

NOTES:
[a] Gordon Site yearly emissions are projected using the emission intensity calculated based on Year 2 operations
[b] MacLellan Site yearly emissions are projected using the emission intensity calculated based on Year 7 operations

Figure F-9 Projected Operation GHG Emissions Over the Lifetime of the Project

F.6 COMPARISON TO NATIONAL AND PROVINCIAL GHG EMISSIONS

Table F-13 summarizes the historical GHG emissions from Manitoba and Canada. As shown in Table F-13, most recently reported 2017 total annual GHG emissions were 21,668 kt CO_2e (provincially) and 715,760 kt CO_2e (nationally). When compared to 2005 emissions, the provincial 2017 GHG emissions have increased by 7.1%, whereas the national 2017 GHG emissions have decreased by 2.0%.

The increase in provincial 2017 GHG emissions from 2005 emissions is mainly because of the increased emissions from transportation, production & consumption of halocarbons, SF_6 and NF_3 and agricultural soils categories. The decrease in national 2017 GHG emissions from 2005 emissions is mainly because of the decreased emissions from energy and industrial process and product use.

Table F-13 National and Provincial GHG Emissions Summary

Year	Canada GHG Emissions, kt CO_2e	Manitoba GHG Emissions, kt CO_2e	Manitoba's Contribution to Canada's Total, %	Canada's Emissions change from 2005, %	Manitoba Emission change from 2005
2003	741,011	20,359	2.7%	1.4%	1.2%
2004	742,980	20,638	2.8%	1.7%	2.5%
2005	730,361	20,122	2.8%	0.0%	0.0%
2006	721,463	20,303	2.8%	-1.2%	0.9%
2007	743,812	20,792	2.8%	1.8%	3.2%
2008	723,238	20,562	2.8%	-1.0%	2.1%
2009	681,711	19,342	2.8%	-7.1%	-4.0%
2010	692,633	19,098	2.8%	-5.4%	-5.4%
2011	703,393	18,858	2.7%	-3.8%	-6.7%
2012	711,037	20,179	2.8%	-2.7%	0.3%
2013	722,077	20,901	2.9%	-1.1%	3.7%
2014	723,101	20,794	2.9%	-1.0%	3.2%
2015	722,001	20,620	2.9%	-1.2%	2.4%
2016	707,736	20,980	3.0%	-3.2%	4.1%
2017	**715,760**	**21,668**	**3.0%**	**-2.0%**	**7.1%**

NOTE
Provincial and national GHG emission totals for the last 15 years of available data from ECCC NIR (ECCC 2019b)

F.6.1 CONSTRUCTION

The maximum annual worst-case year construction GHG emissions from both the Gordon and MacLellan sites for the 12-month period (i.e., Q2 2021 to Q1 2022) are presented in Table F-14. The construction phase GHG emissions from off-road equipment, on-road equipment, blasting and land clearing are approximately 80.6 kt CO_2e. On an annual basis, the construction phase GHG emissions from the Project contribute approximately 0.372% and 0.0113% to the provincial and national totals respectively, based on the most recently reported 2017 provincial and national GHG emissions totals (see Table F-13).

Table F-14 Comparison of Estimated Worst-Case Year Construction Emissions from the Project to Provincial and National 2017 Emissions

Parameter	Units	CO_2	CH_4	N_2O	CO_2e
Construction GHG Emissions	kt/y [c]	34.9	0.000929	0.00282	**80.6**
2017 Manitoba GHG Emissions [a]	kt/y [c]	13,328	3,933	3,910	**21,668 [b]**
2017 National GHG Emissions [a]	kt/y [c]	571,137	92,862	38,037	**715,760 [b]**
Project construction contribution to Manitoba GHG Emissions	%	0.262%	0.0000236%	0.0000722%	**0.372%**
Project construction contribution to national GHG Emissions	%	0.00610%	0.00000100%	0.00000742%	**0.0113%**

NOTES:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019b)
[b] Provincial and national GHG emission totals include other fluorinated GHGs
[c] Emissions are expressed in kilotonnes per year (kt/y)

F.6.1.1 Gordon Site Construction GHG Emissions

The maximum annual worst-case year construction GHG emissions from the Gordon site for the 12-month period (i.e., Q2 2021 to Q1 2022) are presented in Table F-15. The Gordon site construction GHG emissions from off-road equipment, on-road equipment, blasting and land clearing are approximately 16.0 kt CO_2e. On an annual basis, the operation GHG emissions both Gordon and MacLellan site contributes approximately 0.0740% and 0.00224% to the most recently reported 2017 provincial and national GHG emission totals (see Table F-13), respectively.

Table F-15 Comparison of Estimated Worst-Case Year Construction Emissions from the Gordon Site to Provincial and National 2017 Emissions

Parameter	Units	CO_2	CH_4	N_2O	CO_2e
Construction GHG Emissions	kt/y [c]	7.81	0.000209	0.000617	**16.0**
2017 Manitoba GHG Emissions [a]	kt/y [c]	13,328	3,933	3,910	**21,668** [b]
2017 National GHG Emissions [a]	kt/y [c]	571,137	92,862	38,037	**715,760** [b]
Project construction contribution to Manitoba GHG Emissions	%	0.0586%	0.00000532%	0.0000158%	**0.0740%**
Project construction contribution to national GHG Emissions	%	0.00137%	0.000000225%	0.00000162%	**0.00224%**

NOTES:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019a)
[b] Provincial and national GHG emission totals include other fluorinated GHGs
[c] Emissions are expressed in kilotonnes per year (kt/y)

F.6.1.2 MacLellan Site Construction GHG Emissions

The maximum annual worst-case year construction GHG emissions from the MacLellan site for the 12-month period (i.e., Q2 2021 to Q1 2022) are presented in Table F-16. The MacLellan site construction GHG emissions from off-road equipment, on-road equipment, blasting, and land clearing are approximately 64.6 kt CO_2e. On an annual basis, the operation GHG emissions both Gordon and MacLellan site contributes approximately 0.298% and 0.00902% to the most recently reported 2017 provincial and national GHG emission totals (see Table F-13), respectively.

Table F-16 Comparison of Estimated Worst-Case Year Construction Emissions from the MacLellan Site to Provincial and National 2017 Emissions

Parameter	Units	CO_2	CH_4	N_2O	CO_2e
Construction GHG Emissions	kt/y [c]	27.0	0.000720	0.00221	**64.6**
Manitoba GHG Emissions [a]	kt/y [c]	13,328	3,933	3,910	**21,668** [b]
National GHG Emissions [a]	kt/y [c]	571,137	92,862	38,037	**715,760** [b]
Project construction contribution to Manitoba GHG Emissions	%	0.203%	0.0000183%	0.0000564%	**0.298%**
Project construction contribution to National GHG Emissions	%	0.00473%	0.000000775%	0.00000580%	**0.00902%**

NOTES:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019b)
[b] Provincial and national GHG emission totals include other fluorinated GHGs
[c] Emissions are expressed in kilotonnes per year (kt/y)

F.6.2 OPERATION

The maximum annual worst-case year operation GHG emissions from both the Gordon and MacLellan sites are presented in Table F-17. The operation GHG emissions from off-road equipment, on-road equipment, and blasting are approximately 105 kt CO_2e. On an annual basis, the operation GHG emissions from the Project contribute approximately 0.484% and 0.0147% to provincial and national totals respectively, based on the most recently reported 2017 provincial and national GHG emission totals (see Table F-13).

Table F-17 Comparison of Estimated Worst-Case Year Operation Emissions from the Project to Provincial and National 2017 Emissions

Parameter	Units	CO_2	CH_4	N_2O	CO_2e
Operation GHG Emissions	kt/y [c]	102	0.00270	0.00799	**105**
Manitoba GHG Emissions [a]	kt/y [c]	13,328	3,933	3,910	**21,668 [b]**
National GHG Emissions [a]	kt/y [c]	571,137	92,862	38,037	**715,760 [b]**
Project operation contribution to Manitoba GHG Emissions	%	0.766%	0.0000686%	0.000204%	**0.484%**
Project operation contribution to national GHG Emissions	%	0.0179%	0.00000290%	0.0000210%	**0.0147%**

NOTES:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019b)
[b] Provincial and national GHG emission totals include other fluorinated GHGs
[c] Emissions are expressed in kilotonnes per year (kt/y)

F.6.2.1 Gordon Site Operation GHG Emissions

The maximum annual worst-case year operation GHG emissions from the Gordon site are presented in Table F-18. The Gordon site operation GHG emissions from off-road equipment, on-road equipment, and blasting are approximately 36.5 kt CO_2e. On an annual basis, the operation GHG emissions both Gordon and MacLellan site contributes approximately 0.169% and 0.00511% to the most recently reported 2017 provincial and national GHG emission totals (see Table F-13), respectively.

Table F-18 Comparison of Estimated Worst-Case Year Operation Emissions from the Gordon Site to Provincial and National 2017 Emissions

Parameter	Units	CO_2	CH_4	N_2O	CO_2e
Operation GHG Emissions	kt/y [c]	35.8	0.000920	0.00251	**36.5**
Manitoba GHG Emissions [a]	kt/y [c]	13,328	3,933	3,910	**21,668 [b]**
National GHG Emissions [a]	kt/y [c]	571,137	92,862	38,037	**715,760 [b]**
Project operation contribution to Manitoba GHG Emissions	%	0.268%	0.0000234%	0.0000641%	**0.169%**
Project operation contribution to national GHG Emissions	%	0.00626%	0.000000991%	0.00000659%	**0.00511%**

NOTE:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019b)
[b] Provincial and national GHG emission totals include other fluorinated GHGs
[c] Emissions are expressed in kilotonnes per year (kt/y)

F.6.2.2 MacLellan Site Operation GHG Emissions

The maximum annual worst-case year operation GHG emissions from the Maclellan site are presented in Table F-19. The Maclellan site operation GHG emissions from off-road equipment, on-road equipment, and blasting are approximately 68.3 kt CO_2e. On an annual basis, the operation GHG emissions both Gordon and MacLellan site contributes approximately 0.315% and 0.00955% to the most recently reported 2017 provincial and national GHG emission totals (see Table F-13), respectively.

Table F-19 Comparison of Estimated Worst-Case Year Operation Emissions from the MacLellan Site to Provincial and National 2017 Emissions

Parameter	Units	CO_2	CH_4	N_2O	CO_2e
Operation GHG Emissions	kt/y [c]	66.7	0.00178	0.00548	**68.3**
Manitoba GHG Emissions [a]	kt/y [c]	13,328	3,933	3,910	**21,668 [b]**
National GHG Emissions [a]	kt/y [c]	571,137	92,862	38,037	**715,760 [b]**
Project operation contribution to Manitoba GHG Emissions	%	0.498%	0.0000452%	0.000140%	**0.315%**
Project operation contribution to National GHG Emissions	%	0.0116%	0.00000191%	0.0000144%	**0.00955%**

NOTES:
[a] Provincial and national GHG emission totals from ECCC NIR (ECCC 2019b)
[b] Provincial and national GHG emission totals include other fluorinated GHGs
[c] Emissions are expressed in kilotonnes per year (kt/y)

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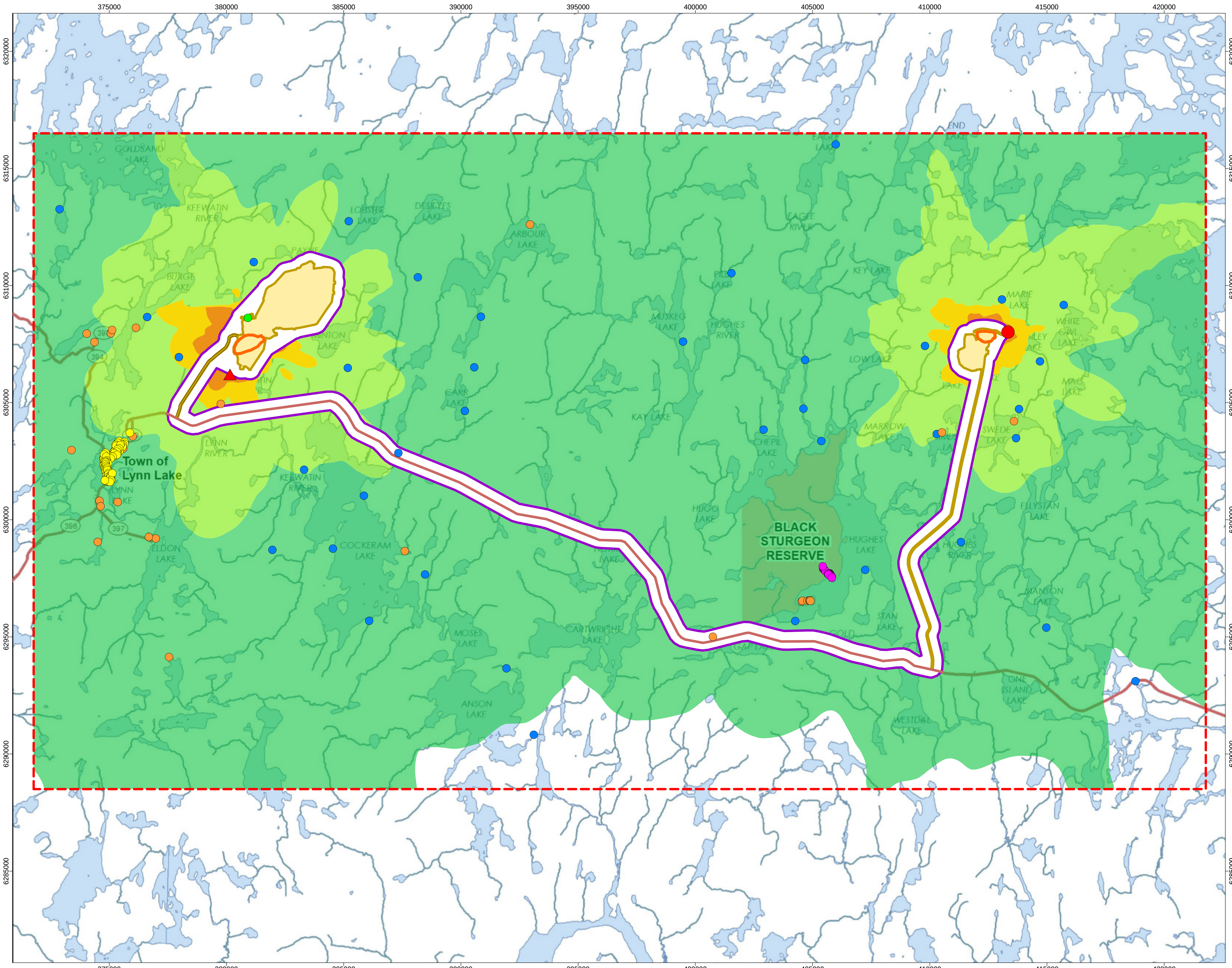
Appendix G CONCENTRATION CONTOUR MAPS



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 459 µg/m³
- Maximum Concentration (MacLellan Site): 404 µg/m³

Background Concentration: 7.5 µg/m³

1-hour NO_2 MAAQC: 400 µg/m³

40 | 100 | 200 | 300 | 400

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

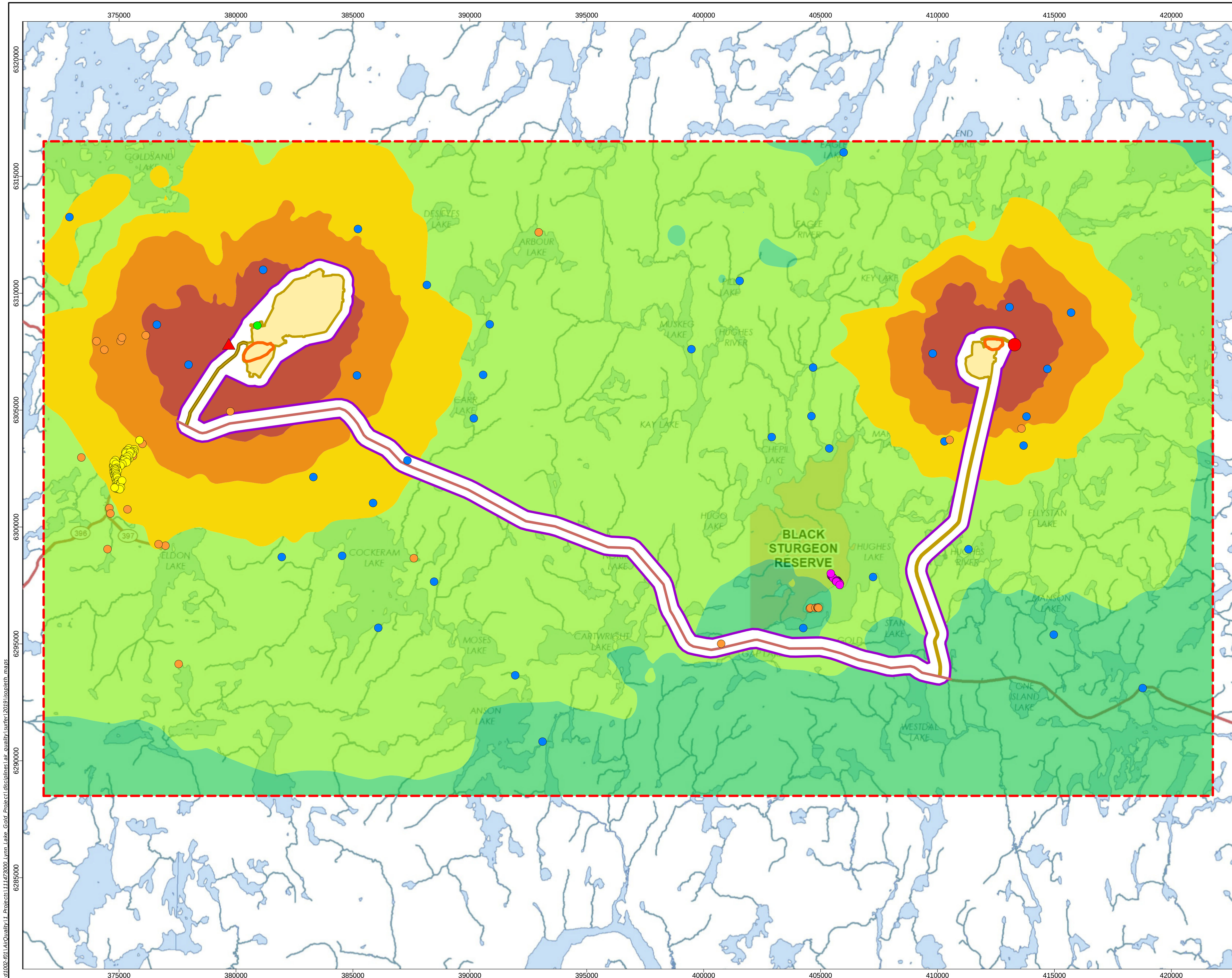
Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-1

Title
Maximum Predicted 1-hour Average NO_2 Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473008 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

ALAMOS GOLD INC.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 224 μg/m³
- Maximum Concentration (MacLellan Site): 146 μg/m³

Background Concentration: 7.5 μg/m³

1-hour NO_2 CAAQS: 79 μg/m³

7.9 | 19.8 | 39.5 | 59.3 | 79

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

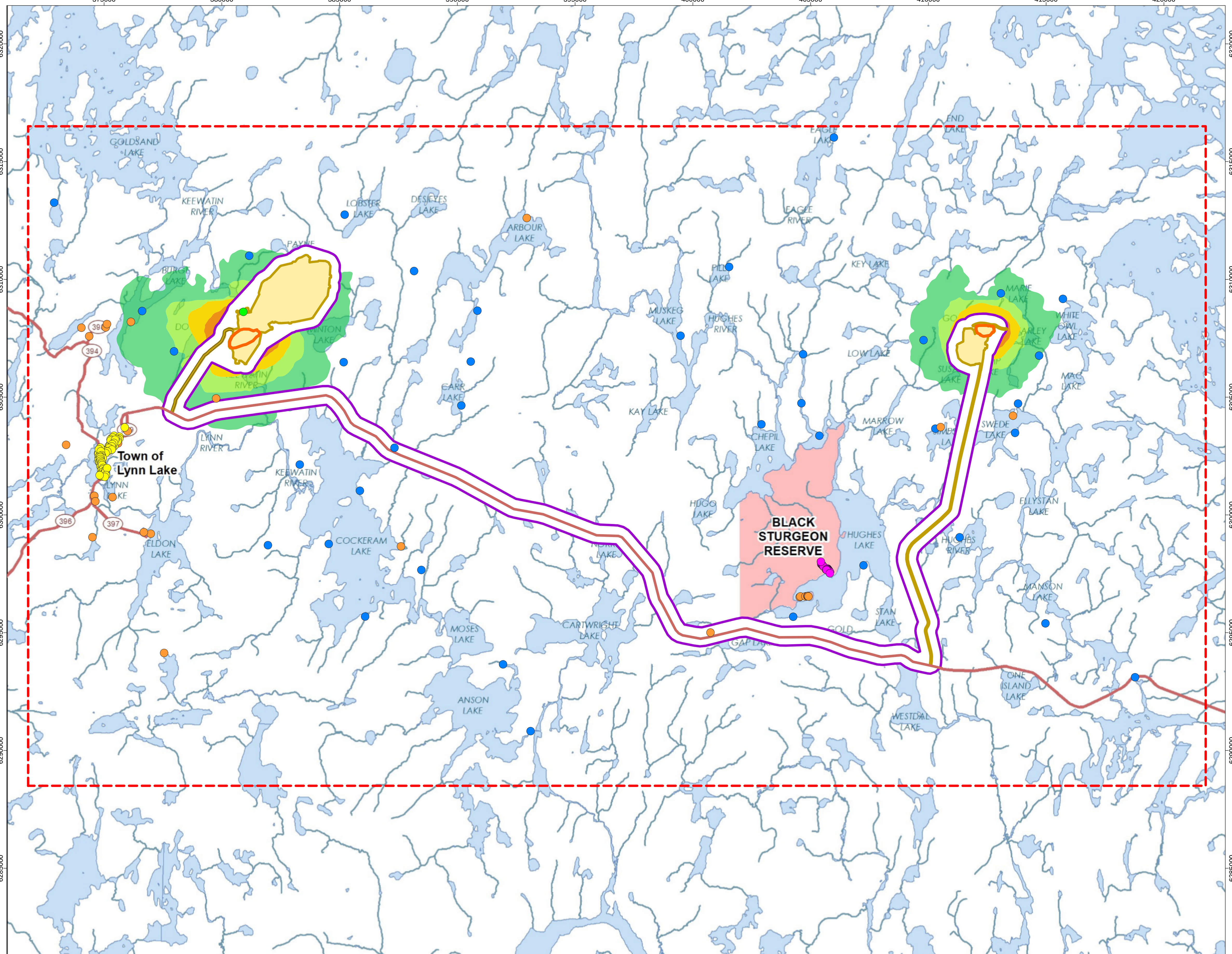
Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-2

Title
Maximum Predicted 98% Daily 1-hour Average NO_2 Concentrations (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

Maximum Exceedances (Gordon Site): 99 days/year

Maximum Exceedances (MacLellan Site): 79 days/year

Background Concentration: 7.5 µg/m³

1-hour NO_2 CAAQS: 79 µg/m³

1 15 30 50 90

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

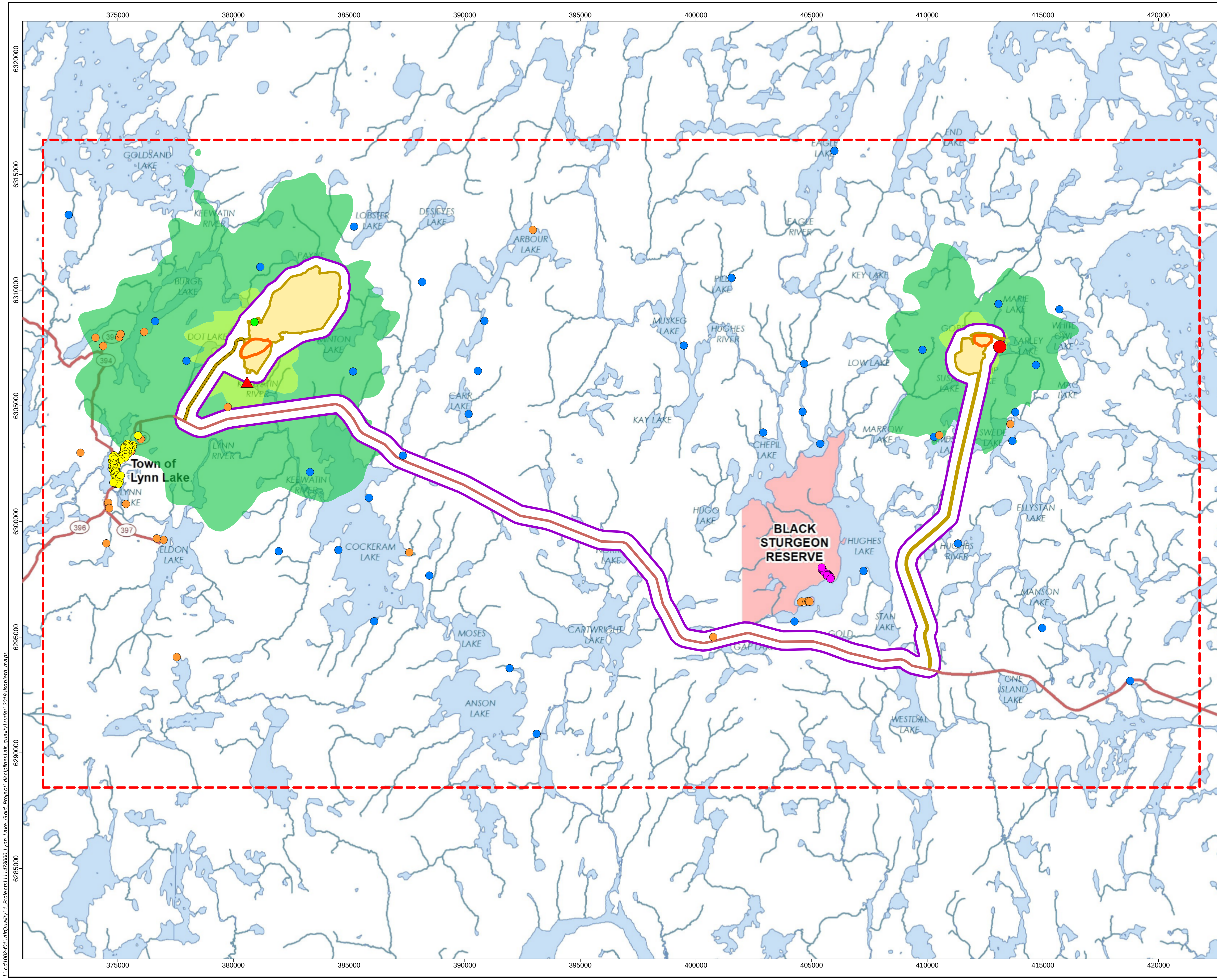
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

G-3

Title

Maximum Frequency Exceedance of 98% Daily 1-hour Average NO_2 Concentrations (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 74.1 μg/m³
- Maximum Concentration (MacLellan Site): 84.5 μg/m³

Background Concentration: 5.6 μg/m³

24-hour NO_2 MAAQC: 200 μg/m³

20 50 100 150 200

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

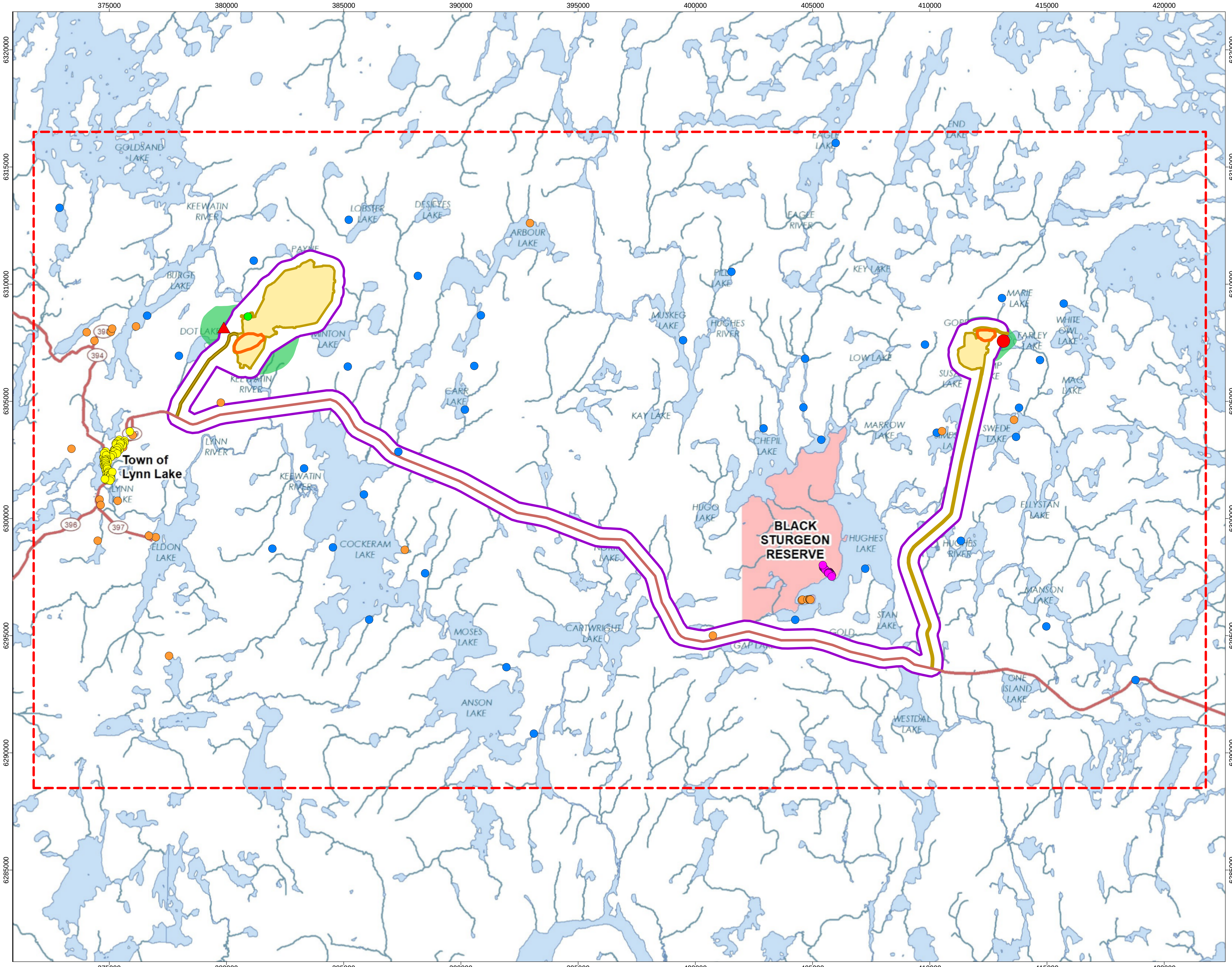
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

G-4

Title

Maximum Predicted 24-hour Average NO_2 Concentrations (μg/m³) (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 11.2 µg/m³
- Maximum Concentration (MacLellan Site): 9.03 µg/m³

Background Concentration:1.9 µg/m³

Annual NO_2 MAAQC: 60 µg/m³

Annual NO_2 CAAQS: 23 µg/m³

6 | 15 | 30 | 45 | 60

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

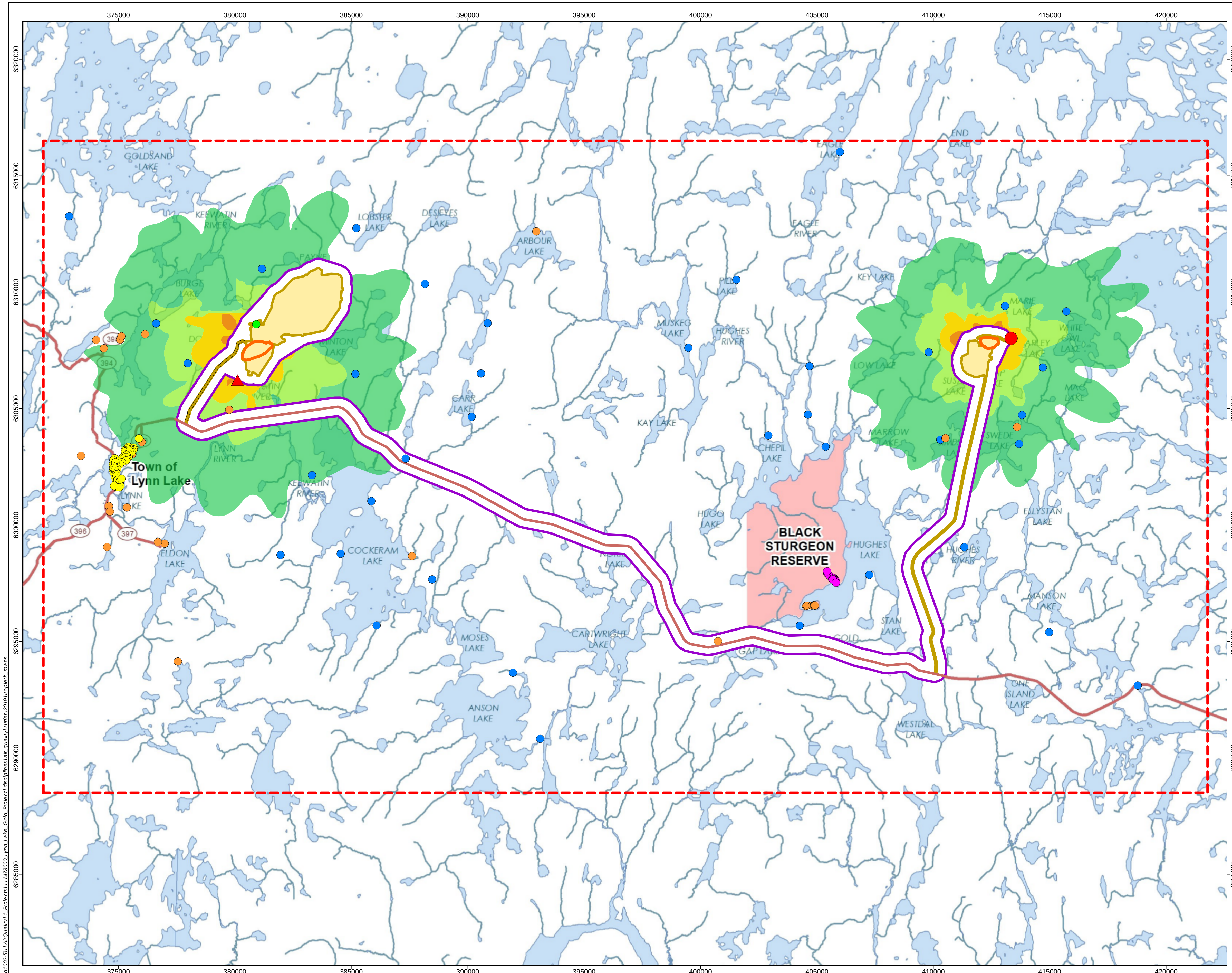
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

G-5

Title

Maximum Predicted Annual Average NO_2 Concentrations (µg/m³) (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 16096 µg/m³
- Maximum Concentration (MacLellan Site): 13328 µg/m³

Background Concentration:406 µg/m³

1-hour CO MAAQC: 15000 µg/m³

1500 3750 7500 11250 15000

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

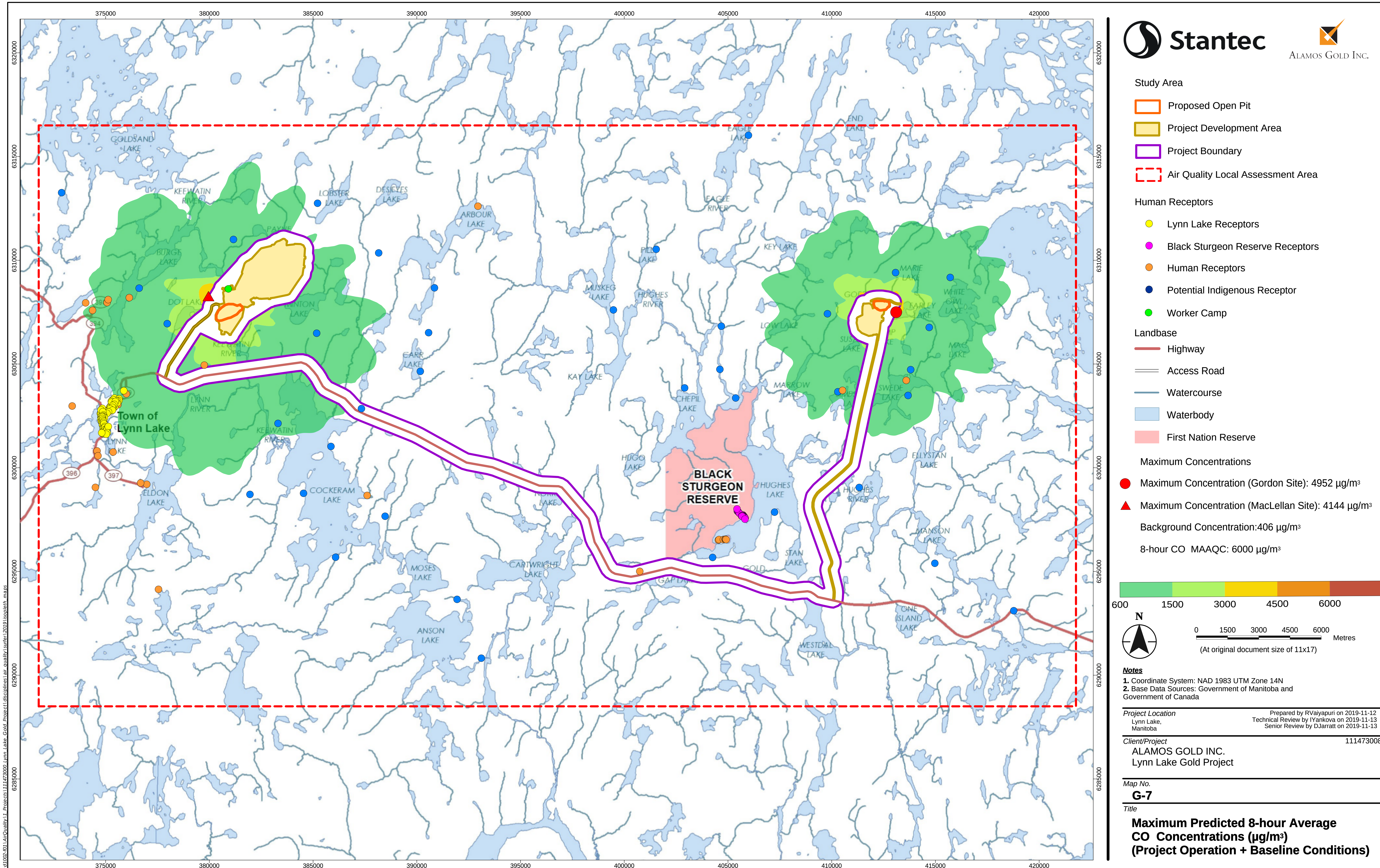
Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-6

Title
Maximum Predicted 1-hour Average CO Concentrations (µg/m³) (Project Operation + Baseline Conditions)



Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

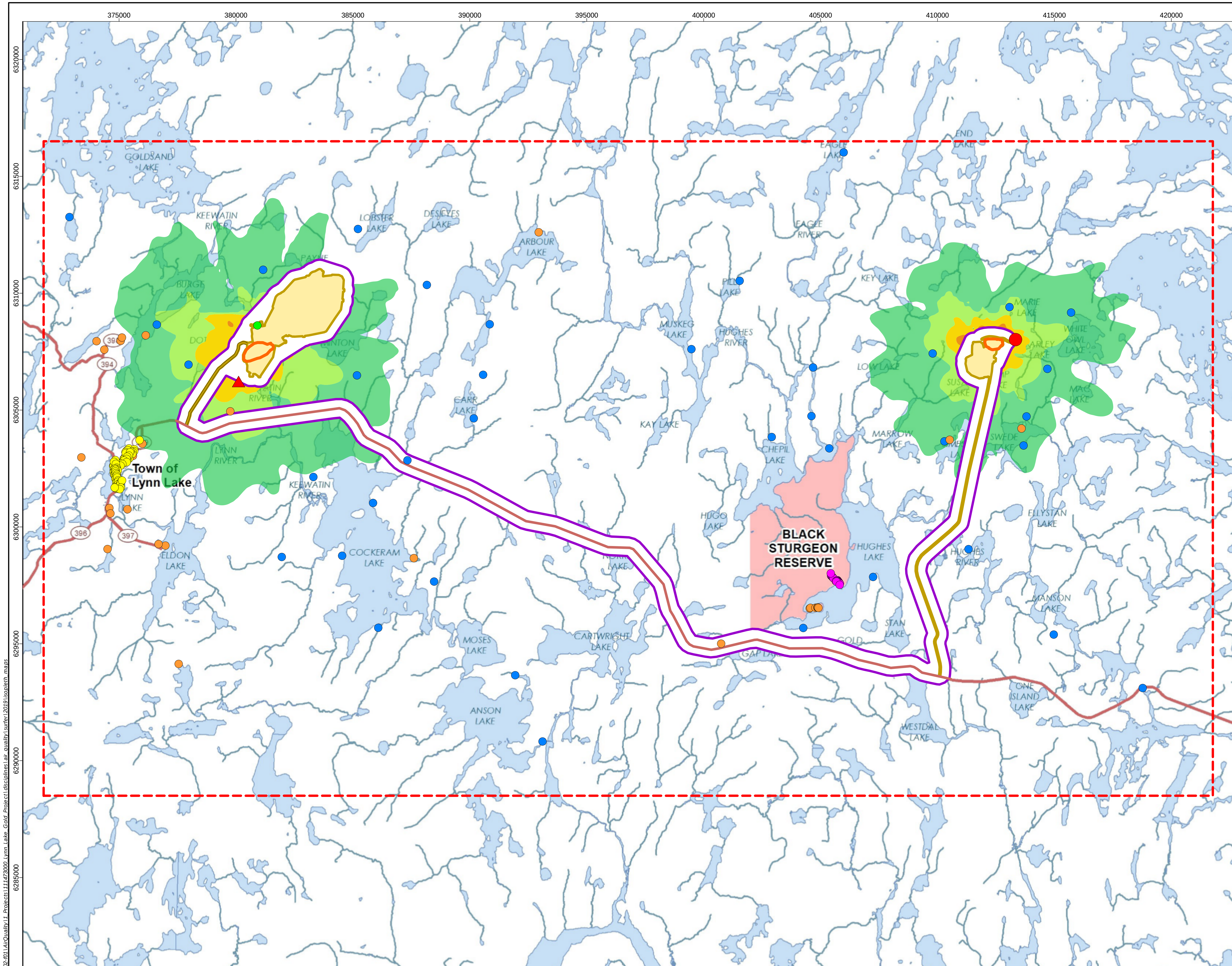
Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-7

Title
Maximum Predicted 8-hour Average CO Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 460 µg/m³
- Maximum Concentration (MacLellan Site): 370 µg/m³

Background Concentration: 6 µg/m³

1-hour SO_2 MAAQC: 450 µg/m³

45 | 113 | 225 | 338 | 450

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

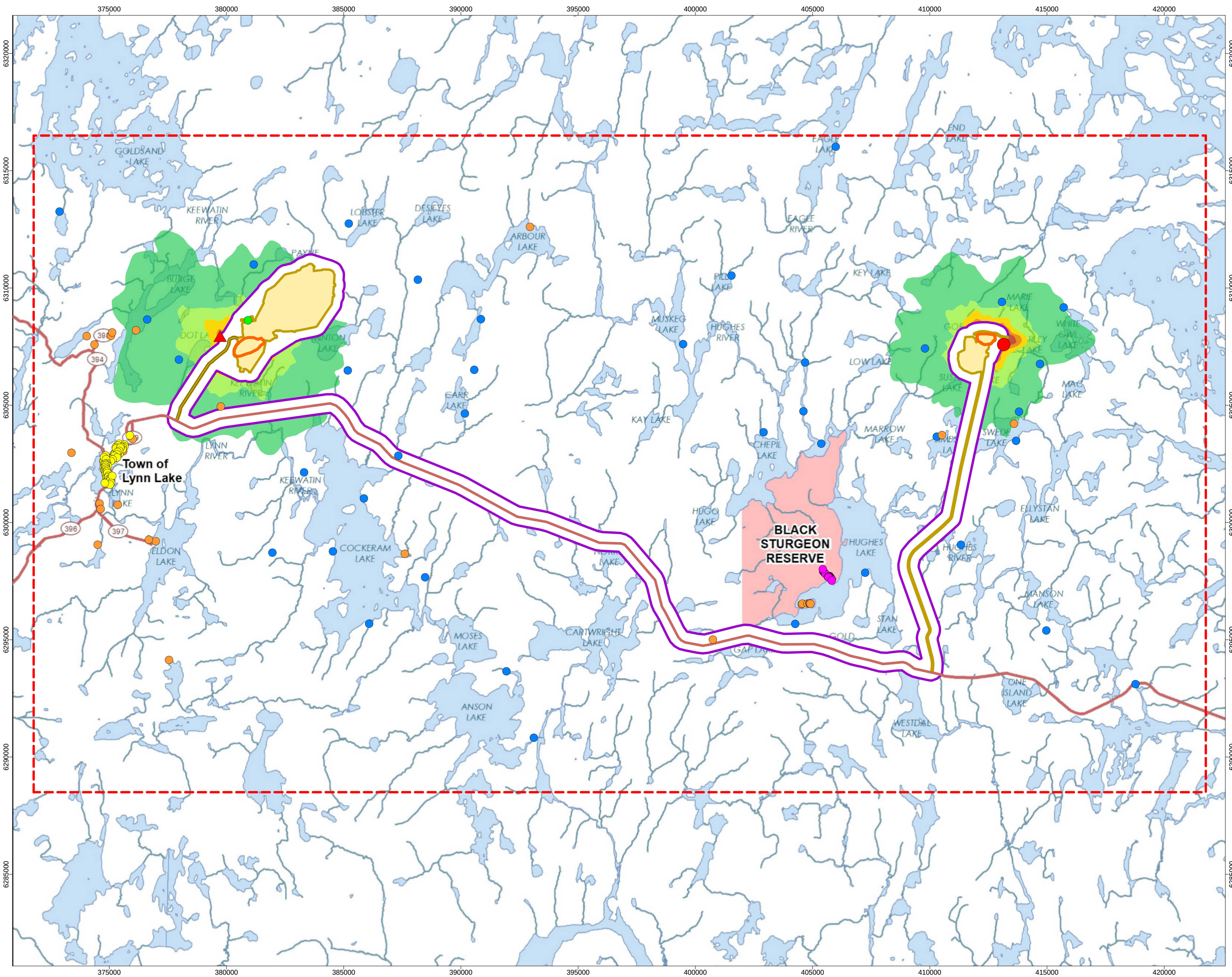
Map No.

G-8

Title

Maximum Predicted 1-hour Average SO_2 Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 342 µg/m³
- Maximum Concentration (MacLellan Site): 147 µg/m³

Background Concentration: 6 µg/m³

1-hour SO_2 CAAQS: 170 µg/m³

17 | 42.5 | 85 | 128 | 170

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

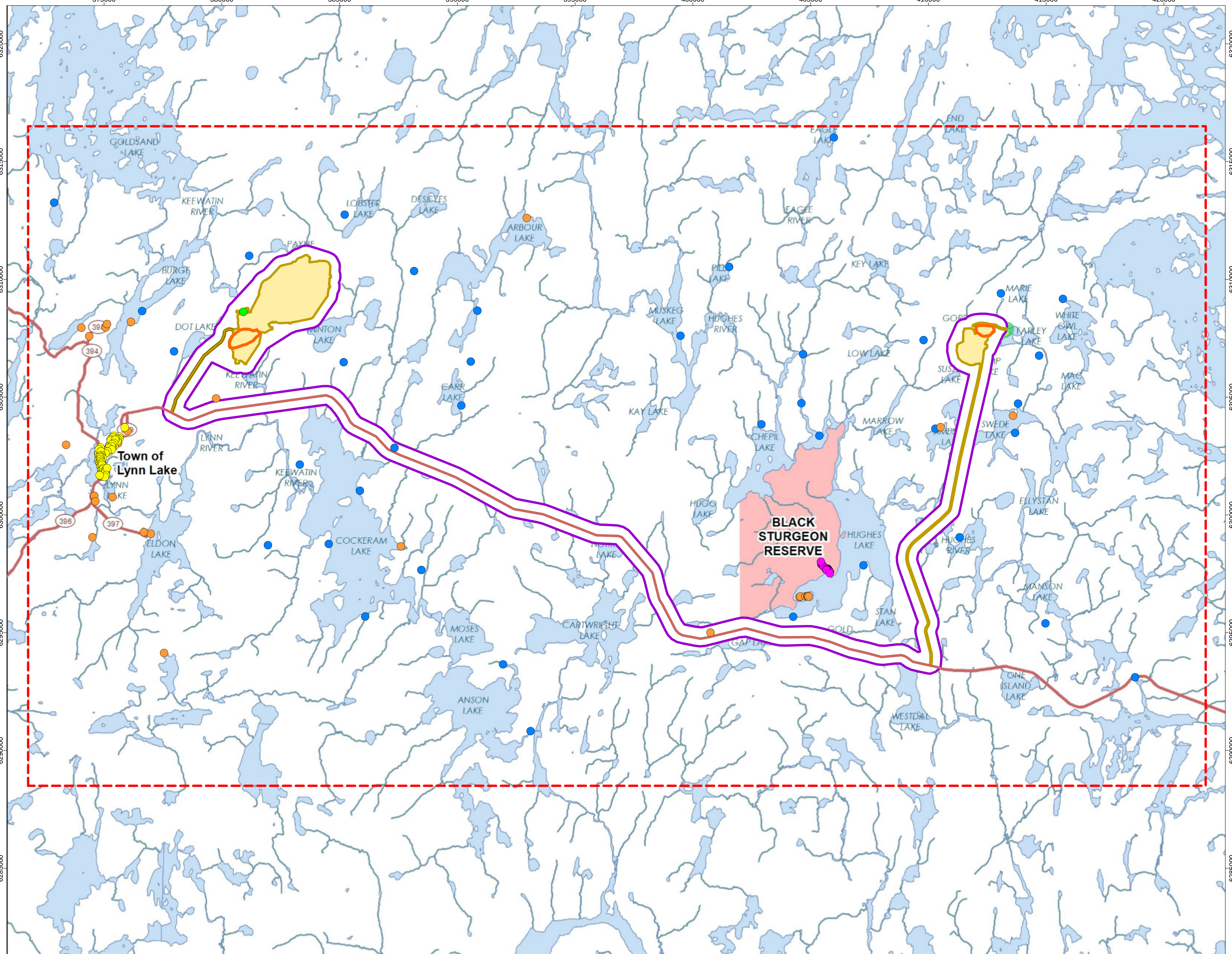
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

G-9

Title

Maximum Predicted 99% Daily 1-hour Average SO_2 Concentrations (Project Operation + Baseline Conditions)



Stantec

ALAMOS GOLD INC.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

Maximum Exceedances (Gordon Site): 5 days/year

Maximum Exceedances (MacLellan Site): 0 days/year

Background Concentration: 6 µg/m³

1-hour SO_2 CAAQS: 170 µg/m³

1 2 3 4 5

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

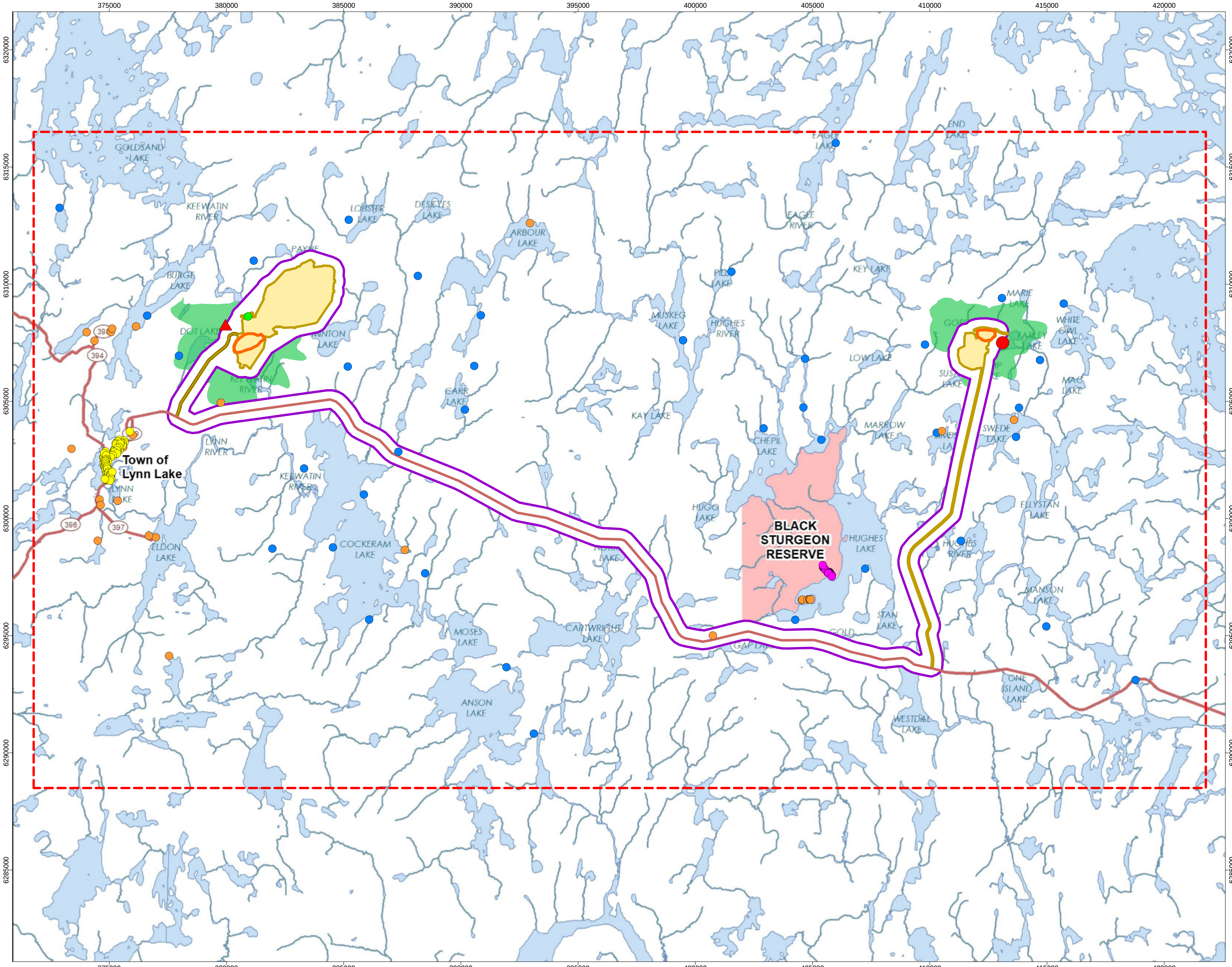
Map No.

G-10

Title

Maximum Frequency Exceedance of 99% Daily 1-hour Average SO_2 Concentrations (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473008 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 48.7 µg/m³
- Maximum Concentration (MacLellan Site): 39.0 µg/m³

Background Concentration: 6 µg/m³

24-hour SO_2 MAAQC: 150 µg/m³

15 | 37.5 | 75 | 113 | 150

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

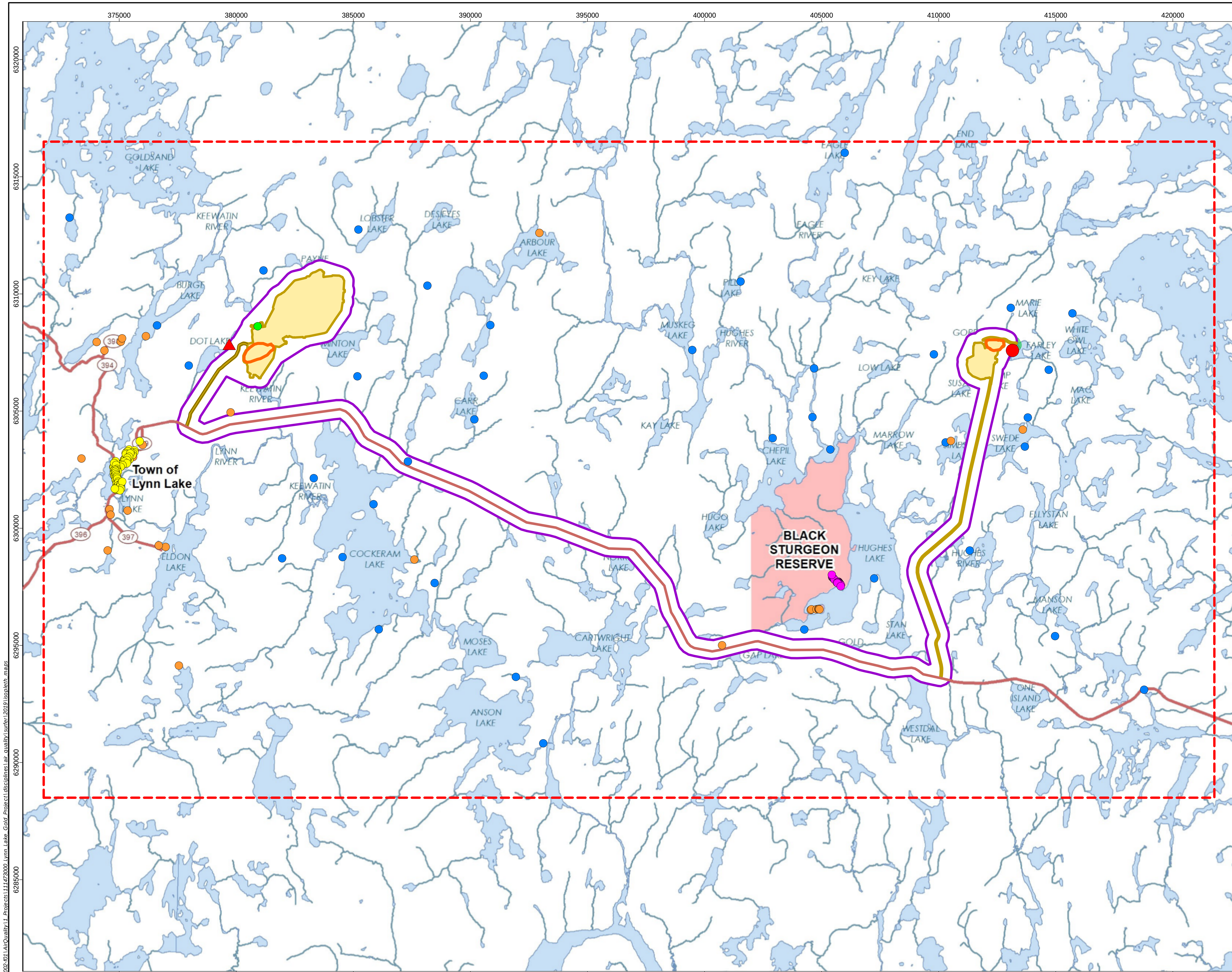
Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-11

Title
Maximum Predicted 24-hour Average SO_2 Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000 Lynn Lake Gold Project\disciplines\air quality\surfer\2019\isopleth maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 2.45 μg/m³
- Maximum Concentration (MacLellan Site): 1.95 μg/m³

Background Concentration:1.5 μg/m³

Annual SO_2 CAAQS: 10 μg/m³

Annual SO_2 MAAQC: 30 μg/m³

2 2.5 5 7.5 10

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

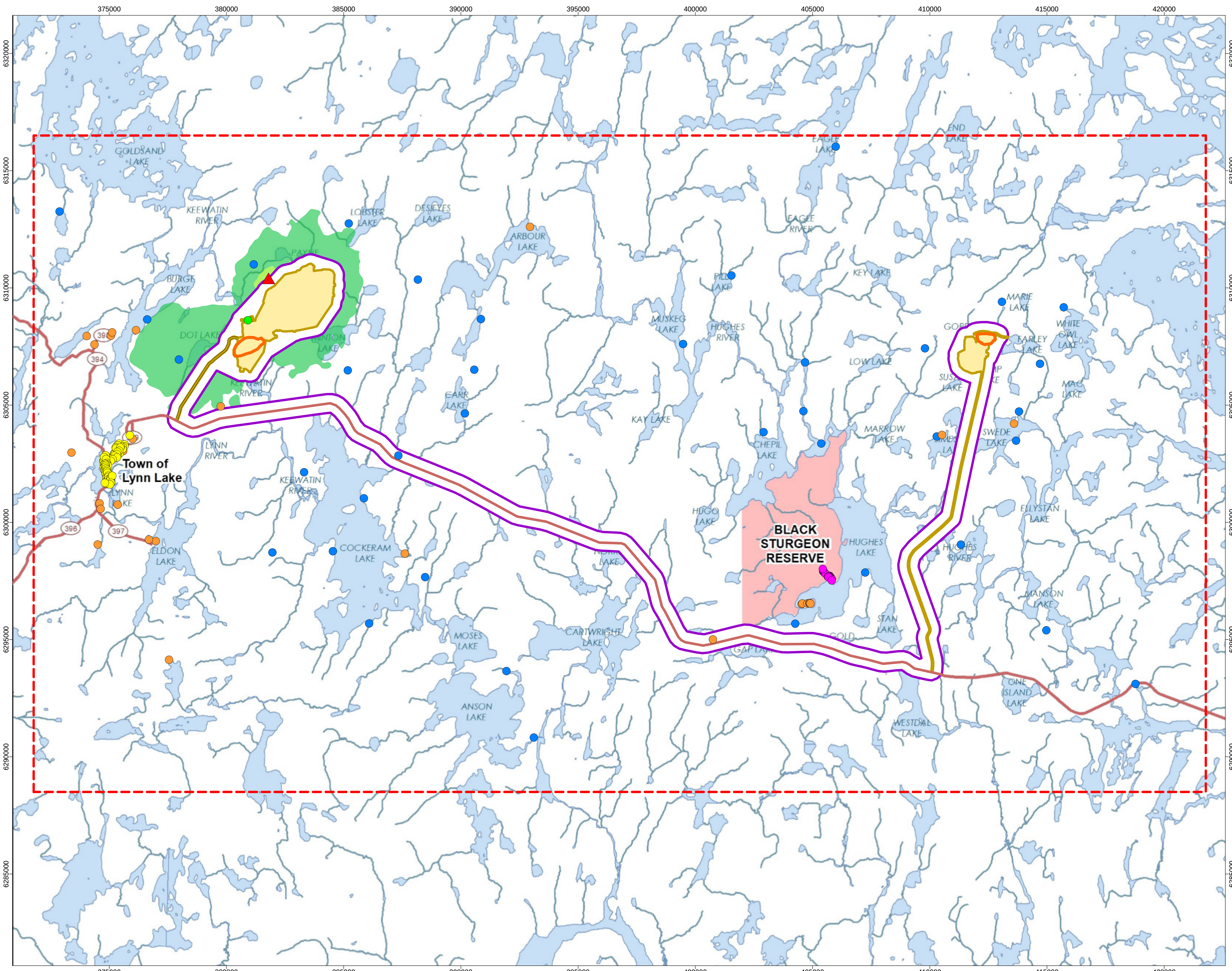
Map No.

G-12

Title

Maximum Predicted Annual Average SO_2 Concentrations (μg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000 Lynn_Lake_Gold_Project\disciplines\air_quality\surfer\2019\isopleth_maps



Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

Maximum Concentration (Gordon Site): 0 µg/m³

Maximum Concentration (MacLellan Site): 14.4 µg/m³

Background Concentration:0 µg/m³

1-hour HCN MAAQC: 40 µg/m³

4 10 20 30 40

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

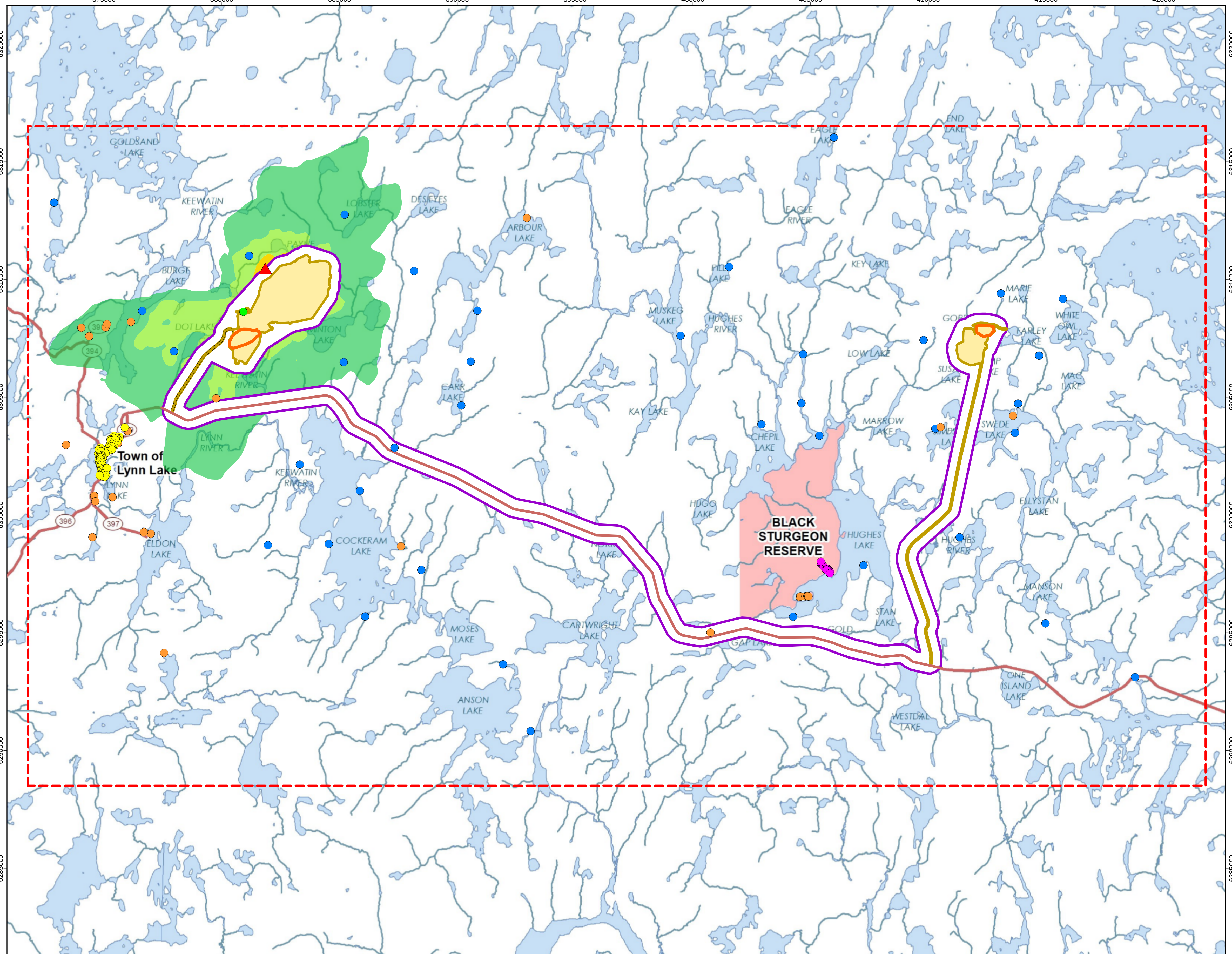
Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-13

Title
Maximum Predicted 1-hour Average HCN Concentrations (µg/m³) (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

Maximum Concentration (Gordon Site): 0 µg/m³

Maximum Concentration (MacLellan Site): 6.50 µg/m³

Background Concentration:0 µg/m³

24-hour HCN OAAQC: 8 µg/m³

0.8 2 4 6 8

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

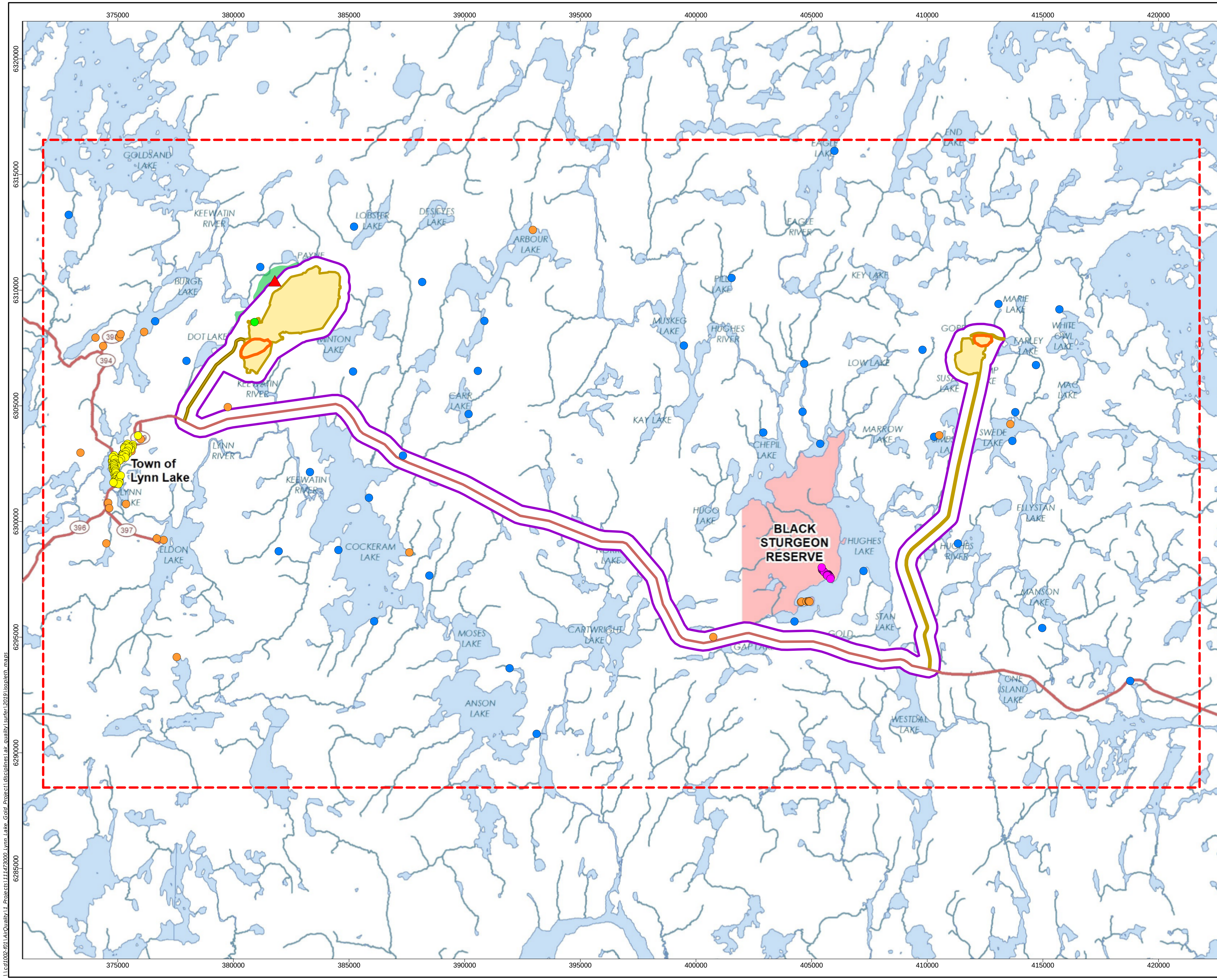
Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-14

Title
Maximum Predicted 24-hour Average HCN Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000_Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

Maximum Concentration (Gordon Site): 0 µg/m³

Maximum Concentration (MacLellan Site): 0.547 µg/m³

Background Concentration:0 µg/m³

Annual HCN MAAQC: 3 µg/m³

0.3 | 0.75 | 1.2 | 2.25 | 3

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

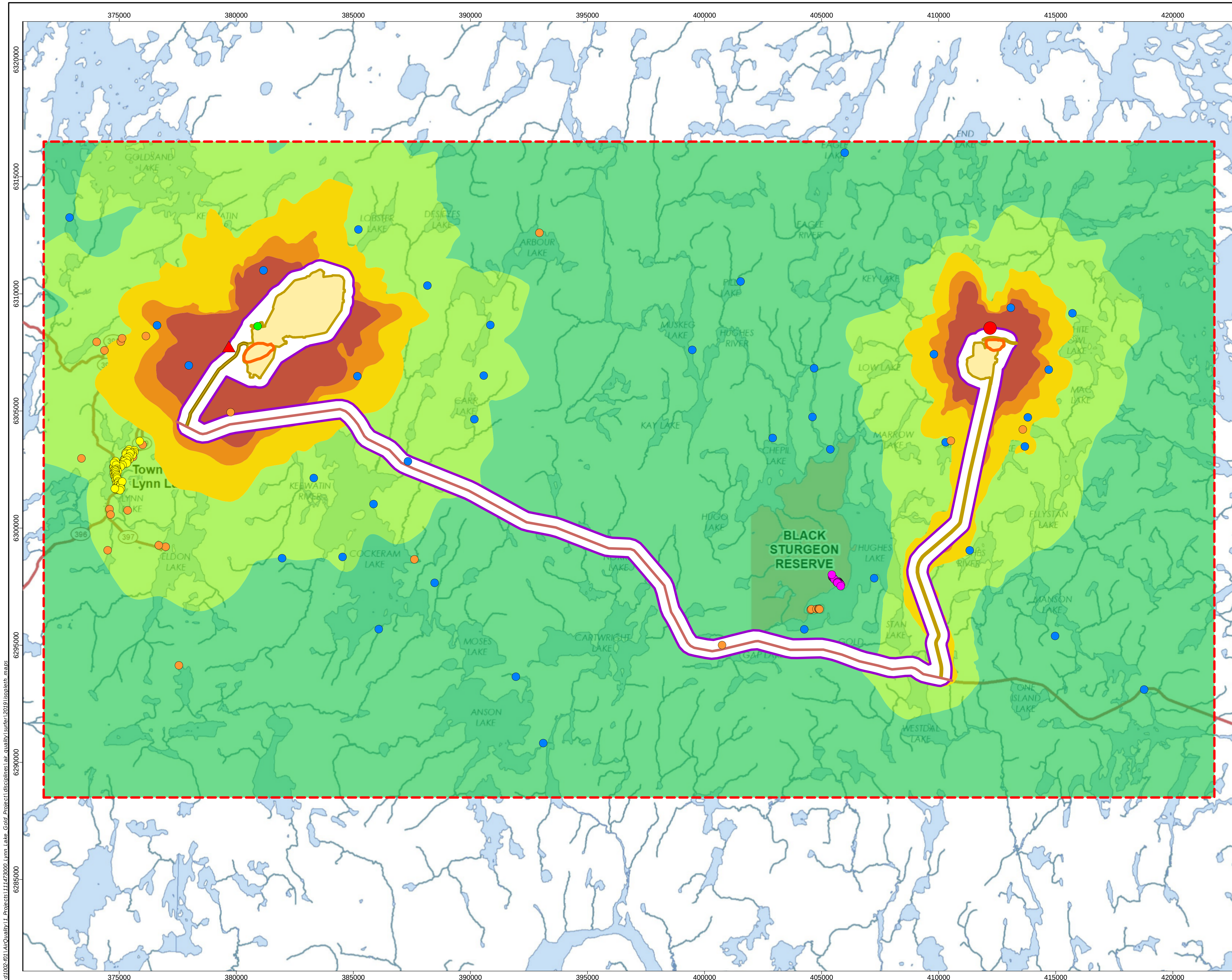
Map No.

G-15

Title

Maximum Predicted Annual Average HCN Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000 Lynn Lake Gold Project\discipline\air quality\surfer\2019\isopleth maps



Stantec

ALAMOS GOLD INC.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 606 µg/m³
- Maximum Concentration (MacLellan Site): 513 µg/m³
- Background Concentration:10.5 µg/m³
- 24-hour TSP MAAQC: 120 µg/m³

12 30 60 90 120

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake,
Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

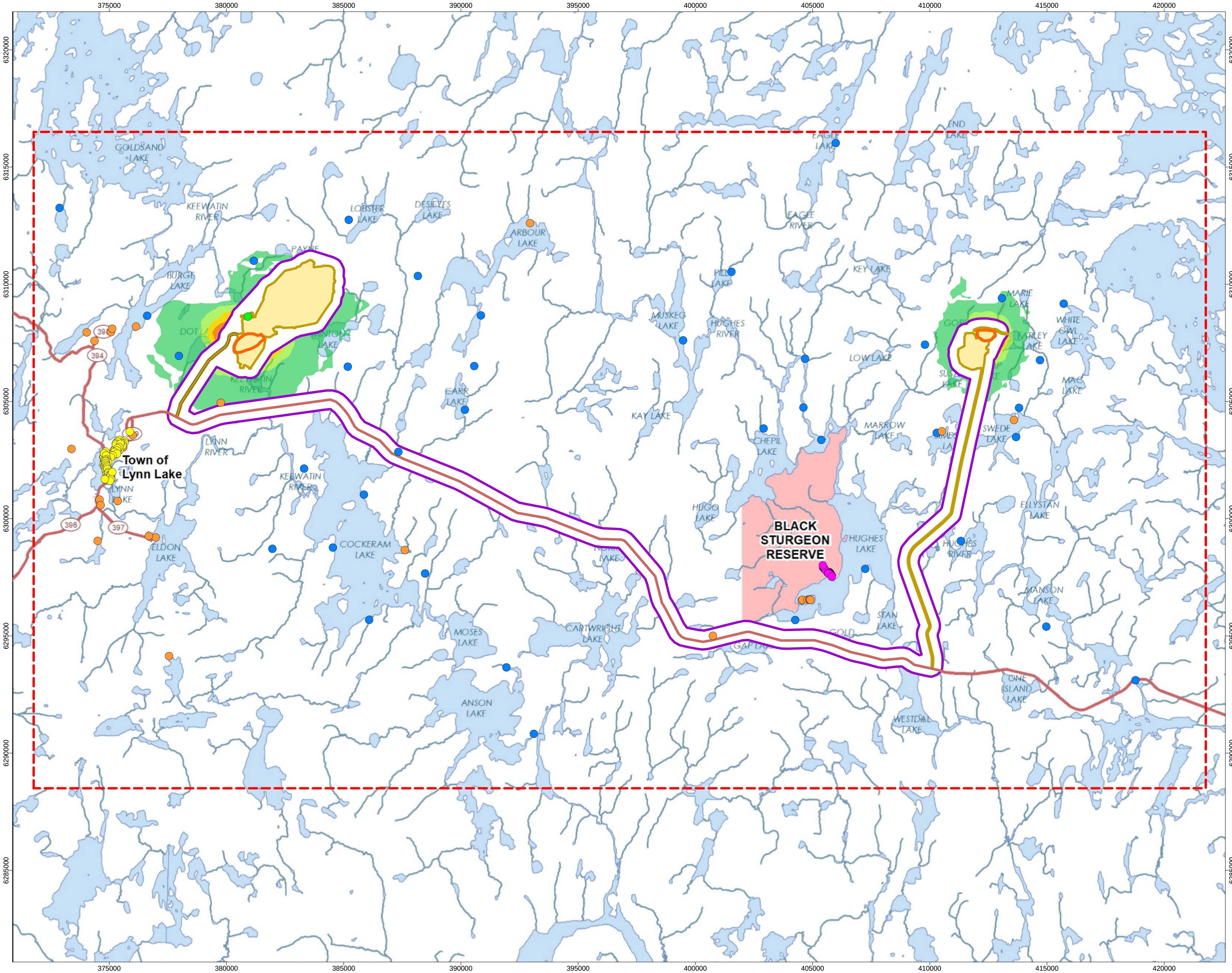
Map No.

G-16

Title

Maximum Predicted 24-hour Average TSP Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473008 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

Proposed Open Pit

Project Development Area

Project Boundary

Air Quality Local Assessment Area

Human Receptors

Lynn Lake Receptors

Black Sturgeon Reserve Receptors

Human Receptors

Potential Indigenous Receptor

Worker Camp

Landbase

Highway

Access Road

Watercourse

Waterbody

First Nation Reserve

Maximum Concentrations

Maximum Exceedances (Gordon Site): 73 days/year

Maximum Exceedances (MacLellan Site): 64 days/year

Background Concentration:10.5 µg/m³

24-hour TSP MAAQC: 120 µg/m³

1 15 30 45 60

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

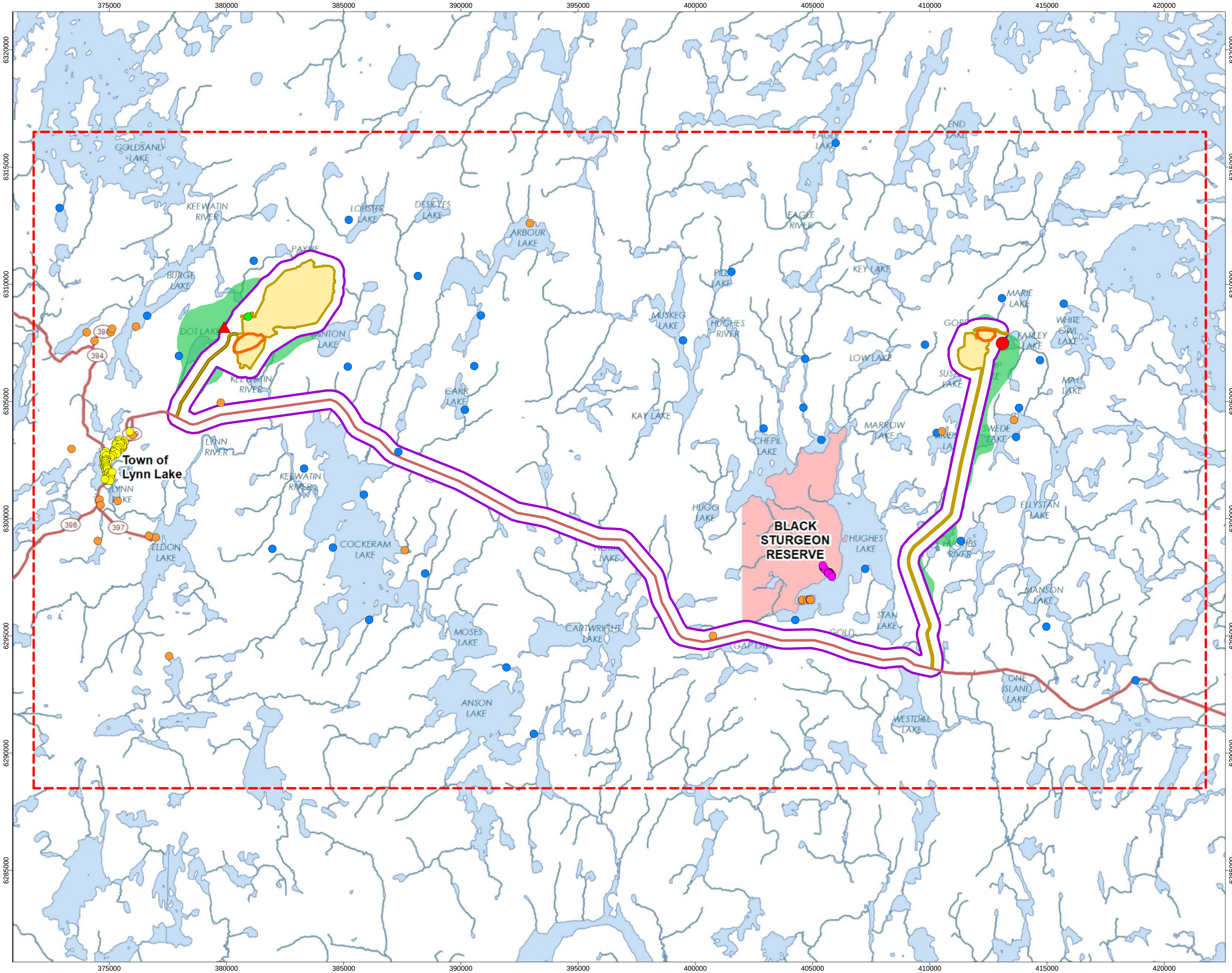
Map No.

G-17

Title

Maximum Frequency Exceedance of 24-hour Average Level TSP Concentrations (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473008 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 14.7 µg/m³
- Maximum Concentration (MacLellan Site): 14.2 µg/m³

Background Concentration:10.5 µg/m³

Annual TSP MAAQC: 60 µg/m³

12 15 30 45 60

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

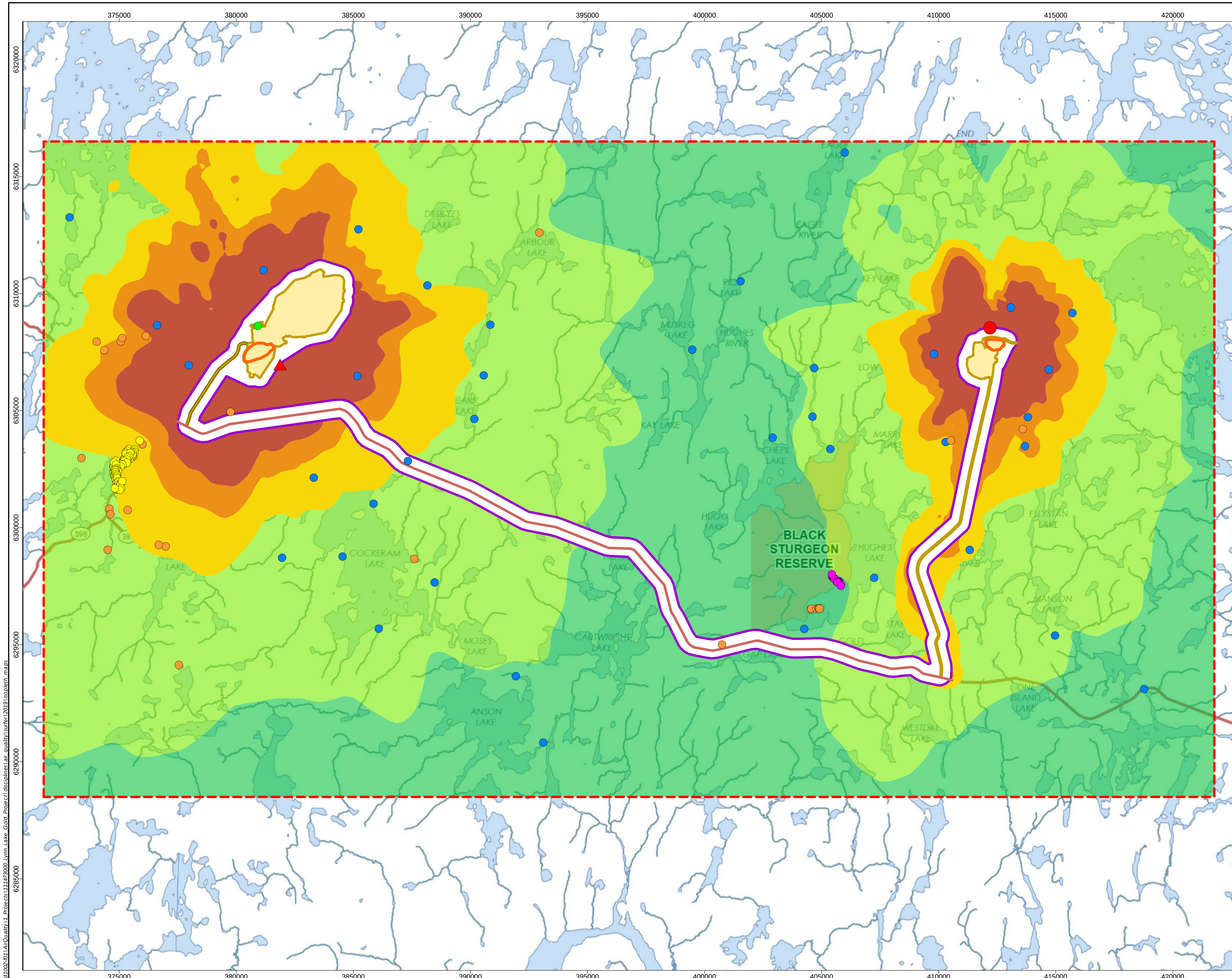
Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-18

Title
Maximum Predicted Annual Average TSP Concentrations (µg/m³) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473008 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 361 µg/m³
- Maximum Concentration (MacLellan Site): 315 µg/m³

Background Concentration:4.6 µg/m³

24-hour PM_{10} MAAQC: 50 µg/m³

5 | 12.5 | 25 | 37.5 | 50

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

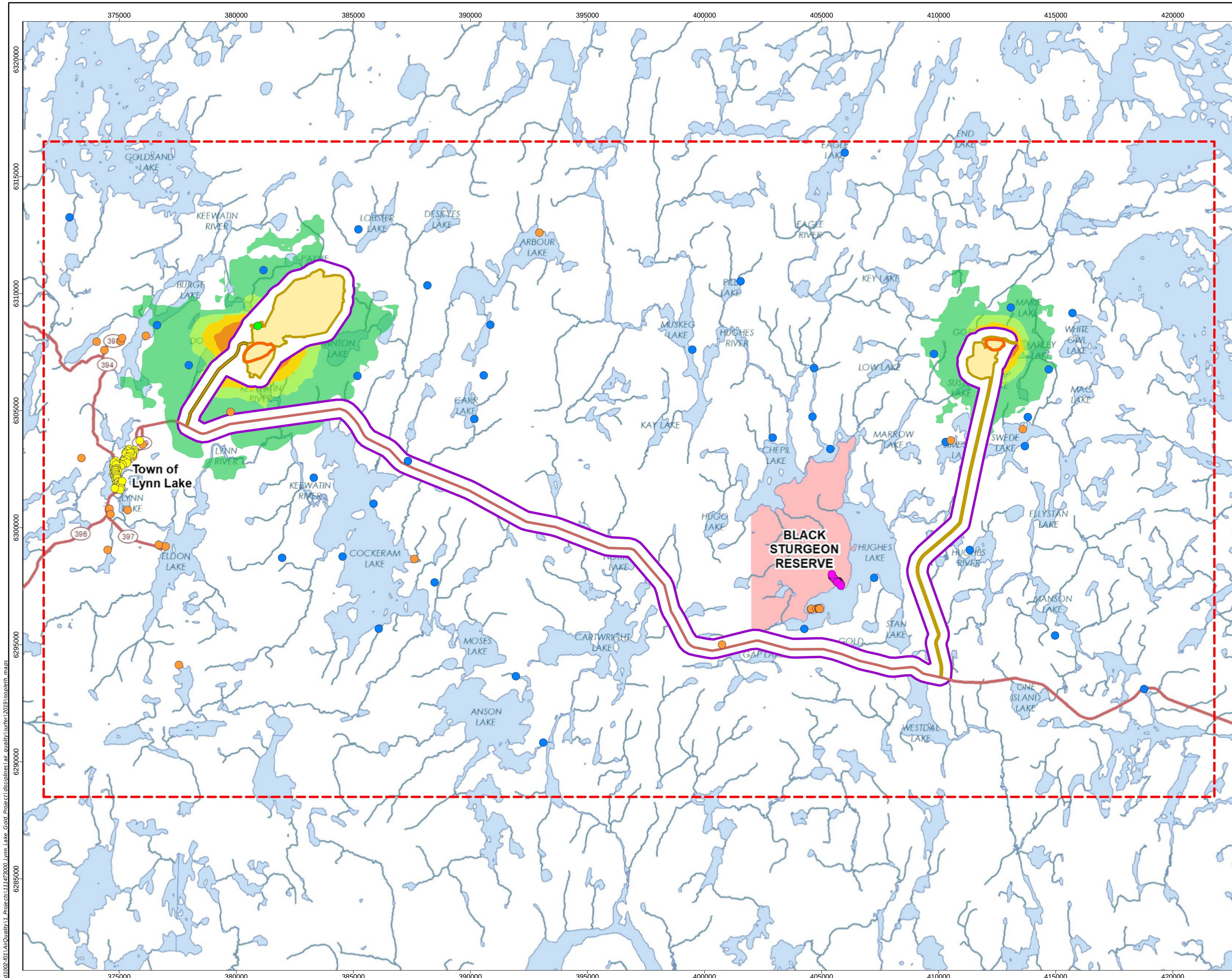
Project Location
Lynn Lake,
Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-19

Title
Maximum Predicted 24-hour Average PM_{10} Concentrations (µg/m³) (Project Operation + Baseline Conditions)



Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

Maximum Exceedances (Gordon Site): 110 days/year

Maximum Exceedances (MacLellan Site): 89 days/year

Background Concentration: 4.6 µg/m³

24-hour PM_{10} MAAQC: 50 µg/m³

1 15 30 50 100

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

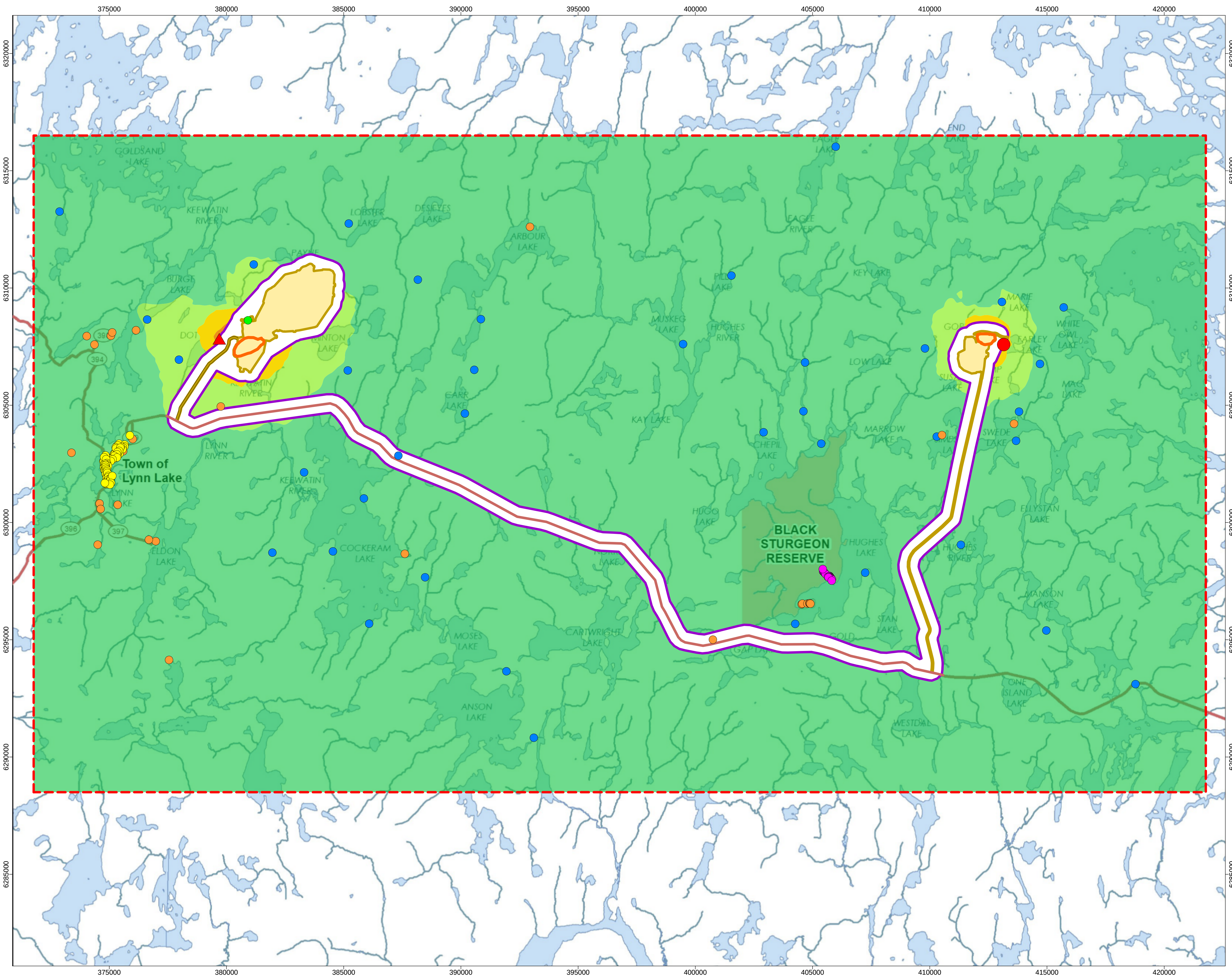
Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-20

Title
Maximum Frequency Exceedance of 24-hour Average Level PM_{10} Concentrations (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

Proposed Open Pit

Project Development Area

Project Boundary

Air Quality Local Assessment Area

Human Receptors

Lynn Lake Receptors

Black Sturgeon Reserve Receptors

Human Receptors

Potential Indigenous Receptor

Worker Camp

Landbase

Highway

Access Road

Watercourse

Waterbody

First Nation Reserve

Maximum Concentrations

Maximum Concentration (Gordon Site): 23.5 µg/m³

Maximum Concentration (MacLellan Site): 24.1 µg/m³

Background Concentration:2.9 µg/m³

24-hour $PM_{2.5}$ CAAQS: 27 µg/m³

3 | 6.75 | 13.5 | 20.3 | 27

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

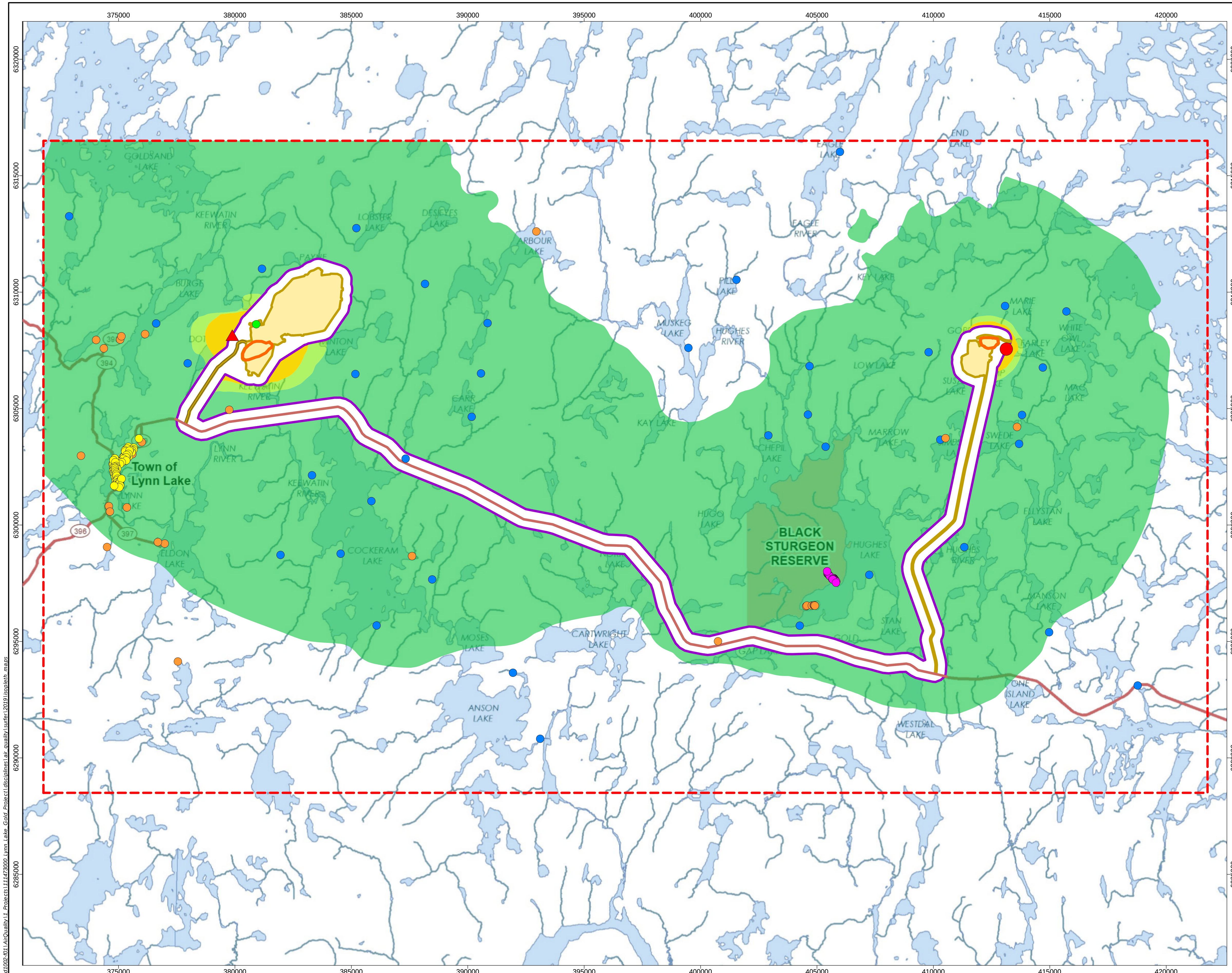
Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-21

Title
Maximum Predicted 98% 24-hour Average $PM_{2.5}$ Concentrations (Project Operation + Baseline Conditions)



Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 6.87 µg/m³
- Maximum Concentration (MacLellan Site): 6.23 µg/m³

Background Concentration:2.9 µg/m³

Annual $PM_{2.5}$ CAAQS: 8.8 µg/m³

3 | 4 | 4.4 | 6.6 | 8.8

N

0 | 1500 | 3000 | 4500 | 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008

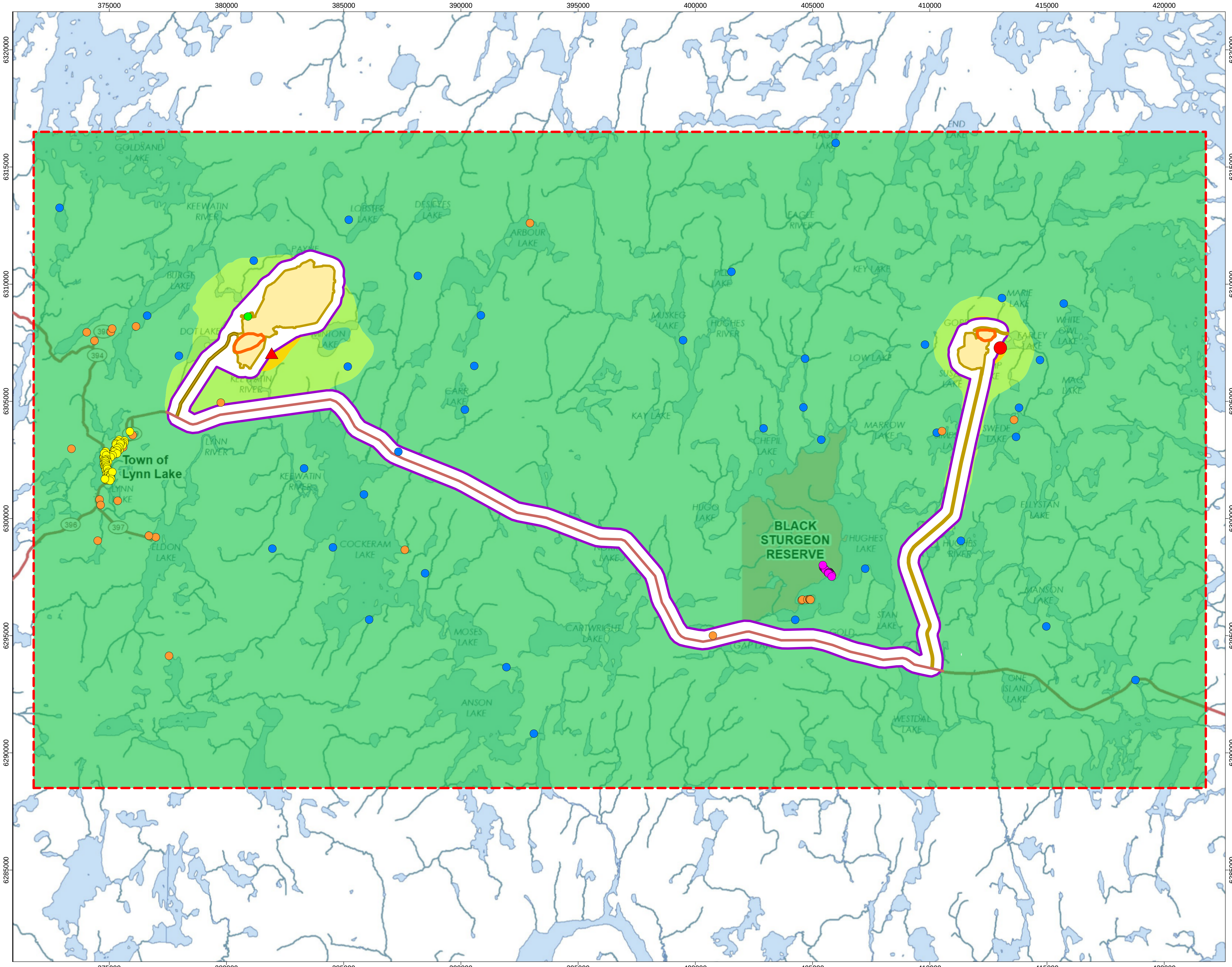
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

G-22

Title

Maximum Predicted Annual Average $PM_{2.5}$ Concentrations (µg/m³) (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Depositions

- Maximum Deposition (Gordon Site): 4.90 g/m²
- Maximum Deposition (MacLellan Site): 5.51 g/m²

Background Deposition:0.99 g/m²/30-day

30-day Dustfall OAAQC: 7 g/m²/30-day

1 | 1.75 | 3.5 | 5.25 | 7

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

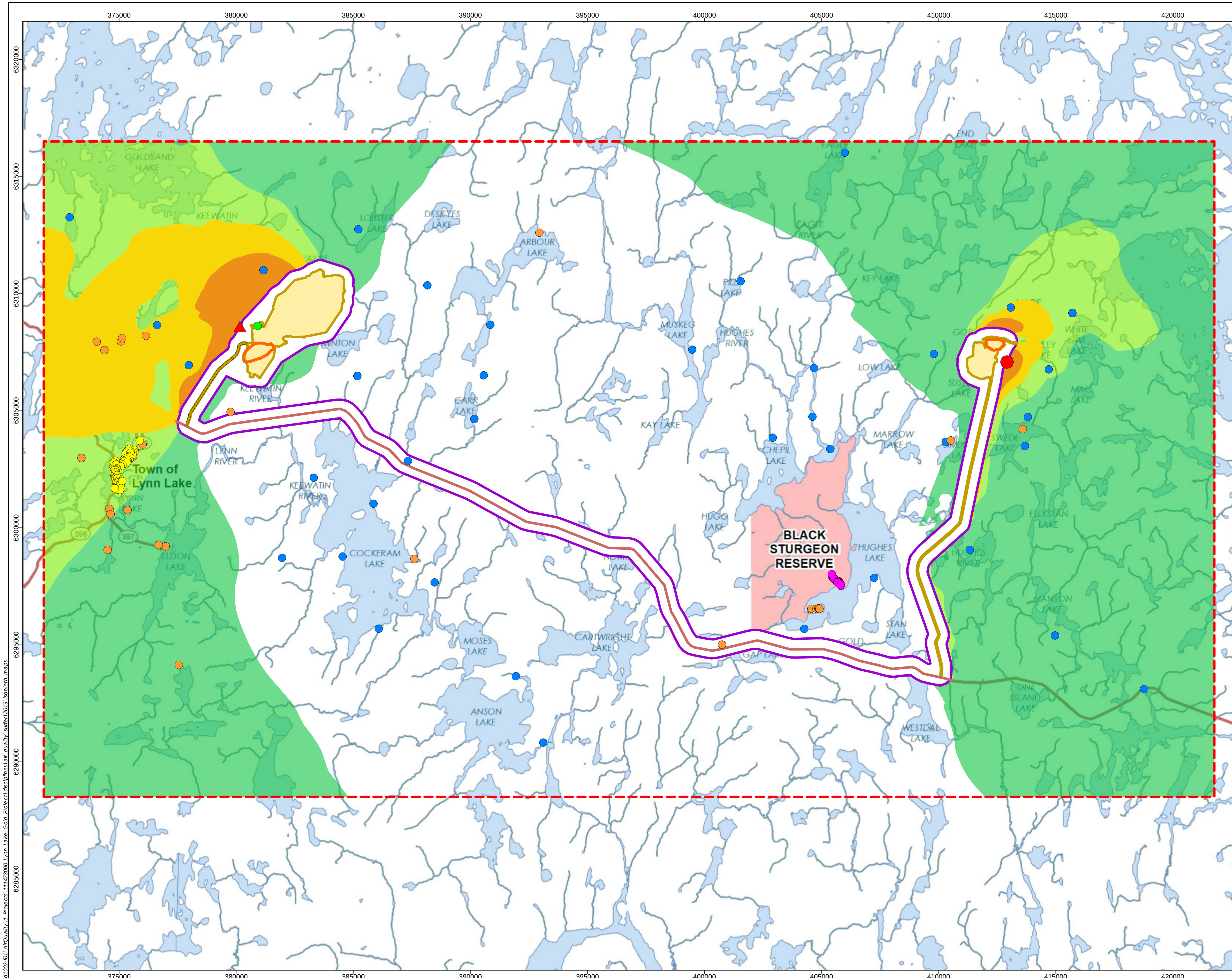
Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-23

Title
Maximum Predicted 30-day Average Dustfall Depositions (g/m²/30-day) (Project Operation + Baseline Conditions)



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Depositions

- Maximum Deposition (Gordon Site): 1.87 g/m²/30-day
- Maximum Deposition (MacLellan Site): 1.97 g/m²/30-day

Background Deposition:0.99 g/m²/30-day

Annual Dustfall OAAQC: 4.6 g/m²/30-day

1.1 1.3 1.4 1.5 4.6

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

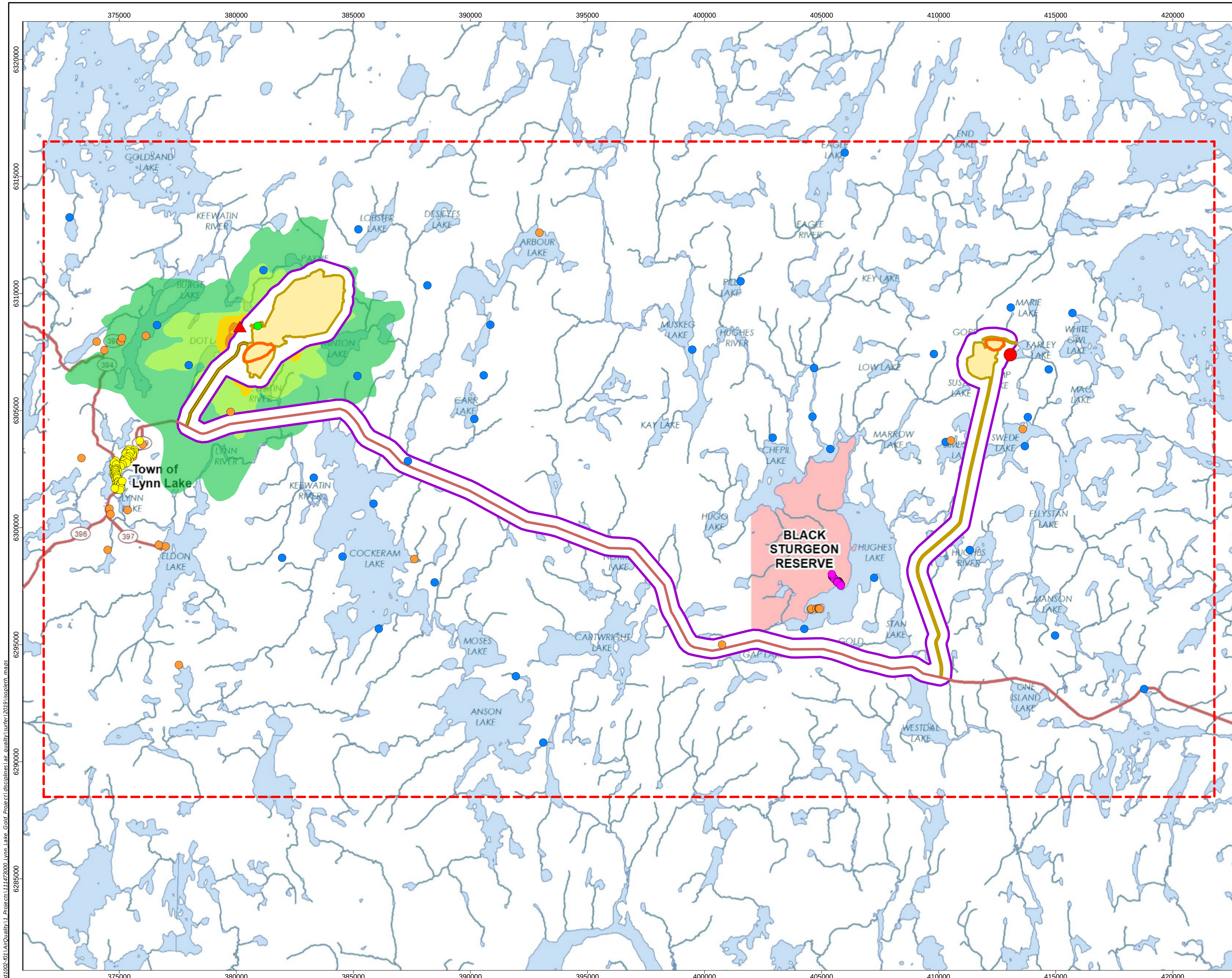
Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-24

Title
Maximum Predicted Annual Average Dustfall Depositions (g/m²/30-day) (Project Operation + Baseline Conditions)

\\cd1002-f01\AirQuality\1_Projects\111473000 Lynn_Lake_Gold_Project\discipline\air_quality\surfer\2019\isopleth_maps



Stantec

Alamos Gold Inc.

Study Area

- Proposed Open Pit
- Project Development Area
- Project Boundary
- Air Quality Local Assessment Area

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Human Receptors
- Potential Indigenous Receptor
- Worker Camp

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

Maximum Concentrations

- Maximum Concentration (Gordon Site): 0.0379 µg/m³
- Maximum Concentration (MacLellan Site): 0.278 µg/m³

Background Concentration:0 µg/m³

24-hour Arsenic MAAQC: 0.3 µg/m³

0.03 | 0.075 | 0.15 | 0.225 | 0.3

N

0 1500 3000 4500 6000 Metres

(At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by RVaiyapuri on 2019-11-12
Technical Review by IYankova on 2019-11-13
Senior Review by DJarratt on 2019-11-13

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
G-25

Title

Maximum Predicted 24-hour Average Arsenic Concentrations (µg/m³) (Project Operation + Baseline Conditions)

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Stantec

Lynn Lake Gold Project, Light Emissions Impact Assessment

Technical Modelling Report

March 11, 2020

Prepared for:

Alamos Gold Inc.
Brookfield Place, 181 Bay Street
Suite 3910
Toronto, ON M5J 2T3

Prepared by:

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB R3B 2B9

111473008

Table of Contents

LIST OF TABLES

LIST OF APPENDICES

Abbreviations

Alamos	Alamos Gold Inc.
IDA	International Dark Sky Association
CIE	Commission International De L'Eclairage/International Commission on Illumination
LED	Light Emitting Diode
LEIA	Light Emissions Impact Assessment
TMF	Tailings Management Facility
IESNA	Illuminating Engineering Society of North America
ULR	Upward Light Ratio
UFR	Upward Flux Ratio
APt	American Petroleum Institute
IES	Illuminating Engineering Society
LLGP/the Project	Lynn Lake Gold Project

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: The 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open-pit gold mines at both of these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Light Emission Impact Assessment (LEIA) has been completed to fulfill a requirement of the "Guidelines for the Preparation of an Environmental Impact Statement" (2017) pursuant to the *Canada Environmental Assessment Act* (2012) for the LLGP. The LEIA provides an overview of the existing conditions in the Project area and predicts the effects of proposed Project lighting on nearby receptors.

This report is presented in 10 sections. The purpose of the Light Emission Impact Assessment is provided in Section 1 and a description of the types of obtrusive light is provided in Section 2. The regulatory criteria used in the assessment is discussed in Section 3 and an overview of the existing ambient light environment in the Project area is provided in Section 4. Section 5 contains the results of a viewshed analysis and Section 6 describes the methodology, results and provides a discussion of the LEIA. Concluding remarks are provided in Section 7 with references cited listed in Section 8. Section 9 presents Stantec's Quality Management section and Section 10 provides the report limitations.

2.0 TYPES OF OBTRUSIVE LIGHT

Light associated with an industrial development is critical to the safe and efficient operation of the enterprise. Excessive or poorly designed lighting can have detrimental effects on the environment whereas careful and progressive design can achieve the operational requirements while reducing the residual impact to the environment. Good lighting meets the required levels on the designated property with low capital, maintenance and energy costs. Badly designed lighting or excessive lighting can result in three types of obtrusive lighting, generally referred to as light trespass, glare and sky glow, and are described below.

Light Trespass: The transmission of light from fixtures within a facility to the environment and sensitive receptors outside the facility. The unit of measure for light incidence, within or outside a facility, is a lux. A lux is equal to 1 lumen per square metre (lumen/m^2). Incident light mainly becomes problematic when lights located on the outside of a facility shine in through the windows of nearby residential homes at levels that can potentially disrupt sleep or distract from normal levels.

Glare: Potential environment effect in which intense, harsh, or contrasting lighting conditions can reduce the ability to see . A common example of glare is the oncoming high-beam headlights that provide ample light but result in poor visibility. The units of measure for brightness is luminous intensity, measured in candela (cd).

Sky Glow: Illumination of the sky or clouds by light sources on the surface of the earth such as street lighting, and haze in the atmosphere that replaces the natural nighttime sky with a translucent to opaque lighting dome. Sky glow is the cumulative effect of lights either emitting upward or being reflected upward by the surface plus the emission from photochemical activity in the atmosphere . The unit of measure for the brightness of the sky, including sky glow, is magnitudes per square arcsecond (mag/arcsec^2). Sky glow values range from approximately 22 mag/arcsec^2 in a rural environment where stars are abundant to approximately 17 mag/arcsec^2 in an urban environment where stars are minimally visible (CIE 2003). Due to the astronomy roots of the measure, it is inverse; that is, higher numbers are darker, and lower numbers are brighter.

In addition to the three main categories of obtrusive lighting described above, light flicker and light presence can also result in disruptive environmental effects. Light flicker refers to the periodic flickering of light sources (Scottish Executive 2007). The rate of flicker and the duration of exposure can cause over-stimulation of electrical activity to the human brain (Scottish Executive 2007). Light presence refers to where light emitted from a light source can be viewed from outside the area it was provided for (Scottish Executive 2007). In general, light presence causes minimal visual discomfort.

3.0 REGULATORY BACKGROUND AND ASSESSMENT CRITERIA

Most lighting guidelines and regulations have been directed toward the provision of suitable lighting for the safe and efficient activities of humans. For example, street lighting, indoor lighting and lighting around industrial plants are subjects of various guidelines to facilitate a safe work environment. Currently there are no legally binding requirements (e.g., regulations) in Manitoba to regulate obtrusive light being emitted from facilities.

Various international organizations, including the International Dark Sky Association (IDA) and the *Commission Internationale de L'Éclairage* (CIE), also known as the International Commission on Illumination, have developed guidelines and recommendations to limit light pollution and associated impacts to humans and wildlife. The Illuminating Engineering Society of North America (IESNA) have adopted such guidelines and recommendations for use in developing new outdoor lighting. Each of these organizations and their guidelines are further described in Sections 3.1 and 3.2.

3.1 THE COMMISSION INTERNATIONAL DE L'ECLAIRAGE (CIE)

The Commission International de L'Eclairage (CIE), also known as the International Commission on Illumination, is an independent non-profit organization serving member countries on a voluntary basis. Since its inception in 1913, CIE has become a professional organization and is currently recognized by the International Organization for Standardization (ISO) as an international standardization body relating to matters on light and lighting, color and vision, photobiology and image technology (CIE 2017).

CIE has established guidelines for light trespass and glare for various levels of urbanization. These guidelines have been adopted in Great Britain, in particular by the Scottish Executive in their guidance document “Controlling Light Pollution and Reducing Lighting Energy Consumption” (Scottish Executive 2007).

The values represented in the guidelines are based on environmental zones and time of day. Five environmental zones have been established by the CIE (CIE 2017) as a basis for outdoor lighting. The five zones are listed in Table 3-1.

Table 3-1 Environmental Lighting Zones

Zone	Lighting Environment	Examples
E0	Intrinsically Dark	IDA Dark Sky Parks
E1	Dark	Relatively uninhabited rural areas
E2	Low district brightness	Sparsely inhabited rural areas
E3	Medium district brightness	Well inhabited rural and urban settlements
E4	High district brightness	Town and city centres and other commercial areas
Source: CIE 2017		

The maximum values recommended by CIE for light trespass (vertical illuminance) on properties by environmental lighting zone and time of day are presented in Table 3-2.

Table 3-2 Recommended Maximum Values of Light Trespass (Vertical Illumination) on Properties per Environmental Zones

Application Conditions	Environmental Lighting Zones				
	E0	**E1**	**E2**	**E3**	**E4**
Pre-curfew (19:00 – 23:00)	NA	2 lux	5 lux	10 lux	25 lux
Post-curfew (23:00 – 6:00)	NA	0.1* lux	1 lux	2 lux	5 lux
NA – Not Applicable *if the installation is for public (i.e. road) lighting then this value may be up to 1 lux. Source: CIE 2017					

The maximum values recommended by CIE for glare (intensity of luminaires) in designated directions by environmental lighting zone and time of day are presented in Table 3-3. The limits are dependent on the distance (d) between the observer and the luminaire and the projected area (A_p) of the bright part of the luminaire in the direction of the observer.

Table 3-3 Recommended Maximum Values for Glare (Intensity of Luminaires) in Designated Directions

Light Parameter	Application Conditions	Luminaire Group (projected area A_p in m^2)				
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$
Maximum Luminous Intensity Emitted by Luminaire (cd)	E0					
	Pre-curfew	0	0	0	0	0
	Post-curfew	0	0	0	0	0
	E1					
	Pre-curfew	0.29 * *d*	0.63 * *d*	1.3 * *d*	2.5 * *d*	5.1 * *d*
	Post-curfew	0	0	0	0	0
	E2					
	Pre-curfew	0.57 * *d*	1.3 * *d*	2.5 * *d*	5.0 * *d*	10 * *d*
	Post-curfew	0.29 * *d*	0.63 * *d*	1.3 * *d*	2.5 * *d*	5.1 * *d*
	E3					
	Pre-curfew	0.86 * *d*	1.9 * *d*	3.8 * *d*	7.5 * *d*	15 * *d*
	Post-curfew	0.29 * *d*	0.63 * *d*	1.3 * *d*	2.5 * *d*	5.1 * *d*
	E4					
	Pre-curfew	1.4 * *d*	3.1 * *d*	6.3 * *d*	13 * *d*	26 * *d*
	Post-curfew	0.29 * *d*	0.63 * *d*	1.3 * *d*	2.5 * *d*	5.1 * *d*

d is the distance between the observer and the glare source in meters
Source: CIE 2017

To limit the potential for sky glow CIE recommends maximum values for the upward light ratio (ULR) of luminaires and for the upward flux ratio (UFR) of installations (four or more luminaries). The UFR takes into account the light that is reflected upwards based on the reflecting surface as well as from the luminaire, whereas the ULR only considers the light directed upwards from the luminaire itself. For this purpose of this assessment the ULR is considered, as the Project will contain multiple luminaries with the potential to contribute to sky glow.

The CIE maximum values of UFR are presented in Table 3-4.

Table 3-4 Maximum Values of Upward Flux Ratio of Installation

Light Parameter	Type of Installation	Environmental Lighting Zones				
		E0	E1	E2	E3	E4
Upward Flux Ratio (%)	Road	NA	2	5	8	12
	Amenity	NA	NA	6	12	35
	Sports	NA	NA	2	6	15

NA – Not applicable
Source: CIE 2017

Reference levels for sky glow are shown in Table 3-5 (Berry 1976). The higher the number, the more the sky is dominated by the natural background, and the lower the number, the greater the degree of sky glow caused by the reflection of lighting from the atmosphere.

Table 3-5 Reference Levels of Sky Glow

Sky Glow (mag/arcsec^2)	Corresponding Appearance of the Sky
21.7 (Rural)	The sky is covered with stars that appear large and close. In the absence of haze, the Milky Way can be seen to the horizon. The clouds appear as black silhouettes against the sky.
21.6	The above with a glow in the direction of one or more cities is seen on the horizon. Clouds are bright near the city glow.
21.1	The Milky Way is brilliant overhead but cannot be seen near the horizon. Clouds have a greyish glow at the zenith and appear bright in the direction of one or more prominent city glows.
20.4	The contrast to the Milky Way is reduced and detail is lost. Clouds are bright against the zenith sky. Stars no longer appear large and near.
19.5	Milky Way is marginally visible, only near the zenith. Sky is bright and discoloured near the horizon in the direction of cities. The sky looks dull grey.
(18.5 Urban)	Stars are weak and washed out and reduced to a few hundred. The sky is bright and discoloured everywhere.
Source: Berry 1976	

The CIE maximum values for light trespass and glare have been used in this assessment to identify potential effects on nearly receptors (refer to Section 6.3).

3.2 OTHER RELEVANT STANDARDS AND GUIDELINES

There are a number of other organizations whose mandate is aimed at providing awareness of the potential effects from light pollution and providing means to reduce light pollution including. These organizations include, but are not limited to:

- Illuminating Engineering Society (IES)
- International Dark Sky Association (IDA)

The Illuminating Engineering Society (IES) was founded in 1906 and is composed of members with an interest in good lighting, lighting designers and architects, consultants, distributors and wholesalers working in affiliated lighting fields, utilities and energy services, and people in government and education. The IES "seeks to improve the lighted environment by bringing together those with lighting knowledge and by translating that knowledge into actions that benefit the public" (IES 2017). The IES – North America chapter, has adopted the use of the environmental zones originally proposed by the CIE, and recommends their implementation in designing new outdoor lighting.

The IES produced "The Lighting Handbook" to guide and give recommendations for designing, installing, and maintain lighting systems. The handbook presents recommended guidelines only, as the IES is not an authoritative entity. The tenth edition (2011) of the handbook provides information and recommendations for guiding designers and users of light systems with a focus on both reducing lighting energy expectations and the need for effective luminous environments. This handbook is recognized internationally as a best practices resource.

The International Dark Sky Association (IDA) is closely associated with astronomical interests, and publishes a number of model municipal guidelines, fact sheets, and other material for public education on the benefits of reducing light pollution.

4.0 EXISTING CONDITIONS

4.1 BASELINE MONITORING APPROACH

In October 2015 baseline light monitoring was completed at five locations surrounding the Gordon and MacLellan sites to quantify the existing ambient light surrounding the Project. Baseline light monitoring at each site included measurements of illuminance (lux) and sky glow. Illuminance was measured using a conventional, integrating hemispherical light meter (Extech EA33) with a resolution of 0.01 lux. Sky glow was measured using a Unihedron Sky Quality Meter with lens (SQM-L). This meter was developed for astronomical applications to document the level of sky brightness, with the measurement consisting of light within an approximate 60-degree solid angle of sky. This instrument measures in magnitudes/square arc-second (mag/arcsec^2). In addition to the light measurements, photographs were made at all but one monitoring location (VP3) to document the view during the day and during the night using a high quality (Canon 60D) digital camera. At VP3, the site was dark to the point that landscape features were not properly resolving in the photography.

The locations designated for the baseline light survey and the rationale for their selection are presented in Table 4-1.

Table 4-1 Baseline Ambient Light Measurement Locations

Location No.	Site Location (UTM Zone 10U)		Selection Rationale
	Easting (m)	Northing (m)	
VP1 – Burge Lake	375529	6308046	Important recreation area about 4 km west of MacLellan Site
VP2 – Lynn Lake Project end (north)	375605	6303376	At north edge of town, about 5 km SSW of MacLellan Site
VP3 – Along Highway	381280	6304656	Closest point along Highway to MacLellan Site (~2 km), representing total dark site.
VP4 – Black Sturgeon Reserve Road	405612	6297833	Marcel Colomb First Nation Monitoring Site
VP5 – Lynn Lake, Main Street	375236	6302819	Representative of urban centre, Lynn Lake

4.2 BASELINE MONITORING RESULTS

Results of sky glow measurements for each baseline light monitoring location are shown in Table 5.2. Measurements of incident light were below the meter's detection level of 0.1 lux at each monitoring location, and therefore not presented in Table 4-2.

The photographs collected during the baseline ambient light monitoring survey were provided in the "Lynn Lake Gold Project (LLGP): Ambient Lighting Baseline Technical Data Report" (Stantec Consulting ltd. 2017).

Table 4-2 Average Sky Glow Readings

Site	Sky Brightness (mag/arcsec^2)	Date
VP1 – Burge Lake	19.67 19.60 19.61 19.86 19.61 19.78	2015-10-14 and 2015-10-15
VP2- Lynn Lake, Project end (north)	12.98 14.07 17.69 18.86	2015-10-14
VP3 – Along Highway	19,27 19.30 19.28	2015-10-14
VP4 – Black Sturgeon Reserve Road	20.27 18.62 18.17 19.02	2015-10-14
VP5 – Lynn Lake, Main Street	15.38 14.38 12.77	2015-10-14

The current light environment surrounding the Project is typical of light levels in remote towns and villages. Sky glow measurements were more comparable to urban or suburban environments, as classified in Table 4-2, due to the presence of Aurora Borealis both nights measurements were taken. Measurements were consistent with other small towns and villages where light pollution is typically not a priority for control. Streetlights, for example, are not necessarily selected and located with control in mind; older "cobra" style luminaires that emit a substantial fraction of light above the horizontal are used, rather than modern "horizontal cut-off" luminaires.

The baseline survey determined that the light impacting the community of Lynn Lake and the Black Sturgeon Reserve is the light that is generated within the community and reserve, not from other sources, such as industry, outside of these areas, and that the dark sky is visible within a few kilometres.

5.0 VIEWSHED ANALYSIS

A viewshed analysis was conducted to illustrate whether Project components would be visible from each of the five viewpoints considered during the baseline light monitoring as well as three additional viewpoints of interest from a recreational activity perspective. The three additional viewpoints included the Keewatin River west of the MacLellan site, an elevated location along PR 391 in between the Gordon and MacLellan sites, and the Hughes River. The locations of each of the additional viewpoints are presented in Maps A-6 to A-8 in Appendix A.

The viewshed analysis was conducted using the Viewshed Analysis tool in ArcMap. The viewshed analysis estimates the change in elevation from each viewpoint location to the Gordon and MacLellan sites. To evaluate if the Gordon or MacLellan sites and Project components would be visible from each viewpoint, the software estimates the change in elevation at a number of locations between the viewpoint location and the Project location to determine if there is a line of sight. If there are locations in-between with higher elevation, the line of sight to the Project is considered blocked, and therefore the Project components would not be visible from that location.

The viewshed analysis performed for each viewpoint are graphically presented in Maps A-1 to A-8 in Appendix A.

The results of the viewshed analysis show that the Project components located at the Gordon and MacLellan sites would not be visible at any of the five viewpoint locations considered during the baseline light monitoring. Of the viewpoints considered with respect to recreational activities, it was determined that portions of the Project Development Area for the MacLellan site could be visible from the Keewatin River and along PR 391, in between the Gordon and MacLellan sites.

6.0 LIGHT IMPACT ASSESSMENT

6.1 OVERVIEW OF LIGHTING DESIGN

Stantec developed a preliminary Light Plan to incorporate into the light modelling. The preliminary Light Plan was developed using recommended minimum lighting levels provided by the Illuminating Engineering Society (IES) of North America's IES Lighting Handbook for outdoor worksite lighting.

The AGi32 software package by Lighting Analysts was used in the development of the Project's Light Plan. Features of AGi32 include:

- Creating 3D models of Project site layouts to scale that incorporate distribution optics, mounting height, tilt, rotation, and electrical power.
- Using international standard photometry data for luminaires.
- Providing realistic textures and colours for objects and buildings created in the 3D model.
- Inserting calculation areas and points, via 3D objects, into the model to represent receptor locations.

To initiate the process, Stantec imported Project CAD files, indicating the location of the Project infrastructure and equipment, as well as site and regional elevation data. The design documents and additional Project mapping files were then used to create 3-dimensional buildings and infrastructure for each site. The amount of light required at each site, known as illuminance targets, was then acquired from IES recommended practices based on the different work areas, by assigning each area a classification, and assuming that the Project Area would fall in the Low Ambient Lighting (LZ1) zone. The LZ1 zone classification considers that the vision of existing human residents and users is adapted to low light levels.

Once the project components were incorporated into the AGi32 model software, and the work classifications were set, the type of light fixtures required to meet the minimum recommended lighting level for each classified work area were identified in consideration of the IES criteria and preliminary engineering details from Alamos. The appropriate number and locations of the fixtures were also determined.

The preliminary Light Plan for the Gordon and MacLellan sites is presented in Maps 6-1 and 6-2, respectively. The characteristics of the light fixtures are provided in Tables B-1 and B-2 in Appendix B. Cut sheets for the luminaires are also included in Appendix B.

6.2 PREDICTIVE MODELLING APPROACH

The AGi32 model used to develop the Light Plan for the Project was subsequently used to predict levels of light trespass (i.e. luminance) and glare (i.e. intensity) at off-site receptor locations.

Residences located nearest the Project Development Areas were considered as receptor locations for the predictive modelling. Receptors that were located in close proximity to one another were grouped together to form a receptor “cluster”. Other areas that were identified as Indigenous fishing camps and trapping areas were also considered in the assessment, as individual receptors. The locations of each individual receptor and the receptor clusters considered in the modelling are presented on Map 6-3.

Within the model, receptor locations were created from a standard sized building object and placed with the broad side of the building exposed to the highest concentration of lighting from the mine sites. As the local terrain is heavily forested, trees were incorporated into the model so that the final predictions are realistic of coverage consistent with typical coniferous forested areas.

The results of the light modelling for light trespass and glare were compared against the baseline measurements (refer to Section 4) and analyzed to determine compliance against the CIE guidelines for luminance and luminaire intensity (refer to Section 3.2).

As determined through the viewshed analysis there is no direct line of sight between each viewpoint location considered in the baseline light monitoring study (VP1 – 5) and the highest Project component/ infrastructure. According to the CIE, illuminance (i.e. light trespass) and luminous intensities (i.e., glare) calculations are not required for receptors were a direct line of sight between the source of the light and the receptor is not possible due to the presence of foliage, buildings fences, etc. As noted above, based on the current Light Plan the luminaries proposed for the Project are not visible at each of the five viewshed points (VP1 – 5) considered during the baseline light monitoring. The modelling considered additional receptor locations (i.e. not just the five viewshed locations considered for the baseline light monitoring study); and the predicted levels of light trespass (i.e. illuminance) and glare (i.e. luminous intensities) were calculated and presented in Section 6.3.

6.3 PREDICTIVE MODELLING RESULTS

The predicted levels of light trespass and glare resulting from the operation of the Project for the residential receptor clusters are presented in Table 6-1. The predicted levels of light trespass and glare from the operation of the Project at the individual receptor locations (including sparsely located residential areas, fishing camps and trapping areas) are provided in Table C-1 in Appendix C. The values presented in Tables 6-1 and C-1 represent the overall maximum predicted value and not an average.

Table 6-1 Predicted Levels of Light Trespass and Glare – Receptor Clusters

Receptor Cluster ID	Light Trespass (lux)	Glare (cd)
Cluster 1	<0.001	<0.001
Cluster 2	0.0002	<0.001
Cluster 3	<0.001	<0.001
Cluster 4	0.0001	<0.001
Cluster 5	0.0001	<0.001
Lynn Lake Cluster North	<0.001	<0.001
Lynn Lake Cluster Central	<0.001	<0.001
Lynn Lake Cluster South	<0.001	<0.001

Based on the CIE environmental lighting zones (refer to Table 3-1), the area surrounding the Project could be considered as an E2 environmental lighting zone; a sparsely inhabited rural area with low district brightness. Considering the results presented in Table 6-1 and C-1 in Appendix C, the predicted levels of light trespass (i.e. illuminance) and glare (i.e. luminous intensity) are below CIE criteria for an E2 environmental lighting zone. The light design for the Project explicitly incorporated CIE criteria to limit illuminance off-site and reduce incidence of light trespass.

The Project's light design incorporates the use of full cut-off LED luminaires and was developed in accordance with the guidelines and recommendations of the IDA and CIE. Therefore, the Project is expected to have a small contribution to the existing sky glow.

7.0 CONCLUSIONS

Light associated with an industrial development is critical to the safe and efficient operation of the enterprise. Excessive or poorly designed lighting can have detrimental effects on the environment whereas careful and progressive design can achieve the operational requirements while reducing the residual impact to the environment.

The current light environment surrounding the Project is typical of light levels in remote towns and villages. The light that does affect the nearest communities is the light that is generated within the community, not from other sources, such as industry.

This Light Emission Impact Assessment shows that the light emissions from the operation of the Project can be designed to be within CIE guidelines at the nearest receptor locations and communities.

8.0 REFERENCES

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9.0 STANTEC QUALITY MANAGEMENT PROGRAM

This Technical Modelling Report, entitled **Lynn Lake Gold Project, Light Emissions Impact Assessment** prepared for Alamos Gold Inc., dated March 11, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individual:

Gillian Hatcher, M.A.Sc.
Project Manager, Environmental Management

Signature

This report was reviewed by the following individual:

John Walker, Ph.D.
Senior Associate

Signature

Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC, PMP
Principal – Environmental Services

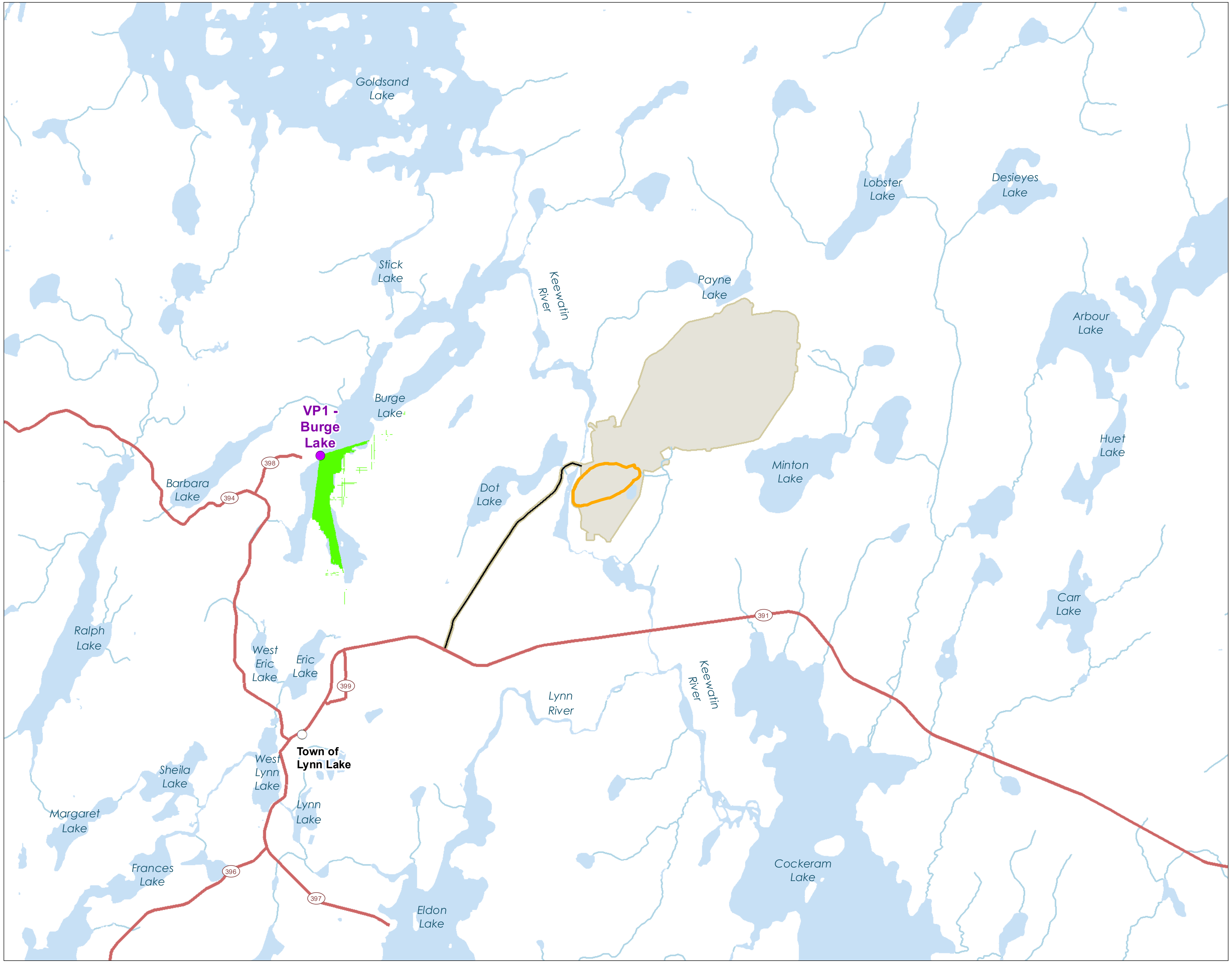
Signature

This report was independently reviewed by Jennifer McPhail, M.Eng., P.Eng., Associate

10.0 LIMITATIONS

This Technical Modelling Report entitled Lynn Lake Gold Project, Light Emissions Impact Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Alamos Gold Inc. (the "Client") to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A VIEWSHED ANALYSIS



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Viewshed Analysis Result

- Monitoring Site
- Visible Areas

Landbase

- Existing Access
- Highway
- Watercourse
- Waterbody

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2019-11-05
Technical Review by GHatcher on 2019-11-05
Senior GIS Review by XXxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-1

Title
Viewshed Analysis from Monitoring Location VP1

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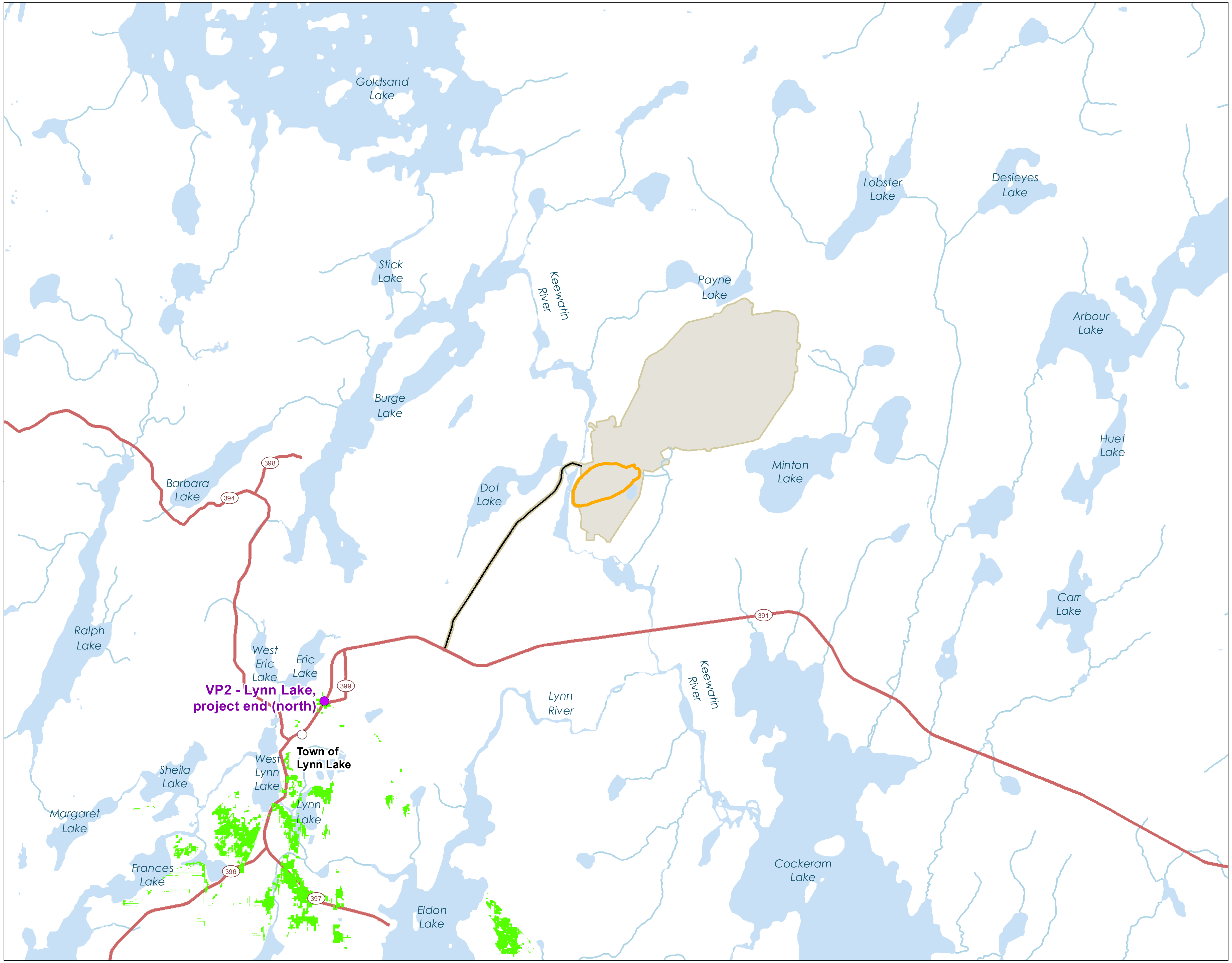

Stantec

Alamos Gold Inc.

Project Infrastructure

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- Project Development Area

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- Existing Access
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Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

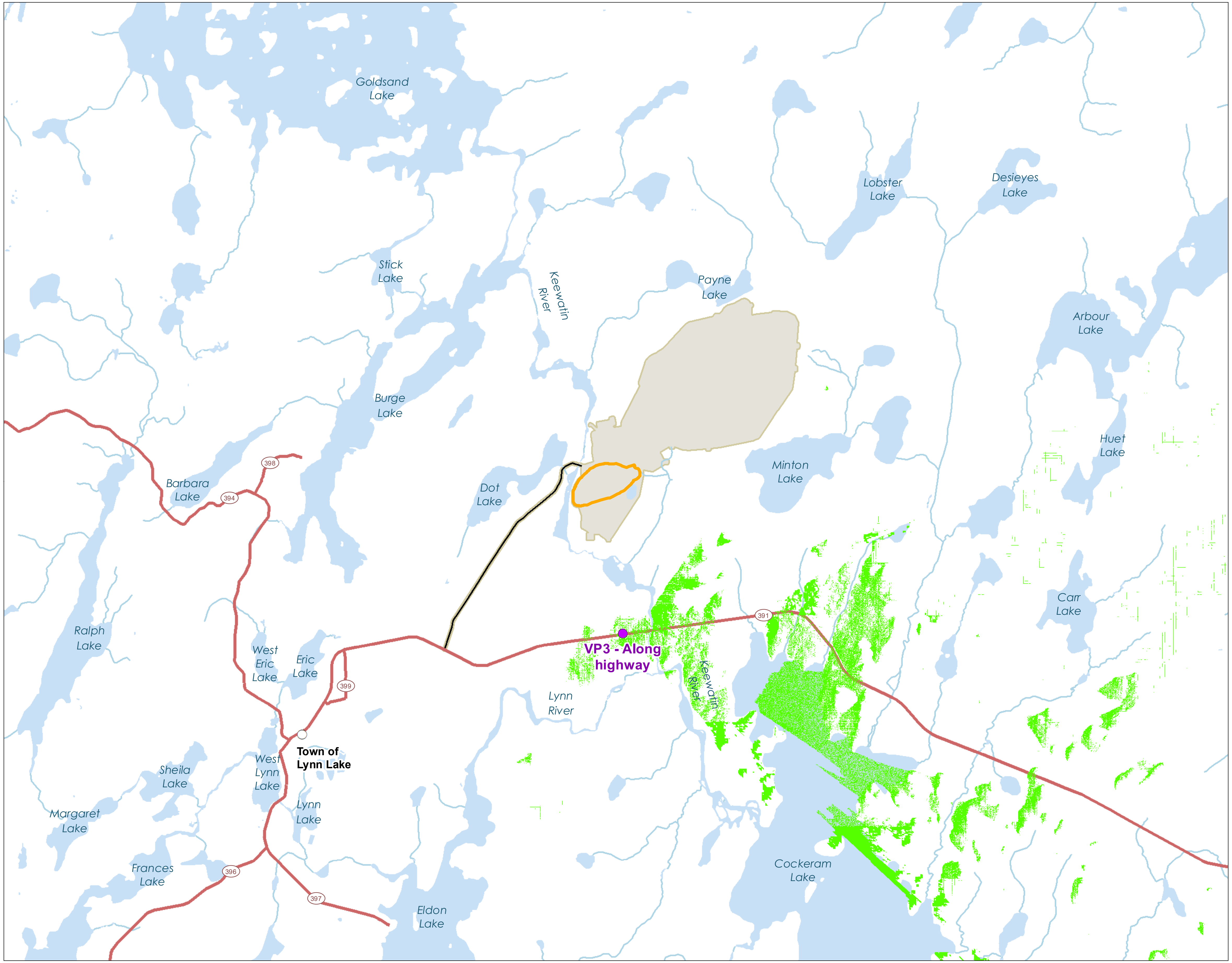
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2019-11-15
Technical Review by GHatcher on 2019-11-15
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-2

Title
Viewshed Analysis from Monitoring Location VP2



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Viewshed Analysis Result

- Monitoring Site
- Visible Areas

Landbase

- Existing Access
- Highway
- Watercourse
- Waterbody

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake,
Manitoba

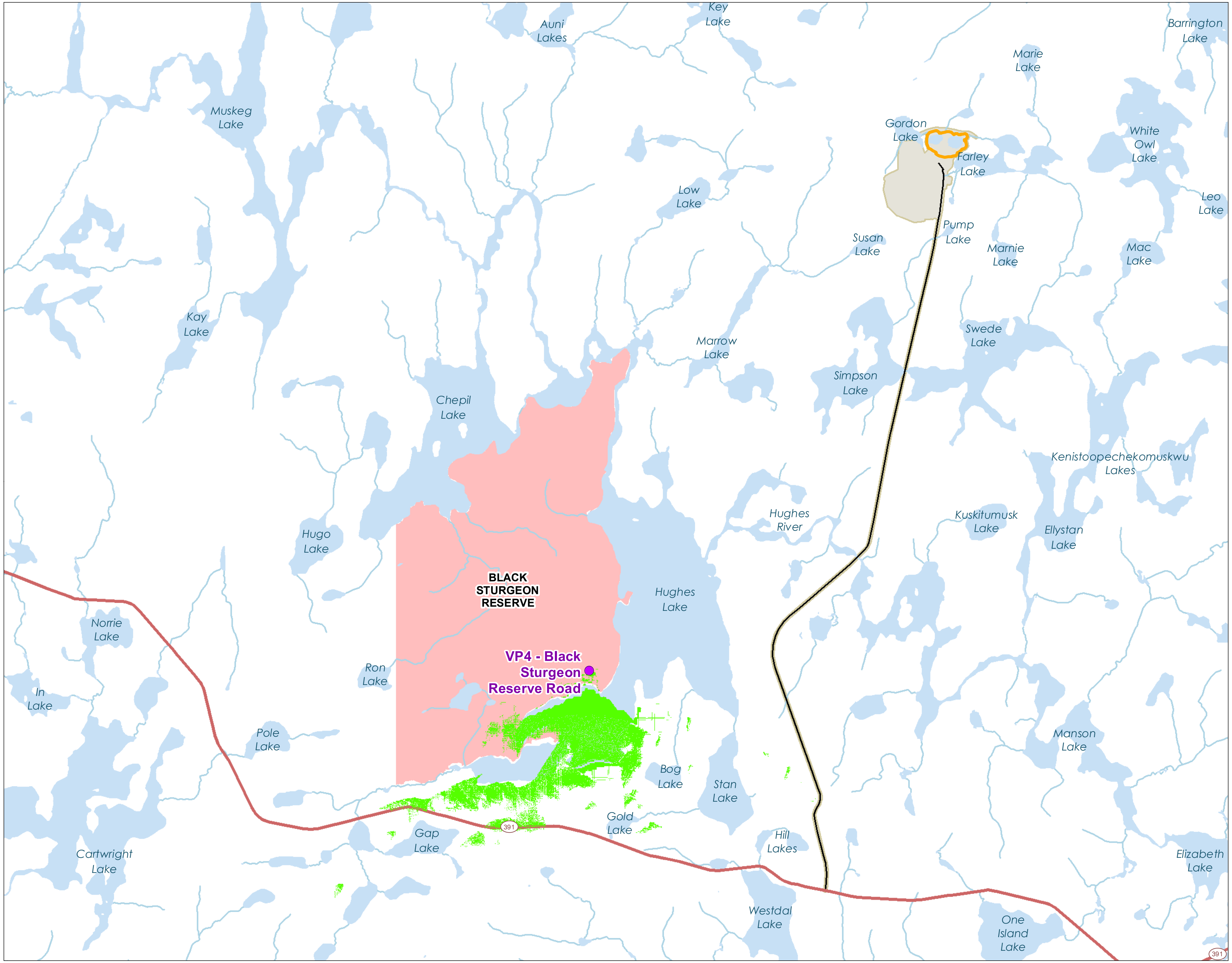
Prepared by ACampigotto on 2019-11-05
Technical Review by GHatcher on 2019-11-05
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-3

Title
Viewshed Analysis from Monitoring Location VP3

G:\ GIS Project Folder\111473008 LLGP EA\working\AC\Viewshed Analysis\VP3 ViewshedAnalysis 20191105.mxd Revised: 2019-12-06 By: ACampigotto



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Viewshed Analysis Result

- Monitoring Site
- Visible Areas

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

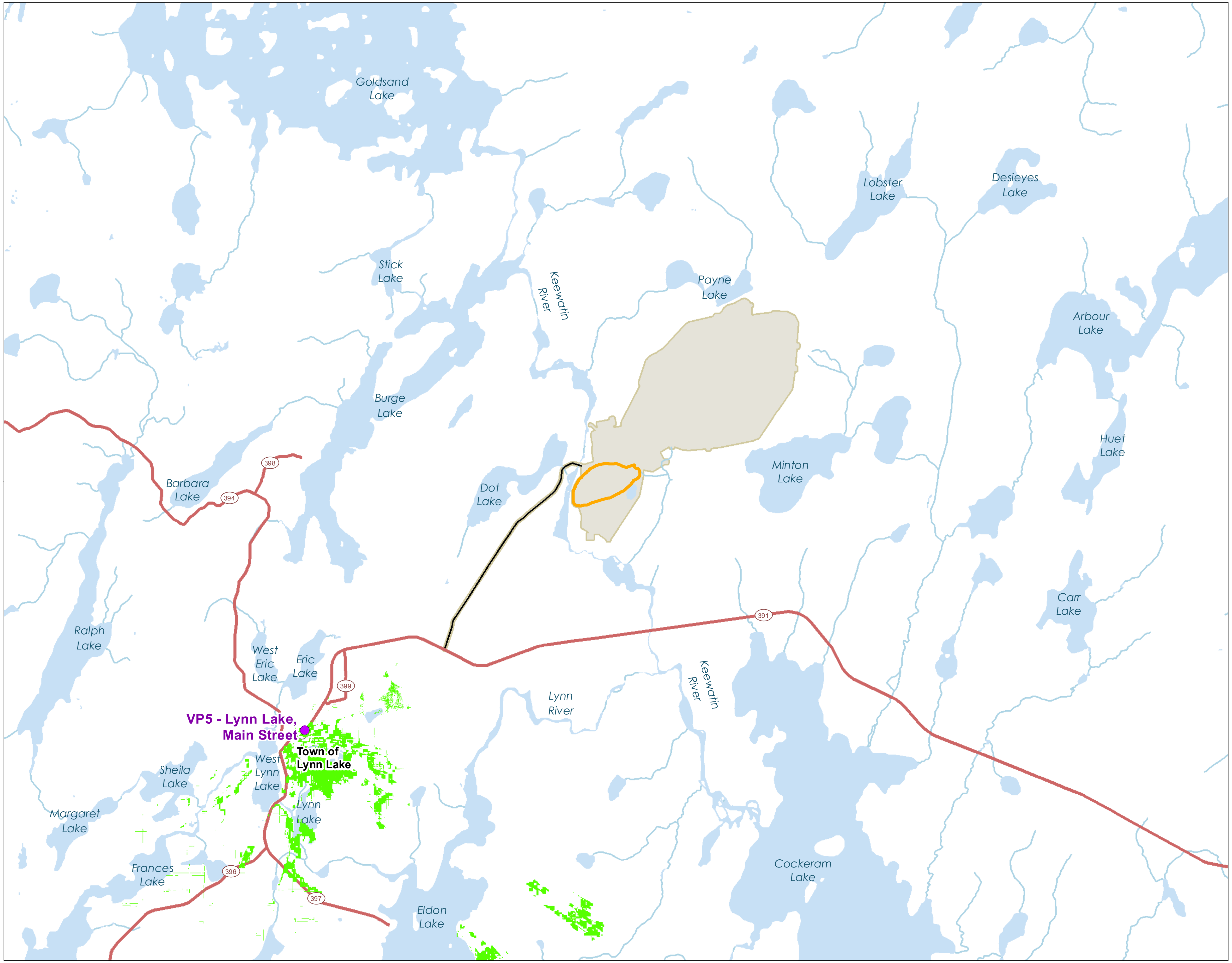
Prepared by ACampigotto on 2019-11-15
Technical Review by GHatcher on 2019-11-15
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-4

Title
Viewshed Analysis from Monitoring Location VP4

G:_GIS_Project_Folder\111473008_LLGP_EA\working\AC\Viewshed_Analysis\VP4_ViewshedAnalysis_20191115.mxd Revised: 2020-05-08 By: ACampigotto



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Viewshed Analysis Result

- Monitoring Site
- Visible Areas

Landbase

- Existing Access
- Highway
- Watercourse
- Waterbody

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

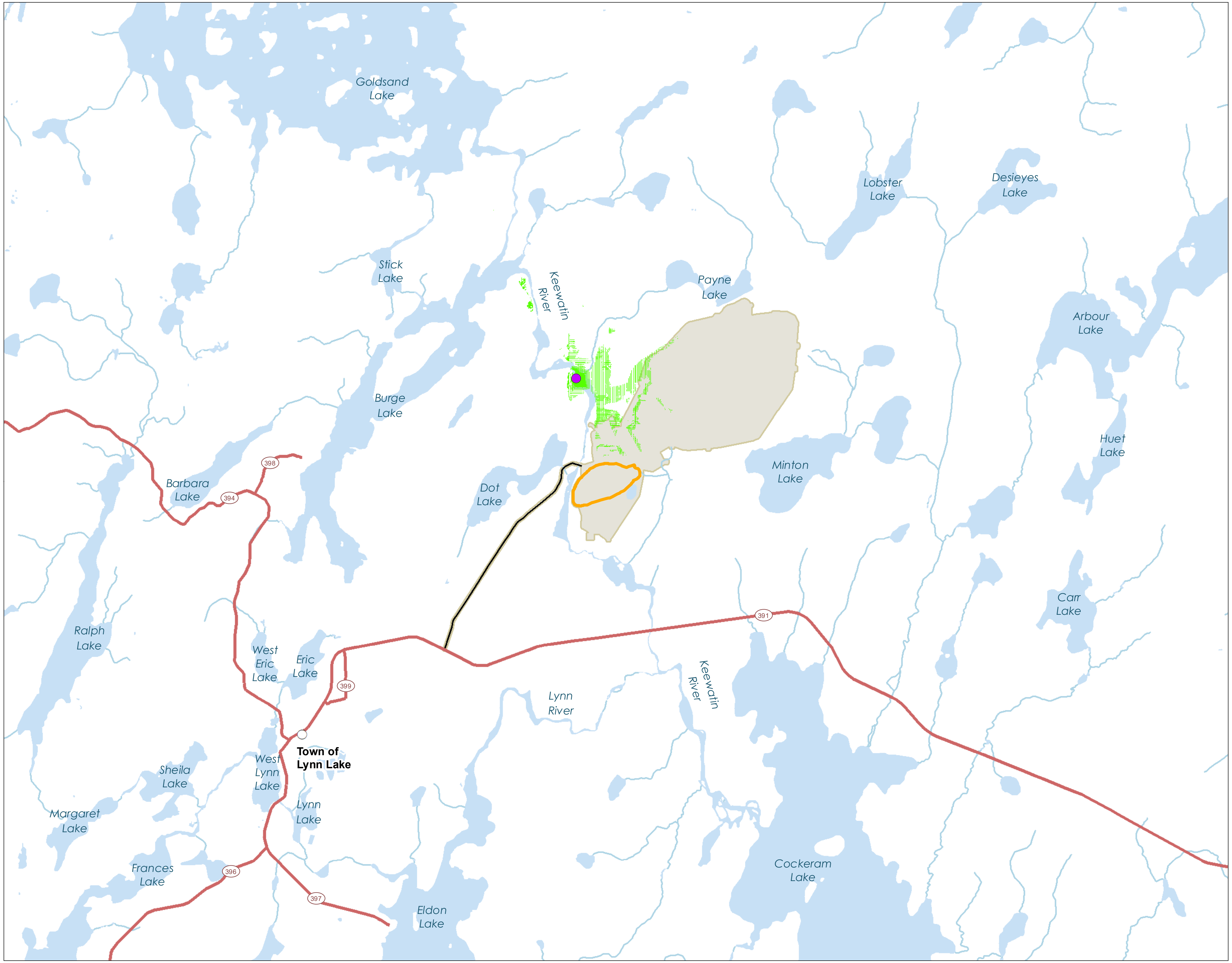
Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2019-11-15
Technical Review by GHatcher on 2019-11-15
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-5

Title
Viewshed Analysis from Monitoring Location VP5



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Viewshed Analysis Result

- Monitoring Site
- Visible Areas

Landbase

- Existing Access
- Highway
- Watercourse
- Waterbody

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

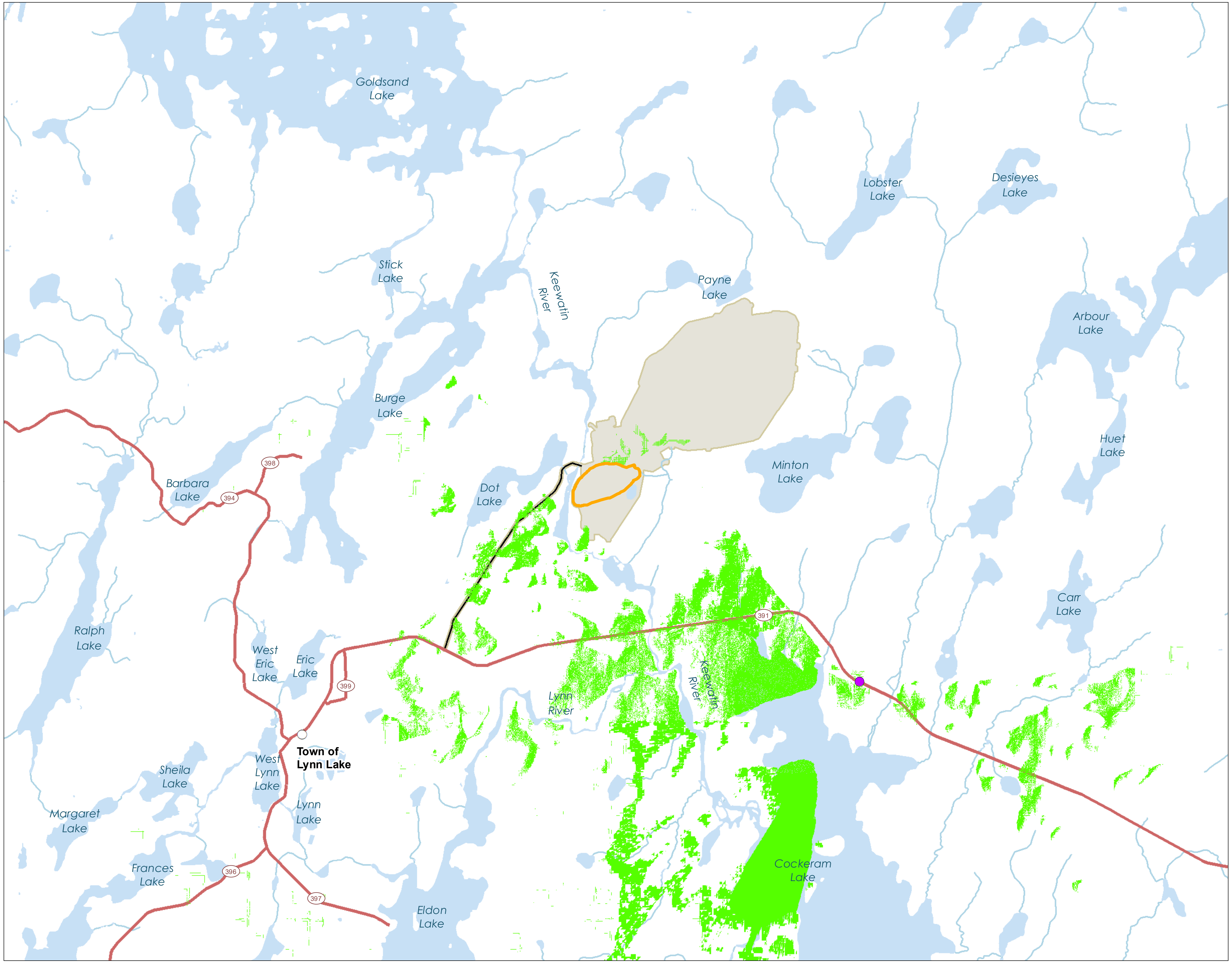
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2019-12-04
Technical Review by BKrawchuk on 2019-12-04
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-6

Title
Viewshed Analysis from Keewatin River



Stantec

Alamos Gold Inc.

Project Infrastructure

Proposed Open Pit

Project Development Area

Viewshed Analysis Result

Monitoring Site

Visible Areas

Landbase

Existing Access

Highway

Watercourse

Waterbody

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada.

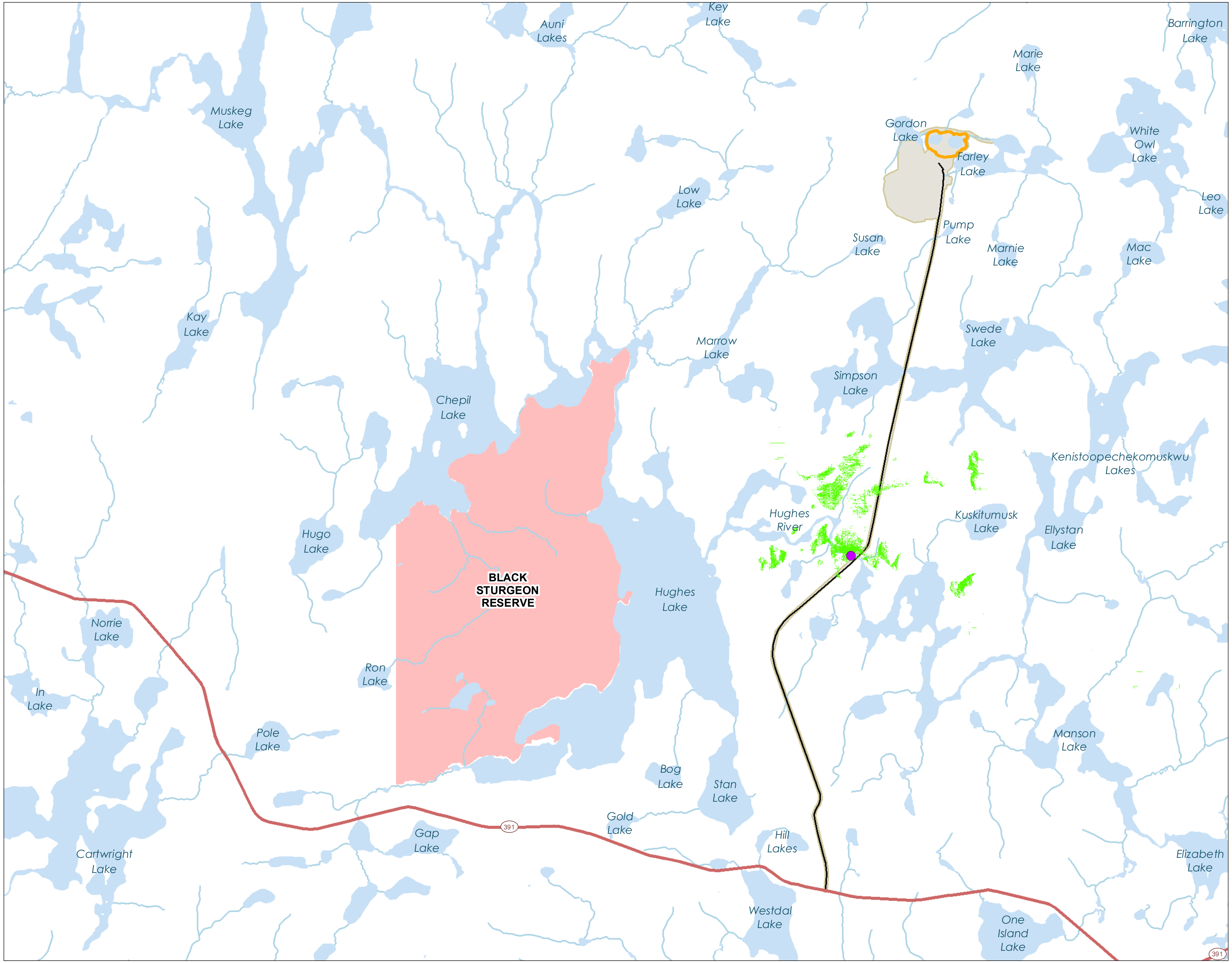
Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2019-12-04
Technical Review by BKrawchuk on 2019-12-04
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-7

Title
Viewshed Analysis from PR391



Stantec

ALAMOS GOLD INC.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Viewshed Analysis Result

- Monitoring Site
- Visible Areas

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2019-12-04
Technical Review by BKrawchuk on 2019-12-04
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
A-8

Title
Viewshed Analysis from Hughes River

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Appendix B LIGHT PLAN DETAILS

Lumark

DESCRIPTION

The patented Lumark Crosstour™ MAXX LED wall pack series of luminaries provides low-profile architectural style with super bright, energy-efficient LEDs. The rugged die-cast aluminum construction, back box with secure lock hinges, stainless steel hardware along with a sealed and gasketed optical compartment make Crosstour impervious to contaminants. The Crosstour MAXX wall luminaire is ideal for wall/surface, inverted mount for facade/canopy illumination, perimeter and site lighting. Typical applications include pedestrian walkways, building entrances, multi-use facilities, industrial facilities, perimeter parking areas, storage facilities, institutions, schools and loading docks.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction
Low-profile LED design with rugged one-piece, die-cast aluminum back box and hinged removable door. Matching housing styles incorporate both a full cutoff and refractive lens design. Full cutoff and refractive lens models are available in 58W, 81W and 102W. Patent pending secure lock hinge feature allows for safe and easy tool-less electrical connections with the supplied push-in connectors. Back box includes four 1/2" NPT threaded conduit entry points. The back box is secured by four lag bolts (supplied by others). External fin design extracts heat from the fixture surface. One-piece silicone gasket seals door and back box. Not recommended for car wash applications.

Optical
Silicone sealed optical LED chamber incorporates a custom engineered reflector providing high-efficiency illumination. Full cutoff models integrate an impact-resistant molded refractive prism optical lens assembly meeting requirements for Dark Sky compliance. Refractive lens models incorporate a molded lens assembly designed for maximum forward throw. Solid state LED Crosstour MAXX luminaries are thermally optimized with eight lumen packages in cool 5000K, neutral 4000K, or warm 3000K LED color temperature (CCT).

Electrical
LED driver is mounted to the die-cast aluminum housing for optimal heat sinking. LED thermal management system incorporates both conduction and natural convection to transfer heat rapidly away from the LED source. 58W, 81W and 102W models operate in -40°C to 40°C [-40°F to 104°F]. High ambient 50°C [122°F] models available in 58W and 81W models only. Crosstour MAXX luminaires maintain greater than 89% of initial light output after 72,000 hours of operation. Four half-inch NPT threaded conduit entry points allow for thru-branch wiring. Back box is an authorized electrical wiring compartment. Integral LED electronic driver incorporates surge protection. 120-277V 50/60Hz, 480V 60Hz, or 347V 60Hz electrical operation. 480V is compatible for use with 480V Wye systems only.

Emergency Egress
Optional integral cold weather battery emergency egress includes emergency operation test switch (available in 58W and 81W models only), an AC-ON indicator light and a premium extended rated sealed maintenance-free nickel-metal hydride battery pack. The separate emergency lighting LEDs are wired to provide redundant emergency lighting. Listed to UL Standard 924, Emergency Lighting.

Area and Site Pole Mounting
Optional extruded aluminum 6-1/2" arm features internal bolt guides for supplied twin support rods, allowing for easy positioning of the fixture during installation to pole. Supplied with round plate adapter plate. Optional tenon adapter fits 2-3/8" or 3-1/2" O.D. Tenon.

Finish
Crosstour MAXX is protected with a super TGIC carbon bronze or summit white polyester powder coat paint. Super TGIC powder coat paint finishes withstand extreme climate conditions while providing optimal color and gloss retention of the installed life.

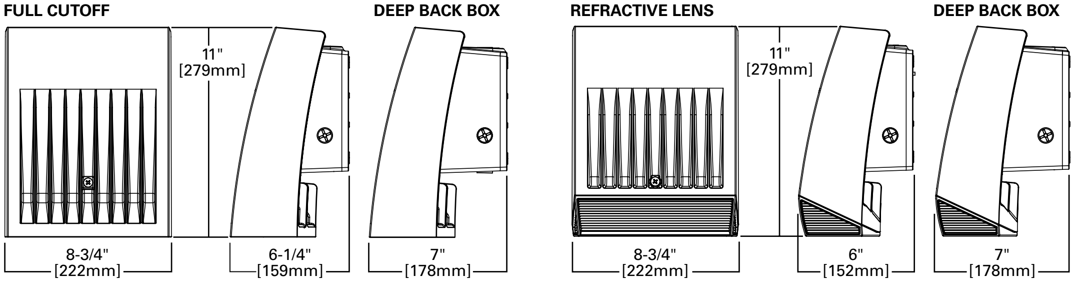
Warranty
Five-year warranty.

XTOR
CROSSTOUR MAXX LED

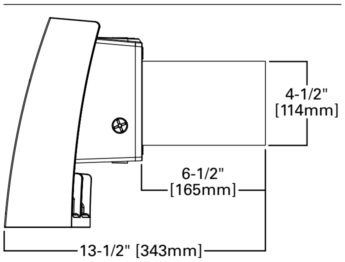
APPLICATIONS:
WALL / SURFACE
INVERTED
SITE LIGHTING

DIMENSIONS

FULL CUTOFF — DEEP BACK BOX — REFRACTIVE LENS — DEEP BACK BOX

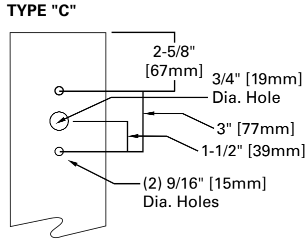


OPTIONAL POLE MOUNT ARM

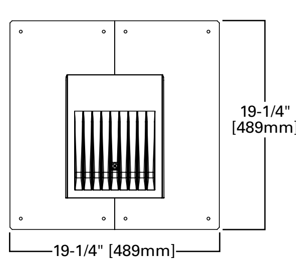


ARM DRILLING

TYPE "C"



ESCUTCHEON PLATES



CERTIFICATION DATA

UL/cUL Wet Location Listed
LM79 / LM80 Compliant
ROHS Compliant
NOM Compliant Models
3G Vibration Tested
UL924 Listed (CBP Models)
IP66 Rated
DesignLights Consortium® Qualified*

TECHNICAL DATA

40°C Ambient Temperature
External Supply Wiring 90°C Minimum

EPA

Effective Projected Area (Sq. Ft.):
XTOR6B, XTOR8B, XTOR12B=0.54
With Pole Mount Arm=0.98

SHIPPING DATA:

Approximate Net Weight:
12-15 lbs. [5.4-6.8 kgs.]

EATON
Powering Business Worldwide

*www.designlights.org

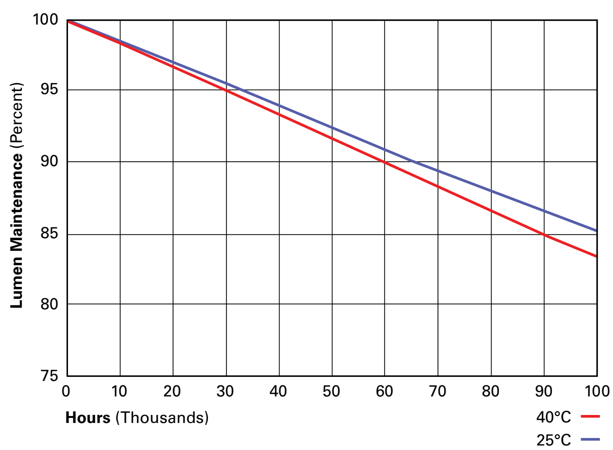
POWER AND LUMENS BY FIXTURE MODEL

58W Series						
LED Information	**XTOR6B**	**XTOR6BRL**	**XTOR6B-W**	**XTOR6BRL-W**	**XTOR6B-Y**	**XTOR6BRL-Y**
Delivered Lumens	6,129	6,225	6,038	6,133	5,611	5,826
B.U.G. Rating	B1-U0-G1	B2-U4-G3	B1-U0-G1	B2-U4-G3	B1-U0-G1	B2-U4-G3
CCT (Kelvin)	5000K	5000K	4000K	4000K	3000K	3000K
CRI (Color Rendering Index)	70	70	70	70	70	70
Power Consumption (Watts)	58W	58W	58W	58W	58W	58W
81W Series						
LED Information	**XTOR8B**	**XTOR8BRL**	**XTOR8B-W**	**XTOR8BRL-W**	**XTOR8B-Y**	**XTOR8BRL-Y**
Delivered Lumens	8,502	8,635	8,373	8,504	7,748	8,079
B.U.G. Rating	B2-U0-G1	B2-U4-G3	B2-U0-G1	B2-U4-G3	B2-U0-G1	B2-U4-G3
CCT (Kelvin)	5000K	5000K	4000K	4000K	3000K	3000K
CRI (Color Rendering Index)	70	70	70	70	70	70
Power Consumption (Watts)	81W	81W	81W	81W	81W	81W
102W Series						
LED Information	**XTOR12B**	**XTOR12BRL**	**XTOR12B-W**	**XTOR12BRL-W**	**XTOR12B-Y**	**XTOR12BRL-Y**
Delivered Lumens	12,728	13,458	12,539	13,258	11,861	12,595
B.U.G. Rating	B2-U0-G1	B2-U4-G3	B2-U0-G1	B2-U4-G3	B2-U0-G1	B2-U4-G3
CCT (Kelvin)	5000K	5000K	4000K	4000K	3000K	3000K
CRI (Color Rendering Index)	70	70	70	70	70	70
Power Consumption (Watts)	102W	102W	102W	102W	102W	102W

EGRESS Information	**XTOR6B, XTOR8B and XTOR12B Full Cutoff CBP Egress LED**	**XTOR6B, XTOR8B and XTOR12B Refractive Lens CBP Egress LED**
Delivered Lumens	509	468
B.U.G. Rating	N.A.	N.A.
CCT (Kelvin)	4000K	4000K
CRI (Color Rendering Index)	65	65
Power Consumption (Watts)	1.8W	1.8W

LUMEN MAINTENANCE

Ambient Temperature	**TM-21 Lumen Maintenance** (72,000 Hours)	**Theoretical L70** (Hours)
XTOR6B Model		
25°C	> 90%	246,000
40°C	> 88%	217,000
50°C	> 88%	201,000
XTOR8B Model		
25°C	> 89%	219,000
40°C	> 87%	195,000
50°C	> 86%	181,000
XTOR12B Model		
25°C	> 89%	222,000
40°C	> 87%	198,000



CURRENT DRAW

Voltage	**Model Series**				
	XTOR6B	**XTOR8B**	**XTOR12B**	**XTOR6B-CBP (Fixture/Battery)**	**XTOR8B-CBP (Fixture/Battery)**
120V	0.51	0.71	0.94	0.60/0.25	0.92/0.25
208V	0.25	0.39	0.52	- -	- -
240V	0.25	0.35	0.45	- -	- -
277V	0.22	0.31	0.39	0.36/0.21	0.50/0.21
347V	0.19	0.25	0.33		- -
480V	0.14	0.19	0.24		- -

ORDERING INFORMATION

Sample Number: XTOR6B-W-WT-PC1

Series [1]	**LED Kelvin Color**	**Housing Color**	**Options** (Add as Suffix)
Full Cutoff **XTOR6B**=58W **XTOR8B**=81W **XTOR12B**=102W **Refractive Lens** **XTOR6BRL**=58W **XTOR8BRL**=81W **XTOR12BRL**=102W	**[Blank]**=Bright White (Standard) 5000K **W**=Neutral, 4000K **Y**=Warm, 3000K	**[Blank]**=Carbon Bronze (Standard) **WT**=Summit White **BK**=Black **BZ**=Bronze **AP**=Grey **GM**=Graphite Metallic **DP**=Dark Platinum	**347V**=347V [2, 3, 4, 5] **480V**=480V [2, 3, 4, 5, 6] **PC1**=Photocontrol 120V [7] **PC2**=Photocontrol 208-277V [7, 8] **PMA**=Pole Mount Arm (C Drilling) with Round Adapter [3, 9] **MS-L20**=Motion Sensor for ON/OFF Operation [2, 3, 10, 11] **MS/DIM-L20**=Motion Sensor for Dimming Operation [2, 3, 10, 11, 12, 13, 14] **CBP**=Cold Weather Battery Pack [2, 3, 15, 16, 17] **HA**=50°C High Ambient [17]

Accessories (Order Separately)	
WG-XTORMX=Crosstour MAXX Wire Guard **PB120V**=Field Installed 120V Photocontrol **PB277V BUTTON PC**=Field Installed 208-277V Photocontrol [8] **VA1040-XX**=Single Tenon Adapter for 3-1/2" O.D. Tenon [18] **VA1041-XX**=2@180° Tenon Adapter for 3-1/2" O.D. Tenon [18] **VA1042-XX**=3@120° Tenon Adapter for 3-1/2" O.D. Tenon [18] **VA1043-XX**=4@90° Tenon Adapter for 3-1/2" O.D. Tenon [18] **VA1044-XX**=2@90° Tenon Adapter for 3-1/2" O.D. Tenon [18] **VA1045-XX**=3@90° Tenon Adapter for 3-1/2" O.D. Tenon [18] **VA1046-XX**=2@120° Tenon Adapter for 3-1/2" O.D. Tenon [18]	**VA1033-XX**=Single Tenon Adapter for 2-3/8" O.D. Tenon [18] **VA1034-XX**=2@180° Tenon Adapter for 2-3/8" O.D. Tenon [18] **VA1035-XX**=3@120° Tenon Adapter for 2-3/8" O.D. Tenon [18] **VA1036-XX**=4@90° Tenon Adapter for 2-3/8" O.D. Tenon [18] **VA1037-XX**=2@90° Tenon Adapter for 2-3/8" O.D. Tenon [18] **VA1038-XX**=3@90° Tenon Adapter for 2-3/8" O.D. Tenon [18] **VA1039-XX**=2@120° Tenon Adapter for 2-3/8" O.D. Tenon [18] **EWP/XTORMX**=Escutcheon Wall Plate, Carbon Bronze **EWP/XTORMX-WT**=Escutcheon Wall Plate, Summit White **FSIR-100**=Wireless Configuration Tool for Occupancy Sensor [14]

NOTES:
1. DesignLights Consortium® Qualified and classified for both DLC Standard and DLC Premium, refer to www.designlights.org for details.
2. Not available with HA option.
3. Deep back box is standard for 347V, 480V, CBP, PMA, MS-L20 and MS/DIM-L20.
4. Not available with CBP option.
5. Thru-branch wiring not available with HA option or with 347V.
6. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
7. Not available with MS-L20 and MS/DIM-L20 options.
8. Use PC2 with 347V or 480V option for photocontrol. Factory wired to 208-277V lead.
9. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
10. For use in downlight orientation only. Optimal coverage at mounting heights of 9'-20'.
11. 120V thru 277V only.
12. Factory set to 50% power reduction after 15-minutes of inactivity. Dimming driver included.
13. Includes integral photo sensor.
14. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff, and more. Consult your lighting representative at Eaton for more information.
15. 120V or 277V operation only.
16. Operating temperatures -20°C to 25°C.
17. Not available in XTOR12B or XTOR12BRL models.
18. Replace XX with housing color.

STOCK ORDERING INFORMATION

58W Series	**81W Series**	**102W Series**
Full Cutoff		
XTOR6B=58W, 5000K, Carbon Bronze	**XTOR8B**=81W, 5000K, Carbon Bronze	**XTOR12B**=102W, 5000K, Carbon Bronze
XTOR6B-PC1=58W, 5000K, 120V PC, Carbon Bronze	**XTOR8B-PC1**=81W, 5000K, 120V PC, Carbon Bronze	
XTOR6B-WT= 58W, 5000K, Summit White	**XTOR8B-WT**=81W, 5000K, Summit White	
XTOR6B-W=58W, 4000K, Carbon Bronze	**XTOR8B-PC2**=81W, 5000K, 208-277V PC, Carbon Bronze	
XTOR6B-PMA= 58W, 5000K, Pole Mount Arm, Carbon Bronze	**XTOR8B-PMA**=81W, 5000K, Pole Mount Arm, Carbon Bronze	
XTOR6B-PC2= 58W, 5000K, 208-277V PC, Carbon Bronze	**XTOR8B-347V**=81W, 5000K, Carbon Bronze, 347V	
Refractive Lens		
XTOR6BRL=58W, 5000K, Refractive Lens, Carbon Bronze	**XTOR8BRL**=81W, 5000K, Refractive Lens, Carbon Bronze	**XTOR12BRL**=102W, 5000K, Refractive Lens, Carbon Bronze
XTOR6BRL-PC1=58W, 5000K, Refractive Lens, 120V PC, Carbon Bronze	**XTOR8BRL-PC1**=81W, 5000K, Refractive Lens, 120V PC, Carbon Bronze	**XTOR12BRL-W**=102W, 4000K, Refractive Lens, Carbon Bronze
XTOR6BRL-WT=58W, 5000K, Refractive Lens, Summit White	**XTOR8BRL-WT**=81W, 5000K, Refractive Lens, Summit White	**XTOR12RBL-347V**=102W, 5000K, Refractive Lens, Carbon Bronze, 347V
XTOR6BRL-W=58W, 4000K, Refractive Lens, Carbon Bronze	**XTOR8BRL-PC2**=81W, 5000K, Refractive Lens, 208-277V PC, Carbon Bronze	
XTOR6BRL-PMA=58W, 5000K, Refractive Lens, Pole Mount Arm, Carbon Bronze	**XTOR8BRL-PMA**=81W, 5000K, Refractive Lens, Pole Mount Arm, Carbon Bronze	
XTOR6BRL-PC2=58W, 5000K, Refractive Lens, 208-277V PC, Carbon Bronze	**XTOR8BRL-W**=81W, 4000K, Refractive Lens, Carbon Bronze	
XTOR6BRL-347V=58W, 5000K, Refractive Lens, Carbon Bronze, 347V	**XTOR8BRL-347V** = 81W, 5000K, Refractive Lens, Carbon Bronze, 347V	

Hazlux® 8
FDL

CLASSIFICATION

CLASS 1	
Division 2	Groups A, B, C, D
CLASS II	
Division 2	Group F, G

Contact your Thomas & Betts sales representative to verify classification

An energy-efficient broad-beamed, high-intensity flood light designed to be used in hazardous, marine or low-bay outdoor conditions.

Multiple distribution patterns, type V

Selection of mounting styles
- Ceiling
- Pendant
- Yoke
- Wall
- Stanchion
- Angled stanchion

50W (6400 lumens)
80W (9000 lumens)
105W (11000 lumens)

Designed for outdoor, hazardous, marine, low-bay and flood applications

CERTIFICATIONS

MARINE UL LISTED

C UL US LISTED

UL 1598A
UL 844

IP66

CSA 22.2 No. 137

Hazlux® 8 FDL
Key features & benefits

Features
- Energy efficient alternative to hazardous location Metal Halide and High Pressure Sodium
- Designed for outdoor, hazardous, Marine, low-bay and flood
  applications
- Gray powder coat finish
- Multiple distribution patterns, Type V
- Selection of Frosted film, 16°, 70° or 120° Lens
- CCT of 5000K
- Selection of mounting style
- Tamper-proof screws
- > 120,000 hours Rated Lifetime Projection (L70)

Construction
- Cooper-free cast aluminum housing
- Captive stainless steel fasteners and insert
- 24 high-power LED's

Electrical
- 50W (6400 Lumens), 80W (9000 Lumens), 105W (11000 Lumens)
- 120-277V
- 277-480V (6400 Lumens only)

Options
- Mounting: Ceiling, Pendant, Yoke, Wall, Straight or Angled Stanchion
- Cord with Blunt End
- Lens Guard
- Black or White finish

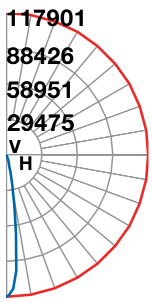
Thermal Performance Data

Model	Rated Ambient oC	Class I, Div 2 Operating Temperature Code	Class II, Div 2 Operating Temperature Code
FDL05	50°C	T3C (160°C)	T5 (100°C)
FDL08	50°C	T3C (160°C)	T5 (100°C)
FDL10	50°C	T3C (160°C)	T5 (100°C)

Photometry

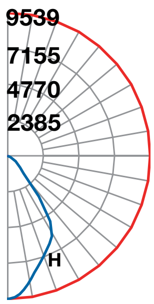
Reference data	
Catalogue number	**FDL10UNC1-N**
Luminaire Lumens	12,059
Input Watt	106.6
NEMA Type	2 H x 2 V
Maximum Candela	117901
Maximum Candela Angle	0H 0V
Horizontal Beam Angle (50%)	15.3
Vertical Beam Angle (50%)	15.2
Horizontal Field Angle (10%)	28.6
Vertical Field Angle (10%)	28.3

Axial Candela Display



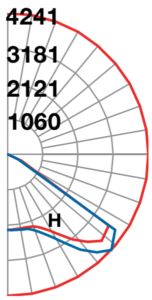
Reference data	
Catalogue number	**FDL10UNC1-M**
Luminaire Lumens	10,714
Input Watt	106.1
NEMA Type	6 H x 6 V
Maximum Candela	9539.4
Maximum Candela Angle	0H 0V
Horizontal Beam Angle (50%)	68.2
Vertical Beam Angle (50%)	68.2
Horizontal Field Angle (10%)	100.1
Vertical Field Angle (10%)	100.5

Axial Candela Display



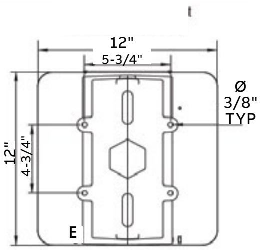
Reference data	
Catalogue number	**FDL10UNC1-W**
Luminaire Lumens	11,025
Input Watt	107
NEMA Type	6 H x 6 V
Maximum Candela	4241
Maximum Candela Angle	0H -47.5V
Horizontal Beam Angle (50%)	87.3
Vertical Beam Angle (50%)	120.2
Horizontal Field Angle (10%)	106.4
Vertical Field Angle (10%)	129.6

Axial Candela Display

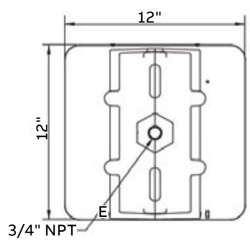


Hazlux® 8 FDL
Dimensions

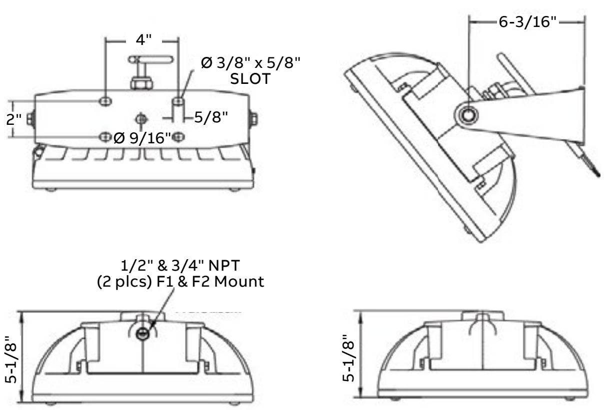
C1 and C2 Ceiling Mount
(ceiling spacers provided)



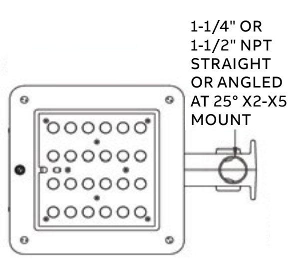
P2 Pendant Mount



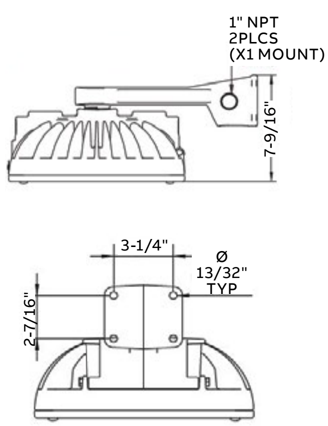
Y1 Yoke Mount



L4-S4 L5-S5 Wall/ Stanchion Mount



B3 Mount



Numbering system

Lighting fixture

FDL	10	UN	Y1	M	LG
1	2	3	4	5	6

01. Lighting Fixture

Part	Part number	Description
1 Fixture Series	FDL	Hazlux® Floodlights LED Class I Div 2
2 Lumen	05	6,400 Lumen (50 Watts)
	08	9,000 Lumen (80 Watts)
	10	11,000 Lumen (105 Watts)
3 Voltage	UN	120-277 V
	UN2	277-480 V (on 05 model only)
4 Mounting Style	C1	Ceiling 1/2"
	C2	Ceiling 3/4"
	P2	Pendant 3/4"
	Y1	Yoke Mount 1/2"
	B3	Wall Mount 1"
	L4	Stanchion 1-1/4"
	S4	Angled stanchion 1-1/4"
	L5	Stanchion 1-1/2"
	S5	Angled stanchion 1-1/2"
5 Optics	F	Frosted film
	N	Narrow 16° FWHM
	M	Medium 70° FWHM
	W	Wide 120° FWHM
6 Options	LG	Lens Guard
	PW	Pre-wired 3' cord with blunt end (Y1 mount only)
	GRY	Gray powder coat finish
	BLK	Black powder coat finish
	WHT	White powder coat finish

Ordering form

Type:

Catalogue number:

Notes:

Hazlux®

Type: __________
Catalog #: __________
Notes: __________

Safety Technology

FDL Series

Vapor / Dust Proof Lighting

Class I	**Division 2, Groups A, B, C and D**
Class II	**Division 2, Groups F and G**

- UL1598 For Marine Locations
- UL844
- IP66, Wet Location, NEMA-4X

Contact your Thomas&Betts sales representatives to verify classification

c UL US

Features

- Energy efficient alternative to hazardous location Metal Halide and High Pressure Sodium
- Designed for outdoor, hazardous, Marine, low-bay and flood applications
- Gray powder coat finish
- Multiple distribution patterns, Type V
- Selection of Frosted film, 16°, 70° or 120° Lens
- CCT of 5000K, minimum 70 CRI
- Selection of mounting style
- Tamper-proof screws and tempered glass lens
- > 120,000 hours Rated Lifetime Projection (L70)
- Passed UL844 Vibration Test
- Driver Life: + 50.000 hours
- Dimming control 0-10V
- Operating range -35°C to 50°C
- 5 Years warranty

Construction

- Cooper-free cast aluminum housing
- Captive stainless steel fasteners and insert
- 24 high-power LED's
- Modular design
- Weight: 26lbs with yoke mount
- Door fall restraint (insert)
- EPA 1.2 with yoke mount

Electrical

- 50W (6400 Lumens), 80W (9000 Lumens), 105W (11000 Lumens)
- Maximum LED current 1.4A
- 120-277V
- 277-480V (6400 Lumens only)
- Voltage tolerance 90-305, 249-528
- Built-in surge protection 4KV line to line, 6KV line to earth
- Power factor: 0.92 at 277V
- THD= 12.7 at 277V

Options

- Mounting: Ceiling, Pendant, Yoke, Wall, Straight or angled stanchion
- Cord with Blunt End
- Lens Guard
- Black or White finish

T-Ratings

Model	Rated Ambient °C	Class I, Div 2 Operating Temperature Code	Class II, Div 2 Operating Temperature Code
FDL05	50°C	T3C (160°C)	T5 (100°C)
FDL08	50°C	T3C (160°C)	T5 (100°C)
FDL10	50°C	T3C (160°C)	T5 (100°C)

Thomas&Betts
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Hazlux®

Safety Technology

Catalog Ordering Number System

EXAMPLE	FDL	10	UN	Y1	M	LG
	1	2	3	4	5	6

1 Fixture Series

FDL= Hazlux Floodlights LED Class I Div 2

2 Lumen

05= 6,400 Lumen (50 Watts)
08= 9,000 Lumen (80 Watts)
10= 11,000 Lumen (105 Watts)

3 Voltage

UN= 120-277V
UN2= 277-480V (on 05 models only)

4 Mounting Style

C1= Ceiling 1/2”
C2= Ceiling 3/4”
P2= Pendant 3/4”
Y1= Yoke Mount 1/2”
B3= Wall Mount 1”
L4= Stanchion 1-1/4”
S4= Angled stanchion 1-1/4”
L5= Stanchion 1-1/2”
S5= Angled stanchion 1-1/2”

5 Optics

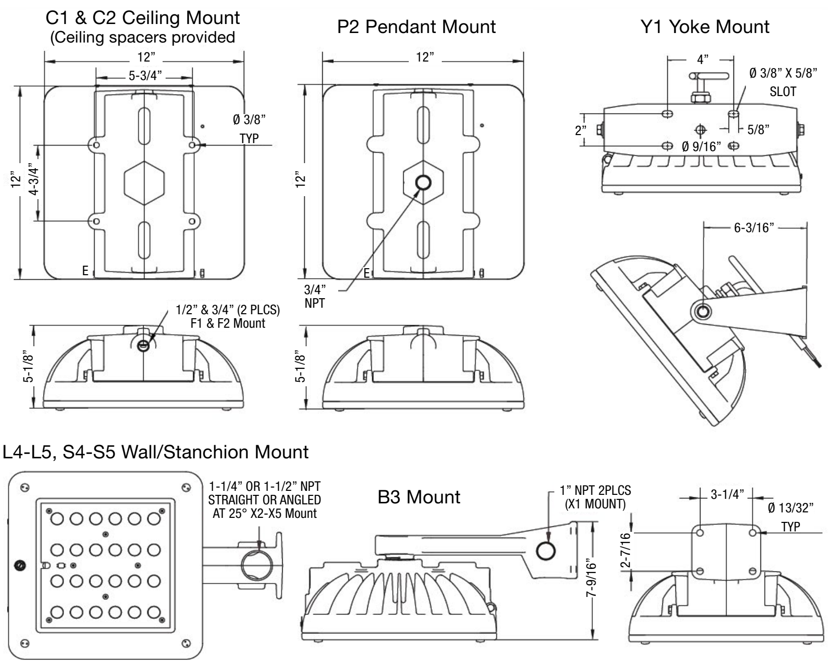
F= Frosted film
N= Narrow 16° FWHM
M= Medium 70° FWHM
W= Wide 120° FWHM

6 Options

LG= Lens Guard
PW= Pre-wired 3ft cord with blunt end*
GRY= Gray powder coat finish
BLK= Black powder coat finish
WHT= White powder coat finish

(*) Y1 mount only

Dimensions

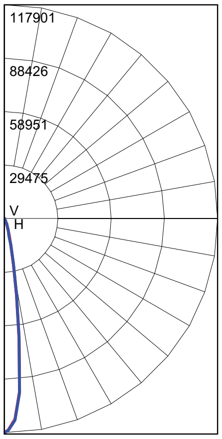


Hazlux®

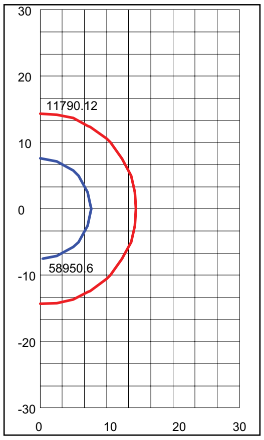
Safety Technology

Catalogue	FDL10UNC1-N
Luminaire Lumens	12,059
Input Watt	106.6
NEMA Type	2 H x 2 V
Maximum Candela	117901
Maximum Candela Angle	0H 0V
Horizontal Beam Angle (50%)	15.3
Vertical Beam Angle (50%)	15.2
Horizontal Field Angle (10%)	28.6
Vertical Field Angle (10%)	28.3

Axial Candela Display

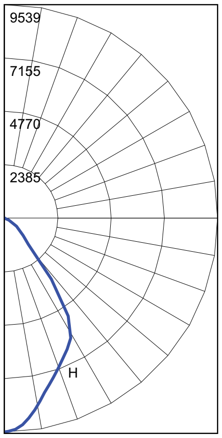


Isocandela Curves

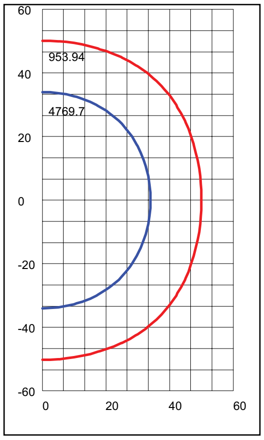


Catalogue	FDL10UNC1-M
Luminaire Lumens	10,714
Input Watt	106.1
NEMA Type	6 H x 6 V
Maximum Candela	9539.4
Maximum Candela Angle	0H 0V
Horizontal Beam Angle (50%)	68.2
Vertical Beam Angle (50%)	68.2
Horizontal Field Angle (10%)	100.1
Vertical Field Angle (10%)	100.5

Axial Candela Display

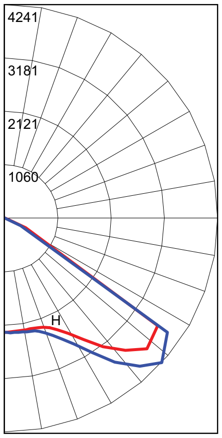


Isocandela Curves

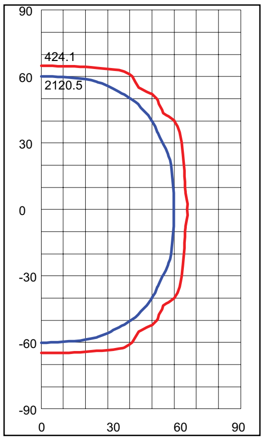


Catalogue	FDL10UNC1-W
Luminaire Lumens	11,025
Input Watt	107
NEMA Type	6 H x 6 V
Maximum Candela	4241
Maximum Candela Angle	0H -47.5V
Horizontal Beam Angle (50%)	87.3
Vertical Beam Angle (50%)	120.2
Horizontal Field Angle (10%)	106.4
Vertical Field Angle (10%)	129.6

Axial Candela Display



Isocandela Curves



Thomas&Betts
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Streetworks

DESCRIPTION

The Ventus™ LED area luminaire provides uncompromising optical performance and outstanding versatility for a wide variety of area and roadway applications. Patented modular LightBAR™ technology delivers uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and any security lighting application. UL/cUL Listed for wet locations.

Catalog #		**Type**
Project		
Comments		**Date**
Prepared by		

SPECIFICATION FEATURES

Construction
Die-cast aluminum frame secures thermally conductive, extruded aluminum heat sink to independent electrical chamber. Heavy-wall, die-cast aluminum housing and door isolates driver components for cooler operation. The unique construction allows for passive cooling and natural cleaning of the extruded heat sink ensuring reliable operation at 40°C high ambient conditions. Stainless steel fasteners and hinging allow access to electrical components for installation and maintenance. Optional tool-less hardware available for ease of entry into electrical chamber.

Optics
Choice of twelve patented, high-efficiency AccuLED Optics™ distributions. Optics are precisely designed to shape the light output, maximizing efficiency and application spacing. AccuLED Optics technology creates consistent distributions with the scalability to meet customized application requirements. Offered Standard in 4000K (+/- 275K) CCT and minimum 70 CRI. Optional 3000K CCT, 5000K CCT and 5700K CCT. For the ultimate level of spill light control, an optional house-side shield accessory can be field or factory installed. The house-side shield is designed to seamlessly integrate with the SL2, SL3 or SL4 optics.

Electrical
LED drivers mount to die-cast aluminum back housing for optimal heat sinking, operation efficacy, and prolonged life. Standard drivers feature electronic universal voltage (120-277V 50/60Hz), 347V 60Hz or 480V 60Hz operation. 480V is compatible for use with 480V Wye systems only. Greater than 0.9 power factor, less than 20% harmonic distortion, and is suitable for operation in -40°C to 40°C ambient environments. All fixtures are shipped standard with 10kV/10kA common – and differential – mode surge protection. LightBARs feature an IP66 enclosure rating and maintain greater than 95% lumen maintenance at 60,000 hours per IESNA TM-21. Occupancy sensor and dimming options available.

Mounting
Internal mast arm mount accepts a 1-1/4” to 2” (1-5/8” to 2-3/8” O.D.) horizontal tenon, while a two-bolt clamping mechanism secures fixture. Cast-in leveling guides provide +/-5° vertical leveling adjustment. Optional cast aluminum 6” arm includes bolt guides allowing for easy positioning of fixture during installation to pole or wall surface.

Finish
Cast components and arm finished in a five-stage super TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Standard colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available. Consult the McGraw-Edison Architectural Colors brochure for the complete selection.

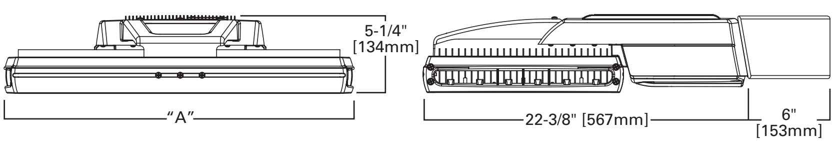
Warranty
Five-year warranty.

VST
VENTUS LED

2 - 12 LightBARs
Solid State LED

AREA LUMINAIRE

DIMENSIONS



DIMENSIONAL DATA

Number of LightBars	“A” Width	Weight		EPA [Square Feet]	
		Without Arm	With Arm	Without Arm	With Arm
2-4	12-7/8" [328mm]	24 lbs. [10.91 kgs.]	29 lbs. [13.18 kgs.]	0.94	1.00
5-8	18" [458mm]	30 lbs. [13.64 kgs.]	35 lbs. [15.91 kgs.]	1.10	1.20
9-12	25-7/8" [658mm]	39 lbs. [17.73 kgs.]	44 lbs. [20.00 kgs.]	1.31	1.44

CERTIFICATION DATA

UL/cUL Listed
LM79 / LM80 Compliant
IP66 LightBARs
3G Vibration Rated
ISO 9001

ENERGY DATA

Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120-277V/50Hz & 60Hz, 347V/60Hz, 480V/60Hz
-40°C Minimum Temperature
40°C Ambient Temperature Rating
50°C Ambient Temperature Rating (HA option)

SHIPPING DATA

Approximate Net Weight:
(See Tabulated Reference Data)

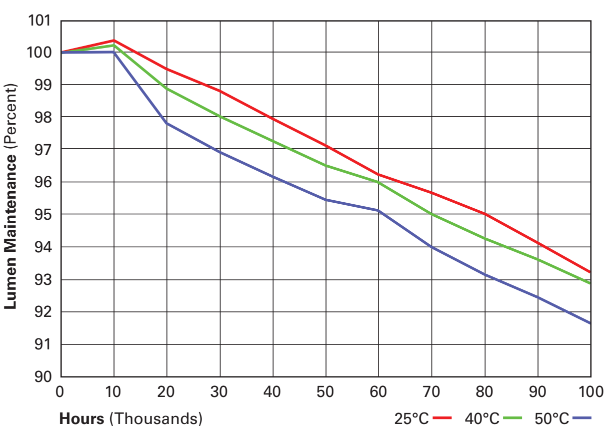
POWER AND LUMENS BY BAR COUNT (21 LED LIGHTBAR)

Number of LightBARs		E02	E03	E04	E05	E06	E07	E08	E09	E10	E11	E12
Drive Current		350mA Drive Current										
Power (Watts)		52W	75W	97W	127W	149W	173W	195W	226W	247W	270W	292W
Current @ 120V (A)		0.44	0.63	0.82	1.07	1.26	1.45	1.63	1.89	2.08	2.26	2.45
Current @ 277V (A)		0.20	0.28	0.36	0.48	0.56	0.64	0.71	0.84	0.92	0.99	1.07
Power (Watts)		58W	82W	99W	132W	159W	174W	196W	227W	247W	271W	293W
Current @ 347V (A)		0.19	0.28	0.29	0.39	0.48	0.56	0.57	0.68	0.76	0.85	0.86
Current @ 480V (A)		0.15	0.20	0.21	0.30	0.36	0.41	0.42	0.51	0.57	0.62	0.63
T2	Lumens	6,173	9,260	12,347	15,434	18,520	21,607	24,694	27,780	30,867	33,954	37,041
	BUG Rating	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4
T3	Lumens	6,117	9,175	12,233	15,292	18,350	21,409	24,467	27,525	30,584	33,642	36,700
	BUG Rating	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4
T4	Lumens	5,953	8,929	11,905	14,882	17,858	20,835	23,811	26,787	29,764	32,740	35,716
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
5MQ	Lumens	6,398	9,597	12,795	15,994	19,193	22,392	25,591	28,790	31,989	35,187	38,386
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5WQ	Lumens	6,315	9,472	12,630	15,787	18,945	22,102	25,260	28,417	31,575	34,732	37,890
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
5XQ	Lumens	6,325	9,488	12,650	15,813	18,975	22,138	25,301	28,463	31,626	34,788	37,951
	BUG Rating	B3-U1-G2	B3-U1-G3	B4-U1-G3	B4-U1-G3	B4-U1-G4	B5-U1-G4	B5-U2-G5	B5-U2-G5	B5-U2-G5	B5-U2-G5	B5-U2-G5
SL2	Lumens	6,018	9,026	12,035	15,044	18,053	21,061	24,070	27,079	30,088	33,096	36,105
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B4-U0-G4
SL3	Lumens	6,034	9,051	12,067	15,084	18,101	21,118	24,135	27,152	30,169	33,186	36,202
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
SL4	Lumens	5,802	8,703	11,604	14,505	17,406	20,307	23,207	26,108	29,009	31,910	34,811
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	Lumens	6,231	9,346	12,462	15,577	18,692	21,808	24,923	28,039	31,154	34,270	37,385
	BUG Rating	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	Lumens	5,375	8,062	10,749	13,436	16,124	18,811	21,498	24,186	26,873	29,560	32,247
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5

LUMEN MAINTENANCE

Ambient Temperature	25,000 Hours*	50,000 Hours*	60,000 Hours*	100,000 Hours	Theoretical L70 (Hours)
25°C	> 99%	> 97%	> 96%	> 93%	> 450,000
40°C	> 98%	> 97%	> 96%	> 92%	> 425,000
50°C	> 97%	> 96%	> 95%	> 91%	> 400,000

* Per IESNA TM-21 data.



LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
10°C	1.02
15°C	1.01
25°C	1.00
40°C	0.99
50°C	0.96

LIGHTBAR OPERATION WITH 2L BI-LEVEL SWITCHING OPTION

Number of LightBars	Circuit 1	Circuit 2
2	1	1
3	2	2
4	2	2
5	3	2
6	3	3
7	4	3
8	4	4
9	5	4
10	6	4
11	7	4
12	8	4

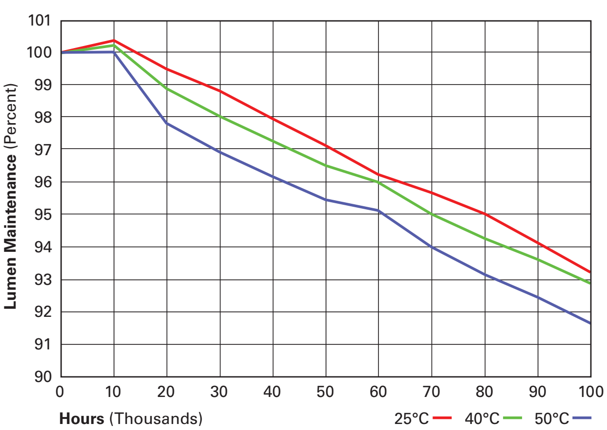
POWER AND LUMENS BY BAR COUNT (7 LED LIGHTBAR)

Number of LightBARs		**F02**	**F03**	**F04**	**F05**	**F06**	**F07**	**F08**	**F09**	**F10**	**F11**	**F12**
Drive Current		1A Drive Current										
Power (Watts)		55W	78W	102W	133W	157W	180W	204W	235W	259W	283W	307W
Current @ 120V (A)		0.46	0.66	0.86	1.12	1.31	1.51	1.71	1.97	2.17	2.37	2.57
Current @ 277V (A)		0.21	0.29	0.37	0.50	0.58	0.66	0.74	0.88	0.96	1.04	1.12
Power (Watts)		60W	85W	105W	137W	164W	181W	204W	236W	259W	284W	308W
Current @ 347V (A)		0.19	0.28	0.30	0.41	0.49	0.58	0.60	0.71	0.79	0.88	0.90
Current @ 480V (A)		0.15	0.21	0.22	0.31	0.37	0.43	0.44	0.53	0.59	0.65	0.66
T2	Lumens	5,096	7,644	10,193	12,741	15,289	17,837	20,385	22,933	25,482	28,030	30,578
	BUG Rating	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4
T3	Lumens	5,050	7,574	10,099	12,624	15,149	17,673	20,198	22,723	25,248	27,772	30,297
	BUG Rating	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4
T4	Lumens	4,914	7,371	9,828	12,285	14,742	17,199	19,656	22,114	24,571	27,028	29,485
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
5MQ	Lumens	5,281	7,922	10,563	13,204	15,844	18,485	21,126	23,767	26,407	29,048	31,689
	BUG Rating	B3-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3
5WQ	Lumens	5,213	7,820	10,426	13,033	15,640	18,246	20,853	23,459	26,066	28,672	31,279
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5XQ	Lumens	5,222	7,832	10,443	13,054	15,665	18,276	20,886	23,497	26,108	28,719	31,330
	BUG Rating	B3-U1-G2	B3-U1-G3	B4-U1-G3	B4-U1-G3	B4-U1-G3	B4-U1-G4	B5-U1-G4	B5-U2-G4	B5-U2-G5	B5-U2-G5	B5-U2-G5
SL2	Lumens	4,968	7,451	9,935	12,419	14,903	17,387	19,870	22,354	24,838	27,322	29,806
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
SL3	Lumens	4,981	7,471	9,962	12,452	14,943	17,433	19,924	22,414	24,905	27,395	29,886
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
SL4	Lumens	4,790	7,184	9,579	11,974	14,369	16,764	19,158	21,553	23,948	26,343	28,738
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
RW	Lumens	5,144	7,716	10,287	12,859	15,431	18,003	20,575	23,147	25,719	28,290	30,862
	BUG Rating	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	Lumens	4,437	6,655	8,874	11,092	13,311	15,529	17,747	19,966	22,184	24,403	26,621
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5

LUMEN MAINTENANCE

Ambient Temperature	25,000 Hours*	50,000 Hours*	60,000 Hours*	100,000 Hours	Theoretical L70 (Hours)
25°C	> 99%	> 97%	> 96%	> 93%	> 450,000
40°C	> 98%	> 97%	> 96%	> 92%	> 425,000
50°C	> 97%	> 96%	> 95%	> 91%	> 400,000

* Per IESNA TM-21 data.



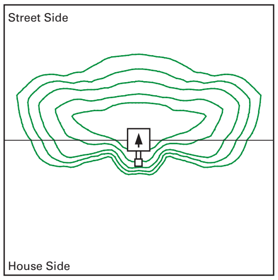
LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
10°C	1.02
15°C	1.01
25°C	1.00
40°C	0.99
50°C	0.96

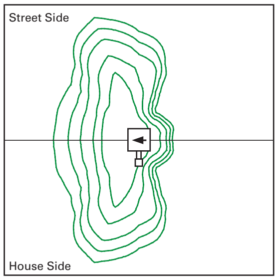
LIGHTBAR OPERATION WITH 2L BI-LEVEL SWITCHING OPTION

Number of LightBars	Circuit 1	Circuit 2
2	1	1
3	2	2
4	2	2
5	3	2
6	3	3
7	4	3
8	4	4
9	5	4
10	6	4
11	7	4
12	8	4

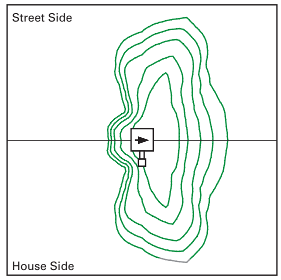
OPTIC ORIENTATION



Standard



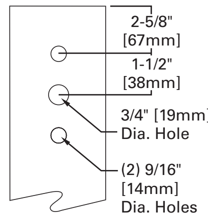
Optics Rotated Left @ 90° [L90]



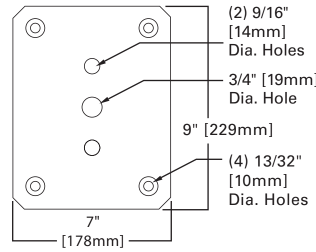
Optics Rotated Right @ 90° [R90]

DRILLING PATTERNS

Type "C"



Wall Mount [WM]



ORDERING INFORMATION

Sample Number: VST-E12-LED-E-U-T3-GM

Product Family [1]	Number of LightBARs [2, 3]		Lamp Type	Ballast Type	Voltage	Distribution	Color
VST=Ventus	**E02**=(2) 21 LED LightBARs **E03**=(3) 21 LED LightBARs **E04**=(4) 21 LED LightBARs **E05**=(5) 21 LED LightBARs **E06**=(6) 21 LED LightBARs **E07**=(7) 21 LED LightBARs **E08**=(8) 21 LED LightBARs **E09**=(9) 21 LED LightBARs **E10**=(10) 21 LED LightBARs **E11**=(11) 21 LED LightBARs **E12**=(12) 21 LED LightBARs	**F02**=(2) 7 LED LightBARs **F03**=(3) 7 LED LightBARs **F04**=(4) 7 LED LightBARs **F05**=(5) 7 LED LightBARs **F06**=(6) 7 LED LightBARs **F07**=(7) 7 LED LightBARs **F08**=(8) 7 LED LightBARs **F09**=(9) 7 LED LightBARs **F10**=(10) 7 LED LightBARs **F11**=(11) 7 LED LightBARs **F12**=(12) 7 LED LightBARs	**LED**=Solid State Light Emitting Diodes	**E**=Electronic	**U**=Universal (120-277V) **8**=480V [4, 5] **9**=347V [4]	**T2**=Type II **T3**=Type III **T4**=Type IV **5MQ**=Type V Square Medium **5WQ**=Type V Square Wide **5XQ**=Type V Square Extra Wide **RW**=Rectangular Wide **SL2**=Type II with Spill Control **SL3**=Type III with Spill Control **SL4**=Type IV with Spill Control **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right	**AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Metallic **WH**=White

Options (Add as Suffix)	**Accessories** (Order Separately) [20]
3=Three-Position Terminal Block **4**=NEMA Twistlock Photocontrol Receptacle **4N7**=NEMA 7-PIN Twistlock Photocontrol Receptacle [6] **U**=UL and cUL Listed **HA**=50°C High Ambient Temperature Rating [7, 8] **2L**=Two Circuits [9, 10, 11] **L90**=Optics Rotated 90° Left [12] **R90**=Optics Rotated 90° Right [12] **7030**=70 CRI / 3000K CCT [13] **7050**=70 CRI / 5000K CCT [13] **7060**=70 CRI / 5700K CCT [13] **8030**=80 CRI / 3000K CCT [13] **LCF**=LightBAR Cover Plate Matches Housing Finish **AIR**=Arm Included for Round Pole **AIS**=Arm Included for Square Pole **WM**=Wall Mount with Arm **MS-LXX**=Motion Sensor for On/Off Operation [14] **MS/X-LXX**=Motion Sensor for Bi-Level Operation [15] **MS/DIM-LXX**=Motion Sensor for Dimming Operation [16, 17] **DIM**=0-10V Dimming Drivers [18] **HSS**=Factory Installed House Side Shield [19]	**VA1033-XX**=Single Tenon Adapter for 2-3/8" O.D. Tenon **VA1034-XX**=2@180° Tenon Adapter for 2-3/8" O.D. Tenon **VA1035-XX**=3@120° Tenon Adapter for 2-3/8" O.D. Tenon **VA1036-XX**=4@90° Tenon Adapter for 2-3/8" O.D. Tenon **VA1037-XX**=2@90° Tenon Adapter for 2-3/8" O.D. Tenon **VA1038-XX**=3@90° Tenon Adapter for 2-3/8" O.D. Tenon **VA1039-XX**=2@120° Tenon Adapter for 2-3/8" O.D. Tenon **VA1040-XX**=Single Tenon Adapter for 3-1/2" O.D. Tenon **VA1041-XX**=2@180° Tenon Adapter for 3-1/2" O.D. Tenon **VA1042-XX**=3@120° Tenon Adapter for 3-1/2" O.D. Tenon **VA1043-XX**=4@90° Tenon Adapter for 3-1/2" O.D. Tenon **VA1044-XX**=2@90° Tenon Adapter for 3-1/2" O.D. Tenon **VA1045-XX**=3@90° Tenon Adapter for 3-1/2" O.D. Tenon **VA1046-XX**=2@120° Tenon Adapter for 3-1/2" O.D. Tenon **OA/RA1016**=NEMA Photocontrol - Multi-Tap **OA/RA1027**=NEMA Photocontrol - 480V **OA/RA1201**=NEMA Photocontrol - 347V **OA1223**=10kV Circuit Module Replacement **LS/HSS**=Field Installed House Side Shield [21]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. Standard 4000K CCT and nominal 70CRI.
3. 21 LED LightBAR powered at 350mA, 7 LED LightBAR powered at 1A.
4. Not available with HA option.
5. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
6. Must specify DIM option to add dimming driver(s). Only available in E02-E06 and F02-F06.
7. Not available with DIM option or MS/DIM-LXX.
8. Not available with motion sensor. 120 - 277V only.
9. Requires two electrical circuits to luminaire. See LightBAR operation table for additional information.
10. Consult factory before ordering in combination with MS-LXX or MS/X-LXX options.
11. Not available in 347V or 480V.
12. Not available with 5MQ, 5WQ or 5XQ distributions. Not available with HSS option.
13. Extended lead times apply.
14. Sensor housed in external box mounted to the luminaire. Available in E02-E12 and F02-F12 configurations. Replace XX with mounting height in feet for proper lens selection, (e.g., MS-L25). Consult factory for additional information.
15. Sensor housed in external box mounted to the luminaire. Available in E02-E12 and F02-F12 configurations. Replace X with number of bars operating in low output mode and replace XX with mounting height for proper lens selection, (e.g., MS/3-L25). Maximum 4 bars in low output mode. Consult factory for additional information.
16. Not available with HA option. Only available in E02-E06 and F02-F06. Includes Dimming Drivers. Not available in 347V or 480V.
17. Replace XX with mounting height in feet for proper lens selection, (e.g., MS/DIM-L25).
18. Available in E02-E06 and F02-F06 only.
19. Only for use with SL2, SL3 and SL4 distributions. Not available with L90 or R90 options.
20. Replace XX with color suffix.
21. One required for each LightBAR. Not available with L90 or R90 options.

Table B-1 Characteristics of Light Fixtures - Gordon Site

Fixture Type	Fixture ID	Location UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Street Light	20500lm - VST-E07-LED-E-	412,348	6,307,129	7	176	0
Street Light	20500lm - VST-E07-LED-E-	412,312	6,307,126	7	85	0
Street Light	20500lm - VST-E07-LED-E-	412,242	6,307,160	7	46	0
Street Light	20500lm - VST-E07-LED-E-	412,173	6,307,211	7	62	0
Street Light	20500lm - VST-E07-LED-E-	412,103	6,307,259	7	180	0
Street Light	20500lm - VST-E07-LED-E-	412,112	6,307,300	7	162	0
Street Light	20500lm - VST-E07-LED-E-	412,075	6,307,264	7	68	0
Street Light	20500lm - VST-E07-LED-E-	412,030	6,307,282	7	72	0
Street Light	20500lm - VST-E07-LED-E-	412,017	6,307,313	7	333	0
Street Light	20500lm - VST-E07-LED-E-	411,905	6,307,319	7	4	0
Street Light	20500lm - VST-E07-LED-E-	411,980	6,307,290	7	65	0
Street Light	20500lm - VST-E07-LED-E-	412,093	6,307,312	7	248	0
Street Light	20500lm - VST-E07-LED-E-	412,088	6,307,316	7	69	0
Street Light	20500lm - VST-E07-LED-E-	412,050	6,307,328	7	249	0
Street Light	20500lm - VST-E07-LED-E-	412,051	6,307,330	7	68	0
Street Light	20500lm - VST-E07-LED-E-	411,928	6,307,376	7	341	0
Street Light	20500lm - VST-E07-LED-E-	411,950	6,307,432	7	338	0
Street Light	20500lm - VST-E07-LED-E-	411,965	6,307,470	7	333	0
Street Light	20500lm - VST-E07-LED-E-	411,979	6,307,504	7	340	0
Street Light	20500lm - VST-E07-LED-E-	412,040	6,307,494	7	243	0
Street Light	20500lm - VST-E07-LED-E-	412,092	6,307,473	7	249	0
Street Light	20500lm - VST-E07-LED-E-	412,114	6,307,432	7	166	0
Street Light	20500lm - VST-E07-LED-E-	412,099	6,307,380	7	159	0
Street Light	20500lm - VST-E07-LED-E-	412,009	6,307,350	7	68	0
Wall Pack	102W - XTOR12B	412,041	6,307,351	2.5	69	0
Wall Pack	102W - XTOR12B	412,031	6,307,354	2.5	157	0
Wall Pack	102W - XTOR12B	412,027	6,307,343	2.5	158	0
Wall Pack	102W - XTOR12B	412,050	6,307,347	2.5	336	0
Wall Pack	102W - XTOR12B	412,046	6,307,335	2.5	336	0
Wall Pack	102W - XTOR12B	411,993	6,307,364	2.5	340	0
Wall Pack	102W - XTOR12B	411,968	6,307,370	2.5	157	0
Wall Pack	102W - XTOR12B	412,000	6,307,381	2.5	334	0
Wall Pack	102W - XTOR12B	412,011	6,307,409	2.5	338	0
Wall Pack	102W - XTOR12B	412,019	6,307,429	2.5	345	0
Wall Pack	102W - XTOR12B	411,995	6,307,439	2.5	159	0

Table B-1 Characteristics of Light Fixtures - Gordon Site

Fixture Type	Fixture ID	Location UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Wall Pack	102W - XTOR12B	411,988	6,307,418	2.5	157	0
Wall Pack	102W - XTOR12B	411,975	6,307,385	2.5	158	0
Wall Pack	102W - XTOR12B	412,321	6,307,116	2.5	82	0
Wall Pack	102W - XTOR12B	412,325	6,307,110	2.5	353	0
Wall Pack	102W - XTOR12B	412,320	6,307,106	2.5	266	0
Wall Pack	102W - XTOR12B	412,315	6,307,111	2.5	173	0
Street Light	20500lm - VST-E07-LED-E-	412,132	6,307,491	7	25	0
Street Light	20500lm - VST-E07-LED-E-	412,071	6,307,551	7	46	0
Street Light	20500lm - VST-E07-LED-E-	412,000	6,307,602	7	90	0
Street Light	20500lm - VST-E07-LED-E-	411,952	6,307,565	7	153	0
Street Light	20500lm - VST-E07-LED-E-	411,910	6,307,601	7	235	0
Street Light	20500lm - VST-E07-LED-E-	411,917	6,307,488	7	153	0
Street Light	20500lm - VST-E07-LED-E-	411,879	6,307,386	7	154	0
Street Light	20500lm - VST-E07-LED-E-	411,833	6,307,277	7	161	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Street Light	20500lm - VST-E07-LED-E-	380,796	6,308,684	7	333	0
Street Light	20500lm - VST-E07-LED-E-	380,861	6,308,724	7	317	0
Street Light	20500lm - VST-E07-LED-E-	380,941	6,308,738	7	249	0
Street Light	20500lm - VST-E07-LED-E-	381,012	6,308,722	7	237	0
Street Light	20500lm - VST-E07-LED-E-	381,025	6,308,655	7	193	0
Street Light	20500lm - VST-E07-LED-E-	381,036	6,308,588	7	152	0
Street Light	20500lm - VST-E07-LED-E-	380,995	6,308,550	7	139	0
Street Light	20500lm - VST-E07-LED-E-	380,827	6,308,521	7	73	0
Street Light	20500lm - VST-E07-LED-E-	380,809	6,308,618	7	9	0
Wall Pack	102W - XTOR12B	380,902	6,308,721	2.5	103	0
Wall Pack	102W - XTOR12B	380,904	6,308,704	2.5	279	0
Wall Pack	102W - XTOR12B	380,910	6,308,693	2.5	100	0
Wall Pack	102W - XTOR12B	380,911	6,308,680	2.5	8	0
Wall Pack	102W - XTOR12B	380,906	6,308,679	2.5	193	0
Wall Pack	102W - XTOR12B	380,910	6,308,657	2.5	188	0
Wall Pack	102W - XTOR12B	380,915	6,308,658	2.5	9	0
Wall Pack	102W - XTOR12B	380,913	6,308,637	2.5	192	0
Wall Pack	102W - XTOR12B	380,918	6,308,638	2.5	13	0
Wall Pack	102W - XTOR12B	380,923	6,308,615	2.5	10	0
Wall Pack	102W - XTOR12B	380,917	6,308,614	2.5	190	0
Wall Pack	102W - XTOR12B	380,926	6,308,596	2.5	14	0
Wall Pack	102W - XTOR12B	380,921	6,308,595	2.5	193	0
Wall Pack	102W - XTOR12B	380,929	6,308,577	2.5	12	0
Wall Pack	102W - XTOR12B	380,925	6,308,576	2.5	191	0
Wall Pack	102W - XTOR12B	380,903	6,308,566	2.5	188	0
Wall Pack	102W - XTOR12B	380,904	6,308,559	2.5	189	0
Wall Pack	102W - XTOR12B	380,920	6,308,548	2.5	283	0
Wall Pack	102W - XTOR12B	380,964	6,308,556	2.5	279	0
Wall Pack	102W - XTOR12B	380,979	6,308,579	2.5	12	0
Wall Pack	102W - XTOR12B	381,000	6,308,598	2.5	10	0
Wall Pack	102W - XTOR12B	380,996	6,308,618	2.5	13	0
Wall Pack	102W - XTOR12B	380,993	6,308,639	2.5	12	0
Wall Pack	102W - XTOR12B	380,989	6,308,660	2.5	10	0
Wall Pack	102W - XTOR12B	380,985	6,308,681	2.5	12	0
Wall Pack	102W - XTOR12B	380,981	6,308,701	2.5	13	0
Wall Pack	102W - XTOR12B	380,833	6,308,675	2.5	194	0
Wall Pack	102W - XTOR12B	380,836	6,308,654	2.5	187	0
Wall Pack	102W - XTOR12B	380,841	6,308,634	2.5	186	0
Wall Pack	102W - XTOR12B	380,844	6,308,613	2.5	191	0
Wall Pack	102W - XTOR12B	380,847	6,308,592	2.5	193	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Wall Pack	102W - XTOR12B	380,851	6,308,571	2.5	189	0
Street Light	20500lm - VST-E07-LED-E-	380,853	6,308,515	7	217	0
Street Light	20500lm - VST-E07-LED-E-	380,786	6,308,483	7	11	0
Street Light	20500lm - VST-E07-LED-E-	380,859	6,308,470	7	188	0
Street Light	20500lm - VST-E07-LED-E-	380,819	6,308,445	7	105	0
Street Light	20500lm - VST-E07-LED-E-	380,779	6,308,439	7	99	0
Street Light	20500lm - VST-E07-LED-E-	380,735	6,308,448	7	12	0
Street Light	20500lm - VST-E07-LED-E-	380,753	6,308,473	7	281	0
Street Light	20500lm - VST-E07-LED-E-	380,832	6,308,486	7	277	0
Street Light	20500lm - VST-E07-LED-E-	380,704	6,308,470	7	324	0
Street Light	20500lm - VST-E07-LED-E-	380,706	6,308,358	7	8	0
Street Light	20500lm - VST-E07-LED-E-	380,719	6,308,265	7	354	0
Street Light	20500lm - VST-E07-LED-E-	380,712	6,308,168	7	0	0
Street Light	20500lm - VST-E07-LED-E-	380,731	6,308,022	7	13	0
Street Light	20500lm - VST-E07-LED-E-	380,748	6,307,907	7	220	0
Street Light	20500lm - VST-E07-LED-E-	380,735	6,307,861	7	196	0
Street Light	20500lm - VST-E07-LED-E-	380,667	6,307,813	7	110	0
Street Light	20500lm - VST-E07-LED-E-	380,582	6,307,816	7	14	0
Street Light	20500lm - VST-E07-LED-E-	380,630	6,307,862	7	48	0
Street Light	20500lm - VST-E07-LED-E-	380,844	6,307,924	7	334	0
Street Light	20500lm - VST-E07-LED-E-	381,015	6,307,877	7	41	0
Street Light	20500lm - VST-E07-LED-E-	381,105	6,307,860	7	235	0
Street Light	20500lm - VST-E07-LED-E-	380,983	6,307,948	7	326	0
Street Light	20500lm - VST-E07-LED-E-	380,961	6,308,055	7	12	0
Street Light	20500lm - VST-E07-LED-E-	380,948	6,308,131	7	38	0
Street Light	20500lm - VST-E07-LED-E-	380,994	6,308,166	7	143	0
Street Light	20500lm - VST-E07-LED-E-	381,052	6,308,184	7	100	0
Street Light	20500lm - VST-E07-LED-E-	380,998	6,308,212	7	271	0
Street Light	20500lm - VST-E07-LED-E-	381,479	6,307,817	7	116	0
Street Light	20500lm - VST-E07-LED-E-	381,529	6,307,895	7	294	0
Street Light	20500lm - VST-E07-LED-E-	381,637	6,307,912	7	116	0
Street Light	20500lm - VST-E07-LED-E-	381,634	6,307,967	7	258	0
Street Light	20500lm - VST-E07-LED-E-	381,836	6,308,023	7	99	0
Street Light	20500lm - VST-E07-LED-E-	382,047	6,308,078	7	96	0
Street Light	20500lm - VST-E07-LED-E-	382,213	6,308,111	7	95	0
Street Light	20500lm - VST-E07-LED-E-	381,507	6,308,206	7	257	0
Street Light	20500lm - VST-E07-LED-E-	381,526	6,308,155	7	151	0
Street Light	20500lm - VST-E07-LED-E-	382,414	6,308,147	7	99	0
Street Light	20500lm - VST-E07-LED-E-	381,770	6,309,562	7	163	0
Street Light	20500lm - VST-E07-LED-E-	381,634	6,309,396	7	288	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Street Light	20500lm - VST-E07-LED-E-	381,721	6,309,471	7	145	0
Street Light	20500lm - VST-E07-LED-E-	381,626	6,309,288	7	153	0
Street Light	20500lm - VST-E07-LED-E-	381,542	6,309,123	7	158	0
Street Light	20500lm - VST-E07-LED-E-	381,445	6,308,932	7	150	0
Street Light	20500lm - VST-E07-LED-E-	381,352	6,308,765	7	187	0
Street Light	20500lm - VST-E07-LED-E-	381,276	6,308,712	7	334	0
Street Light	20500lm - VST-E07-LED-E-	381,361	6,308,478	7	270	0
Street Light	20500lm - VST-E07-LED-E-	381,293	6,308,505	7	23	0
Street Light	20500lm - VST-E07-LED-E-	381,337	6,308,428	7	25	0
Street Light	20500lm - VST-E07-LED-E-	381,373	6,308,359	7	12	0
Street Light	20500lm - VST-E07-LED-E-	381,400	6,308,294	7	344	0
Street Light	20500lm - VST-E07-LED-E-	381,353	6,308,271	7	248	0
Street Light	20500lm - VST-E07-LED-E-	381,344	6,308,290	7	191	0
Street Light	20500lm - VST-E07-LED-E-	381,337	6,308,333	7	189	0
Street Light	20500lm - VST-E07-LED-E-	381,329	6,308,376	7	191	0
Street Light	20500lm - VST-E07-LED-E-	381,329	6,308,408	7	171	0
Street Light	20500lm - VST-E07-LED-E-	381,292	6,308,429	7	277	0
Street Light	20500lm - VST-E07-LED-E-	381,233	6,308,419	7	274	0
Street Light	20500lm - VST-E07-LED-E-	381,248	6,308,273	7	10	0
Street Light	20500lm - VST-E07-LED-E-	381,247	6,308,253	7	306	0
Street Light	20500lm - VST-E07-LED-E-	381,218	6,308,303	7	83	0
Street Light	20500lm - VST-E07-LED-E-	381,176	6,308,337	7	10	0
Street Light	20500lm - VST-E07-LED-E-	381,169	6,308,381	7	11	0
Street Light	20500lm - VST-E07-LED-E-	381,214	6,308,420	7	245	0
Street Light	20500lm - VST-E07-LED-E-	381,204	6,308,469	7	185	0
Street Light	20500lm - VST-E07-LED-E-	381,192	6,308,557	7	138	0
Street Light	20500lm - VST-E07-LED-E-	381,268	6,308,572	7	56	0
Street Light	20500lm - VST-E07-LED-E-	381,197	6,308,517	7	192	0
Street Light	20500lm - VST-E07-LED-E-	381,067	6,308,553	7	353	0
Street Light	20500lm - VST-E07-LED-E-	381,055	6,308,633	7	9	0
Street Light	20500lm - VST-E07-LED-E-	380,713	6,308,410	7	228	0
Street Light	20500lm - VST-E07-LED-E-	380,769	6,308,419	7	279	0
Street Light	20500lm - VST-E07-LED-E-	380,833	6,308,429	7	280	0
Street Light	20500lm - VST-E07-LED-E-	380,883	6,308,438	7	279	0
Street Light	20500lm - VST-E07-LED-E-	380,769	6,308,393	7	12	0
Street Light	20500lm - VST-E07-LED-E-	380,778	6,308,348	7	11	0
Street Light	20500lm - VST-E07-LED-E-	380,789	6,308,303	7	38	0
Street Light	20500lm - VST-E07-LED-E-	380,834	6,308,288	7	100	0
Street Light	20500lm - VST-E07-LED-E-	380,886	6,308,297	7	101	0
Wall Pack	102W - XTOR12B	380,750	6,308,395	2.5	98	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Wall Pack	102W - XTOR12B	380,739	6,308,386	2.5	194	0
Wall Pack	102W - XTOR12B	380,764	6,308,392	2.5	9	0
Wall Pack	102W - XTOR12B	380,743	6,308,361	2.5	193	0
Wall Pack	102W - XTOR12B	380,749	6,308,331	2.5	192	0
Wall Pack	102W - XTOR12B	380,762	6,308,331	2.5	281	0
Wall Pack	102W - XTOR12B	380,775	6,308,337	2.5	14	0
Wall Pack	102W - XTOR12B	380,769	6,308,367	2.5	7	0
Wall Pack	102W - XTOR12B	380,851	6,308,432	2.5	281	0
Wall Pack	102W - XTOR12B	380,816	6,308,399	2.5	104	0
Wall Pack	102W - XTOR12B	380,811	6,308,387	2.5	190	0
Wall Pack	102W - XTOR12B	380,844	6,308,381	2.5	189	0
Wall Pack	102W - XTOR12B	380,844	6,308,376	2.5	185	0
Wall Pack	102W - XTOR12B	380,843	6,308,386	2.5	281	0
Wall Pack	102W - XTOR12B	380,838	6,308,385	2.5	278	0
Wall Pack	102W - XTOR12B	380,866	6,308,386	2.5	101	0
Wall Pack	102W - XTOR12B	380,861	6,308,385	2.5	105	0
Wall Pack	102W - XTOR12B	380,864	6,308,412	2.5	106	0
Wall Pack	102W - XTOR12B	380,869	6,308,413	2.5	102	0
Wall Pack	102W - XTOR12B	380,894	6,308,402	2.5	94	0
Wall Pack	102W - XTOR12B	380,921	6,308,374	2.5	12	0
Wall Pack	102W - XTOR12B	380,939	6,308,356	2.5	280	0
Wall Pack	102W - XTOR12B	380,946	6,308,356	2.5	274	0
Wall Pack	102W - XTOR12B	380,835	6,308,351	2.5	281	0
Wall Pack	102W - XTOR12B	380,851	6,308,350	2.5	187	0
Wall Pack	102W - XTOR12B	380,816	6,308,367	2.5	189	0
Wall Pack	102W - XTOR12B	380,818	6,308,356	2.5	188	0
Wall Pack	102W - XTOR12B	380,827	6,308,370	2.5	9	0
Wall Pack	102W - XTOR12B	380,829	6,308,356	2.5	7	0
Wall Pack	102W - XTOR12B	380,840	6,308,337	2.5	189	0
Wall Pack	102W - XTOR12B	380,845	6,308,306	2.5	190	0
Wall Pack	102W - XTOR12B	380,863	6,308,303	2.5	282	0
Wall Pack	102W - XTOR12B	380,878	6,308,312	2.5	356	0
Wall Pack	102W - XTOR12B	380,873	6,308,339	2.5	9	0
Wall Pack	102W - XTOR12B	380,879	6,308,340	2.5	189	0
Wall Pack	102W - XTOR12B	380,881	6,308,321	2.5	189	0
Wall Pack	102W - XTOR12B	380,895	6,308,322	2.5	281	0
Wall Pack	102W - XTOR12B	380,911	6,308,325	2.5	278	0
Wall Pack	102W - XTOR12B	380,918	6,308,329	2.5	10	0
Wall Pack	102W - XTOR12B	380,915	6,308,344	2.5	8	0
Wall Pack	102W - XTOR12B	380,941	6,308,372	2.5	98	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Wall Pack	102W - XTOR12B	380,976	6,308,368	2.5	8	0
Flood Light	Flood - 105W, 11000lumen	380,928	6,308,386	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,936	6,308,388	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,943	6,308,389	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,950	6,308,391	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,956	6,308,392	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,963	6,308,393	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,970	6,308,394	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,977	6,308,396	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,984	6,308,398	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,991	6,308,399	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,001	6,308,401	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,007	6,308,402	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,016	6,308,404	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,026	6,308,405	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,035	6,308,407	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,044	6,308,409	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,057	6,308,412	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,068	6,308,414	7	234	0
Flood Light	Flood - 105W, 11000lumen	381,081	6,308,417	7	234	0
Flood Light	Flood - 105W, 11000lumen	380,951	6,308,366	7	113	0
Flood Light	Flood - 105W, 11000lumen	380,957	6,308,368	7	111	0
Flood Light	Flood - 105W, 11000lumen	380,964	6,308,370	7	106	0
Flood Light	Flood - 105W, 11000lumen	380,971	6,308,372	7	110	0
Flood Light	Flood - 105W, 11000lumen	380,977	6,308,375	7	116	0
Flood Light	Flood - 105W, 11000lumen	380,984	6,308,377	7	117	0
Flood Light	Flood - 105W, 11000lumen	380,991	6,308,379	7	108	0
Flood Light	Flood - 105W, 11000lumen	380,997	6,308,381	7	114	0
Flood Light	Flood - 105W, 11000lumen	381,004	6,308,383	7	107	0
Flood Light	Flood - 105W, 11000lumen	381,011	6,308,385	7	107	0
Flood Light	Flood - 105W, 11000lumen	381,017	6,308,387	7	113	0
Flood Light	Flood - 105W, 11000lumen	381,024	6,308,389	7	115	0
Flood Light	Flood - 105W, 11000lumen	381,031	6,308,391	7	118	0
Flood Light	Flood - 105W, 11000lumen	381,037	6,308,394	7	128	0
Flood Light	Flood - 105W, 11000lumen	381,044	6,308,396	7	117	0
Flood Light	Flood - 105W, 11000lumen	380,928	6,308,356	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,929	6,308,349	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,930	6,308,342	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,931	6,308,335	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,932	6,308,328	7	0	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Flood Light	Flood - 105W, 11000lumen	380,934	6,308,322	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,935	6,308,315	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,936	6,308,308	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,937	6,308,301	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,938	6,308,294	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,939	6,308,287	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,940	6,308,280	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,942	6,308,273	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,943	6,308,266	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,944	6,308,259	7	0	0
Flood Light	Flood - 105W, 11000lumen	381,000	6,308,462	7	284	0
Flood Light	Flood - 105W, 11000lumen	381,047	6,308,473	7	281	0
Flood Light	Flood - 105W, 11000lumen	381,085	6,308,477	7	254	0
Flood Light	Flood - 105W, 11000lumen	381,123	6,308,451	7	214	0
Flood Light	Flood - 105W, 11000lumen	381,133	6,308,390	7	174	0
Flood Light	Flood - 105W, 11000lumen	381,106	6,308,352	7	135	0
Flood Light	Flood - 105W, 11000lumen	381,072	6,308,343	7	101	0
Flood Light	Flood - 105W, 11000lumen	381,030	6,308,349	7	71	0
Street Light	20500lm - VST-E07-LED-E-	380,972	6,308,533	7	282	0
Street Light	20500lm - VST-E07-LED-E-	381,300	6,308,264	7	279	0
Street Light	20500lm - VST-E07-LED-E-	381,110	6,308,232	7	280	0
Street Light	20500lm - VST-E07-LED-E-	381,573	6,308,061	7	212	0
Wall Pack	102W - XTOR12B	381,239	6,308,410	2.5	100	0
Wall Pack	102W - XTOR12B	381,260	6,308,414	2.5	97	0
Wall Pack	102W - XTOR12B	381,292	6,308,420	2.5	100	0
Wall Pack	102W - XTOR12B	381,296	6,308,415	2.5	12	0
Wall Pack	102W - XTOR12B	381,301	6,308,390	2.5	9	0
Wall Pack	102W - XTOR12B	381,300	6,308,385	2.5	280	0
Wall Pack	102W - XTOR12B	381,283	6,308,382	2.5	276	0
Wall Pack	102W - XTOR12B	381,265	6,308,379	2.5	279	0
Wall Pack	102W - XTOR12B	381,264	6,308,374	2.5	277	0
Wall Pack	102W - XTOR12B	381,262	6,308,374	2.5	278	0
Wall Pack	102W - XTOR12B	381,259	6,308,373	2.5	278	0
Wall Pack	102W - XTOR12B	381,249	6,308,371	2.5	278	0
Wall Pack	102W - XTOR12B	381,243	6,308,370	2.5	276	0
Wall Pack	102W - XTOR12B	381,242	6,308,375	2.5	281	0
Wall Pack	102W - XTOR12B	381,275	6,308,417	2.5	102	0
Wall Pack	102W - XTOR12B	381,233	6,308,404	2.5	193	0
Wall Pack	102W - XTOR12B	381,238	6,308,379	2.5	188	0
Wall Pack	102W - XTOR12B	381,298	6,308,363	2.5	358	0

Table B-2 Characteristics of Light Fixtures - MacLellan Site

Fixture Type	Fixture ID	Location - UTM Coordinates		Height (m)	Orientation (degrees)	Tilt (degrees)
		Easting (m)	Northing (m)			
Wall Pack	102W - XTOR12B	381,300	6,308,353	2.5	17	0
Wall Pack	102W - XTOR12B	381,295	6,308,347	2.5	12	0
Wall Pack	102W - XTOR12B	381,297	6,308,335	2.5	8	0
Wall Pack	102W - XTOR12B	381,285	6,308,331	2.5	278	0
Wall Pack	102W - XTOR12B	381,282	6,308,362	2.5	102	0
Wall Pack	102W - XTOR12B	381,266	6,308,359	2.5	195	0
Wall Pack	102W - XTOR12B	381,268	6,308,347	2.5	186	0
Wall Pack	102W - XTOR12B	381,269	6,308,343	2.5	192	0
Wall Pack	102W - XTOR12B	381,271	6,308,330	2.5	194	0
Flood Light	Flood - 105W, 11000lumen	380,940	6,308,220	7	11	0
Flood Light	Flood - 105W, 11000lumen	380,940	6,308,208	7	335	0
Flood Light	Flood - 105W, 11000lumen	380,966	6,308,225	7	188	0
Flood Light	Flood - 105W, 11000lumen	380,976	6,308,219	7	241	0
Flood Light	Flood - 105W, 11000lumen	380,916	6,308,401	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,923	6,308,402	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,930	6,308,403	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,937	6,308,405	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,944	6,308,406	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,951	6,308,407	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,958	6,308,408	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,964	6,308,409	7	0	0
Flood Light	Flood - 105W, 11000lumen	380,971	6,308,410	7	0	0
Wall Pack	102W - XTOR12B	412,035	6,307,337	2.5	246	0
Wall Pack	102W - XTOR12B	411,985	6,307,357	2.5	251	0
Wall Pack	102W - XTOR12B	411,969	6,307,363	2.5	247	0
Wall Pack	102W - XTOR12B	412,000	6,307,438	2.5	69	0
Wall Pack	102W - XTOR12B	412,015	6,307,432	2.5	67	0

Appendix C LIGHT PREDICTIONS

Table C-1 Predicted Light Levels at Individual Receptor Locations

Individual Receptor ID	Light Trespass (lux)	Glare (cd)
50	0	0
51	0.0001	0
52	0	0
53	0.0001	0
54	0.0001	0
55	0	0
56	0	0
57	0.0002	0
58	0.0001	0
59	0	0
60	0.0001	0
61	0	0
62	0	0
63	0	0
64	0.0001	0
65	0.0005	0
66	0.0003	0
67	0.0006	0
68	0	0
69	0	0
70	0	0
71	0.0005	0
72	0.0004	0
73	0.0007	0
74	0	0
75	0.0001	0
76	0.0004	7
77	0.0013	8
78	0.0002	0
79	0.0027	0
80	0	0
81	0.0003	0
82	0	0
83	0	0
84	0	0
85	0.0002	13
86	0.0001	0
101	0	0
104	0	0
105	0.0013	0
106	0	0
109	0	0
110	0	0
111	0	0

Table C-1 Predicted Light Levels at Individual Receptor Locations

Individual Receptor ID	Light Trespass (lux)	Glare (cd)
112	0	0
114	0	0
116	0	0
117	0	0
118	0.0017	0
119	0.0024	0
120	0.0019	0
121	0.0003	0
122	0.0021	0
123	0.0009	0
124	0	0
131	0.0002	0
132	0.0004	0
133	0.0017	0
134	0.0007	0
135	0.0003	0
153	0	0
154	0	0
155	0	0
156	0.0004	0
162	0	0
168	0	0

Lynn Lake Gold Project, Noise and Vibration Impact Assessment

Technical Modelling Report

April 7, 2020

Prepared for:

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111473008

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Abbreviations

%HA	percent highly annoyed
Alamos	Alamos Gold Inc.
C	confinement constant
D	distance from equipment to receptor
dB or dBL or dBZ	linear (unweighted) decibel sound level
dBA	a-weighted decibel sound level
dBC	c-weighted decibel sound level
EA	Environmental Assessment
EIS	Environmental Impact Statement
FTA	Federal Transit Administration
ID	identification
km	kilometres
L	Litre
LAA	Local Assessment Area
L_d	daytime equivalent sound level
L_{dn}	day-night average sound level
$L_{dn, adjusted}$	day-night average sound level with adjustments made for certain characteristics of sound such as expectation of “peace and quiet”, tonality, or impulsiveness
L_{eq}	equivalent sound level
$L_{eq, 1hr}$	one-hour equivalent sound level
LFN	low frequency noise
LLGP	Lynn Lake Gold Project

L_n	nighttime equivalent sound level
$L_{v\ distance}$	root mean square velocity level adjusted for distance
$L_{v\ ref}$	source reference vibration level at 25 feet
m	metre
m^3	cubic metre
mm	millimetre
ms	milliseconds
mm/s	metres per second
MECP	Ontario Ministry of Environment, Conservation and Parks
MNL	mitigation noise level
MRSA	Mine rock storage area
PDA	Project Development Area
PPV	peak particle velocity
PWL	sound power level
RAA	Regional Assessment Area
rms	root mean square
s	second
SLM	sound level meter
TDR	Technical Data Report
the Project	Lynn Lake Gold Project
TMF	Tailings Management Facility
VdB	vibration velocity in decibel scale
W	highest weight of explosives fired per delay
WHO	World Health Organization

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: The 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open-pit gold mines at both of these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Noise and Vibration Impact Assessment has been completed to fulfill a requirement of the "Guidelines for the Preparation of an Environmental Impact Statement" (2017) pursuant to the *Canada Environmental Assessment Act* (2012) for the LLGP. The assessment provides an overview of the existing conditions in the Project area and identifies the changes in noise and vibration levels at key receptor locations for the Project to determine potential residual and cumulative changes to noise and vibration for the Environmental Impact Statement (EIS).

The noise and vibration modelling focused on two Project phases: construction and operation. Noise and vibration in the decommissioning/closure phase are expected to be similar to, but less than, in the construction phase because the equipment and activities required will be similar in nature but less in quantity. Modelling also focused on the Project noise and vibration effect on humans outside the Project Development Area (PDA). A total of 42 noise receptors were identified outside the PDA. These receptors included Indigenous communities, potential indigenous receptor areas, permanent and seasonal residences, places of worship, recreation area, school, and hospital.

The noise model considered noise emission from mobile and stationery equipment during construction and operation activities at both Gordon site and MacLellan site. Mobile equipment included the trucks moving around the Project area (e.g., haul trucks, loaders, excavators). Stationery equipment included the processing equipment (e.g.., crushers, mills, pumps, compressors).

The vibration model considered mobile equipment induced ground-borne vibration effect on human habitats and structures during the construction phase. In the operation phase, the model considered open pit production blast-induced ground vibration and air blast overpressure effects on human habitats and structures.

This report is presented in eight sections. Section 1 is the introduction and Section 2 examines the local and regional settings, including receptor locations. Section 3 summarizes the regulatory framework used for the modelling. Section 4 presents the baseline conditions and Section 5 explains the model approach. Section 6 presents the modelling results. Concluding remarks are provided in Section 7 and references cited are listed in Section 8.

2.0 ASSESSMENT AREA AND RECEPTORS

2.1 PROJECT DEVELOPMENT AREA (PDA)

The Project Development Area (PDA) encompasses the immediate area in which Project activities and components may occur plus a 30 m buffer and is the anticipated area of direct physical disturbance associated with construction and operation of the Project (i.e., the Project footprint). The PDA includes the access roads, the open pits, mine rock storage areas, overburden stockpiles, and ore stockpiles at the Gordon and MacLellan sites; and the Tailings Management Facility (TMF) and ore milling and processing plant at the MacLellan site. The PDA does not include Provincial Road 391 (PR 391) that connects the Gordon and MacLellan sites. The extent of the PDA at the Gordon site and MacLellan site is shown on Map 1 and Map 2, respectively.

2.2 LOCAL ASSESSMENT AREA (LAA) AND REGIONAL ASSESSMENT AREA (RAA)

The Local Assessment Area (LAA) includes an area extending two kilometres (km) out from the PDA and the section of PR 391 between the Gordon and MacLellan access roads. The LAA is the area Project-specific environmental effects on noise and vibration can be predicted or measured with a reasonable degree of accuracy and confidence.

The Regional Assessment Area (RAA) represents the area within which cumulative effects on noise and vibration effects are likely to occur, depending on the location of other existing, approved, or planned developments. The RAA is defined as an area extending five km out from the PDA and the section of PR 391 between the Gordon and MacLellan access roads.

The extent of the LAA and RAA at the Gordon site and MacLellan site is shown on Map 1 and Map 2, respectively.

The noise modelling domain of 15 km x 25 km is used for the Gordon site. The noise modelling domain of 19 km x 19 km is used for the MacLellan site. The noise model domain includes both the LAA and RAA.

2.3 RECEPTORS

The selection of noise and vibration receptors outside the Project PDA is based on the Health Canada noise guidance. Receptors include:

- Indigenous communities
- Potential indigenous receptor area
- Permanent and seasonal residences
- Places of worship

- Recreation areas
- School
- Hospital.

The noise and vibration receptors for the Gordon site and MacLellan Site are summarized in Table 2-1 and Table 2-2, respectively. These receptors at the Gordon site and MacLellan site are shown on Map 1 and Map 2, respectively.

Table 2-1 Noise and Vibration Receptors – Gordon Site

Receptor ID	Description	UTM Easting	UTM Northing
59	Potential Indigenous Receptor	411326	6299050
61	Potential Indigenous Receptor	407246	6297860
62	Potential Indigenous Receptor	404260	6295677
72	Potential Indigenous Receptor	413807	6304727
73	Potential Indigenous Receptor	414701	6306763
74	Potential Indigenous Receptor	415713	6309172
76	Potential Indigenous Receptor	413079	6309406
77	Potential Indigenous Receptor	409795	6307422
93	Black Sturgeon Reserve Residence	405720	6297720
101	Black Sturgeon Reserve Residence	405437	6298012
104	Remote Cottage	400748	6295006
126	Recreation Lot	404567	6296539
130	Remote Cottage	404909	6296537
131	Remote Cottage	410520	6303728
132	Trapper Cabin	413593	6304211
139	Park Vacation Home	404912	6296550

Table 2-2 Noise and Vibration Receptors - MacLellan Site

Receptor ID	Description	UTM Easting	UTM Northing
66	Potential Indigenous Receptor	384540	6298768
67	Potential Indigenous Receptor	385862	6301026
68	Potential Indigenous Receptor	383310	6302137
69	Potential Indigenous Receptor	390169	6304646
78	Potential Indigenous Receptor	390569	6306510
79	Potential Indigenous Receptor	388472	6297663
81	Potential Indigenous Receptor	387332	6302850
82	Potential Indigenous Receptor	385174	6306484

Table 2-2 Noise and Vibration Receptors - MacLellan Site

Receptor ID	Description	UTM Easting	UTM Northing
83	Potential Indigenous Receptor	388163	6310354
84	Potential Indigenous Receptor	385216	6312748
85	Potential Indigenous Receptor	381162	6311003
86	Potential Indigenous Receptor	377971	6306944
105	Remote Cottage	387607	6298665
115	Museum Site	375014	6302733
116	Communication Site	376000	6303558
121	Recreation Lot	375124	6308103
123	Potential Indigenous Receptor [1]	376617	6308656
135	Park Vacation Home	376478	6308281
163	Lynn Lake Friendship Center	375787	6301800
166	Lynn Lake Gospel Church	375309	6303205
169	Lynn Lake Library	375219	6302737
172	West Lynn Lake High School	375129	6302766
173	Lynn Lake Hospital	374770	6302635
177	Lynn Lake Residence	375423	6303359
178	Lynn Lake Residence	375653	6303322
225	Lynn Lake Residence	375648	6303243

Note:
[1] This receptor location was a youth camp, but the status is unknown because there were reports of a fire. It is unclear if the camp will be operational in the future

Health Canada noise guidance recommends the assessment of noise impacts such as sleep disturbance on off-duty workers residing in or near the Project area. As a result, the temporary and permanent work camp has been included as additional noise sensitive receptors in the context of sleep disturbance.

3.0 REGULATORY FRAMEWORK

3.1 NOISE

Environmental noise typically varies over time. To account for this variation, a single number descriptor known as the energy equivalent sound level (L_{eq}) is used. It is defined as the steady, continuous sound level over that specified time that has the same acoustic energy as the actual varying sound levels over the same time. The unit for L_{eq} is A-weighted decibel level (dBA). dBA is a logarithmic measurement unit where the recorded sound has been filtered using the “A” frequency weighting scale. A-weighting somewhat mimics the response of the human ear to sounds at different frequencies. Unweighted or linear sound level measurement unit without the A-weighted filter are denoted by dB, dBL, or dBZ.

For a summary of acronyms and additional details on commonly used noise terminology, refer to Appendix A.

3.1.1 Provincial Guideline

The Manitoba Guidelines for Sound Pollution prepared by the Environmental Management Division provides environmental sound level objectives for the assessment of noise in the outdoor environment. The highest desirable level for residential areas is 55 dBA during the daytime (7:00 AM to 10:00 PM) and 45 dBA during the nighttime (10:00 PM to 7:00 AM).

3.1.2 Federal Guidance

Health Canada's Useful Information for Environmental Assessments document (Health Canada 2017) provides noise targets for annoyance, sleep disturbance, and low-frequency noise effects. Health Canada's approach to noise assessment is based on a number of international standards and technical publications. The technical standards and publications referenced in the Health Canada document can be used as guidance for assessments. Noise sensitive receptor locations are based on Health Canada noise guidance as presented in Section 2.3.

3.1.2.1 Annoyance Targets

The Health Canada Noise Guidance (Health Canada 2017) uses daytime or nighttime equivalent sound levels (L_d and L_n, respectively), day-night average sound levels (L_{dn}), adjusted day-night average sound levels ($L_{dn, adjusted}$), and percent highly annoyed (%HA) to quantify noise effects for activities with a duration of more than 12 months.

The daytime sound level (L_d) is a 15-hour time average over the daytime period from 7:00 AM to 10:00 PM. The nighttime sound level (L_n) is a 9-hour time average over the nighttime period from 10:00 PM to 7:00 AM. The day-night average sound level (L_{dn}) is a 24-hour time-averaged L_{eq}, with a 10-dB penalty applied to nighttime hours. The adjusted day-night average sound level ($L_{dn, adjusted}$) is day-night average sound level with adjustments made for certain characteristics of sound such as expectation of "peace and quiet", tonality, or impulsiveness.

Receptors in rural areas could be considered to have a greater expectation of "peace and quiet" (i.e., quiet rural areas) than in urban areas. The Health Canada Noise Guidance considers a "quiet rural area" to be a rural area with L_{dn} due to human-made sounds to be below 45 dBA. A receptor with an existing sound level of 45 dB L_{dn} or less is considered as a quiet rural area. Due to the expected heightened sensitivity to noise, existing levels in quiet rural areas are adjusted by adding 10 dB. This +10-dB adjustment also applies to the predicted Project noise levels in determining percent highly annoyed (%HA). The effect of this +10-dB adjustment in quiet rural areas is to produce a greater change in %HA than would occur with unadjusted noise levels. The exponential relationship between %HA and noise levels produces increasingly larger changes in %HA for equal increases in Project noise, compared to the baseline level.

Impulsive and tonal characteristics of source noise are accounted for in the %HA calculations because their presence can increase annoyance. If the change in %HA is exceeded, effects are considered to be of concern and may require mitigation.

Health Canada Noise Guidance recommends the highest increase for change in %HA is 6.5% at a receptor for Project activities with a duration of more than one year. If the change in %HA exceeds 6.5%, effects are of concern and may require mitigation. Health Canada also recommends mitigation of Project noise if it exceeds L_{dn} of 75 dBA at a receptor, even if the change in %HA does not exceed 6.5%.

For activities less than 12 months, Health Canada noise guidance considers the mitigation noise level (MNL) to assess noise effect. The MNL was used as a target for noise effects related to short-term construction activities such as pile driving. The MNL of 47 dBA (L_{dn}) for a quiet suburban or rural community is applicable. Various correction factors can be applied to the MNL, depending on construction duration, noise source characteristics, and seasonality. The correction factors that can be applied to the basic MNL are as follows:

- Construction activities less than two months, +10 dB L_{dn} correction.
- Negligible tonal or impulsive noise, + 5 dB L_{dn} correction.
- Winter season construction, +5 dB L_{dn} correction.

3.1.2.2 Sleep Disturbance

Health Canada noise guidance references the guidelines and recommendations of the World Health Organization (WHO) Guidelines for Community Noise (WHO 1999) and Night Noise Guidelines for Europe (WHO 2009) regarding sleep disturbance. The WHO (1999) recommends a target for sleep disturbance as being an indoor sound level of no more than 30 dBA L_{eq} for continuous noise during the sleep period.

The indoor sound level is affected by the outdoor-to-indoor sound transmission of a building structure. Health Canada noise guidance recommends that an outdoor-to-indoor sound transmission loss with windows at least partially open is 15 dBA and fully closed windows are assumed to reduce outdoor sound levels by approximately 27 dBA. However, the outdoor-to-indoor sound transmission loss could vary between different building construction for receptors outside the PDA. More recently, the WHO (2009) has published nighttime noise guidelines that are intended to protect the public, including the most vulnerable groups, from adverse health effects associated with sleep disturbance due to nighttime noise. The recommended annual average is 40 dBA L_n outdoors. The outdoor nighttime annual sound level of 40 dBA was used as the sleep disturbance noise target for all receptors outside the PDA in the noise model.

Health Canada noise guidance recommends the assessment of noise impacts such as sleep disturbance on off-duty workers residing in or near the Project area, with consideration of mitigation measures in the design of living quarters for workers to limit noise. As a result, the temporary and permanent work camps were included as noise receptors in the context of sleep disturbance effects. The outdoor-to-indoor sound transmission loss of the work camp can be estimated by the camp construction information. The WHO (1999) indoor sound level of 30 dBA was used as the target for sleep disturbance effects at the work camp.

3.1.2.3 Low Frequency Noise

Sounds with strong low frequency noise (LFN) content may result in noise-induced rattles within buildings, resulting in greater annoyance. As a target for the LFN issue, Health Canada noise guidance recommends that the energy sum of the linear sound levels in the 16, 31.5 and 63-Hz octave bands at a receptor location not exceeding 70 dBL.

3.2 VIBRATION

Manitoba does not have provincial guidelines for vibration. Provincially, the Ontario Ministry of Environment, Conservation, and Park (MECP) provides guidance on blast-related vibration which is referenced herein in absence of Manitoba guidance. Federally, the Health Canada Noise Guidance (Health Canada 2017) provides guidance on blast related vibration.

For non-blast-related construction activities, there is no available Manitoba or federal construction vibration guidance for remote locations or smaller population centers. As published codes and guidance for non-blast-related vibration levels are limited, the United State Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual (FTA 2018) is referenced for ground-borne vibration target.

3.2.1 MECP Guidance

In blasting activity, the explosive energy is intended to break hard rock. However, some energy travels beyond the intended work zone through the ground. The ground vibration level in this model is defined in terms of peak particle velocity (PPV) and is measured in mm/s, representing the highest instantaneous positive or negative peak of the vibration signal. Blast energy that liberates into the atmosphere generates air overpressure. Air overpressure is the additional pressure above normal atmospheric pressure that is generated from a blast and is measured in decibels (dBL).

The MECP Guidelines on Information Required for the Assessment of Blasting Noise and Vibration (MECP 1985) guidance recommends the following vibration targets:

- Standard targets – ground vibration of 12.5 mm/s and air overpressure of 128 dBL.
- Cautionary targets – ground vibration of 10 mm/s and air overpressure of 120 dBL.

The cautionary targets of 10 mm/s and 120 dBL are the most conservative blast-related vibration targets in this assessment. These targets will be applied to all receptors outside the PDA.

3.2.2 Health Canada Guidance

Health Canada only provides threshold for air overpressure effect. The guidance recommends that little or no public annoyance is expected to result from any number of daytime sonic booms per day, if their measured or predicted peak value is below 125-10 log N (dBL), where N is number of blasts per day. For one blast per day, the limit is 125 dBL. At receptor inside the PDA such as the Permanent Work Camp, the Health Canada overpressure target of 125 dBL will be used.

3.2.3 FTA 2018 Guidance

The Federal Transit Administration (FTA) provides guidance on structural damage threshold due to vibration effects from mobile and stationery heavy equipment. Structural damage targets for ground-borne vibration are expressed in terms of PPV levels in mm/s. Structural damage target at a residential building due to ground-borne vibration effect is the PPV of 5 mm/s for non-engineered timber and masonry buildings.

Ground-borne vibration related to human annoyance is related to root mean square (rms) velocity levels, expressed in VdB. The annoyance target for frequent ground-borne vibration is 72 VdB.

4.0 BASELINE CONDITIONS

The baseline conditions for receptors allows a characterization of the interaction between the Project noise and vibration effect and the existing environment.

4.1.1 Noise

An understanding of the baseline noise environment within the Project area is required to assess the effect of noise resulting from the Project.

4.1.1.1 Baseline Noise Survey

A baseline noise field survey in the Project area was conducted in 2015. Details were provided in the "Lynn Lake Gold Project (LLGP): Acoustic Baseline Technical Data Report" (Stantec Consulting Ltd. 2017). Following from a request made by the Canadian Environmental Assessment Agency (now the Impact Assessment Agency of Canada), on account of the passage of time since the completion of the 2015 noise survey, an Acoustic Baseline Validation Report was completed (Stantec 2020), which outlines the validation process for the survey. As there have been no new substantial sources of noise (e.g., commercial, residential or industrial) added to the Town of Lynn Lake or the surrounding area since 2015, the 2015 survey thereby provides an understanding of the acoustic environment in the Project area and the surrounding environment. The baseline data gathered are sufficient to form an understanding of current acoustic conditions, and no additional baseline surveys are required.

The purpose of the noise baseline survey was to quantify the baseline sound levels at noise-sensitive receptors that were close to the Project area to establish baseline conditions against which potential Project effects could be evaluated in the environmental assessment.

Three locations (referred to as NM1, NM2, and NM3) were selected to monitor the existing noise level for five days (Map 1). Location NM1 was at a cottage adjacent to Burge Lake, west of the MacLellan site (NM1). NM2 was located at a remote site south of the Gordon site. NM3 was within the Black Sturgeon Reserve. Map 1 shows noise monitoring locations within the RAA.

Three Type 1 integrating sound level meters (SLMs) meeting the ANSI S1.43-1997 standard were used for measuring ambient noise. The equipment used comprised Brüel and Kjær® 2250 (B&K 2250) Type 1 SLM and Type 4952 outdoor microphone and preamp. Each SLM was enclosed in an individual weather-proof hard case and powered by an external battery for overnight continuous unattended monitoring. The outdoor microphones were set up on a tripod at a height of 1.5 m and connected to the SLM using an extension cable. Each SLM collected the following data:

- One-minute integrated A-weighted overall sound levels ($L_{eq,\ 1min}$) in dBA.
- One-minute integrated linear sound levels at One Third Octave Band Frequency (L_{eq}) in dB.
- Continuous audio sound recording for the duration of the field survey.

Each SLM was laboratory-calibrated within the previous 24 months as recommended in other provincial noise guidelines (AUC 2019 and BC OGC 2018). A portable field calibrator, Brüel and Kjær® Type 4231, was used to calibrate the SLMs immediately before and after each measurement series and after changes in equipment conditions (e.g., cable or battery replacement).

The data from the field study were analyzed to identify noise sources for each monitoring period such as natural sounds and local activities. Data that were not representative of normal site activity (i.e. animals and birds interfering with SLM, Stantec staff) or non-representative weather conditions (i.e. rain and high wind speed more than 15 km/hr) were isolated from the data set prior to the calculation of averages or other statistical values. Filtered hourly ($L_{eq,\ 1hr}$), daytime (L_d), and nighttime (L_n) equivalent sound levels were then calculated for the measurement period. There were 92, 85, and 70 hours of monitoring at NM1, NM2, and NM3, respectively.

Measured data that are not typical of ambient sound levels were excluded from the measurements. Invalid data generally includes periods with non-representative weather conditions (e.g., rain precipitation and high wind), which are typically associated with excessive sound level recordings. This approach of isolating non-representative events is considered reasonable and results in a lower baseline sound level or quieter existing acoustic environments. Consistent with environmental assessment principles, this is a conservative approach.

The average daytime and nighttime sound level (L_d and L_n) monitoring results are summarized in Table 4-1.

Table 4-1 Daytime and Nighttime Sound Level at Baseline Monitoring Locations

Monitoring Location	Description	Daytime Sound Level, L_d (dBA)	Nighttime Sound Level, L_n (dBA)	Day-Night Average Sound Level, L_{dn} (dBA)
NM1	Burge Lake Provincial Park	40.6	35.2	42.9
NM2	Gordon Site	34.3	33.4	40.0
NM3	Black Sturgeon Reserve	39.4	37.9	44.6

Location NM1 is representative of a rural area with dominant noise sources from residents' activities, local traffic, watersport and recreational activities, occasional aircraft flyovers, vegetation rustling, wildlife, insects, and water ripple noise. The average L_d and L_n values are 40.6 dBA and 35.2 dBA, respectively.

The L_d values are higher than the L_n values. This is due to residential, watersport, and recreational activities occurring at Burge Lake Provincial Park, which occur mostly during the daytime periods. During the nighttime period, the acoustic environment is quieter, characterized by occasional wildlife calling and the dawn chorus around sunrise. The NM1 results provide a baseline acoustic environment for the residences along the lake shores in Burge Lake Provincial Park during the summer season.

Location NM2 is representative of a remote area with limited human activity. The dominant noise sources observed during the field survey at NM2 included wildlife, birds, insects, occasional aircraft flyovers, vegetation rustling, and wind noise. The average daytime L_d and nighttime L_n values are 34.3 dBA and 33.4 dBA, respectively. There was limited human activity recorded during the measurement period other than the Stantec study team personnel setting up the acoustic environment monitoring equipment and two vehicle pass-by events, that were isolated from the L_d and L_n calculations. Therefore, NM2 results provide a baseline characterization of the acoustic environment in remote areas within the RAA during the summer season.

Location NM3 is representative of a sparsely populated area with frequent noise events from the residents, children, domestic animals, birds, and insects. The average L_d and L_n values are 39.4 dBA and 37.9 dBA, respectively. The acoustic environment is dominated by residential and recreational activities during the daytime and earlier part of the nighttime period (due to longer daylight hours), occasional dog barking, wildlife calling, and dawn bird chorus during sunrise. The NM3 results provide a baseline characterization of the acoustic environment for the residential area within the Black Sturgeon Reserve during the summer season.

4.1.1.2 Estimated Baseline Sound Levels

While the standard approach for baseline sound determinations is direct measurement, there may be situations where baseline measurement data are not available. Health Canada Noise Guidance (Health Canada 2017) provide alternative approaches to estimating baseline levels based on qualitative descriptions and population density, as shown in Table 4-2.

Table 4-2 Health Canada Estimate Baseline Sound Levels

Community Type	Population Density (person per square km)	Estimated Baseline Sound Level, L_{dn} (dBA)
Quiet Rural - dwelling units more than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers	28	≤ 45
Quiet Suburban Residential - remote from large cities, industrial activity and trucking	249	48 to 52
Normal Suburban Residential - not immediately adjacent to heavily travelled roads and industrial areas	791	53 to 57

4.1.1.3 Baseline Sound Level

The Health Canada noise guidance recognizes that both measurements and estimates are acceptable methods in establishing the baseline sound levels for receptors. The baseline sound level at the receptors can be estimated from two data sources.

The first data source uses the measurement results from the baseline monitoring program. The baseline sound level at some of the receptors is based on the results from one of the three monitoring locations, due to the proximity to the measurement location or similar acoustic environment (i.e., remote locations). The results at the three monitoring locations (NM1, NM2, and NM3) can be used to represent the existing sound level at some of the receptors. The baseline sound level at the recreation lot, youth camp, and park vacation home near Burge Lake are represented by the monitoring results from NM1. Potential indigenous receptors (e.g., trap lines, trapping areas, and fishing camps), trapper cabin, remote cottages, and recreation lot are in a remote area. The baseline sound level at these locations are represented by the monitoring results from NM2. Receptor locations within the Black Sturgeon Reserve are represented by monitoring results from NM3.

The second data source uses the estimated baseline sound level for different communities recommended in the Health Canada noise guidance for a receptor location. Baseline sound levels at receptors located in the community of Lynn Lake were based on levels advised in Health Canada noise guidance for quiet rural communities (i.e., population density of 28 per square km). The Health Canada quiet rural community baseline sound level is 45 dBA L_d and 35 dBA L_n (or L_{dn} of 45 dBA). This actual baseline sound level is likely to be higher because the population density at Lynn Lake is more than 28 per square km. However, the quieter baseline sound level is considered a more conservative approach.

The baseline sound level at each receptor is listed in Table 4-3 and Table 4-4 for the Gordon site and MacLellan site, respectively. The baseline sound levels selected for each receptor represents the existing acoustic environment, based on available information from the noise survey and Health Canada Noise Guidance (Health Canada 2017). These values were used in the assessment of %HA target for annoyance.

Table 4-3 Receptor Baseline Sound Level – Gordon Site

Receptor ID	Description	Daytime Sound Level, L_d (dBA)	Nighttime Sound Level, L_{dn} (dBA)	Day-Night Sound Level, L_{dn} (dBA)	Based on Monitoring Location
59	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
61	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
62	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
72	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
73	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
74	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
76	Potential Indigenous Receptor	34.3	33.4	40.0	NM2

Table 4-3 Receptor Baseline Sound Level – Gordon Site

Receptor ID	Description	Daytime Sound Level, L_d (dBA)	Nighttime Sound Level, L_{dn} (dBA)	Day-Night Sound Level, L_{dn} (dBA)	Based on Monitoring Location
77	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
93	Black Sturgeon Reserve Residence	39.4	37.9	44.6	NM3
101	Black Sturgeon Reserve Residence	39.4	37.9	44.6	NM3
104	Remote Cottage	34.3	33.4	40.0	NM2
126	Recreation Lot	34.3	33.4	40.0	NM2
130	Remote Cottage	34.3	33.4	40.0	NM2
131	Remote Cottage	34.3	33.4	40.0	NM2
132	Trapper Cabin	34.3	33.4	40.0	NM2
139	Park Vacation Home	34.3	33.4	40.0	NM2

Table 4-4 Receptor Baseline Sound Level – MacLellan Site

Receptor ID	Description	Daytime Sound Level, L_d (dBA)	Nighttime Sound Level, L_{dn} (dBA)	Day-Night Sound Level, L_{dn} (dBA)	Based on Monitoring Location or Health Canada [1]
66	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
67	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
68	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
69	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
78	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
79	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
81	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
82	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
83	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
84	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
85	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
86	Potential Indigenous Receptor	34.3	33.4	40.0	NM2
105	Remote Cottage	34.3	33.4	40.0	NM2
115	Museum Site	45.0	35.0	45.0	Health Canada
116	Communication Site	45.0	35.0	45.0	Health Canada
121	Recreation Lot	40.6	35.2	42.9	NM1
123	Potential Indigenous Receptor [2]	40.6	35.2	42.9	NM1
135	Park Vacation Home	40.6	35.2	42.9	NM1
163	Lynn Lake Friendship Center	45.0	35.0	45.0	Health Canada
166	Lynn Lake Gospel Church	45.0	35.0	45.0	Health Canada
169	Lynn Lake Library	45.0	35.0	45.0	Health Canada
172	West Lynn Lake High School	45.0	35.0	45.0	Health Canada
173	Lynn Lake Hospital	45.0	35.0	45.0	Health Canada
177	Lynn Lake Residence	45.0	35.0	45.0	Health Canada
178	Lynn Lake Residence	45.0	35.0	45.0	Health Canada
225	Lynn Lake Residence	45.0	35.0	45.0	Health Canada

Note:

[1] Baseline sound levels at receptors located in the community of Lynn Lake were based on levels advised in Health Canada noise guidance for quiet rural communities

[2] This receptor location was a youth camp, but the status is unknown because there were reports of a fire. It is unclear if the camp will be operational in the future

4.1.2 Vibration

In contrast to audible noise, the background environmental ground-borne vibration levels in an outdoor rural area without local human activities is typically below the threshold of human perception (FTA 2018). The typical threshold of human perception of ground vibration is 0.5 mm/s PPV (ISEE 2011); however, the perceptibility threshold varies from person to person. In an urban and suburban environment, a person may be subjected to a wide range of vibration effects depending on the location, time of the day, proximity to day-to-day vibration sources (e.g., vehicle, train, construction activities).

The FTA noise and vibration guideline (FTA 2018) recommends that background vibration velocity level in residences is usually 50 VdB or lower, and the threshold of perception for humans is approximately 65 VdB.

Vibration targets are applicable to individual events or occurrences only and do not consider existing vibration levels. The vibration model is therefore based on comparing the effects from Project only events (e.g., blasting) to the targets. The effect from background vibration level or cumulative vibration level from another event is typically not included. Therefore, a vibration baseline study for the existing condition was not performed.

5.0 MODEL APPROACH

The following list outlines the noise model approach. Stantec conducted the following tasks:

1. Conducted noise baseline study at selected locations.
2. Defined the LAA, RAA, and receptors.
3. Established the baseline sound level at the noise receptors.
4. Identified modelling scenarios that will reflect worst case construction and operation in terms of noise emissions.
5. Determined noise emission sources from Project construction and operation activities.
6. Characterized these sources by their sound power levels (PWLs) using manufacturer’s data, acceptable theoretical calculation methods, or similar equipment noise data from an archived database of measurements.
7. Developed an acoustic model for each modelling scenario.
8. Established the sound levels within the LAA and RAA, and at receptors by applying the emission sources in noise models for construction and operation phases.
9. Assessed compliance of the Project by comparing the modelled results to the applicable noise targets (i.e., Health Canada Noise Guidance and Manitoba Noise Guidelines).

10. If the modelled results are in compliance with applicable criteria, the noise effect is considered to be acceptable. Otherwise, mitigation measures are identified by re-modelling to manage the noise effects.

The following list outlines the vibration model approach:

1. Defined the LAA, RAA, and receptors.
2. Predicted the ground-borne vibration effect at the receptors due to construction activities
3. Predicted the air overpressure and ground-borne vibration effects at the receptors due to in-pit blasting
4. Assessed compliance of the Project by comparing the modelled results to the applicable vibration targets (i.e., FTA, Health Canada, and MECP).
5. If the results are in compliance with applicable criteria, the vibration effect is considered to be acceptable. Otherwise, mitigation measures are identified by re-modelling to manage the vibration effects.

5.1 NOISE

5.1.1 Modelling

Noise modelling used the latest version of the Cadna/A® software (DataKustik 2019), which incorporates International Organization for Standardization (ISO) Standard 9613 (ISO 1993, 1996) algorithms. ISO 9613 standards are commonly used by acoustic practitioners for modelling sound propagation and are accepted by Health Canada. The Cadna/A® software model accounts for the following factors:

- Geometric spreading.
- Screening effects.
- Atmospheric absorption.
- Source size, location, and elevation.
- Mild downwind from the Project to the dwelling(s) and or temperature inversion condition.
- Source directivity.

Table 5-1 lists the modelling parameters used in the model.

Table 5-1 Noise Modelling Software Parameters

Item	Model Parameters	Model Setting
1	Temperature	10°C
2	Relative humidity	70%
3	Wind speed	Downwind condition, wind speed of 1 to 5 m/s
4	Noise source	Refer to Section 5.1.2, Section 5.1.3, and Appendix C
7	Noise Propagation Standard	ISO 9613
8	Ground conditions and attenuation factor	• Ground absorption (G) of 0.5 for the Project site and surrounding area with predominantly soil with short grass • Ground absorption (G) of 0 for lake areas
9	Terrain Parameters (terrain resolution)	Ground terrain incorporated in model
10	Reflection parameters	1 order reflection

5.1.2 Construction

Based on the review of the mine plan and equipment list, the time period from the second quarter of Year -2 to the fourth quarter of Year -1 was chosen for modelling of the construction phase at the Gordon site and the MacLellan site because it represents the worst-case scenario of equipment usage during activities such as bulk earth work, pre-production mining activities, and piling activities for the bridge construction over the Keewatin River (MacLellan site) and old diversion channel (Gordon site).

The Project construction phase noise emissions were established using the following information sources:

- Equipment lists, design data, equipment noise ratings provided by Alamos, Q'Pit Inc., and Ausenco Engineering Canada Inc. (Ausenco).
- Measurement data of similar equipment from Stantec acoustic database
- Equipment specifications and referenced formula from acoustic literature (Crocker 2007, Bies and Hansen 2004)
- Publication that provides reference sound power levels and sound pressure levels for common construction equipment (DEFRA 2005).

5.1.2.1 Processing Plant

There is one processing plant at the MacLellan site and no processing plant at the Gordan site. The processing plant construction includes equipment presented in Table 5-2. Details of the equipment sound power levels in full octave band frequency are presented in Appendix B.

Table 5-2 Processing Plant Construction Equipment Summary

Item	Description	Quantity	Sound Power Level (dBA) Per Unit
1	John Deere 700K Dozer	1	108
2	John Deere 850K Dozer	3	111
3	Cat D8 Dozer	2	110
4	Cat D9 Dozer	1	111
5	Cat D7 Dozer	1	108
6	Cat D6 Dozer	1	108
7	Cat 815K Packers	1	100
8	Plate Packers	2	100
9	Packers 15 Ton	3	97
10	Packers 10 Ton	1	104
11	Cat 980h Site Loader	1	109
12	Cat 966h Site Loader	1	108
13	Zoom Boom	1	103
14	Grader	1	109
15	John Deere 135G Excavator	1	98
16	John Deere 220G Excavator	1	99
17	John Deere 300G Excavator	2	104
18	John Deere 400G Excavator	3	106
19	John Deere 850D Excavator	1	107
20	30 Ton Rock Truck	1	108
21	40 Ton Rock Truck	6	117
22	65 Ton Rock Truck	5	119
23	Highway Trucks	4	108
24	Tridem Trailer/Highway Tractor	1	107
25	Water Truck	1	109
26	Powder Truck	1	108
27	Rock Drill	1	114
28	Fusing C-Can	1	101
29	Flushing Equipment	1	91
30	Hammer (John Deere 400 Excavator)	1	115
31	C-Can Buses	5	104

The construction phase noise emissions for the processing plant are based on the following assumptions:

- Worst case scenario is based on the period between Q2 Year -2 and Q4 Year -1.

- Equipment operates 10 hours (6 hours daytime and 4 hours nighttime) during a 24-hour period.
- Equipment operates at 100% capacity.
- Pile driving activities occur at the Keewatin River bridge (MacLellan site) and the old diversion channel (Gordon site) during daytime (7:00 to 22:00).
- Piling activities were assumed to be less than 12 months.
- Active piling is assumed to be 30% of the equipment operating time, with a 12 dB tonality penalty added to noise emissions.
- Back-up alarms are assumed to be 20% of the equipment operating time, with a 5 dB tonality penalty added to noise emissions.

5.1.2.2 Tailing Management Facility

There is one TMF at the MacLellan site and no TMF at the Gordon site. The construction of the TMF includes the equipment presented in Table 5-3. Details of the equipment sound power levels in full octave band frequency are presented in Appendix B.

Table 5-3 Tailing Management Facility Construction Equipment Summary

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Cat D6 Dozer	4	108
2	Cat D7 Dozer	1	108
3	Cat D8 Dozer	2	110
4	Cat 980k Loader	2	109
7	Zoom Boom	2	103
8	Cat 14 m^3 Grader	1	109
9	John Deere 300 Excavator	2	104
10	John Deere 400 Excavator	2	106
11	Articulated Truck 40 Ton	8	117
12	Lowbed	1	119
13	Fuel Truck	2	97
14	Heavy Truck	1	108
15	HVAC Truck	4	107
16	Mechanic Truck	1	107
17	Concrete Mixer Truck	2	108
18	Service Truck	1	107
19	Truck 1/2 Ton	5	106
20	Truck 1 Ton	4	106

Table 5-3 Tailing Management Facility Construction Equipment Summary

Item	Description	Quantity	Sound Power Level (dBA) per unit
21	Crew Van/Bus	1	107
22	Hand Drill	2	112
23	Grout Mixer	1	90
24	3" Minus Pump	1	95
25	6" Pump	2	99
26	Generator 25 kW	2	98
27	Generator 50 kW	2	86
28	Light Plant	1	89
29	Compressor	5	104

The construction phase noise emissions for the TMF are based on the following assumptions:

- TMF construction activities occur during the worst-case scenario within the TMF area at MacLellan site.
- Equipment operates 10 hours (6 hours daytime and 4 hours nighttime) during a 24-hour period.
- Equipment operates at 100% capacity.
- Back-up alarms are assumed to be 20% of equipment operating time, with a 5 dB tonality penalty added to noise emissions.

5.1.2.3 Pre-Production Equipment

Pre-production activities is not related to the construction phase of the Project; however, the activities will occur during the time period for the processing plant and TMF construction. Therefore, the pre-production noise emission is including in the construction phase modelling. The pre-production equipment for the Gordon site includes the equipment presented in Table 5-4. The pre-production equipment for the MacLellan site includes the equipment presented in Table 5-5. Details of the equipment sound power level in full octave band frequency is presented in Appendix B.

Table 5-4 Pre-Production Equipment Summary – Gordon Site

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Excavator Backhoe 65 Ton	3	110
2	Rubber Tire Loader Cat 993	1	116
3	Rubber Tire Loader Wheel Loader 260 KW	1	109
4	Articulated Trucks 38 Ton	6	117
7	Articulated Trucks Primary Trucks 144 Ton	3	121
8	Grader 215 kW	1	109
9	Grader 178 kW	1	108
10	Crawler Dozer 150 kW 20 Ton	1	110
11	Crawler Dozer 264 kW 11 Ton	1	109
12	Crawler Dozer 450 kW 14 Ton	1	115
13	Rubber Tire (Wheel) Dozer 370 kW	1	111
14	Hydraulic Excavator 36 Ton	1	109
15	Diesel (WATER) TRUCK 15 kW	1	108
16	Diesel Rough Terrain Cranes 110 Ton	2	94
17	Diesel Bore/Drill Rigs Blasthole Stemmer	1	95
18	Diesel Trucks On Highway Class 8 Dump Truck	1	108
19	Diesel Trucks Lube & Fuel Truck	1	108
20	Diesel Trucks Field Welding Service Truck	1	104
21	Diesel Trucks Sand Spreader Body	1	106
22	Rubber Tire Loader Wheel Loader 260 kW	1	109
23	Diesel Rough Terrain Forklift (Telescopic) 12 Ton	1	92
24	Diesel Truck Explosives Contractor Equipment	1	105
25	Diesel Truck Crew Change Vehicle	1	104
26	Light Tower Heavy Duty Light Tower	8	89
27	Diesel Light Commercial Pressure Washer Flameless Air Mobile Heater	1	91
28	Diesel Light Commercial Pump Portable 4-Inch Dewatering Pump	1	95
29	Diesel Light Commercial Pump Portable 8-Inch Dewatering Pump	1	99
30	Diesel Truck Mine Pickup Truck	5	106

Table 5-5 Pre-Production Equipment Summary – MacLellan Site

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Excavator Backhoe 65 Ton	2	110
2	Rubber Tire Loader Cat 993	1	116
3	Rubber Tire Loader (Wheel Loader) 260 kW	1	109
4	Articulated Truck 38 Ton	8	117
7	Articulated Truck (Primary Truck) 144 Ton	3	121
8	Grader 215 kW	1	109
9	Grader 178 kW	1	108
10	Crawler Dozer 150 kW 20 Ton	1	110
11	Crawler Dozer 264 kW	2	109
12	Crawler Dozer 450 kW	2	115
13	Rubber Tire Dozer (Wheel Dozer) 370 kW	1	111
14	Hydraulic Excavator 36 Ton	1	109
15	Diesel Truck 15kl Water Truck	1	108
16	Diesel (Rough-Terrain) Crane 110 Ton	1	94
17	Diesel (Rough-Terrain) Crane 90 Ton	1	88
18	Excavators Hydraulic Breaker 36 Ton	1	103
19	Diesel Bore/Drill Rigs Blasthole Stemmer	1	95
20	Diesel Trucks On-Highway Class 8 Dump Truck	2	108
21	Diesel Trucks Lube & Fuel Truck	1	108
22	Diesel Trucks Field Welding Service Truck	1	104
23	Diesel Trucks Sand Spreader Body	1	106
24	Diesel Rough Terrain (Telescopic) Forklift 12 Ton	1	92
25	Diesel Skid Steer Loaders	1	95
26	Diesel Truck Explosives Contractor Equipment	1	105
27	Diesel Truck Crew Change Vehicle	1	104
28	Light Tower Heavy-Duty Light Tower	6	89
29	Diesel Light Commercial Portable Air Compressor 5-6m3	1	104
30	Diesel Light Commercial Pressure Washer Flameless Air Mobile Heater	1	91
31	Diesel Light Commercial Pressure Washer Trailer-Mounted Pressure Washer	1	101
32	Diesel Light Commercial Pump Portable 4-Inch Dewatering Pump	1	95
33	Diesel Light Commercial Pump Portable 8-Inch Dewatering Pump	1	99
34	Diesel Truck Mine Pickup Truck	10	106

The pre-production noise emissions are based on the following assumptions:

- Mobile equipment operates 20 hours (12.5 hours daytime and 7.5 hours nighttime) during a 24-hour period.
- Equipment operates at 100% capacity.
- Stationery equipment (i.e., Temporary Crusher) operates at 100% capacity continuously during 24-hour period.
- Back-up alarms are assumed to be 20% of equipment operating time, with a 5 dB tonality penalty added to noise emissions.

5.1.2.4 Haul Road Traffic

The pre-production haul road traffic within the Gordon site and MacLellan site is presented in Table 5-6 and Table 5-7, respectively. The hourly traffic volume is based on the annual traffic volume. The annual traffic volume is based on annual quantities of transferred material divided by the payload capacity of the haul truck. The annual traffic volume is divided by the actual operating hours per year to estimate the average hourly truck traffic count usage. Therefore, the traffic volume per hour presented in the table is not a round number due to the averaging calculation. Details of the equipment sound power level in full octave band frequency are presented in Appendix B.

Table 5-6 Haul Road Traffic Summary – Gordon Site

Item	Description	Volume (Trucks/hr)	Sound Power Level [1] (dBA)
1	Pit to Ore Stockpile (Articulated Truck 144 Ton)	1.0	121
2	Construction to Waste Area (Articulated Truck 65 Ton)	1.0	119
3	Pit to Waste Area (Articulated Truck 144 Ton)	1.4	121
4	Pit to Overburden (Articulated Truck 40 Ton)	1.3	118

Note:
[1] Represent sound power level per unit of mobile equipment

Table 5-7 Haul Road Traffic Summary – MacLellan Site

Item	Description	Volume (Trucks/hr)	Sound Power Level [1] (dBA)
1	Plant to Topsoil (Articulated Truck 40 Ton)	4.3	118
2	Plant to Waste (Articulated Truck 65 Ton)	2.1	119
3	Tailing to Waste (Articulated Truck 40 Ton)	3.5	118
4	Pit to Overburden (Articulated Truck 40 Ton)	3.4	118
5	Pit to Waste Rock Stockpile (Articulated Truck 144 Ton)	2.7	121
6	Pit to Ore (Articulated Truck 40 Ton)	2.3	118
7	Pit to Crusher (Articulated Truck 40 Ton)	13.9	118
Note: [1] Represents sound power level per unit of mobile equipment			

The haul road traffic noise emission is based on the following assumptions:

- Equipment operates 24 hours continuously.
- Equipment operates at 100% capacity.
- Highest haul road traffic volumes were used.

5.1.2.5 Access Road

The construction phase access road traffic for Gordon site and MacLellan site is presented in Table 5-8 and Table 5-9, respectively. The traffic volume is based on truck frequency information provided by Ausenco and conservative assumptions made for heavy trucks, pickup trucks, and crew buses.

Table 5-8 Access Road Traffic Summary – Gordon Site

Item	Description	Volume (Trucks/hr)
1	Access Road Traffic	2

Table 5-9 Access Road Traffic Summary – MacLellan Site

Item	Description	Volume (Trucks/hr)
1	Access Road Traffic	6

The access road traffic noise emission is based on the following assumptions:

- Equipment operates 24 hours continuously.
- Equipment operates at 100% capacity.

- Highest access road traffic volumes were used.

5.1.2.6 PR 391

The Project related construction phase traffic along PR 391 between Gordon site and MacLellan site is presented in Table 5-10. The traffic volume is based on truck frequency information provided by Ausenco and conservative assumptions made for mixer trucks, fuel trucks, and delivery trucks.

Table 5-10 PR 391 Construction Traffic Summary

Item	Description	Volume (Trucks/hr)
1	PR 391 Traffic	2

The PR 391 road traffic noise emission is based on the following assumptions:

- Equipment operates 24 hours per day continuously.
- Equipment operates at 100% capacity.
- Highest PR 391 road traffic volumes were used.

5.1.3 Operation

Based on the review of the mine plan and equipment list, the operation phase scenario that was considered representative of the worst-cases for noise emissions were modeled; Year 2 of the Gordon site operation and Year 7 of the MacLellan site operation were chosen because they represent the production year with highest production rates, respectively. This is based on the quantity of the equipment fleet, the haulage lengths, and the total amount of material moved.

The Project operation phase noise emissions were established using the following information sources:

- Equipment lists, design data, equipment noise ratings provided by Alamos, Q'Pit Inc., and Ausenco.
- Measurement data of similar equipment from Stantec acoustic database.
- Equipment specifications and referenced formula from acoustic literature (Crocker 2007, Bies and Hansen 2004).
- Publication that provides reference sound power levels and sound pressure levels for common construction equipment (DEFRA 2005).

5.1.3.1 Processing Plant

The noise model of the processing facility at MacLellan site considers the full built-out phase (i.e., all equipment in operation). There is no processing facility at Gordon site. The facility will operate continuously during a 24-hour period. The plant facility sound power levels are based on a combination of theoretical calculations and past project experiences for similar facilities. The major components of the plant facility are listed as follows:

- Primary crusher building
- Secondary crusher building
- Cover stockpile
- Mill building
- Reagent building
- Gold room
- Oxygen plant
- Conveyors
- Dust collectors
- HVAC units
- Water pump stations.

Table 5-11 to Table 5-17 summarize the noise emission level for indoor equipment and outdoor HVAC equipment associated with different buildings. Noise attenuation effects due to roof and walls sound transmission loss is considered for the indoor equipment in the noise model. Table 5-18 summarizes the noise emission of outdoor equipment that is not enclosed within a building.

Details of the equipment sound power levels in full octave band frequency are presented in Appendix B.

Table 5-11 Primary Crusher Building

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Primary Crushing Air Compressor	1	106
2	Secondary Crusher Overhead Crane	1	88
3	Primary Crusher	1	112
4	Primary Crusher Transfer Conveyor	1	103
5	Apron Feeder	1	112
6	Vibrating Grizzly Screen	2	107
8	Rock Breaker	1	118
9	Primary Crusher Bag House Dust Collector Fan	1	101

Table 5-12 Secondary Crusher Building

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Secondary Crusher Overhead Crane	1	88
2	Secondary Crusher	1	115
3	Primary Crusher Transfer Conveyor	1	103
4	Secondary Crusher Vibrating Feeder	1	118
5	Secondary Crusher Retractable Feeder	1	107
6	Wet Scrubber Recirculating Pump	1	90

Table 5-13 Covered Stockpile

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Sag Mill Feed Conveyor	1	101
2	Reclaim Fine Ore Apron Feeder 1&2	2	112
3	Cartridge Dust Collector	2	101

Table 5-14 Mill Building

Item	Description	Quantity	Sound Power Level (dBA) Per Unit
1	Wet Scrubber Recirculating Pump	1	90
2	Cyclone Feed Pump	1	107
3	Process Water Pump	1	109
4	CIP Tailings Pump	1	106
5	Carbon Advance Pump 1&2	2	90
6	Elution Area Potable Water Pump	1	98
7	Barren Solution Pump	1	96
8	Tailings Pump	1	107
9	Mill Area Overhead Crane	1	95
10	CIP Area Overhead Crane	1	88
11	Elution Area Jib Crane	1	85
12	Carbon Regeneration Area Jib Crane	1	85
13	Sulphur Dioxide Package	1	107
14	Sag Mill Feed Conveyor	1	101
15	High Angle Pebble Conveyor	1	87
16	Pebble Conveyor	1	85
17	Sag Mill	1	113
18	Ball Mill	1	115
19	Sag Mill Trommel Screen	1	107
20	Trash Screen	1	99
21	Ball Mill Trommel Screen	1	107
22	Inter-Tank Screen	1	104

Table 5-15 Reagent Building

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Lime Distribution Pump	1	96
2	Fresh Water Pump	1	112
3	Keewatin River Fresh Water Pump	1	97
4	Gland Water Pump	1	88
5	Electrowinning Cell Rectifier	2	84
6	Potable Water Pump	1	93
7	Process Plant Air Compressor	1	106

Table 5-16 Gold Room

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Induction Furnace Extraction Fan	1	88
2	Drying Oven Extraction Fan	1	89

Table 5-17 Oxygen Plant

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Oxygen Plant Rotary & Reciprocating Compressor	1	115

Table 5-18 Processing Plant Outdoor Equipment

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Carbon Regeneration Kiln Exhaust Fan	1	76
2	Electrowinning Cells Extraction Fan	1	82
3	Gold Room Vent Fan	1	64
4	Pre-Leach Thickener Underflow Pump	1	108
5	Secondary Crusher Wet Scrubber Fan	1	91
6	Pebble Conveyor 2 Motor	1	85
7	High Angle Pebble Conveyor Motor	1	87
8	Reclaim Tunnel Vent Fan	1	94
9	Fine Ore Stockpile Cover Ventilation Fan	1	82
10	Primary Crusher Transfer Conveyor	1	95
11	Fine Ore Stockpile Feed Conveyor	1	93
12	Sag Mill Feed Conveyor	1	94
13	Pebble Conveyor	1	92
14	Primary Crusher Transfer Conveyor	2	88

5.1.3.2 Mining Equipment

The noise model of mining equipment during the operation phase include primary equipment, support equipment, and haul road traffic. The primary equipment is used mainly in the Gordon site open pit and the MacLellan site open pit and haul roads. The support equipment is used in the open pits, processing plant, and different areas within the Project boundary. The haul road traffic includes the haul truck and other mobile equipment travelling between different areas.

Primary Equipment

The primary equipment for Gordon site and MacLellan site is presented in Table 5-19 and Table 5-20, respectively. Details of the equipment sound power level in full octave band frequency is presented in Appendix B.

Table 5-19 Primary Equipment Summary – Gordon Site

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Hydraulic Shovel	1	114
2	Wheel Loader 13 m^3	1	116
3	Ore Haul Truck 136 Ton	7	121
4	Motor Grader 215 kW	1	109
5	Crawler Dozer 450 kW	1	115
6	Wheel Dozer 370 kW	1	111
7	Water Truck 60,000 L	1	109
8	Production HP Drill	2	120
9	Hydraulic Track Drill	1	119
10	Excavator Mounted Rock Drill	1	114
11	Blasthole Stemmer	1	95
12	Forklift/Telehandler	1	92
13	Hydraulic Excavator 3.75 m^3	1	110
14	Crawler Dozer 264 kW	1	109
15	Articulated Truck 30 Ton	1	108
16	Wheel Loader 260 kW	1	109
17	Crawler Dozer 264 kW	1	109

Table 5-20 Primary Equipment Summary – MacLellan Site

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Hydraulic Shovel	2	114
2	Wheel Loader 13 m^3	1	116
3	Ore Haul Truck 136 Ton	18	121
4	Motor Grader 215 kW	1	109
5	Motor Grader 178 kW	1	108
6	Crawler Dozer 450 kW	2	115
7	Wheel Dozer 370 kW	1	111
8	Water Truck 60,000 L	1	109
9	Hydraulic Excavator 3.75 m^3	1	110
10	Crawler Dozer 264 kW	1	109
11	Articulated Truck 30 Ton	1	108
12	Production HP Drill	3	120
13	Hydraulic Track Drill	2	119
14	Excavator Mounted Rock Drill	1	114
15	Excavator Mounted Hydraulic Hammer	1	110
16	Blasthole Stemmer	1	95
17	Forklift/Telehandler	1	92
18	Wheel Loader 260 kW	1	109
19	On-Highway Class 8 Dump Truck	2	108
20	Crawler Dozer 264 kW	1	109

The primary equipment noise emissions are based on the following assumptions:

- Mobile equipment operates 20 hours (12.5 hours daytime and 7.5 hours nighttime) during a 24-hour period.
- Equipment operates at 100% capacity
- Back-up alarms are assumed to on 20% of equipment operating time, and 5 dB tonality penalty added to noise emissions.

Support Equipment

The support equipment for Gordon site and MacLellan site is presented in Table 5-21 and Table 5-22, respectively. Details of the equipment sound power level in full octave band frequency is presented in Appendix B.

Table 5-21 Support Equipment Summary – Gordon Site

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Rough-Terrain Crane 110 Ton	1	94
2	Hydraulic Excavator 36 Ton	1	103
3	On-Highway Class 8 Dump Truck	1	106
4	Heavy-Duty Light Tower	12	89
5	Flameless Air Mobile Heater	1	91
6	Portable Dewatering Pump (4-Inch)	1	95
7	Portable Dewatering Pump (8-Inch)	1	99
8	Dewatering Pump	2	99
9	Lift Truck/Flatbed	1	119

Table 5-22 Support Equipment Summary – MacLellan Site

Item	Description	Quantity	Sound Power Level (dBA) per unit
1	Rough-Terrain Crane 110 Ton	2	94
2	Hydraulic Excavator 36 Ton	1	103
3	Skid-Steer Loader	1	95
4	Portable Air Compressor (5-6 m^3)	1	104
5	Flameless Air Mobile Heater	1	91
6	Trailer-Mounted Pressure Washer	1	101
7	Portable Dewatering Pump (4-Inch)	1	95
8	Portable Dewatering Pump (8-Inch)	1	99
9	Dewatering Pump	3	99
10	Heavy-Duty Light Tower	28	89
11	Lift Truck/Flatbed	1	119

The support equipment noise emissions are based on the following assumptions:

- Mobile equipment operates 20 hours (12.5 hours daytime and 7.5 hours nighttime) during a 24-hour period.
- Equipment operates at 100% capacity.
- Stationery equipment (i.e., pumps) operates at 100% capacity continuously during a 24-hour period.

Haul Road Traffic

The operation phase haul road traffic within the Gordon site and MacLellan site is presented in Table 5-23 and Table 5-24, respectively. The annual traffic volume is based on annual quantities of transferred material divided by the payload capacity of the haul truck. The annual traffic volume is divided by the actual operating hours per year to estimate the average hourly truck traffic count usage.

Details of the equipment sound power level in full octave band frequency is presented in Appendix B.

Table 5-23 Haul Road Traffic Summary – Gordon Site

Item	Description	Volume (Trucks/hr)	Sound Power Level [1] (dBA)
1	Pit Area to Overburden (Articulated Truck 30 Ton)	3	108
2	Haul Road from Open Pit to Waste Rock Stockpile (Komatsu Haul Truck 136 Ton)	21	121
3	Haul Road from Open Pit to Low Grade Ore Stockpile (Komatsu Haul Truck 136 Ton)	4	121
4	Haul Road in Open Pit (Komatsu Haul Truck 136 Ton)	25	121

Note:
[1] Represent sound power level per unit of mobile equipment

Table 5-24 Haul Road Traffic Summary – MacLellan Site

Item	Description	Volume (Trucks/hr)	Sound Power Level [1] (dBA)
1	Haul Road in Open Pit (Komatsu Haul Truck 136 Ton)	44	121
2	Haul Road from Ore Stockpile to Process Plant (Articulated Truck 30 Ton)	13	108
3	Haul Road from Open Pit to Waste Rock Stockpile (Komatsu Haul Truck 136 Ton)	38	121
4	Haul Road from Open Pit to Low Grade Ore Stockpile (Komatsu Haul Truck 136 Ton)	1	121
7	Haul Road from Open Pit to Overburden Stockpile (Articulated Truck 30 Ton)	6	108
8	Haul Road from Open Pit to Mill (Komatsu Haul Truck 136 Ton)	4	121

Note:
[1] Represent sound power level per unit of mobile equipment

The haul road traffic noise emission is based on the following assumptions:

- Equipment operates 24 hours continuously.
- Equipment operates at 100% capacity.
- Highest haul road traffic volumes were used.

5.1.3.3 Access Road

The access road traffic for Gordon site and MacLellan site is presented in Table 5-25 and Table 5-26, respectively. The truck traffic is based on truck frequency information provided by Ausenco and conservative assumptions made for heavy trucks, pickup trucks, and crew buses.

Table 5-25 Access Road Traffic Summary – Gordon Site

Item	Description	Volume (Trucks/hr)
1	Access Road Traffic	12

Table 5-26 Access Road Traffic Summary – MacLellan Site

Item	Description	Volume (Trucks/hr)
1	Access Road Traffic	12

The access road traffic noise emission is based on the following assumptions:

- Equipment operates 24 hours continuously.
- Equipment operates at 100% capacity.
- Highest access road traffic volumes were used.

5.1.3.4 PR 391

The Project related operation phase PR 391 traffic between Gordon site and MacLellan site is presented in Table 5-27. The traffic volume is based on truck frequency information provided by Ausenco and conservative assumptions made for haul trucks, delivery trucks, and fuel trucks.

Table 5-27 PR 391 Operation Traffic Summary

Item	Description	Volume (Trucks/hr)
1	PR 391 Traffic	12

The PR 391 road traffic noise emission is based on the following assumptions:

- Equipment operates 24 hours per day continuously.
- Equipment operates at 100% capacity.
- Highest PR 391 traffic volumes were used.

5.1.4 Decommissioning/Closure

The noise effects model focused on activities during the construction and operation phase. The quantity of equipment required for the decommissioning/closure phase is expected to be below that required for the construction and operation phases. Noise emissions during decommissioning/closure activities are expected to be similar to, but less than, in the construction phase, and as such noise effects will be less than those of construction. Accordingly, quantitative noise modelling of decommissioning/closure phase was not conducted.

5.2 VIBRATION

5.2.1 Modelling

The FTA 2018 guidance recommends the vibration assessment for building damage be performed for each piece of equipment individually using PPV as the measurable parameter. The vibration level at a receptor is predicted by using the reference vibration level (PPV_{ref}) for each piece of equipment at a reference distance of 7.62 m and the distance from equipment to receptor, as described in Equation 1 below.

$$PPV = PPV_{ref} \times (7.62/D)^{1.5} \qquad \text{Equation 1}$$

Where:

PPV = Peak particle velocity at the receptor (mm/s)
PPV_{ref} = the source reference vibration level at 7.62 m (mm/s)
D = Distance from equipment to receptor (m).

The FTA 2018 guidance recommends that annoyance due to vibration be performed for each piece of equipment individually. The vibration level at a receptor is predicted by using the vibration source level (L_{vref}) for each piece of equipment at a reference distance of 7.62 m and the distance from equipment to receptor, as described in Equation 2 below.

$$L_{v,distance} = L_{vref} - 30\ LOG\ (D/7.62) \qquad \text{Equation 2}$$

Where:

$L_{v,distance}$ = the root mean square velocity level adjusted for distance (VdB)
L_{vref} = the source reference vibration level at 7.62 m (VdB)
D = Distance from equipment to receptor (m).

In the vibration assessment of blasted related activities from the open pits during operation, equations commonly used and accepted by the industry were used to predict the blast-induced ground vibration and air level (ISEE 2011).

Ground vibration level related to blast activities is defined in terms of PPV and is measured in mm/s, representing the highest instantaneous positive or negative peak of the vibration signal. A commonly used and accepted equation from the International Society of Explosives Engineers (ISEE) technical literature Blasters’ Handbook (ISEE 2011) was used to predict vibration levels for a coal mine, as presented in Equation 3.

$$PPV = 3330(D/W^{1/2})^{-1.52} \qquad \text{Equation 3}$$

Where:

PPV = Peak particle velocity at a receptor (mm/s).
D = Distance from the blast to nearest inhabited residential dwelling (m).
W = Highest weight of explosives fired per delay (kg).

During blasting, blast energy that liberates into the atmosphere generates air overpressure. Air overpressure is the additional pressure above normal atmospheric pressure that is generated from a blast and is measured in decibels (dBL). Air overpressure often feels like a gust of wind by a receptor as a confined blast will generally result in an inaudible air overpressure. Equation 4 is commonly accepted by the industry to predict air overpressure levels at a point of concern was developed by the Blasters’ Handbook (ISEE 2011) for a metal mine.

$$\text{Air overpressure} = 14.3\ (D/W^{1/3})^{-0.71}\ [\text{Pa}] \qquad \text{Equation 4}$$

Where:

Air overpressure in Pascals
C = Confinement constant
D = Distance from blast to point of concern (m)
W = Weight of explosives per delay (kg).

The overpressure can be converted from Pascal (Pa) to dBL Equation 5 presented below.

$$\text{Air overpressure \{dBL\}} = 20\ \text{LOG}\ (\text{Air overpressure \{Pa\}}/2 \times 10^{-5}) \qquad \text{Equation 5}$$

The following assumptions were used in the blast-related vibration model:

- Vibration prediction used a conservative method with the highest explosive charge weight. The actual blast charges could be lower.
- Blast-related vibration prediction was based on the shortest distance between receptor and the pit boundary.

5.2.2 Construction

During the construction phase, heavy equipment such as excavators, compactors, piling equipment, and haul trucks will be used. The ground-borne vibration effect due to high impact piling equipment, excavator, compactor, drilling, and large bulldozer were assessed at receptors closest to the construction activities. These pieces of equipment were selected in this model because they typically produce higher vibration levels than other construction equipment. Based values recommended in the FTA noise and vibration guideline (FTA 2018), the construction equipment reference vibration level in PPV_{ref} and $L_{v,ref}$ are summarized in Table 5-28.

Table 5-28 Construction Equipment Reference Vibration Level at 25 feet or 7.62 m

Construction Equipment	PPV_{ref} (mm/s)	$L_{v,ref}$ (VdB)
Vibratory Roller	5.33	94
Bulldozer	2.26	87
Drilling	2.26	87
Clam Shovel	5.13	94
Impact Piling	38.56	112

5.2.3 Operation

During the operation phase, the primary vibration effects are ground vibration and air overpressure due to blasting activities within the open pit at the Gordon site or the MacLellan site. Given the same distance from a blast to the receptor, the primary factor affecting vibration is the explosive charge per delay. The highest explosive charge specification in the blast design is 208 kg per hole per delay for both the Gordon and MacLellan sites. However, the explosive charge could be reduced during operation due to site conditions.

The closest receptors to the Gordon site open pit are receptors ID 76 and ID 73 at the approximate distance of 1.4 km and 2.2 km, respectively. Outside the PDA, the closest receptor ID 86 is approximately 2.4 km from the MacLellan site open pit. All three receptors are First Nation trap lines or trapping areas. Inside the PDA, the closest receptor is the permanent work camp located approximately 800 m from the MacLellan pit.

5.2.4 Decommissioning/Closure

The vibration effects model focused on activities during the construction and operation phases. The quantity of equipment required for the decommissioning/closure phase is expected to be below the requirement for the construction and operation phases, and activities such as blasting, or pile driving, will not be conducted during decommissioning. Vibration effects during decommissioning/closure activities are expected to be less than the construction phase. Accordingly, quantitative vibration model of decommissioning/closure phase was not included.

5.3 PREDICTION CONFIDENCE

Overall, accuracy of predictions for the noise model depends on several factors, including the accuracy of the Project design information, noise source data, and the sound propagation algorithm. The latest Project design information available at the time of this model was used. The sound power levels of the noise sources were established with field measurements of similar equipment or vendor sound emission data, where available. Acoustic models can be revised (if necessary) when final design information is available.

The Cadna/A model predicts outdoor noise in accordance with ISO 9613. The ISO 9613 sound propagation algorithms have a published accuracy of ± 3 dB over source receiver distances between 100 m and 1,000 m. The accuracy for distances up to or over 1.5 km is not stated. The ISO 9613 model also produces results representative of meteorological conditions enhancing sound propagation (e.g., downwind and temperature inversion conditions). These conditions do not occur all the time; therefore, model predictions are expected to be conservative.

To account for the level of uncertainty in the noise predictions, conservative assumptions regarding the Project have been made. These include the assumptions that downwind conditions exist 100% of the time and that the maximum number of equipment operates at rated capacity for each scenario assessed.

Prediction method for blast-related ground-borne vibration are based on upper bound equations. Upper bound equations will generally estimate the highest potential vibration level with at least 95% confidence. Prediction method for blast-related overpressure levels are based on best fit equation. Statistically the best fit equations are meant to estimate the expected air overpressure level. The equations are useful for blasts that are well designed and implemented properly in the field.

Confidence in the blast vibration predictions is high, since the analytical approach and methodology used in this model have been tested and verified in many blast audits worldwide. Confidence in the vibration predictions during construction phase is high because the model was based on methods commonly accepted by the industry.

6.0 RESULTS

6.1 NOISE

6.1.1 Construction

6.1.1.1 Gordon Site

Table 6-1 summarizes the Project only daytime, nighttime, and day-night average sound level results at the receptors for the Gordon site construction phase. Map 3 shows the construction phase only noise contour map for the Gordon site LAA.

Table 6-1 Construction Phase Sound Level – Gordon Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
59	Potential Indigenous Receptor	21.8	21.8	28.2
61	Potential Indigenous Receptor	12.8	12.8	19.2
62	Potential Indigenous Receptor	12.5	12.5	18.9
72	Potential Indigenous Receptor	24.9	24.9	31.3
73	Potential Indigenous Receptor	25.7	25.7	32.1
74	Potential Indigenous Receptor	20.5	20.5	26.9
76	Potential Indigenous Receptor	30.5	30.5	36.9
77	Potential Indigenous Receptor	30.7	30.7	37.1
93	Black Sturgeon Reserve Residence	12.7	12.7	19.1
101	Black Sturgeon Reserve Residence	14.1	14.1	20.5
104	Remote Cottage	27.0	27.0	33.4
126	Recreation Lot	14.7	14.7	21.1
130	Remote Cottage	14.3	14.3	20.7
131	Remote Cottage	25.9	25.9	32.3
132	Trapper Cabin	25.0	25.0	31.4
139	Park Vacation Home	14.2	14.2	20.6

Table 6-2 summarizes the Project sound level at the receptors during pile driving operation for closing off the old diversion channel north of the Gordon pit.

Table 6-2 Construction Phase Pile Driving Sound Level – Gordon Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
59	Potential Indigenous Receptor	12.3	--	10.2
61	Potential Indigenous Receptor	7.0	--	5.0
62	Potential Indigenous Receptor	--	--	--
72	Potential Indigenous Receptor	31.0	--	29.0
73	Potential Indigenous Receptor	37.0	--	34.9
74	Potential Indigenous Receptor	32.2	--	30.1
76	Potential Indigenous Receptor	42.9	--	40.8
77	Potential Indigenous Receptor	32.0	--	30.0
93	Black Sturgeon Reserve Residence	5.3	--	3.2
101	Black Sturgeon Reserve Residence	5.4	--	3.4
104	Remote Cottage	--	--	--
126	Recreation Lot	2.8	--	0.8
130	Remote Cottage	3.1	--	1.0
131	Remote Cottage	24.8	--	22.7
132	Trapper Cabin	28.6	--	26.6
139	Park Vacation Home	3.1	--	1.0

Note:
“- -“ not applicable as there is no pile driving activities during the nighttime period

6.1.1.2 MacLellan Site

Table 6-3 summarizes the Project only daytime, nighttime, and day-night average sound level results at the receptors for the MacLellan site construction phase. Map 4 shows the construction phase only noise contour map for the MacLellan site RAA.

Table 6-3 Construction Phase Sound Level – MacLellan Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
66	Potential Indigenous Receptor	6.2	6.2	12.6
67	Potential Indigenous Receptor	14.8	14.8	21.2
68	Potential Indigenous Receptor	14.9	14.9	21.3
69	Potential Indigenous Receptor	6.6	6.6	13.0
78	Potential Indigenous Receptor	6.4	6.4	12.8
79	Potential Indigenous Receptor	2.4	2.4	8.8
81	Potential Indigenous Receptor	22.9	22.9	29.3
82	Potential Indigenous Receptor	27.4	27.4	33.8
83	Potential Indigenous Receptor	16.2	16.2	22.6
84	Potential Indigenous Receptor	23.7	23.7	30.1
85	Potential Indigenous Receptor	35.5	35.5	41.9
86	Potential Indigenous Receptor	31.2	31.2	37.6
105	Remote Cottage	5.3	5.3	11.7
115	Museum Site	13.2	13.2	19.6
116	Communication Site	15.7	15.7	22.1
121	Recreation Lot	21.4	21.4	27.8
123	Potential Indigenous Receptor	24.2	24.2	30.6
135	Park Vacation Home	21.1	21.1	27.5
163	Lynn Lake Friendship Center	13.1	13.1	19.5
166	Lynn Lake Gospel Church	13.9	13.9	20.3
169	Lynn Lake Library	13.0	13.0	19.4
172	West Lynn Lake High School	11.8	11.8	18.2
173	Lynn Lake Hospital	17.0	17.0	23.4
177	Lynn Lake Residence	11.0	11.0	17.4
178	Lynn Lake Residence	16.5	16.5	22.9
225	Lynn Lake Residence	10.8	10.8	17.2
--	Temporary Work Camp (outdoor)	56.7	56.7	63.1

Table 6-4 summarizes the Project sound level at the receptors during pile driving operation at the Keewatin River bridge.

Table 6-4 Construction Phase Pile Driving Sound Level – MacLellan Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
66	Potential Indigenous Receptor	10.3	--	8.3
67	Potential Indigenous Receptor	13.5	--	11.4
68	Potential Indigenous Receptor	19.5	--	17.4
69	Potential Indigenous Receptor	9.6	--	7.6
78	Potential Indigenous Receptor	9.8	--	7.7
79	Potential Indigenous Receptor	--	--	--
81	Potential Indigenous Receptor	13.6	--	11.5
82	Potential Indigenous Receptor	24.4	--	22.4
83	Potential Indigenous Receptor	14.6	--	12.6
84	Potential Indigenous Receptor	18.2	--	16.1
85	Potential Indigenous Receptor	31.5	--	29.4
86	Potential Indigenous Receptor	35.1	--	33.1
105	Remote Cottage	7.0		5.0
115	Museum Site	16.4	--	14.3
116	Communication Site	20.2	--	18.1
121	Recreation Lot	23.2	--	21.2
123	Potential Indigenous Receptor	28.6	--	26.5
135	Park Vacation Home	28.2	--	26.1
163	Lynn Lake Friendship Center	17.9	--	15.9
166	Lynn Lake Gospel Church	16.8	--	14.8
169	Lynn Lake Library	16.7	--	14.6
172	West Lynn Lake High School	15.7	--	13.7
173	Lynn Lake Hospital	18.5	--	16.4
177	Lynn Lake Residence	18.9	--	16.9
178	Lynn Lake Residence	18.7	--	16.7
225	Lynn Lake Residence	15.0	--	13.0

Note:
“- -“ not applicable as there is no pile driving activities during the nighttime period

6.1.2 Operation

6.1.2.1 Gordon Site

Table 6-5 summarizes the Project only daytime, nighttime, and day-night average sound level results at the receptors for the Gordon site operation phase. Map 5 shows the operation phase only noise contour map for the Gordon site LAA.

Table 6-5 Operation Phase Sound Level – Gordon Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
59	Potential Indigenous Receptor	30.1	30.1	36.5
61	Potential Indigenous Receptor	20.2	20.2	26.6
62	Potential Indigenous Receptor	20.3	20.3	26.7
72	Potential Indigenous Receptor	30.2	30.2	36.6
73	Potential Indigenous Receptor	29.6	29.6	36.0
74	Potential Indigenous Receptor	25.4	25.4	31.8
76	Potential Indigenous Receptor	38.5	38.5	44.9
77	Potential Indigenous Receptor	37.2	37.2	43.6
93	Black Sturgeon Reserve Residence	20.1	20.1	26.6
101	Black Sturgeon Reserve Residence	21.3	21.3	27.7
104	Remote Cottage	34.7	34.7	41.1
126	Recreation Lot	22.2	22.2	28.6
130	Remote Cottage	21.7	21.7	28.1
131	Remote Cottage	32.8	32.8	39.2
132	Trapper Cabin	30.7	30.7	37.1
139	Park Vacation Home	21.7	21.7	28.1

6.1.2.2 MacLellan Site

Table 6-6 summarizes the Project only daytime, nighttime, and day-night average sound level results at the receptors for the MacLellan site operation phase. Map 6 shows the operation phase only noise contour map for the MacLellan site RAA.

Table 6-6 Operation Phase Sound Level – MacLellan Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
66	Potential Indigenous Receptor	14.0	14.0	20.4
67	Potential Indigenous Receptor	22.5	22.5	28.9
68	Potential Indigenous Receptor	22.7	22.7	29.1
69	Potential Indigenous Receptor	14.4	14.4	20.8
78	Potential Indigenous Receptor	14.2	14.2	20.6
79	Potential Indigenous Receptor	10.2	10.2	16.6
81	Potential Indigenous Receptor	30.6	30.6	37.0
82	Potential Indigenous Receptor	33.5	33.5	39.9
83	Potential Indigenous Receptor	16.0	16.0	22.4
84	Potential Indigenous Receptor	23.6	23.6	30.0
85	Potential Indigenous Receptor	35.2	35.2	41.6
86	Potential Indigenous Receptor	37.3	37.3	43.7
105	Remote Cottage	13.2	13.2	19.6
115	Museum Site	14.2	14.2	20.6
116	Communication Site	23.0	23.0	29.4
121	Recreation Lot	25.9	25.9	32.3
123	Potential Indigenous Receptor	28.0	28.0	34.4
135	Park Vacation Home	24.5	24.5	30.9
163	Lynn Lake Friendship Center	14.0	14.0	20.4
166	Lynn Lake Gospel Church	13.7	13.7	20.1
169	Lynn Lake Library	14.3	14.3	20.7
172	West Lynn Lake High School	13.4	13.4	19.8
173	Lynn Lake Hospital	18.4	18.4	24.8
177	Lynn Lake Residence	13.0	13.0	19.4
178	Lynn Lake Residence	15.5	15.5	21.9
225	Lynn Lake Residence	14.9	14.9	21.3
--	Permanent Work Camp (outdoor)	53.5	53.5	59.9

6.1.3 Mitigation Measures

Mitigation measures are implemented as part of the design to reduce potential noise effects during the construction and operation phases. The mitigation measures are applicable to both the Gordon and MacLellan sites.

- Large stationary machinery (i.e., crushers) will be located inside buildings.
- Fully enclosed conveyor between buildings in processing plant.
- Roads designed to reduce haul distances.
- Large transportation trucks will be used to reduce the number of trips.
- Mobile equipment will have exhaust mufflers.
- Work camp building wall and roof will be noise insulated panel.
- Work camp building will include air conditioning system such that double pane windows and insulated doors can be closed during the summer season.
- Reduce heavy fleets idling when not operating.

The operational sound levels listed in the Appendix B are the estimated equipment sound power levels used in the acoustic modelling; it is assumed that these acoustical specifications are achievable by the suppliers. If the sound power level cannot be achieved, additional mitigation measures may be required.

6.1.4 Comparison to Regulatory Framework

6.1.4.1 Manitoba

During the construction phase the predicted Project L_d and L_n sound levels (see Table 6-1, Table 6-2, Table 6-3, and Table 6-4) at all residential receptors are below the Manitoba noise guideline target of 55 dBA daytime and 45 dBA nighttime. During the operation phase the predicted Project L_d and L_n sound levels (see Table 6-5 and Table 6-6) at all residential receptors are below the Manitoba noise guideline target of 55 dBA daytime and 45 dBA nighttime.

6.1.4.2 Health Canada Change in Percent Highly Annoyed and Mitigated Noise Level

For the construction and operation phases, change in %HA associated with the Project is compared with the threshold of 6.5% advised by Health Canada. The change is %HA at a receptor is based on the difference between the baseline %HA and total (Project and Baseline) %HA.

The %HA is determined from the adjusted baseline sound level or the adjusted total sound level, based on an equation from the Health Canada guidance. The adjusted baseline sound level and adjusted total sound level sound level is calculated by adding the 10 dB “peace and quiet” adjustment to the baseline sound level (Section 4.1.1.3) and total sound level at a receptor. The total sound level is the combined noise effect of the baseline sound level and project sound level (see Sections 6.1.1 and 6.1.2). A detail sample calculation of the change in %HA at a receptor is presented in Appendix C.

The changes in %HA associated with the Project construction phase at Gordon site and MacLellan site are summarized in Table 6-7 and Table 6-8, respectively. The changed in %HA results are compared to the target for change in %HA of 6.5% advised in the Health Canada noise guidance. The changes in %HA at all receptors are below the 6.5% target for the construction phase. The results indicate compliance with the Health Canada guidance.

During pile driving activities with a duration of less than 12 months, the MNL was used as a target for noise effects related to short-term construction activities. The MNL of 47 dBA (L_{dn}) for a quiet suburban or rural community is applicable. Table 6-2 summarizes the predicted sound level for the receptors during pile driving activities for closing off the old diversion channel north of the Gordan open pit. Table 6-4 summarizes the predicted sound level for the receptors during pile driving activities at the Keewatin River bridge at the MacLellan site. The predicted L_{dn} levels at all receptors are below the target of 47 dBA.

Table 6-7 Construction Phase - Change in %HA – Gordon Site

Receptor ID	Description	Baseline			Project	Total (Baseline and Project)			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	L_{dn} (dBA)	L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
59	Potential Indigenous Receptor	40.0	50.0	2.17	28.2	40.2	50.2	2.25	0.1
61	Potential Indigenous Receptor	40.0	50.0	2.17	19.2	40.0	50.0	2.18	0.0
62	Potential Indigenous Receptor	40.0	50.0	2.17	18.9	40.0	50.0	2.18	0.0
72	Potential Indigenous Receptor	40.0	50.0	2.17	31.3	40.5	50.5	2.34	0.2
73	Potential Indigenous Receptor	40.0	50.0	2.17	32.1	40.6	50.6	2.37	0.2
74	Potential Indigenous Receptor	40.0	50.0	2.17	26.9	40.2	50.2	2.23	0.1
76	Potential Indigenous Receptor	40.0	50.0	2.17	36.9	41.7	51.7	2.72	0.5
77	Potential Indigenous Receptor	40.0	50.0	2.17	37.1	41.8	51.8	2.75	0.6
93	Black Sturgeon Residence	44.6	54.6	3.92	19.1	44.6	54.6	3.93	0.0
101	Black Sturgeon Residence	44.6	54.6	3.92	20.5	44.6	54.6	3.93	0.0
104	Remote Cottage	40.0	50.0	2.17	33.4	40.8	50.8	2.43	0.3
126	Recreation Lot	40.0	50.0	2.17	21.1	40.0	50.0	2.19	0.0
130	Remote Cottage	40.0	50.0	2.17	20.7	40.0	50.0	2.19	0.0
131	Remote Cottage	40.0	50.0	2.17	32.3	40.6	50.6	2.38	0.2
132	Trapper Cabin	40.0	50.0	2.17	31.4	40.5	50.5	2.34	0.2
139	Park Vacation Home	40.0	50.0	2.17	20.6	40.0	50.0	2.19	0.0

Note:[1] The + 10 dB "peace and quiet" adjustment is included

Table 6-8 Construction Phase - Change in %HA – MacLellan Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
66	Potential Indigenous Receptor	40.0	50.0	2.17	12.6	40.0	50.0	2.18	0.0
67	Potential Indigenous Receptor	40.0	50.0	2.17	21.2	40.0	50.0	2.19	0.0
68	Potential Indigenous Receptor	40.0	50.0	2.17	21.3	40.0	50.0	2.19	0.0
69	Potential Indigenous Receptor	40.0	50.0	2.17	13.0	40.0	50.0	2.18	0.0
78	Potential Indigenous Receptor	40.0	50.0	2.17	12.8	40.0	50.0	2.18	0.0
79	Potential Indigenous Receptor	40.0	50.0	2.17	8.8	40.0	50.0	2.18	0.0
81	Potential Indigenous Receptor	40.0	50.0	2.17	29.3	40.3	50.3	2.28	0.1
82	Potential Indigenous Receptor	40.0	50.0	2.17	33.8	40.9	50.9	2.46	0.3
83	Potential Indigenous Receptor	40.0	50.0	2.17	22.6	40.0	50.0	2.20	0.0
84	Potential Indigenous Receptor	40.0	50.0	2.17	30.1	40.4	50.4	2.30	0.1
85	Potential Indigenous Receptor	40.0	50.0	2.17	41.9	44.0	54.0	3.68	1.5
86	Potential Indigenous Receptor	40.0	50.0	2.17	37.6	41.9	51.9	2.81	0.6
105	Remote Cottage	40.0	50.0	2.17	11.7	40.0	50.0	2.18	0.0
115	Museum Site	45.0	55.0	4.15	19.6	45.0	55.0	4.16	0.0
116	Communication Site	45.0	55.0	4.15	22.1	45.0	55.0	4.16	0.0
121	Recreation Lot	42.9	52.9	3.18	27.8	43.1	53.1	3.24	0.1
123	Potential Indigenous Receptor	42.9	52.9	3.18	30.6	43.2	53.2	3.29	0.1
135	Park Vacation Home	42.9	52.9	3.18	27.5	43.0	53.0	3.24	0.1
163	Lynn Lake Friendship Center	45.0	55.0	4.15	19.5	45.0	55.0	4.16	0.0
166	Lynn Lake Gospel Church	45.0	55.0	4.15	20.3	45.0	55.0	4.16	0.0
169	Lynn Lake Library	45.0	55.0	4.15	19.4	45.0	55.0	4.16	0.0
172	West Lynn Lake High School	45.0	55.0	4.15	18.2	45.0	55.0	4.15	0.0
173	Lynn Lake Hospital	45.0	55.0	4.15	23.4	45.0	55.0	4.16	0.0
177	Lynn Lake Residence	45.0	55.0	4.15	17.4	45.0	55.0	4.15	0.0

Table 6-8 Construction Phase - Change in %HA – MacLellan Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
178	Lynn Lake Residence	45.0	55.0	4.15	22.9	45.0	55.0	4.16	0.0
225	Lynn Lake Residence	45.0	55.0	4.15	17.2	45.0	55.0	4.15	0.0

Note:

[1] The + 10 dB "peace and quiet" adjustment is included

The changes in %HA associated with the Project operation phase at Gordon site and MacLellan site are summarized in Table 6-9 and Table 6-10, respectively. The change in %HA results are compared to the target for change in %HA of 6.5% advised in the Health Canada noise guidance. The changes in %HA at all receptors are below the 6.5% target for the operation phase. The results indicate compliance with the Health Canada guidance. A sample calculation on the determination of change in %HA for receptor 76 near Gordon site during the operation phase is presented in Appendix C.

Table 6-9 Operation Phase - Change in %HA – Gordon Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
59	Potential Indigenous Receptor	40.0	50.0	2.17	36.5	41.6	51.6	2.68	0.5
61	Potential Indigenous Receptor	40.0	50.0	2.17	26.6	40.1	50.1	2.23	0.1
62	Potential Indigenous Receptor	40.0	50.0	2.17	26.7	40.2	50.2	2.23	0.1
72	Potential Indigenous Receptor	40.0	50.0	2.17	36.6	41.6	51.6	2.69	0.5
73	Potential Indigenous Receptor	40.0	50.0	2.17	36.0	41.4	51.4	2.63	0.5
74	Potential Indigenous Receptor	40.0	50.0	2.17	31.8	40.6	50.6	2.36	0.2
76 [2]	Potential Indigenous Receptor	40.0	50.0	2.17	44.9	46.1	56.1	4.77	2.6
77	Potential Indigenous Receptor	40.0	50.0	2.17	43.6	45.2	55.2	4.24	2.1
93	Black Sturgeon Residence	44.6	54.6	3.92	26.6	44.6	54.6	3.96	0.0
101	Black Sturgeon Residence	44.6	54.6	3.92	27.7	44.6	54.6	3.97	0.0
104	Remote Cottage	40.0	50.0	2.17	41.1	43.6	53.6	3.46	1.3

Table 6-9 Operation Phase - Change in %HA – Gordon Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
126	Recreation Lot	40.0	50.0	2.17	28.6	40.3	50.3	2.26	0.1
130	Remote Cottage	40.0	50.0	2.17	28.1	40.2	50.2	2.25	0.1
131	Remote Cottage	40.0	50.0	2.17	39.2	42.6	52.6	3.06	0.9
132	Trapper Cabin	40.0	50.0	2.17	37.1	41.8	51.8	2.75	0.6
139	Park Vacation Home	40.0	50.0	2.17	28.1	40.2	50.2	2.25	0.1

Note:
[1] The + 10 dB "peace and quiet" adjustment is included
[2] Sample calculations for the change in %HA are presented in Appendix C

Table 6-10 Operation Phase - Change in %HA – MacLellan Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
66	Potential Indigenous Receptor	40.0	50.0	2.17	20.4	40.0	50.0	2.2	0.0
67	Potential Indigenous Receptor	40.0	50.0	2.17	28.9	40.3	50.3	2.3	0.1
68	Potential Indigenous Receptor	40.0	50.0	2.17	29.1	40.3	50.3	2.3	0.1
69	Potential Indigenous Receptor	40.0	50.0	2.17	20.8	40.0	50.0	2.2	0.0
78	Potential Indigenous Receptor	40.0	50.0	2.17	20.6	40.0	50.0	2.2	0.0
79	Potential Indigenous Receptor	40.0	50.0	2.17	16.6	40.0	50.0	2.2	0.0
81	Potential Indigenous Receptor	40.0	50.0	2.17	37.0	41.7	51.7	2.7	0.6
82	Potential Indigenous Receptor	40.0	50.0	2.17	39.9	42.9	52.9	3.2	1.0
83	Potential Indigenous Receptor	40.0	50.0	2.17	22.4	40.0	50.0	2.2	0.0
84	Potential Indigenous Receptor	40.0	50.0	2.17	30.0	40.4	50.4	2.3	0.1
85	Potential Indigenous Receptor	40.0	50.0	2.17	41.6	43.9	53.9	3.6	1.4
86	Potential Indigenous Receptor	40.0	50.0	2.17	43.7	45.2	55.2	4.3	2.1
105	Remote Cottage	40.0	50.0	2.17	19.6	40.0	50.0	2.2	0.0
115	Museum Site	45.0	55.0	4.15	20.6	45.0	55.0	4.2	0.0
116	Communication Site	45.0	55.0	4.15	29.4	45.1	55.1	4.2	0.1
121	Recreation Lot	42.9	52.9	3.18	32.3	43.3	53.3	3.3	0.2
123	Potential Indigenous Receptor	42.9	52.9	3.18	34.4	43.5	53.5	3.4	0.2
135	Park Vacation Home	42.9	52.9	3.18	30.9	43.2	53.2	3.3	0.1

Table 6-10 Operation Phase - Change in %HA – MacLellan Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$[1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$[1] (dBA)	%HA	
163	Lynn Lake Friendship Center	45.0	55.0	4.15	20.4	45.0	55.0	4.2	0.0
166	Lynn Lake Gospel Church	45.0	55.0	4.15	20.1	45.0	55.0	4.2	0.0
169	Lynn Lake Library	45.0	55.0	4.15	20.7	45.0	55.0	4.2	0.0
172	West Lynn Lake High School	45.0	55.0	4.15	19.8	45.0	55.0	4.2	0.0
173	Lynn Lake Hospital	45.0	55.0	4.15	24.8	45.0	55.0	4.2	0.0
177	Lynn Lake Residence	45.0	55.0	4.15	19.4	45.0	55.0	4.2	0.0
178	Lynn Lake Residence	45.0	55.0	4.15	21.9	45.0	55.0	4.2	0.0
225	Lynn Lake Residence	45.0	55.0	4.15	21.3	45.0	55.0	4.2	0.0

Note:
[1] The + 10 dB "peace and quiet" adjustment is included

6.1.4.3 Health Canada Low Frequency Noise

As a target for the LFN issue, Health Canada noise guidance recommends that the energy sum of the linear sound levels in the 16, 31.5 and 63-Hz octave bands at a receptor location not exceeding 70 dBL.

Table 6-11 summarizes the predicted octave band sound level at 16 Hz, 31.5 Hz, and 63 Hz for the receptors near Gordon site during the construction and operation phases. Assessment of the 16 Hz sound pressure level is not possible because no sound power data is available for the proposed equipment and this octave band is outside of the ISO 9613-2 calculation standard, however Stantec's professional experience suggests that the 16 Hz octave band sound pressure level will be similar to that of the 31.5 Hz octave band. The sound levels at 16 Hz octave band were assumed to be the same as the sound levels at 31.5 Hz octave band. Potential of LFN noise effect is low at receptors near the Gordon site because the predicted sound level results are below the Health Canada target of 70 dBL.

Table 6-11 Sound Level at 16 Hz, 31 Hz, and 63 Hz Octave Band Frequency – Gordon Site

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz, 31.Hz, and 63 Hz	16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz, 31.Hz, and 63 Hz
59	Potential Indigenous Receptor	-	-	32.7	32.7	-	-	40.4	40.4
61	Potential Indigenous Receptor	-	-	24.8	24.8	-	-	32.3	32.3
62	Potential Indigenous Receptor	-	-	18.8	18.8	-	-	26.4	26.4
72	Potential Indigenous Receptor	41.0	41.0	43.5	46.8	41.4	41.4	44.4	47.4
73	Potential Indigenous Receptor	41.9	41.9	44.2	47.6	42.2	42.2	44.2	47.7
74	Potential Indigenous Receptor	38.6	38.6	40.8	44.2	39.5	39.5	41.6	45.1
76	Potential Indigenous Receptor	46.2	46.2	48.7	52.0	47.0	47.0	49.6	52.8
77	Potential Indigenous Receptor	46.4	46.4	49.1	52.3	46.0	46.0	48.7	51.9
93	Black Sturgeon Reserve Residence	-	-	23.8	23.8	-	-	31.3	31.3
101	Black Sturgeon Reserve Residence	-	-	25.9	25.9	-	-	32.9	32.9
104	Remote Cottage	-	-	28.8	28.8	-	-	36.6	36.6
126	Recreation Lot	-	-	24.2	24.2	-	-	31.4	31.4
130	Remote Cottage	-	-	23.7	23.7	-	-	31.0	31.0
131	Remote Cottage	39.7	39.7	42.7	45.7	40.2	40.2	44.9	47.1
132	Trapper Cabin	40.3	40.3	43.1	46.2	40.8	40.8	44.5	47.2
139	Park Vacation Home	-	-	23.6	23.6	-	-	31.0	31.0

Note:
"-" Predicted noise level is negligible

Table 6-12 summarizes the predicted octave band sound level at 16 Hz, 31.5 Hz, and 63 Hz for the receptors near MacLellan site during the construction and operation phases. Similar to the results presented for Gordon site, potential for LFN noise effect is low at receptors near the MacLellan site because the predicted sound level results are below the Health Canada target of 70 dB.

Table 6-12 Sound Level at 16 Hz, 31 Hz, and 63 Hz Octave Band Frequency – MacLellan Site

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	125 Hz	Sum of 16 Hz, 31.Hz, and 125 Hz	16 Hz	31.5 Hz	125 Hz	Sum of 16 Hz, 31.Hz, and 125 Hz
66	Potential Indigenous Receptor	-	-	17.6	17.6	-	-	25.3	25.3
67	Potential Indigenous Receptor	-	-	23.7	23.7	-	-	31.5	31.5
68	Potential Indigenous Receptor	-	-	24.9	24.9	-	-	32.7	32.7
69	Potential Indigenous Receptor	-	-	16.9	16.9	-	-	24.6	24.6
78	Potential Indigenous Receptor	-	-	18.1	18.1	-	-	25.8	25.8
79	Potential Indigenous Receptor	-	-	14.8	14.8	-	-	22.5	22.5
81	Potential Indigenous Receptor	-	-	24.0	24.0	-	-	31.8	31.8
82	Potential Indigenous Receptor	43.8	43.8	46.3	49.6	46.8	46.8	47.0	51.6
83	Potential Indigenous Receptor	35.4	35.4	37.9	41.2	30.6	30.6	33.0	36.3
84	Potential Indigenous Receptor	41.7	41.7	44.2	47.5	38.5	38.5	39.8	43.7
85	Potential Indigenous Receptor	50.0	50.0	52.7	55.9	54.2	54.2	51.3	58.2
86	Potential Indigenous Receptor	46.0	46.0	48.8	51.9	51.9	51.9	50.9	56.4

Table 6-12 Sound Level at 16 Hz, 31 Hz, and 63 Hz Octave Band Frequency – MacLellan Site

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	125 Hz	Sum of 16 Hz, 31.Hz, and 125 Hz	16 Hz	31.5 Hz	125 Hz	Sum of 16 Hz, 31.Hz, and 125 Hz
105	Remote Cottage	-	-	16.4	16.4	-	-	24.1	24.1
115	Museum Site	-	-	25.7	25.7	-	-	26.4	26.4
116	Communication Site	27.8	27.8	31.3	34.1	36.1	36.1	39.0	42.1
121	Recreation Lot	39.3	39.3	41.8	45.1	44.1	44.1	43.1	48.6
123	Potential Indigenous Receptor	42.4	42.4	44.6	48.0	46.0	46.0	45.2	50.5
135	Park Vacation Home	40.8	40.8	42.4	46.2	44.8	44.8	43.3	49.1
163	Lynn Lake Friendship Center	-	-	25.3	25.3	-	-	26.0	26.0
166	Lynn Lake Gospel Church	-	-	26.5	26.5	-	-	26.5	26.5
169	Lynn Lake Library	-	-	25.3	25.3	-	-	26.7	26.7
172	West Lynn Lake High School	-	-	24.6	24.6	-	-	26.1	26.1
173	Lynn Lake Hospital	-	-	27.9	27.9	-	-	30.0	30.0
177	Lynn Lake Residence	-	-	23.0	23.0	-	-	24.9	24.9
178	Lynn Lake Residence	-	-	27.5	27.5	-	-	27.0	27.0
225	Lynn Lake Residence	-	-	23.6	23.6	-	-	27.8	27.8

Note:
"-" Predicted noise level is negligible

6.1.4.4 World Health Organization Sleep Disturbance

The outdoor nighttime annual sound level of 40 dBA was used as the sleep disturbance noise target for this assessment, based on the World Health Organization Night Guidelines for Europe (WHO 2009). The L_n results in Sections 6.1.1 and 6.1.2 (see Table 6-1 to Table 6-6) indicate that the nighttime equivalent sound level from the Project is below 40 dBA at residential receptors. No noise-related sleep disturbances of residential receptors are predicted from the Project operation during the nighttime period.

The work camp building design will affect the sound level experienced inside the work camp due to sound transmission loss through the building structure. Based on the work camp building design, a minimum of 30-dB noise reduction is expected for the building walls with the windows closed. Air conditioning units are recommended for the work camp building such that exterior windows and doors can be closed during summer season. The WHO (1999) recommends a target for sleep disturbance as being an indoor sound level of no more than 30 dBA. The predicted daytime or nighttime and level at the temporary work camp is 56.7 dBA during the construction phase. The predicted daytime or nighttime and level at the permanent work camp and 53.5 dBA during the operation phase. The construction phase noise level inside the temporary work camp is predicted to be 26.7 dBA. The operation phase noise level inside the temporary work camp is predicted to be 23 dBA. The indoor level predicted is based on a building transmission loss of 30 dB with the exterior windows and doors closed.

The predicted results during both construction and operation phases are therefore below the WHO 1999 indoor sound level target of 30 dBA. No noise-related sleep disturbances of workers are predicted from the Project operation during the daytime and nighttime period.

6.2 VIBRATION

6.2.1 Construction

The greatest distances that will result in a structural damage vibration level target of 5 mm/s (FTA 2018) and annoyance target of 72 VdB (FTA 2018) are summarized in Table 6-13.

Table 6-13 Greatest Distance for Structural Damage and Annoyance Vibration

Construction Equipment	Structural Damage Target Distance (m)	Annoyance Target Distance (m)
High Impact Piling	29	280
Excavator	8	71
Compactor	8	71
Bulldozer	4.5	42
Drilling	4.5	42

The distances presented in Table 6-13 are expected to be less for other heavy equipment required for construction that have lower vibratory emissions. The closest receptors to potential construction activities at the Gordon site or the MacLellan site are both located at a distance of more than 1 km. These receptors are located at sufficient distances that annoyance due to construction equipment vibration is expected to be unlikely. Table 6-14 summarizes the predicted vibration level for annoyance effect at the closest receptor for the Gordon site and the MacLellan site. The predicted vibration levels at both receptors are below the annoyance target of 72 VdB.

Table 6-14 Construction Activities Vibration Levels for Receptors

Receptor ID	Description	High Impact Piling (VdB, rms)	Excavator (VdB, rms)	Compactor (VdB, rms)	Bulldozer (VdB, rms)	Drilling (VdB, rms)
76 [1]	Potential Indigenous Receptor	60	42	42	35	35
86 [2]	Potential Indigenous Receptor	51	33	33	26	26

Note:
[1] closest receptor to the Gordon site
[2] closest receptor to the MacLellan site

6.2.2 Operation

Table 6-15 and Table 6-16 presents the prediction ground-borne vibration and air overpressure for receptors at the Gordon site and the MacLellan site, respectively. To be conservative in the predictions, the distance to each receptor was taken from the final pit boundary, and blasts were assumed to be fired with 208 kg of explosives.

The highest blast charge of 208 kg will result in ground-borne vibration below the vibration target of 10 mm/s at all receptors for the Gordon site. The predicted air overpressures are below the vibration target of 120 dBL at all receptors, with the exception of receptor ID 73 and ID 76 near the Gordon site. The predicted air overpressure at receptor ID 73 and 76 is 121 dBL and 123 dBL, respectively. When the blast charge is reduced from 208 kg to 43 kg per hole per delay, the predicted overpressures at receptor ID 73 and ID 76 meet the 120 dBL target.

The highest blast charge of 208 kg will result in ground-borne vibration below the vibration target of 10 mm/s at all receptors for the MacLellan site. The predicted air overpressures are below the vibration target of 120 dBL at all receptors, with the exception of the Permanent Work Camp in the MacLellan Site. The predicted air overpressure at the Permanent Work Camp is 127 dBL. This level is also above the Health Canada target of 125 dBL for one blast per day. In order to meet the Health Canada target of 125 dBL, the blast charge reduction to 85 kg per hole per delay is required. The reduced blast charge of 85 kg can be implemented initially to achieve the overpressure level of 125 dBL at the Permanent Work Camp. Reduced blast charge of 85 kg can be increased if monitoring results indicate air overpressure level below 125 dBL at Permanent Work Camp.

Primary factor in the blasting plan that influence the air overpressure is the charge-weight per delay. Charge weight dictates the amount of energy release. Decreasing the charge-weight per delay will effectively reduce the overpressure effect. The blasting plan will consider distance to receptors and will size the charges to avoid exceeding regulatory targets at receptors.

Other mine plan factors such as depth of burial, volume of displaced rock, delay time interval, and type of explosive will also affect the overpressure. A deeply buried or heavily confined charge will cause mostly ground vibration. Lightly confined blast will transfer most blast energy to atmosphere. Blast that displace large volume of rock create high air overpressure with low frequency content.

Air overpressure monitoring can be conducted at nearby receptors during a blast event to confirm vibrations are below regulatory targets. With mitigation measures, the overpressures are predicted to meet the most conservative target of 120 dBL at all receptors outside the PDA and 125 dBL at the Permanent Work Camp.

Table 6-15 Blast Related Vibration Levels for Receptors near Gordon Site

Receptor ID	Description	Distance to Open Pit (m)	Ground-borne Vibration (mm/s)	Air Overpressure with blast charge of 208 kg per hole per delay (dBL)	Air Overpressure with blast charge of 43 kg per hole per delay (dBL)
59	Potential Indigenous Receptor	8590	0.2	112	109
61	Potential Indigenous Receptor	10960	0.1	111	107
62	Potential Indigenous Receptor	14430	0.1	109	106
72	Potential Indigenous Receptor	3130	0.9	118	115
73	Potential Indigenous Receptor	2170	1.6	121 [a]	118
74	Potential Indigenous Receptor	3180	0.9	118	115
76	Potential Indigenous Receptor	1430	3.1	123 [a]	120
77	Potential Indigenous Receptor	2270	1.5	120	117
93	Black Sturgeon Residence Reserve	11850	0.1	110	107
101	Black Sturgeon Residence Reserve	11760	0.1	110	107
104	Remote Cottage	17070	0.1	108	105
126	Recreation Lot	13470	0.1	109	106
130	Remote Cottage	13290	0.1	110	106
131	Remote Cottage	4260	0.6	117	113
132	Trapper Cabin	3550	0.8	118	114
139	Park Vacation Home	13270	0.1	110	106

Note:

[a] exceeds the MECP cautionary target of 120 dBL based on the blast charge of 280 kg per hole per delay. However, the reduced charge as recommended in the mitigation section will lower the air overpressure to 120 dBL at Receptor ID 76.

Table 6-16 Blast Related Vibration Levels for Receptors near MacLellan Site

Receptor ID	Description	Distance to Open Pit (m)	Ground-borne Vibration (mm/s)	Air Overpressure with blast charge of 208 kg per hole per delay (dBL)	Air Overpressure with blast charge of 85 kg per hole per delay (dBL)
66	Potential Indigenous Receptor	9170	0.2	112	110
67	Potential Indigenous Receptor	7850	0.2	113	111
68	Potential Indigenous Receptor	5590	0.4	115	113
69	Potential Indigenous Receptor	9100	0.2	112	110
78	Potential Indigenous Receptor	9050	0.2	112	110
79	Potential Indigenous Receptor	12100	0.1	110	108
81	Potential Indigenous Receptor	7620	0.2	113	111
82	Potential Indigenous Receptor	3770	0.7	117	115
83	Potential Indigenous Receptor	7070	0.3	113	112
84	Potential Indigenous Receptor	6140	0.3	114	112
85	Potential Indigenous Receptor	3120	0.9	118	117
86	Potential Indigenous Receptor	2370	1.4	120	118
105	Remote Cottage	10780	0.1	111	109
115	Museum Site	6910	0.3	114	112
116	Communication Site	5630	0.4	115	113
121	Recreation Lot	5260	0.4	115	113
123	Potential Indigenous Receptor	3940	0.7	117	115
135	Park Vacation Home	3960	0.7	114	115
163	Lynn Lake Friendship Center	6390	0.3	114	112
166	Lynn Lake Gospel Church	6750	0.3	114	112
169	Lynn Lake Library	6800	0.3	114	112
172	West Lynn Lake High School	7160	0.3	113	112
173	Lynn Lake Hospital	6200	0.3	114	112

Table 6-16 Blast Related Vibration Levels for Receptors near MacLellan Site

Receptor ID	Description	Distance to Open Pit (m)	Ground-borne Vibration (mm/s)	Air Overpressure with blast charge of 208 kg per hole per delay (dBL)	Air Overpressure with blast charge of 85 kg per hole per delay (dBL)
177	Lynn Lake Residence	6040	0.3	114	113
178	Lynn Lake Residence	6910	0.3	114	112
225	Lynn Lake Residence	7390	0.3	113	111
	Permanent Work Camp (outdoor)	800	7.4	127 [a]	125

Note:

[a] exceeds the Health Canada target of 125 dBL based on the blast charge of 280 kg per hole per delay. However, the reduced charge of 85 kg per hole per delay will lower the air overpressure to 125 dBA at the Permanent Work Camp.

6.2.3 Mitigation

The modelling results presented in Section 6.2.2 includes mitigation. In an adaptive management approach, mitigation measures presented in this section will be implemented as needed, and monitoring will help to confirm effectiveness.

Mitigation will be achieved by blast design. The mitigation measures that apply to both the Gordon and MacLellan sites are summarized as follows:

- Highest explosive per time delay that do not exceed 207.9 kg
- Only one hole/delay will be fired in the blast
- Minimum time delay between holes in blasts will not be less than 8 milliseconds (ms)

The specific mitigation measures for receptor ID 76 and ID 73 near the Gordon site are as follows:

- The reduced blast charge of 43 kg can be increased if the distance between the blast and closest receptor ID 76 and ID 73 is more than 1,430 m and 2,170 m (distance based on receptor location to pit boundary), respectively.
- The reduced blast charge of 43 kg can be increased if monitoring results indicate air overpressure level below 120 dBL at ID 76 and ID 73.
- Engagement with Marcel Colomb First Nation to discuss the potential of a seasonal mitigation approach, which relaxes the reduced blast charge of 43 kg during off-season period when trapping activities at receptors (ID 76 and ID 73) is not expected.

The specific mitigation measures for the Permanent Work Camp within the MacLellan site are as follows:

- Reduced blast charge of 85 kg can be increased if the distance between the blast Permanent Work Camp is more than 800 m.
- The reduced blast charge of 85 kg can be increased if monitoring results indicate air overpressure level below 125 dBL at the Permanent Work Camp.
- Blasting will be scheduled during shift change (e.g., less worker sleeping and more local activities) to reduce potential annoyance at the Permanent Work Camp.

7.0 SUMMARY AND CONCLUSION

A total of 32 noise and vibration receptors were identified in the vicinity of the Project sites, including residences, potential indigenous receptor areas, First Nation communities, schools, daycares, and hospitals.

The noise model focused on the potential Project noise effects during operation and construction phases. Blast related noise was considered as air blast overpressure effects in the vibration assessment. Noise effects such as community annoyance, sleep disturbance, and low frequency noise were assessed. The potential effects of Project activities on Noise were predicted to comply with the provincial, federal, and international noise targets (i.e. Province of Manitoba, Health Canada, and WHO) at all receptors.

The vibration model focused on the Project vibration effect during operation and construction phases. The construction phase vibration model focused on ground vibration from construction equipment. The potential effects of Project activities on vibration were predicted to meet the international vibration target (FTA 2018) during construction phase. The operation phase vibration model focused on the blast induced ground vibration and air blast overpressure effects. Blast designs were developed to avoid structural damage and reduce annoyance effects from blast induced ground vibrations and air blast overpressure. The results meet the provincial and federal vibration target during operation phase.

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9.0 STANTEC QUALITY MANAGEMENT PROGRAM

This Technical Modelling Report, entitled **Lynn Lake Gold Project, Noise and Vibration Impact Assessment** prepared for Alamos Gold Inc., dated April 7, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individual:

Jonathan Chui, P.Eng., INCE
Senior Associate, Noise Management Group

Signature

This report was reviewed by the following individual:

Michael Murphy, Ph.D, P.Eng.
Senior Principal

Signature

Approval to transmit to client:

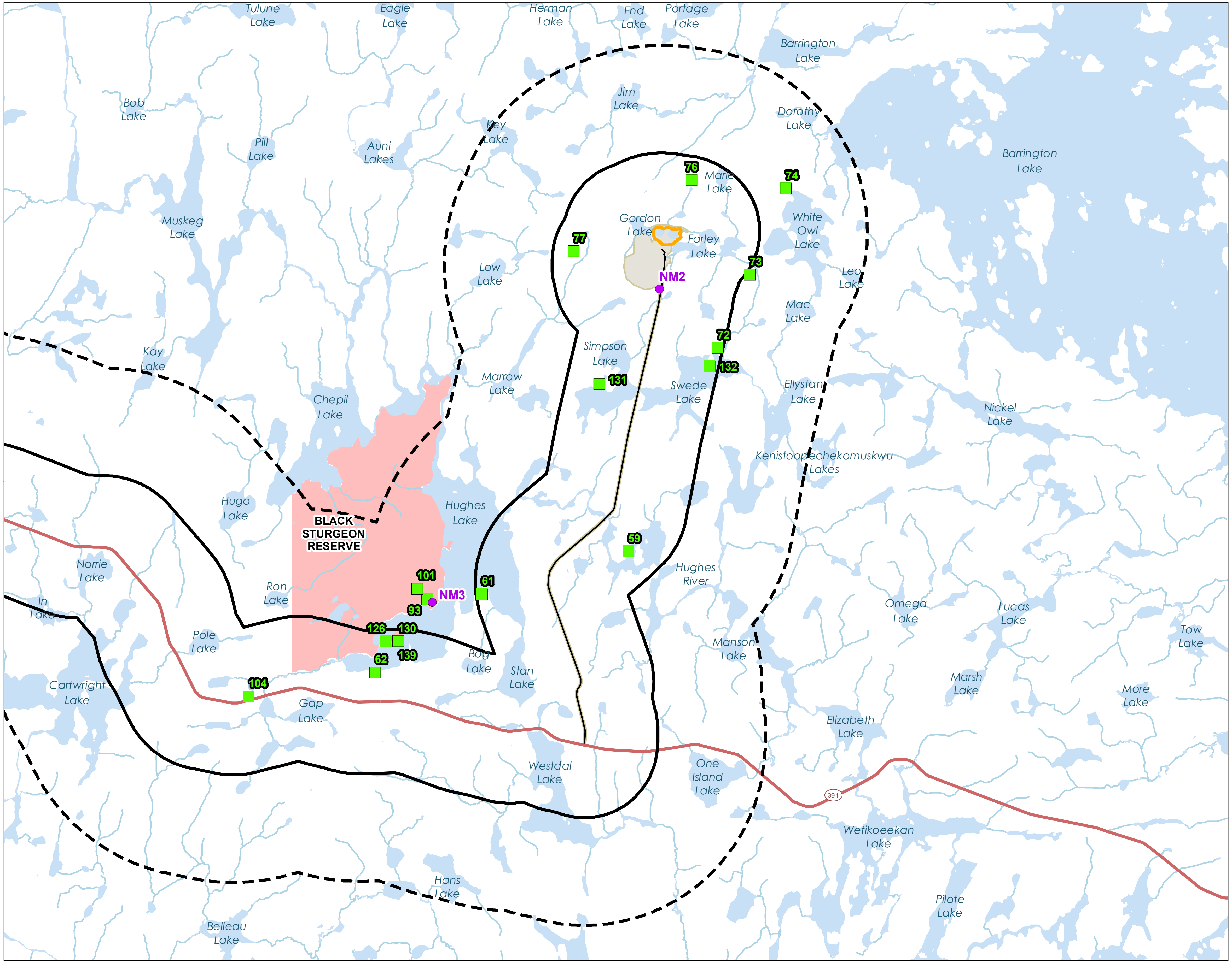
Karen Mathers, M.Sc., P.Geo. FGC, PMP
Principal – Environmental Services

Signature

This report was independently reviewed by Jennifer McPhail, M.Eng., P.Eng., Associate

10.0 LIMITATIONS

This Technical Modelling report entitled Lynn Lake Gold Project, Noise and Vibration Impact Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Alamos Gold Inc. (the "Client") to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2 4 Kilometres

(At original document size of 11x17)
1:110,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

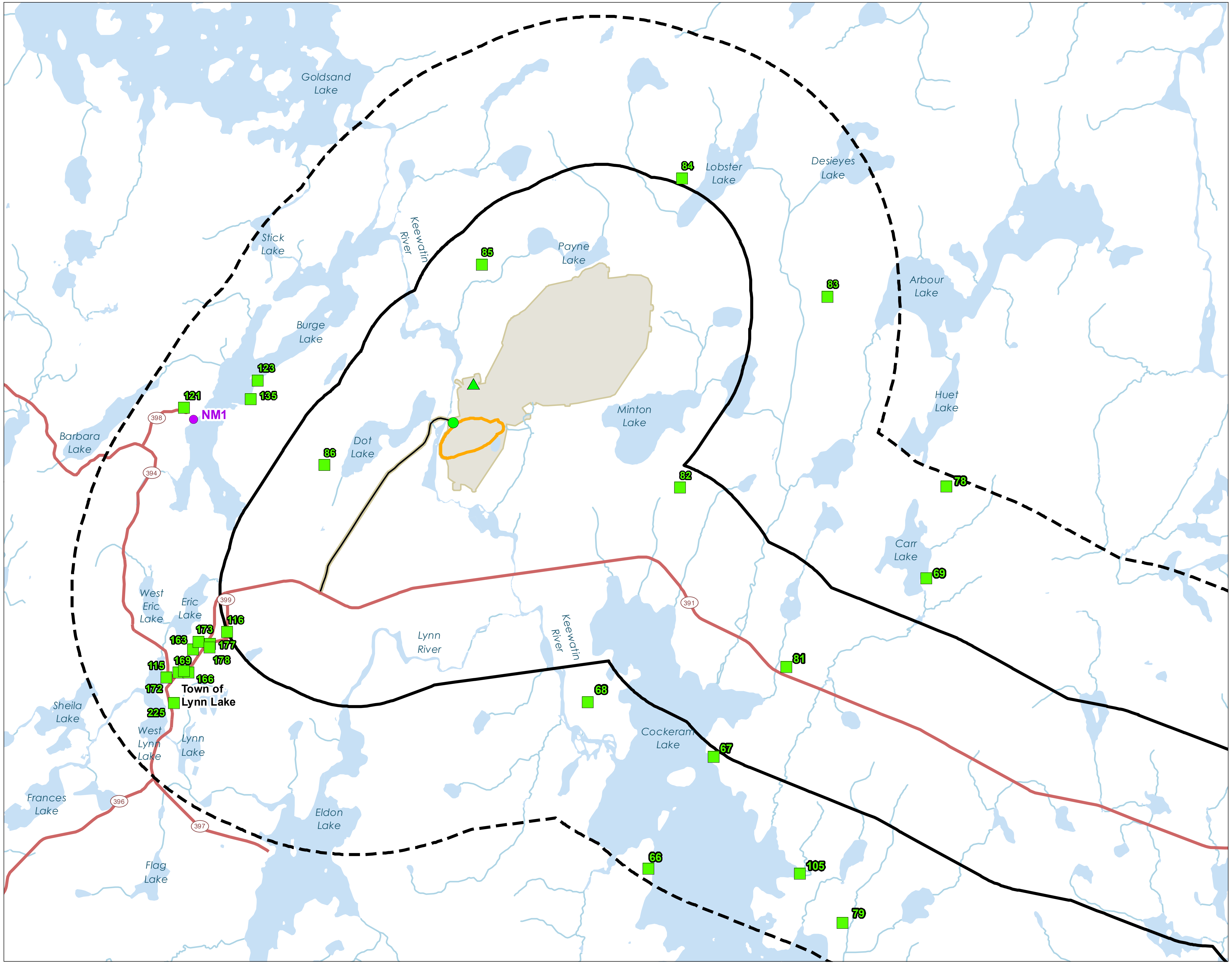
Project Location
Lynn Lake,
Manitoba

Prepared by JHiebert on 2020-07-10
Technical Review by JChui on 2020-07-10
Senior GIS Review by GKroupa on 2020-07-10

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
1

Title
Noise and Vibration Assessment Areas - Gordon Site



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location
- Future Worker Camp
- Temporary Worker Camp

Landbase

- Existing Access
- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres

(At original document size of 11x17)
1:80,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
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Project Location
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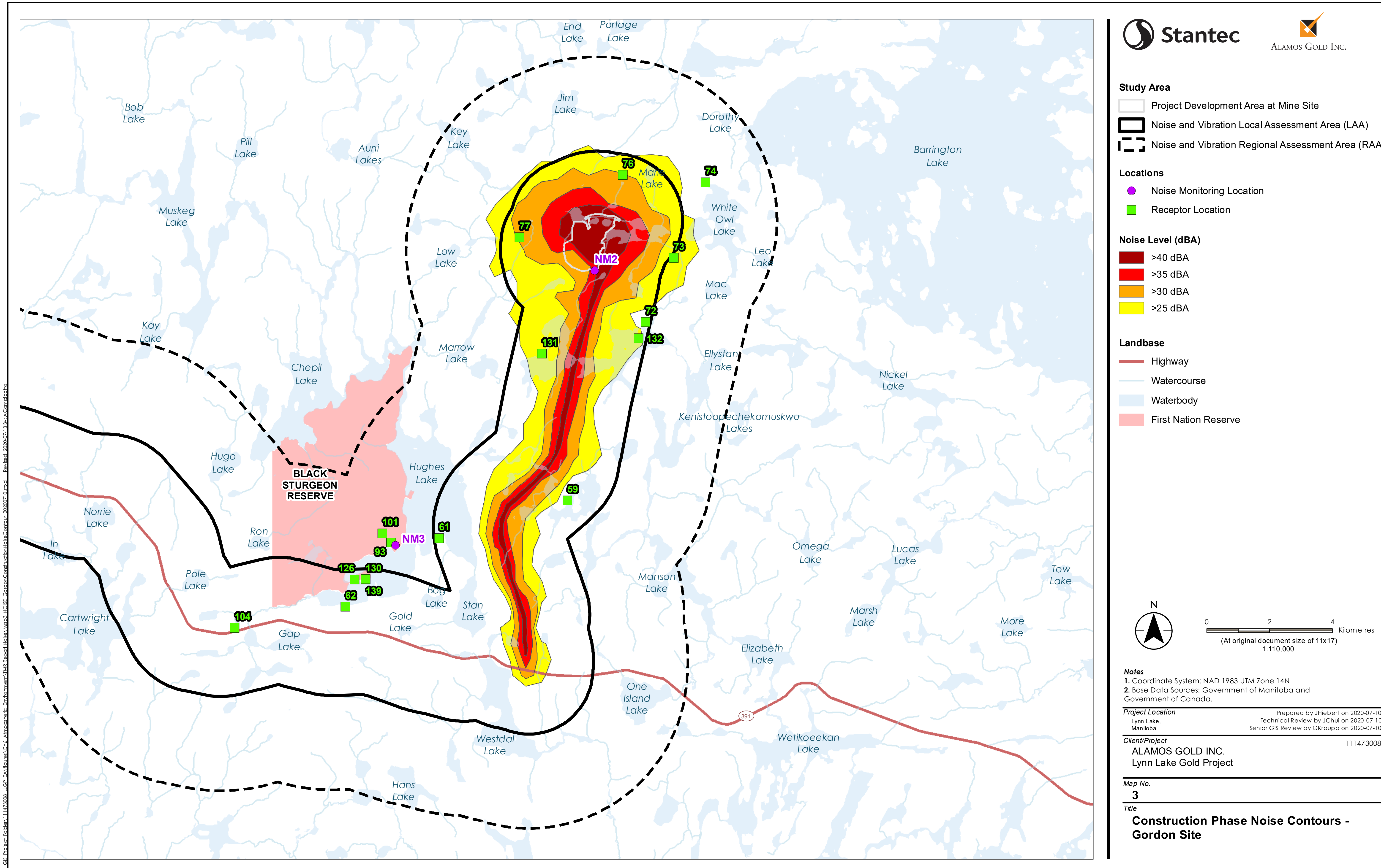
Senior GIS Review by GKroupa on 2020-07-10

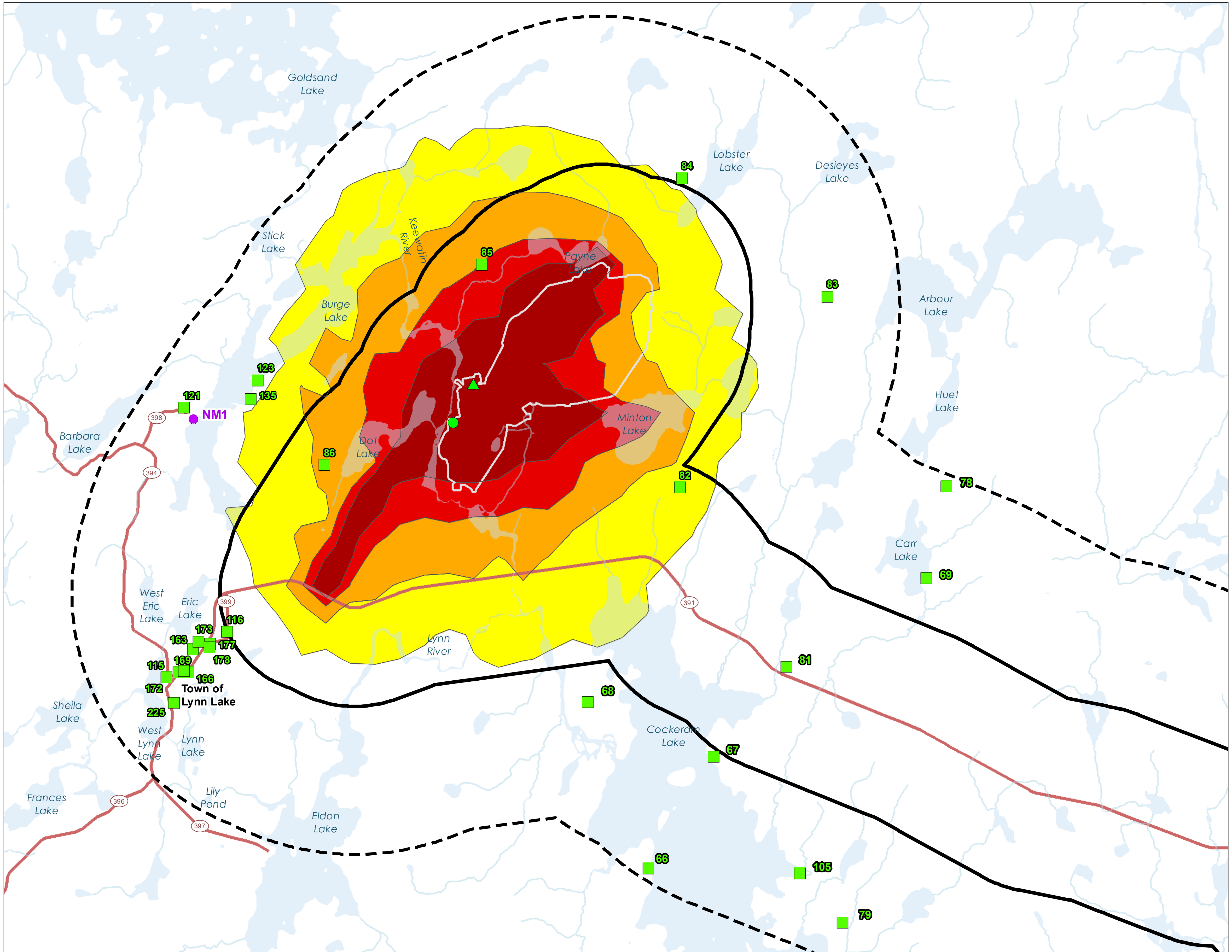
Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
2

Title
Noise and Vibration Assessment Areas - MacLellan Site



Stantec
Alamos Gold Inc.
Study Area
Project Development Area at Mine Site
Noise and Vibration Local Assessment Area (LAA)
Noise and Vibration Regional Assessment Area (RAA)
Locations
Noise Monitoring Location
Receptor Location
Noise Level (dBA)
>40 dBA
>35 dBA
>30 dBA
>25 dBA
Landbase
Highway
Watercourse
Waterbody
First Nation Reserve
BLACK STURGEON RESERVE
NM2
NM3
0 2 4 Kilometres
(At original document size of 11x17)
1:110,000
Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
Project Location
Lynn Lake, Manitoba
Prepared by JHiebert on 2020-07-10
Technical Review by JChui on 2020-07-10
Senior GIS Review by GKroupa on 2020-07-10
Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project
Map No.
3
Title
Construction Phase Noise Contours - Gordon Site



Stantec

Alamos Gold Inc.

Study Area

- Project Development Area at Mine
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location
- Future Worker Camp
- Temporary Worker Camp

Noise Level (dBA)

- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres

(At original document size of 11x17)
1:80,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

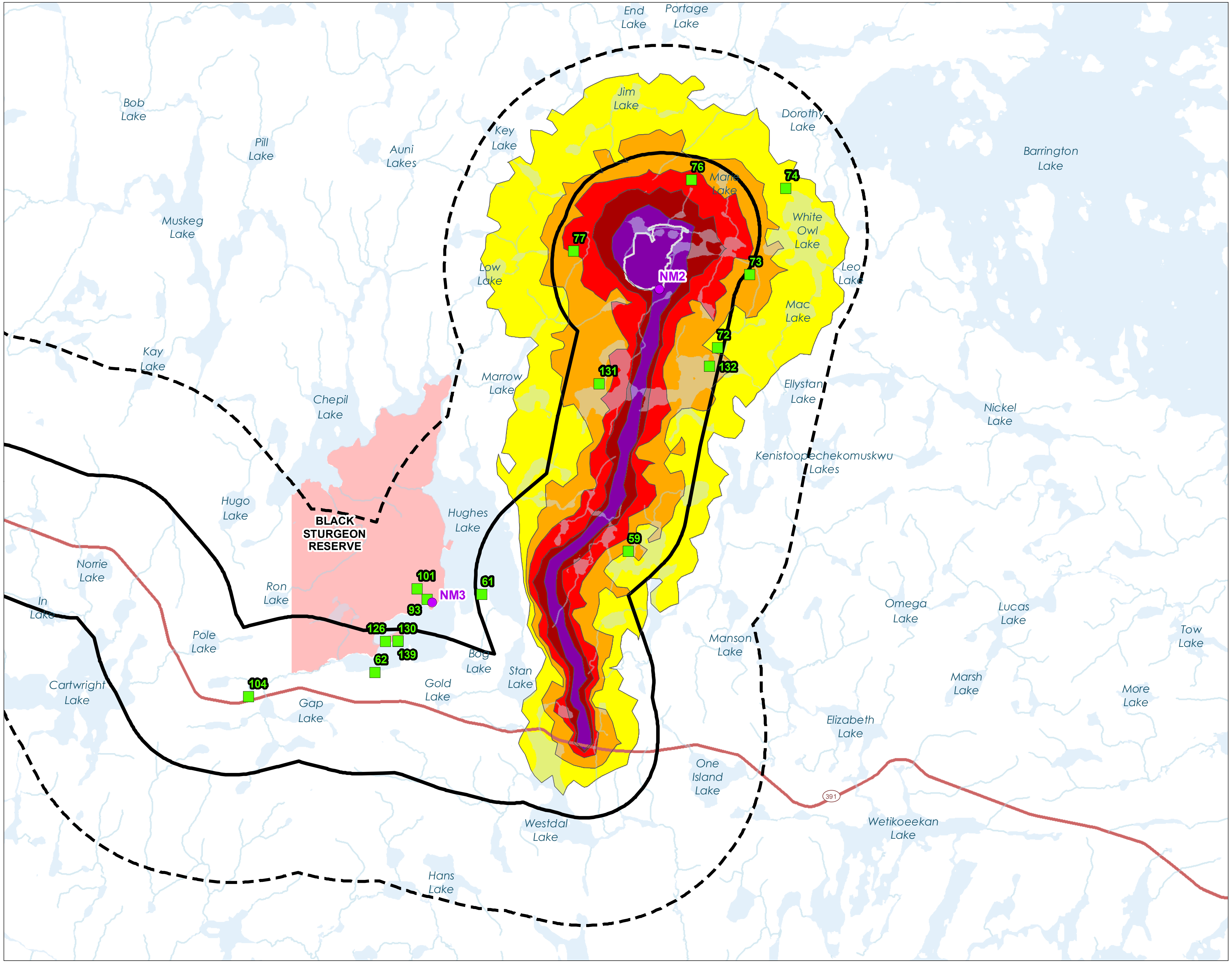
Project Location
Lynn Lake,
Manitoba

Prepared by JHiebert on 2020-07-10
Technical Review by JChui on 2020-07-10
Senior GIS Review by GKroupa on 2020-07-10

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
4

Title
Construction Phase Noise Contours - MacLellan Site



Stantec

Alamos Gold Inc.

Study Area

- Project Development Area at Mine Site
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring
- Receptor Location

Noise Level (dBA)

- >45 dBA
- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2 4 Kilometres

(At original document size of 11x17)
1:110,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N

2. Base Data Sources: Government of Manitoba and Government of Canada.

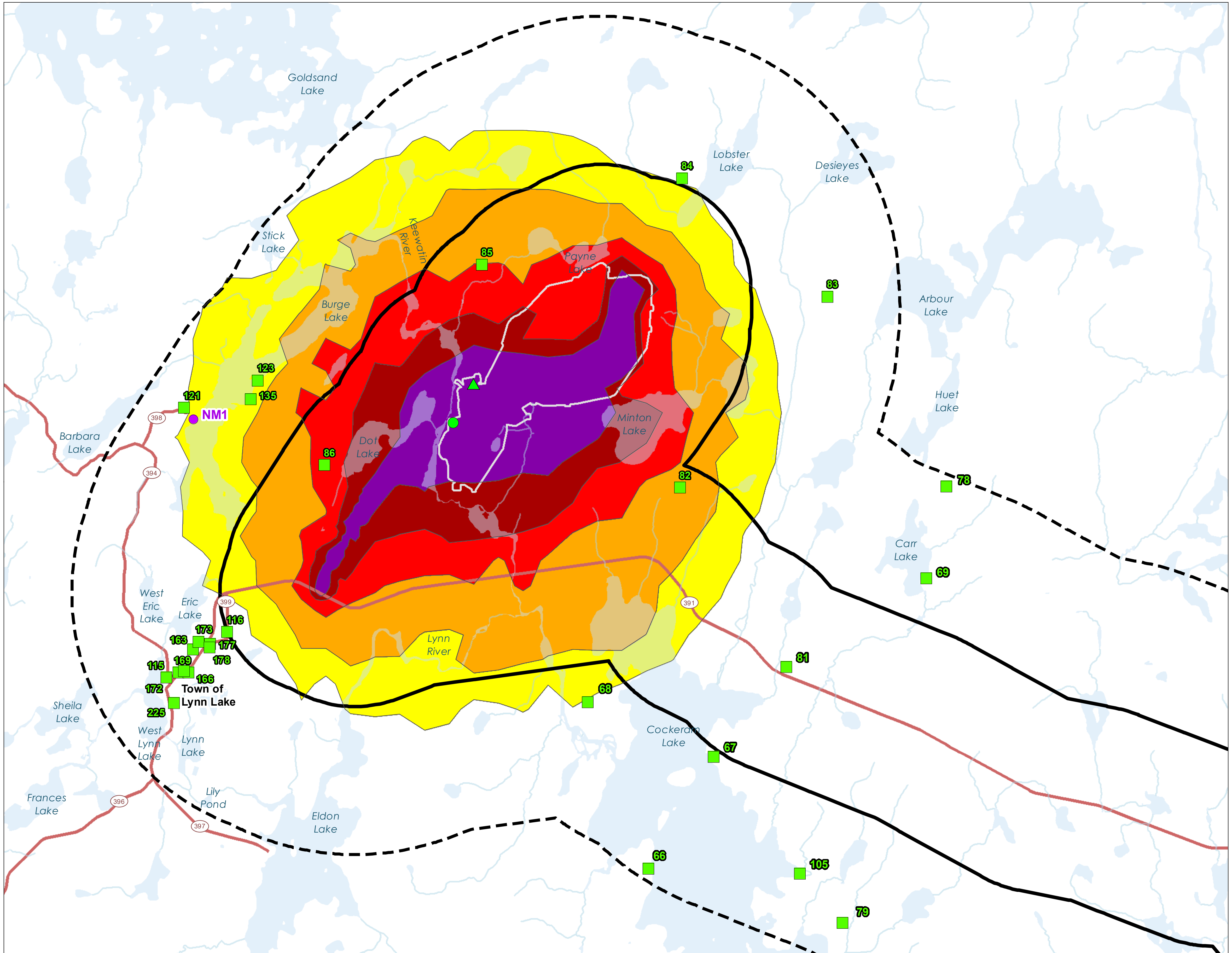
Project Location
Lynn Lake, Manitoba

Prepared by JHiebert on 2020-07-10
Technical Review by JChui on 2020-07-10
Senior GIS Review by GKroupa on 2020-07-10

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
5

Title
Operation Phase Noise Contours - Gordon Site



Stantec

Alamos Gold Inc.

Study Area

- Project Development Area at Mine Site
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location
- Future Worker Camp
- Temporary Worker Camp

Noise Level (dBA)

- >45 dBA
- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres

(At original document size of 11x17)
1:80,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by JHiebert on 2020-07-10
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Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
6

Title
Operation Phase Noise Contours - MacLellan Site

Appendix A COMMONLY USED NOISE AND VIBRATION TERMINOLOGY

Ambient Sound Level	The pre-project background noise or vibration level, which is often used interchangeably with “existing noise” in this manual.
Background Sound Level (i.e., Baseline)	It includes noise from all sources other than the sound of interest (i.e., sound from other industrial noise not being measured, transportation sources, animals, and nature)
Bands (octave, 1/3 octave)	A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. Each octave band has a centre frequency that is double the centre frequency of the octave band preceding it
Daytime	The hours from 7:00 am to 10:00 pm
day-night Sound Level (L_{dn})	An equivalent continuous sound level taken over 24 hours, with the night-time (10 p.m. to 7 a.m.) contributions adjusted by +10 dB. (This is a type of rating level because of the night-time adjustments.) The night-time adjustment (or addition of 10 dB to the night-time period) is used to account for the expected increased annoyance due to noise-induced sleep disturbance and the increased residential population at night relative to daytime, by a factor of 2–3. US EPA 1974 suggests that in quiet areas, the night-time levels naturally drop by about 10 dB and this level of adjustment has been used with success in the U.S.
dB/dBL/dBZ - Decibel	A logarithmic unit associated with sound pressure levels and sound power levels
dBA - Decibel, A-Weighted	A logarithmic unit where the recorded sound has been filtered using the A frequency weighting scale. A-weighting somewhat mimics the response of the human ear to sounds at different frequencies. A-weighted sound pressure levels are denoted by the suffix ‘A’ (i.e., dBA), and the term pressure is normally omitted from the description (i.e., sound level or noise level)
Decibel Addition	In acoustics, due to the logarithmic nature of the decibel scale, the addition of two or more sound pressure levels (denoted as SPL_1, SPL_2, … SPL_n) is done as follows: $SPL_1 + SPL_2 + \ldots SPL_n = 10 \log (10^{(SPL1/10)} + 10^{(SPL2/10)} + \ldots + 10^{(SPLn/10)})$ As an example: 50 dB + 50 dB = 53 dB

Energy Equivalent Sound Level (L_{eq})	An energy-average sound level taken over a specified period of time. It represents the average sound pressure encountered for the period. The time period is often added as a suffix to the label (e.g., L_{eq} (24) for the 24-hour equivalent sound level). L_{eq} is usually A-weighted. A L_{eq} value expressed in dBA is a good, single value descriptor of the annoyance of noise. Here is a list of L_{eq} used in this assessment: • $L_{eq,1hr}$ Hourly equivalent sound level • L_d Daytime period equivalent sound level (15 hours, 7:00 AM to 10:00 PM) • L_n Nighttime period equivalent sound level (9 hours, 10:00 PM to 7:00 AM) • L_{dn} day-night sound level (also see definitions for day-night Sound Level)
Frequency	Number of cycles per unit of time. In acoustics, frequency is expressed in hertz (Hz), i.e. cycles per second
Hertz (Hz)	Unit of measurement of frequency, numerically equal to cycles per second
Low Frequency Noise (LFN)	Noise in the low frequency range, 20 Hz up to 200 Hz. Health Canada guidance indicates that sounds in the 16, 31.5 and 63-Hz octave bands greater than 70 dB may result in noise-inducted rattles; Low frequency noise can be associated with the introduction of noticeable vibrations and rattles in some structures
Nighttime	The hours from 10:00 PM to 7:00 AM
Noise	Unwanted sound
Noise Level	Same as Sound Level, except applied to unwanted sounds
Sound	A dynamic (fluctuating) pressure
Sound Pressure Level (SPL)	The logarithmic ratio of the root mean square sound pressure to the sound pressure at the threshold of hearing. The sound pressure level is defined by equation below where P is the RMS pressure due to a sound and P_0 is the reference pressure. P_0 is usually taken as 2.0×10^{-5} Pascals. SPL (dB) = $20 \log(P_{RMS}/P_0)$
Sound Power Level (PWL)	The logarithmic ratio of the instantaneous sound power of a noise source to that of the reference power. The sound power level is defined by equation below where W is the sound power of the source in watts, and Wo is the reference power of 10^{-12} watts PWL (dB) = $10 \log(W/W_0)$
Spectrum	The description of a sound wave's resolution into its components of frequency and amplitude
Transmission Loss	The ratio of the sound energy striking an outside wall relative to the transmitted sound energy inside the wall, expressed in decibels.

Tonal Components	Often industrial facilities exhibit tonal components. Examples of tonal components are transformer hum, sirens, and piping noise. The test for the presence of tonal components consists of two parts (as per tonality prescribed in AUC Rule 012). The first part must demonstrate that the sound pressure level of any one of the slow-response, A-weighted, 1/3-octave bands between 20 and 16 kHz is 10 dBA or more than the sound pressure level of at least one of the adjacent bands within two 1/3-octave bandwidths. In addition, there must be a minimum of a 5 dBA drop from the band containing the tone within 2 bandwidths on the opposite side. The second part is that the tonal component must be a pronounced peak clearly obvious within the spectrum
VdB – Decibel, Vibration Velocity	Vibration Velocity Level (VdB) Ten times the common logarithm of the ratio of the square of the amplitude of the root mean square vibration velocity to the square of the amplitude of the reference RMS vibration velocity. The reference velocity in the United States is one micro-inch per second. Abbreviated as VdB.
Vibration	An oscillation wherein the quantity is a parameter that defines the motion of a mechanical system.

Appendix B NOISE EMISSION SOURCES

Table B-1 Equipment Sound Power Level Summary - Construction

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
PROCESSING PLANT CONSTRUCTION EQUIPMENT											
John Deere 700K Dozer	1	114	117	118	109	101	102	98	96	92	108
John Deere 850K Dozer	3	117	120	121	112	104	105	101	99	95	111
Cat D8 Dozer	2	116	119	120	111	103	104	100	98	94	110
Cat D9 Dozer	1	117	120	121	112	104	105	101	99	95	111
Cat D7 Dozer	1	114	117	118	109	101	102	98	96	92	108
Cat D6 Dozer	1	114	117	118	109	101	102	98	96	92	108
Cat 815K Packers	1	98	101	103	98	94	96	92	86	78	100
Plate Packers	2	98	101	103	98	94	96	92	86	78	100
Packers 15 Ton	3	96	99	101	96	92	94	90	84	76	97
Packers 10 Ton	1	102	105	107	102	98	100	96	90	82	104
Cat 980H Site Loader	1	114	117	112	107	108	103	100	94	87	109
Cat 966H Site Loader	1	113	116	111	106	107	102	99	93	86	108
Zoom Boom	1	109	112	103	99	98	98	97	89	80	103
Grader	1	108	111	110	106	102	107	101	97	88	109
John Deere 135G Excavator	1	100	103	101	95	97	92	90	86	82	98
John Deere 220G Excavator	1	101	104	102	96	98	93	91	87	83	99
John Deere 300G Excavator	2	100	103	112	106	102	98	96	92	89	104
John Deere 400G Excavator	3	101	104	113	107	103	99	97	93	90	106
John Deere 850G Excavator	1	102	105	114	108	104	100	98	94	91	107
30 Ton Rock Truck	1	119	122	104	105	103	104	101	96	91	108
40 Ton Rock Truck	6	126	129	126	117	113	111	109	106	97	117
65 Ton Rock Truck	5	126	129	126	119	115	113	111	108	99	119
Highway Trucks	4	114	117	113	104	102	104	101	97	89	108
Tridem Trailer/Highway Tractor	1	118	121	114	104	104	101	100	92	87	107
Water Truck	1	101	106	106	106	106	104	100	98	99	109
Powder Truck	1	98	113	109	106	106	104	95	93	88	108
Rock Drill	1	103	106	110	107	104	105	110	105	100	114
Fusing C-Can	1	92	95	96	97	96	97	94	89	84	101
Flushing Equipment	1	100	103	103	90	86	83	82	76	68	91
Hammer (400 Excavator)	1	105	108	115	116	112	111	106	102	93	115
C-Can Buses	5	95	109	106	103	102	101	92	90	85	104
Tailing Management Facility Construction Equipment											

Table B-1 Equipment Sound Power Level Summary - Construction

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Cat D6/850 Dozer	4	114	117	118	109	101	102	98	96	92	108
Cat D7 Dozer	1	114	117	118	109	101	102	98	96	92	108
Cat D8 Dozer	2	116	119	120	111	103	104	100	98	94	110
Cat 980K Loader	2	114	117	112	107	108	103	100	94	87	109
Zoom Boom	2	109	112	103	99	98	98	97	89	80	103
Grader	1	108	111	110	106	102	107	101	97	88	109
John Deere 300G Excavator	2	100	103	112	106	102	98	96	92	89	104
John Deere 400G Excavator	2	101	104	113	107	103	99	97	93	90	106
Articulated Truck 40 Ton	8	126	129	126	117	113	111	109	106	97	117
Lowbed	1	111	114	117	116	116	114	111	104	98	119
Fuel Truck	2	109	126	129	126	117	113	111	109	106	97
Heavy Truck	1	109	111	119	108	101	103	98	92	83	108
HVAC Truck	4	107	109	117	107	100	101	96	91	82	107
Mechanic Truck	1	107	109	117	107	100	101	96	91	82	107
Concrete Mixer Truck	2	108	111	118	108	101	103	97	92	83	108
Service Truck	1	107	109	117	107	100	101	96	91	82	107
Truck 1/2 Ton	5	97	111	108	104	104	103	93	91	86	106
Truck 1 Ton	4	97	111	108	104	104	103	93	91	86	106
Crew Van/Bus	1	107	109	117	107	100	101	96	91	82	107
Hand Drill	2	100	103	102	103	100	102	103	108	108	112
Grout Mixer	1	86	89	93	86	86	85	81	79	77	90
3" Minus Pump	1	100	103	98	92	92	91	86	83	71	95
6" Pump	2	103	106	101	95	95	94	89	86	74	99
Generator 25 kW	2	98	98	99	97	94	93	90	84	77	98
Generator 50 kW	2	86	86	87	85	82	81	78	72	65	86
Light Plant	1	98	101	96	88	84	83	81	78	66	89
Compressor	5	101	104	100	94	99	100	98	91	86	104
Pre-Production Equipment – Gordon Site											
Excavator Backhoe 65 Ton	3	114	117	112	106	107	105	102	97	89	110
Rubber Tire Loader Cat 993	1	113	116	121	112	112	111	109	107	97	116
Rubber Tire Loader Wheel Loader 260 kW	1	114	117	112	107	108	103	100	94	87	109

Table B-1 Equipment Sound Power Level Summary - Construction

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Articulated Trucks 38 Ton	6	126	129	126	117	113	111	109	106	97	117
Articulated Trucks Primary Trucks 144 Ton	3	113	116	119	118	118	116	113	106	100	121
Grader 215 kW	1	108	111	110	106	102	107	101	97	88	109
Grader 178 kW	1	107	110	109	105	101	106	100	96	87	108
Crawler Dozer 150 kW 20 Ton	1	107	110	116	109	108	103	100	91	85	110
Crawler Dozer 264 kW 11 Ton	1	102	105	109	107	107	104	101	95	87	109
Crawler Dozer 450 kW 14 Ton	1	108	111	115	107	108	110	112	100	90	115
Rubber Tire (Wheel) Dozer 370 kW	1	117	120	121	112	104	105	101	99	95	111
Hydraulic Excavator 36 Ton	1	101	104	107	103	103	104	101	98	93	109
Diesel (Water) Truck 15 kW	1	109	111	119	108	101	103	98	92	83	108
Diesel Rough Terrain Cranes 110 Ton	2	102	105	96	94	91	89	84	76	67	94
Diesel Bore/Drill Rigs Blasthole Stemmer	1	98	101	93	91	91	90	87	86	77	95
Diesel Trucks on Highway Class 8 Dump Truck	1	114	117	113	104	102	104	101	97	89	108
Diesel Trucks Lube & Fuel Truck	1	109	111	119	108	101	103	98	92	83	108
Diesel Trucks Field Welding Service Truck	1	95	109	106	103	102	101	92	90	85	104
Diesel Trucks Sand Spreader Body	1	114	117	108	110	101	98	97	92	85	106
Rubber Tire Loader Wheel Loader 260 kW	1	114	117	112	107	108	103	100	94	87	109
Diesel Rough Terrain Forklift (Telescopic) 12 Ton	1	100	103	94	92	89	87	82	74	65	92
Diesel Truck Explosives Contractor Equipment	1	96	110	107	104	103	102	93	91	86	105
Diesel Truck Crew Change Vehicle	1	95	109	106	103	102	101	92	90	85	104
Light Tower Heavy Duty Light Tower	8	98	101	96	88	84	83	81	78	66	89
Diesel Light Commercial Pressure Washer Flameless Air Mobile Heater	1	102	105	100	93	90	81	77	71	66	91

Table B-1 Equipment Sound Power Level Summary - Construction

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Diesel Light Commercial Pump Portable 4-Inch Dewatering Pump	1	100	103	98	92	92	91	86	83	71	95
Diesel Light Commercial Pump Portable 8-Inch Dewatering Pump	1	103	106	101	95	95	94	89	86	74	99
Diesel Truck Mine Pickup Truck	5	97	111	108	104	104	103	93	91	86	106
Pre-Production Equipment – MacLellan Site											
Excavator Backhoe 65 Ton	2	114	117	112	106	107	105	102	97	89	110
Rubber Tire Loader Cat 993	1	113	116	121	112	112	111	109	107	97	116
Rubber Tire Loader (Wheel Loader) 260 kW	1	114	117	112	107	108	103	100	94	87	109
Articulated Truck 38 Ton	8	126	129	126	117	113	111	109	106	97	117
Articulated Truck (Primary Truck) 144 Ton	3	113	116	119	118	118	116	113	106	100	121
Grader 215 kW	1	108	111	110	106	102	107	101	97	88	109
Grader 178 kW	1	107	110	109	105	101	106	100	96	87	108
Crawler Dozer 150 kW 20 Ton	1	107	110	116	109	108	103	100	91	85	110
Crawler Dozer 264 kW	2	102	105	109	107	107	104	101	95	87	109
Crawler Dozer 450 kW	2	108	111	115	107	108	110	112	100	90	115
Rubber Tire Dozer (Wheel Dozer) 370 kW	1	117	120	121	112	104	105	101	99	95	111
Hydraulic Excavator 36 Ton	1	101	104	107	103	103	104	101	98	93	109
Diesel Truck 15kl Water Truck	1	109	111	119	108	101	103	98	92	83	108
Diesel (Rough-Terrain) Crane 110 Ton	1	102	105	96	94	91	89	84	76	67	94
Diesel (Rough-Terrain) Crane 90 Ton	1	91	94	93	86	85	83	80	71	62	88
Excavators Hydraulic Breaker 36 Ton	1	110	113	108	104	100	97	93	86	78	103
Diesel Bore/Drill Rigs Blasthole Stemmer	1	98	101	93	91	91	90	87	86	77	95
Diesel Trucks On-Highway Class 8 Dump Truck	2	114	117	113	104	102	104	101	97	89	108
Diesel Trucks Lube & Fuel Truck	1	109	111	119	108	101	103	98	92	83	108

Table B-1 Equipment Sound Power Level Summary - Construction

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Diesel Trucks Field Welding Service Truck	1	95	109	106	103	102	101	92	90	85	104
Diesel Trucks Sand Spreader Body	1	114	117	108	110	101	98	97	92	85	106
Diesel Rough Terrain (Telescopic) Forklift 12 Ton	1	100	103	94	92	89	87	82	74	65	92
Diesel Skid Steer Loaders	1	98	101	93	91	91	90	87	86	77	95
Diesel Truck Explosives Contractor Equipment	1	96	110	107	104	103	102	93	91	86	105
Diesel Truck Crew Change Vehicle	1	95	109	106	103	102	101	92	90	85	104
Light Tower Heavy-Duty Light Tower	6	98	101	96	88	84	83	81	78	66	89
Diesel Light Commercial Portable Air Compressor 5-6m^3	1	101	104	100	94	99	100	98	91	86	104
Diesel Light Commercial Pressure Washer Flameless Air Mobile Heater	1	102	105	100	93	90	81	77	71	66	91
Diesel Light Commercial Pressure Washer Trailer-Mounted Pressure Washer	1	83	84	84	86	89	91	94	96	95	101
Diesel Light Commercial Pump Portable 4-Inch Dewatering Pump	1	100	103	98	92	92	91	86	83	71	95
Diesel Light Commercial Pump Portable 8-Inch Dewatering Pump	1	103	106	101	95	95	94	89	86	74	99
Diesel Truck Mine Pickup Truck	10	97	111	108	104	104	103	93	91	86	106

Table B-2 Equipment Sound Power Level – Construction Haul Road Traffic

Source	Volume (Trucks/Hr)	Sound Power Levels At Octave Band Center Frequencies For Each Unit (Hz) (Db Re 1 Pw)									Total Dba
		31.5	63	125	250	500	1000	2000	4000	8000	
Haul Road Traffic – Gordon Site											
Pit to Ore Stockpile (Articulated Truck 144 Ton)	1	113	116	119	118	118	116	113	106	100	121
Construction to Waste Area (Articulated Truck 65 Ton)	1	126	129	126	119	115	113	111	108	99	119
Pit to Waste Area (Articulated Truck 144 Ton)	1.4	113	116	119	118	118	116	113	106	100	121
Pit to Overburden (Articulated Truck 40 Ton)	1.3	120	123	105	106	104	105	102	97	92	109
Haul Road Traffic – MacLellan Site											
Plant to Topsoil (Articulated Truck 40 Ton)	4.3	120	123	105	106	104	105	102	97	92	109
Plant to Waste (Articulated Truck 65 Ton)	2.1	126	129	126	119	115	113	111	108	99	119
Tailing to Waste (Articulated Truck 40 Ton)	3.5	120	123	105	106	104	105	102	97	92	109
Pit to Overburden (Articulated Truck 40 Ton)	3.4	120	123	105	106	104	105	102	97	92	109
Pit to Waste Rock Stockpile (Articulated Truck 144 Ton)	2.7	113	116	119	118	118	116	113	106	100	121
Pit to Ore (Articulated Truck 40 Ton)	2.3	120	123	105	106	104	105	102	97	92	109
Pit to Crusher (Articulated Truck 40 Ton)	13.9	120	123	105	106	104	105	102	97	92	109

Table B-3 Equipment Sound Power Level - Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Primary Crusher Building											
Primary Crushing Air Compressor	1	97	93	98	97	95	98	103	100	93	106
Secondary Crusher Overhead Crane	1	96	99	90	88	85	83	78	70	61	88
Primary Crusher	1	115	115	115	111	109	106	104	100	91	112
Primary Crusher Transfer Conveyor	1	90	90	93	95	98	98	97	92	84	103
Apron Feeder	1	113	113	113	111	109	108	106	100	93	112
Vibrating Grizzly Screen	2	107	110	108	105	105	100	100	97	90	107
Rock Breaker	1	113	116	116	114	117	111	111	108	104	118
Primary Crusher Bag House Dust Collector Fan	1	104	107	100	100	97	97	92	90	89	101
Secondary Crusher Building											
Secondary Crusher Overhead Crane	1	96	99	90	88	85	83	78	70	61	88
Secondary Crusher	1	118	118	118	114	112	109	107	103	94	115
Primary Crusher Transfer Conveyor	1	90	90	93	95	98	98	97	92	84	103
Secondary Crusher Vibrating Feeder	1	118	118	118	116	114	113	111	105	98	118
Secondary Crusher Retractable Feeder	1	107	107	107	105	103	102	100	94	87	107
Wet Scrubber Recirculating Pump	1	78	79	81	83	84	86	83	79	72	90
Covered Stockpile											
Sag Mill Feed Conveyor	1	88	88	91	93	96	96	95	90	82	101
Reclaim Fine Ore Apron Feeder 1&2	2	112	112	112	110	108	107	105	99	92	112
Cartridge Dust Collector	2	104	107	100	100	97	97	92	90	89	101
Mill Building											
Wet Scrubber Recirculating Pump	1	78	79	81	83	84	86	83	79	72	90
Cyclone Feed Pump	1	97	98	99	101	101	103	101	97	91	107
Process Water Pump	1	97	97	100	102	104	105	103	98	91	109
CIP Tailings Pump	1	94	95	97	99	101	102	100	95	88	106
Carbon Advance Pump 1&2	2	79	80	81	83	84	86	84	80	73	90

Table B-3 Equipment Sound Power Level - Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Elution Area Potable Water Pump	1	86	87	89	91	92	94	92	87	80	98
Barren Solution Pump	1	84	85	86	88	90	91	89	85	78	96
Tailings Pump	1	97	98	100	101	101	103	101	97	91	107
Mill Area Overhead Crane	1	103	106	97	95	92	90	85	77	68	95
CIP Area Overhead Crane	1	96	99	90	88	85	83	78	70	61	88
Elution Area Jib Crane	1	93	96	87	85	82	80	75	67	58	85
Carbon Regeneration Area Jib Crane	1	93	96	87	85	82	80	75	67	58	85
Sulphur Dioxide Package	1	98	94	99	98	96	99	104	101	94	107
Sag Mill Feed Conveyor	1	88	88	91	93	96	96	95	90	82	101
High Angle Pebble Conveyor	1	74	74	77	79	82	82	81	76	68	87
Pebble Conveyor	1	72	72	75	77	80	80	79	74	66	85
Sag Mill	1	110	111	110	109	107	108	108	99	89	113
Ball Mill	1	113	114	113	112	110	111	110	101	91	115
Sag Mill Trommel Screen	1	107	110	108	105	105	100	100	97	90	107
Trash Screen	1	99	102	100	97	97	92	92	89	82	99
Ball Mill Trommel Screen	1	107	110	108	105	105	100	100	97	90	107
Inter-Tank Screen	1	104	107	105	102	102	97	97	94	87	104
Reagent Building											
Lime Distribution Pump	1	84	85	86	88	90	91	89	85	78	96
Fresh Water Pump	1	101	101	103	105	107	108	106	102	95	112
Keewatin River Fresh Water Pump	1	85	86	88	90	91	93	91	86	79	97
Gland Water Pump	1	77	78	79	81	82	84	82	77	71	88
Electrowinning Cell Rectifier	1	94	94	92	86	80	75	75	70	67	84
Potable Water Pump	1	94	94	92	86	80	75	75	70	67	84
Process Plant Air Compressor	1	82	83	84	86	88	89	87	83	76	93
Lime Distribution Pump	1	97	93	98	97	95	98	103	100	93	106

Table B-3 Equipment Sound Power Level - Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Gold Room											
Induction Furnace Extraction Fan	1	98	98	96	90	84	79	79	74	71	88
Drying Oven Extraction Fan	1	99	99	97	91	85	80	80	75	72	89
Oxygen Plant											
Oxygen Plant Rotary & Reciprocating Compressor	1	105	101	106	105	103	106	111	108	101	115
Processing Plant											
Carbon Regeneration Kiln Exhaust Fan	1	81	81	82	74	71	71	66	64	63	75.6
Electrowinning Cells Extraction Fan	1	92	92	90	84	78	73	73	68	65	82
Gold Room Vent Fan	1	74	74	72	66	60	55	55	50	47	64
Pre-Leach Thickener Underflow Pump	1	96	97	99	101	103	104	102	98	90	108
Secondary Crusher Wet Scrubber Fan	1	101	101	99	93	87	82	82	77	74	91
Pebble Conveyor 2 Motor	1	72	72	75	77	80	80	79	74	66	85
High Angle Pebble Conveyor Motor	1	74	74	77	79	82	82	81	76	68	87
Reclaim Tunnel Vent Fan	1	85	85	91	92	91	89	88	82	80	94
Fine Ore Stockpile Cover Ventilation Fan	1	92	92	90	84	78	73	73	68	65	82
Primary Crusher Transfer Conveyor	1	93	99	95	92	93	88	87	81	73	95
Fine Ore Stockpile Feed Conveyor	1	92	98	94	91	92	87	86	80	72	93
Sag Mill Feed Conveyor	1	93	99	95	92	93	88	87	81	73	94
Pebble Conveyor	1	91	97	93	90	91	86	85	79	71	92
Primary Crusher Transfer Conveyor	2	87	93	89	86	87	82	81	75	67	88
Primary Equipment – Gordon Site											
Hydraulic Shovel	1	119	122	117	111	112	110	107	102	94	114
Wheel Loader 13 M3	1	113	116	121	112	112	111	109	107	97	116
Ore Haul Truck 136 Ton	7	113	116	119	118	118	116	113	106	100	121
Motor Grader 215 kW	1	108	111	110	106	102	107	101	97	88	109
Crawler Dozer 450 kW	1	108	111	115	107	108	110	112	100	90	115

Table B-3 Equipment Sound Power Level - Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Wheel Dozer 370 kW	1	117	120	121	112	104	105	101	99	95	111
Water Truck 60,000 L	1	101	106	106	106	106	104	100	98	99	109
Production Hp Drill	2	113	116	122	115	118	114	113	108	107	120
8 Hyd Track Drill	1	112	115	121	114	117	113	112	107	106	119
Excavator Mounted Rock Drill	1	103	106	110	107	104	105	110	105	100	114
Blasthole Stemmer	1	98	101	93	91	91	90	87	86	77	95
Forklift/Telehandler	1	100	103	94	92	89	87	82	74	65	92
Hydraulic Excavator 3.75 M3	1	114	117	112	106	107	105	102	97	89	110
Crawler Dozer 264 kW	1	102	105	109	107	107	104	101	95	87	109
Articulated Truck 30 Ton	1	119	122	104	105	103	104	101	96	91	108
Wheel Loader 260 kW	1	114	117	112	107	108	103	100	94	87	109
Crawler Dozer 264 kW	1	102	105	109	107	107	104	101	95	87	109
Primary Equipment – MacLellan Site											
Hydraulic Shovel	2	119	122	117	111	112	110	107	102	94	114
Wheel Loader 13 M3	1	113	116	121	112	112	111	109	107	97	116
Ore Haul Truck 136 Ton	18	113	116	119	118	118	116	113	106	100	121
Motor Grader 215 kW	1	108	111	110	106	102	107	101	97	88	109
Motor Grader 178 kW	1	107	110	109	105	101	106	100	96	87	108
Crawler Dozer 450 kW	2	108	111	115	107	108	110	112	100	90	115
Wheel Dozer 370 kW	1	117	120	121	112	104	105	101	99	95	111
Water Truck 60,000 L	1	101	106	106	106	106	104	100	98	99	109
Hydraulic Excavator 3.75 M3	1	114	117	112	106	107	105	102	97	89	110
Crawler Dozer 264 kW	1	102	105	109	107	107	104	101	95	87	109
Articulated Truck 30ton	1	119	122	104	105	103	104	101	96	91	108
Production Hp Drill	3	113	116	122	115	118	114	113	108	107	120
8 Hyd Track Drill	2	112	115	121	114	117	113	112	107	106	119
Excavator Mounted Rock Drill	1	103	106	110	107	104	105	110	105	100	114
Excavator Mounted Hydraulic Hammer	1	100	103	102	105	108	106	102	95	89	110
Blasthole Stemmer	1	98	101	93	91	91	90	87	86	77	95
Forklift/Telehandler	1	100	103	94	92	89	87	82	74	65	92

Table B-3 Equipment Sound Power Level - Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Wheel Loader 260 kW	1	114	117	112	107	108	103	100	94	87	109
On-Highway Class 8 Dump Truck	2	114	117	113	104	102	104	101	97	89	108
Crawler Dozer 264 kW	1	102	105	109	107	107	104	101	95	87	109
Support Equipment Summary – Gordon Site											
Rough-Terrain Crane 110 Ton	1	102	105	96	94	91	89	84	76	67	94
Hydraulic Excavator 36 Ton	1	110	113	108	104	100	97	93	86	78	103
On-Highway Class 8 Dump Truck	1	112	115	111	102	100	102	99	95	87	106
Heavy-Duty Light Tower (4 X 1000 W)	12	98	101	96	88	84	83	81	78	66	89
Flameless Air Mobile Heater	1	102	105	100	93	90	81	77	71	66	91
Portable Dewatering Pump (4-Inch)	1	100	103	98	92	92	91	86	83	71	95
Portable Dewatering Pump (8-Inch)	1	103	106	101	95	95	94	89	86	74	99
Dewatering Pump	2	103	106	101	95	95	94	89	86	74	99
Lift Truck/Flatbed	1	111	114	117	116	116	114	111	104	98	119
Support Equipment Summary – MacLellan Site											
Rough-Terrain Crane 110 Ton	2	102	105	96	94	91	89	84	76	67	94
Hydraulic Excavator 36 Ton	1	110	113	108	104	100	97	93	86	78	103
Skid-Steer Loader	1	98	101	93	91	91	90	87	86	77	95
Portable Air Compressor (5-6m3)	1	101	104	100	94	99	100	98	91	86	104
Flameless Air Mobile Heater	1	102	105	100	93	90	81	77	71	66	91
Trailer-Mounted Pressure Washer	1	83	84	84	86	89	91	94	96	95	101
Portable Dewatering Pump (4-Inch)	1	100	103	98	92	92	91	86	83	71	95
Portable Dewatering Pump (8-Inch)	1	103	106	101	95	95	94	89	86	74	99
Dewatering Pump	3	103	106	101	95	95	94	89	86	74	99
Heavy-Duty Light Tower (4 X 1000 W)	28	98	101	96	88	84	83	81	78	66	89

Table B-3 Equipment Sound Power Level - Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Lift Truck/Flatbed	1	111	114	117	116	116	114	111	104	98	119

Table B-4 Equipment Sound Power Level – Operation Haul Road Traffic

Source	Volume (#Trucks/hour)	Sound Levels at Octave Band Center Frequencies For Each Unit (Hz) (dB Re 1 Pw)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Haul Road Traffic Summary – Gordon Site											
Pit Area to Overburden (Articulated Truck 30 Ton)	3	119	122	104	105	103	104	101	96	91	108
Haul Road from Open Pit to Waste Rock Stockpile (Komatsu Haul Truck 136 Ton)	21	113	116	119	118	118	116	113	106	100	121
Haul Road from Open Pit to Low Grade Ore Stockpile (Komatsu Haul Truck 136 Ton)	4	113	116	119	118	118	116	113	106	100	121
Haul Road in Open Pit (Komatsu Haul Truck 136 Ton)	25	113	116	119	118	118	116	113	106	100	121
Haul Road Traffic Summary – MacLellan Site											
Haul Road in Open Pit (Komatsu Haul Truck 136 Ton)	44	113	116	119	118	118	116	113	106	100	121
Haul Road from Ore Stockpile to Process Plant (Articulated Truck 30 Ton)	13	119	122	104	105	103	104	101	96	91	108
Haul Road from Open Pit to Waste Rock Stockpile (Komatsu Haul Truck 136 Ton)	38	113	116	119	118	118	116	113	106	100	121
Haul Road from Open Pit to Low Grade Ore Stockpile (Komatsu Haul Truck 136 Ton)	1	113	116	119	118	118	116	113	106	100	121
Haul Road from Open Pit to Overburden Stockpile (Articulated Truck 30 Ton)	6	119	122	104	105	103	104	101	96	91	108
Haul Road from Open Pit to Mill (Komatsu Haul Truck 136 Ton)	4	113	116	119	118	118	116	113	106	100	121

Appendix C EXAMPLE CALCULATION - % HIGHLY ANNOYED

This section presents a detailed sample calculation for the change in %HA at receptor 76 during the operation phase for the Gordon site. The %HA is calculated by the adjusted day-night sound level ($L_{dn,adjusted}$) using equation F4 in Appendix F of Health Canada 2017:

$$\%HA = 100 / [1 + e^{(10.4 - 0.132 * Ldn,adjusted)}] \qquad [F4]$$

Adjusted Baseline Day-night Sound Level

At receptor 76, the "peace and quiet" adjustment of +10 dB is added to the baseline L_{dn} of 40 dBA (Table 4-3), resulted in the adjusted baseline $L_{dn,\ adjusted}$ of 50 dBA.

Baseline %HA

The baseline %HA of 2.17 % is based on the adjusted baseline $L_{dn,\ adjusted}$ of 50 dBA in equation F4 as follows:

$$\text{Baseline } \%HA = 100 / [1 + e^{(10.4 - 0.132 * 50\ dBA)}] = 2.17\ \%$$

Adjusted Cumulative Day-night Sound Level

The cumulative day-night sound level is determined by adding the baseline sound level 40 dBA (Table 4-3) to the project sound level of 44.9 dBA (Table 6-4) at receptor 76. The cumulative day-night sound level of 46.1 dBA is calculated as follows:

$$\text{Cumulative } L_{dn} = 10 \log[10^{(0.1 \times 40\ dBA)} + 10^{(0.1 \times 44.9\ dBA)}] = 46.1\ dBA$$

The adjusted cumulative day-night sound level $L_{dn,\ adjusted}$ of 56.1 dBA is determined by adding the "peace and quiet" adjustment of 10 dB to the cumulative L_{dn} of 46.1 dBA.

Cumulative (Baseline and Project) %HA

The cumulative (Baseline and Project) %HA of 4.77 % is based on the adjusted cumulative day-night sound level of 56.1 dBA in equation F4 as follows:

$$\text{Cumulative } \%HA = 100 / [1 + e^{(10.4 - 0.132 * 56.1\ dBA)}] = 4.77\ \%$$

Change in %HA

The change in %HA of 2.60 % is determined by the different in the cumulative (Baseline and Project) %HA of 4.77 % and Baseline %HA of 2.17 %.

Lynn Lake Gold Project Hydrology Water Balance and Water Quality Impact Assessment: Gordon Site

Technical Modelling Report

April 30, 2020

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Abbreviations

Alamos	Alamos Gold Inc.
BL-WB	baseline water balance
BL-WQM	baseline water quality model
CT	contaminant transport
CWQG	Canadian Water Quality Guidelines
E	Nash–Sutcliffe model efficiency coefficient
ECCC	Environment and Climate Change Canada
EOM	end of mining
FAL	freshwater aquatic life
g/t	grams per ton
km	kilometres
km^2	square kilometres
LAA	Local Assessment Area
LiDAR	Light Detecting and Ranging
LLGP	Lynn Lake Gold Project
log_{10}	logarithm with base of ten
m	metre
mg/L	milligram per liter
mm	millimeter
Mm^3	million cubic metres
m^3/s	cubic metres per second
MRSA	mine rock storage area
Mt	million tonnes

MSOG	Manitoba Water Quality Standards Objectives and Guidelines
PAG	potentially acid generating
PDA	Project Development Area
POI	parameters of interest
PROJ-WB	project water balance
PROJ-WQM	project water quality model
the Project	Lynn Lake Gold Project
R	Pearson’s Correlation Coefficient
RAA	Regional Assessment Area
RCS	Reference Climate Station
ROM	run-of-mine
RPD	relative percent of difference
SRM	snowmelt runoff model
t/yr	tons per year
TMR	Technical Modelling Report
WAD	Weak Acid Dissociative
WB	water balance model
WQM	water quality model

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or “the Project”) consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: the ‘Gordon’ site and the ‘MacLellan’ site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open pit gold mines at both these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle) (Map 1, Appendix A). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Hydrology Water Balance and Water Quality Technical Modeling Report (TMR) for the Gordon site has been prepared to assess the potential effects of the construction, operation, and closure phases of the Project on surface water resources (water quantity and water quality) at the Gordon site. The TMR considers the Gordon site components of the Project, baseline data collected for the Project since 2015, and comments received from agencies, Indigenous communities, and other stakeholders.

To evaluate the effects of the Project, a water balance and water quality model (WBWQM) has been developed for the Gordon site to:

- Estimate the quantity and quality of surface water runoff associated with the Project including the open pit, mine rock storage area (MRSA) and the ore stockpiles during all phases.
- Predict the quantity and quality of water that will be discharged to the environment during all phases.
- Estimate quantity and quality of surface water in the environmental receptors for baseline condition and during all phases.
- Aid in the development of the conceptual closure plan for the Project.

This TMR, and a companion TMR conducted for the MacLellan site (Stantec 2020a), form part of the supporting documentation for the Environmental Impact Statement/Environmental Assessment completed for the Project.

1.1 PROJECT BOUNDARIES

1.1.1 Gordon Project Development Area (PDA)

The Gordon Project Development Area (PDA) encompasses the immediate area in which Project activities and components may occur plus a 30-metre (m) buffer (Map 1-2, Appendix A). It is the anticipated area of direct physical disturbance associated with the construction and operation of the Project. At the Gordon site, the PDA includes two legacy open pits (Wendy and East pits), and the legacy diversion channel between Gordon and Farley lakes. Except for the existing access road, the Gordon site is located entirely within the Farley Lake watershed. All former buildings and infrastructure associated with legacy mining activities have been removed. The size of the Gordon PDA is approximately 5 square kilometres (km^2).

1.1.2 Gordon Local Assessment Area (LAA)

The Gordon Local Assessment Area (LAA) includes the PDA, the former Farley Lake mine site and watercourses and lakes potentially affected by the Project (see Map 1-2, Appendix A). The Gordon site, formerly called the Farley Lake site, was operated between 1996 and 1999 as an open pit gold mine. After closure, the site underwent a reclamation process. In addition to the components described above in the PDA, the existing infrastructure at the site includes a 15-kilometre (km) gravel access road, a bridge across the Hughes River, two reclaimed mine rock storage areas and two overburden storage areas that have been capped. The LAA includes lakes and streams with the Ellystan Lake watershed, a sub-watershed in the Hughes River system. The LAA extends to the outlet of Ellystan Lake and is approximately 47.5 km^2. The LAA also represents the extent of the WBWQM.

1.1.3 Regional Assessment Area (RAA)

The Gordon LAA is one small component of the Regional Assessment Area (RAA). The RAA represents an area of approximately 9,929 km^2. The RAA includes the drainage area that encompasses the PDAs and LAAs of both Project sites (Gordon and MacLellan) and the streams and lakes that drain the LAAs to a common downstream location (i.e., Granville Lake). It also includes upstream lakes and streams in the Keewatin River watershed to provide regional context for the lakes and streams within the LAAs and has been defined to allow assessment of potential cumulative effects resulting from the interaction of the Project with past, present, and reasonably foreseeable future projects. The RAA is not included in the Gordon model domain, beyond the Gordon LAA.

1.2 PROJECT PHASES AND COMPONENTS

Alamos proposes to develop a conventional open pit with shovel and truck removal of the mine rock and ore produced during blasting at the Gordon site. Infrastructure at the Gordon site will be limited to the open pit, ore and overburden stockpiles, a MRSA, and minor supporting infrastructure for equipment storage and maintenance. Ore from the Gordon site will be shipped to the MacLellan site for processing.

1.2.1 Mine Life Phases and Mine Plan

For modelling purposes, the third Project phase, decommissioning/closure, was sub-divided into two sub-phases of active closure and post-closure. On this basis, the phases of the Project considered in the WBWQM included construction, operation, active closure, and post-closure. Each phase is described in Table 1-1, including the time lengths for each.

Table 1-1 Project Phases and Model Time Frames

Project Phase	Time Frames Incorporated into the Model	Description
Baseline	Prior to Year -2	Mine activity does not occur during this phase. The baseline time frame is extended in the model to allow reservoirs within the model to reach steady state conditions.
Construction	Year -2 – Year -1 (2 years)	During this phase, the two legacy open pits will be dewatered, and the interceptor wells start operating. A temporary ore stockpile will be developed.
Operations	Year 1 – Year 6 (6 years)	During this phase, the open pit will be developed, a MRSA will be constructed, and ore will be shipped to the MacLellan site.
Active Closure	Year 6 – Year 11 (6 years)	During this phase, the MRSA will be recontoured and reclaimed and the open pit will be allowed to fill with water.
Post-Closure	Year 12 – Year 128 (117 years)	During this phase, the open pit fills and eventually discharges to the environment. Other discharges to the environment include groundwater and surface water runoff from the MRSA.

1.2.2 Project Components

In this section, individual Project components (legacy and proposed) and catchment areas at the Gordon site are discussed and shown on Map 1-3 (Appendix A).

1.2.2.1 Legacy Mine Components

East and Wendy Pits - Water from both East and Wendy pits will be pumped and discharged into Farley Lake during construction.

Legacy Mine Rock Storage Areas - The legacy MRSA located north of the legacy pits (North MRSA) will not be disturbed as a result of Project activities. The legacy MRSA located south of the legacy pits (South MRSA) will be partially disturbed (with the disturbed portion relocated to the proposed MRSA; see Section 1.2.2.2).

1.2.2.2 Proposed Mine Components

Interceptor (Dewatering) Wells - A series of interceptor (dewatering) wells will be installed between the ultimate footprint of the proposed open pit and Gordon and Farley lakes. The wells will be used to reduce groundwater inflow into the open pit, thus limiting contact water, during mine construction and operation as well as maintaining the water elevations in both lakes.

Open Pit - A new open pit will be developed that will encapsulate the legacy East and Wendy pits. The pit will be developed in a series of benches with drilling and blasting completed on each bench. Blasting will be achieved using emulsion explosives with non-electric detonators. The proposed depth of the Gordon open pit is approximately 190 m and will have an ultimate surface area at the ground level of 335,945 m^2.

The total quantity of material to be mined from the Gordon open pit during Project mine operation is approximately 58.98 million tonnes (Mt), which includes ore material of 8.00 Mt (Q'Pit 2019).

Ore Stockpiles - The estimated maximum volume of ore is 0.7 million cubic metres (Mm^3). A temporary ore stockpile will be required for ore contained within material excavated from the first benches of pit construction. A short-term high-grade stockpile will be constructed to provide access both from the open pit and the external mine trucks. The material will be transported via highway trucks to the mill feed storage area and crushing plant at the MacLellan site for short-term storage and initial crushing before it is used as feedstock for the adjacent ore milling and processing plant. Mine operations at the Gordon site are currently planned to cease after Year 5. The transfer of stockpiled ore, however, will continue into Year 6 of the current mine plan. Longer term lower-grade run-of-mine (ROM) stockpiles will be also be constructed. The ore in these piles will eventually be transferred to MacLellan for processing but will remain in place for longer than the higher-grade ore in the short-term pile.

Overburden Stockpile – The estimated volume of material in the overburden stockpile is 0.5 Mm^3. The overburden material will be stripped during construction and used for reclamation activities during closure.

Mine Rock Storage Area - The estimated maximum volume in the MRSA is 22.3 Mm^3 of mine rock. The MRSA will be developed during operations. During closure the MRSA will be recontoured and reclaimed.

Collection Ditches - During construction, seepage/runoff collection ditches will be constructed around the perimeter of each stockpile/storage area and directed to a series of sumps and/or small ponds located at topographic lows. Water collected in the sumps and/or small ponds will be pumped to a site water collection pond for management and/or treatment (if required) prior to discharge. The collection ditches are assumed to be decommissioned during closure.

Sewage Treatment – Sewage from the Gordon site buildings will be collected locally in two septic tanks and will be trucked to MacLellan for processing.

2.0 MODELLING APPROACH

The WBWQM was constructed using GoldSim simulation software with the contaminant transport (CT) module add-on extension. GoldSim software is commonly used in the mining industry to develop water balances and to predict water quality at user-defined modelling nodes by combining system dynamics with discrete event simulations. The model was run dynamically on a daily time step for the construction, operation, active closure and post-closure phases. Results are presented and interpreted based on monthly averaged values.

The model is compartmentalized into the Water Balance (WB) and the Water Quality Model (WQM). The WB is calculated by incorporating defined inputs, such as inflow rates and outflow rates into the WQM. These inflows and outflows are based on precipitation rates, catchments and facility areas and volumes, groundwater inflow and outflow rates, operational water management strategies and the movement of materials within and out of the site. The water quality predictions are calculated at the model nodes by integrating source term development (loading sources) into the WB.

The WB consists of two sub-models to facilitate the evaluation of the “relative” impacts of the Project on the baseline environment. The first sub-model is the baseline water balance (BL-WB) and the second sub-model is the project water balance (PROJ-WB). The PROJ-WB was developed to predict changes in flows to the receiving environment and within the Project site during each phase of mine life. The BL-WB was developed to predict baseline flows across the site throughout the life of the mine assuming the Project does not occur, and it runs concurrently within the GoldSim platform with the PROJ-WB, to facilitate comparison between non-Project and Project conditions at each time step in the model.

Like the WB, the WQM consists two sub-models, the baseline water quality model (BL-WQM) and the Project water quality model (PROJ-WQM) to facilitate comparison between non-Project and Project conditions.

Within the WBWQM, model nodes are representative of water monitoring stations. Creeks, streams or rivers are represented by a flow-through function in the WB, for which inflow equals outflow. Lakes are represented by reservoirs in the WB for which inflow equals outflow plus or minus storage. The model nodes are often represented as cells in the WQM; the flow through and within the cell is dependent on the WB, while loads can be added independently to the WBWQM. A load refers the amount of mass entering a model reservoir. The WB and WQM are presented in Section 3.0 and Section 4.0, respectively.

Three climate scenarios were considered to evaluate the potential effects of the Project on surface water. The WB and climate scenarios are discussed in more detail in Section 3.0. Two load scenarios are included in this TMR to evaluate the sensitivity of the source terms on the predictions and to aid in the development of a contingency planning (Section 4.0).

3.0 WATER BALANCE

3.1 GENERAL APPROACH

The following subsections present the approaches used for modelling water quantity with the WB. The WB provides estimates of streamflow and water levels from the existing watersheds, rivers and lakes.

As introduced above, the WB consists of two models:

Baseline Water Balance (BL-WB): Models the baseline condition or pre-Project phase, with no proposed mine features. The model boundary is the LAA. The baseline model was calibrated using data from 2015-2016.

Project Water Balance (PROJ-WB): This model is built within the BL-WB and includes the proposed Project infrastructure and water management of the mine within the PDA as well as all other non-Project affected watersheds within the LAA.

The model includes various climate scenarios intended to define the potential range of flows and water levels considering uncertainty associated with inputs and assumptions. The general approach was to:

- Develop the BL-WB that includes lakes (reservoirs) for the sub-watersheds within the LAA.
- Calibrate the BL-WB to a period of measured climatic and hydrologic data from 2015 and 2016.
- Use the calibrated BL-WB to estimate the baseline streamflow and water levels for all climate scenarios.
- Develop the PROJ-WB by adding Project-specific components and flows to the BL-WB.
- Estimate streamflows and water levels during all phases of the Project.
- Compare the BL-WB stream flows and lake water levels to the PROJ-WB predictions during all phases of the Project for wet, dry, and average conditions.

3.2 BASELINE WATER BALANCE STRUCTURE

This section describes the inputs used to calibrate the BL-WB. The BL-WB was developed to model the baseline conditions of the LAA. This includes watersheds within the PDA, as well as all watersheds and sub-watersheds connected to the Ellystan Lake watershed (i.e., those contained within the LAA). The BL-WB models the LAA without the Project and represents the baseline or pre-Project conditions.

3.2.1 Baseline Water Balance Conceptual Model

The BL-WB is developed to predict streamflow for sub-watersheds and lake levels within the LAA of the Gordon site. The watersheds modelled are shown in Map 3-1 (Appendix A), with more detail on the Gordon site watersheds provided in Map 3-2 (Appendix A). Details of the BL-WB input parameters and the calibration of the model are provided below in Section 3.2.3 and Section 3.2.4.

For the BL-WB, the Snowmelt-Runoff Model (SRM) was selected to represent the physical processes observed at the site. The model was run on a daily time step and calculated the runoff from each watershed and integrated into lake water balance model for lakes in the modelled area. For each lake a stage-volume and stage-area relationship was used to balance the water in the lake and determine lake levels for model calibration and lake volumes for water quality modelling. The model provides an integrated hydrology and water balance. Table 3-1 presents a list of the watersheds modelled for the Gordon site. Figure 3-1 (Appendix B) presents a conceptual model for how the watershed and the lakes are connected in the WB.

The BL-WB was calibrated iteratively to measured streamflow and lake water level data during 2015 and 2016 at a number of hydrometric stations shown on Map 3-2 (Stantec 2017a). Statistical assessment of the BL-WB was performed to measure the model’s performance. Detailed model inputs, calibration parameters and statistical assessment of the calibration is provided Section 3.2.3 and Section 3.2.4.

Table 3-1 Watersheds Modelled in the Gordon LAA

Watershed Name	Sub-Watershed Name	Model Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Area (km²)
ws-FAR5 (Gordon site watershed)	sws-FAR7-A1	FO1	MRSA and Overburden Stockpile	1.5
	sws-FAR7-B1	F10	n/a*	0.5
	sws-FAR7-C1	F03sub	n/a*	1.4
	sws-FAR7	F03	Gordon Lake Overburden Stockpile	0.9
	sws-FAR6-A2	F05Ex4	Unnamed lakes FAR6-A1 and FAR6-A4	1.0
	sws-FAR5-B2	F05Ex4	Wendy Pit and Diversion Channel Proposed Pit	1.0
	sws-FAR5-A1	F05Ex5	Unnamed lake FAR5-A2 MRSA, Ore Stockpiles, and Mine Site Access Road	1.1
	sws-FAR5-MAR4	F04Ex3	Marie Lake	0.6
	sws-FAR5-MAR1	F04	Unnamed lake FAR5-MAR2	0.9
	sws-FAR5-MAN2	F05ex1	Marnie Lake	1.0
	sws-FAR5-MAN1	F05ex2	n/a*	0.5
	sws-FAR5.2	F05	Upper Farley Lake and Diversion Channel	2.2
	sws-FAR5.1	F05	Lower Farley Lake	0.6
ws-FAR3-SIM1	n/a	FLSA2	White Owl Lake and Mac Lake	8.0
ws-FAR3	n/a	FLSA3	Swede Lake	13.0
ws-FAR2-WHI1	n/a	FLSA2	White Owl Lake and Mac Lake	11.0
ws-FAR1	n/a	FLSA1	Ellystan Lake	16.0
ws-SUS4	n/a	FLSA4	Pump Lake and Simpson Lake	1.2

3.2.2 Baseline Water Balance Description

The SRM is designed to simulate streamflow at a daily timestep (additional details are provided in Martinec et al., 2008). Streamflow generated from snowmelt and rainfall is computed, using the following equation (*Equation 3-1*):

$$Q_{n+1} = [C_{Sn}.a_n(T_n + \Delta T_n)S_n + C_{Rn}P_n]\frac{A.10000}{86400}(1 - K_{n+1}) + Q_nK_{n+1} \qquad \textit{Equation 3-1}$$

Where:

Q = average daily discharge ($m^3 s^{-1}$)

C = runoff coefficient; expresses losses to streamflow as a ratio (runoff/precipitation), with C_S referring to snowmelt and C_R to rain

a = degree-day factor (cm °C^{-1} d^{-1}) indicating the snowmelt depth resulting from 1 degree-day

T = number of degree-days (°C d)

ΔT = the adjustment by temperature lapse rate when extrapolating the temperature from the station to the average hypsometric elevation of the basin or zone (°C d)

S = ratio of the snow-covered area to the total area

P = precipitation contributing to runoff (cm).

T_{CRIT} = threshold temperature that determines whether the precipitation is rainfall or snow. A threshold temperature is used to decide whether a precipitation event will be treated as rain ($T \geq T_{CRIT}$) or as new snow ($T < T_{CRIT}$). If precipitation is determined by T_{CRIT} to be new snow, it is kept on storage over the hitherto snow free area until melting conditions occur.

A = area of the sub-catchment [km^2]

K = recession coefficient indicating the decline of discharge in a period without snowmelt or rainfall:

n = sequence of days during the discharge computation period.

$\frac{10000}{86400}$ = conversion from cm·km^2 d^{-1} to m^3 s^{-1}

T, S and P are variables measured or determined each day, C_R, C_S, are lapse rates to be determined, ΔT, T_{CRIT}, K and the lag time are parameters which are characteristic for a given basin or, more generally, for a given climate. The lag time is the time difference between the start of increasing temperatures and the corresponding increase in runoff from the basin.

All parameters with unknown values (S, C_R, C_S, *K, a)* were determined during the calibration process.

3.2.2.1 Lake Level and Lake Outflow

Where no stage-discharge relation was available for lakes in the LAA, the relation was estimated using *Equation 3-2*:

$$Q_{out} = CD * (Lake\ Water\ Level - H_O)^{P} \qquad \textit{Equation 3-2}$$

Where:

Q_{out} = Lake Outflow (m^3/s)

CD = Lake Coefficient

H_o = Minimum water level for lake outflow (m^3/s)

P = Power Coefficient (m^3/s)

All parameters with unknown values (CD, Ho, P*)* were determined during the calibration process.

3.2.2.2 Baseline Water Balance Calibration

Models are mathematical approximations of physical systems. Calibration is a process wherein certain parameters of the model are altered in a systematic fashion and the model is run iteratively until the computed values matches the observed values within a range that is considered acceptable. The GoldSim model optimization tool was used for model calibration of the SRM. Model performance is measured in terms of the ability to reasonably predict key response variables such as streamflow and lake level. Statistical assessment of the calibrated hydrology model was performed to measure model performance. The following statistical parameters were used:

Nash-Sutcliffe Model Efficiency

The Nash–Sutcliffe model efficiency coefficient, was used to assess the predictive results (flow or lake level) of the BL-WB (*Equation 3-3*). The Nash–Sutcliffe model efficiency coefficient (*E*) is defined as (Nash and Sutcliffe, 1970):

$$\boldsymbol{E = 1 - \frac{\sum_{t=1}^{T}\left(Q_o^t - Q_m^t\right)^2}{\sum_{t=1}^{T}\left(Q_o^t - Q_{o,av}\right)^2}}$$

Equation 3-3

Where:

Q_o is observed value

Q_m is modelled value

$Q_{o,avg}$ is average observed value

Generally, Nash–Sutcliffe coefficient ranges from $-\infty$ to 1 with a value of 1 indicating a perfect match of modelled value to the observed data (i.e., the closer the model efficiency to 1, the more accurate the model is). An efficiency of 0 indicates that the model predictions are as accurate as the mean of the observed data. An efficiency less than zero indicates that the observed mean is a better predictor than the model.

Correlation Coefficient

The Pearson's Correlation Coefficient (R) indicates the strength and direction of a linear relationship between the model output and observed values. It is obtained by dividing the covariance of the two variables by the product of their standard deviations (*Equation 3-4*).

$$R = \frac{\sum_{t=1}^{T}(Q_o^t - Q_{o,avg}).(Q_m^t - Q_{m,avg})}{\sqrt{\sum_{t=1}^{T}(Q_o^t - Q_{o,avg})^2 . \sum_{t=1}^{T}(Q_m^t - Q_{m,avg})^2}} \qquad \text{Equation 3-4}$$

Where: $Q_{m,avg}$ is average modelled value for the simulation period, and other variables are as previously defined.

Further details on inputs and calibration are discussed in Section 3.2.3 and Section 3.2.4.

3.2.3 Baseline Water Balance Inputs

3.2.3.1 Climate

Historical climate data were gathered from the Environment and Climate Change Canada (ECCC) National Climate Data and Information Archive (ECCC 2019). Climate data relevant to the Project area is available from four ECCC meteorological stations (Stantec 2017b): Lynn Lake Airport (Climate ID 5061646), Lynn Lake (Climate ID 5061648), Lynn Lake (Climate ID 5061645), and Lynn Lake Reference Climate Station (RCS) (Climate ID 5061649). These four stations were chosen because of their proximity to the Project area and relatively long period of record. Stations 5061646, 5061648, and 5061645 are located at the Lynn Lake Airport and Station 5061649 is located just south of the airport. The Lynn Lake climate stations encompass data from 1968 to 2005 (5061646), 2005 to 2014 (5061648), and 2010 to 2017 (5061645 and 5061649). Together these stations have a continuous record going back more than 40 years; this record was used to generate historic temperature and precipitation. Stations 5061645 and 5061649 are currently in operation. Daily temperature, precipitation, and snowfall data were downloaded and used for input.

The summary of the average temperature, precipitation, and snow on ground data for the 2015 and 2016 water years and climate normals (1981-2010) at the Lynn Lake stations (the combined record of ECCC stations 5061645 and 5061649) is provided in Table 3-2.

The 2015 and 2016 daily climate data were used for model calibration periods. The historical climate data were used to develop the average, 25-year wet and 25-year dry climate scenarios for the model simulations (see Section 3.3.2). The Prairie Farm and Rehabilitation Administration (PFRA) estimated the Lynn Lake annual lake evaporation rate to be 476 mm based on historical gross evaporation data (PRFA 2002), with the maximum monthly evaporation rate occurring in July (Table 3-3). The monthly lake evaporation data were used in the WB for the lake and pond (open pit and collection ponds) models.

Table 3-2 Summary of Climate Normals (1981 – 2010) and Meteorological (2015 and 2016) Data at Lynn Lake, MB (ECCC 2019)

Parameter	Units	Data Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly Average Maximum Temperature	°C	1981-2010	-19	-14	-6.2	3.2	12	19	22	20	12	3.1	-8.4	-17	2.3
		2015	-17	-19	-4.8	4.5	13	20	22	20	13	4.1	-12	-13	2.4
		2016	-15	-15	-4.1	2.7	15	20	22	21	15	5	-4.3	-11	3.7
Monthly Average Temperature	°C	1981-2010	-24	-20	-13	-3.1	5.6	13	16	15	7.7	-0.6	-13	-21	-3.2
		2015	-22	-25	-12	-1.9	5.6	14	16	15	8	1.1	-17	-17	-3.2
		2016	-19	-22	-11	-4.4	8.6	14	17	14	10	1.4	-8.1	-14	-1.7
Monthly Average Minimum Temperature	°C	1981-2010	-29	-26	-20	-9.4	-0.8	6.6	10	9	3	-4.2	-17	-26	-8.6
		2015	-28	-30	-20	-8.3	-2.3	7.3	10	9.6	3.4	-1.9	-22	-21	-8.8
		2016	-24	-29	-19	-11	2.4	7.8	11	8.1	4.8	-2.2	-12	-17	-7.1
Average Total Precipitation (mm)	mm	1981-2010	20	16	20	24	37	62	85	69	61	38	27	19	478
		2015	11	11	19	25	29	58	60	30	90	17	8.2	11	370
		2016	11	13	20	14	32	40	104	55	42	45	16	8.9	399
Average Total Rainfall (mm)	mm	1981-2010	0.2	0.1	1.4	4.5	27	61	85	69	57	12	0.8	0.1	318
Average Total Snowfall (cm)	cm	1981-2010	28	24	25	24	10	1.3	0.1	0.1	3.5	31	36	26	208
Average of Snow on Ground (cm)	cm	1981-2010	34	37	33	14	1	0	0	0	0	3	17	26	14
		2015	20	34	41	19	0	0	0	0	0	0	10	13	11
		2016	34	50	51	34	0	0	0	0	0	5	14	28	18
% of Precipitation as Rainfall	%	1981-2010	1	1	7	19	72	98	100	100	94	32	3	1	

Table 3-3 Gross Evaporation Data at Lynn Lake, MB (1971 – 2006) (PFRA 2002, 2017)

Parameter	Units	Data Period	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Lake Evaporation (mm)	mm	1971-2006	0	0	0	0	33.5	109.1	141.2	118.9	67	6.7	0	0	476

3.2.3.2 Watershed Areas

A geographic information system mapping approach was used to delineate sub-watersheds for the Gordon Site. Site-specific Light Detecting and Ranging (LiDAR) data at approximately 2 m x 2 m resolution was used. For areas where LiDAR coverage was not available, digital elevation model data from GeoBase (Natural Resources Canada 2014) at approximately 20 m x 20 m resolution was used. A naming system was designated for all reaches in the Gordon LAAs; where *ws* stands for watershed and *sws* stands for sub-watershed. Table 3-4 presents watershed characteristics.

Table 3-4 Physiographic Characteristics of Watersheds

Watershed Name	Sub-Watershed Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Area (km²)	Minimum Elevation (m)	Maximum Elevation (m)	Lake Coverage (%)	Tributary to
ws-FAR5 (Gordon site watershed)	sws-FAR7-A1	MRSA and Overburden Stockpile	1.5	345	317	0	Gordon Lake
	sws-FAR7-B1	n/a*	0.5	351	315	0	Gordon Lake
	sws-FAR7-C1	n/a*	1.4	359	315	0	Gordon Lake
	sws-FAR7	Gordon Lake Overburden Stockpile	0.9	346	314	22	Diversion Channel to Farley Lake
	sws-FAR6-A2	Unnamed lakes FAR6-A1 and FAR6-A4	1.0	341	316	5	runoff to sws-FAR5-B2
	sws-FAR5-B2	Wendy Pit and Diversion Channel Proposed Pit	1.0	346	314	5	Diversion Channel to Farley Lake
	sws-FAR5-A1	Unnamed lake FAR5-A2 MRSA, Ore Stockpiles, and Mine Site Access Road	1.1	351	313	1	Upper Farley Lake
	sws-FAR5-MAR4	Marie Lake	0.6	345	331	28	Unnamed stream FAR5-MAR3 to Lower Farley Lake

Watershed Name	Sub-Watershed Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Area (km²)	Minimum Elevation (m)	Maximum Elevation (m)	Lake Coverage (%)	Tributary to
ws-FAR5 (Gordon site watershed)	sws-FAR5-MAR1	Unnamed lake FAR5-MAR2	0.9	341	313	2	Lower Farley Lake
	sws-FAR5-MAN2	Marnie Lake	1.0	340	319	18	Unnamed stream FAR5-MAN1 to Lower Farley Lake
	sws-FAR5-MAN1	n/a*	0.5	337	313	0	Lower Farley Lake
	sws-FAR5.2	Upper Farley Lake and Diversion Channel	2.2	342	312	24	Lower Farley Lake
	sws-FAR5.1	Lower Farley Lake	0.6	333	312	27	Unnamed stream FAR4 to Swede Lake
ws-FAR3-SIM1	n/a	White Owl Lake and Mac Lake	8.0	354	301	22	Swede Lake
ws-FAR3	n/a	Swede Lake	13.0	338	296	17	Ellystan Lake
ws-FAR2-WHI1	n/a	White Owl Lake and Mac Lake	11.0	351	305	27	Ellystan Lake
ws-FAR1	n/a	Ellystan Lake	16.0	339	281	20	Hughes River
ws-SUS4	n/a	Pump Lake and Simpson Lake	1.2	310	351	10	Unnamed stream SUS3 to Marrow Lake

3.2.3.3 Lake Bathymetry

Lake bathymetric data were collected at key lakes. Waterbodies were chosen based on their proximity to the proposed mine operations and potential to be physically altered by the proposed development. Within the Gordon LAA, waterbodies included Farley Lake, Gordon Lake, Wendy Pit, and East Pit. Additional details of the bathymetric field program are presented in Stantec 2017a. Lake volume-elevation and lake area-elevation relationships were established using the lake bathymetric data and topographic information surrounding the lake and used as an input to the lake water balance model. The results of lake surface area and volume for average lake levels in the hydrology model for the Gordon site are presented in Table 3-5.

Table 3-5 Lake Surface Areas and Volumes for the Gordon LAA

Lake Name	Surface Area (m^2)	Volume (m^3)
Wendy Pit	44,100	573,930
East Pit	58,460	1,561,931
Ellystan Lake	2,507,299	7,378,240 *
Gordon Lake	190,292	260,370
Simpson Lake	1,719,038	2,578,557 *
Farley Lake	773,944	724,960
Swede Lake	2,305,012	7,376,000
* No data available, estimated based on local experience		

3.2.3.4 Measured Streamflow and Water Level

The locations and watersheds of the hydrometric stations that are used for model calibration are shown in Table 3-6. Only one station (QF08) had sufficient data to produce a stage-discharge relationship and subsequent calculation of discharge for the 2015 and 2016 monitoring period (Stantec 2017a). The remaining stations were limited to stage data and point measurements of discharge, except for QF03 where no flow was observed throughout the monitoring period. A more thorough explanation of the data limitations and field data analysis are provided in Stantec 2017a. The measured discharge at monitoring stations QF08 and lake water level data at monitoring stations QF03, QF05, QF06, QF07 and QF08 were used for BL-WB calibration. The drainage areas in Table 3-6 differ from the catchment areas in Table 3-1 in that those listed in Table 3-6 represent the cumulative watershed area that drains to the hydrometric station.

Table 3-6 Geographic and Physiographic Details for the Gordon Hydrometric Monitoring Stations Used in the Model

Station	UTM Coordinates (Zone 14V)	Period of Operation	Available Parameters for model calibration	Area (km^2)	% Lakes	Description
QF03	411995 E 6308030 N	May 29, 2015 - present	Water Level	4.3	4.4	Gordon Lake. This station is intended to measure outflows from Gordon Lake into the diversion to Farley Lake.
QF05	414317 E 6307228 N	May 28, 2015 - present	Water Level	13.3	9.3	Outlet of Farley Lake, to the east. The objective of this station is to measure outflows from Farley Lake.
QF06	411577 E 6303510 N	May 30, 2015 - present	Water Level	8.0	21.9	Outlet of Simpson Lake into Swede Lake. Flows are measured downstream of the culvert connecting the two lakes.
QF07	414759 E 6303927 N	May 30, 2015 - present	Water Level	34.5	15.8	Outlet of Swede Lake.

Table 3-6 Geographic and Physiographic Details for the Gordon Hydrometric Monitoring Stations Used in the Model

Station	UTM Coordinates (Zone 14V)	Period of Operation	Available Parameters for model calibration	Area (km^2)	% Lakes	Description
QF08	413309 E 6298252 N	May 27, 2015 - present	Water Level, Discharge	61.8	18.8	Downstream of the outlet of Ellystan Lake

3.2.3.5 Groundwater

Groundwater discharge to the lake and lake discharge to the groundwater system were predicted for Gordon, Farley and Susan lakes for baseline conditions using a hydrogeological model (Stantec 2020b). The steady-state calibrated groundwater flow model was used to quantify baseline groundwater levels and flow and groundwater discharge to the receiving environment under baseline conditions.

The estimated groundwater discharges to the lakes under baseline conditions is presented in Table 3-7. The groundwater discharge to the lake and lake discharge to groundwater were used as inputs to the lake water balance model (Stantec 2020b).

Groundwater also discharges to rivers as baseflow. Baseflow estimates in the model are based on inflows calibrated in the BL-WB using the SRM model.

Table 3-7 Estimated Groundwater Discharges for Lakes under Baseline Conditions (Stantec 2020b)

Lakes	Groundwater to Lake (m^3/s)	Lake to Groundwater (m^3/s)	Net Groundwater Inflow (m^3/s)
Susan Lake	0.00041	0.00005	0.00036
Gordon Lake	0.00074	0.00016	0.00058
Farley Lake	0.00450	0.00209	0.00241

3.2.4 Baseline Water Balance Calibration

3.2.4.1 Model Calibration

The BL-WB was calibrated based on streamflow and lake water level measurements at monitoring stations described in Section 3.2.3 for the period June 2015 to June 2016.

The overall calibration strategy was to compare the model results to observed datasets for the period of record (Stantec 2017a). The calibration was done by generating and comparing simulated and observed monthly and daily average streamflow and simulated and observed daily average lake water levels. Precipitation from June 1, 2015 to September 31, 2016 were used as inputs into the model. The model results were compared to observed values and the parameters comprising the SRM were adjusted until a satisfactory calibration was obtained.

During model calibration, runoff coefficient (*C*), recession coefficient (*K*) and degree-day factor (*a*) were adjusted for each watershed; and lake coefficient (*CD*), minimum water level for lake outflow (*Ho*) and Power Coefficient (*P*) were adjusted for each lake. Runoff coefficient values are different during rain and snowmelt periods for a given watershed. Snowmelt period is the time where the temperature is below a threshold temperature that determines whether the precipitation is rainfall or snow. The rain period is the time where the temperature is above threshold temperature.

3.2.4.2 Calibration Result

Streamflow

As indicated above, streamflow data were only available for monitoring station QF08, this data was used to calibrate the BL-WB (see Stantec 2017a). Figure 3-2 and Figure 3-3 (Appendix B) show monthly and daily measured and simulated streamflow at monitoring station QF08. The model captures the seasonal patterns of the observed streamflow. Statistical assessment of the model performance is presented in Section 3.2.4.3.

Lake Level

Lake level data were available at monitoring stations QF03 (Gordon Lake), QF05 (Farley Lake), QF06 (Simpson Lake), QF07 (Swede Lake) and QF08 (Ellystan Lake) and used to calibrate the BL-WB (Stantec 2017a). Figure 3-4 to Figure 3-8 (Appendix B) show daily measured and simulated lake level at the five monitoring stations. The model captures the observed seasonal lake level patterns for Gordon Lake, Simpson Lake and Ellystan Lake however, the model sometimes under-predicts and sometimes over-predicts lake levels at Farley Lake and Swede Lake. Given the extensive beaver activity in the area (Stantec 2017a), the simulated daily lake level generally compared well with the measured lake level. Statistical assessment of the model performance is presented in Section 3.2.4.3.

3.2.4.3 Statistical Assessment

Table 3-8 shows the Nash–Sutcliffe coefficient (*E*) and correlation coefficient for the average monthly and daily discharge at QF08, and monthly lake levels at QF03, QF05, and QF07. The *E* for the monthly and daily average discharges at QF08 is greater than 0, which indicate the predictive power of the model at QF08 is as good as the observed values. The *E* for the monthly average lake level at QF03, QF05 and QF07 are greater than 0, which indicate the predictive power of the model is as good as the observed values. The simulated average monthly lake levels are also well-correlated with R values of 0.90 and 0.94 and 0.74 at QF03, QF05 and QF07, respectively.

Table 3-8 Hydrology Model Performance Parameters

Parameter	Monthly Discharge	Daily Discharge	Lake Level Monthly		
	QF08	QF08	QF03	QF05	QF07
Nash-Sutcliffe Coefficient (E)	0.59	0.39	0.81	0.86	0.54
Correlation Coefficient (R)	0.83	0.65	0.90	0.94	0.74

3.2.4.4 Application of Baseline Water Balance

With calibration of BL-WB complete, the PROJ-WB was constructed. The PROJ-WB will be used to assess potential effects of the Project on surface water flow and lake levels. This is accomplished through comparison of BL-WB streamflows to PROJ-WB streamflows (or BL-WB lake levels to PROJ-WB lake levels) during all phases of the Project (construction, operation, active closure, and post-closure phases).

3.3 PROJECT WATER BALANCE STRUCTURE

This section presents the conceptual model inputs and assumptions used to develop the PROJ-WB and includes a discussion of baseline catchments that change due to the Project as well as a discussion of the mine site and operational flows. The modelling assumptions used in watersheds that change as a result of the Project are described below.

3.3.1 Project Water Balance Conceptual Model

The PROJ-WB includes components of the BL-WB and details related to the overall Project mine plan from construction, operation, active closure, and post-closure.

The sub-watershed areas affected by site infrastructure were subtracted from the baseline watershed areas for each sub-watershed, and the streamflow from the unaffected watershed is estimated using the BL-WB. The PROJ-WB was used to estimate streamflow and lake level during all phases of the Project.

Figure 3-9 (Appendix B) presents the model structure of the PROJ-WB and highlights the model nodes, the Gordon PDA, and identifies which nodes are associated with either contact water (water that has contacted the Project) or non-contact water (water not affected by the Project).

For conservatism in the model, it is assumed that the catchment area for all mining features are fully realized at start of construction. This means that contact water from stockpiles start flowing to the collection ponds at the beginning of construction. Dewatering of Wendy and East pits also starts with construction, discharging into Farley Lake, this has been modelled to last for 20 months. During dewatering of the legacy pits, interceptor wells are also turned on in the model. The interceptor wells are designed to limit losses from Gordon and Farley lakes due to the increased losses to groundwater associated with the development of the open pit, as well as to limit the volume of contact water.

The following sections present a summary of the Project, schedule and the overall modelling approach used for the PROJ-WB. Wherever possible, conservative assumptions have been included in the modelling approach for the purposes of predicting potential environmental effects.

The Project components at the Gordon site (described in Section 2.0) in the PROJ-WB include: the open pit, MRSA, ore stockpile and overburden storage areas. It is assumed that the above facilities will have external drainage controls that prevent natural drainage from coming into contact with Project components and becoming contact water. The model differs from the BL-WB in that areas directly changed due to Project facilities use runoff coefficients to represent flow pathways in place of the SRM for non-Project areas.

Catchment areas for the open pit, overburden storage area, ore stockpile and MRSA were delineated based on the site plan (see Map 1-2, Appendix A). It is assumed that these catchment areas do not change during operation through to active closure.

The model was run dynamically on a daily time step and results are presented on a monthly reporting period for average, 25-year wet and 25-year dry climate scenarios (see Section 3.3.2) for the construction, operation, active closure, and post-closure phases.

Conceptual models showing the interactions of the Project components during operation, active closure, and post-closure are presented in Figure 3-10 to Figure 3-12 (Appendix B). To simulate post-closure, the PROJ-WB was extended to run until Year 128.

A key assumption that is made for decommissioning/closure is that once operation is finished, water from the collection pond is pumped to the open pit until the pit fills and begins to discharge to Farley Lake. All other contact water if not still draining to the collection pond, is also re-routed to the open pit.

3.3.2 Project Water Balance Inputs

3.3.2.1 Climate Scenarios

An evaluation of climate and hydrologic data for the Project was previously presented by Stantec (2017a). For the PROJ-WB precipitation data from Environment Canada's Lynn Lake climate station (Climate ID 5061646) were used to generate the climatic conditions for average, 25-year wet, and 25-year dry climate scenarios.

The climate normals data for period 1981 to 2010 were used to represent average climatic conditions. For the 25-year wet and 25-year dry return scenarios, annual precipitation data was fit to the log normal probability distribution. The result of the 25-year dry and 25-year wet year precipitation analysis is provided in Table 3-9. The same average annual lake evaporation used in the BL-WB and presented in Section 3.2.3.1 was used.

Table 3-9 Average Climate, Wet-Year and Dry-Year Climate Scenarios

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average Year Total Precipitation (mm)	20.3	16.3	19.8	24.1	37.3	61.8	85.4	68.8	61	37.6	26.8	18.8	478
25-Year Dry Precipitation (mm)	14.6	11.7	14.3	17.4	26.9	44.5	61.5	49.6	44.0	27.1	19.3	13.5	344
25-Year Wet Total Precipitation (mm)	27.8	22.4	27.1	33.0	51.1	84.7	117.1	94.3	83.6	51.6	36.7	25.8	655

3.3.2.2 Runoff Coefficients

For areas changed by Project infrastructure, runoff coefficients were used to transform precipitation into surface runoff taking into consideration relief, surface storage, vegetation cover, evaporation, evapotranspiration, and infiltration losses. Runoff represents all surface water flows originating from overland flow, direct precipitation to waterbody surfaces, interflow and groundwater discharge. Table 3-10 presents the runoff coefficients used in the PROJ-WB for various mine infrastructure facilities.

Table 3-10 Facilities Runoff Coefficients used in PROJ-WB

Parameter	Runoff Coefficient
Ponds	1.0
Open Pit Wall	0.95
Natural Ground	0.40
Disturbed Ground	0.85
Overburden	0.40

Climate in the Project area is continental with lengthy cold winters. Very little surface runoff occurs during the winter months. Accumulated winter precipitation (snow) is released largely as surface runoff during the spring freshet and is accounted for in the precipitation-runoff factors presented in Table 3-11. This process is modelled by applying a monthly precipitation-runoff factor that accounts for how much of the available precipitation becomes runoff in a particular month (Table 3-11). The monthly precipitation-runoff factor was developed using the approximate monthly values of snowmelt and runoff generated by the SRM during baseline conditions and using the precipitation data. Available runoff represents the current month's precipitation plus the remaining fraction of water from the previous month's precipitation that did not became actual runoff, as it accumulated as snow (thus not available for runoff).

The surface runoff from the mine infrastructure facilities is estimated as the product of precipitation, precipitation runoff factors and runoff coefficients. The balance of the precipitation that is not allocated to runoff is carried over to the next month.

Table 3-11 Precipitation-Runoff Factors used in the PROJ-WB

Month	Precipitation-Runoff Factor	Month	Precipitation-Runoff Factor
January	0.01	July	1.0
February	0.01	August	1.0
March	0.01	September	0.95
April	0.01	October	0.50
May	0.40	November	0.05
June	0.98	December	0.01

3.3.2.3 Groundwater

Groundwater discharge to the lakes and lake discharge to the groundwater system were predicted for Gordon, Farley and Susan lakes during the construction, operation and decommissioning/closure phases of the Project using a hydrogeological model developed for the site (Stantec 2020b).

An estimate of groundwater discharge to the lakes during the phases of mining is presented in Table 3-12. The groundwater discharge to the lakes and lake discharge to groundwater were used as inputs to the lake components of the water balance. For additional details of the groundwater modelling results with respect to groundwater changes during phases of the Project refer to Stantec 2020b.

Table 3-12 Estimated Groundwater Discharges for Mine Phases (Stantec 2020b)

Lakes	Groundwater to Lake (m^3/s)	Lake to Groundwater (m^3/s)	Net Groundwater Inflow (m^3/s)
Construction			
Susan Lake	0.00062	0.00002	0.00060
Gordon Lake	0.00055	0.00591	-0.00536
Farley Lake	0.00389	0.01130	-0.00741
Operation			
Susan Lake	0.00054	0.00002	0.00051
Gordon Lake	0.00044	0.01090	-0.01046
Farley Lake	0.00387	0.01830	-0.01443
Decommissioning/Closure - Active Closure and Post-Closure			
Susan Lake	0.00041	0.00005	0.00037
Gordon Lake	0.00064	0.00021	0.00043
Farley Lake	0.00483	0.00206	0.00277

Details of the open pit groundwater inputs are explained in Section 3.3.2.4.

3.3.2.4 Open Pit

Model inputs to the open pit include groundwater inflow, precipitation and runoff that occurs within the open pit and evaporative losses from ponded water within the open pit. During operation, groundwater inflow, precipitation and runoff that accumulates in the open pit will be pumped to the collection pond. This water will require management as part of open pit dewatering. The following provides a summary of the model assumptions and input parameters.

Groundwater Inflow

Groundwater inflow rates to the open pit were predicted using the numerical groundwater flow model developed for the Project (Stantec 2020b). Figure 3-13 (Appendix B) shows the average groundwater inflow rates to the open pit during construction and operation. Due to open pit wall freeze up, groundwater inflow rates are generally low in winter compared to spring, summer and fall months. During operations, water from dewatering of the open pit will be pumped to a collection pond. Note that groundwater inflow to the pits is greatly reduced due to the operation of the interceptor wells.

Legacy Pit Dewatering Rates

In the PROJ-WB, open pit dewatering rates were calculated for each mining year. Initial dewatering of Wendy and East pits will be pumped to Farley Lake during construction. A pump rate of 1,700 m^3/day was assumed to dewater Wendy Pit and 3,950 m^3/day East Pit. It is estimated to take around 620 days (~20 months) to dewater both pits.

Open Pit Filling

Dewatering of the open pit is terminated in Year 5, after which water within the open pit is allowed to accumulate as a result of groundwater inflow, direct precipitation, and runoff from portions of the PDA and the collection pond. The groundwater inflow rates were modelled using results of the groundwater flow model (Stantec 2020b).

To accelerate the filling of the open pit, water from the collection pond will be directed to the open pit beginning in Year 6 (when the dewatering stops) until the pit is filled to the closure design elevation. After the pit is full, overflow will be directed to Farley Lake if it meets receiving environment water quality guidelines.

Interceptor Wells

The construction and operation of the open pit will require the open pit to be dewatered. This will also include dewatering from a series of groundwater interceptor wells installed between the open pit and Gordon and Farley lakes. The dewatering of the open pit and interceptor wells will result in the drawdown of the water table by up to 1 m over an area extending approximately 1,200 m around the open pit (Stantec 2020b).

A total of thirteen interceptor wells have been incorporated into the Project to intercept groundwater flowing to the pit. The wells were added to reduce the volume of contact water due to the Project, to mitigate potential project effects related to water quality and quantity and to maintain lake elevations in Gordon and Farley lakes. Approximately 95% of the of water pumped by the interceptor wells is Expected to be sourced from the lakes, with the remainder sourced from the bedrock. The wells were included in the model according to the pumping rates shown in Table 3-13 and Table 3-14. During construction and operation, the pumping rate is determined annually, which is initially related to the dewatering of the legacy mine pits and then to the development of the new pit (specifically pit depth). During active closure, the volume of water pumped from the wells is dependent upon the water elevation in the filling pit. At the end of operation, a small portion (~5%) of the groundwater from the interceptor wells is redirected towards the pit, as this is in excess to what is required to maintain lake levels.

During operation, the water from the interceptor wells will be directed to either Gordon Lake or Farley Lake. During decommissioning/closure (active closure and post-closure) while the pit is refilling, the interceptor well pumping rate is reduced as water elevation in the pit increases, reducing groundwater inflow rates, until the pit lake elevation reaches around 310 metres above sea level (masl).

Table 3-13 Interceptor Wells – Pumping Rates during Construction and Operation

Mine Year	Pumping Rate (m^3/s)	
	to Farley Lake	to Gordon Lake
-2	0.0969	0.0834
-1	0.0959	0.0828
1	0.0953	0.0825
2	0.095	0.0827
3	0.0949	0.0829
4	0.0949	0.0829
5	0.0949	0.0829
6	0.0949	0.0829

Table 3-14 Interceptor Wells – Pumping Rates during Closure

Pit lake elevation during filling (masl)	Pumping Rate (m³/s)	
	to Farley Lake	to Gordon Lake
115	0.0949	0.0829
235	0.0949	0.0829
240	0.0878	0.0767
245	0.0759	0.0663
250	0.0667	0.0583
255	0.0593	0.0518
260	0.0519	0.0453
265	0.0435	0.038
270	0.0336	0.0294
275	0.0237	0.0207
280	0.021	0.0184
285	0.0183	0.016
290	0.0156	0.0137
295	0.0129	0.0113
300	0.0102	0.0089
305	0.0075	0.0066
310	0.0049	0.0042

3.3.2.5 Site Catchment Areas

Catchment areas for runoff and seepage collection from the open pit, ore stockpiles, MRSA and overburden stockpile were calculated for the operation and decommissioning/closure phases. The areas are summarized in Table 3-15 and the timing when each area is active in the model is determined from the schedule in Table 2-1. It was conservatively assumed that all surface water in the catchment areas is contact water and requires management. The contact water is directed either to the collection ponds via collection ditches or to the open pit.

Table 3-15 Catchment Areas used in PROJ-WB

Project Components	Gordon Site surface areas (km²)		
	Site	Natural Ground	Total Area
Open Pit	0.29	0.00	0.29
Ore	0.05	0.00	0.05
MRSA	0.77	0.24	0.10
Overburden	0.17	0.04	0.21

3.3.2.6 Project Changes to Watershed Areas

Streamflow during operations and decommissioning/closure (active closure and post-closure) were simulated using the PROJ-WB. Table 3-16 presents the area of each sub-watershed modelled using the SRM calculations for the BL-WB and the area using the runoff coefficient model.

Table 3-16 Summary of Watershed Area Changes within the PDA due to the Project

Sub-Watershed Name	Model Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Total Baseline Area (km²)	Area Modelled using Runoff Coefficients (km²)	Area Modelled using SRM – BL-WB (km²)	Tributary to
sws-FAR7-A1	QFO1	MRSA and Overburden Stockpile	1.5	0.44	1.06	Gordon Lake
sws-FAR7-B1	QF10	n/a*	0.5	0	0.5	Gordon Lake
sws-FAR7-C1	QF03sub	n/a*	1.4	0	1.4	Gordon Lake
sws-FAR7	QF03	Gordon Lake	0.7	0.21	0.49	Diversion Channel to Farley Lake
	QF03	Overburden Stockpile				
sws-FAR6-A2	QF05Ex4	Unnamed lakes FAR6-A1 and FAR6-A4	1.0	0	1.0	runoff to sws-FAR5-B2
sws-FAR5-B2	QF05Ex5	Wendy Pit and Diversion Channel	1.0	0.14	0.86	Diversion Channel to Farley Lake
		Proposed Pit				
sws-FAR5-A1	QF02	Unnamed lake FAR5-A2	1.1	0.3	0.8	Upper Farley Lake
		MRSA, Ore Stockpiles, and Mine Site Access Road				
sws-FAR5-MAR4	QF04Ex3	Marie Lake	0.6	0	0.6	Unnamed stream FAR5-MAR3 to Lower Farley Lake
sws-FAR5-MAR1	QF04	Unnamed lake FAR5-MAR2	0.9	0	0.9	Lower Farley Lake
sws-FAR5-MAN2	QF05ex1	Marnie Lake	1.0	0	1.0	Unnamed stream FAR5-MAN1 to Lower Farley Lake

Table 3-16 Summary of Watershed Area Changes within the PDA due to the Project

Sub-Watershed Name	Model Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Total Baseline Area (km²)	Area Modelled using Runoff Coefficients (km²)	Area Modelled using SRM – BL-WB (km²)	Tributary to
sws-FAR5-MAN1	QF05ex2	n/a*	0.5	0	0.5	Lower Farley Lake
sws-FAR5.2	QF05	Upper Farley Lake and Diversion Channel	1.6	0.15	1.45	Lower Farley Lake
sws-FAR5.1	QF05	Lower Farley Lake	0.6	0	0.6	Unnamed stream FAR4 to Swede Lake

Notes:

The catchment areas for watersheds ws-FAR3-SIM1, ws-FAR3, ws-FAR2-WHI1, ws-FAR1, and ws-SUS4 are not affected by Project components and are not listed here.

n/a* - no lake coverage or proposed project components exist within this sub-watershed

3.3.2.7 Mine Rock Storage Area

A conceptual model of flow through the MRSA was developed to model evaporation, infiltration, and runoff in the MRSA through all mine phases (Stantec 2020c). Key inputs and assumptions for the analysis were:

- The MRSA is divided in two components: slopes and central portion.
- The central portion is sub-divided in two sub-surface flow components: macropore flow and micropore flow.
- Infiltration is split between lateral seepage (toe seepage) and groundwater recharge at the base of the MRSA.

Figure 3-14 (Appendix B) presents a schematic of the flow pathways for water around and within the pile. A simple evaporation, runoff and infiltration model was used for the slopes, the macro/micropore flow paths were not modelled. It is assumed that this process will have less effect on flows, particularly at the toe of the slope where the thickness of the slope approaches zero.

The flow behavior through the MRSA depends on the wetting phase, which is dependent on time and whether the MRSA is covered. Flow behavior through the MRSA depends on the following temporal conditions:

- *Wetting*: time during which a wetting front is progressing through the MRSA. The mine rock is initially placed dry, and the wetting process continues over the years following placement. The wetting process was not modelled for the slope, for a similar reason that separate macro/micropore flow paths were not considered.

- *Wet*: the wetting front has broken through the base of the pile and the infiltration and unsaturated hydraulic conductivity profile of the material has reached an equilibrium. Steady state has been reached
- *No-cover*: There is no cover over the MRSA.
- *Cover*: there is a cover over the MRSA. The wetting process continues when the cover is in place.

The stages of MRSA development were defined as follows:

I **Wetting + No-Cover**: occurs during construction, operations and closure

II **Wetting + Cover**: occurs during the first 25 years of post-closure. The 25-year time length has been assumed (Stantec 2020c)

III **Wet + Cover**: occurs following 25 years (i.e., after Stage II) of post-closure

Table 3-17 outlines the proportion of total precipitation that is routed through the MRSA per the flow paths shown on Figure 3-14 (Appendix B). Every division of flow is proportionally calculated using the percentages shown in Table 3-17, according to the wetting phase (**I**, **II** or **III**), and the stockpile section (slope, macropore, micropore).

The following example can be used to explain how the data from the table is used:

To calculate surface flow on the MRSA slope for the stage **II** (wetting + cover), in the table select:

- row: “Surface flow” (Flow 2)

- column section: “a.slope”

- column: “**II**”

Value = 60% - which is the percentage to be applied to the calculated Flow 1 (Effective precipitation).

Table 3-17 MRSA Water Balance

Process	Flow	a. Slopes			b. Micropores			c. Macropores		
		I	II	III	I	II	III	I	II	III
Effective Precipitation	1	50%	50%	50%	50%	45%	45%	same as Micro		
Surface flow	2	60%	60%	60%	0%	60%	60%			
Infiltration	3	40%	40%	40%	100%	40%	40%			
Macro vs Micro	4	doesn't apply			91.3%	100%	100%	8.7%	0%	0%
Macro to toe	5.1				doesn't apply			60%	0%	0%
Macro to recharge	5.2							40%	0%	0%
Micro to toe	6.1	60%	60%	60%	60%	60%	60%	doesn't apply		
Micro to recharge	6.2	40%	40%	40%	40%	40%	40%			

Details of the MRSA water balance estimates are provided in the MRSA modelling memorandum attached in Stantec 2020c. Surface runoff and toe seepage are collected in the contact water collection ditches surrounding the MRSA and directed to the collection pond. The efficiency of the ditches is assumed to be 100% and the recharge is lost to the environment.

3.4 PROJECT WATER BALANCE RESULTS

3.4.1 Overview

The PROJ-WB combines the components of the BL-WB with components developed to model areas changed by the Project. The BL-WB provides estimates of streamflow for watersheds in the LAA under existing conditions. The PROJ-WB provides estimates of flow for the mine facility and incorporates the mine plan and water management features of the mine into the baseline environment. The PROJ-WB also incorporates results from groundwater modelling (Stantec 2020b) and runoff and seepage from key Project components. Runoff from the site infrastructure was estimated using modified model components developed for the PROJ-WB. The PROJ-WB was used to estimate streamflow and lake level during the construction, operation, active closure, and post-closure phases of the Project.

3.4.2 Baseline Water Balance Results

The calibrated BL-WB was used to model baseline flows and lake levels for the Gordon LAA. The baseline streamflows for the average, 1:25 dry, and 1:25 wet climate scenarios are summarized in Table 3-18.

3.4.3 Project Water Balance Results

The results of the PROJ-WB for average and the 25-year wet and dry climate scenarios are discussed next for each of the Project components.

3.4.3.1 Open Pit

Flow components into the open pit include groundwater seepage and direct precipitation, evaporation and dewatering. Figure 3-15 to Figure 3-17 (Appendix B) present the average monthly groundwater inflow rate and flows from direct precipitation, contribution from natural ground for climate average, 25-year dry, and 25-year wet climate scenarios to the open pit. The total dewatering rates and losses due to evaporation are also presented.

Under the average climate scenario, monthly average dewatering rates from the pit are 2,394 m^3/day with a maximum of 8,998 m^3/day. Under 25-year dry and 25-year wet climate scenarios the monthly average dewatering rates are 2,316 m^3/day with a maximum of 8,186 m^3/day, and monthly average of 2,491 m^3/day with maximum of 8,202 m^3/day, respectively. Pit dewatering is directed to the collection pond. Groundwater inflow rates to the pit range from 0 m^3/day to 8,909 m^3/day.

At the end of operations, dewatering of the open pit is terminated, the pit is allowed to fill with water from groundwater inflow, direct precipitation, surface contact water runoff (directed into the pit at this stage), and water from collection pond. Once water levels within the pit reach the final design elevation, water from the pit lake will be directed to Farley Lake. The model results demonstrate that it will take 12, 11 and 9 years to fill the open pit after the end of operation under 25-year dry, average and 25-year wet climate scenarios, respectively. Figure 3-18 (Appendix B) presents the pit filling over time for the three climate scenarios. Once the pit is filled, the annual mean monthly overflow rate from the pit lake ranges from 463 m^3/day (5.4 L/s) to 2,201 m^3/day (25.5 L/s) under average climate conditions (see Table 3-19). The mean monthly pit lake overflow rates for 25-year dry and 25-year wet climate scenarios range from 419 m^3/day to 1,576 m^3/day and 520 m^3/day to 3,026 m^3/day, respectively.

Table 3-18 BL-WB Predicted Streamflow Results for Gordon LAA

Month	Average Climate Scenario - Flow (m3/s)								
	QF10	QF01	QF03	QF04	QF02	QF05	QF06	QF07	QF08
Jan	0.000	0.000	0.005	0.000	0.000	0.029	0.000	0.071	0.111
Feb	0.000	0.000	0.004	0.000	0.000	0.023	0.000	0.054	0.087
Mar	0.000	0.000	0.003	0.000	0.000	0.019	0.000	0.045	0.073
Apr	0.000	0.001	0.003	0.000	0.000	0.018	0.009	0.044	0.067
May	0.008	0.027	0.038	0.032	0.024	0.148	0.168	0.180	0.501
Jun	0.004	0.012	0.039	0.014	0.011	0.153	0.067	0.343	0.639
Jul	0.006	0.016	0.037	0.020	0.014	0.154	0.094	0.362	0.490
Aug	0.005	0.013	0.037	0.016	0.012	0.157	0.078	0.361	0.487
Sep	0.004	0.012	0.033	0.014	0.010	0.143	0.070	0.302	0.435
Oct	0.003	0.007	0.027	0.009	0.006	0.124	0.043	0.258	0.355
Nov	0.000	0.001	0.015	0.001	0.000	0.078	0.004	0.178	0.248
Dec	0.000	0.000	0.008	0.000	0.000	0.042	0.000	0.105	0.157
Annual	0.002	0.007	0.021	0.009	0.007	0.091	0.044	0.192	0.304
Month	1:25 Dry Climate Scenario - Flow (m3/s)								
	QF10	QF01	QF03	QF04	QF02	QF05	QF06	QF07	QF08
Jan	0.000	0.000	0.005	0.000	0.000	0.025	0.000	0.058	0.091
Feb	0.000	0.000	0.004	0.000	0.000	0.020	0.000	0.045	0.072
Mar	0.000	0.000	0.003	0.000	0.000	0.017	0.000	0.037	0.061
Apr	0.000	0.001	0.003	0.001	0.001	0.016	0.010	0.037	0.055
May	0.005	0.018	0.025	0.021	0.016	0.095	0.113	0.133	0.320
Jun	0.003	0.008	0.022	0.010	0.007	0.090	0.049	0.209	0.344
Jul	0.004	0.012	0.023	0.014	0.010	0.092	0.069	0.191	0.263
Aug	0.003	0.010	0.024	0.012	0.008	0.097	0.058	0.170	0.236
Sep	0.003	0.008	0.022	0.010	0.007	0.092	0.051	0.167	0.232
Oct	0.002	0.005	0.019	0.006	0.004	0.086	0.031	0.169	0.228
Nov	0.000	0.001	0.012	0.001	0.000	0.059	0.003	0.131	0.182
Dec	0.000	0.000	0.007	0.000	0.000	0.035	0.000	0.083	0.125
Annual	0.002	0.005	0.014	0.006	0.005	0.060	0.032	0.119	0.184
Month	1:25 Wet Climate Scenario - Flow (m3/s)								
	QF10	QF01	QF03	QF04	QF02	QF05	QF06	QF07	QF08
Jan	0.000	0.000	0.006	0.000	0.000	0.033	0.000	0.085	0.132
Feb	0.000	0.000	0.005	0.000	0.000	0.026	0.000	0.065	0.103
Mar	0.000	0.000	0.004	0.000	0.000	0.022	0.000	0.054	0.087
Apr	0.000	0.000	0.004	0.000	0.000	0.021	0.007	0.053	0.082
May	0.012	0.040	0.050	0.045	0.034	0.193	0.187	0.208	0.720
Jun	0.005	0.015	0.066	0.019	0.014	0.264	0.151	0.600	1.196
Jul	0.008	0.022	0.060	0.027	0.020	0.236	0.129	0.634	0.858
Aug	0.006	0.018	0.053	0.022	0.016	0.230	0.109	0.645	0.850
Sep	0.005	0.016	0.047	0.019	0.014	0.206	0.096	0.536	0.748
Oct	0.003	0.010	0.037	0.012	0.009	0.173	0.061	0.376	0.527
Nov	0.001	0.001	0.019	0.001	0.001	0.103	0.005	0.227	0.316
Dec	0.000	0.000	0.009	0.000	0.000	0.050	0.000	0.129	0.190
Annual	0.003	0.010	0.030	0.012	0.009	0.130	0.062	0.301	0.484

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-19 Open Pit Overflow Average Monthly Discharge Rates (m^3/day) Post-Closure – All Climate Scenarios

Case	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Average	607	649	704	2,201	777	958	773	1,135	1,127	671	463	549	884
25-Year Dry	523	553	593	1,576	327	372	302	704	877	569	419	481	608
25-Year Wet	718	775	851	3,026	1,371	1,731	1,396	1,704	1,458	806	520	638	1,249

3.4.3.2 MRSA and Collection Pond

Runoff and toe seepage from the MRSA is collected in a series of ditches and ultimately pumped to the collection pond. Similarly, open pit dewatering is directed to the collection pond.

During operation, water from the pond is discharged to Farley Lake after the discharge water quality requirements are met. The mean monthly discharge ranges from the collection pond to Farley Lake, for the three different climate scenarios, and the mining stage are shown in Table 3-20. Figure 3-19 to Figure 3-21 (Appendix B) present the inflows and outflows of the collection pond for the three climate scenarios.

Table 3-20 Discharge from Collection Pond to Farley Lake (m^3/s) – All Climate Scenarios

Climate Scenario	Construction		Operation	
	min	max	min	max
Average	61	1896	384	9152
25-year dry	44	4387	296	8297
25-year wet	84	1923	298	8464

3.4.4 Results for Streamflow and Lake Level

The BL-WB was developed to predict streamflow for sub-watersheds within the Gordon LAA under existing conditions and during the same temporal and climate scenarios modelled for Project effects (i.e., the PROJ-WB). Flows and lake levels under existing conditions were used as the benchmark against which Project-related changes during the construction, operation, active closure and post-closure phases were assessed. The model predictions of streamflow and lake levels for baseline conditions and during the life of Project are presented below.

3.4.4.1 Streamflow

Average monthly and mean annual flow changes during construction, operation, and decommissioning/ closure (active closure and post-closure) from the baseline conditions are provided in Table 3-21 to Table 3-24, and graphically in Figure 3-22 to Figure 3-25 (Appendix B). Monthly and mean annual flow changes during construction, operation, and decommissioning/closure under the baseline conditions for average, 25-year dry and 25-year wet climate scenarios are provided in Appendix C.

Gordon Lake (QF03)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-21. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual flow increases 0.001 m^3/s from baseline (0.02m^3/s). The interceptor wells, which start functioning with construction (Year -2) are the main reason for this change.
- Operation: Mean annual flows are Expected to increase 0.002 m^3/s from baseline (0.021 m^3/s). The interceptor wells are the main reason for this change.
- Active Closure: Mean annual flow decreases 0.002 m^3/s from baseline (0.021 m^3/s) during the active closure phase. The reduction in flow from Gordon Lake is due to the reduction in total drainage area that drains into the Gordon Lake, as parts of the this now drains towards the pit.
- Post-Closure: Mean annual flow decreases 0.003 m^3/s from baseline (0.021 m^3/s) during the post-closure phase, which is considered a negligible change. The reduction in flow at Gordon Lake outflow is associated with the reduction in total drainage area that drains into the Gordon Lake.

Farley Lake (QF05)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-22. The changes in mean annual flow during each Project phase are:

- Construction: Mean annual flow is Expected to increase 0.06 m^3/s over baseline (0.091 m^3/s) during the construction phase. The reason for this change is associated with the inflow from groundwater interceptor wells and the additional flow from dewatering of the legacy pits.
- Operation: Mean annual flow is Expected to increase 0.04 m^3/s from baseline (0.091 m^3/s) during operation. The reason for this change is associated with the inflow from groundwater interceptor wells as well as additional groundwater related to pit dewatering.
- Active Closure: Mean annual flow decreases 0.005 m^3/s from baseline (0.091 m^3/s) during the active closure phase, which is considered negligible.
- Post-Closure: Mean annual flow change is an increase of 0.002 m^3/s from the baseline during post-closure, which can be considered negligible.

Swede Lake (QF07)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-23 . The changes in mean annual flow for each Project phase are:

- Construction: Mean annual flow increases 0.060 m^3/s from baseline (0.192 m^3/s) during construction. The increase in streamflow at Swede Lake is associated with the additional water from the interceptor wells and the dewatering of the legacy pits.

- Operation: Mean annual flow increases 0.04 m^3/s from baseline (0.192 m^3/s) during operations. The increased streamflow is a result of the interceptor wells and from pit dewatering.

- Active Closure: Mean annual flow decreases 0.005 m^3/s compared with baseline (0.192 m^3/s), which is considered as negligible.

- Post-Closure: Mean annual flow increases by 0.002 m^3/s from baseline condition (0.192 m^3/s), which is considered to be negligible.

Ellystan Lake (QF08)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-24. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual flow increases 0.06 m^3/s from baseline (0.304 m^3/s) during construction. The increase in streamflow at Ellystan Lake is associated with the increased water from the interceptor wells and dewatering of the legacy pits.

- Operation: Mean annual flow increases 0.04 m^3/s from baseline (0.304 m^3/s). The main reason for this change is the operation of the interceptor wells and pit dewatering.

- Active Closure: Mean annual flow decreases by 0.005 m^3/s from baseline (0.304 m^3/s), which is considered negligible.

- Post-Closure: Mean annual flow increases by 0.002 m^3/s from baseline (0.192 m^3/s), which is considered negligible.

Table 3-21 Predicted Streamflows for Existing and Project Conditions for QF03 (Gordon Lake Outlet) - Average Climate Scenario

QF03

Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Jan	0.005	0.007	0.002	0.006	0.001	0.008	0.003	0.008	0.003	0.008	0.003	0.008	0.003	0.005	0	0.005	0	0.007	0.002	0.005	0	0.005	0	0.005	0
Feb	0.004	0.007	0.003	0.006	0.002	0.007	0.003	0.007	0.003	0.007	0.003	0.007	0.003	0.004	0	0.004	0	0.005	0.001	0.004	0	0.004	0	0.004	0
Mar	0.003	0.007	0.003	0.007	0.003	0.007	0.004	0.007	0.003	0.007	0.003	0.007	0.003	0.004	0	0.003	0	0.004	0	0.003	0	0.003	0	0.003	0
Apr	0.003	0.007	0.004	0.007	0.003	0.007	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
May	0.038	0.040	0.002	0.039	0.001	0.040	0.002	0.039	0.001	0.039	0.001	0.039	0.001	0.031	-0.007	0.031	-0.007	0.032	-0.006	0.030	-0.008	0.030	-0.008	0.030	0
Jun	0.039	0.039	0	0.039	0	0.039	0	0.039	0	0.039	0	0.039	0	0.034	-0.005	0.034	-0.005	0.034	-0.005	0.032	-0.007	0.032	-0.007	0.032	0
Jul	0.037	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.033	-0.005	0.033	-0.005	0.033	-0.005	0.031	-0.006	0.031	-0.006	0.031	0
Aug	0.037	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.032	-0.004	0.032	-0.005	0.032	-0.004	0.031	-0.006	0.031	-0.006	0.031	0
Sep	0.033	0.033	0	0.033	0	0.033	0	0.033	0	0.033	0	0.033	0	0.029	-0.004	0.029	-0.004	0.029	-0.004	0.028	-0.005	0.028	-0.005	0.028	0
Oct	0.027	0.028	0.001	0.028	0.001	0.028	0.001	0.028	0.001	0.028	0.001	0.028	0.001	0.024	-0.003	0.024	-0.003	0.024	-0.003	0.023	-0.004	0.023	-0.004	0.023	0
Nov	0.015	0.017	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	-0.002	0.014	-0.002	0.014	0
Dec	0.008	0.010	0.003	0.010	0.003	0.010	0.003	0.010	0.003	0.010	0.003	0.010	0.003	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0
Annual	0.021	0.022	0.001	0.022	0.001	0.022	0.002	0.022	0.002	0.022	0.002	0.022	0.002	0.018	-0.002	0.018	-0.003	0.019	-0.002	0.018	-0.003	0.018	-0.003	0.018	0

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-22 Predicted Streamflows for Existing and Project Conditions for QF05 (Farley Lake outlet) - Average Climate Scenario

QF05

Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Jan	0.029	0.070	0.041	0.049	0.021	0.090	0.061	0.084	0.055	0.076	0.047	0.092	0.063	0.032	0.003	0.027	-0.002	0.049	0.020	0.032	0.003	0.027	-0.002	0.032	0
Feb	0.023	0.079	0.056	0.071	0.048	0.087	0.065	0.096	0.074	0.088	0.065	0.108	0.085	0.024	0.002	0.022	-0.001	0.031	0.008	0.026	0.004	0.021	-0.001	0.027	0
Mar	0.019	0.083	0.064	0.079	0.060	0.087	0.067	0.084	0.065	0.078	0.059	0.094	0.075	0.020	0.001	0.018	-0.001	0.024	0.004	0.024	0.004	0.018	-0.001	0.024	0
Apr	0.018	0.086	0.068	0.083	0.065	0.089	0.071	0.075	0.057	0.070	0.052	0.082	0.064	0.019	0	0.017	-0.001	0.020	0.002	0.023	0.005	0.017	-0.001	0.023	0
May	0.148	0.257	0.109	0.249	0.102	0.264	0.116	0.236	0.089	0.231	0.084	0.245	0.097	0.135	-0.012	0.132	-0.016	0.137	-0.010	0.159	0.012	0.131	-0.017	0.161	0
Jun	0.153	0.222	0.070	0.219	0.067	0.226	0.073	0.189	0.037	0.181	0.028	0.203	0.050	0.141	-0.011	0.140	-0.013	0.142	-0.010	0.150	-0.002	0.138	-0.015	0.151	0
Jul	0.154	0.224	0.070	0.220	0.066	0.227	0.074	0.178	0.024	0.173	0.019	0.185	0.031	0.143	-0.011	0.141	-0.013	0.144	-0.010	0.149	-0.004	0.139	-0.014	0.150	0
Aug	0.157	0.225	0.068	0.221	0.064	0.229	0.072	0.175	0.018	0.174	0.017	0.175	0.019	0.146	-0.011	0.145	-0.012	0.147	-0.010	0.152	-0.004	0.143	-0.014	0.153	0
Sep	0.143	0.205	0.062	0.203	0.060	0.208	0.064	0.159	0.016	0.159	0.015	0.159	0.016	0.133	-0.010	0.132	-0.011	0.134	-0.009	0.141	-0.002	0.131	-0.013	0.142	0
Oct	0.124	0.167	0.043	0.146	0.022	0.187	0.063	0.137	0.013	0.137	0.012	0.137	0.013	0.116	-0.008	0.115	-0.010	0.117	-0.007	0.125	0.001	0.114	-0.011	0.126	0
Nov	0.078	0.113	0.035	0.089	0.011	0.137	0.059	0.087	0.009	0.087	0.009	0.088	0.010	0.074	-0.004	0.073	-0.005	0.075	-0.003	0.080	0.002	0.072	-0.006	0.081	0
Dec	0.042	0.077	0.035	0.054	0.012	0.100	0.058	0.055	0.012	0.054	0.012	0.055	0.013	0.041	-0.001	0.040	-0.002	0.042	-0.001	0.045	0.003	0.040	-0.003	0.046	0
Annual	0.091	0.151	0.060	0.140	0.050	0.161	0.070	0.130	0.039	0.126	0.035	0.135	0.045	0.085	-0.005	0.083	-0.007	0.088	-0.002	0.092	0.002	0.083	-0.008	0.093	0

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-23 Predicted Streamflows for Existing and Project Conditions for QF07 (Swede Lake outlet) - Average Climate Scenario

QF07

Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Jan	0.071	0.099	0.029	0.076	0.005	0.123	0.052	0.094	0.023	0.091	0.020	0.097	0.026	0.072	0.001	0.068	-0.002	0.085	0.015	0.073	0.002	0.068	-0.002	0.073	0
Feb	0.054	0.094	0.040	0.078	0.023	0.111	0.057	0.106	0.052	0.098	0.044	0.114	0.060	0.056	0.002	0.053	-0.001	0.067	0.013	0.057	0.003	0.052	-0.002	0.057	0
Mar	0.045	0.096	0.051	0.087	0.042	0.106	0.061	0.106	0.061	0.099	0.054	0.115	0.070	0.047	0.002	0.044	-0.001	0.053	0.008	0.049	0.004	0.044	-0.001	0.049	0
Apr	0.044	0.105	0.061	0.099	0.055	0.110	0.066	0.104	0.060	0.098	0.055	0.113	0.069	0.045	0.001	0.043	-0.001	0.049	0.005	0.048	0.004	0.043	-0.001	0.048	0
May	0.180	0.294	0.114	0.286	0.106	0.301	0.121	0.279	0.099	0.273	0.093	0.290	0.110	0.176	-0.004	0.172	-0.008	0.180	0.001	0.191	0.012	0.172	-0.008	0.192	0
Jun	0.343	0.440	0.096	0.435	0.092	0.445	0.101	0.412	0.069	0.405	0.062	0.424	0.081	0.331	-0.012	0.328	-0.016	0.333	-0.010	0.348	0.004	0.327	-0.017	0.349	0
Jul	0.362	0.436	0.074	0.432	0.070	0.439	0.077	0.396	0.033	0.389	0.027	0.406	0.044	0.351	-0.011	0.349	-0.013	0.352	-0.010	0.359	-0.003	0.347	-0.015	0.360	0
Aug	0.361	0.430	0.069	0.426	0.065	0.433	0.073	0.382	0.021	0.380	0.019	0.385	0.025	0.349	-0.011	0.348	-0.013	0.350	-0.010	0.356	-0.004	0.346	-0.014	0.357	0
Sep	0.302	0.366	0.064	0.364	0.062	0.368	0.066	0.319	0.016	0.318	0.016	0.319	0.017	0.292	-0.010	0.291	-0.011	0.293	-0.009	0.299	-0.003	0.290	-0.013	0.300	0
Oct	0.258	0.307	0.050	0.296	0.038	0.319	0.061	0.271	0.014	0.271	0.014	0.272	0.014	0.249	-0.009	0.247	-0.010	0.249	-0.008	0.257	-0.001	0.246	-0.011	0.257	0
Nov	0.178	0.214	0.036	0.195	0.017	0.234	0.056	0.188	0.010	0.188	0.010	0.189	0.011	0.172	-0.006	0.171	-0.007	0.173	-0.005	0.180	0.001	0.170	-0.008	0.180	0
Dec	0.105	0.136	0.030	0.115	0.010	0.156	0.051	0.113	0.008	0.113	0.008	0.114	0.009	0.102	-0.003	0.101	-0.004	0.103	-0.002	0.107	0.002	0.101	-0.004	0.108	0.001
Annual	0.192	0.251	0.059	0.241	0.049	0.262	0.070	0.231	0.039	0.227	0.035	0.236	0.045	0.187	-0.005	0.185	-0.007	0.191	-0.001	0.194	0.002	0.184	-0.008	0.194	0

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-24 Predicted Streamflows for Existing and Project Conditions for QF08 (Ellystan Lake outlet) - Average Climate Scenario

QF08

Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Jan	0.111	0.134	0.023	0.112	0.001	0.156	0.045	0.123	0.012	0.122	0.011	0.123	0.013	0.111	0	0.108	-0.003	0.121	0.010	0.112	0.002	0.108	-0.003	0.113	0
Feb	0.087	0.117	0.030	0.097	0.011	0.136	0.049	0.119	0.032	0.114	0.027	0.124	0.037	0.088	0.002	0.085	-0.001	0.098	0.012	0.089	0.003	0.085	-0.002	0.090	0.001
Mar	0.073	0.113	0.040	0.099	0.026	0.126	0.054	0.122	0.049	0.115	0.042	0.130	0.058	0.074	0.002	0.072	-0.001	0.082	0.010	0.076	0.003	0.071	-0.002	0.076	0.001
Apr	0.067	0.118	0.051	0.109	0.042	0.127	0.060	0.123	0.056	0.117	0.050	0.132	0.066	0.068	0.001	0.066	-0.001	0.074	0.007	0.070	0.003	0.065	-0.001	0.071	0
May	0.501	0.644	0.143	0.633	0.132	0.655	0.154	0.633	0.132	0.624	0.123	0.648	0.147	0.500	-0.001	0.495	-0.006	0.510	0.009	0.515	0.014	0.494	-0.007	0.516	0.001
Jun	0.639	0.740	0.101	0.735	0.096	0.746	0.107	0.715	0.076	0.709	0.070	0.726	0.087	0.627	-0.012	0.624	-0.015	0.630	-0.009	0.645	0.006	0.623	-0.016	0.647	0
Jul	0.490	0.565	0.076	0.562	0.072	0.569	0.079	0.527	0.038	0.520	0.030	0.539	0.049	0.479	-0.011	0.477	-0.013	0.480	-0.010	0.488	-0.002	0.475	-0.015	0.489	0
Aug	0.487	0.556	0.069	0.552	0.065	0.560	0.073	0.510	0.023	0.507	0.020	0.515	0.027	0.476	-0.011	0.474	-0.013	0.477	-0.010	0.483	-0.004	0.473	-0.014	0.484	0
Sep	0.435	0.499	0.064	0.497	0.061	0.502	0.067	0.452	0.017	0.451	0.016	0.453	0.018	0.425	-0.010	0.424	-0.011	0.426	-0.009	0.432	-0.003	0.423	-0.013	0.432	0
Oct	0.355	0.406	0.051	0.398	0.043	0.414	0.059	0.369	0.014	0.369	0.013	0.369	0.014	0.346	-0.009	0.345	-0.010	0.347	-0.008	0.354	-0.001	0.344	-0.011	0.354	0
Nov	0.248	0.284	0.036	0.267	0.019	0.300	0.052	0.258	0.010	0.258	0.010	0.258	0.010	0.242	-0.006	0.241	-0.007	0.242	-0.006	0.249	0.001	0.240	-0.008	0.249	0
Dec	0.157	0.184	0.028	0.167	0.010	0.202	0.045	0.164	0.007	0.164	0.007	0.165	0.008	0.153	-0.003	0.153	-0.004	0.154	-0.003	0.158	0.002	0.152	-0.005	0.160	0.001
Annual	0.304	0.363	0.059	0.352	0.048	0.374	0.070	0.343	0.039	0.339	0.035	0.349	0.044	0.299	-0.005	0.297	-0.007	0.303	-0.001	0.306	0.002	0.296	-0.008	0.307	0

* Flows lower than 0.0005 m3/s are shown as "0".

3.4.4.2 Lake Levels

Gordon Lake

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 3-25. The changes in mean annual lake level for each Project phase are:

- Construction: Mean annual lake levels increase 0.03 m from baseline. The interceptor wells, which start functioning in Year -2, are the main reason for this change.
- Operation: Mean annual lake level is Expected to increase by 0.03 m from baseline. This change is associated with the interceptor wells.
- Active Closure: Mean annual lake level decreases 0.01 m from baseline. The reduction in the lake level at Gordon Lake is associated with the reduction in total drainage area that drains into the Gordon Lake as it is redirected towards the pit.
- Post-Closure: Mean annual lake level decreases 0.02 m from the baseline condition during the post-closure phase. The reduction in lake level at Gordon Lake is associated with the reduction in total drainage area that drains into the Gordon Lake, during the time that the pit is still filling. Under average climate scenario, the pit starts to spill over in Year 16.

Farley Lake

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 3-26. The changes in mean annual lake level for each Project phase are:

- Construction: Mean annual lake level is Expected to increase 0.14 m over baseline. The increase in water level at Farley Lake is associated with the inflow from groundwater interceptor wells and the additional flow from dewatering of the legacy pits.
- Operation: Mean annual lake level is Expected to increase 0.11 m from baseline. The increase is related to the inflow from groundwater interceptor wells and pit dewatering.
- Active Closure: Mean annual lake level deceases 0.01 m from baseline. This change is associated with all contact water being routed to the pit.
- Post-Closure: Mean annual lake level increases 0.01 m from baseline. This change is initially associated with the interceptor wells, and then with outflow from the new pit lake.

Swede Lake

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 3-27. The changes in mean annual lake level for each Project phase are:

- Construction: Mean annual lake level increases 0.05 m from baseline. The increase in water level at Swede Lake is associated with the inflow from groundwater interceptor wells and the additional flow from dewatering of the legacy pits.
- Operations: Mean annual lake level increases 0.04 m from baseline. The increased lake level is a result of the interceptor wells and pit dewatering.
- Closure: Mean annual lake level change is lower than 0.01 m, which is considered negligible.
- Post Closure: Mean annual lake level is lower than 0.01 m, which is considered negligible.

Ellystan Lake

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 3-28. The changes in mean annual lake level for each Project phase are:

- Construction: Mean annual change in lake level increases 0.02 m from baseline. The increase in water level at Ellystan Lake is associated with the inflow from groundwater interceptor wells and dewatering of the legacy pits.
- Operation: Mean annual lake level increases 0.02 m from baseline. The increased lake level is a result of the interceptor wells and pit dewatering.
- Closure: Mean annual lake level change is lower than 0.01 m, which is considered negligible.
- Post Closure: Mean annual lake level change is lower than 0.01 m, which is considered negligible.

Predicted lake levels for the baseline conditions and during the Project life (construction, operation, active closure and post-closure phases) are also presented in Figure 3-26 to Figure 3-28 (Appendix B) for Gordon Lake, Farley Lake, Simson Lake, Swede Lake and Ellystan Lake. respectively.

Table 3-25 Predicted Lake Level for Existing and Project Conditions for Gordon Lake - Average Climate Scenario

Month	Existing Condition	Construction (Year -1 - Year -2)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Jan	315.12	315.15	0.04	315.14	0.02	315.17	0.05	315.17	0.05	315.17	0.05	315.17	0.05	315.12	0.00	315.11	0.00	315.15	0.03	315.11	0.00	315.11	0.00	315.11	0.00
Feb	315.09	315.15	0.06	315.14	0.05	315.16	0.06	315.16	0.06	315.16	0.06	315.16	0.06	315.10	0.00	315.09	0.00	315.11	0.02	315.09	0.00	315.09	0.00	315.09	0.00
Mar	315.08	315.15	0.07	315.14	0.06	315.15	0.07	315.15	0.07	315.15	0.07	315.15	0.07	315.08	0.00	315.08	0.00	315.09	0.01	315.08	0.00	315.08	0.00	315.08	0.00
Apr	315.07	315.15	0.08	315.15	0.07	315.15	0.08	315.15	0.08	315.15	0.08	315.15	0.08	315.07	0.00	315.07	0.00	315.08	0.00	315.07	0.00	315.07	0.00	315.07	0.00
May	315.36	315.38	0.02	315.38	0.02	315.38	0.02	315.38	0.02	315.38	0.02	315.38	0.02	315.33	-0.03	315.33	-0.03	315.33	-0.03	315.32	-0.04	315.32	-0.04	315.32	0.00
Jun	315.40	315.40	0.00	315.40	0.00	315.40	0.00	315.40	0.00	315.40	0.00	315.40	0.00	315.38	-0.02	315.38	-0.02	315.38	-0.02	315.37	-0.04	315.37	-0.04	315.37	0.00
Jul	315.40	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.37	-0.02	315.37	-0.02	315.37	-0.02	315.36	-0.03	315.36	-0.03	315.36	0.00
Aug	315.39	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.37	-0.02	315.37	-0.02	315.37	-0.02	315.36	-0.03	315.36	-0.03	315.36	0.00
Sep	315.37	315.37	0.00	315.37	0.00	315.37	0.00	315.37	0.00	315.37	0.00	315.37	0.00	315.35	-0.02	315.35	-0.02	315.35	-0.02	315.34	-0.03	315.34	-0.03	315.34	0.00
Oct	315.34	315.34	0.01	315.34	0.01	315.34	0.01	315.34	0.01	315.34	0.01	315.34	0.01	315.32	-0.02	315.32	-0.02	315.32	-0.02	315.31	-0.02	315.31	-0.02	315.31	0.00
Nov	315.25	315.27	0.02	315.27	0.02	315.27	0.02	315.27	0.02	315.27	0.02	315.27	0.02	315.24	-0.01	315.24	-0.01	315.24	-0.01	315.23	-0.01	315.23	-0.01	315.23	0.00
Dec	315.16	315.20	0.04	315.20	0.04	315.20	0.04	315.20	0.04	315.20	0.04	315.20	0.04	315.16	0.00	315.15	-0.01	315.16	0.00	315.15	-0.01	315.15	-0.01	315.15	0.00
Annual	315.25	315.28	0.03	315.28	0.02	315.28	0.03	315.28	0.03	315.28	0.03	315.28	0.03	315.24	-0.01	315.24	-0.01	315.25	-0.01	315.23	-0.02	315.23	-0.02	315.23	0.00

Table 3-26 Predicted Lake Level for Existing and Project Conditions Farley Lake - Average Climate Scenario

Farley Lake

Month	Existing	Construction (Year -1 - Year -2)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Jan	313.58	313.72	0.14	313.66	0.08	313.78	0.20	313.76	0.19	313.74	0.17	313.78	0.21	313.59	0.01	313.57	-0.01	313.66	0.08	313.59	0.02	313.57	-0.01	313.59	0.00
Feb	313.54	313.75	0.21	313.73	0.19	313.77	0.23	313.80	0.25	313.78	0.23	313.82	0.28	313.55	0.01	313.54	-0.01	313.59	0.05	313.57	0.02	313.54	-0.01	313.57	0.00
Mar	313.52	313.76	0.24	313.75	0.23	313.77	0.25	313.77	0.24	313.75	0.23	313.79	0.27	313.53	0.01	313.52	-0.01	313.55	0.03	313.55	0.03	313.51	-0.01	313.55	0.00
Apr	313.51	313.77	0.26	313.77	0.25	313.78	0.26	313.74	0.23	313.73	0.22	313.76	0.25	313.52	0.00	313.51	-0.01	313.53	0.02	313.55	0.03	313.51	-0.01	313.55	0.00
May	313.85	314.03	0.18	314.02	0.17	314.04	0.19	314.01	0.15	314.00	0.15	314.02	0.17	313.84	-0.02	313.83	-0.03	313.84	-0.01	313.88	0.03	313.83	-0.03	313.89	0.00
Jun	313.91	314.01	0.10	314.00	0.10	314.01	0.11	313.96	0.06	313.95	0.04	313.98	0.08	313.89	-0.02	313.88	-0.02	313.89	-0.02	313.90	0.00	313.88	-0.03	313.90	0.00
Jul	313.91	314.01	0.10	314.01	0.10	314.02	0.11	313.95	0.04	313.94	0.03	313.96	0.05	313.89	-0.02	313.89	-0.02	313.89	-0.02	313.90	-0.01	313.88	-0.02	313.90	0.00
Aug	313.91	314.01	0.10	314.01	0.09	314.02	0.10	313.94	0.03	313.94	0.03	313.94	0.03	313.89	-0.02	313.89	-0.02	313.90	-0.02	313.91	-0.01	313.89	-0.02	313.91	0.00
Sep	313.89	313.99	0.10	313.98	0.09	313.99	0.10	313.92	0.03	313.92	0.03	313.92	0.03	313.87	-0.02	313.87	-0.02	313.87	-0.02	313.89	0.00	313.87	-0.02	313.89	0.00
Oct	313.85	313.93	0.07	313.89	0.04	313.96	0.11	313.88	0.02	313.88	0.02	313.88	0.02	313.84	-0.02	313.83	-0.02	313.84	-0.01	313.86	0.00	313.83	-0.02	313.86	0.00
Nov	313.75	313.83	0.08	313.78	0.03	313.88	0.13	313.77	0.02	313.77	0.02	313.77	0.03	313.74	-0.01	313.73	-0.01	313.74	-0.01	313.75	0.01	313.73	-0.02	313.76	0.00
Dec	313.64	313.74	0.11	313.68	0.04	313.80	0.17	313.68	0.05	313.68	0.04	313.68	0.05	313.63	-0.01	313.63	-0.01	313.63	0.00	313.65	0.01	313.63	-0.01	313.65	0.00
Annual	313.74	313.88	0.14	313.86	0.12	313.90	0.16	313.85	0.11	313.84	0.10	313.86	0.12	313.73	-0.01	313.72	-0.02	313.74	0.01	313.75	0.01	313.72	-0.02	313.75	0.00

Table 3-27 Predicted Lake Level for Existing and Project Conditions for Swede Lake Average Climate Scenario

Swede Lake

Month	Existing	Construction (Year -1 - Year -2)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Jan	297.14	297.17	0.03	297.15	0.01	297.20	0.06	297.17	0.03	297.17	0.02	297.17	0.03	297.14	0.00	297.14	0.00	297.16	0.02	297.14	0.00	297.14	0.00	297.14	0.00
Feb	297.12	297.17	0.05	297.15	0.03	297.19	0.07	297.18	0.06	297.17	0.06	297.19	0.07	297.12	0.00	297.12	0.00	297.14	0.02	297.12	0.00	297.12	0.00	297.12	0.00
Mar	297.10	297.17	0.07	297.16	0.06	297.18	0.08	297.18	0.08	297.17	0.07	297.19	0.09	297.11	0.00	297.10	0.00	297.12	0.01	297.11	0.01	297.10	0.00	297.11	0.00
Apr	297.10	297.18	0.08	297.18	0.07	297.19	0.08	297.18	0.08	297.17	0.07	297.19	0.09	297.10	0.00	297.10	0.00	297.11	0.01	297.11	0.01	297.10	0.00	297.11	0.00
May	297.24	297.33	0.09	297.32	0.08	297.33	0.09	297.32	0.08	297.31	0.07	297.33	0.09	297.24	0.00	297.23	-0.01	297.24	0.00	297.25	0.01	297.23	-0.01	297.25	0.00
Jun	297.37	297.43	0.06	297.43	0.05	297.43	0.06	297.41	0.04	297.41	0.04	297.42	0.05	297.36	-0.01	297.36	-0.01	297.36	-0.01	297.37	0.00	297.36	-0.01	297.37	0.00
Jul	297.38	297.43	0.04	297.42	0.04	297.43	0.05	297.40	0.02	297.40	0.02	297.41	0.03	297.38	-0.01	297.37	-0.01	297.38	-0.01	297.38	0.00	297.37	-0.01	297.38	0.00
Aug	297.38	297.42	0.04	297.42	0.04	297.42	0.04	297.39	0.01	297.39	0.01	297.40	0.02	297.37	-0.01	297.37	-0.01	297.37	-0.01	297.38	0.00	297.37	-0.01	297.38	0.00
Sep	297.34	297.38	0.04	297.38	0.04	297.39	0.04	297.35	0.01	297.35	0.01	297.35	0.01	297.34	-0.01	297.34	-0.01	297.34	-0.01	297.34	0.00	297.34	-0.01	297.34	0.00
Oct	297.31	297.35	0.03	297.34	0.03	297.35	0.04	297.32	0.01	297.32	0.01	297.32	0.01	297.31	-0.01	297.31	-0.01	297.31	-0.01	297.31	0.00	297.30	-0.01	297.31	0.00
Nov	297.25	297.28	0.03	297.26	0.01	297.29	0.04	297.26	0.01	297.26	0.01	297.26	0.01	297.24	-0.01	297.24	-0.01	297.25	0.00	297.25	0.00	297.24	-0.01	297.25	0.00
Dec	297.18	297.21	0.03	297.19	0.01	297.23	0.05	297.19	0.01	297.19	0.01	297.19	0.01	297.18	0.00	297.18	0.00	297.18	0.00	297.18	0.00	297.18	0.00	297.18	0.00
Annual	297.24	297.29	0.05	297.28	0.04	297.30	0.06	297.28	0.04	297.28	0.03	297.29	0.04	297.24	0.00	297.24	-0.01	297.25	0.00	297.25	0.00	297.24	-0.01	297.25	0.00

Table 3-28 Predicted Lake Level for Existing and Project Conditions for Ellystan Lake - Average Climate Scenario

Ellystan Lake

Month	Existing	Construction (Year -1 - Year -2)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Jan	282.86	282.88	0.02	282.86	0.00	282.89	0.03	282.87	0.01	282.87	0.01	282.87	0.01	282.86	0.00	282.86	0.00	282.87	0.01	282.86	0.00	282.86	0.00	282.87	0.00
Feb	282.84	282.87	0.02	282.85	0.01	282.88	0.04	282.87	0.03	282.87	0.02	282.87	0.03	282.84	0.00	282.84	0.00	282.85	0.01	282.85	0.00	282.84	0.00	282.85	0.00
Mar	282.83	282.86	0.04	282.85	0.03	282.88	0.05	282.87	0.04	282.87	0.04	282.88	0.05	282.83	0.00	282.83	0.00	282.84	0.01	282.83	0.00	282.83	0.00	282.83	0.00
Apr	282.82	282.87	0.05	282.86	0.04	282.88	0.05	282.87	0.05	282.87	0.05	282.88	0.06	282.82	0.00	282.82	0.00	282.83	0.01	282.83	0.00	282.82	0.00	282.83	0.00
May	282.99	283.02	0.03	283.02	0.03	283.02	0.03	283.02	0.03	283.02	0.03	283.02	0.03	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00
Jun	283.03	283.05	0.02	283.05	0.02	283.05	0.02	283.04	0.01	283.04	0.01	283.05	0.01	283.03	0.00	283.03	0.00	283.03	0.00	283.03	0.00	283.03	0.00	283.03	0.00
Jul	283.01	283.02	0.02	283.02	0.01	283.02	0.02	283.01	0.01	283.01	0.01	283.02	0.01	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00
Aug	283.00	283.02	0.01	283.02	0.01	283.02	0.01	283.01	0.00	283.01	0.00	283.01	0.01	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00
Sep	282.99	283.01	0.01	283.01	0.01	283.01	0.01	283.00	0.00	283.00	0.00	283.00	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00
Oct	282.97	282.99	0.01	282.98	0.01	282.99	0.02	282.98	0.00	282.98	0.00	282.98	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00
Nov	282.94	282.95	0.01	282.94	0.01	282.95	0.02	282.94	0.00	282.94	0.00	282.94	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.94	0.00	282.93	0.00	282.94	0.00
Dec	282.89	282.91	0.01	282.90	0.01	282.92	0.02	282.90	0.00	282.90	0.00	282.90	0.00	282.89	0.00	282.89	0.00	282.89	0.00	282.89	0.00	282.89	0.00	282.90	0.00
Annual	282.93	282.95	0.02	282.95	0.02	282.96	0.03	282.95	0.02	282.95	0.02	282.95	0.02	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00

4.0 WATER QUALITY MODEL

4.1 BASELINE WATER QUALITY MODEL

4.1.1 Conceptual Model

The contaminant transport module of GoldSim was used to build a water quality model (WQM) directly linked to the WB.

The general approach was to:

- Use the BL-WB and baseline water quality monitoring data to develop a baseline water quality model (BL-WQM) that predicts water quality in lakes and streams.
- Verify the model by comparing the downstream predicted water quality in lakes and streams with that predicted by the BL-WQM.

The BL-WQM consists of network of individual cells representing catchments (undeveloped areas and areas of historical mine features) and lakes, connected by links (channels). An example of this network is shown on Figure 4-1 (Appendix B) for baseline conditions of the Gordon site. The catchments are defined using the watersheds delineated in the BL-WB (Map 3-2) and are sometimes split into smaller areas in order to attribute different water quality concentrations which reflect the influence of baseline conditions (e.g., historical mine features).

Catchments are defined as source cells with concentration as inputs to the BL-WQM. The volume inputs for these source cells are irrelevant because concentration is constant. These cells are shown in grey and blue in Figure 4-1 (Appendix B). Blue source cells represent natural or non-contact catchments and grey source cells represent contact or historic project components. Advective mass flux from a cell is determined as concentration in the source multiplied by an outflow rate (runoff) determined in the BL-WB. The BL-WQM transfers mass from source cells to mixing cells representing reservoirs, ponds, lakes and river sections.

The mixing cells are shown in orange on Figure 4-1 (Appendix B). Mixing cells represent selected lakes that are being modelled to assess the effect of the Project. The labels in each cell (e.g., “QF01_CT”) represent a naming convention for the BL-WQM that relates to a lake water quality monitoring station or a lake sub-catchment. The chemical concentrations in each mixing cell are variable and depend on mass inflow/outflow and cell volume, which considers ice formation in the modelled lakes (to capture the cryo-concentration effect). The flows and volumes of water in the mixing cells are determined in the BL-WB with values directly used in the BL-WQM.

Mass was added and removed to mixing cells to simulate reactions and seasonal variability as described in Section 4.1.3.4.

4.1.2 Model Structure

The BL-WQM structure is shown in Figure 4-1 (Appendix B). The watersheds and lakes are modelled to simulate conditions within the LAA. The model includes the chain of lakes from Gordon Lake to Farley Lake to Swede Lake and to Ellystan Lake, at the downstream extent of the LAA. Simpson Lake is modelled as a source cell with constant concentration because it does not receive any flow from lakes affected by the Project. Concentrations of various parameters (e.g., sulfate) in East and West parts of Farley Lake are consistently different indicating that Farley Lake is not well-mixed between the upstream (Farley Lake West) and downstream (Farley Lake East) basins. Therefore, Farley Lake was split into two cells representing the East and West parts of the lake (Figure 4-1, Appendix B).

Gordon Lake receives runoff from historic North MRSA with flows calculated from BL-WB. This lake is also affected by groundwater seepages from South MRSA (0.02 m^3/day) and North MRSA (1 m^3/day) based on results from the groundwater model (Stantec 2020b). Farley Lake receives surface runoff from both South and North MRSAs and groundwater seepage from the South MRSA (3.17 m^3/day).

Background groundwater inflows to the Gordon and Farley lakes were modelled as source cells with constant concentrations for bedrock. The groundwater inflows from these cells and groundwater outflows from lakes were defined in Section 3.2.3.5.

4.1.3 Water Quality Model Inputs

4.1.3.1 Parameter Selection

The selection of parameters for inclusion in the model was based on the results of the geochemical characterization presented in Stantec 2017c and 2020d, and criteria listed in the following federal and provincial regulatory documents:

- *Canadian Water Quality Guidelines* (CWQG) for the Protection of Freshwater Aquatic Life (FAL) by Canadian Council of Ministers of the Environment (CCME 2019).
- *Manitoba Water Quality Standards Objectives and Guidelines* (MSOG) for Freshwater Aquatic Life (FAL) by Manitoba Water Stewardship (MWS 2011).
- *Metal and Diamond Mining Effluent Regulations of the Fisheries Act* (MDMER 2018).

In addition to the parameters listed in these documents, the supporting parameters such as general water chemistry were added. The full list of parameters and applicable guidelines have been provided in (Table E-1, Appendix E).

Temperature and pH were not modelled but were required for calculations of CWQG values for aluminum and un-ionized ammonia. Although pH was not modeled, concentrations of proton, acidity and alkalinity were tracked by the model for potential future geochemical modelling outside of GoldSim, if needed. It should be noted that pH values below 6.0 are not Expected in ponds or reservoirs based on geochemical testing data and monitoring of the historical pit lakes and historic MRSAs (Stantec 2017c, 2020d).

Potentially acid generating (PAG) materials (rock and tailings) will be blended with non-PAG materials having excess of neutralization potential to prevent development of acidic drainage reduce metal mobility from Project components as discussed in Stantec (2017c, 2020d).

4.1.3.2 Chemistry Inputs

For each sub-catchment, a surface water quality monitoring station was selected as a source input (see Table E-2, Appendix E). Groundwater quality inputs were based on monitoring wells representing different sources, such as natural or historical components. The water quality inputs were prepared using following steps:

Step 1: Detection Limits

Concentrations of some elements were reported below detection limits (Stantec 2020e). For measured concentrations below detection limit, the full detection limit was used for the model inputs.

Step 2: Grouping and Checking Seasonal Data

Surface water concentrations were grouped by season for selected stations as follows:

- Spring: May and June
- Summer: July and August
- Fall: September and October
- Winter: November, December, January February, March and April

Concentrations for elements which are currently exceeding or close to the exceedances in the receiving environment, according to on baseline water quality monitoring data (Stantec 2020e) were checked for outliers for each season. Outliers were removed if they were suspected to be caused by sampling/analytical error prior to calculation of statistics. The values impacted by outlier removal are highlighted in Appendix F.

Step 3: Calculation and Adjustment of Statistics

For surface water, average and 95th percentiles were calculated for each station and season. In some stations, when no samples were available for the season (e.g., when a stream was frozen to the bottom), statistics from the preceding season were used (Appendix F). For related parameters, the adjustments of statistical inputs where made to confirm that the fraction of metals and species were not above the sum of these fractions (e.g., total ≥ dissolved fraction for the same element). The adjustments we made using following conditions:

- If dissolved fraction > total, then dissolved fraction = total fraction
- If dissolved Chromium (Cr) VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr

- If free cyanide > Weak Acid Dissociative (WAD) cyanide, then free cyanide = WAD cyanide
- If WAD cyanide > total cyanide, then WAD cyanide = total cyanide
- If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N)

The adjusted values are highlighted in Appendix F.

For groundwater concentrations, average concentrations were calculated for each monitoring well from baseline monitoring (Stantec 2020f). These averages were grouped to represent different groundwater units/sources: background bedrock, background overburden, and groundwater associated with historical features. For each group, geomean and log_{10} of 95^{th} percentile of the average concentrations were calculated assuming geometrical distribution due to heterogeneity of groundwater quality (Appendix F). Groundwater was filtered prior to sampling and therefore represents dissolved concentrations. It was assumed that statistics for dissolved concentrations in groundwater are the same for total concentrations of metal that discharges to surface water considering natural filtration as water moves through geological units.

4.1.3.3 Legacy Mine Features

Gordon Lake receives groundwater seepages from South (0.02 m^3/day) and North (1 m^3/day) MRSAs based on the groundwater model (Stantec 2020b). Farley Lake receives runoff from both South and North MRSAs and groundwater seepage from South MRSA (3.17 m^3/day). Groundwater inflows were set the same for all cases, while respective concentrations were geomeans or log_{10} of 95^{th} percentiles depending on selected case (Appendix F).

4.1.3.4 Mass Addition and Removal

Seasonal changes in water quality are also related to turnover and fast changes of redox conditions in the lakes, which are complex and parameter-specific processes. Removal and addition of mass in the lake was included to reproduce the seasonal changes occurring in lakes based on observed data, which will be potentially influenced by surface water discharges from the Project (Gordon, Farley, Swede and Ellystan lakes). The removal and addition of mass in the lakes was completed using the following steps:

1) Baseline model was run for average case with average climate scenario and average baseline concentrations inputs using daily timestep without any removal or addition of the mass.

   Monthly removal fraction of mass inflow in lakes ($F_{removal}$) was calculated using modeled average monthly concentrations (C_{model}) and observed seasonal concentrations as $F_{removal}$ = ($C_{observed}$ - C_{model})/C_{model} for each month of year. If removal fraction for a parameter was negative, it was set to zero.

2) To avoid the potential for removal to result in the fraction of metals and species being above the sum of these fractions (e.g., total fraction of the element must be greater than or equal to the dissolved fraction for the same element), adjustments were made using the following conditions:

a. If dissolved fraction removal < total, then dissolved fraction removal = total fraction removal
b. If dissolved Cr VI (hexavalent) removal < dissolved Cr removal, then dissolved Cr VI (hexavalent) removal = dissolved Cr removal
c. If free cyanide fraction removal < WAD cyanide fraction removal, then free cyanide removal = WAD cyanide removal
d. If WAD cyanide removal < total cyanide removal, then WAD cyanide removal = total cyanide removal
e. If nitrite (as N) removal < nitrate + nitrite (as N) removal, then Nitrite (as N) removal = nitrate + nitrite (as N) removal

3) Mass addition was calculated only for parameters showing negative values for removal rate. Annual mass addition (M_{added}) was calculated as average from observed seasonal concentrations ($C_{observed}$), lake volume (V_{model}) and modeled mass in the lake (M_{model}) as follows $M_{added} = C_{observed} \times V_{model} - M_{model}$.

4) To make sure that the addition of mass did not result in fraction of metals and species being above the sum of these fractions, adjustments were made using the following conditions:

a. If dissolved fraction addition > total, then dissolved fraction addition = total fraction addition
b. If dissolved Cr VI (hexavalent) addition > dissolved Cr addition, then dissolved Cr VI (hexavalent) addition = dissolved Cr addition
c. If free cyanide fraction addition > WAD cyanide fraction addition, then free cyanide addition = WAD cyanide addition
d. If WAD cyanide addition > total cyanide addition, then WAD cyanide addition = total cyanide addition
e. If nitrite (as N) addition > nitrate + nitrite (as N) addition, then Nitrite (as N) addition = nitrate + nitrite (as N) addition

5) The resulting mass was generally added once per year at the end of November or May when sudden changes were often observed in the data.

6) The model was run with calculated removal fraction and mass additions. Removal fraction and mass additions were adjusted or redistributed between months for a better match between predicted and observed concentration seasonal trends for selected parameters.

The steps were repeated to generate removal fraction and mass additions for a dry Upper Case (scenario) with inputs for 1:25 year dry climate scenario and 95th percentile baseline concentrations inputs. The resulting removal fractions of mass inflows and mass additions to the lakes are presented in Appendix G.

4.1.4 Verification of Baseline Water Quality Model

Modelled concentrations in Gordon, Farley, Swede and Ellystan Lakes were compared to observed concentrations using relative percent of difference (RPD):

$$RPD = (C_{model} - C_{observed})/C_{observed} \times 100\%$$

For the Expected Case, modelled concentrations were compared to average observed values, while 95th percentile of observed concentrations were used to calculate RPDs for the Upper Case. Positive RPDs indicate that the model overpredicts concentrations, which indicates that the model is conservative for this parameter (Table E-3 and Table E-4, Appendix E). Negative RPDs show that the model underestimates existing concentration inputs into the lakes. Modelled predictions for the concentrations of some elements were underestimated by 50% to 0% of observed concentrations. This was considered acceptable considering natural variability, errors of laboratory analysis and data manipulation for the inputs. Predictions for conservative parameters that are generally present in dissolved form such as fluoride, sulfate, and sodium regardless of season are well within 50% of observed concentrations indicating mass flow is adequate in the model. Potential reasons for some results being below 50% (RPD<-50%) are as follows:

- Dissolved fractions of aluminum, copper, cadmium, iron, lead and zinc are generally underestimated due to conditions set for the inputs such that the model will not predict dissolved concentrations above total concentration.
- Inputs for Upper Case use 95th percentile concentrations, which might be affected by outliers for some parameters regardless of the data pre-screening.
- Many parameters such as cyanide species, nitrite, chromium, cadmium, selenium, silver, and other metals measured close to the detection limits, result in analytical errors up to 100% which is within 3 times above reportable detection limits.

Other studies have observed similar differences between modelled and observed date. Bird et. al (1992) predicted water quality in Canadian Shield lakes and reported discrepancies between modelled and observed concentrations as follows:

- Phosphorous, (bio)reactive parameter, was within a factor of two (200%) of observed.
- Calcium, relatively conservative (unreactive) major cation, was underpredicted by 20-30%.
- Cadmium, relatively reactive trace metal, was underpredicted by 70-90%.

This shows that the differences between the modelled and observed parameters are less than those reported by Bird et. al (1992), thus it is concluded that the model presented here represents baseline conditions well.

4.2 PROJECT WATER QUALITY MODEL

4.2.1 Model Overview

To model water quality effects, the project water quality model (PROJ-WQM) is built upon operational flow rates and reservoir volumes calculated in the PROJ-WB. The PROJ-WQM integrates Project-specific source terms into the PROJ-WB to estimate water quality generated from the proposed mine components for each phase: construction, operation, active closure and post-closure (Figure 4-2 to Figure 4-5). The

PROJ-WQM inputs were prepared for Expected Case where average concentrations and leaching rates were used and for the Upper Case associated with 95th percentile inputs for concentrations and assumptions resulting in elevated leaching rates. These inputs are described in the following sections.

4.2.2 Historic Pit Lakes

The Wendy and East pit lakes are meromictic pit lakes with low dissolved oxygen content (DO), with elevated concentrations of iron (Fe) and arsenic (As) in the lower anoxic zone of the pits. Mean concentrations (C_{mean}) for shallow and deep portions of Wendy (AQF4) and East (AQF6) pit lakes are presented in Appendix F. The pit lakes will be mixed with compressed air prior to dewatering to increase DO to a level safe for fish (Stantec 2019). The introduction of compressed air will result in reduced concentrations of iron through oxidation and precipitation of iron oxyhydroxides. Experimental oxidation of samples from the anoxic zone shows that 10-30% of arsenic can also coprecipitate with iron solids. The concentrations (C) of elements in the mixed pits were averaged using a volume (V) weighting approach for shallow and deep parts of the pit lakes, using *Equation 4-1*.

$$C_{MIXED} = (C_{SHALLOW} \times V_{SHALLOW} + C_{DEEP} \times V_{DEEP})/(V_{SHALLOW} + V_{DEEP}) \quad \textit{Equation 4-1}$$

The resulting concentrations in the mixed pits were applied to the discharges from Wendy and East pit lakes during construction except for iron, arsenic and aluminum. Concentrations of total and dissolved iron in the discharges were limited to 0.374 mg/L, which is the maximum concentration observed in oxygenated portions of the pits (Figure 4-6, Appendix B). Based on experimental oxidation of pit samples, it is assumed that 30% and 10% of total and dissolved arsenic will be removed in the pit lakes, in Expected and Upper Cases, respectively. Both pit lakes will be discharged into the western basin of Farley Lake. It was assumed that most of the suspended Fe and As will stay at the bottom of the pits and during pit development and operation this sediment-rich water will be pumped to the collection pond and settle in there.

4.2.3 Interceptor Wells

Six interceptor wells will be located on the east side of the open pit which will discharge to Gordon Lake, and seven wells will be located on west side of the open pit and discharge to Farley Lake West. Interceptor wells start pumping from the beginning of construction (see Figure 4-2, Appendix B).The pumping rate was estimated to be 14 L/s for each well. More details on the interceptor wells can be found in Stantec (2020b). In the PROJ-WQM model wells stop operating during the closure phase when the pit lake is 50 m below overflow (full pit lake) level in order to provide opportunity stratification of the pit lake as discussed in section 4.2.9 (Figure 4-5, Appendix B). In reality. Interceptor well pumping rates will start declining once this elevation is reached, however pumping will not be shut down until pit lake elevations remain stable.

The groundwater model estimates that the average travel time from Gordon Lake to interceptor wells on the east side of the open pit is 490 days and 730 days from Farley Lake to wells of the east side of the open pit (Stantec 2020b). Before the water from the lakes arrives at the pit, the geomean and log_{10} of 95th percentiles bedrock concentrations were used as input for well water quality for the Expected and Upper Case, respectively. When travel time is exceeded, the concentrations from the respective lakes were mixed with groundwater concentrations proportional to flows calculated in the PROJ-WB model.

4.2.4 Open Pit

Open pit outflow represents a mixture of groundwater and net precipitation inflows with the addition of mass leached from mine rock, pit wall and undetonated explosives. The numerical groundwater model indicates that groundwater consists of approximately 80% water that has originated from bedrock and the remaining 20% from overburden (Stantec 2020b). Therefore, concentrations from selected bedrock wells were applied to 80% inflow and overburden well concentrations were applied to 20% of groundwater inflows. Geometric mean and $\log_{10}$ of 95^{th} percentiles concentrations from these groups of wells were used as input for Expected and Upper Case, respectively (Appendix F). Additional groundwater discharges to the pit are discussed in Section 4.2.10 and shown on Figure 4-3 to Figure 4-5 with dotted line.

Mine water receives additional mass from:

1) Elements leached from rock rubble pit and pit walls as a result of weathering, and

2) Nitrogen species leached from undetonated explosives.

4.2.4.1 Exposed Rock Inputs

To account for mass input, it was assumed that the 3D surface of ultimate open pit (436,100 m^2) was covered with 1 m mine rock with a density of 2.3 t/m^3 resulting in approximately 1 Mt of rock exposed during operation. This is a conservative assumption and is often used in industry (Golder 2014). Element leaching rates from (R) exposed rock mass were based on average rates estimated from field bin tests and by scaling factors (SF) and using *Equation 4-2*:

$$R = M \times R_{FIELD\ BIN} \times SF_{SURFACE\ AREA} \qquad \textit{Equation 4-2}$$

Where:

M = 1,003 kilotonnes rock mass of rock exposed in the open pit, based on pit area, thickness of rubble and mine rock density

$R_{FIELD\ BIN}$ = three year (2015-2018) average weighted leaching rates from field bins applied to construction, operation and closure, while the last year (2018) average weighted leaching rates were used as inputs for the post-closure. Field bin weighting was done based on percentages of lithologies in the open pit. The Banded Iron Formation (BIF) lithology is represented by two composite samples (S5J and S5FI). This results in different leaching rates for post-closure conditions (i.e., 2018 leaching rates). Therefore, the lower rate from sample S5J is used to derive the average rate ($R_{FIELD\ BIN}$) for the Expected Case. The lower rate is incorporated because it is assumed to be representative of neutral conditions which are Expected to be maintained as a result of operational blending of PAG and non-PAG rock. For Upper Case, it is assumed that the higher leaching rates (e.g., for arsenic) in the post-closure phase could be related to acidification in pockets of PAG rock, which represents up 22% of the mass. Therefore, for the Upper Case scenario at decommissioning/closure, it is assumed that 22% of the leaching rate (PAG BIF) is approximated by S5FI sample and 37% of the leaching rate is approximated by sample S5J (non-

PAG BIF). The loading rates approximated by the remaining rock types are similar to the Expected Case loading rates (Table E-5, Appendix E).

$SF_{SURFACE\ AREA}$ = scaling factor for rock surface area. Rock in field bins were crushed to - ¼” and it was scaled up to represent blasted rock, which is coarser and has smaller surface area. The surface areas were calculated from particle site distributions (PSD) assuming spherical particles and density of 2.3 t/m^3. Mine rock PSD were taken from the Diavik mine studies (Smith et al. 2013) and resulted in 1.94 m^2/kg. This area was used for average case scaling, while a higher value of 3 m^2/kg was selected for the Upper Case based on experience with similar mine sites. Average surface area of crushed rock in field bins was 34.1 m^2/kg as calculated from average weighted PSD for each lithology. Dividing surface areas of blasted rock by average weighted surface areas for crushed mine rock in field bins, $SF_{SURFACE\ AREA}$ of 0.057 for Expected Case and 0.088 for Upper Case were used in Equation 4-2.

4.2.4.2 Blasting Residues

Mass rate of lost (non-exploded) nitrogen (R_N, g/yr) was calculated using *Equation 4-3*:

$R_N = MR \times PF \times F_N \times L_N \times FR_N$ *Equation 4-3*

Where:

MR is the total mining rate of ore + mine rock t/yr, (Table C-6)

PF = 300 g/t, is the Powder Factor based on the Mine Plan

F_N = 0.333, is the fraction of nitrogen in the explosive based on 1/3 of nitrogen in the explosive (Bailey et al. 2012) dimensionless

L_N = 0.002 for Expected and 0.01 for Upper Cases, based on 0.2% nitrogen of total nitrogen used loss from Ferguson and Leask (1988) and 1% as maximum observed in dry open pit mines in Table A-4 from Golder (2008)

FR_N = 0.1 (10%), is the fraction of nitrogen released from rock and ore while in the open pit, prior material transfer to storage areas, this assumes that another 90% will be leached in storage areas (Golder 2007).

The leached nitrogen was speciated as follows based on recommendations from Ferguson and Leask (1988):

- For Expected Case: N-NH3 - 11%; N-NO3 - 87%; N-NO2 – 2%
- For sensitivity case: N-NH3 - 4%; N-NO3 - 95%; N-NO2 – 1%.

This speciation was also applied to nitrogen leached from mine rock and ore stockpiles as described in Sections 4.2.5 and 4.2.6. The release of nitrogen species was assumed to be instant in mine water.

Leaching rates of nitrogen species and elements from rock weathering were explicitly added to cell OP_CT representing the open pit. The volume of this cell was calculated using PROJ-WB. Mine water will be collected in sumps at the bottom of the open pit and pumped to a collection pond. During closure and post-closure phases, the open pit will be filled, eventually forming a pit lake, which is described below in Section 4.2.9.

4.2.5 Mine Rock Storage Areas

The leaching rates from proposed MRSA (MRSA _CT) were calculated using Equations 4-2 and 4-3 and inputs are shown in Table E-6 (Appendix E). The calculated total leaching rate ($R_+ R_N$) was released to porewater stored in the MRSA cell to provide the concentration inside the MRSA at each time step. The volume of pore water was calculated from the PROJ-WB (see Section 3.3.8) assuming that one year of infiltration to matrix is stored until material in the MRSA is wetted. When mine rock is fully wetted, the volume of infiltrating water equals outflow from MRSA. In the model, porewater leaves the MRSA cell as both toe seepage and recharge to groundwater with the mass proportioned to each pathway based on outflow percentages shown in Table 3-17. The mass associated with runoff and toe seepage is captured by the ditches and directed to the collection pond. The mass associated with groundwater recharge directed to the open pit or environmental receptors based on the results of the groundwater flow model (Stantec 2020b). During construction, operation and closure the mine rock pile is assumed to be fully oxygenated similar to field bins. Element leaching rates from mine rock (R) should decline in post-closure because cover will limit oxygen ingress into the interior of the stockpile resulting in reduction of sulfide oxidation. For post-closure, element leaching rates from (R) covered rock mass was calculated using *Equation 4-4*:

$$R = (M_{>10m} \times SF_{>10m} + M_{<10m} \times SF_{<10m}) \times R_{FIELD\ BIN} \times SF_{SURFACE\ AREA} \qquad \textit{Equation 4-4}$$

Where:

$M_{>10m}$ = 36,740 kilotonnes, rock mass in upper 10 m of the stockpile

$M_{<10m}$ = 13,335 kilotonnes, rock mass located below 10 m of the stockpile surface

$SF_{>10m}$ - reduction scaling factor in upper 10 m of the mine rock stockpile

- For Expected Case: 0.71 in spring, summer and fall and 0.24 in winter
- For Upper Case: 0.85 in spring, summer and fall and 0.31 in winter

$SF_{>10m}$ - reduction scaling factor in mass located below 10 m of the stockpile surface

- For Expected Case: 0.42 in spring, summer and fall and 0.4 in winter
- For Upper Case: 0.54 in spring, summer and fall and 0.42 in winter

These scaling factors were calculated assuming first order kinetics for sulfide oxidation (Elberling and Nicholson 1996). As input, the oxygen content from monitoring of mine rock at Detour mine was used, the mine rock has similar sulfide content to the rock at Gordon and 0.5 m of soil cover

(Steinepreis 2017). During operation and closure this factor is equal to 1, which conservatively assumes no reduction in leaching rate.

- For the definition of $R_{FIELD\ BIN}$ and $SF_{SURFACE\ AREA}$ inputs refer to definitions provide in Equation 4-2.

Calculated pore water concentrations in mine rock were limited for dissolved and total iron at 0.49 mg/L, and total and dissolved aluminum – 0.085 mg/L based on maximum observed concentrations in oxygenated historical ponds (Figure 4-6). The reason for capping these elements is that they are Expected to precipitate as hydroxides and partially settle within the pile. Fluoride showed high leaching rates in field bin S2C resulting in high predicted concentrations that have never been observed at the site regardless that this lithology has been mined before and is present in the historical mine features. Therefore, fluoride was capped at 0.61 mg/L as maximum concentration observed in field bin S2C, which is approximately six times higher than concentrations observed in historical ponds (Figure 4-6). Similar to fluoride, predicted arsenic was much higher for the post-closure of the Upper Case than maximum observed concentration (0.034 mg/L) in historical features and kinetic tests (Figure 4-6). The limit for total and dissolved arsenic in porewater was conservatively set at 0.1 mg/L which is ~3x higher than the maximum observed value.

4.2.6 Ore Stockpile

The leaching rates from ore stockpile (Ore_cell _CT) were calculated using equations 4-2 and 4-3 and inputs shown in Table E-5 and Table E-6 (Appendix E). The volume balance for the cell representing ore stockpile was calculated using the same approach as for MRSA.

4.2.7 Overburden Stockpile and Runoff

For the overburden storage, existing overland runoff quality (average of inputs from stations AQF10 and AQF23) was assumed for overburden stockpile. Runoff from overburden stockpile is directed to the collection pond during operation and closure.

4.2.8 Collection Pond

The collection pond receives mass from mine water pumped from the open pit and from discharges from MRSA, ore and overburden storage areas during construction and operation. During these phases, the pond discharges to the western basin of Farley Lake. During closure and post-closure, the discharge is diverted to the open pit. The solubility limits of MRSA pore water were applied to the pond.

4.2.9 Pit Lake

During closure and post-closure the open pit will be filled, forming a pit lake as described in section 3.4.3.1. Major sources of elements for the pit lake are the collection pond and the groundwater inflow with minor contribution from pit walls and rubble on benches, which eventually become submerged. The pit lake filling was modeled as follows:

- Fully mixed lake is assumed until the level reaches an elevation of 50 m below the spillway elevation.

- When lake reaches level of 50 m below the spillway elevation, discharge from collection pond is sent via pipe to the pit below this elevation. The pit lake stratifies because collection pond discharge water is denser than groundwater, most of which enters the upper portion of the pit lake based on groundwater model (Stantec 2020b). The upper portion of the lake (epilimnion) is set to reach maximum 16m depth estimated on the geometry of the pit and existing (Wendy and East) pit lakes. The upper portion of the pit lakes also receives mass loading from pit walls and rubble on benches. This loading gradually reduces in the pit lake as these features are submergence. There is an additional mass of soluble metal fraction flushed from submerged rubble to the upper portion of pit lake Table E-7 (Appendix E).

- Upper portion of pit lake starts do discharge to Farley Lake West when the level of the lake reaches spillway elevation. At this point, collection pond is allowed to discharge to upper portion. As a result, the upper layer of the pit become denser and the pit lake eventually destratifies as predicted total dissolved solids concentration in the layers.

The residence time in the pit lake is estimated to be over 100 years based on water balance for normal conditions. The long residence time in the pit lake results in a reduction in concentration of contaminants through degradation (e.g. denitrification), uptake by algae coagulation/flocculation of suspended particles and further sedimentation. Removal or transfer rates from water to sediment were estimated from available literature. The transfer rates assumed in the model are generally lower, more conservative, than average values reported in the literature (Table E-8, Appendix E). The removal of the elements was limited to the upper 16 m of the pit lake, where photosynthesis and algae growth is Expected to occur.

4.2.10 Groundwater Discharges

Potential subsurface contamination, sourced from Project components (e.g., ore stockpile or MRSA), are not Expected to reach the closest natural receptors such as Gordon and Farley lakes for at least 300 years based on the groundwater model (Stantec 2020b). In post-closure, the pit lake and Susan Lake are Expected to receive 300-yr averaged flows of 0.3 m^3/day and 8.7 m^3/day from the MRSA, respectively.

5.0 WATER QUALITY PREDICTIONS

5.1 REPORTING OF CASES

Water quality predictions are presented for two cases/scenarios:

- Expected Case inputs include average and geometric mean concentrations for surface and groundwater, respectively. This case considers average leaching rates from mine rock in post-closure, which assumes no development of localized acidic conditions as a result of successful management of PAG materials.

- Upper Case inputs include 95^{th} percentiles and $\log_{10}$ of 95^{th} percentiles concentrations for surface and groundwater, respectively. This case assumes elevated leaching rates due to development of localized acidic conditions during post-closure. However, overall pH of seepage is Expected to stay neutral.

Both cases assume average climate and 1 year of wetting scenario for MRSA to faster reach steady state concentrations in pore water of mine rock. Additional sensitivity runs showed that water quality predictions for dry and average climate inputs are similar. This comparison showed that that water quality model is less sensitive to the flow and more sensitive to chemistry inputs including both baseline and Project.

The prediction statistics for each month of each phase of the Project of the Expected Case and Upper Case for water quality for point source discharges are summarized in Table 5-1 to Table 5-6, and for the receiving environment are provided in Appendix H. These summaries only include modeled parameters of interest (POI); these parameters are regulated by the guidelines listed in Table E-1 (Appendix E), regardless of exceedances. Time series (trends) for POI in the discharges are included in Appendix I. The long-term federal and provincial guidelines on the plots for discharges are not applicable, as the guidelines are developed for the receiving environment, and are shown just for comparison. Appendix I also includes trends in the receiving environment for parameters exceeding federal or provincial freshwater quality guidelines.

The predicted water quality of bed seepage (i.e., not captured in seepage collection ditches) from the MRSA are presented in Appendix J. The seepage water quality is not discussed in this report as diffuse groundwater inflow to the receiving environment is a not point-source discharge.

5.2 POINT SOURCE DISCHARGES

Point source discharges of contact water from the mine include:

- Wendy and East pit dewatering to West Farley Lake during construction.
- Interceptor wells to both Gordon and West Farley Lake from construction to post-closure.
- Collection pond to West Farley Lake during construction and operation.
- Overflow from the pit lake directly into West Farley Lake during post-closure (once the open pit is flooded). Initial overflow occurs from upper portion of stratified pit lake. When pit de-stratifies (mixes), chemistry of the discharge instantly changes and remains relatively stable after that (Appendix I).

Concentration summaries for POI in the discharges are shown in Table 5-1 to Table 5-6. The water quality model predicts that none of the parameters will exceed MDMER discharge limits and acute/short term federal and provincial guidelines in both the Expected and Upper Cases.

Table 5-1: Predicted concentrations of POI in discharge from Wendy Pit lake

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit	Construction			
				Expected Case		Upper Case	
				Mean	Max	Mean	Max
Ammonia (as N)	n/v	Equation[3]	n/v	0.018	0.116	0.0331	0.211
Ammonia (NH_3)[1]	n/v	n/v	0.5	0.0051	0.0329	0.0094	0.0599
Arsenic	n/v	n/v	0.1	0.000446	0.00316	0.000817	0.0057
Arsenic (d)	n/v	0.34	n/v	0.000417	0.00295	0.000817	0.0057
Boron	29	n/v	n/v	0.0085	0.0603	0.0131	0.0902
Cadmium	Equation	n/v	n/v	9.17E-07	5.79E-06	4.11E-06	3.74E-05
Cadmium (d)	n/v	Equation	n/v	9.17E-07	5.79E-06	4.11E-06	3.74E-05
Chloride	640	n/v	n/v	0.287	1.99	0.456	2.88
Chromium (d)	n/v	Equation	n/v	0.0000108	0.0000757	0.0000265	0.00027
Chromium VI (d)	n/v	0.16	n/v	0.0000108	0.0000757	0.0000265	0.00027
Copper	n/v	n/v	0.1	0.0000909	0.000594	0.00025	0.00191
Copper (d)	n/v	Equation	n/v	0.0000865	0.000562	0.000245	0.00189
Cyanide	n/v	n/v	0.5	0.0000834	0.000528	0.000106	0.000668
Cyanide (free)	n/v	0.022	n/v	0.0000802	0.000505	0.0000883	0.000561
Lead	n/v	n/v	0.08	0.00000632	0.0000398	0.0000229	0.000222
Lead (d)	n/v	Equation	n/v	0.00000632	0.0000398	0.0000227	0.000221
Manganese (d)	Equation	n/v	n/v	0.0904	0.646	0.284	1.99
Molybdenum	2	n/v	n/v	0.000144	0.00101	0.000284	0.00261
Nickel	n/v	n/v	0.25	0.000112	0.000759	0.000214	0.00136
Nickel (d)	n/v	Equation	n/v	0.000108	0.000734	0.000205	0.0013
Uranium	0.033	n/v	n/v	0.000266	0.00177	0.000549	0.00414
Zinc	n/v	n/v	0.4	0.000235	0.0015	0.00074	0.00661
Zinc (d)	Equation	Equation	n/v	0.000189	0.00124	0.000654	0.00629

Notes:
The proposed open pit is planned to discharge to the receiving environment only during post-closure.
CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved
"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the open pit (calculated from predicted Mg and Ca).
[1]Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.
[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021 (see Section 9.1.1.1).
[3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

Table 5-2: Predicted concentrations of POI in discharge from East Pit lake

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Construction			
				Expected Case		Upper Case	
				Mean	Max	Mean	Max
Ammonia (as N)	n/v	Equation[3]	n/v	0.0389	0.0925	0.0916	0.27
Ammonia (NH_3)[1]	n/v	n/v	0.5	0.0110	0.026	0.0260	0.0767
Arsenic	n/v	n/v	0.1	0.000977	0.00274	0.00162	0.00436
Arsenic (d)	n/v	0.34	n/v	0.000916	0.00255	0.00162	0.00436
Boron	29	n/v	n/v	0.0156	0.0435	0.0165	0.0437
Cadmium	Equation	n/v	n/v	0.00000253	0.0000061	0.0000144	0.0000581
Cadmium (d)	n/v	Equation	n/v	0.00000253	0.0000061	0.0000144	0.0000581
Chloride	640	n/v	n/v	1.3	3.65	2.18	5.37
Chromium (d)	n/v	Equation	n/v	0.0000335	0.000108	0.000098	0.000431
Chromium VI (d)	n/v	0.16	n/v	0.0000335	0.000108	0.000098	0.000431
Copper	n/v	n/v	0.1	0.000327	0.000841	0.00101	0.0031
Copper (d)	n/v	Equation	n/v	0.000306	0.000779	0.00101	0.0031
Cyanide	n/v	n/v	0.5	0.00022	0.000504	0.000242	0.000692
Cyanide (free)	n/v	0.022	n/v	0.000222	0.000514	0.000258	0.000611
Lead	n/v	n/v	0.08	0.0000226	0.0000541	0.00011	0.000357
Lead (d)	n/v	Equation	n/v	0.0000182	0.000042	0.0000876	0.000389
Manganese (d)	Equation	n/v	n/v	0.167	0.475	0.28	0.699
Molybdenum	2	n/v	n/v	0.000517	0.00154	0.00118	0.00432
Nickel	n/v	n/v	0.25	0.000294	0.00077	0.000472	0.0011
Nickel (d)	n/v	Equation	n/v	0.000272	0.000702	0.000445	0.00113
Uranium	0.033	n/v	n/v	0.00109	0.00292	0.00229	0.00679
Zinc	n/v	n/v	0.4	0.000668	0.00186	0.00239	0.00996
Zinc (d)	Equation	Equation	n/v	0.000581	0.00174	0.00239	0.00996

Notes:
The proposed open pit is planned to discharge to the receiving environment only during post-closure.
CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved
"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the open pit (calculated from predicted Mg and Ca).
[1]Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.
[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021 (see Section 9.1.1.1).
[3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

Table 5-3: Predicted concentrations of POI in interceptor wells discharging to Gordon Lake

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Construction		Operation		Closure		Construction		Operation		Closure	
				Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Ammonia (as N)	n/v	Equation[3]	n/v	0.085	0.0853	0.0836	0.0844	0.0844	0.0853	0.384	0.387	0.376	0.381	0.382	0.386
Ammonia (NH_3)[1]	n/v	n/v	0.5	0.0241	0.0242	0.0237	0.0240	0.0240	0.0242	0.109	0.110	0.107	0.108	0.108	0.110
Arsenic	n/v	n/v	0.1	0.000572	0.000574	0.000565	0.000569	0.00057	0.000574	0.00158	0.00158	0.00155	0.00156	0.00157	0.00158
Arsenic (d)	n/v	0.34	n/v	0.000571	0.000574	0.000563	0.000568	0.000569	0.000574	0.00157	0.00158	0.00154	0.00156	0.00157	0.00158
Boron	29	n/v	n/v	0.00943	0.00947	0.00928	0.00937	0.00938	0.00947	0.0347	0.0349	0.034	0.0344	0.0345	0.0349
Cadmium	Equation	n/v	n/v	0.00000715	0.00000724	0.00000682	0.00000701	0.00000705	0.00000723	0.000127	0.000129	0.00012	0.000124	0.000125	0.000129
Cadmium (d)	n/v	Equation	n/v	0.00000713	0.00000724	0.0000067	0.00000694	0.00000699	0.00000723	0.000127	0.000129	0.000119	0.000123	0.000124	0.000129
Chloride	640	n/v	n/v	0.565	0.572	0.537	0.553	0.556	0.572	3.34	3.38	3.16	3.26	3.28	3.38
Chromium (d)	n/v	Equation	n/v	0.000184	0.000187	0.000174	0.000179	0.00018	0.000186	0.000926	0.000941	0.000865	0.000897	0.000905	0.000939
Chromium VI (d)	n/v	0.16	n/v	0.000184	0.000187	0.000177	0.000181	0.00018	0.000186	0.000926	0.000941	0.000865	0.000897	0.000905	0.000939
Copper	n/v	n/v	0.1	0.000353	0.000358	0.000336	0.000346	0.000348	0.000358	0.0043	0.00437	0.00407	0.0042	0.00423	0.00436
Copper (d)	n/v	Equation	n/v	0.000352	0.000358	0.00033	0.000342	0.000345	0.000357	0.00429	0.00437	0.004	0.00416	0.0042	0.00436
Cyanide	n/v	n/v	0.5	0.000537	0.00054	0.000521	0.000531	0.000532	0.00054	0.000755	0.000758	0.000735	0.000747	0.000748	0.000757
Cyanide (free)	n/v	0.022	n/v	0.000551	0.000556	0.000527	0.000541	0.000543	0.000555	0.000881	0.000887	0.000845	0.000866	0.000869	0.000886
Lead	n/v	n/v	0.08	0.0000482	0.0000485	0.0000467	0.0000476	0.0000477	0.0000485	0.000787	0.000797	0.000752	0.000772	0.000776	0.000796
Lead (d)	n/v	Equation	n/v	0.0000477	0.0000485	0.0000443	0.0000461	0.0000465	0.0000484	0.000782	0.000797	0.000724	0.000755	0.000763	0.000795
Manganese (d)	Equation	n/v	n/v	0.0579	0.058	0.0569	0.0574	0.0574	0.0579	0.472	0.475	0.461	0.467	0.467	0.473
Molybdenum	2	n/v	n/v	0.00214	0.00218	0.00201	0.00208	0.0021	0.00217	0.00707	0.00719	0.00664	0.00688	0.00693	0.00718
Nickel	n/v	n/v	0.25	0.000267	0.000269	0.000257	0.000263	0.000264	0.000269	0.000786	0.000794	0.000753	0.000772	0.000775	0.000793
Nickel (d)	n/v	Equation	n/v	0.000265	0.000269	0.000251	0.000259	0.000261	0.000268	0.000783	0.000794	0.000739	0.000763	0.000768	0.000793
Uranium	0.033	n/v	n/v	0.00118	0.0012	0.0011	0.00114	0.00115	0.0012	0.011	0.0112	0.01	0.0105	0.0107	0.0112
Zinc	n/v	n/v	0.4	0.00243	0.00246	0.00228	0.00236	0.00238	0.00246	0.0175	0.0178	0.0164	0.017	0.0171	0.0178
Zinc (d)	Equation	Equation	n/v	0.00242	0.00246	0.00227	0.00235	0.00237	0.00246	0.0175	0.0178	0.0164	0.017	0.0171	0.0178

Notes:

The proposed open pit is planned to discharge to the receiving environment only during post-closure.

CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved

"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the open pit (calculated from predicted Mg and Ca).

[1]Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.

[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021 (see Section 9.1.1.1).

[3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

Table 5-4: Predicted concentrations of POI in interceptor wells discharging to Farley Lake

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Construction		Operation		Closure		Construction		Operation		Closure	
				Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Ammonia (as N)	n/v	Equation[3]	n/v	0.0853	0.0853	0.085	0.0862	0.0847	0.0861	0.384	0.387	0.365	0.375	0.371	0.383
Ammonia (NH_3)[1]	n/v	n/v	0.5	0.0242	0.0242	0.0241	0.0245	0.0241	0.0245	0.109	0.110	0.104	0.107	0.105	0.109
Arsenic	n/v	n/v	0.1	0.000584	0.000613	0.000667	0.000818	0.00068	0.000849	0.00159	0.0016	0.00164	0.00178	0.00165	0.00179
Arsenic (d)	n/v	0.34	n/v	0.000583	0.00061	0.000659	0.000805	0.000675	0.000836	0.00159	0.0016	0.00163	0.00176	0.00164	0.00177
Boron	29	n/v	n/v	0.00966	0.0102	0.0103	0.011	0.0103	0.0116	0.0349	0.0349	0.0344	0.0352	0.035	0.036
Cadmium	Equation	n/v	n/v	0.0000072	0.00000724	0.00000687	0.00000708	0.00000699	0.00000717	0.000127	0.000129	0.000113	0.000122	0.000118	0.000127
Cadmium (d)	n/v	Equation	n/v	0.00000719	0.00000724	0.00000671	0.00000703	0.00000688	0.00000715	0.000127	0.000129	0.000113	0.000122	0.000118	0.000127
Chloride	640	n/v	n/v	0.581	0.606	0.575	0.613	0.564	0.57	3.37	3.38	3.17	3.31	3.22	3.35
Chromium (d)	n/v	Equation	n/v	0.000185	0.000187	0.000166	0.000178	0.000172	0.000183	0.00093	0.000941	0.000819	0.00089	0.000855	0.000924
Chromium VI (d)	n/v	0.16	n/v	0.000185	0.000187	0.000166	0.000178	0.000172	0.000183	0.00093	0.000941	0.000819	0.00089	0.000855	0.000924
Copper	n/v	n/v	0.1	0.000359	0.000362	0.000356	0.000369	0.000362	0.00038	0.00433	0.00437	0.00396	0.00418	0.00408	0.00431
Copper (d)	n/v	Equation	n/v	0.000358	0.000358	0.000345	0.000357	0.000354	0.000363	0.00432	0.00437	0.00386	0.00415	0.00401	0.0043
Cyanide	n/v	n/v	0.5	0.000539	0.00054	0.000526	0.000538	0.000529	0.000537	0.000755	0.000758	0.000713	0.000742	0.000727	0.000752
Cyanide (free)	n/v	0.022	n/v	0.000553	0.000556	0.00052	0.000543	0.00053	0.00055	0.000879	0.000887	0.000796	0.00085	0.000823	0.000874
Lead	n/v	n/v	0.08	0.0000483	0.0000485	0.0000457	0.0000475	0.0000466	0.000048	0.000788	0.000797	0.000701	0.000756	0.000729	0.000783
Lead (d)	n/v	Equation	n/v	0.0000481	0.0000485	0.0000441	0.0000468	0.0000455	0.0000478	0.000787	0.000797	0.000687	0.000751	0.000719	0.000781
Manganese (d)	Equation	n/v	n/v	0.0605	0.0678	0.0653	0.0699	0.0614	0.0644	0.474	0.475	0.455	0.473	0.458	0.47
Molybdenum	2	n/v	n/v	0.00216	0.00218	0.00205	0.00211	0.00211	0.00215	0.00711	0.00719	0.00636	0.00682	0.00662	0.00707
Nickel	n/v	n/v	0.25	0.000271	0.000278	0.000276	0.000285	0.000276	0.000292	0.000791	0.000794	0.000765	0.000782	0.000778	0.000787
Nickel (d)	n/v	Equation	n/v	0.00027	0.000274	0.000267	0.000274	0.00027	0.000281	0.00079	0.000794	0.000748	0.000774	0.000765	0.000785
Uranium	0.033	n/v	n/v	0.0012	0.0012	0.00113	0.00118	0.00116	0.00118	0.0111	0.0112	0.00983	0.0106	0.0102	0.011
Zinc	n/v	n/v	0.4	0.00244	0.00246	0.00225	0.00237	0.00231	0.00243	0.0176	0.0178	0.0155	0.0168	0.0162	0.0175
Zinc (d)	Equation	Equation	n/v	0.00244	0.00246	0.00221	0.00236	0.00228	0.00242	0.0176	0.0178	0.0155	0.0168	0.0162	0.0175

Notes:

The proposed open pit is planned to discharge to the receiving environment only during post-closure.

CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved

"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the open pit (calculated from predicted Mg and Ca).

[1]Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.

[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021 (see Section 9.1.1.1).

[3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

Table 5-5: Predicted concentrations of POI in discharge from collection pond

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Expected Case				Upper Case			
				Construction Phase		Operations Phase		Construction Phase		Operations Phase	
				Mean	Max	Mean	Max	Mean	Max	Mean	Max
Ammonia (as N)	n/v	Equation[3]	n/v	0.0705	0.104	0.261	0.571	0.208	0.354	0.601	1.09
Ammonia (NH_3)[1]	n/v	n/v	0.5	0.0197	0.0291	0.0731	0.160	0.0582	0.0991	0.168	0.305
Arsenic	n/v	n/v	0.1	0.0011	0.00204	0.011	0.03	0.00194	0.00314	0.0136	0.0328
Arsenic (d)	n/v	0.34	n/v	0.000893	0.00171	0.0108	0.0296	0.00172	0.00279	0.0134	0.0324
Boron	29	n/v	n/v	0.00746	0.00993	0.0599	0.176	0.02	0.0307	0.105	0.28
Cadmium	Equation	n/v	n/v	7.28E-06	0.0000115	1.38E-05	2.79E-05	0.0000452	0.0000919	7.83E-05	0.000102
Cadmium (d)	n/v	Equation	n/v	4.32E-06	6.37E-06	1.11E-05	0.000023	0.0000421	0.0000907	7.56E-05	0.000101
Chloride	640	n/v	n/v	0.383	0.573	0.45	0.601	2.06	3.4	2.62	3.57
Chromium (d)	n/v	Equation	n/v	0.000102	0.000151	0.000174	0.000256	0.000381	0.00071	0.000619	0.000797
Chromium VI (d)	n/v	0.16	n/v	0.000102	0.000151	0.000174	0.000256	0.000381	0.00071	0.000619	0.000797
Copper	n/v	n/v	0.1	0.000477	0.000958	0.00176	0.00472	0.0026	0.00418	0.0053	0.00877
Copper (d)	n/v	Equation	n/v	0.000336	0.000428	0.00166	0.00451	0.00245	0.00412	0.0052	0.00857
Cyanide	n/v	n/v	0.5	0.0004	0.000646	0.000414	0.000509	0.000639	0.00114	0.000615	0.000724
Cyanide (free)	n/v	0.022	n/v	0.000412	0.000659	0.000431	0.000532	0.000726	0.00124	0.000725	0.000874
Lead	n/v	n/v	0.08	0.0000771	0.00025	0.000116	0.000271	0.00032	0.000583	0.000528	0.000663
Lead (d)	n/v	Equation	n/v	0.0000293	0.000041	8.83E-05	0.000202	0.000265	0.000563	0.000498	0.000645
Manganese (d)	Equation	n/v	n/v	0.0643	0.19	0.0581	0.0762	0.255	0.414	0.324	0.438
Molybdenum	2	n/v	n/v	0.00136	0.00206	0.00633	0.0165	0.00398	0.0066	0.0124	0.0271
Nickel	n/v	n/v	0.25	0.000508	0.00117	0.00121	0.00304	0.0012	0.00198	0.00236	0.00496
Nickel (d)	n/v	Equation	n/v	0.000296	0.000411	0.00106	0.00274	0.00094	0.00128	0.00219	0.00462
Uranium	0.033	n/v	n/v	0.000689	0.00103	0.00486	0.0138	0.00451	0.00868	0.0127	0.0242
Zinc	n/v	n/v	0.4	0.00209	0.00361	0.00301	0.00481	0.0103	0.0163	0.0142	0.018
Zinc (d)	Equation	Equation	n/v	0.00149	0.00229	0.00273	0.00422	0.00925	0.0161	0.0137	0.0178

Notes:
The proposed collection pond is planned to discharge to the receiving environment only during the Construction and Operations phases.
CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved
"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the collection pond (calculated from predicted Mg and Ca).
1Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.
2Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021 (see Section 9.1.1.1).
3The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

Table 5-6: Predicted concentrations of POI in discharge from future pit lake

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Post-Closure			
				Expected Case		Upper Case	
				Mean	Max	Mean	Max
Ammonia (as N)	n/v	Equation[3]	n/v	0.0898	0.0925	0.288	0.299
Ammonia (NH_3)[1]	n/v	n/v	0.5	0.0251	0.0259	0.0806	0.0837
Arsenic	n/v	n/v	0.1	0.00479	0.00502	0.00538	0.0056
Arsenic (d)	n/v	0.34	n/v	0.0046	0.00483	0.0052	0.00542
Boron	29	n/v	n/v	0.0686	0.0719	0.129	0.134
Cadmium	Equation	n/v	n/v	0.000011	0.0000115	0.0000564	0.0000592
Cadmium (d)	n/v	Equation	n/v	0.00000869	0.00000912	0.0000541	0.0000568
Chloride	640	n/v	n/v	0.81	0.842	3.64	3.82
Chromium (d)	n/v	Equation	n/v	0.000252	0.000282	0.000796	0.000821
Chromium VI (d)	n/v	0.16	n/v	0.000252	0.000282	0.000796	0.000821
Copper	n/v	n/v	0.1	0.00111	0.00117	0.00356	0.00373
Copper (d)	n/v	Equation	n/v	0.00103	0.00109	0.00348	0.00366
Cyanide	n/v	n/v	0.5	0.00046	0.000472	0.000672	0.000683
Cyanide (free)	n/v	0.022	n/v	0.000393	0.000412	0.000659	0.000682
Lead	n/v	n/v	0.08	0.000146	0.000159	0.000612	0.000621
Lead (d)	n/v	Equation	n/v	0.00011	0.000113	0.000569	0.000611
Manganese (d)	Equation	n/v	n/v	0.0633	0.0675	0.292	0.306
Molybdenum	2	n/v	n/v	0.00751	0.0078	0.0156	0.016
Nickel	n/v	n/v	0.25	0.000933	0.000975	0.00199	0.00206
Nickel (d)	n/v	Equation	n/v	0.000799	0.000838	0.00184	0.00191
Uranium	0.033	n/v	n/v	0.00348	0.00365	0.00983	0.0102
Zinc	n/v	n/v	0.4	0.00225	0.00238	0.0109	0.0114
Zinc (d)	Equation	Equation	n/v	0.00201	0.00213	0.0105	0.011

Table 5-6: Predicted concentrations of POI in discharge from future pit lake

Notes:
The proposed open pit is planned to discharge to the receiving environment only during post-closure.
CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved
"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the open pit (calculated from predicted Mg and Ca).
[1]Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.
[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021 (see Section 9.1.1.1).
[3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

5.3 RECEIVING ENVIRONMENT WATER QUALITY

The direct receivers are Gordon Lake and the West basin of Farley Lake (Farley Lake West) during all phases of the Project. However, interceptor wells will only be discharging to Gordon Lake for approximately half year in the post-closure phase. After that, only Farley Lake West will receive overflow pit lake during post-closure. Downstream receivers are the East basin of Farley Lake (Farley Lake East), Swede Lake and Ellystan Lakes. Susan Lake is outside of the Project catchment and receives seepage from the MRSA during post-closure.

To facilitate discussion, the receiving environment is presented in the following order:

- Gordon Lake
- Farley Lake West
- Downstream receivers: Farley Lake East, Swede Lake and Ellystan Lakes.
- Susan Lake.

The water quality predictions for the receiving environment are compared against the long-term federal and provincial freshwater quality guidelines (CWQG and MSOG, respectively). For the parameters with variable guidelines (pH, hardness, and ect. dependent), mean monthly inputs were used for calculation. The parameters exceeding the guidelines are identified in Table 5-7 and Table 5-8 for the Expected and Upper Cases, respectively. In some cases, plots show marginal exceedances (e.g., manganese) that are not listed in these tables (Appendix I). The reason for that is that plotted guidelines are based on median annual inputs resulting in straight line for simplification, while tables are generated from guidelines that vary on monthly basis. The sections below are not intended to provide an assessment of Project effects on water quality, but rather to highlight predicted exceedances and to identify sources causing these exceedances.

5.3.1 Gordon Lake

Exceedances of fluoride (CWQG and MSOG), total phosphorous (MSOG) and total iron (CWQG and MSOG) are predicted in Gordon Lake for Expected Case. Phosphorous and total iron are naturally exceeded in the baseline, while fluoride is related to discharge from the groundwater interceptor wells. When wells are decommissioned, fluoride concentrations decline below CWQG and MSOG (Appendix I). In addition, total copper and dissolved manganese show marginal exceedances of the CWQG benchmarks for Upper Case. Copper is sourced from groundwater interceptor wells. Manganese is naturally above the CWQG in the lake.

5.3.2 Farley Lake West

Total phosphorous exceedances of MSOG for the Expected Case are predicted during construction only and are related to dewatering of the legacy pit lakes. In the Upper Case, sources of total phosphorous are dewatering wells and collection pond. In post-closure, discharge from the pit lake results in marginal exceedances in total phosphorous for both Expected and Upper Cases. Fluoride shows exceedances of

CWQG and MSOG during all Project phases for both cases. These exceedances are related to discharges from groundwater interceptor wells, collection pond and overflow from pit lake. Exceedances for total iron (CWQG and MSOG) are predicted for the Upper Case only. The major source of iron is groundwater interceptor wells, decommissioning of which results in the decline of concentrations to below the guidelines in post-closure. An exceedance of dissolved manganese (CWQG) is predicted only for the construction phase for the Upper Case and is related to dewatering of historical pit lakes.

5.3.3 Downstream Receivers

Total iron and total phosphorous are exceeded in the baseline predictions for Farley Lake East and Ellystan lakes for both cases. These baseline exceedances are not predicted for Swede Lake, which is located between Farley Lake East and Ellystan lakes, indicating that iron and phosphorous are controlled by local conditions of the lakes.

Fluoride exceedances are predicted for both cases in Farley Lake East in all Project phases, similar to Farley Lake West. Fluoride concentrations decline along a flow path in the downstream direction with no exceedances predicted to pass beyond Swede Lake for the Expected Case in any Project phase. In the Upper Case, fluoride exceeds guidelines during operations in all downstream receivers, but declines in Swede Lake and Ellystan Lake to below the guidelines during post-closure.

Dissolved manganese is naturally above the CWQG in Farley Lake East in the Upper Case. Elevated manganese is also related to dewatering of legacy pit lakes during construction.

5.3.4 Susan Lake

No exceedances were predicted in Susan Lake for the Expected Case. In the Upper Case, total iron and total phosphorous are exceeded CWQG and MSOG in the baseline predictions. There is very little change in these parameters related to subsurface non-point discharge from MRSA.

6.0 CONCLUSIONS

No parameters are predicted to exceed the MDMER discharge limits or short-term (acute) federal and provincial guidelines for discharges, even for the conservative Upper Case.

In the receiving environment, total copper, fluoride, total iron, dissolved manganese and total phosphorus, were predicted to exceeded long-term (chronic) federal or provincial guidelines for protection of aquatic life. Total iron, dissolved manganese and total phosphorus were predicted to exceed the respective guidelines under baseline conditions, which is consistent with water quality monitoring. However, concentrations of these parameters are predicted to increase in some receptors as result of the Project. Fluoride exceedances are related to the discharge from interceptor wells and collection pond, decommissioning of which (well and pond) results in a decline of fluoride in post-closure. Total copper is predicted to exceed federal guidelines only during the Upper Case and the primary source is from groundwater interceptor wells.

The assessment of the exceedances and proposed mitigations are discussed in Environmental Impact Statement/Environmental Assessment completed for the Project. This report provides inputs for that assessment. .

Table 5-7 Exceedances in the Receiving Environment for the Expected Case

Parameters	Modelled Baseline		Construction		Operations		Active Closure		Post-Closure	
	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG
Gordon Lake										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total		X		X		X		X		X
Iron, Total	X	X	X	X	X	X	X	X	X	X
Farley Lake - West										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total				X						X
Farley Lake - East										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total		X								X
Iron, Total	X	X							X	X
Swede Lake										
Fluoride					X	X	X	X		
Ellystan Lake										
Phosphorus, Total		X								X
Iron, Total	X	X	X	X					X	X
Susan Lake - no exceedances										
Note: x indicates an exceedance was predicted for this model cell										

Table 5-8 Exceedances in the Receiving Environment for Upper Case

Parameters	Modelled Baseline		Construction		Operations		Closure		Post-Closure	
	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG
Gordon Lake										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total		X		X		X		X		X
Copper, Total			X		X		X			
Iron, Total	X	X	X	X	X	X	X	X	X	X
Manganese, Dissolved	X		X		X		X		X	
Farley Lake - West										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total				X		X		X		X
Iron, Total			X	X	X	X	X	X	X	X
Manganese, Dissolved			X							
Farley Lake - East										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total		X		X		X		X		X
Iron, Total	X	X	X	X	X	X	X	X	X	X
Manganese, Dissolved	X		X		X		X		X	
Swede Lake										
Fluoride			X	X	X	X	X	X	X	X
Phosphorus, Total				X		X		X		X
Ellystan Lake										
Fluoride					X	X	X	X	X	X
Susan Lake										
Phosphorus, Total		X		X		X		X		X
Iron, Total	X	X	X	X	X	X	X	X	X	X
Note: X indicates an exceedance was predicted for this model cell										

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8.0 STANTEC QUALITY MANAGEMENT PROGRAM

This report, Lynn Lake Gold Project (LLGP) Hydrology and Water Balance and Water Quality Model Technical Modeling Report: Gordon Site, prepared for Alamos Gold Inc., dated April 30, 2020, was produced by Stantec Consulting Ltd.

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Senior Environmental Geochemist

Signature

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Senior Hydrologist

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Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC (MB), PMP
Senior Project Manager

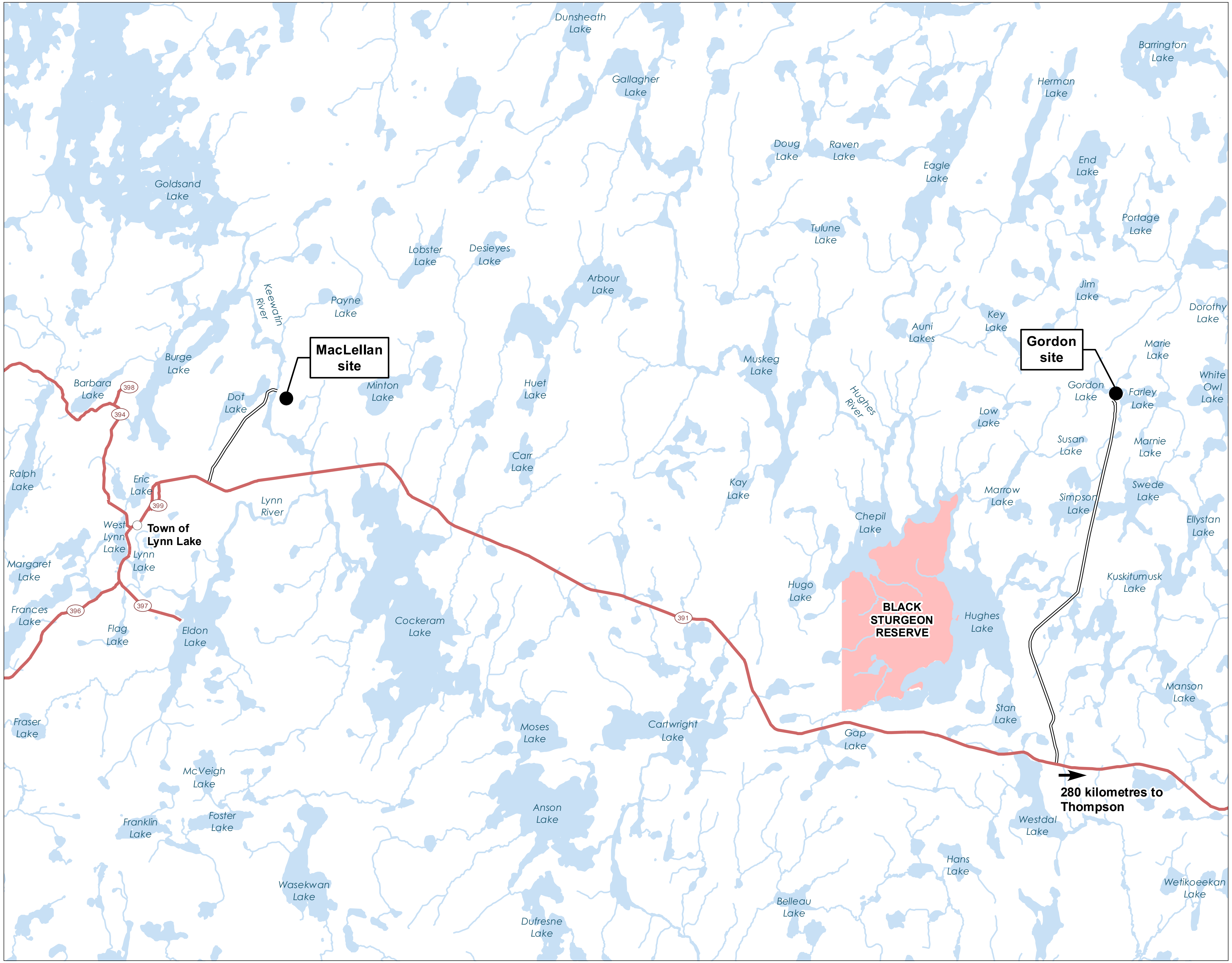
Signature

This report was independently reviewed by Kara Hewgill, B.Sc., Principal.

9.0 LIMITATIONS

This Technical Modelling Report entitled Lynn Lake Gold Project Hydrology Water Balance and Water Quality Impact Assessment: Gordon Site was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Alamos Gold Inc. (the “Client”) to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A MAPS



Stantec

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

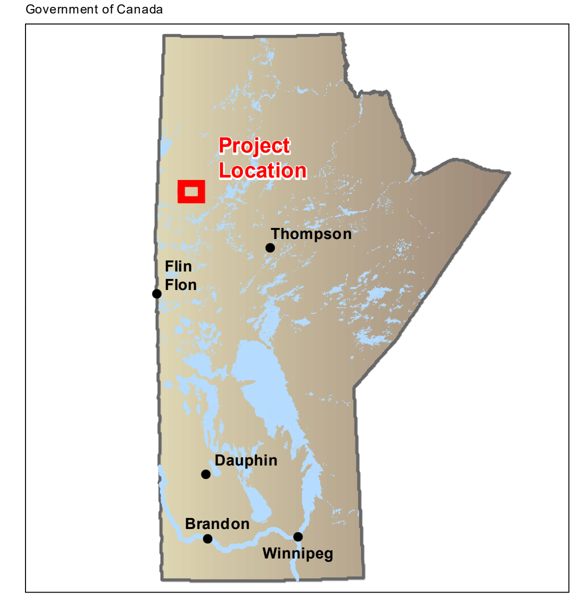
N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:150,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada



Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-01
Technical Review by DLuzi on 2020-05-01

Client/Project 111473008

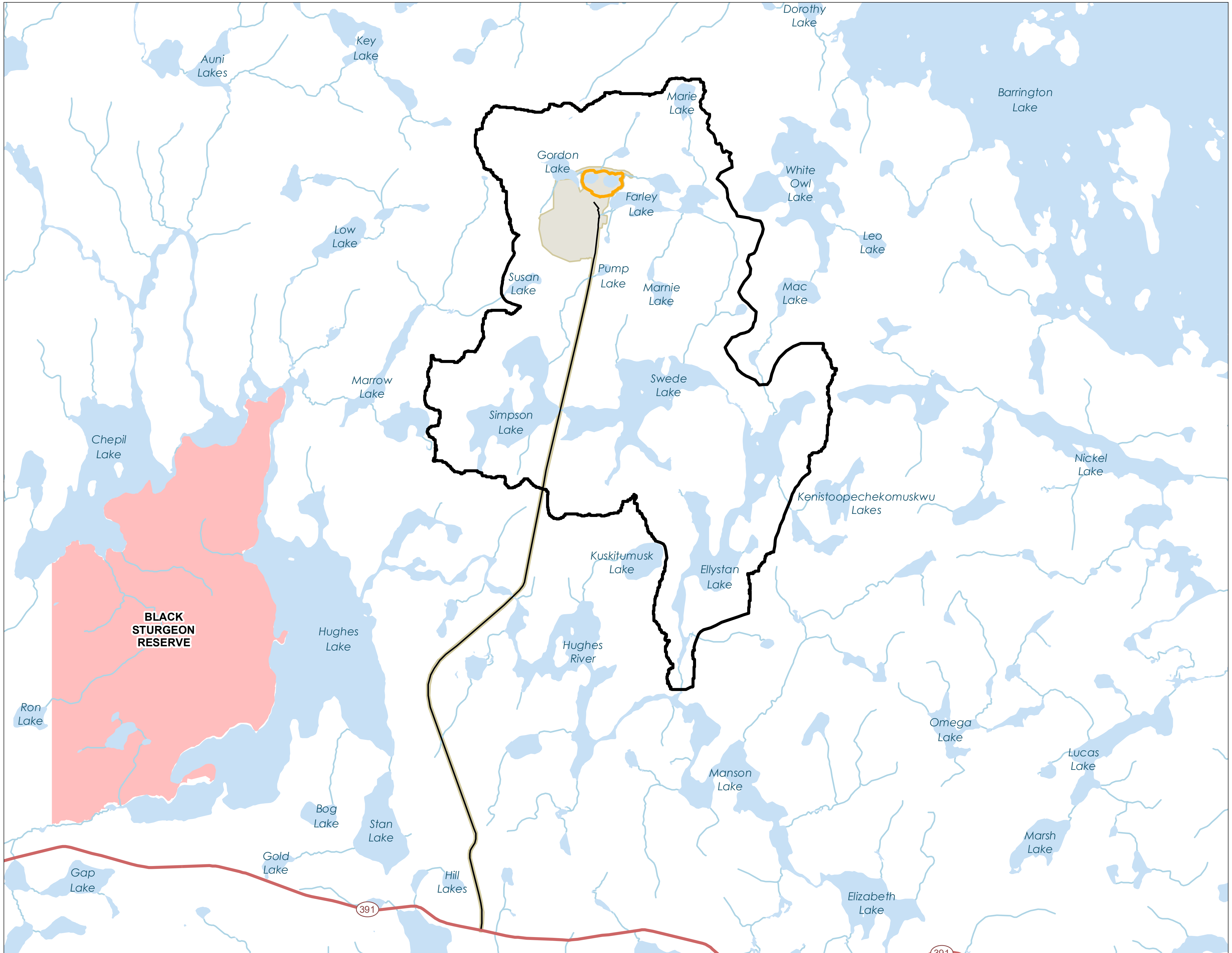
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

1-1

Title

General Project Area



Stantec

Project Infrastructure

Proposed Open Pit

Project Development Area

Study Area

Surface Water Local Assessment Area (LAA)

Landbase

Existing Access Road

Highway

Watercourse

Waterbody

First Nation Reserve

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

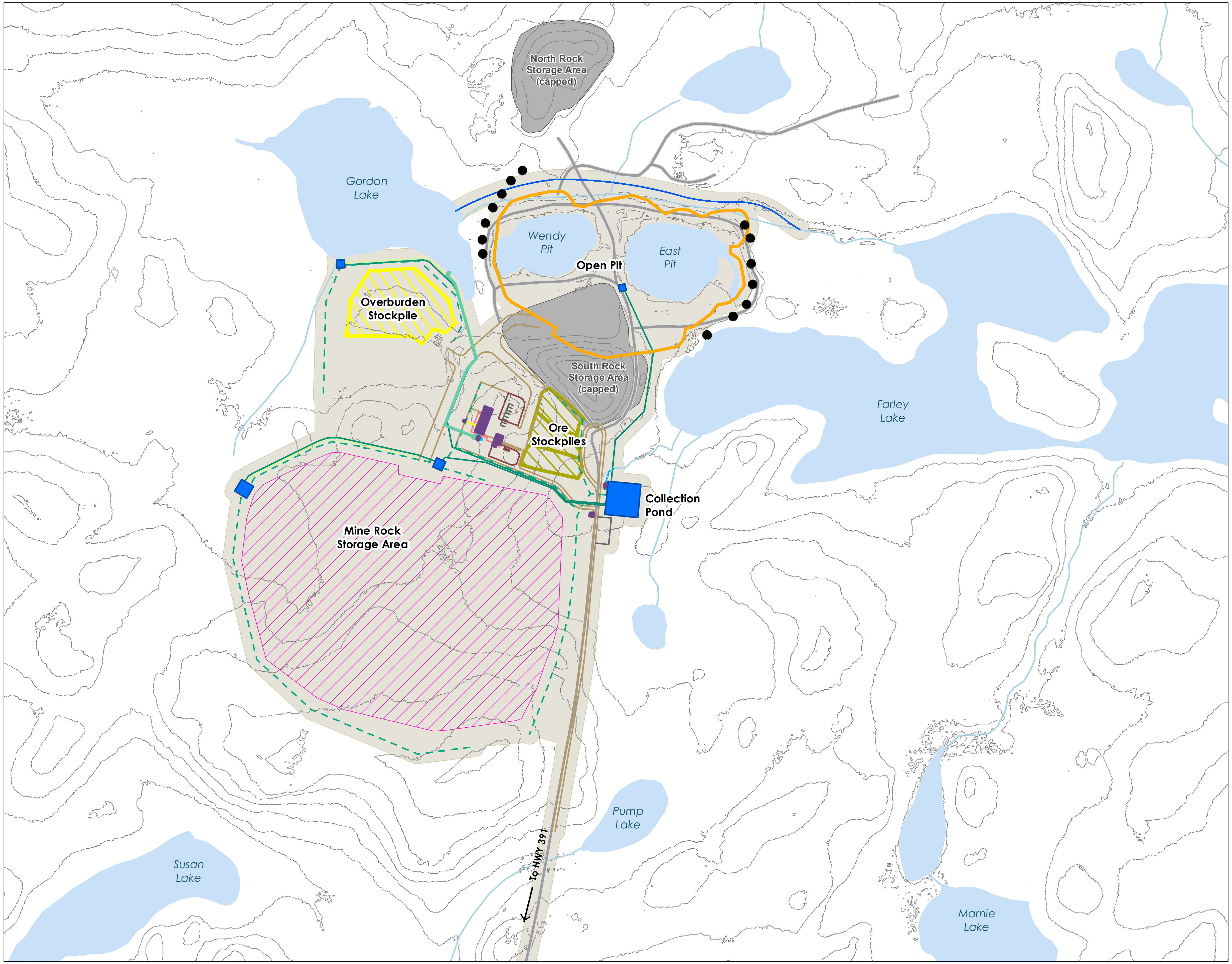
Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-05-01
Technical Review by DLuzi on 2020-05-01

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
1-2

Title
Surface Water Local Assessment Area - Gordon Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area
- Buildings
- Collection Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Ditch
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Gordon Features

- Interceptor Wells

Landbase

- Existing Access Road
- Contour (5m Interval)
- Watercourse
- Waterbody
- Existing Infrastructure Associated with Historical Mine

N

0 250 500 Metres

(At original document size of 11x17)
1:12,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

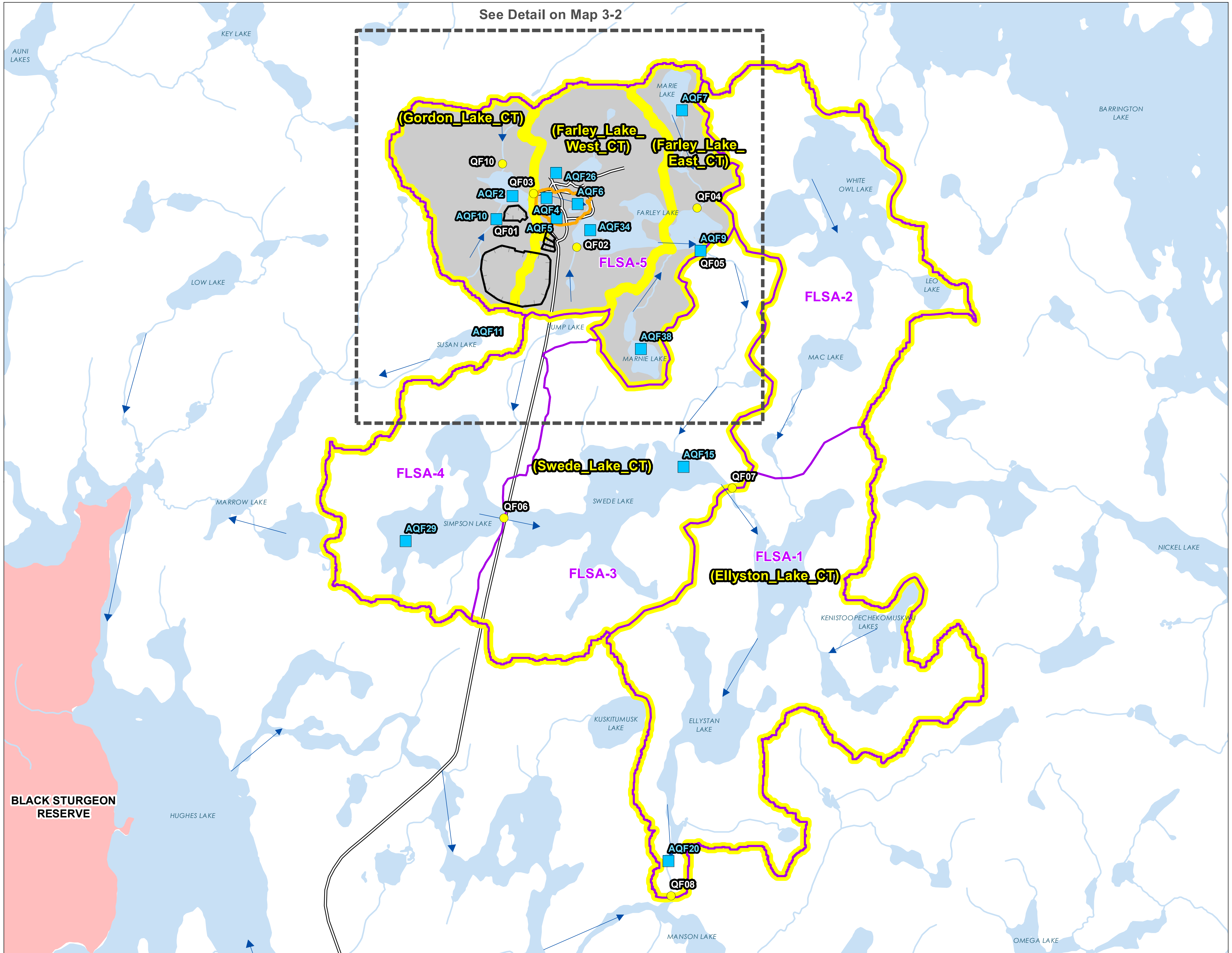
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-01
Technical Review by DLuzi on 2020-05-01

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
1-3

Title
Project Components at Gordon Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Infrastructure

Project Data

- FLSA-2 Hydrology Model Subwatersheds
- (Swede_Lake_CT) Water Quality Model Catchments (Mixing Cells)
- Combined Subwatersheds
- Hydrology Monitoring Station
- Water Quality Station
- Local Study Area

Landbase

- Existing Access Road
- Surface Water Flow Direction
- Watercourse
- Waterbody
- First Nation Reserve

N

0 1 2 Kilometres

1:55,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake, Manitoba

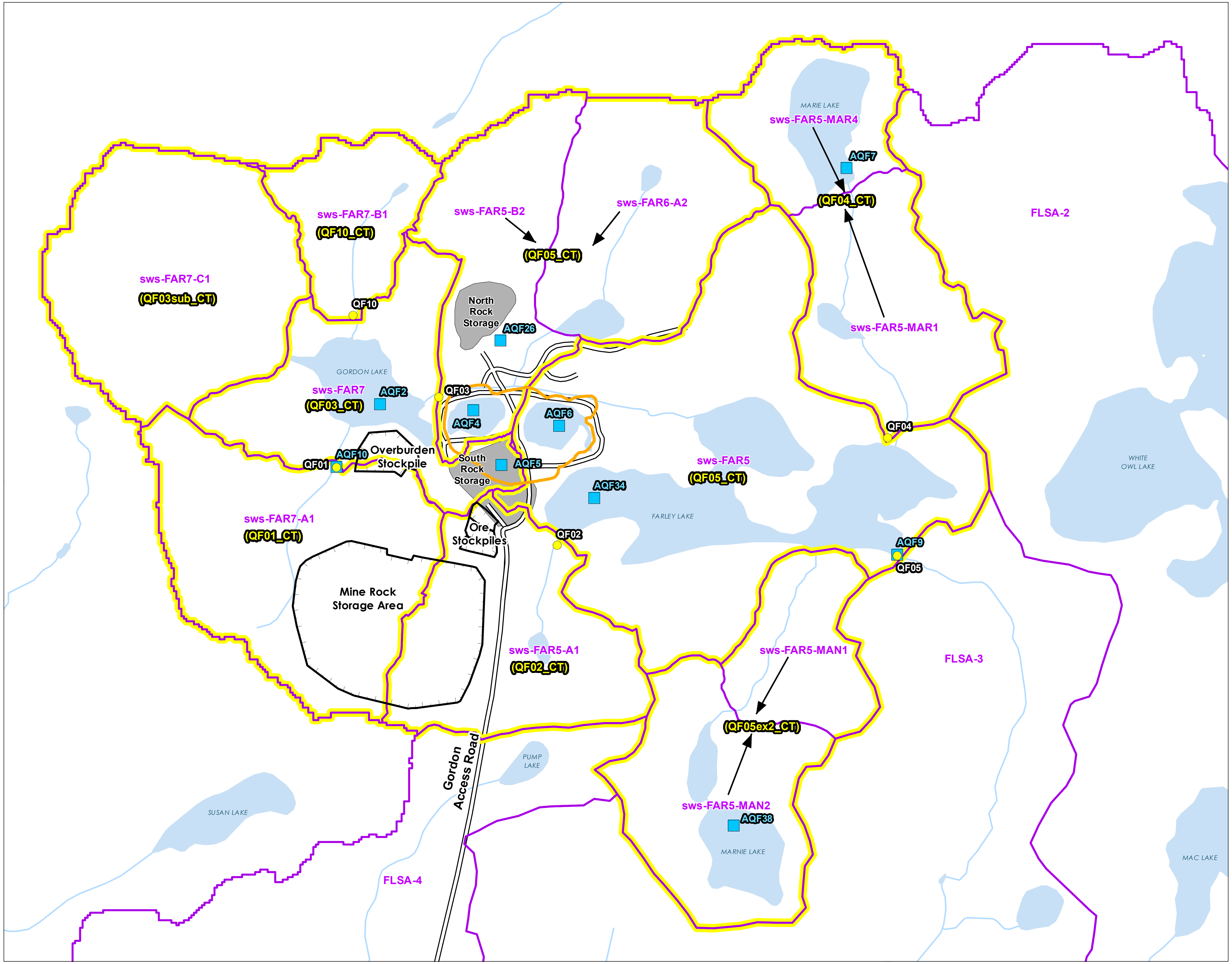
Prepared by ACampigotto on 2020-05-01
Technical Review by DLuzi on 2020-05-01

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
3-1

Title
Modelled Watersheds for Gordon Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Infrastructure

Project Data

- Hydrology Model Subwatersheds (sws-FAR5)
- Water Quality Model Subcatchments (Source Cells) ((QF04_CT))
- Combined Subwatersheds
- Hydrology Monitoring Station
- Water Quality Station

Landbase

- Access Road
- Watercourse
- Waterbody
- Existing Infrastructure Associated with Historical Mine

N

0 250 500 Metres

1:20,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-01
Technical Review by DLuzi on 2020-05-01

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
3-2

Title
Project Components and Catchment Areas at Gordon Site

Appendix B FIGURES

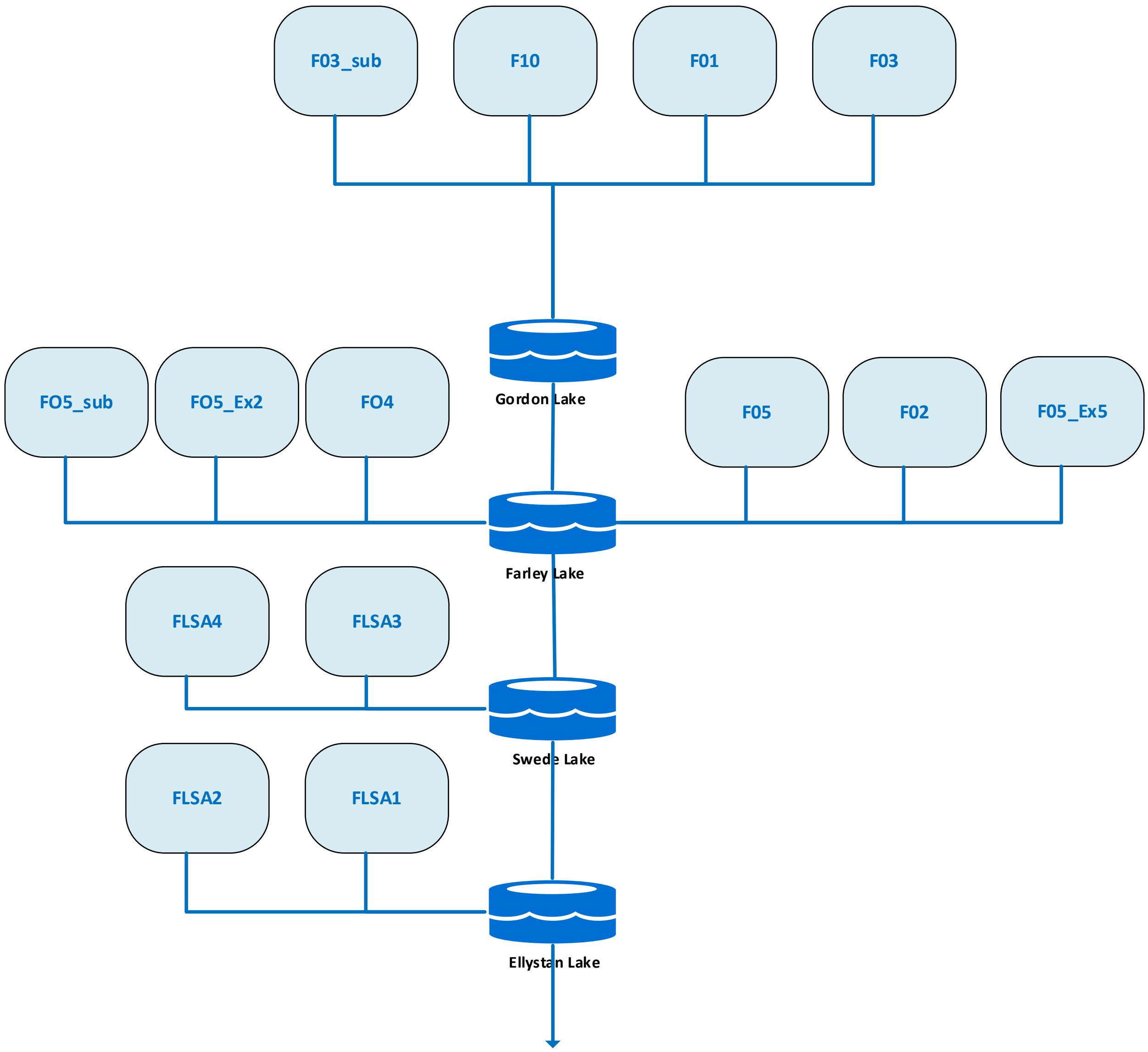


Figure 3-1 Conceptual Model for Catchments and Lakes on the Gordon Site

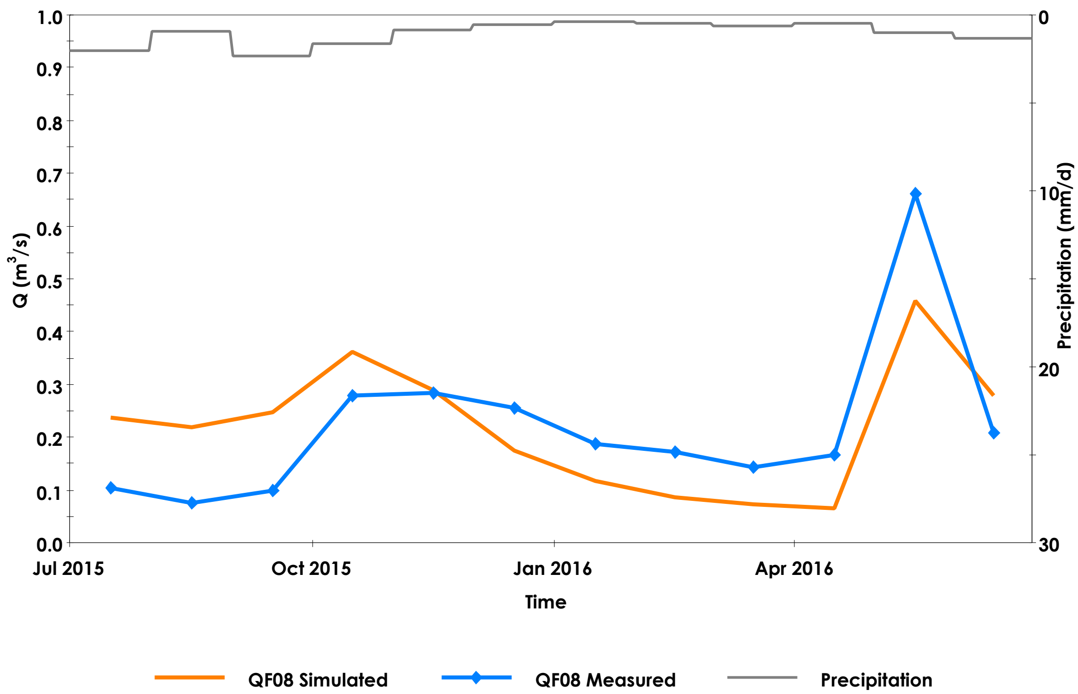


Figure 3-2 Measured and Simulated Monthly Streamflow (QF08)

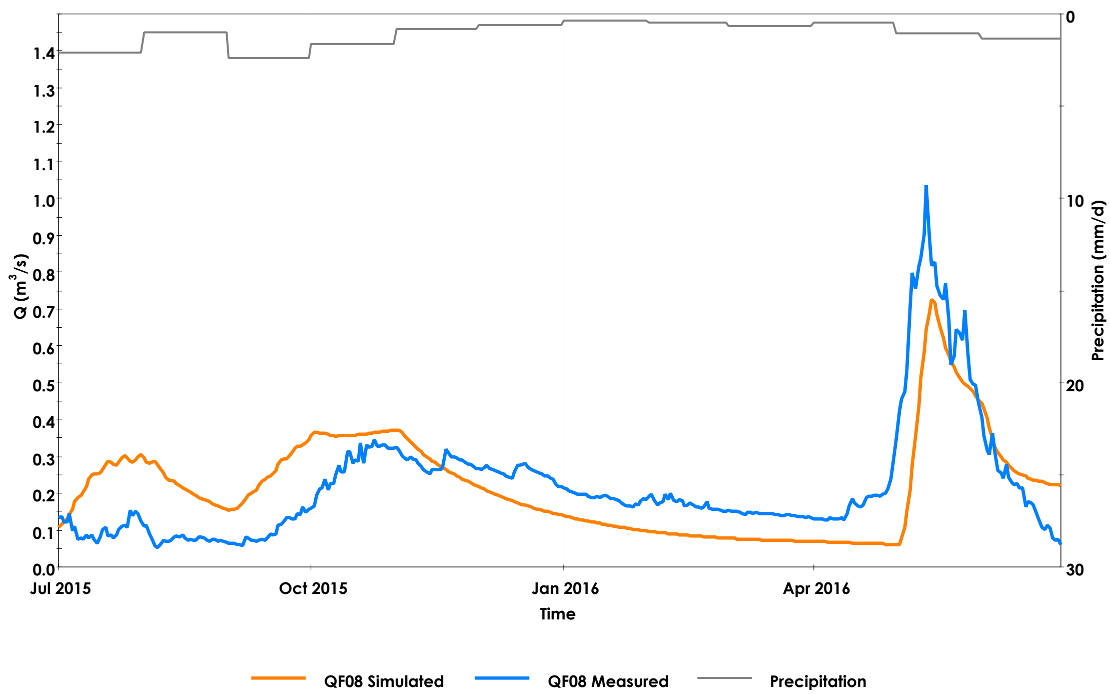


Figure 3-3 Measured and Simulated Daily Streamflow (QF08)

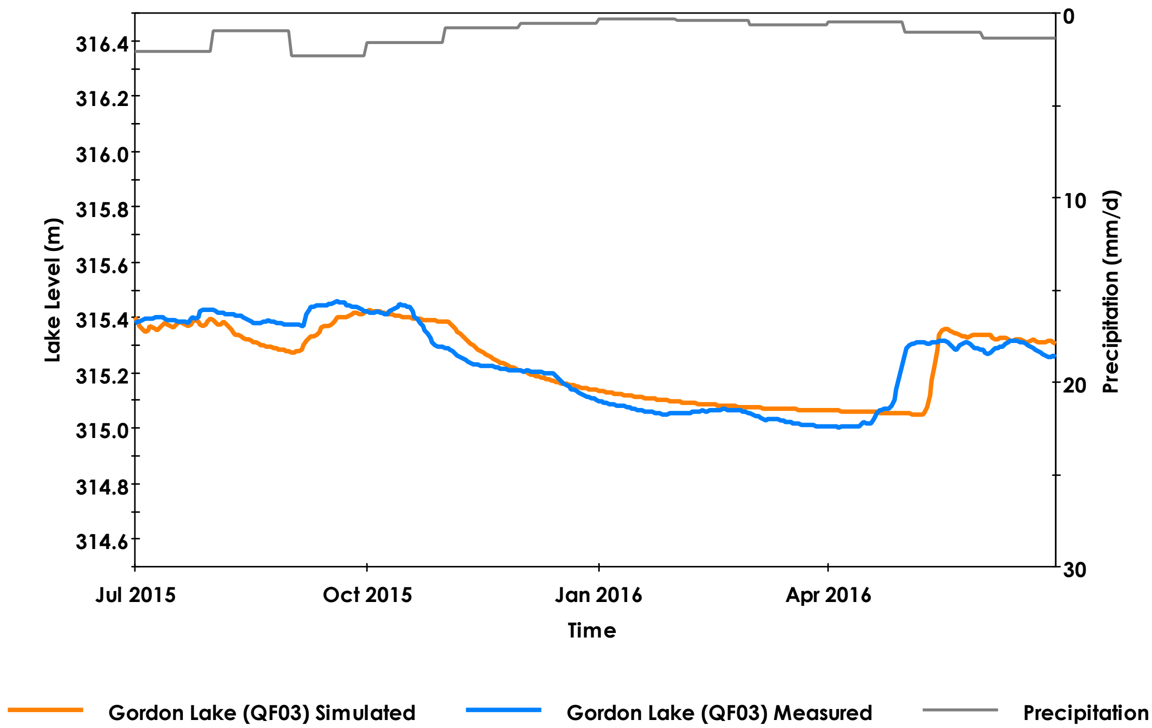


Figure 3-4 Measured and Simulated Lake Level at Gordon Lake (QF03)

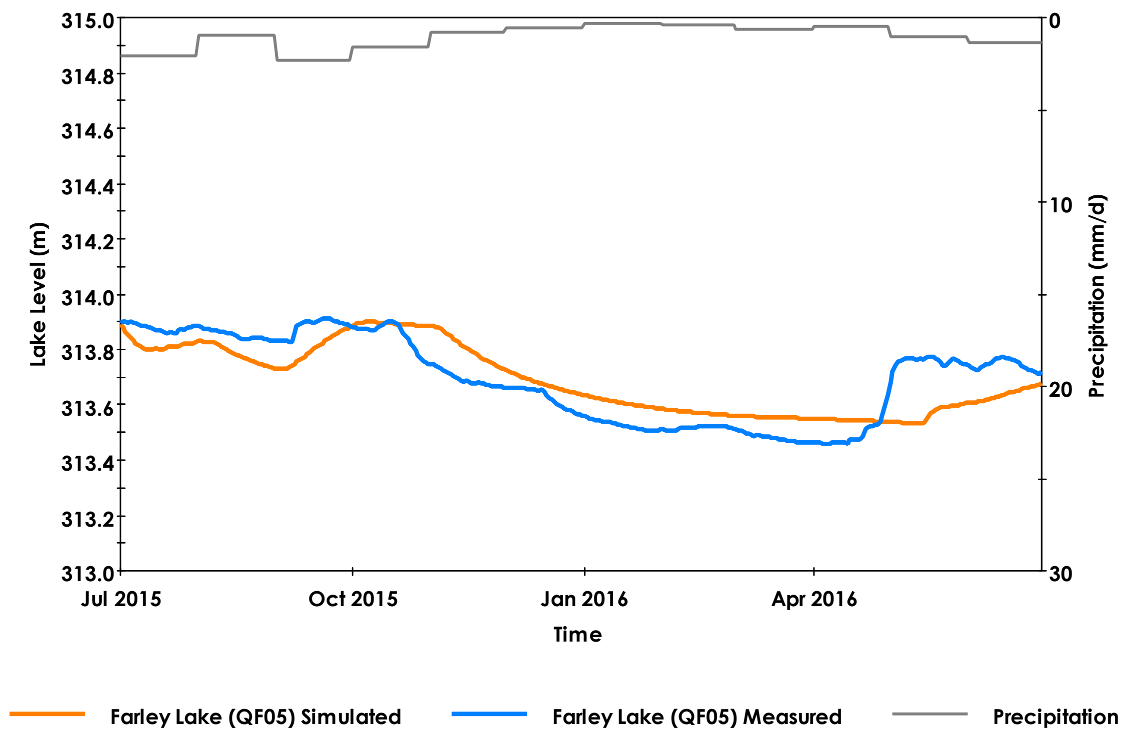


Figure 3-5 Measured and Simulated Lake Level at Farley Lake (QF05)

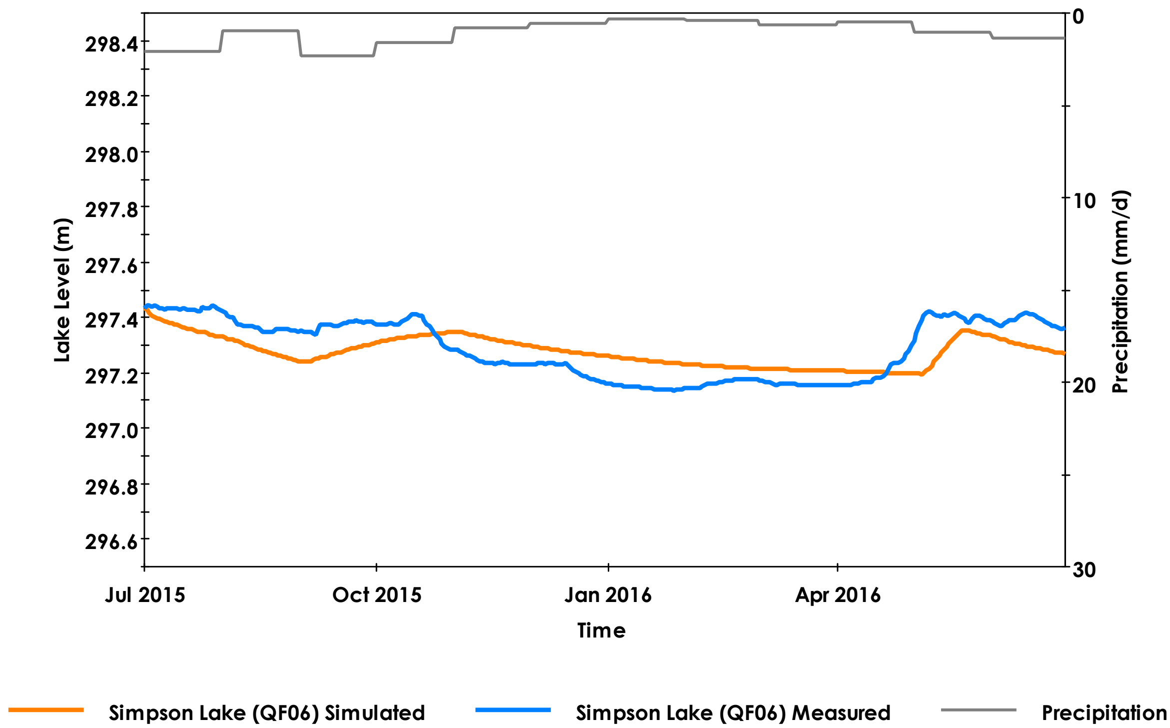


Figure 3-6 Measured and Simulated Lake Level at Simpson Lake (QF06)

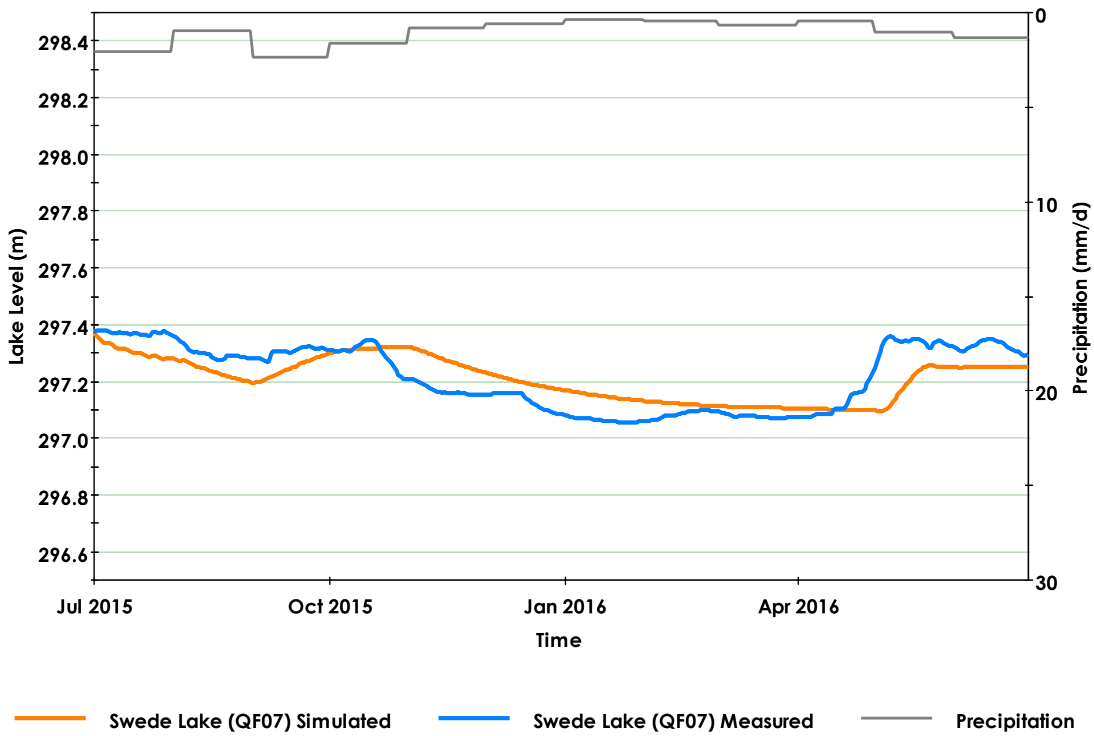


Figure 3-7 Measured and Simulated Lake Level at Swede Lake (QF07)

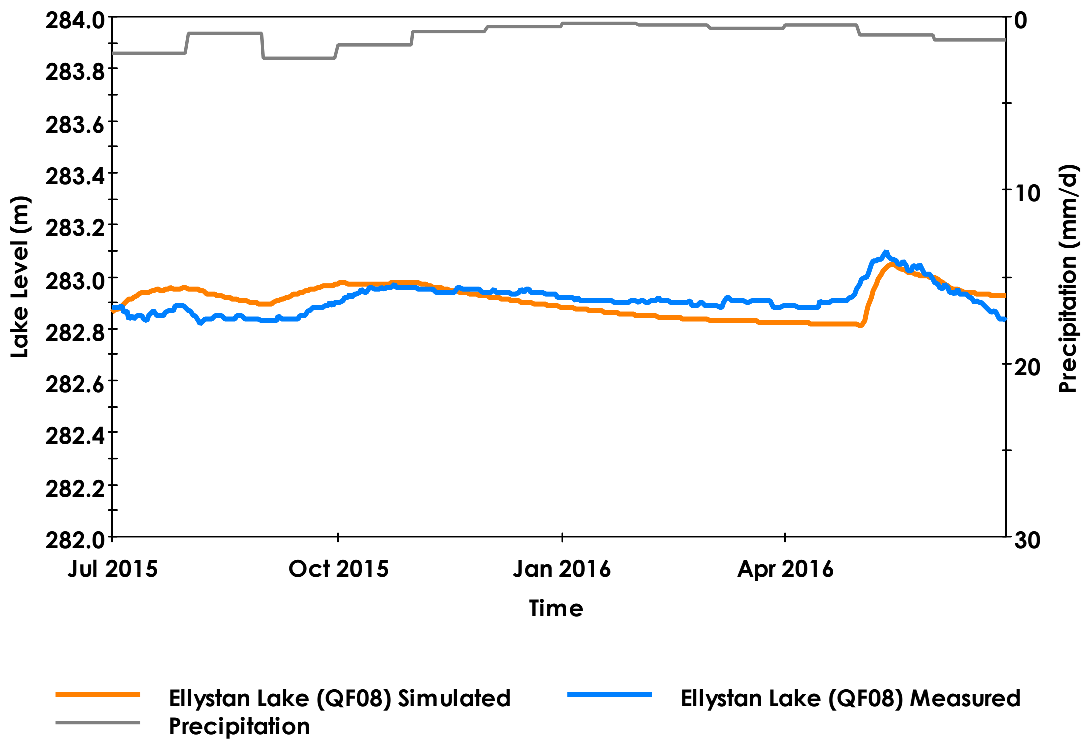


Figure 3-8 Measured and Simulated Lake Level at Ellystan Lake (QF08)

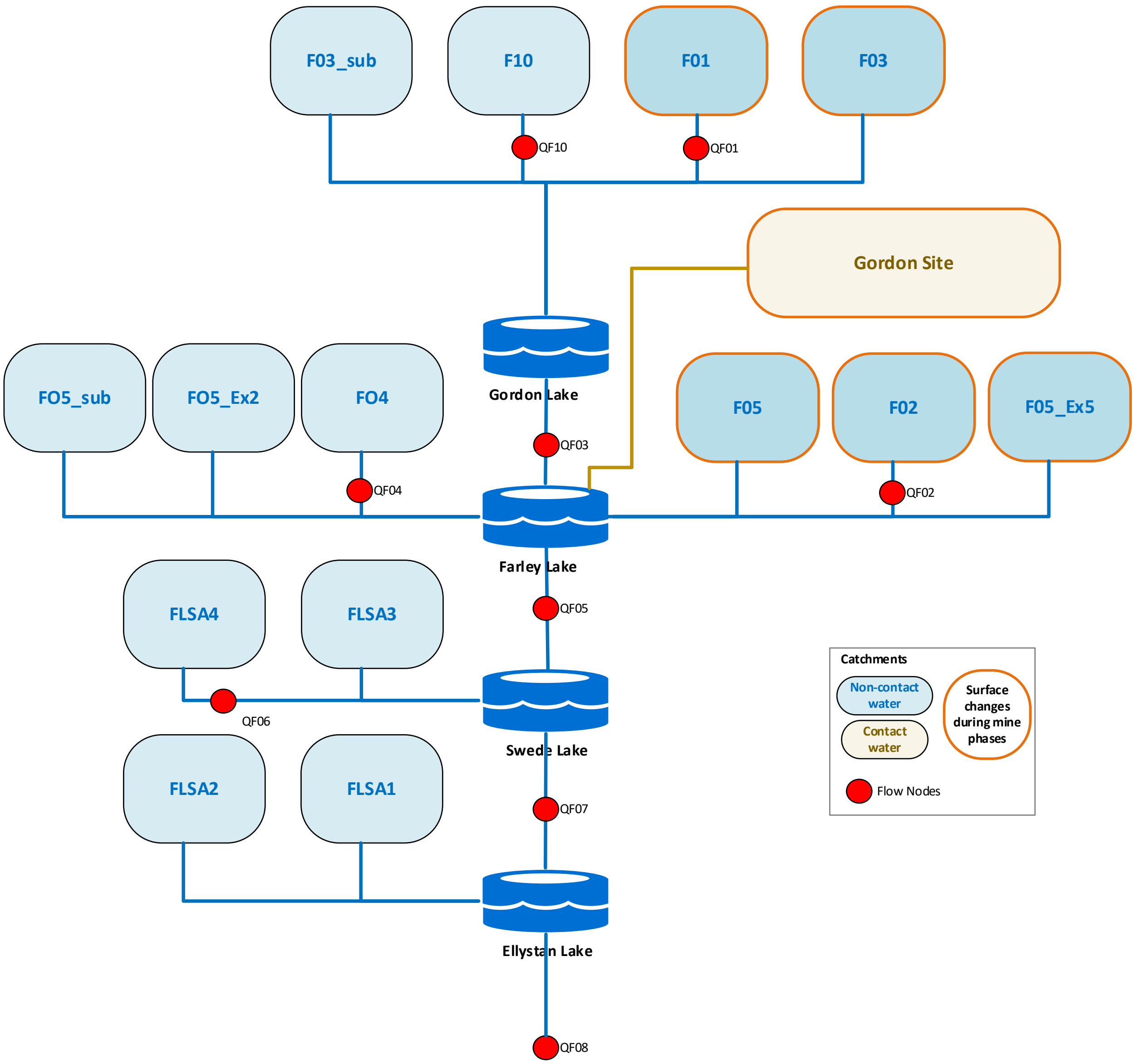


Figure 3-9 PROJ-WB Structure and Nodes

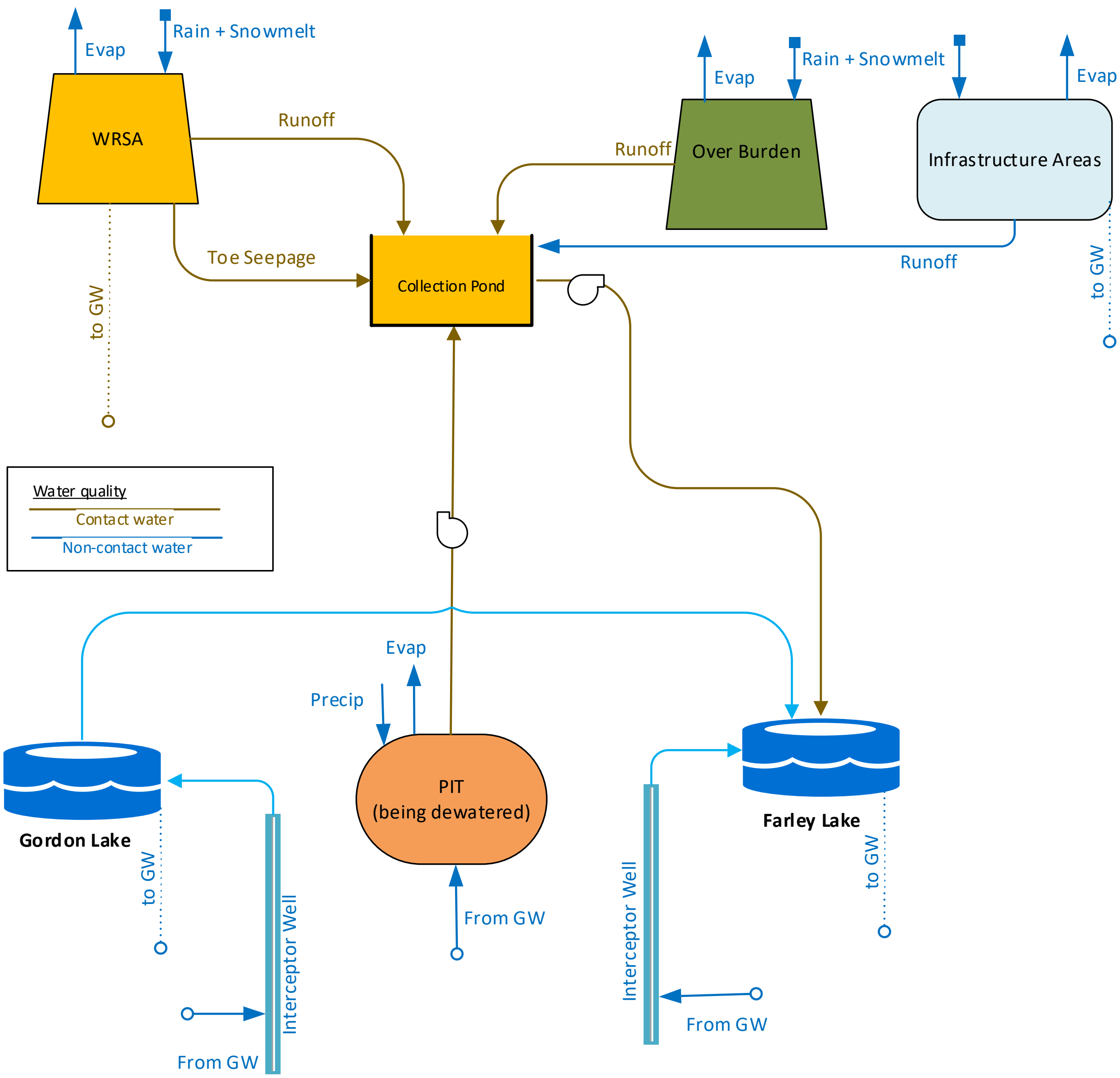


Figure 3-10 Conceptual Model of Mine Water Management – Operation

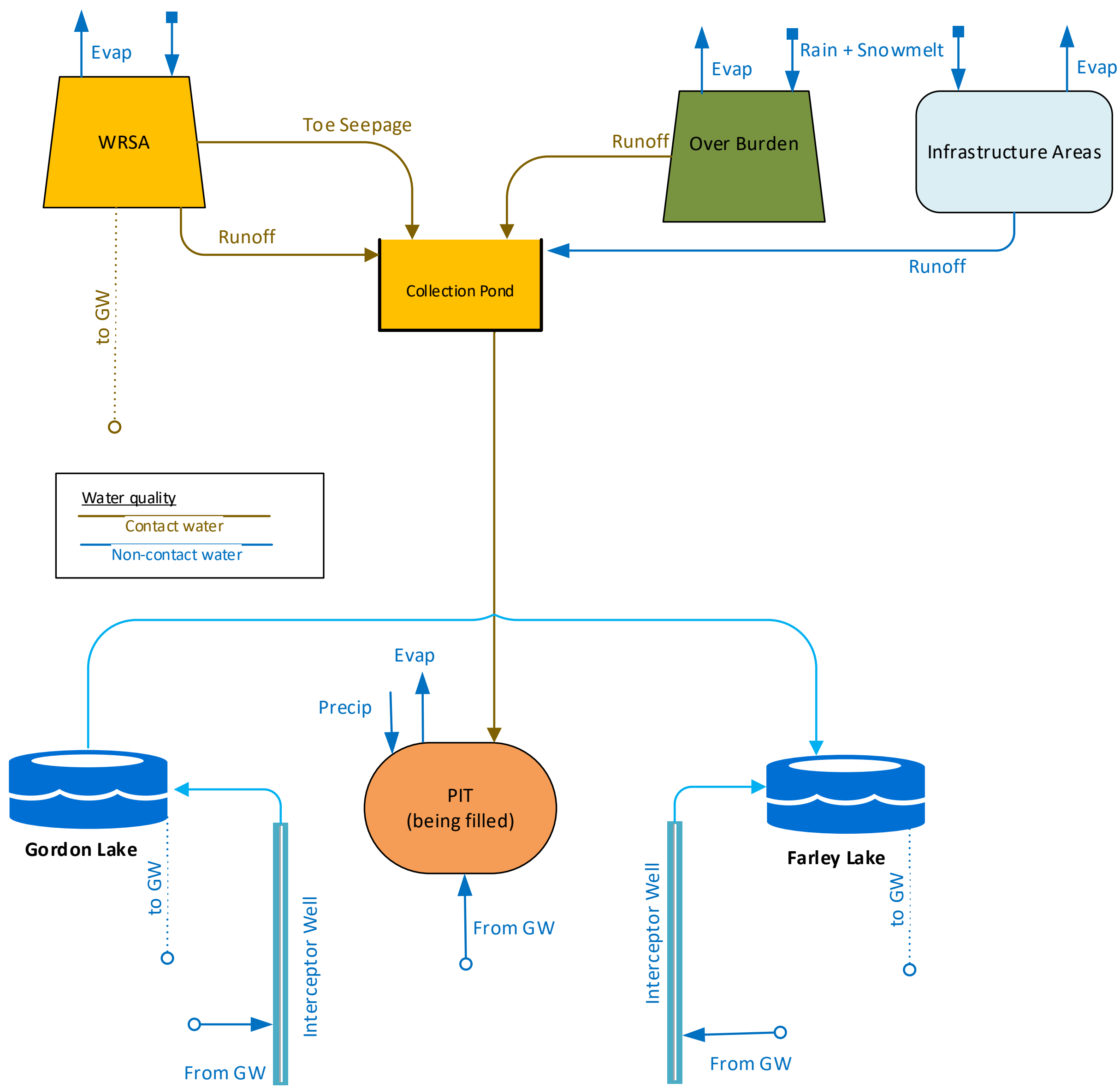


Figure 3-11 Conceptual Model of Mine Water Management – Active Closure

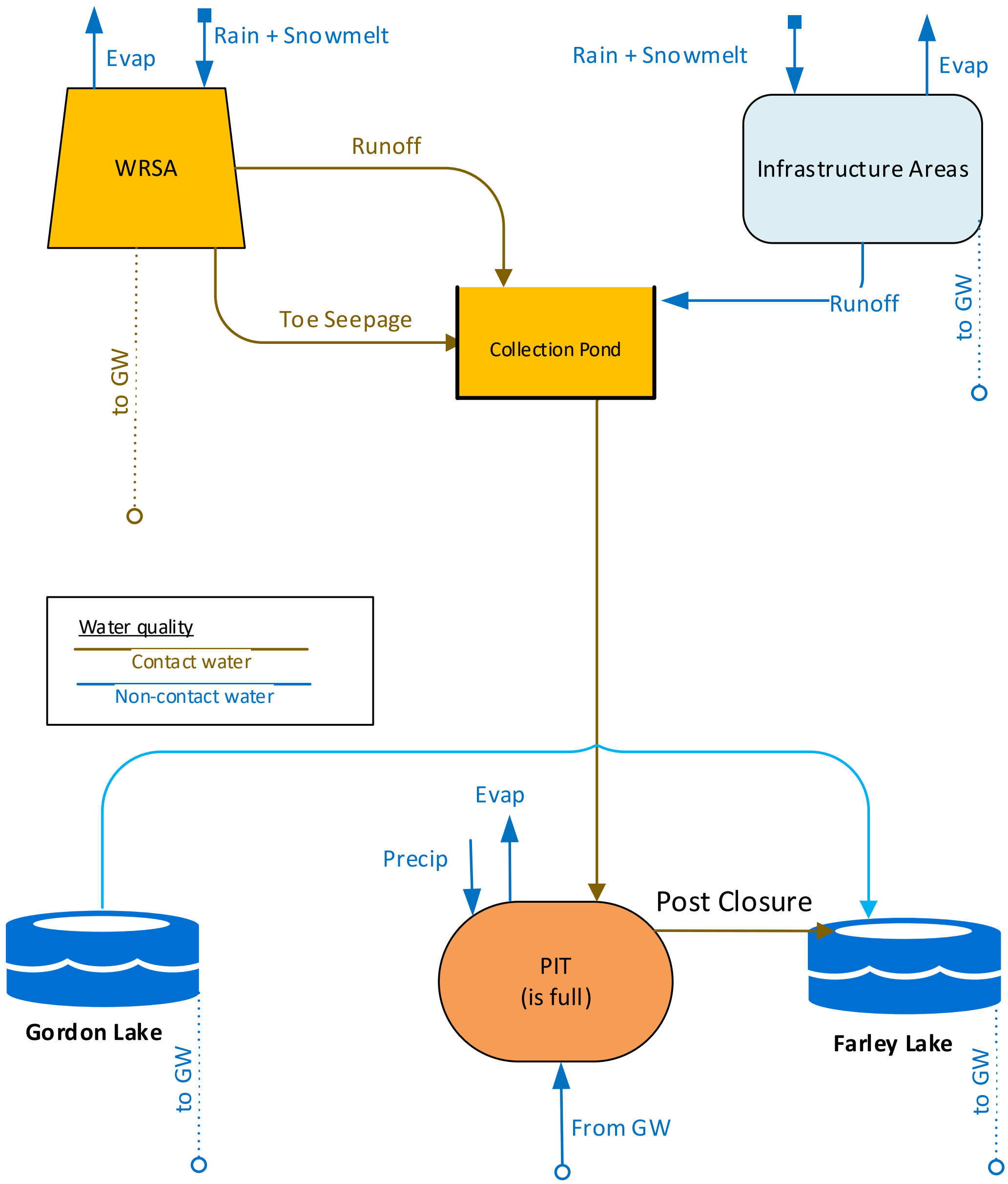


Figure 3-12 Conceptual Model of Mine Water Management – Post-Closure

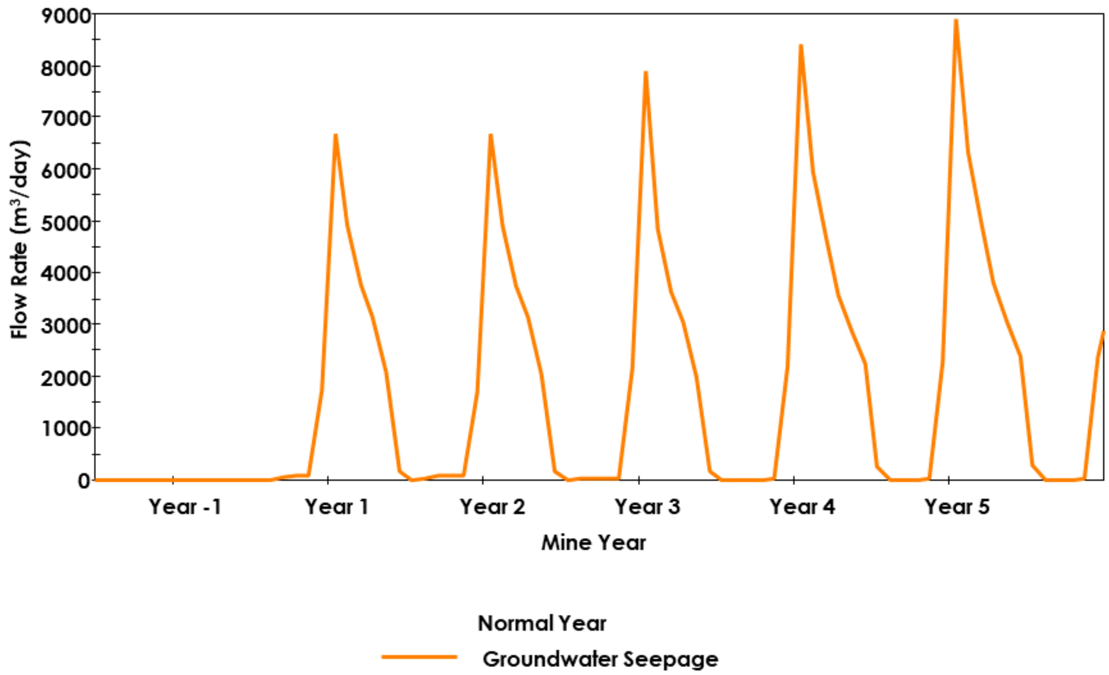


Figure 3-13 Average Groundwater Inflows to Open Pit

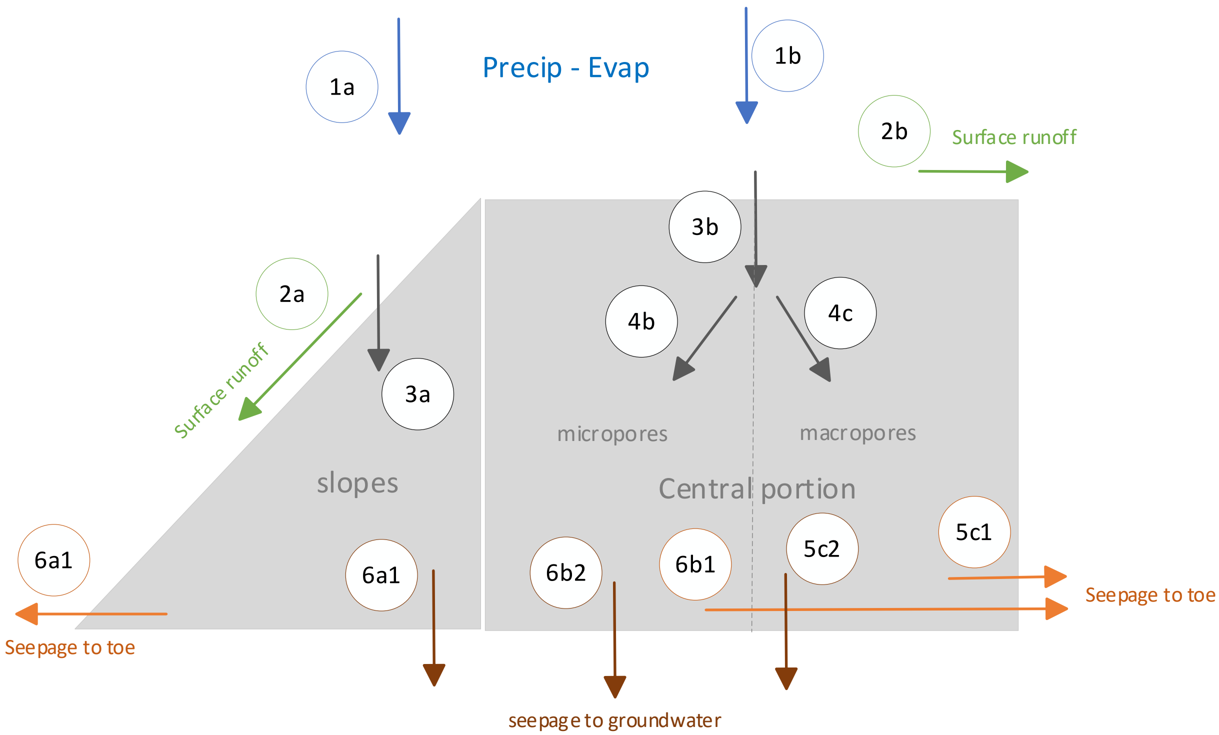


Figure 3-14 Flows through MRSA

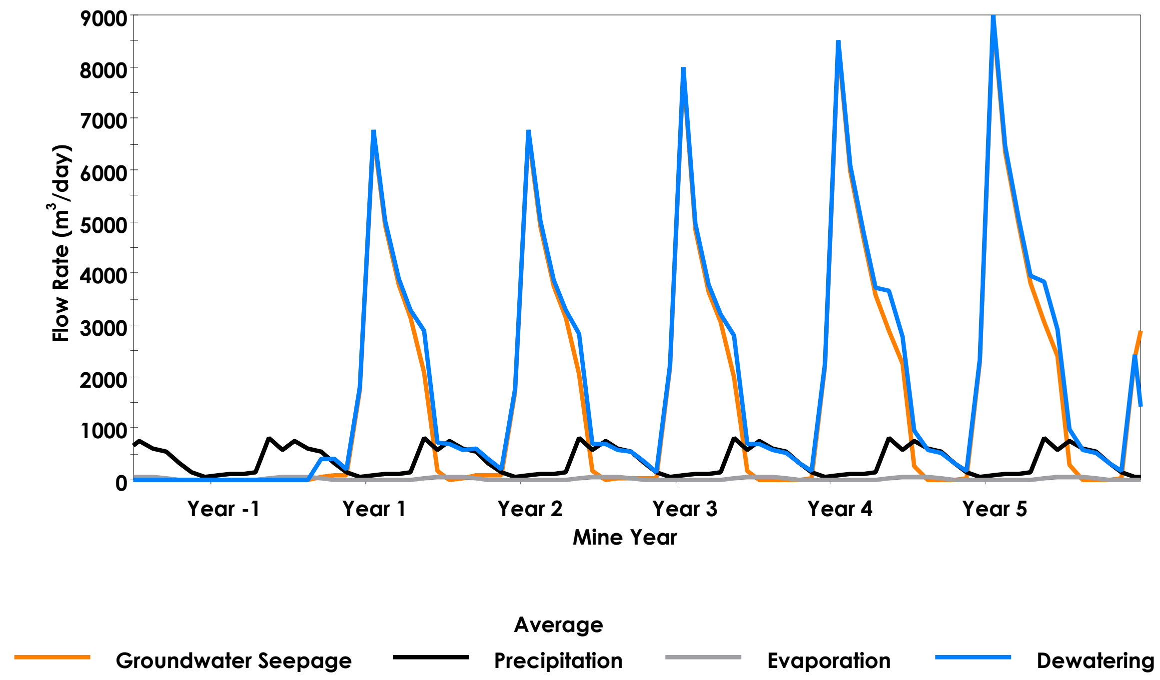


Figure 3-15 Open Pit Inflows and Dewatering Rates - Average Climate Scenario

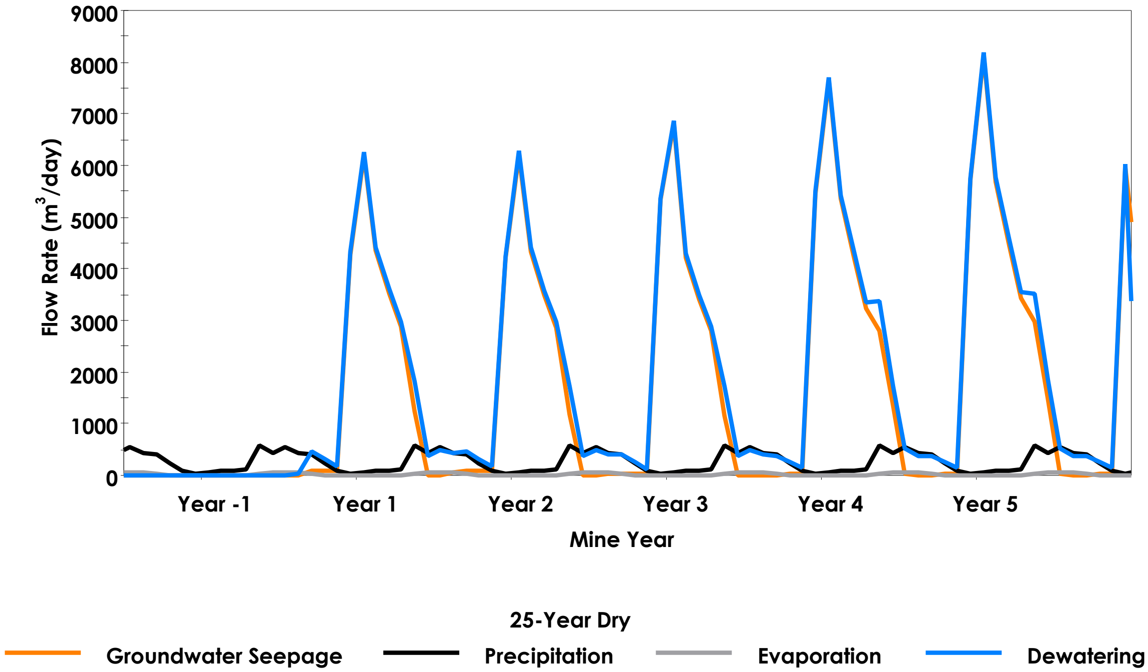


Figure 3-16 Open Pit Inflows and Dewatering Rates - 25-year Dry Climate Scenario

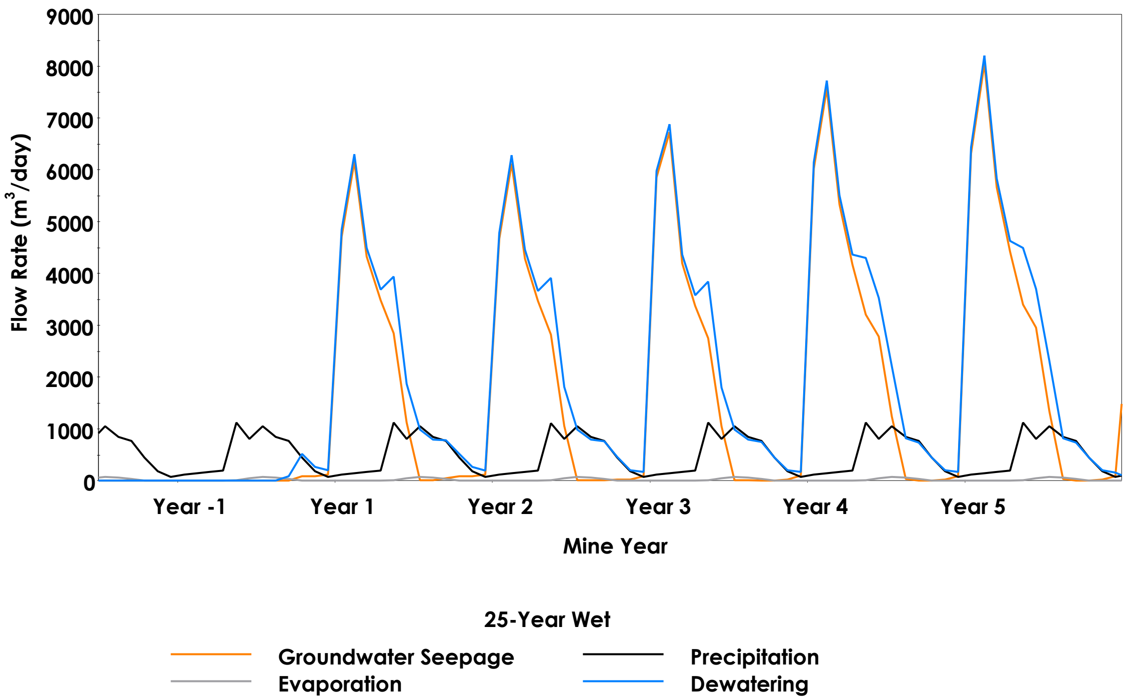


Figure 3-17 Open Pit Inflows and Dewatering Rates - 25-year Wet Climate Scenario

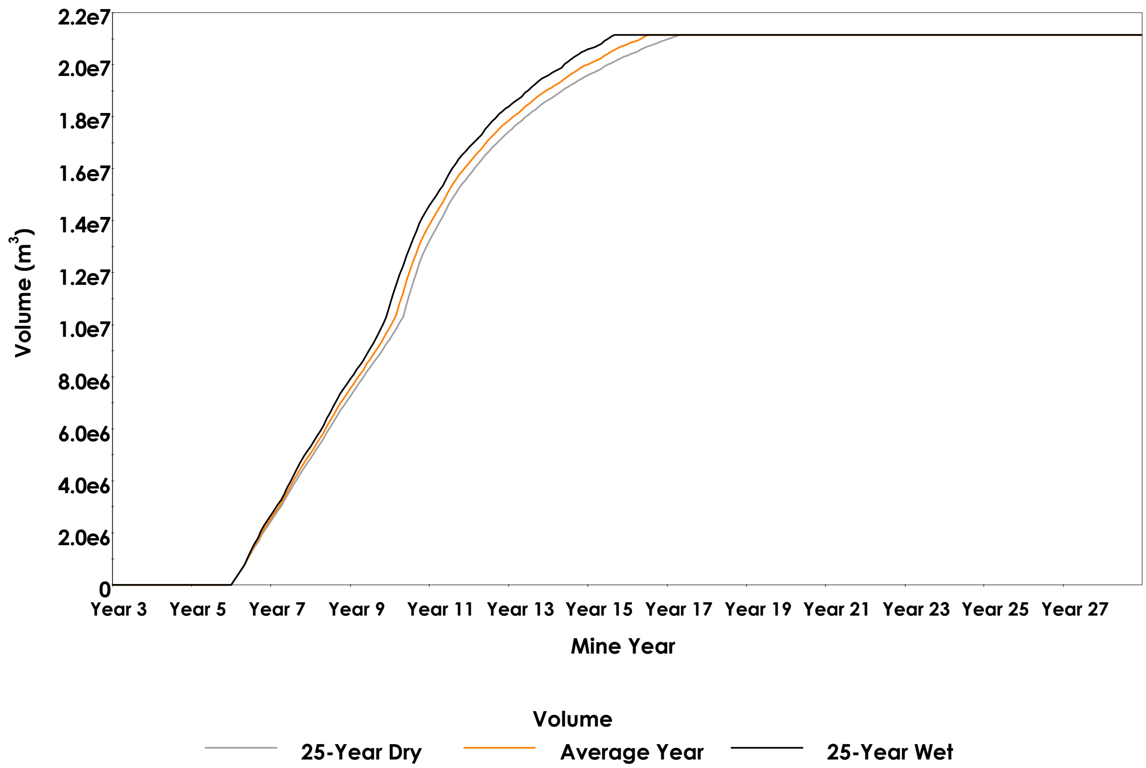


Figure 3-18 Open Pit Filling – All Climate Scenarios

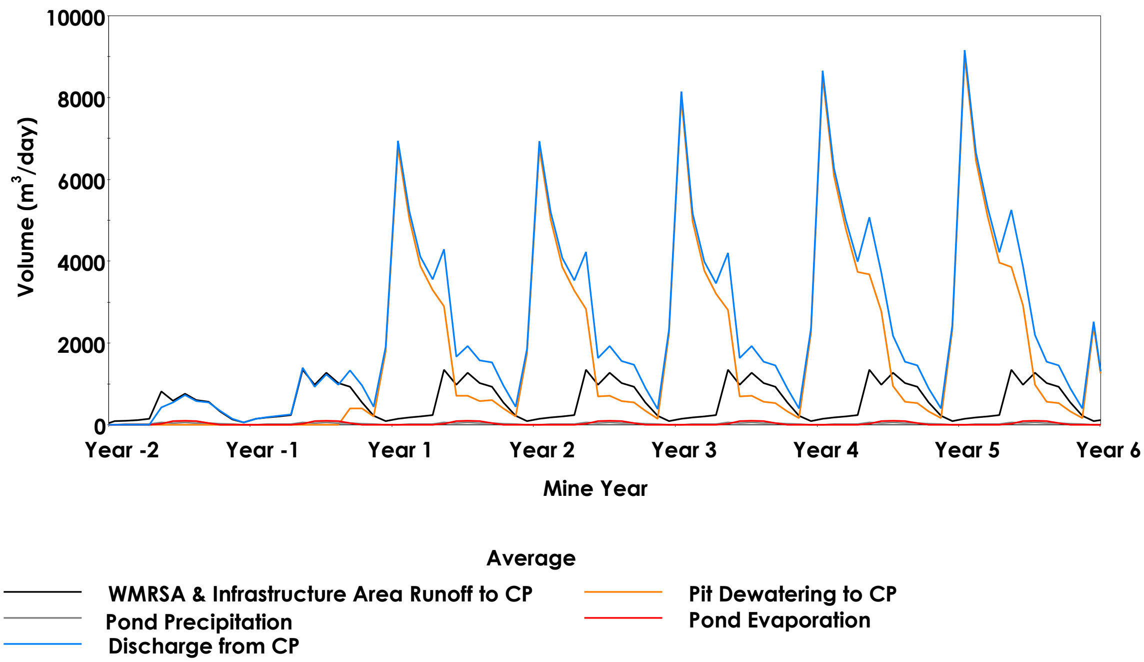


Figure 3-19 MRSA Runoff and Collection Pond Balance - Average Climate Scenario

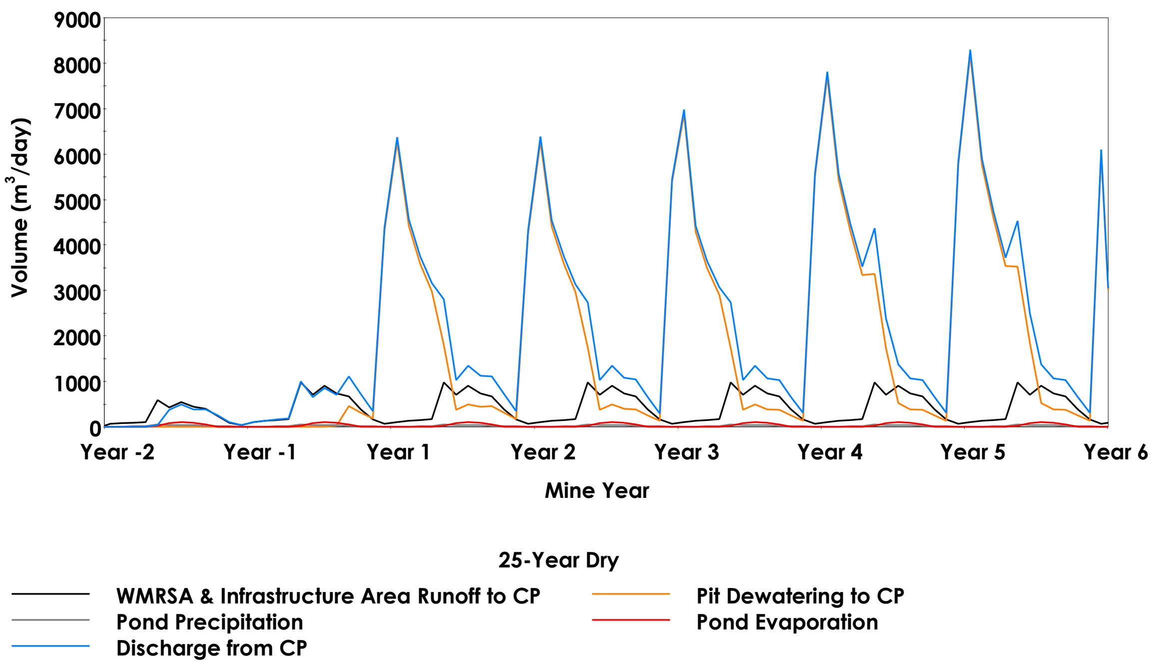


Figure 3-20 MRSA Runoff and Collection Pond Balance - 25-year Dry Climate Scenario

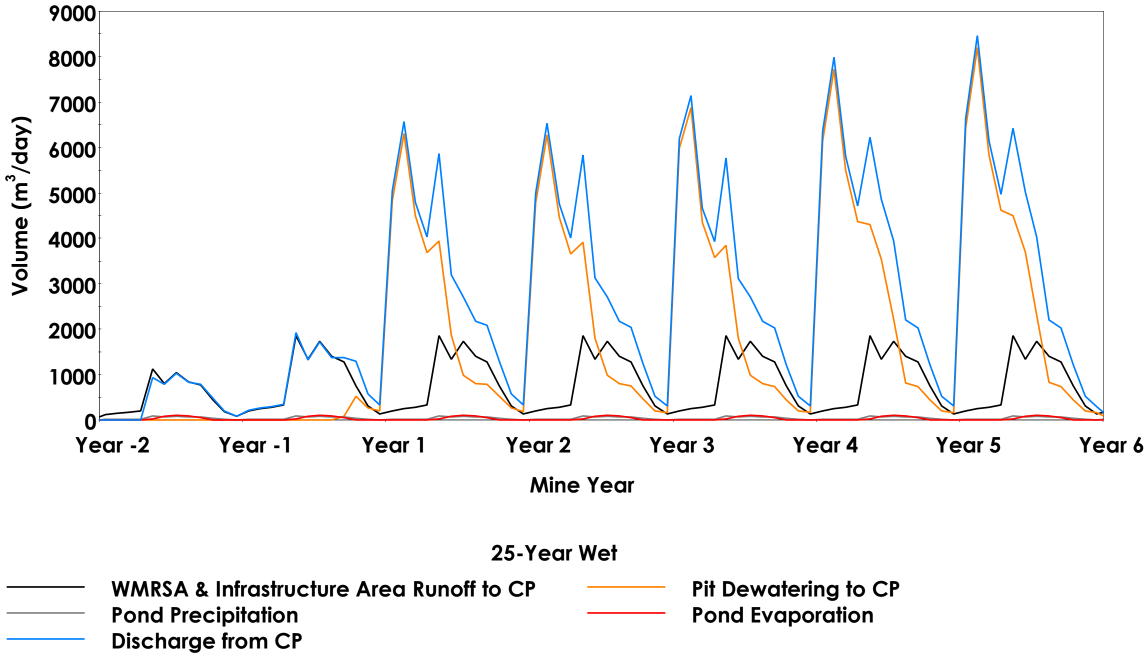


Figure 3-21 MRSA Runoff and Collection Pond Balance - 25-year Wet Climate Scenario

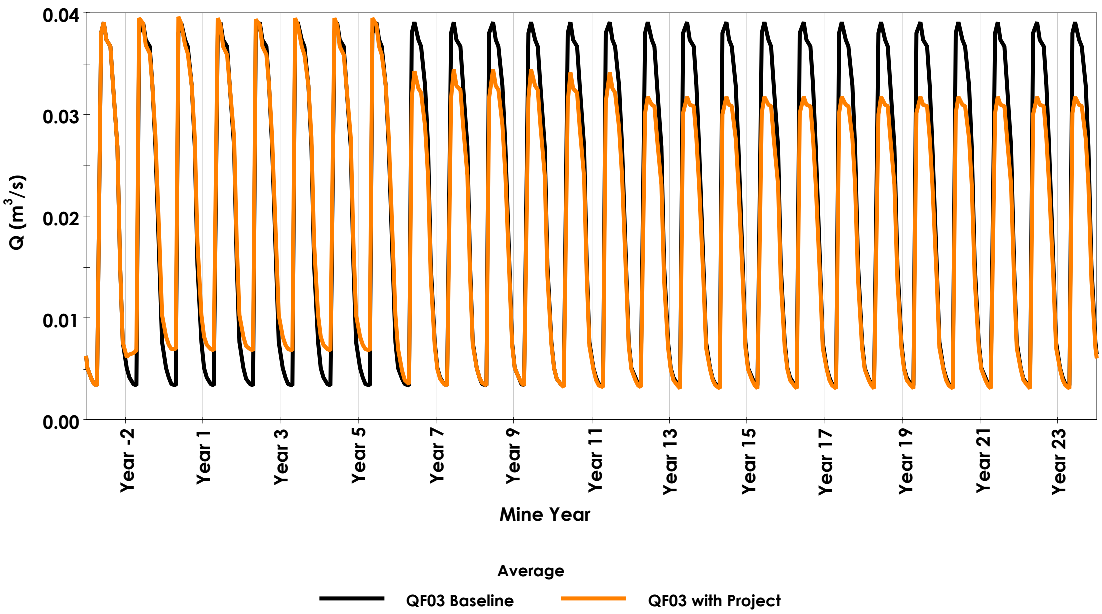


Figure 3-22 Predicted Streamflows for Existing and Project Conditions for QF03 - Average Climate Scenario

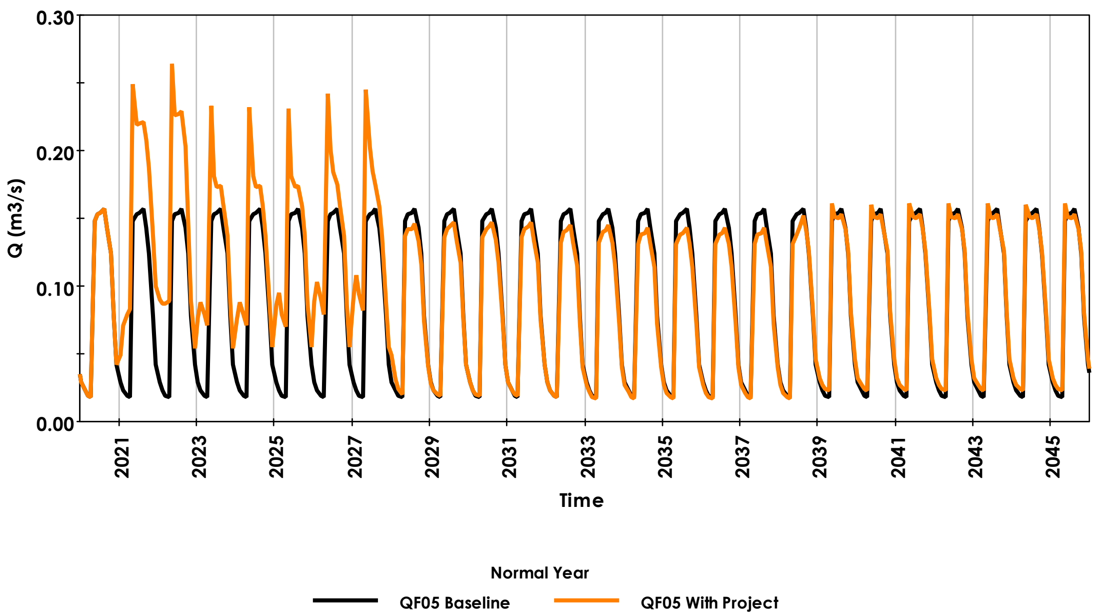


Figure 3-23 Predicted Streamflows for Existing and Project Conditions for QF05 - Average Climate Scenario

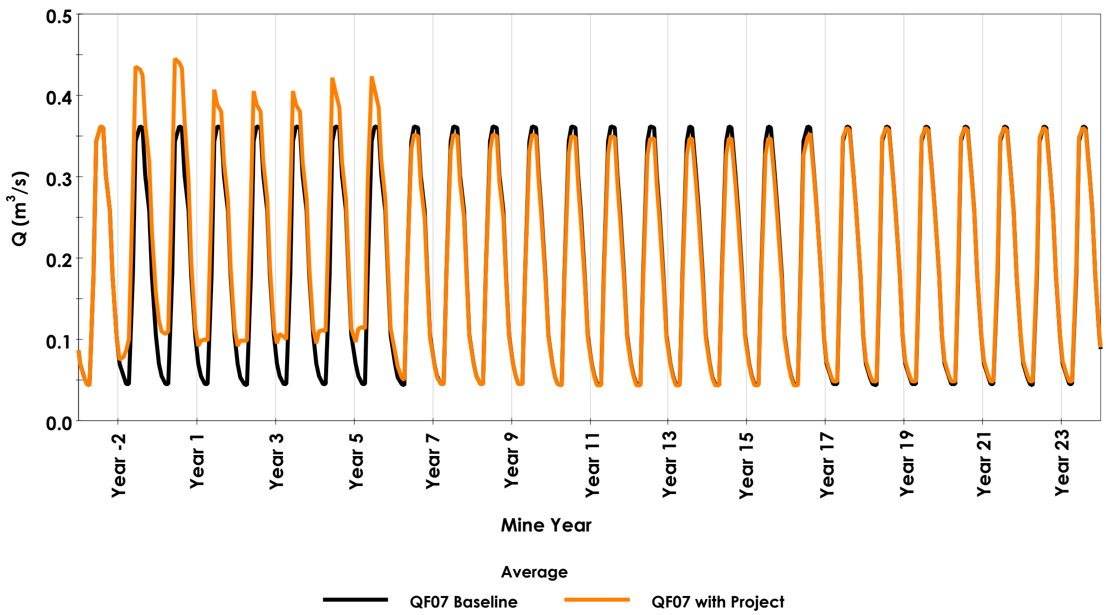


Figure 3-24 Predicted Streamflows for Existing and Project Conditions for QF07 - Average Climate Scenario

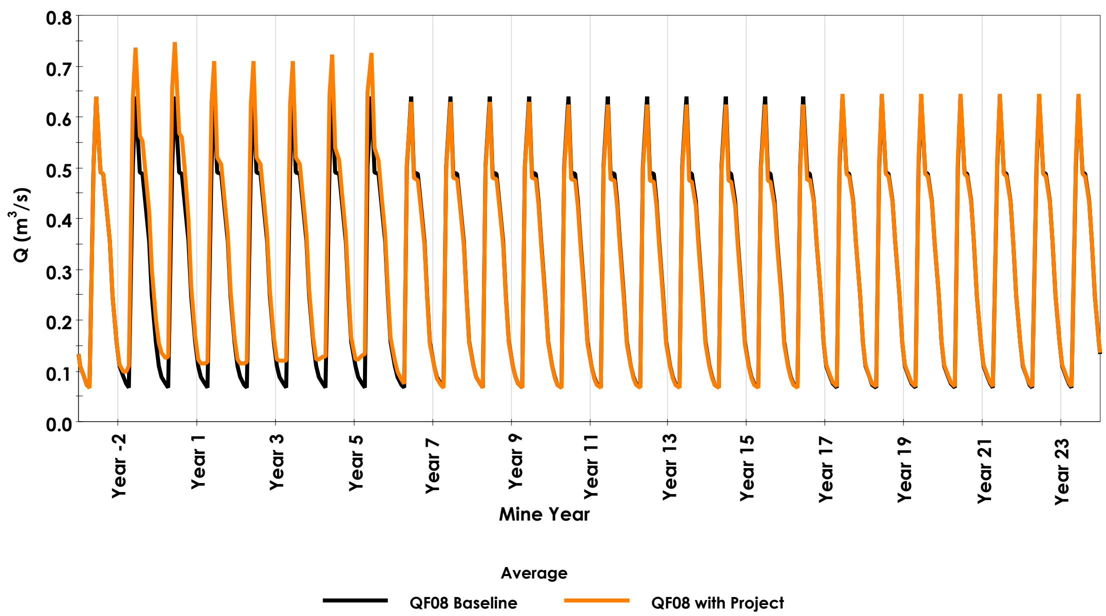


Figure 3-25 Predicted Streamflows for Existing and Project Conditions for QF08 - Average Climate Scenario

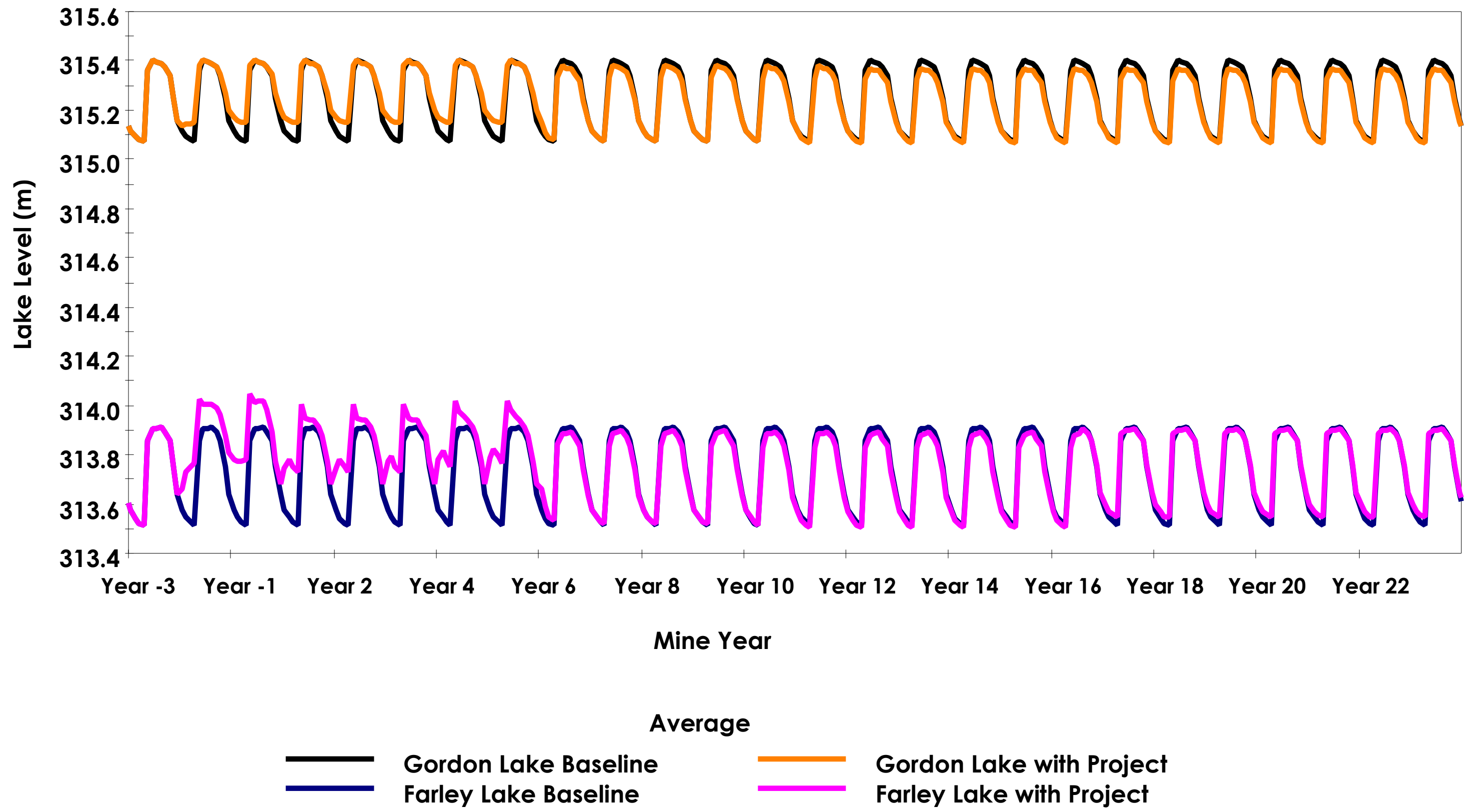


Figure 3-26 Predicted Lake Levels for Existing and Project Conditions for Gordon Lake and Farley Lake - Average Climate Scenario

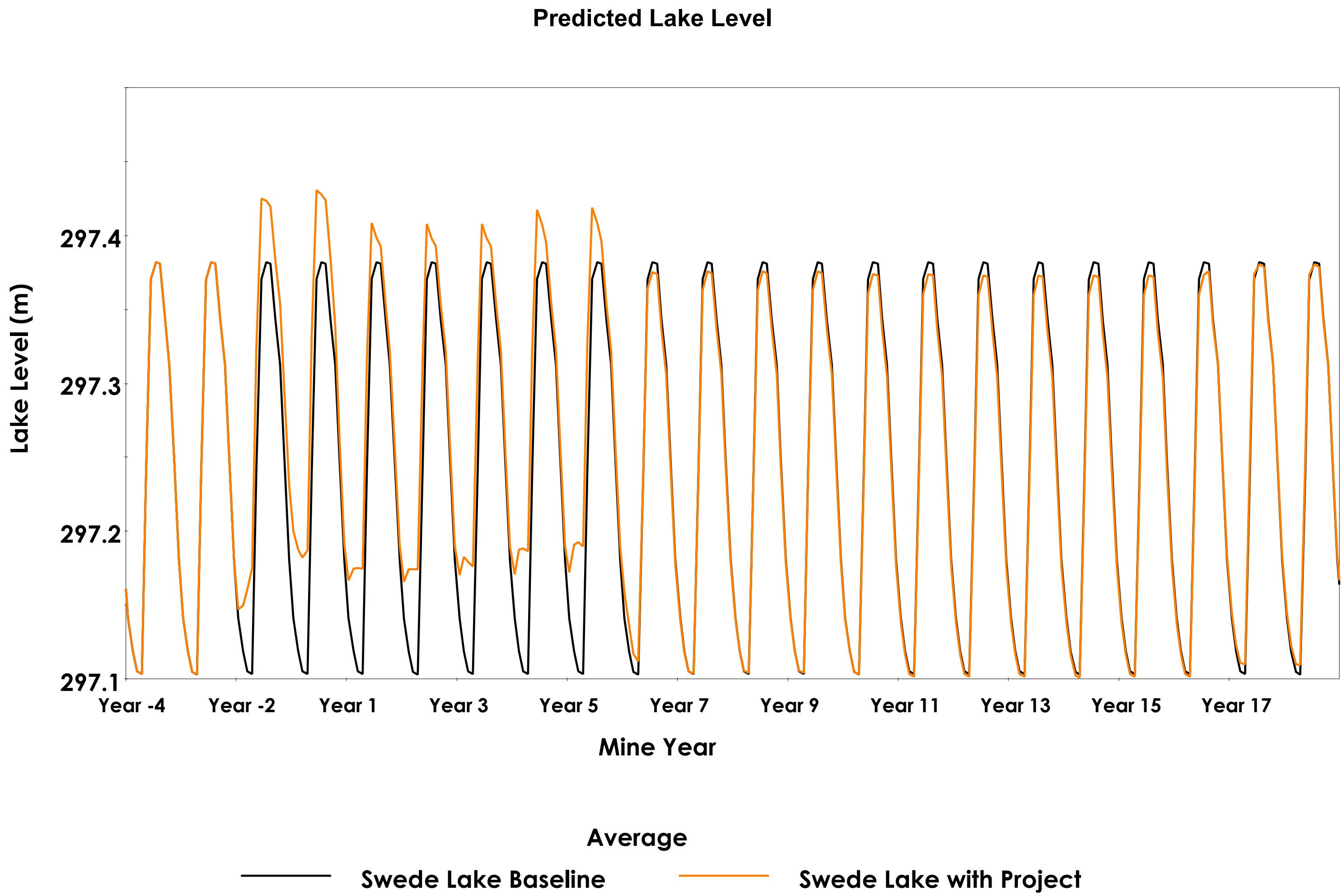


Figure 3-27 Predicted Lake Levels for Existing and Project Conditions for Swede Lake - Average Climate Scenario

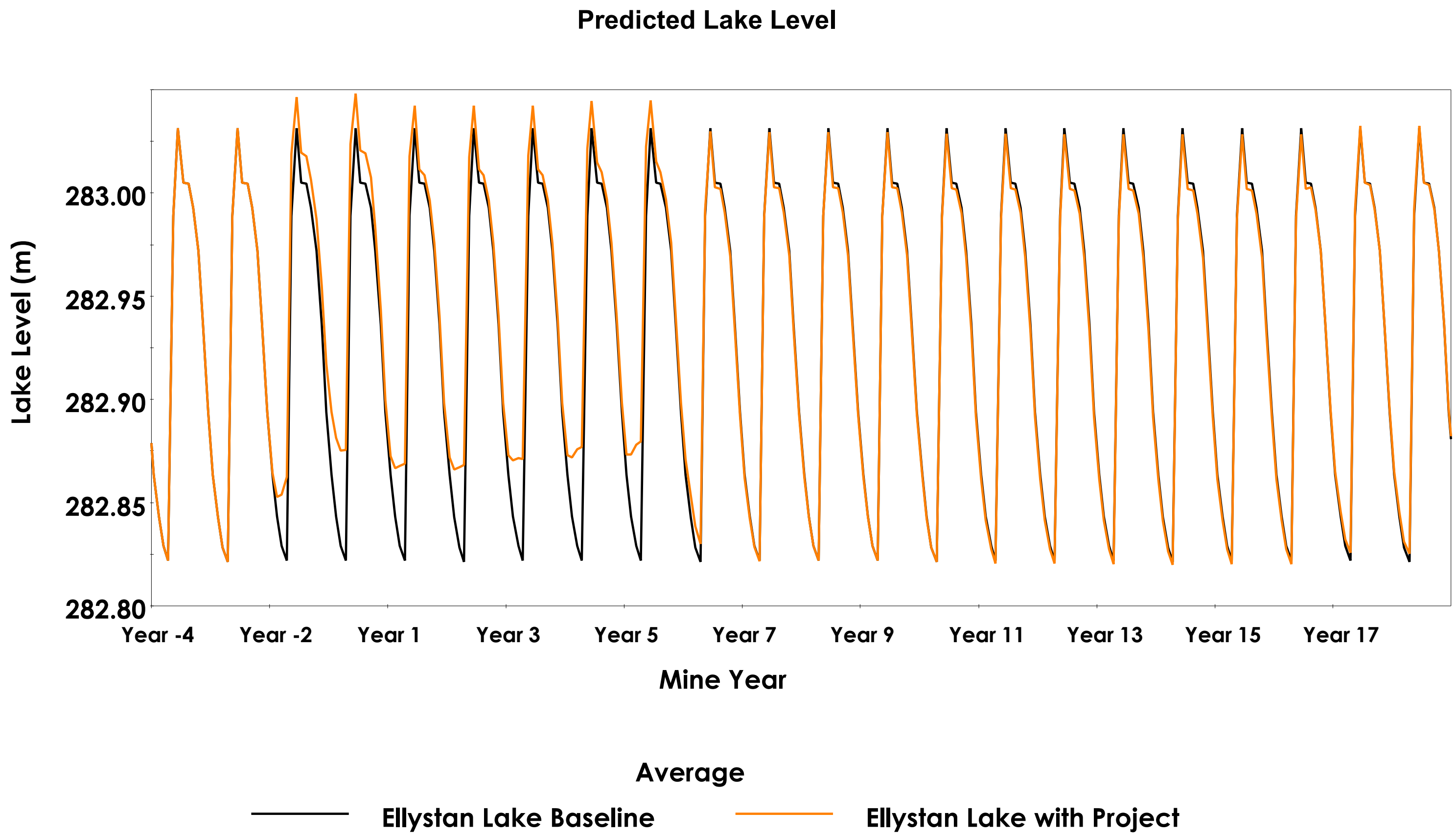


Figure 3-28 Predicted Lake Levels for Existing and Project Conditions for Ellystan Lake - Average Climate Scenario

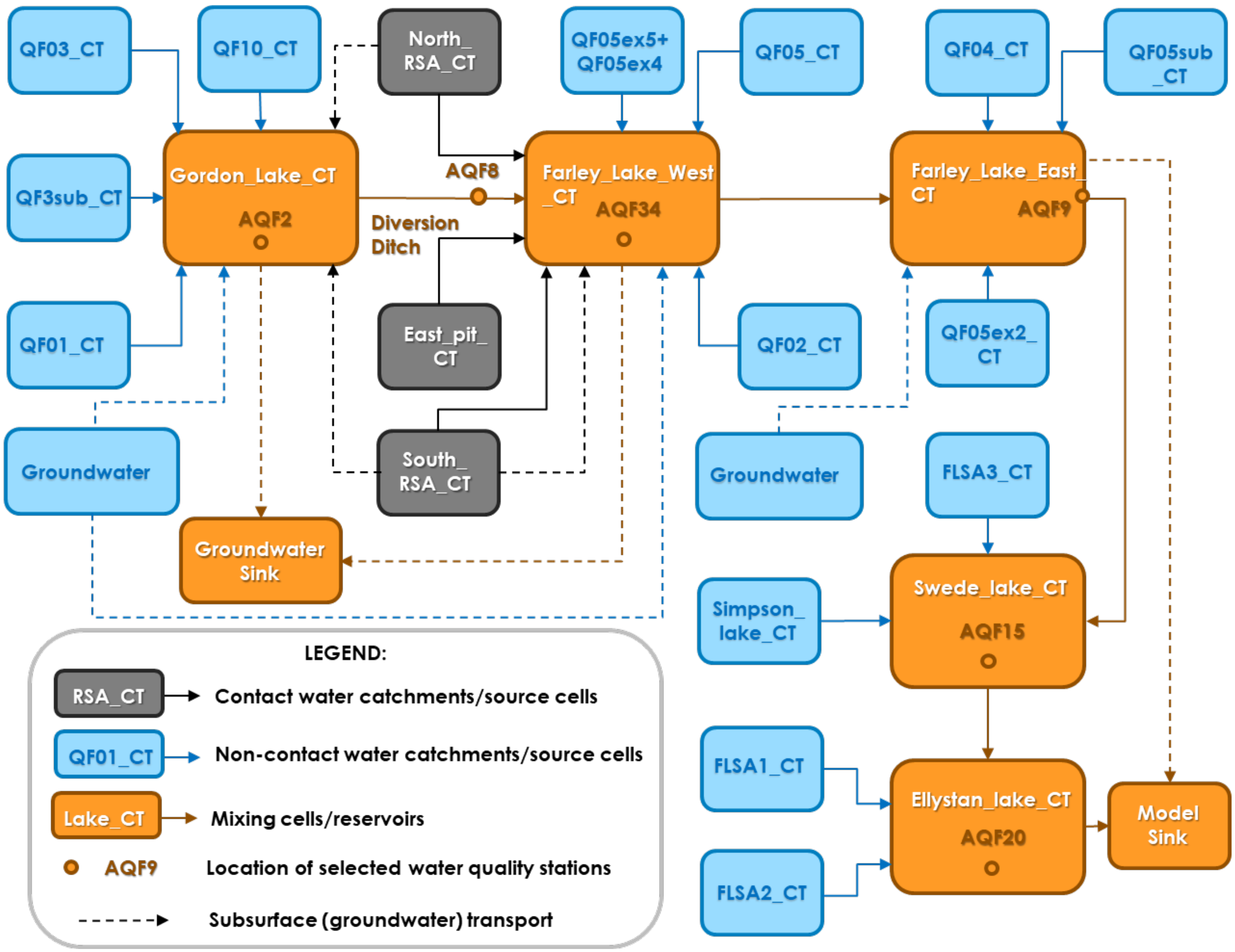


Figure 4-1 Mass Transport Network for Baseline Conditions at Gordon Site

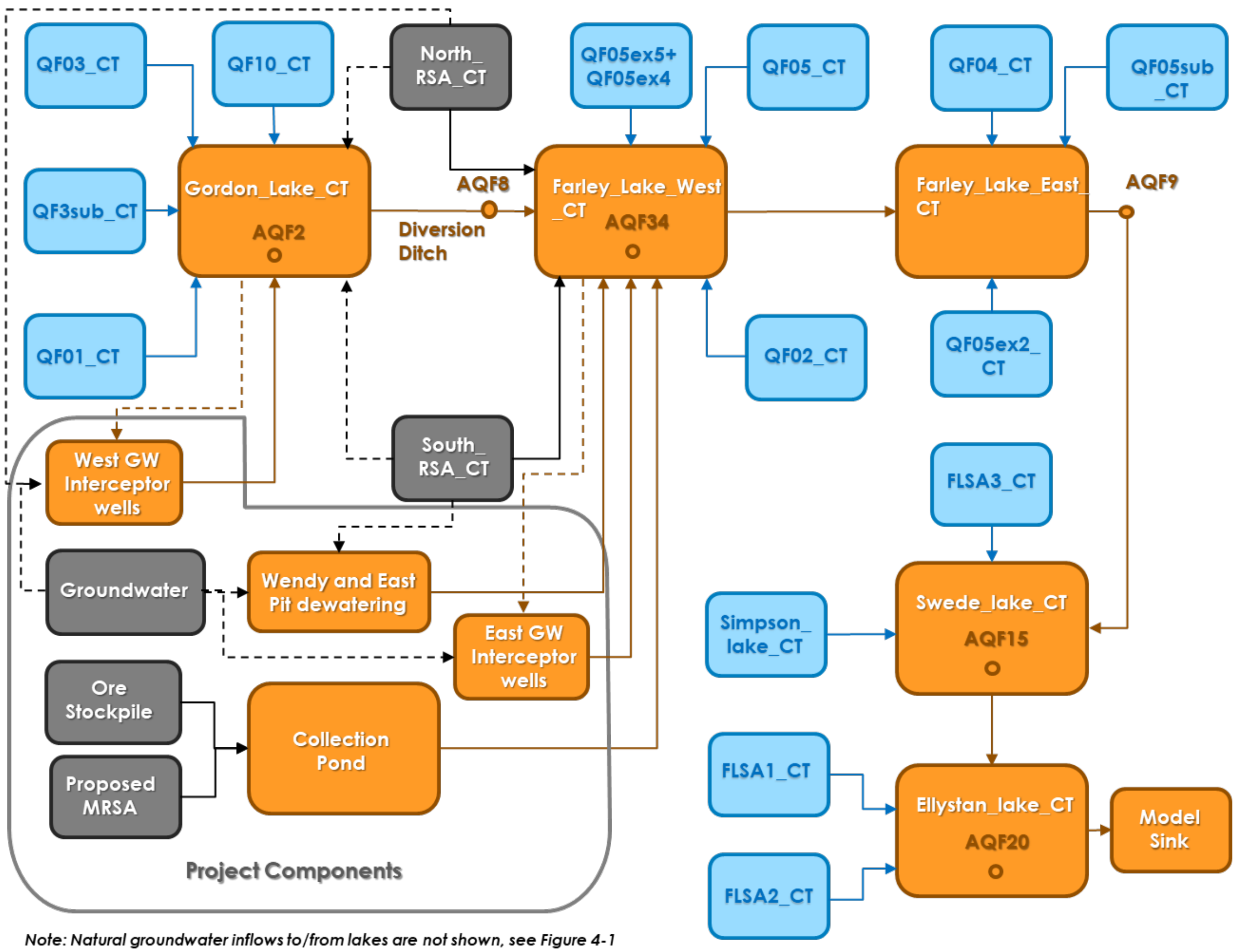
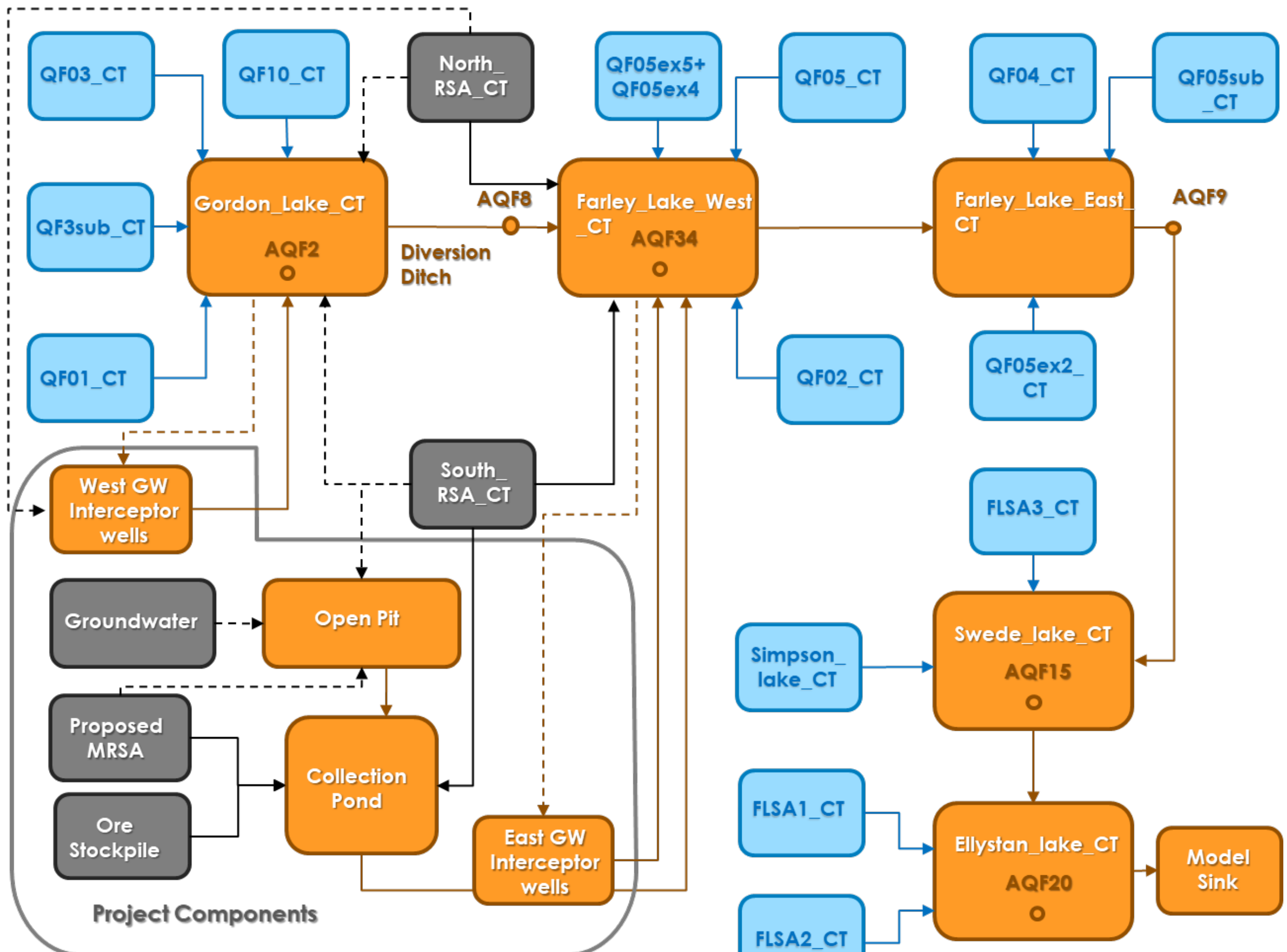


Figure 4-2 Mass Transport Network for Construction Phase



Note: Natural groundwater inflows to/from lakes are not shown, see Figure 4-1

Figure 4-3 Mass Transport Network for Operation Phase

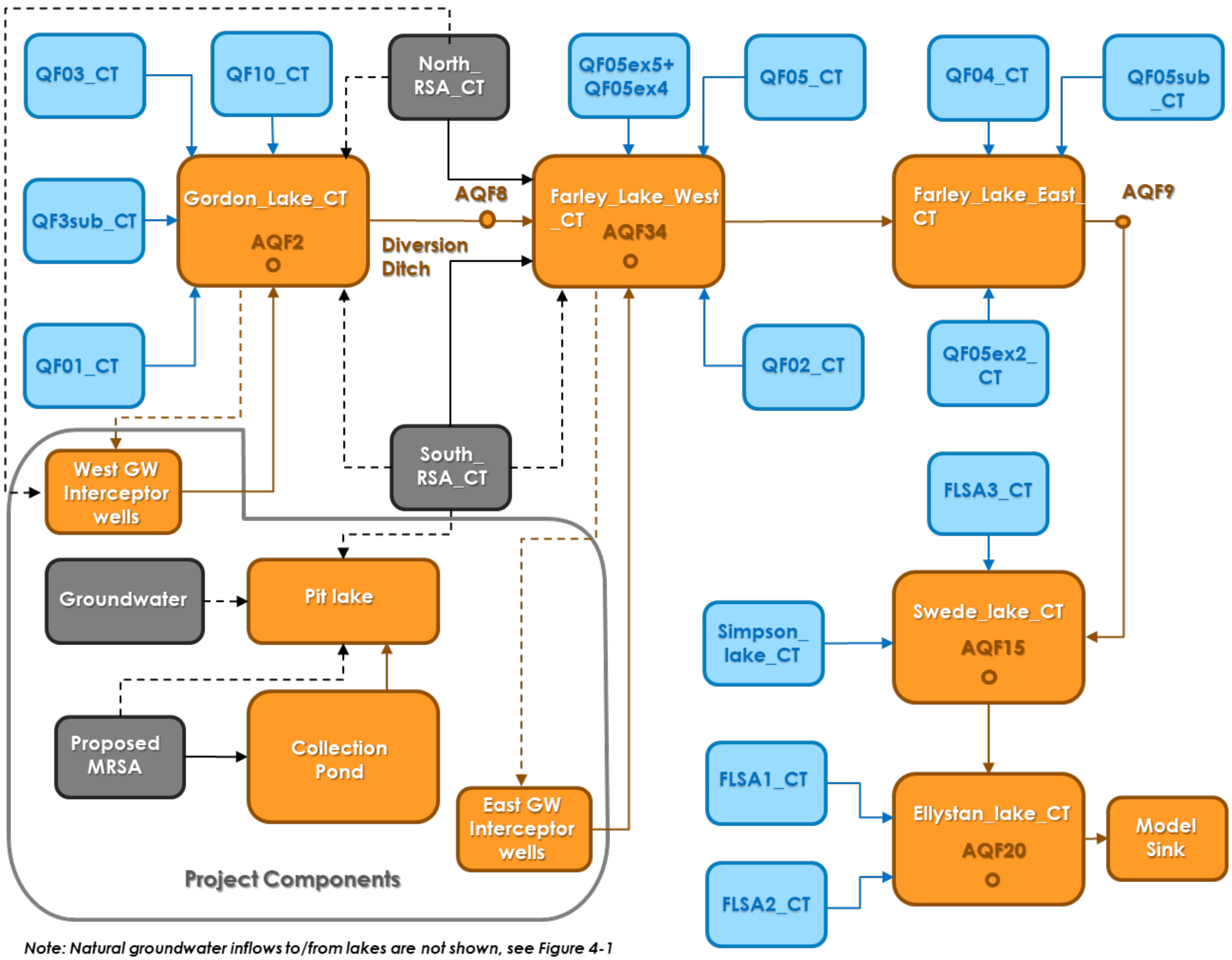


Figure 4-4 Mass Transport Network for Closure Phase

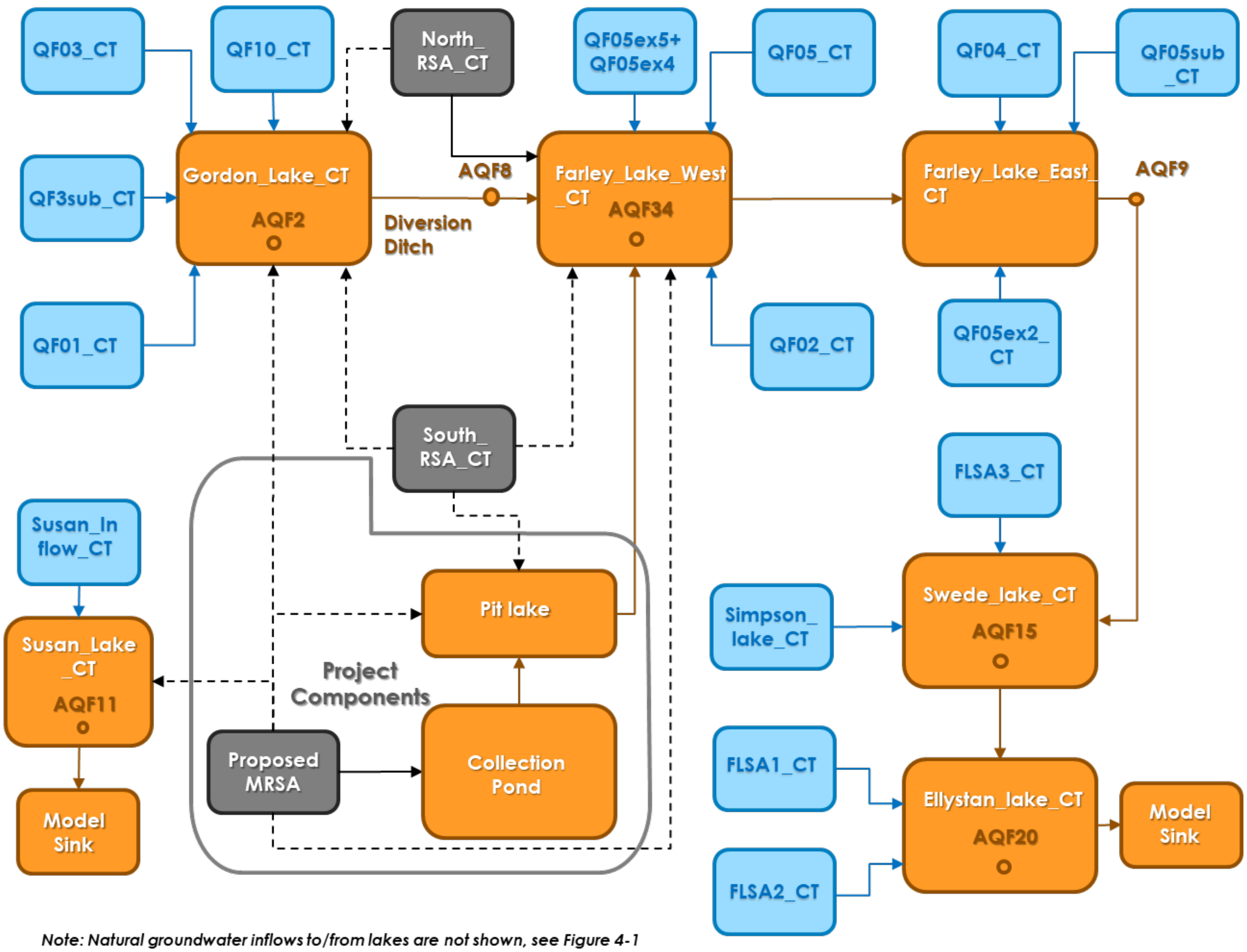


Figure 4-5 Mass Transport Network for Post-Closure Phase

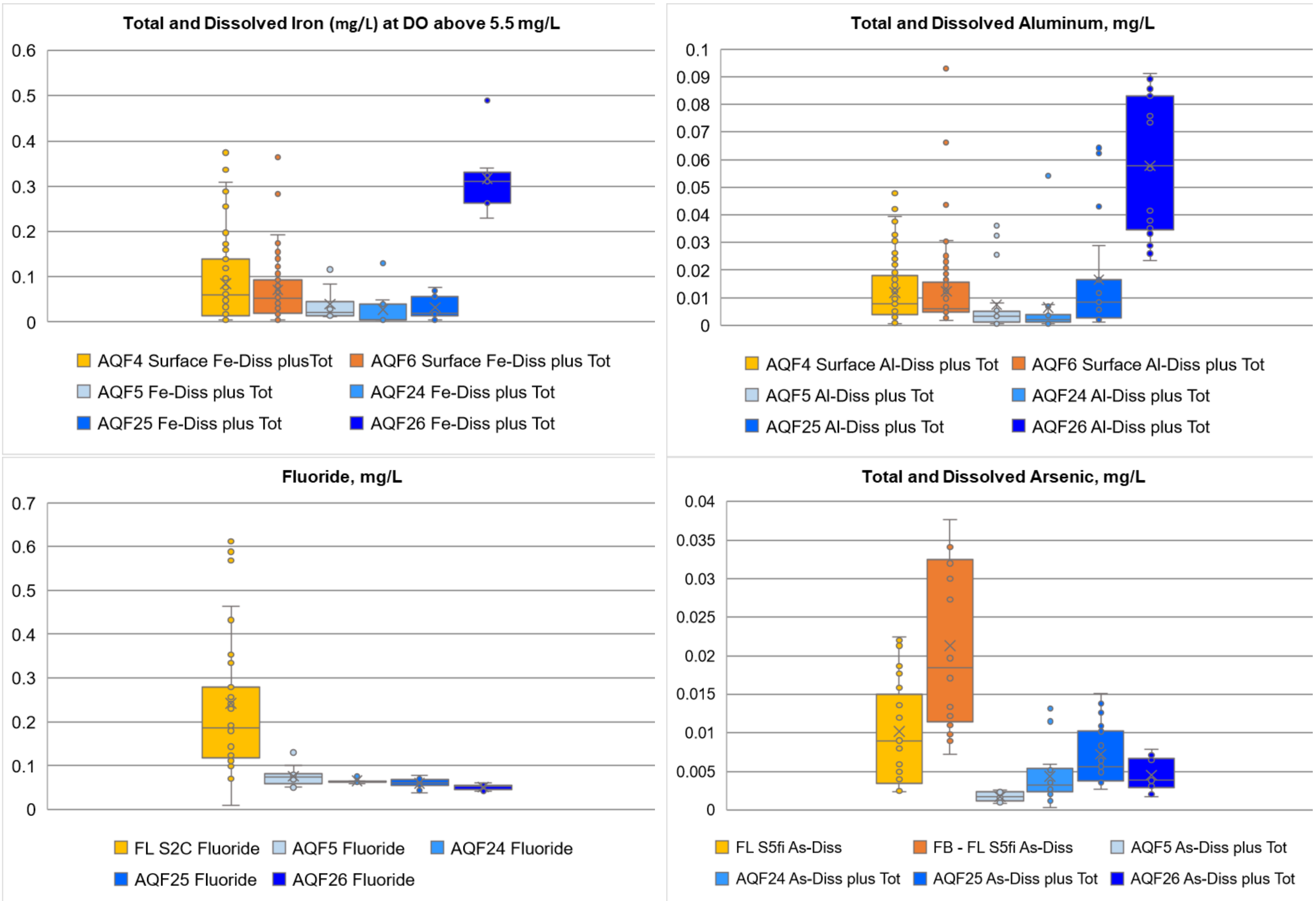


Figure 4-6 Box plots for Selected Parameters in Contact Water

Appendix C PREDICTED STREAMFLOWS – AVERAGE, 1:25 YEAR DRY AND 1:25 YEAR WET CLIMATE SCENARIOS

QF10

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.008	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0
	Jun	0.004	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	Jul	0.006	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0
	Aug	0.005	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0
	Sep	0.004	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	Oct	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.002	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0
1:25 Dry	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.005	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0
	Jun	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Jul	0.004	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	Aug	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Sep	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Oct	0.002	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0
	Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.002	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0	0.002	0
1:25 Wet	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.012	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0
	Jun	0.005	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0
	Jul	0.008	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0
	Aug	0.006	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0
	Sep	0.005	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0
	Oct	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF10 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF01

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.027	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	-0.008	0.019	0
	Jun	0.012	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	0
	Jul	0.016	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	0
	Aug	0.013	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	-0.004	0.009	0
	Sep	0.012	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	0
	Oct	0.007	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.007	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	0
1:25 Dry	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.018	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	0
	Jun	0.008	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	0
	Jul	0.012	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	0
	Aug	0.010	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	0
	Sep	0.008	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	0
	Oct	0.005	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	-0.001	0.004	0
	Nov	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.005	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	-0.002	0.004	0
1:25 Wet	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.040	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	-0.012	0.028	0
	Jun	0.015	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	0
	Jul	0.022	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	0
	Aug	0.018	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	-0.005	0.013	0
	Sep	0.016	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	0
	Oct	0.010	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.010	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF01 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF04

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.032	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0
	Jun	0.014	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0
	Jul	0.020	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0	0.020	0
	Aug	0.016	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0	0.016	0
	Sep	0.014	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0
	Oct	0.009	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.009	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0
1:25 Dry	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	May	0.021	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0	0.021	0
	Jun	0.010	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0
	Jul	0.014	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0	0.014	0
	Aug	0.012	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0
	Sep	0.010	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0
	Oct	0.006	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.006	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0
1:25 Wet	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.045	0.046	0	0.046	0	0.046	0	0.045	0	0.045	0	0.046	0	0.045	0	0.045	0	0.046	0	0.045	0	0.045	0	0.046	0
	Jun	0.019	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0
	Jul	0.027	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0	0.027	0
	Aug	0.022	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0	0.022	0
	Sep	0.019	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0	0.019	0
	Oct	0.012	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.012	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0	0.012	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF04 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF03

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.005	0.007	0.002	0.006	0.001	0.008	0.003	0.008	0.003	0.008	0.003	0.008	0.003	0.005	0	0.005	0	0.007	0.002	0.005	0	0.005	0	0.005	0
	Feb	0.004	0.007	0.003	0.006	0.002	0.007	0.003	0.007	0.003	0.007	0.003	0.007	0.003	0.004	0	0.004	0	0.005	0.001	0.004	0	0.004	0	0.004	0
	Mar	0.003	0.007	0.003	0.007	0.003	0.007	0.004	0.007	0.003	0.007	0.003	0.007	0.003	0.004	0	0.003	0	0.004	0	0.003	0	0.003	0	0.003	0
	Apr	0.003	0.007	0.004	0.007	0.003	0.007	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	May	0.038	0.040	0.002	0.039	0.001	0.040	0.002	0.039	0.001	0.039	0.001	0.039	0.001	0.031	-0.007	0.031	-0.007	0.032	-0.006	0.030	-0.008	0.030	-0.008	0.030	0
	Jun	0.039	0.039	0	0.039	0	0.039	0	0.039	0	0.039	0	0.039	0	0.034	-0.005	0.034	-0.005	0.034	-0.005	0.032	-0.007	0.032	-0.007	0.032	0
	Jul	0.037	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.037	-0.001	0.033	-0.005	0.033	-0.005	0.033	-0.005	0.031	-0.006	0.031	-0.006	0.031	0
	Aug	0.037	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.036	-0.001	0.032	-0.004	0.032	-0.005	0.032	-0.004	0.031	-0.006	0.031	-0.006	0.031	0
	Sep	0.033	0.033	0	0.033	0	0.033	0	0.033	0	0.033	0	0.033	0	0.029	-0.004	0.029	-0.004	0.029	-0.004	0.028	-0.005	0.028	-0.005	0.028	0
	Oct	0.027	0.028	0.001	0.028	0.001	0.028	0.001	0.028	0.001	0.028	0.001	0.028	0.001	0.024	-0.003	0.024	-0.003	0.024	-0.003	0.023	-0.004	0.023	-0.004	0.023	0
	Nov	0.015	0.017	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.017	0.002	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	-0.002	0.014	-0.002	0.014	0
	Dec	0.008	0.010	0.003	0.010	0.003	0.010	0.003	0.010	0.003	0.010	0.003	0.010	0.003	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0
	Annual	0.021	0.022	0.001	0.022	0.001	0.022	0.002	0.022	0.002	0.022	0.002	0.022	0.002	0.018	-0.002	0.018	-0.003	0.019	-0.002	0.018	-0.003	0.018	-0.003	0.018	0
1:25 Dry	Jan	0.005	0.007	0.002	0.006	0.001	0.008	0.003	0.008	0.003	0.008	0.003	0.008	0.003	0.005	0	0.004	0	0.006	0.002	0.004	0	0.004	0	0.004	0
	Feb	0.004	0.006	0.003	0.006	0.002	0.007	0.003	0.007	0.003	0.007	0.003	0.007	0.003	0.004	0	0.003	0	0.004	0.001	0.003	0	0.003	0	0.003	0
	Mar	0.003	0.006	0.003	0.006	0.003	0.007	0.003	0.007	0.003	0.006	0.003	0.007	0.003	0.003	0	0.003	0	0.004	0	0.003	0	0.003	0	0.003	0
	Apr	0.003	0.006	0.004	0.006	0.003	0.007	0.004	0.006	0.004	0.006	0.004	0.006	0.004	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	May	0.025	0.028	0.003	0.028	0.003	0.028	0.004	0.028	0.003	0.028	0.003	0.028	0.003	0.020	-0.005	0.020	-0.005	0.020	-0.004	0.019	-0.006	0.019	-0.006	0.019	0
	Jun	0.022	0.024	0.002	0.024	0.002	0.024	0.002	0.024	0.002	0.024	0.002	0.024	0.002	0.019	-0.003	0.019	-0.003	0.020	-0.003	0.018	-0.004	0.018	-0.004	0.018	0
	Jul	0.023	0.024	0.001	0.024	0.001	0.024	0.001	0.024	0.001	0.024	0.001	0.024	0.001	0.020	-0.003	0.020	-0.004	0.020	-0.003	0.019	-0.005	0.019	-0.005	0.019	0
	Aug	0.024	0.025	0.001	0.025	0.001	0.025	0.001	0.025	0.001	0.025	0.001	0.025	0.001	0.021	-0.003	0.021	-0.004	0.021	-0.003	0.020	-0.005	0.020	-0.005	0.020	0
	Sep	0.022	0.023	0.001	0.023	0.001	0.023	0.001	0.023	0.001	0.023	0.001	0.023	0.001	0.019	-0.003	0.019	-0.003	0.019	-0.003	0.018	-0.004	0.018	-0.004	0.018	0
	Oct	0.019	0.021	0.002	0.021	0.002	0.021	0.002	0.021	0.002	0.021	0.002	0.021	0.002	0.017	-0.002	0.017	-0.002	0.017	-0.002	0.016	-0.003	0.016	-0.003	0.016	0
	Nov	0.012	0.015	0.002	0.015	0.002	0.015	0.002	0.014	0.002	0.014	0.002	0.014	0.002	0.011	-0.001	0.011	-0.001	0.011	-0.001	0.011	-0.001	0.011	-0.001	0.011	0
	Dec	0.007	0.009	0.003	0.009	0.003	0.009	0.003	0.009	0.003	0.009	0.003	0.009	0.003	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0	0.006	0
	Annual	0.014	0.016	0.002	0.016	0.002	0.016	0.002	0.016	0.002	0.016	0.002	0.016	0.002	0.012	-0.002	0.012	-0.002	0.013	-0.001	0.012	-0.002	0.012	-0.002	0.012	0
1:25 Wet	Jan	0.006	0.008	0.002	0.007	0.001	0.009	0.003	0.009	0.003	0.009	0.003	0.009	0.003	0.006	0	0.006	0	0.008	0.002	0.006	0	0.006	0	0.006	0
	Feb	0.005	0.007	0.003	0.007	0.002	0.008	0.003	0.008	0.003	0.008	0.003	0.008	0.003	0.005	0	0.004	0	0.005	0.001	0.004	0	0.004	0	0.004	0
	Mar	0.004	0.007	0.003	0.007	0.003	0.007	0.004	0.007	0.003	0.007	0.003	0.007	0.003	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	Apr	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	May	0.050	0.050	-0.001	0.050	-0.001	0.050	-0.001	0.050	-0.001	0.050	-0.001	0.050	-0.001	0.042	-0.009	0.041	-0.009	0.042	-0.009	0.040	-0.010	0.040	-0.010	0.040	0
	Jun	0.066	0.063	-0.003	0.063	-0.003	0.063	-0.003	0.063	-0.003	0.063	-0.003	0.063	-0.003	0.058	-0.008	0.058	-0.008	0.058	-0.008	0.055	-0.011	0.055	-0.011	0.055	0
	Jul	0.060	0.057	-0.003	0.057	-0.003	0.057	-0.003	0.057	-0.003	0.057	-0.003	0.057	-0.003	0.053	-0.007	0.053	-0.007	0.053	-0.007	0.050	-0.011	0.050	-0.011	0.050	0
	Aug	0.053	0.051	-0.002	0.051	-0.002	0.051	-0.002	0.051	-0.002	0.051	-0.002	0.051	-0.002	0.047	-0.006	0.047	-0.006	0.047	-0.006	0.045	-0.008	0.045	-0.008	0.045	0
	Sep	0.047	0.045	-0.001	0.045	-0.001	0.045	-0.001	0.045	-0.002	0.045	-0.002	0.045	-0.002	0.041	-0.005	0.041	-0.006	0.041	-0.005	0.040	-0.007	0.040	-0.007	0.040	0
	Oct	0.037	0.037	0	0.037	0	0.037	0	0.037	0	0.037	0	0.037	0	0.033	-0.004	0.032	-0.004	0.033	-0.004	0.031	-0.006	0.031	-0.006	0.031	0
	Nov	0.019	0.021	0.002	0.021	0.002	0.021	0.002	0.021	0.002	0.021	0.002	0.021	0.002	0.018	-0.001	0.018	-0.002	0.018	-0.001	0.017	-0.002	0.017	-0.002	0.017	0
	Dec	0.009	0.011	0.003	0.011	0.003	0.011	0.003	0.011	0.003	0.011	0.003	0.011	0.003	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0
	Annual	0.030	0.030	0.001	0.030	0	0.031	0.001	0.030	0.001	0.030	0.001	0.030	0.001	0.027	-0.003	0.026	-0.004	0.027	-0.003	0.025	-0.005	0.025	-0.005	0.025	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF03 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF02

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.024	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	-0.007	0.017	0
	Jun	0.011	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	0
	Jul	0.014	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	0
	Aug	0.012	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	-0.003	0.009	0
	Sep	0.010	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	-0.003	0.008	0
	Oct	0.006	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	0
	Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.007	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	0
1:25 Dry	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.016	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	0
	Jun	0.007	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	0
	Jul	0.010	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	-0.003	0.007	0
	Aug	0.008	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	0
	Sep	0.007	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	-0.002	0.005	0
	Oct	0.004	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	0
	Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.005	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	-0.001	0.003	0
1:25 Wet	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	May	0.034	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	-0.010	0.024	0
	Jun	0.014	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	0
	Jul	0.020	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	-0.005	0.014	0
	Aug	0.016	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	-0.004	0.011	0
	Sep	0.014	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	-0.004	0.010	0
	Oct	0.009	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	0
	Nov	0.001	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0	0.001	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.009	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	-0.002	0.006	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF02 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF05

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.029	0.070	0.041	0.049	0.021	0.090	0.061	0.084	0.055	0.076	0.047	0.092	0.063	0.032	0.003	0.027	-0.002	0.049	0.020	0.032	0.003	0.027	-0.002	0.032	0
	Feb	0.023	0.079	0.056	0.071	0.048	0.087	0.065	0.096	0.074	0.088	0.065	0.108	0.085	0.024	0.002	0.022	-0.001	0.031	0.008	0.026	0.004	0.021	-0.001	0.027	0
	Mar	0.019	0.083	0.064	0.079	0.060	0.087	0.067	0.084	0.065	0.078	0.059	0.094	0.075	0.020	0.001	0.018	-0.001	0.024	0.004	0.024	0.004	0.018	-0.001	0.024	0
	Apr	0.018	0.086	0.068	0.083	0.065	0.089	0.071	0.075	0.057	0.070	0.052	0.082	0.064	0.019	0	0.017	-0.001	0.020	0.002	0.023	0.005	0.017	-0.001	0.023	0
	May	0.148	0.257	0.109	0.249	0.102	0.264	0.116	0.236	0.089	0.231	0.084	0.245	0.097	0.135	-0.012	0.132	-0.016	0.137	-0.010	0.159	0.012	0.131	-0.017	0.161	0
	Jun	0.153	0.222	0.070	0.219	0.067	0.226	0.073	0.189	0.037	0.181	0.028	0.203	0.050	0.141	-0.011	0.140	-0.013	0.142	-0.010	0.150	-0.002	0.138	-0.015	0.151	0
	Jul	0.154	0.224	0.070	0.220	0.066	0.227	0.074	0.178	0.024	0.173	0.019	0.185	0.031	0.143	-0.011	0.141	-0.013	0.144	-0.010	0.149	-0.004	0.139	-0.014	0.150	0
	Aug	0.157	0.225	0.068	0.221	0.064	0.229	0.072	0.175	0.018	0.174	0.017	0.175	0.019	0.146	-0.011	0.145	-0.012	0.147	-0.010	0.152	-0.004	0.143	-0.014	0.153	0
	Sep	0.143	0.205	0.062	0.203	0.060	0.208	0.064	0.159	0.016	0.159	0.015	0.159	0.016	0.133	-0.010	0.132	-0.011	0.134	-0.009	0.141	-0.002	0.131	-0.013	0.142	0
	Oct	0.124	0.167	0.043	0.146	0.022	0.187	0.063	0.137	0.013	0.137	0.012	0.137	0.013	0.116	-0.008	0.115	-0.010	0.117	-0.007	0.125	0.001	0.114	-0.011	0.126	0
	Nov	0.078	0.113	0.035	0.089	0.011	0.137	0.059	0.087	0.009	0.087	0.009	0.088	0.010	0.074	-0.004	0.073	-0.005	0.075	-0.003	0.080	0.002	0.072	-0.006	0.081	0
	Dec	0.042	0.077	0.035	0.054	0.012	0.100	0.058	0.055	0.012	0.054	0.012	0.055	0.013	0.041	-0.001	0.040	-0.002	0.042	-0.001	0.045	0.003	0.040	-0.003	0.046	0
	Annual	0.091	0.151	0.060	0.140	0.050	0.161	0.070	0.130	0.039	0.126	0.035	0.135	0.045	0.085	-0.005	0.083	-0.007	0.088	-0.002	0.092	0.002	0.083	-0.008	0.093	0
1:25 Dry	Jan	0.025	0.065	0.041	0.044	0.019	0.087	0.062	0.094	0.069	0.084	0.059	0.105	0.080	0.031	0.007	0.024	-0.001	0.063	0.039	0.028	0.003	0.024	-0.001	0.028	0
	Feb	0.020	0.076	0.056	0.067	0.047	0.084	0.065	0.089	0.069	0.082	0.062	0.100	0.080	0.023	0.003	0.019	-0.001	0.034	0.015	0.023	0.003	0.019	-0.001	0.023	0
	Mar	0.017	0.080	0.063	0.076	0.059	0.084	0.067	0.077	0.060	0.071	0.055	0.086	0.069	0.019	0.002	0.016	-0.001	0.024	0.007	0.021	0.004	0.016	-0.001	0.021	0
	Apr	0.016	0.084	0.068	0.081	0.065	0.086	0.070	0.068	0.052	0.064	0.049	0.074	0.059	0.017	0.001	0.015	-0.001	0.020	0.004	0.020	0.004	0.015	-0.001	0.020	0
	May	0.095	0.199	0.104	0.193	0.098	0.206	0.111	0.172	0.077	0.165	0.071	0.182	0.087	0.089	-0.006	0.085	-0.010	0.092	-0.003	0.104	0.010	0.084	-0.011	0.105	0
	Jun	0.090	0.162	0.072	0.159	0.069	0.165	0.075	0.123	0.033	0.115	0.025	0.135	0.045	0.084	-0.006	0.082	-0.008	0.085	-0.005	0.089	0	0.081	-0.009	0.090	0
	Jul	0.092	0.164	0.072	0.160	0.069	0.167	0.075	0.113	0.021	0.110	0.018	0.117	0.025	0.085	-0.006	0.084	-0.008	0.086	-0.005	0.088	-0.004	0.083	-0.009	0.088	0
	Aug	0.097	0.167	0.070	0.164	0.067	0.171	0.074	0.114	0.017	0.113	0.016	0.114	0.017	0.090	-0.007	0.089	-0.008	0.091	-0.006	0.092	-0.005	0.088	-0.009	0.092	0
	Sep	0.092	0.147	0.055	0.134	0.042	0.159	0.067	0.107	0.015	0.107	0.015	0.108	0.016	0.086	-0.006	0.085	-0.007	0.087	-0.005	0.089	-0.003	0.084	-0.008	0.090	0
	Oct	0.086	0.128	0.042	0.104	0.018	0.152	0.066	0.099	0.013	0.099	0.013	0.099	0.014	0.081	-0.005	0.079	-0.006	0.082	-0.004	0.086	0.001	0.079	-0.007	0.087	0
	Nov	0.059	0.095	0.036	0.070	0.011	0.120	0.061	0.069	0.010	0.069	0.010	0.070	0.010	0.057	-0.003	0.056	-0.004	0.058	-0.002	0.062	0.002	0.055	-0.004	0.062	0
	Dec	0.035	0.075	0.040	0.056	0.021	0.094	0.059	0.060	0.025	0.056	0.021	0.062	0.027	0.035	-0.001	0.034	-0.002	0.035	0	0.038	0.003	0.033	-0.002	0.039	0
	Annual	0.060	0.120	0.060	0.109	0.049	0.131	0.071	0.099	0.038	0.095	0.034	0.104	0.044	0.058	-0.002	0.056	-0.005	0.063	0.003	0.062	0.001	0.055	-0.005	0.062	0
1:25 Wet	Jan	0.033	0.074	0.041	0.055	0.022	0.094	0.060	0.060	0.027	0.057	0.023	0.063	0.029	0.034	0	0.031	-0.002	0.040	0.006	0.037	0.003	0.031	-0.002	0.037	0
	Feb	0.026	0.083	0.057	0.075	0.049	0.091	0.065	0.099	0.073	0.089	0.063	0.110	0.084	0.026	0	0.025	-0.002	0.029	0.003	0.030	0.004	0.024	-0.002	0.031	0
	Mar	0.022	0.086	0.064	0.082	0.060	0.090	0.068	0.095	0.072	0.088	0.065	0.106	0.083	0.022	0	0.021	-0.002	0.024	0.001	0.027	0.005	0.021	-0.002	0.028	0
	Apr	0.021	0.089	0.068	0.086	0.065	0.092	0.071	0.084	0.063	0.079	0.058	0.094	0.073	0.021	0	0.019	-0.002	0.022	0	0.027	0.006	0.019	-0.002	0.027	0
	May	0.193	0.304	0.111	0.297	0.104	0.312	0.119	0.294	0.102	0.289	0.097	0.303	0.110	0.174	-0.019	0.170	-0.022	0.175	-0.017	0.208	0.016	0.170	-0.023	0.210	0
	Jun	0.264	0.329	0.065	0.325	0.061	0.333	0.069	0.306	0.042	0.300	0.036	0.315	0.050	0.244	-0.021	0.242	-0.022	0.245	-0.019	0.258	-0.006	0.240	-0.025	0.259	0
	Jul	0.236	0.303	0.067	0.298	0.062	0.307	0.072	0.266	0.030	0.258	0.022	0.279	0.044	0.217	-0.018	0.216	-0.020	0.218	-0.017	0.230	-0.005	0.213	-0.023	0.231	0
	Aug	0.230	0.296	0.065	0.291	0.060	0.301	0.070	0.250	0.019	0.248	0.018	0.252	0.022	0.213	-0.017	0.212	-0.019	0.214	-0.017	0.226	-0.005	0.209	-0.021	0.227	0
	Sep	0.206	0.272	0.066	0.268	0.062	0.276	0.071	0.223	0.017	0.223	0.017	0.223	0.017	0.190	-0.016	0.189	-0.017	0.191	-0.015	0.205	-0.001	0.187	-0.019	0.205	0
	Oct	0.173	0.224	0.052	0.214	0.042	0.234	0.062	0.186	0.013	0.185	0.013	0.186	0.014	0.160	-0.013	0.159	-0.014	0.161	-0.012	0.174	0.001	0.157	-0.015	0.174	0
	Nov	0.103	0.139	0.037	0.118	0.016	0.160	0.057	0.112	0.009	0.112	0.009	0.112	0.010	0.096	-0.006	0.095	-0.007	0.097	-0.006	0.105	0.002	0.094	-0.008	0.105	0
	Dec	0.050	0.083	0.033	0.060	0.010	0.107	0.057	0.059	0.008	0.059	0.008	0.059	0.009	0.048	-0.002	0.047	-0.003	0.049	-0.001	0.054	0.003	0.047	-0.003	0.054	0
	Annual	0.130	0.190	0.061	0.181	0.051	0.200	0.070	0.169	0.040	0.166	0.036	0.175	0.045	0.120	-0.009	0.119	-0.011	0.122	-0.008	0.132	0.002	0.118	-0.012	0.132	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF05 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF06

Scenario	Month	Existing Condition flow (m³/s)	Construction (Year -2 - Year -1) Average flow (m3/s)	Change from Existing (m3/s)	Minimum flow (m3/s)	Change from Existing (m3/s)	Maximum flow (m3/s)	Change from Existing (m3/s)	Operations (Year 1 - Year 6) Average flow (m3/s)	Change from Existing (m3/s)	Minimum flow (m3/s)	Change from Existing (m3/s)	Maximum flow (m3/s)	Change from Existing (m3/s)	Active Closure (Year 6 - Year 11) Average flow (m3/s)	Change from Existing (m3/s)	Minimum flow (m3/s)	Change from Existing (m3/s)	Maximum flow (m3/s)	Change from Existing (m3/s)	Post Closure (from Year 12) Average flow (m3/s)	Change from Existing (m3/s)	Minimum flow (m3/s)	Change from Existing (m3/s)	Maximum flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.009	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0	0.009	0
	May	0.168	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0
	Jun	0.067	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0	0.067	0
	Jul	0.094	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0	0.094	0
	Aug	0.078	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0	0.078	0
	Sep	0.070	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0
	Oct	0.043	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0	0.043	0
	Nov	0.004	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.044	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0	0.044	0
1:25 Dry	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.010	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0
	May	0.113	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0	0.113	0
	Jun	0.049	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0	0.049	0
	Jul	0.069	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0	0.069	0
	Aug	0.058	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0	0.058	0
	Sep	0.051	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0
	Oct	0.031	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0	0.031	0
	Nov	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.032	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0	0.032	0
1:25 Wet	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.007	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0	0.007	0
	May	0.187	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0	0.187	0
	Jun	0.151	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0	0.151	0
	Jul	0.129	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0	0.129	0
	Aug	0.109	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0	0.109	0
	Sep	0.096	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0	0.096	0
	Oct	0.061	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0	0.061	0
	Nov	0.005	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0	0.005	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.062	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0	0.062	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF06 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF07

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.071	0.099	0.029	0.076	0.005	0.123	0.052	0.094	0.023	0.091	0.020	0.097	0.026	0.072	0.001	0.068	-0.002	0.085	0.015	0.073	0.002	0.068	-0.002	0.073	0
	Feb	0.054	0.094	0.040	0.078	0.023	0.111	0.057	0.106	0.052	0.098	0.044	0.114	0.060	0.056	0.002	0.053	-0.001	0.067	0.013	0.057	0.003	0.052	-0.002	0.057	0
	Mar	0.045	0.096	0.051	0.087	0.042	0.106	0.061	0.106	0.061	0.099	0.054	0.115	0.070	0.047	0.002	0.044	-0.001	0.053	0.008	0.049	0.004	0.044	-0.001	0.049	0
	Apr	0.044	0.105	0.061	0.099	0.055	0.110	0.066	0.104	0.060	0.098	0.055	0.113	0.069	0.045	0.001	0.043	-0.001	0.049	0.005	0.048	0.004	0.043	-0.001	0.048	0
	May	0.180	0.294	0.114	0.286	0.106	0.301	0.121	0.279	0.099	0.273	0.093	0.290	0.110	0.176	-0.004	0.172	-0.008	0.180	0.001	0.191	0.012	0.172	-0.008	0.192	0
	Jun	0.343	0.440	0.096	0.435	0.092	0.445	0.101	0.412	0.069	0.405	0.062	0.424	0.081	0.331	-0.012	0.328	-0.016	0.333	-0.010	0.348	0.004	0.327	-0.017	0.349	0
	Jul	0.362	0.436	0.074	0.432	0.070	0.439	0.077	0.396	0.033	0.389	0.027	0.406	0.044	0.351	-0.011	0.349	-0.013	0.352	-0.010	0.359	-0.003	0.347	-0.015	0.360	0
	Aug	0.361	0.430	0.069	0.426	0.065	0.433	0.073	0.382	0.021	0.380	0.019	0.385	0.025	0.349	-0.011	0.348	-0.013	0.350	-0.010	0.356	-0.004	0.346	-0.014	0.357	0
	Sep	0.302	0.366	0.064	0.364	0.062	0.368	0.066	0.319	0.016	0.318	0.016	0.319	0.017	0.292	-0.010	0.291	-0.011	0.293	-0.009	0.299	-0.003	0.290	-0.013	0.300	0
	Oct	0.258	0.307	0.050	0.296	0.038	0.319	0.061	0.271	0.014	0.271	0.014	0.272	0.014	0.249	-0.009	0.247	-0.010	0.249	-0.008	0.257	-0.001	0.246	-0.011	0.257	0
	Nov	0.178	0.214	0.036	0.195	0.017	0.234	0.056	0.188	0.010	0.188	0.010	0.189	0.011	0.172	-0.006	0.171	-0.007	0.173	-0.005	0.180	0.001	0.170	-0.008	0.180	0
	Dec	0.105	0.136	0.030	0.115	0.010	0.156	0.051	0.113	0.008	0.113	0.008	0.114	0.009	0.102	-0.003	0.101	-0.004	0.103	-0.002	0.107	0.002	0.101	-0.004	0.108	0.001
	Annual	0.192	0.251	0.059	0.241	0.049	0.262	0.070	0.231	0.039	0.227	0.035	0.236	0.045	0.187	-0.005	0.185	-0.007	0.191	-0.001	0.194	0.002	0.184	-0.008	0.194	0
1:25 Dry	Jan	0.058	0.087	0.029	0.062	0.004	0.112	0.054	0.093	0.035	0.088	0.030	0.098	0.040	0.062	0.004	0.056	-0.002	0.087	0.029	0.060	0.002	0.056	-0.002	0.061	0
	Feb	0.045	0.084	0.039	0.067	0.022	0.102	0.057	0.101	0.056	0.094	0.049	0.110	0.065	0.049	0.004	0.044	-0.001	0.068	0.023	0.048	0.003	0.044	-0.001	0.048	0
	Mar	0.037	0.088	0.050	0.077	0.040	0.098	0.061	0.096	0.059	0.090	0.052	0.106	0.068	0.040	0.003	0.037	-0.001	0.052	0.015	0.041	0.003	0.036	-0.001	0.041	0
	Apr	0.037	0.097	0.060	0.091	0.054	0.103	0.066	0.093	0.057	0.089	0.052	0.102	0.065	0.039	0.002	0.036	-0.001	0.047	0.010	0.040	0.004	0.036	-0.001	0.041	0
	May	0.133	0.240	0.107	0.233	0.100	0.247	0.114	0.220	0.087	0.214	0.081	0.230	0.097	0.133	0	0.128	-0.005	0.140	0.007	0.142	0.009	0.128	-0.005	0.143	0
	Jun	0.209	0.303	0.094	0.299	0.089	0.308	0.099	0.271	0.061	0.263	0.054	0.283	0.074	0.204	-0.005	0.201	-0.009	0.208	-0.001	0.214	0.005	0.200	-0.010	0.215	0
	Jul	0.191	0.264	0.073	0.261	0.070	0.267	0.076	0.222	0.031	0.217	0.026	0.230	0.039	0.185	-0.006	0.183	-0.008	0.187	-0.004	0.190	-0.001	0.182	-0.009	0.190	0
	Aug	0.170	0.240	0.070	0.237	0.067	0.243	0.073	0.190	0.020	0.188	0.019	0.193	0.024	0.163	-0.006	0.162	-0.008	0.164	-0.006	0.166	-0.004	0.161	-0.009	0.166	0
	Sep	0.167	0.231	0.064	0.228	0.061	0.234	0.067	0.183	0.017	0.183	0.016	0.184	0.018	0.160	-0.006	0.159	-0.008	0.161	-0.005	0.163	-0.004	0.158	-0.009	0.163	0
	Oct	0.169	0.219	0.050	0.202	0.033	0.236	0.067	0.184	0.015	0.184	0.014	0.184	0.015	0.163	-0.006	0.162	-0.007	0.164	-0.005	0.168	-0.002	0.161	-0.008	0.168	0
	Nov	0.131	0.169	0.038	0.148	0.017	0.191	0.060	0.142	0.011	0.142	0.011	0.143	0.012	0.127	-0.004	0.126	-0.005	0.128	-0.003	0.132	0.001	0.125	-0.006	0.132	0
	Dec	0.083	0.116	0.033	0.096	0.013	0.137	0.054	0.095	0.012	0.095	0.011	0.095	0.012	0.081	-0.002	0.080	-0.003	0.082	-0.001	0.085	0.002	0.080	-0.003	0.086	0.001
	Annual	0.119	0.178	0.059	0.167	0.047	0.190	0.071	0.158	0.038	0.154	0.035	0.163	0.044	0.117	-0.002	0.115	-0.005	0.124	0.005	0.121	0.002	0.114	-0.005	0.121	0
1:25 Wet	Jan	0.085	0.113	0.029	0.090	0.006	0.136	0.052	0.096	0.011	0.095	0.011	0.097	0.012	0.084	0	0.082	-0.003	0.091	0.007	0.087	0.003	0.082	-0.003	0.088	0
	Feb	0.065	0.106	0.041	0.090	0.025	0.121	0.057	0.103	0.038	0.097	0.033	0.108	0.043	0.065	0	0.063	-0.002	0.069	0.005	0.068	0.004	0.063	-0.002	0.069	0
	Mar	0.054	0.107	0.052	0.098	0.044	0.116	0.061	0.115	0.060	0.107	0.053	0.124	0.070	0.054	0	0.053	-0.001	0.057	0.003	0.059	0.004	0.052	-0.002	0.059	0.001
	Apr	0.053	0.114	0.062	0.109	0.056	0.119	0.067	0.117	0.065	0.111	0.058	0.127	0.075	0.052	0	0.051	-0.002	0.054	0.002	0.057	0.005	0.051	-0.002	0.058	0
	May	0.208	0.324	0.116	0.316	0.108	0.332	0.124	0.319	0.111	0.312	0.104	0.331	0.123	0.201	-0.007	0.198	-0.010	0.202	-0.006	0.224	0.016	0.197	-0.011	0.225	0.001
	Jun	0.600	0.699	0.100	0.694	0.094	0.705	0.106	0.680	0.081	0.675	0.075	0.689	0.090	0.575	-0.024	0.572	-0.028	0.577	-0.023	0.602	0.002	0.570	-0.029	0.603	0
	Jul	0.634	0.703	0.069	0.698	0.064	0.707	0.073	0.671	0.037	0.663	0.029	0.684	0.051	0.615	-0.019	0.613	-0.020	0.616	-0.017	0.629	-0.005	0.610	-0.023	0.629	0
	Aug	0.645	0.710	0.066	0.706	0.061	0.715	0.071	0.668	0.024	0.664	0.020	0.674	0.030	0.626	-0.018	0.625	-0.020	0.627	-0.017	0.640	-0.005	0.622	-0.023	0.640	0
	Sep	0.536	0.599	0.064	0.595	0.059	0.604	0.068	0.553	0.017	0.553	0.017	0.554	0.018	0.520	-0.016	0.519	-0.017	0.521	-0.015	0.533	-0.002	0.517	-0.019	0.534	0
	Oct	0.376	0.430	0.054	0.427	0.051	0.433	0.057	0.390	0.014	0.390	0.014	0.390	0.014	0.363	-0.013	0.362	-0.014	0.364	-0.012	0.376	0	0.360	-0.016	0.376	0
	Nov	0.227	0.267	0.039	0.253	0.025	0.281	0.053	0.237	0.010	0.237	0.010	0.238	0.010	0.219	-0.009	0.218	-0.010	0.220	-0.008	0.229	0.002	0.217	-0.011	0.229	0
	Dec	0.129	0.160	0.031	0.141	0.012	0.178	0.049	0.137	0.008	0.136	0.008	0.137	0.008	0.125	-0.004	0.124	-0.005	0.125	-0.003	0.131	0.002	0.123	-0.005	0.132	0.001
	Annual	0.301	0.361	0.060	0.351	0.051	0.371	0.070	0.340	0.040	0.337	0.036	0.346	0.045	0.292	-0.009	0.290	-0.011	0.294	-0.007	0.303	0.002	0.289	-0.012	0.304	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF07 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QF08

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.111	0.134	0.023	0.112	0.001	0.156	0.045	0.123	0.012	0.122	0.011	0.123	0.013	0.111	0	0.108	-0.003	0.121	0.010	0.112	0.002	0.108	-0.003	0.113	0
	Feb	0.087	0.117	0.030	0.097	0.011	0.136	0.049	0.119	0.032	0.114	0.027	0.124	0.037	0.088	0.002	0.085	-0.001	0.098	0.012	0.089	0.003	0.085	-0.002	0.090	0.001
	Mar	0.073	0.113	0.040	0.099	0.026	0.126	0.054	0.122	0.049	0.115	0.042	0.130	0.058	0.074	0.002	0.072	-0.001	0.082	0.010	0.076	0.003	0.071	-0.002	0.076	0.001
	Apr	0.067	0.118	0.051	0.109	0.042	0.127	0.060	0.123	0.056	0.117	0.050	0.132	0.066	0.068	0.001	0.066	-0.001	0.074	0.007	0.070	0.003	0.065	-0.001	0.071	0
	May	0.501	0.644	0.143	0.633	0.132	0.655	0.154	0.633	0.132	0.624	0.123	0.648	0.147	0.500	-0.001	0.495	-0.006	0.510	0.009	0.515	0.014	0.494	-0.007	0.516	0.001
	Jun	0.639	0.740	0.101	0.735	0.096	0.746	0.107	0.715	0.076	0.709	0.070	0.726	0.087	0.627	-0.012	0.624	-0.015	0.630	-0.009	0.645	0.006	0.623	-0.016	0.647	0
	Jul	0.490	0.565	0.076	0.562	0.072	0.569	0.079	0.527	0.038	0.520	0.030	0.539	0.049	0.479	-0.011	0.477	-0.013	0.480	-0.010	0.488	-0.002	0.475	-0.015	0.489	0
	Aug	0.487	0.556	0.069	0.552	0.065	0.560	0.073	0.510	0.023	0.507	0.020	0.515	0.027	0.476	-0.011	0.474	-0.013	0.477	-0.010	0.483	-0.004	0.473	-0.014	0.484	0
	Sep	0.435	0.499	0.064	0.497	0.061	0.502	0.067	0.452	0.017	0.451	0.016	0.453	0.018	0.425	-0.010	0.424	-0.011	0.426	-0.009	0.432	-0.003	0.423	-0.013	0.432	0
	Oct	0.355	0.406	0.051	0.398	0.043	0.414	0.059	0.369	0.014	0.369	0.013	0.369	0.014	0.346	-0.009	0.345	-0.010	0.347	-0.008	0.354	-0.001	0.344	-0.011	0.354	0
	Nov	0.248	0.284	0.036	0.267	0.019	0.300	0.052	0.258	0.010	0.258	0.010	0.258	0.010	0.242	-0.006	0.241	-0.007	0.242	-0.006	0.249	0.001	0.240	-0.008	0.249	0
	Dec	0.157	0.184	0.028	0.167	0.010	0.202	0.045	0.164	0.007	0.164	0.007	0.165	0.008	0.153	-0.003	0.153	-0.004	0.154	-0.003	0.158	0.002	0.152	-0.005	0.160	0.001
	Annual	0.304	0.363	0.059	0.352	0.048	0.374	0.070	0.343	0.039	0.339	0.035	0.349	0.044	0.299	-0.005	0.297	-0.007	0.303	-0.001	0.306	0.002	0.296	-0.008	0.307	0
1:25 Dry	Jan	0.091	0.115	0.024	0.092	0.001	0.138	0.047	0.110	0.019	0.107	0.016	0.112	0.020	0.093	0.002	0.089	-0.002	0.109	0.018	0.093	0.002	0.089	-0.002	0.093	0
	Feb	0.072	0.101	0.029	0.081	0.009	0.122	0.050	0.110	0.038	0.105	0.032	0.117	0.044	0.076	0.003	0.071	-0.001	0.094	0.022	0.075	0.002	0.071	-0.002	0.075	0
	Mar	0.061	0.099	0.038	0.083	0.022	0.114	0.053	0.110	0.050	0.104	0.043	0.119	0.058	0.064	0.003	0.060	-0.001	0.079	0.018	0.063	0.003	0.059	-0.001	0.064	0.001
	Apr	0.055	0.104	0.049	0.094	0.039	0.114	0.059	0.108	0.053	0.102	0.048	0.117	0.062	0.057	0.003	0.054	-0.001	0.068	0.013	0.058	0.003	0.054	-0.001	0.058	0
	May	0.320	0.456	0.136	0.445	0.125	0.468	0.147	0.440	0.120	0.432	0.112	0.454	0.134	0.323	0.003	0.317	-0.004	0.341	0.021	0.331	0.011	0.316	-0.005	0.332	0.001
	Jun	0.344	0.439	0.095	0.434	0.090	0.444	0.100	0.411	0.067	0.404	0.060	0.422	0.079	0.340	-0.004	0.336	-0.008	0.345	0.001	0.350	0.007	0.335	-0.009	0.351	0
	Jul	0.263	0.338	0.075	0.335	0.072	0.341	0.078	0.300	0.036	0.294	0.031	0.309	0.046	0.258	-0.005	0.255	-0.008	0.260	-0.003	0.264	0.001	0.255	-0.009	0.264	0
	Aug	0.236	0.304	0.069	0.301	0.066	0.307	0.072	0.258	0.022	0.255	0.020	0.262	0.027	0.230	-0.006	0.228	-0.008	0.230	-0.005	0.233	-0.003	0.227	-0.009	0.233	0
	Sep	0.232	0.299	0.067	0.299	0.067	0.299	0.067	0.250	0.018	0.249	0.017	0.251	0.019	0.225	-0.006	0.224	-0.008	0.226	-0.006	0.228	-0.004	0.223	-0.009	0.228	0
	Oct	0.228	0.281	0.053	0.269	0.041	0.294	0.066	0.243	0.015	0.243	0.015	0.243	0.016	0.222	-0.006	0.221	-0.007	0.223	-0.005	0.225	-0.003	0.220	-0.008	0.226	0
	Nov	0.182	0.221	0.039	0.202	0.020	0.239	0.058	0.193	0.012	0.193	0.011	0.194	0.012	0.177	-0.004	0.176	-0.005	0.178	-0.004	0.182	0	0.176	-0.006	0.182	0
	Dec	0.125	0.155	0.030	0.137	0.012	0.174	0.049	0.134	0.009	0.134	0.009	0.134	0.009	0.122	-0.002	0.122	-0.003	0.123	-0.002	0.126	0.001	0.121	-0.004	0.127	0.001
	Annual	0.184	0.243	0.059	0.231	0.047	0.255	0.071	0.222	0.038	0.218	0.034	0.228	0.044	0.182	-0.002	0.179	-0.005	0.190	0.006	0.186	0.002	0.179	-0.005	0.186	0
1:25 Wet	Jan	0.132	0.155	0.023	0.133	0.002	0.176	0.045	0.140	0.008	0.139	0.007	0.141	0.010	0.131	-0.001	0.129	-0.003	0.138	0.006	0.134	0.002	0.128	-0.003	0.134	0
	Feb	0.103	0.134	0.031	0.116	0.013	0.153	0.049	0.124	0.021	0.121	0.018	0.126	0.023	0.103	0	0.102	-0.002	0.108	0.005	0.106	0.003	0.101	-0.002	0.107	0.001
	Mar	0.087	0.130	0.042	0.117	0.030	0.142	0.055	0.132	0.044	0.125	0.038	0.139	0.052	0.088	0	0.086	-0.001	0.091	0.004	0.091	0.004	0.085	-0.002	0.091	0.001
	Apr	0.082	0.136	0.054	0.128	0.046	0.144	0.062	0.141	0.059	0.134	0.052	0.151	0.069	0.082	0	0.080	-0.001	0.085	0.003	0.086	0.004	0.080	-0.002	0.086	0.001
	May	0.720	0.866	0.146	0.856	0.135	0.877	0.157	0.864	0.144	0.854	0.133	0.881	0.160	0.715	-0.005	0.711	-0.009	0.719	-0.002	0.738	0.018	0.711	-0.010	0.740	0.001
	Jun	1.196	1.302	0.106	1.296	0.100	1.308	0.113	1.284	0.088	1.279	0.083	1.293	0.098	1.171	-0.024	1.168	-0.028	1.173	-0.022	1.200	0.005	1.166	-0.029	1.202	0
	Jul	0.858	0.927	0.069	0.923	0.065	0.931	0.073	0.897	0.039	0.889	0.031	0.910	0.052	0.840	-0.019	0.838	-0.020	0.841	-0.017	0.853	-0.005	0.835	-0.023	0.854	0
	Aug	0.850	0.915	0.066	0.911	0.061	0.920	0.071	0.875	0.025	0.870	0.020	0.882	0.032	0.831	-0.018	0.830	-0.020	0.832	-0.017	0.845	-0.005	0.827	-0.023	0.845	0
	Sep	0.748	0.810	0.062	0.806	0.058	0.815	0.067	0.765	0.017	0.764	0.017	0.766	0.019	0.732	-0.015	0.731	-0.017	0.733	-0.015	0.745	-0.003	0.729	-0.019	0.745	0
	Oct	0.527	0.580	0.053	0.579	0.052	0.581	0.054	0.541	0.014	0.540	0.013	0.541	0.014	0.514	-0.013	0.513	-0.014	0.515	-0.012	0.527	0	0.512	-0.015	0.527	0
	Nov	0.316	0.354	0.038	0.344	0.028	0.365	0.049	0.326	0.010	0.326	0.009	0.326	0.010	0.307	-0.009	0.306	-0.010	0.308	-0.008	0.317	0.001	0.305	-0.011	0.317	0
	Dec	0.190	0.219	0.029	0.204	0.013	0.234	0.044	0.197	0.007	0.197	0.007	0.198	0.008	0.186	-0.005	0.185	-0.005	0.186	-0.004	0.192	0.002	0.184	-0.006	0.194	0.001
	Annual	0.484	0.544	0.060	0.534	0.050	0.554	0.070	0.524	0.040	0.520	0.036	0.529	0.045	0.475	-0.009	0.473	-0.011	0.477	-0.007	0.486	0.002	0.472	-0.012	0.487	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QF08 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

Gordon Lake

		Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	315.12	315.15	0.04	315.14	0.02	315.17	0.05	315.17	0.05	315.17	0.05	315.17	0.05	315.12	0.00	315.11	0.00	315.15	0.03	315.11	0.00	315.11	0.00	315.11	0.00
	Feb	315.09	315.15	0.06	315.14	0.05	315.16	0.06	315.16	0.06	315.16	0.06	315.16	0.06	315.10	0.00	315.09	0.00	315.11	0.02	315.09	0.00	315.09	0.00	315.09	0.00
	Mar	315.08	315.15	0.07	315.14	0.06	315.15	0.07	315.15	0.07	315.15	0.07	315.15	0.07	315.08	0.00	315.08	0.00	315.09	0.01	315.08	0.00	315.08	0.00	315.08	0.00
	Apr	315.07	315.15	0.08	315.15	0.07	315.15	0.08	315.15	0.08	315.15	0.08	315.15	0.08	315.07	0.00	315.07	0.00	315.08	0.00	315.07	0.00	315.07	0.00	315.07	0.00
	May	315.36	315.38	0.02	315.38	0.02	315.38	0.02	315.38	0.02	315.38	0.02	315.38	0.02	315.33	-0.03	315.33	-0.03	315.33	-0.03	315.32	-0.04	315.32	-0.04	315.32	0.00
	Jun	315.40	315.40	0.00	315.40	0.00	315.40	0.00	315.40	0.00	315.40	0.00	315.40	0.00	315.38	-0.02	315.38	-0.02	315.38	-0.02	315.37	-0.04	315.37	-0.04	315.37	0.00
	Jul	315.40	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.37	-0.02	315.37	-0.02	315.37	-0.02	315.36	-0.03	315.36	-0.03	315.36	0.00
	Aug	315.39	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.37	-0.02	315.37	-0.02	315.37	-0.02	315.36	-0.03	315.36	-0.03	315.36	0.00
	Sep	315.37	315.37	0.00	315.37	0.00	315.37	0.00	315.37	0.00	315.37	0.00	315.37	0.00	315.35	-0.02	315.35	-0.02	315.35	-0.02	315.34	-0.03	315.34	-0.03	315.34	0.00
	Oct	315.34	315.34	0.01	315.34	0.01	315.34	0.01	315.34	0.01	315.34	0.01	315.34	0.01	315.32	-0.02	315.32	-0.02	315.32	-0.02	315.31	-0.02	315.31	-0.02	315.31	0.00
	Nov	315.25	315.27	0.02	315.27	0.02	315.27	0.02	315.27	0.02	315.27	0.02	315.27	0.02	315.24	-0.01	315.24	-0.01	315.24	-0.01	315.23	-0.01	315.23	-0.01	315.23	0.00
	Dec	315.16	315.20	0.04	315.20	0.04	315.20	0.04	315.20	0.04	315.20	0.04	315.20	0.04	315.16	0.00	315.15	-0.01	315.16	0.00	315.15	-0.01	315.15	-0.01	315.15	0.00
	Annual	315.25	315.28	0.03	315.28	0.02	315.28	0.03	315.28	0.03	315.28	0.03	315.28	0.03	315.24	-0.01	315.24	-0.01	315.25	-0.01	315.23	-0.02	315.23	-0.02	315.23	0.00
1:25 Dry	Jan	315.11	315.14	0.04	315.13	0.02	315.16	0.06	315.16	0.06	315.16	0.06	315.16	0.06	315.11	0.00	315.10	0.00	315.14	0.04	315.10	-0.01	315.10	-0.01	315.10	0.00
	Feb	315.08	315.14	0.06	315.13	0.05	315.15	0.07	315.15	0.07	315.15	0.07	315.15	0.07	315.09	0.00	315.08	0.00	315.10	0.02	315.08	0.00	315.08	0.00	315.08	0.00
	Mar	315.07	315.14	0.07	315.14	0.07	315.15	0.08	315.14	0.07	315.14	0.07	315.14	0.07	315.07	0.00	315.07	0.00	315.08	0.01	315.07	0.00	315.06	0.00	315.07	0.00
	Apr	315.06	315.14	0.08	315.14	0.08	315.14	0.08	315.14	0.08	315.14	0.08	315.14	0.08	315.06	0.00	315.06	0.00	315.07	0.01	315.06	-0.01	315.06	-0.01	315.06	0.00
	May	315.30	315.33	0.03	315.33	0.03	315.33	0.03	315.33	0.03	315.33	0.03	315.33	0.03	315.27	-0.03	315.27	-0.03	315.27	-0.03	315.26	-0.04	315.26	-0.04	315.26	0.00
	Jun	315.31	315.32	0.01	315.32	0.01	315.32	0.01	315.32	0.01	315.32	0.01	315.32	0.01	315.29	-0.02	315.29	-0.02	315.29	-0.02	315.28	-0.03	315.28	-0.03	315.28	0.00
	Jul	315.31	315.32	0.01	315.32	0.01	315.32	0.01	315.32	0.01	315.32	0.01	315.32	0.01	315.29	-0.02	315.29	-0.03	315.29	-0.02	315.28	-0.03	315.28	-0.03	315.28	0.00
	Aug	315.32	315.33	0.00	315.33	0.00	315.33	0.00	315.32	0.00	315.32	0.00	315.32	0.00	315.30	-0.02	315.30	-0.03	315.30	-0.02	315.29	-0.03	315.29	-0.03	315.29	0.00
	Sep	315.31	315.32	0.01	315.31	0.01	315.32	0.01	315.31	0.01	315.31	0.01	315.31	0.01	315.28	-0.02	315.28	-0.02	315.29	-0.02	315.28	-0.03	315.28	-0.03	315.28	0.00
	Oct	315.29	315.30	0.01	315.30	0.01	315.30	0.01	315.30	0.01	315.30	0.01	315.30	0.01	315.27	-0.02	315.27	-0.02	315.27	-0.02	315.26	-0.02	315.26	-0.02	315.26	0.00
	Nov	315.22	315.24	0.03	315.24	0.03	315.24	0.03	315.24	0.03	315.24	0.03	315.24	0.03	315.21	-0.01	315.21	-0.01	315.21	-0.01	315.20	-0.01	315.20	-0.01	315.20	0.00
	Dec	315.14	315.19	0.04	315.19	0.04	315.19	0.04	315.19	0.04	315.19	0.04	315.19	0.04	315.14	0.00	315.14	-0.01	315.14	0.00	315.14	-0.01	315.14	-0.01	315.14	0.00
	Annual	315.21	315.24	0.03	315.24	0.03	315.25	0.04	315.24	0.03	315.24	0.03	315.24	0.03	315.20	-0.01	315.19	-0.02	315.20	-0.01	315.19	-0.02	315.19	-0.02	315.19	0.00
1:25 Wet	Jan	315.13	315.16	0.03	315.15	0.02	315.18	0.05	315.18	0.05	315.18	0.05	315.18	0.05	315.13	0.00	315.13	0.00	315.16	0.03	315.12	0.00	315.12	0.00	315.13	0.00
	Feb	315.10	315.16	0.05	315.15	0.05	315.17	0.06	315.16	0.06	315.16	0.06	315.16	0.06	315.11	0.00	315.10	0.00	315.12	0.02	315.10	0.00	315.10	0.00	315.10	0.00
	Mar	315.09	315.16	0.07	315.15	0.06	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.09	0.00	315.09	0.00	315.10	0.01	315.09	0.00	315.09	0.00	315.09	0.00
	Apr	315.09	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.09	0.00	315.08	0.00	315.09	0.00	315.08	0.00	315.08	0.00	315.08	0.00
	May	315.40	315.42	0.01	315.42	0.01	315.42	0.01	315.42	0.01	315.41	0.01	315.42	0.01	315.37	-0.03	315.37	-0.04	315.37	-0.03	315.36	-0.04	315.36	-0.04	315.36	0.00
	Jun	315.51	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.48	-0.03	315.48	-0.03	315.48	-0.03	315.47	-0.04	315.47	-0.04	315.47	0.00
	Jul	315.49	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.46	-0.03	315.46	-0.03	315.46	-0.03	315.45	-0.04	315.45	-0.04	315.45	0.00
	Aug	315.46	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.44	-0.02	315.44	-0.03	315.44	-0.02	315.43	-0.03	315.43	-0.03	315.43	0.00
	Sep	315.44	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.41	-0.02	315.41	-0.02	315.42	-0.02	315.41	-0.03	315.41	-0.03	315.41	0.00
	Oct	315.39	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.37	-0.02	315.37	-0.02	315.37	-0.02	315.36	-0.03	315.36	-0.03	315.36	0.00
	Nov	315.28	315.30	0.02	315.30	0.02	315.30	0.02	315.30	0.02	315.30	0.02	315.30	0.02	315.27	-0.01	315.27	-0.01	315.27	-0.01	315.27	-0.01	315.27	-0.01	315.27	0.00
	Dec	315.18	315.21	0.04	315.21	0.04	315.21	0.04	315.21	0.03	315.21	0.03	315.21	0.03	315.17	0.00	315.17	-0.01	315.17	0.00	315.17	-0.01	315.17	-0.01	315.17	0.00
	Annual	315.30	315.32	0.02	315.32	0.02	315.32	0.02	315.32	0.02	315.32	0.02	315.32	0.02	315.28	-0.01	315.28	-0.02	315.29	-0.01	315.28	-0.02	315.28	-0.02	315.28	0.00

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Lake Level for Gordon Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

Farley Lake

		Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	313.58	313.72	0.14	313.66	0.08	313.78	0.20	313.76	0.19	313.74	0.17	313.78	0.21	313.59	0.01	313.57	-0.01	313.66	0.08	313.59	0.02	313.57	-0.01	313.59	0.00
	Feb	313.54	313.75	0.21	313.73	0.19	313.77	0.23	313.80	0.25	313.78	0.23	313.82	0.28	313.55	0.01	313.54	-0.01	313.59	0.05	313.57	0.02	313.54	-0.01	313.57	0.00
	Mar	313.52	313.76	0.24	313.75	0.23	313.77	0.25	313.77	0.24	313.75	0.23	313.79	0.27	313.53	0.01	313.52	-0.01	313.55	0.03	313.55	0.03	313.51	-0.01	313.55	0.00
	Apr	313.51	313.77	0.26	313.77	0.25	313.78	0.26	313.74	0.23	313.73	0.22	313.76	0.25	313.52	0.00	313.51	-0.01	313.53	0.02	313.55	0.03	313.51	-0.01	313.55	0.00
	May	313.85	314.03	0.18	314.02	0.17	314.04	0.19	314.01	0.15	314.00	0.15	314.02	0.17	313.84	-0.02	313.83	-0.03	313.84	-0.01	313.88	0.03	313.83	-0.03	313.89	0.00
	Jun	313.91	314.01	0.10	314.00	0.10	314.01	0.11	313.96	0.06	313.95	0.04	313.98	0.08	313.89	-0.02	313.88	-0.02	313.89	-0.02	313.90	0.00	313.88	-0.03	313.90	0.00
	Jul	313.91	314.01	0.10	314.01	0.10	314.02	0.11	313.95	0.04	313.94	0.03	313.96	0.05	313.89	-0.02	313.89	-0.02	313.89	-0.02	313.90	-0.01	313.88	-0.02	313.90	0.00
	Aug	313.91	314.01	0.10	314.01	0.09	314.02	0.10	313.94	0.03	313.94	0.03	313.94	0.03	313.89	-0.02	313.89	-0.02	313.90	-0.02	313.91	-0.01	313.89	-0.02	313.91	0.00
	Sep	313.89	313.99	0.10	313.98	0.09	313.99	0.10	313.92	0.03	313.92	0.03	313.92	0.03	313.87	-0.02	313.87	-0.02	313.87	-0.02	313.89	0.00	313.87	-0.02	313.89	0.00
	Oct	313.85	313.93	0.07	313.89	0.04	313.96	0.11	313.88	0.02	313.88	0.02	313.88	0.02	313.84	-0.02	313.83	-0.02	313.84	-0.01	313.86	0.00	313.83	-0.02	313.86	0.00
	Nov	313.75	313.83	0.08	313.78	0.03	313.88	0.13	313.77	0.02	313.77	0.02	313.77	0.03	313.74	-0.01	313.73	-0.01	313.74	-0.01	313.75	0.01	313.73	-0.02	313.76	0.00
	Dec	313.64	313.74	0.11	313.68	0.04	313.80	0.17	313.68	0.05	313.68	0.04	313.68	0.05	313.63	-0.01	313.63	-0.01	313.63	0.00	313.65	0.01	313.63	-0.01	313.65	0.00
	Annual	313.74	313.88	0.14	313.86	0.12	313.90	0.16	313.85	0.11	313.84	0.10	313.86	0.12	313.73	-0.01	313.72	-0.02	313.74	0.01	313.75	0.01	313.72	-0.02	313.75	0.00
1:25 Dry	Jan	313.56	313.71	0.15	313.64	0.09	313.77	0.22	313.79	0.23	313.77	0.21	313.81	0.26	313.58	0.03	313.55	-0.01	313.71	0.15	313.57	0.02	313.55	-0.01	313.57	0.00
	Feb	313.53	313.74	0.22	313.72	0.19	313.77	0.24	313.78	0.25	313.76	0.24	313.80	0.28	313.54	0.02	313.52	-0.01	313.60	0.08	313.55	0.02	313.52	-0.01	313.55	0.00
	Mar	313.51	313.76	0.25	313.75	0.24	313.77	0.26	313.75	0.24	313.73	0.23	313.77	0.26	313.52	0.01	313.50	-0.01	313.55	0.05	313.53	0.03	313.50	-0.01	313.53	0.00
	Apr	313.50	313.77	0.27	313.76	0.26	313.77	0.27	313.72	0.23	313.71	0.22	313.74	0.24	313.51	0.01	313.49	-0.01	313.53	0.03	313.53	0.03	313.49	-0.01	313.53	0.00
	May	313.77	313.97	0.20	313.96	0.19	313.98	0.21	313.93	0.16	313.92	0.15	313.94	0.17	313.76	-0.01	313.75	-0.02	313.77	0.00	313.80	0.03	313.74	-0.02	313.80	0.00
	Jun	313.78	313.92	0.14	313.92	0.14	313.93	0.14	313.85	0.07	313.84	0.05	313.87	0.09	313.77	-0.01	313.76	-0.02	313.77	-0.01	313.78	0.00	313.76	-0.02	313.78	0.00
	Jul	313.79	313.92	0.14	313.92	0.13	313.93	0.14	313.83	0.05	313.83	0.04	313.84	0.06	313.77	-0.02	313.77	-0.02	313.77	-0.01	313.78	-0.01	313.76	-0.02	313.78	0.00
	Aug	313.80	313.93	0.13	313.92	0.13	313.93	0.14	313.83	0.04	313.83	0.03	313.84	0.04	313.78	-0.02	313.78	-0.02	313.78	-0.01	313.79	-0.01	313.78	-0.02	313.79	0.00
	Sep	313.79	313.89	0.11	313.87	0.09	313.92	0.13	313.82	0.03	313.82	0.03	313.82	0.03	313.77	-0.01	313.77	-0.02	313.77	-0.01	313.78	-0.01	313.77	-0.02	313.78	0.00
	Oct	313.77	313.86	0.09	313.81	0.04	313.90	0.13	313.80	0.03	313.80	0.03	313.80	0.03	313.76	-0.01	313.76	-0.02	313.76	-0.01	313.77	0.00	313.75	-0.02	313.77	0.00
	Nov	313.70	313.79	0.09	313.73	0.03	313.85	0.15	313.73	0.03	313.73	0.03	313.73	0.03	313.69	-0.01	313.68	-0.01	313.69	-0.01	313.70	0.01	313.68	-0.01	313.70	0.00
	Dec	313.61	313.74	0.13	313.69	0.08	313.79	0.18	313.70	0.09	313.69	0.08	313.70	0.10	313.60	0.00	313.60	-0.01	313.61	0.00	313.62	0.01	313.60	-0.01	313.62	0.00
	Annual	313.67	313.83	0.16	313.81	0.13	313.86	0.19	313.79	0.12	313.78	0.11	313.81	0.13	313.67	0.00	313.66	-0.01	313.69	0.02	313.68	0.01	313.66	-0.01	313.68	0.00
1:25 Wet	Jan	315.13	315.16	0.03	315.15	0.02	315.18	0.05	315.18	0.05	315.18	0.05	315.18	0.05	315.13	0.00	315.13	0.00	315.16	0.03	315.12	0.00	315.12	0.00	315.13	0.00
	Feb	315.10	315.16	0.05	315.15	0.05	315.17	0.06	315.16	0.06	315.16	0.06	315.16	0.06	315.11	0.00	315.10	0.00	315.12	0.02	315.10	0.00	315.10	0.00	315.10	0.00
	Mar	315.09	315.16	0.07	315.15	0.06	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.09	0.00	315.09	0.00	315.10	0.01	315.09	0.00	315.09	0.00	315.09	0.00
	Apr	315.09	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.16	0.07	315.09	0.00	315.08	0.00	315.09	0.00	315.08	0.00	315.08	0.00	315.08	0.00
	May	315.40	315.42	0.01	315.42	0.01	315.42	0.01	315.42	0.01	315.41	0.01	315.42	0.01	315.37	-0.03	315.37	-0.04	315.37	-0.03	315.36	-0.04	315.36	-0.04	315.36	0.00
	Jun	315.51	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.50	-0.01	315.48	-0.03	315.48	-0.03	315.48	-0.03	315.47	-0.04	315.47	-0.04	315.47	0.00
	Jul	315.49	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.48	-0.01	315.46	-0.03	315.46	-0.03	315.46	-0.03	315.45	-0.04	315.45	-0.04	315.45	0.00
	Aug	315.46	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.45	-0.01	315.44	-0.02	315.44	-0.03	315.44	-0.02	315.43	-0.03	315.43	-0.03	315.43	0.00
	Sep	315.44	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.43	-0.01	315.41	-0.02	315.41	-0.02	315.42	-0.02	315.41	-0.03	315.41	-0.03	315.41	0.00
	Oct	315.39	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.39	0.00	315.37	-0.02	315.37	-0.02	315.37	-0.02	315.36	-0.03	315.36	-0.03	315.36	0.00
	Nov	315.28	315.30	0.02	315.30	0.02	315.30	0.02	315.30	0.02	315.30	0.02	315.30	0.02	315.27	-0.01	315.27	-0.01	315.27	-0.01	315.27	-0.01	315.27	-0.01	315.27	0.00
	Dec	315.18	315.21	0.04	315.21	0.04	315.21	0.04	315.21	0.03	315.21	0.03	315.21	0.03	315.17	0.00	315.17	-0.01	315.17	0.00	315.17	-0.01	315.17	-0.01	315.17	0.00
	Annual	315.30	315.32	0.02	315.32	0.02	315.32	0.02	315.32	0.02	315.32	0.02	315.32	0.02	315.28	-0.01	315.28	-0.02	315.29	-0.01	315.28	-0.02	315.28	-0.02	315.28	0.00

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Lake Level for Farley Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

Swede Lake

		Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	297.14	297.17	0.03	297.15	0.01	297.20	0.06	297.17	0.03	297.17	0.02	297.17	0.03	297.14	0.00	297.14	0.00	297.16	0.02	297.14	0.00	297.14	0.00	297.14	0.00
	Feb	297.12	297.17	0.05	297.15	0.03	297.19	0.07	297.18	0.06	297.17	0.06	297.19	0.07	297.12	0.00	297.12	0.00	297.14	0.02	297.12	0.00	297.12	0.00	297.12	0.00
	Mar	297.10	297.17	0.07	297.16	0.06	297.18	0.08	297.18	0.08	297.17	0.07	297.19	0.09	297.11	0.00	297.10	0.00	297.12	0.01	297.11	0.01	297.10	0.00	297.11	0.00
	Apr	297.10	297.18	0.08	297.18	0.07	297.19	0.08	297.18	0.08	297.17	0.07	297.19	0.09	297.10	0.00	297.10	0.00	297.11	0.01	297.11	0.01	297.10	0.00	297.11	0.00
	May	297.24	297.33	0.09	297.32	0.08	297.33	0.09	297.32	0.08	297.31	0.07	297.33	0.09	297.24	0.00	297.23	-0.01	297.24	0.00	297.25	0.01	297.23	-0.01	297.25	0.00
	Jun	297.37	297.43	0.06	297.43	0.05	297.43	0.06	297.41	0.04	297.41	0.04	297.42	0.05	297.36	-0.01	297.36	-0.01	297.36	-0.01	297.37	0.00	297.36	-0.01	297.37	0.00
	Jul	297.38	297.43	0.04	297.42	0.04	297.43	0.05	297.40	0.02	297.40	0.02	297.41	0.03	297.38	-0.01	297.37	-0.01	297.38	-0.01	297.38	0.00	297.37	-0.01	297.38	0.00
	Aug	297.38	297.42	0.04	297.42	0.04	297.42	0.04	297.39	0.01	297.39	0.01	297.40	0.02	297.37	-0.01	297.37	-0.01	297.37	-0.01	297.38	0.00	297.37	-0.01	297.38	0.00
	Sep	297.34	297.38	0.04	297.38	0.04	297.39	0.04	297.35	0.01	297.35	0.01	297.35	0.01	297.34	-0.01	297.34	-0.01	297.34	-0.01	297.34	0.00	297.34	-0.01	297.34	0.00
	Oct	297.31	297.35	0.03	297.34	0.03	297.35	0.04	297.32	0.01	297.32	0.01	297.32	0.01	297.31	-0.01	297.31	-0.01	297.31	-0.01	297.31	0.00	297.30	-0.01	297.31	0.00
	Nov	297.25	297.28	0.03	297.26	0.01	297.29	0.04	297.26	0.01	297.26	0.01	297.26	0.01	297.24	-0.01	297.24	-0.01	297.25	0.00	297.25	0.00	297.24	-0.01	297.25	0.00
	Dec	297.18	297.21	0.03	297.19	0.01	297.23	0.05	297.19	0.01	297.19	0.01	297.19	0.01	297.18	0.00	297.18	0.00	297.18	0.00	297.18	0.00	297.18	0.00	297.18	0.00
	Annual	297.24	297.29	0.05	297.28	0.04	297.30	0.06	297.28	0.04	297.28	0.03	297.29	0.04	297.24	0.00	297.24	-0.01	297.25	0.00	297.25	0.00	297.24	-0.01	297.25	0.00
1:25 Dry	Jan	297.12	297.16	0.04	297.13	0.01	297.19	0.07	297.17	0.04	297.16	0.04	297.17	0.05	297.13	0.01	297.12	0.00	297.16	0.04	297.13	0.00	297.12	0.00	297.13	0.00
	Feb	297.10	297.16	0.05	297.14	0.03	297.18	0.07	297.18	0.07	297.17	0.06	297.19	0.08	297.11	0.01	297.10	0.00	297.14	0.03	297.11	0.00	297.10	0.00	297.11	0.00
	Mar	297.09	297.16	0.07	297.15	0.06	297.17	0.08	297.17	0.08	297.16	0.07	297.18	0.09	297.10	0.00	297.09	0.00	297.12	0.02	297.10	0.01	297.09	0.00	297.10	0.00
	Apr	297.09	297.17	0.08	297.17	0.07	297.18	0.09	297.17	0.08	297.16	0.07	297.18	0.09	297.09	0.00	297.09	0.00	297.11	0.02	297.10	0.01	297.09	0.00	297.10	0.00
	May	297.20	297.29	0.09	297.29	0.09	297.30	0.10	297.28	0.08	297.27	0.07	297.29	0.08	297.20	0.00	297.20	0.00	297.21	0.01	297.21	0.01	297.20	0.00	297.21	0.00
	Jun	297.28	297.34	0.07	297.34	0.06	297.35	0.07	297.32	0.05	297.32	0.04	297.33	0.05	297.27	0.00	297.27	-0.01	297.28	0.00	297.28	0.00	297.27	-0.01	297.28	0.00
	Jul	297.26	297.32	0.06	297.32	0.05	297.32	0.06	297.29	0.02	297.28	0.02	297.29	0.03	297.26	0.00	297.26	-0.01	297.26	0.00	297.26	0.00	297.25	-0.01	297.26	0.00
	Aug	297.24	297.30	0.06	297.30	0.05	297.30	0.06	297.26	0.02	297.26	0.02	297.26	0.02	297.24	-0.01	297.24	-0.01	297.24	0.00	297.24	0.00	297.24	-0.01	297.24	0.00
	Sep	297.24	297.29	0.05	297.29	0.05	297.30	0.05	297.26	0.01	297.25	0.01	297.26	0.01	297.24	-0.01	297.23	-0.01	297.24	0.00	297.24	0.00	297.23	-0.01	297.24	0.00
	Oct	297.24	297.28	0.04	297.27	0.03	297.30	0.05	297.26	0.01	297.26	0.01	297.26	0.01	297.24	-0.01	297.24	-0.01	297.24	0.00	297.24	0.00	297.24	-0.01	297.24	0.00
	Nov	297.21	297.24	0.03	297.22	0.02	297.26	0.05	297.22	0.01	297.22	0.01	297.22	0.01	297.20	0.00	297.20	0.00	297.20	0.00	297.21	0.00	297.20	-0.01	297.21	0.00
	Dec	297.16	297.19	0.04	297.17	0.01	297.21	0.06	297.17	0.01	297.17	0.01	297.17	0.01	297.15	0.00	297.15	0.00	297.15	0.00	297.16	0.00	297.15	0.00	297.16	0.00
	Annual	297.19	297.24	0.06	297.23	0.04	297.25	0.07	297.23	0.04	297.22	0.04	297.23	0.05	297.19	0.00	297.18	0.00	297.19	0.01	297.19	0.00	297.18	-0.01	297.19	0.00
1:25 Wet	Jan	297.16	297.19	0.03	297.16	0.01	297.21	0.05	297.17	0.01	297.17	0.01	297.17	0.01	297.16	0.00	297.15	0.00	297.17	0.01	297.16	0.00	297.15	0.00	297.16	0.00
	Feb	297.13	297.18	0.05	297.16	0.03	297.20	0.07	297.18	0.05	297.17	0.04	297.18	0.05	297.13	0.00	297.13	0.00	297.14	0.01	297.14	0.00	297.13	0.00	297.14	0.00
	Mar	297.12	297.18	0.06	297.17	0.05	297.19	0.07	297.19	0.07	297.18	0.06	297.20	0.08	297.12	0.00	297.12	0.00	297.12	0.00	297.12	0.01	297.12	0.00	297.13	0.00
	Apr	297.12	297.19	0.07	297.19	0.07	297.20	0.08	297.19	0.08	297.19	0.07	297.20	0.09	297.12	0.00	297.11	0.00	297.12	0.00	297.12	0.01	297.11	0.00	297.12	0.00
	May	297.26	297.35	0.09	297.34	0.08	297.35	0.09	297.34	0.08	297.34	0.08	297.35	0.09	297.26	0.00	297.25	-0.01	297.26	0.00	297.27	0.01	297.25	-0.01	297.27	0.00
	Jun	297.51	297.56	0.05	297.56	0.04	297.56	0.05	297.55	0.04	297.55	0.04	297.55	0.04	297.50	-0.01	297.50	-0.01	297.50	-0.01	297.51	0.00	297.50	-0.01	297.51	0.00
	Jul	297.53	297.56	0.03	297.56	0.03	297.56	0.03	297.55	0.02	297.54	0.01	297.55	0.02	297.52	-0.01	297.52	-0.01	297.52	-0.01	297.53	0.00	297.52	-0.01	297.53	0.00
	Aug	297.53	297.56	0.03	297.56	0.03	297.57	0.03	297.54	0.01	297.54	0.01	297.55	0.01	297.52	-0.01	297.52	-0.01	297.53	-0.01	297.53	0.00	297.52	-0.01	297.53	0.00
	Sep	297.48	297.51	0.03	297.51	0.03	297.51	0.03	297.49	0.01	297.49	0.01	297.49	0.01	297.47	-0.01	297.47	-0.01	297.47	-0.01	297.48	0.00	297.47	-0.01	297.48	0.00
	Oct	297.39	297.42	0.03	297.42	0.03	297.42	0.03	297.40	0.01	297.40	0.01	297.40	0.01	297.38	-0.01	297.38	-0.01	297.38	-0.01	297.39	0.00	297.38	-0.01	297.39	0.00
	Nov	297.29	297.32	0.03	297.31	0.02	297.33	0.04	297.30	0.01	297.30	0.01	297.30	0.01	297.28	-0.01	297.28	-0.01	297.28	-0.01	297.29	0.00	297.28	-0.01	297.29	0.00
	Dec	297.21	297.23	0.03	297.22	0.01	297.25	0.05	297.21	0.01	297.21	0.01	297.21	0.01	297.20	0.00	297.20	0.00	297.20	0.00	297.21	0.00	297.20	-0.01	297.21	0.00
	Annual	297.31	297.35	0.04	297.35	0.04	297.36	0.05	297.34	0.03	297.34	0.03	297.35	0.04	297.31	-0.01	297.30	-0.01	297.31	0.00	297.31	0.00	297.30	-0.01	297.31	0.00

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Lake Level for Swede Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

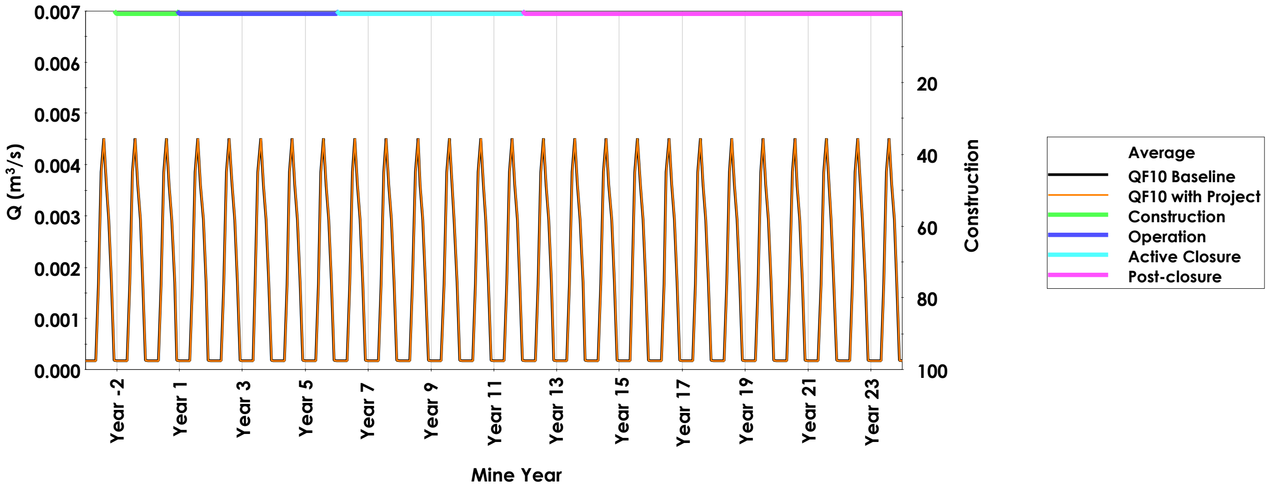
Ellystan Lake

		Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 6)						Active Closure (Year 6 - Year 11)						Post Closure (from Year 12)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	282.86	282.88	0.02	282.86	0.00	282.89	0.03	282.87	0.01	282.87	0.01	282.87	0.01	282.86	0.00	282.86	0.00	282.87	0.01	282.86	0.00	282.86	0.00	282.87	0.00
	Feb	282.84	282.87	0.02	282.85	0.01	282.88	0.04	282.87	0.03	282.87	0.02	282.87	0.03	282.84	0.00	282.84	0.00	282.85	0.01	282.85	0.00	282.84	0.00	282.85	0.00
	Mar	282.83	282.86	0.04	282.85	0.03	282.88	0.05	282.87	0.04	282.87	0.04	282.88	0.05	282.83	0.00	282.83	0.00	282.84	0.01	282.83	0.00	282.83	0.00	282.83	0.00
	Apr	282.82	282.87	0.05	282.86	0.04	282.88	0.05	282.87	0.05	282.87	0.05	282.88	0.06	282.82	0.00	282.82	0.00	282.83	0.01	282.83	0.00	282.82	0.00	282.83	0.00
	May	282.99	283.02	0.03	283.02	0.03	283.02	0.03	283.02	0.03	283.02	0.03	283.02	0.03	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00
	Jun	283.03	283.05	0.02	283.05	0.02	283.05	0.02	283.04	0.01	283.04	0.01	283.05	0.01	283.03	0.00	283.03	0.00	283.03	0.00	283.03	0.00	283.03	0.00	283.03	0.00
	Jul	283.01	283.02	0.02	283.02	0.01	283.02	0.02	283.01	0.01	283.01	0.01	283.02	0.01	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00
	Aug	283.00	283.02	0.01	283.02	0.01	283.02	0.01	283.01	0.00	283.01	0.00	283.01	0.01	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00
	Sep	282.99	283.01	0.01	283.01	0.01	283.01	0.01	283.00	0.00	283.00	0.00	283.00	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00	282.99	0.00
	Oct	282.97	282.99	0.01	282.98	0.01	282.99	0.02	282.98	0.00	282.98	0.00	282.98	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00
	Nov	282.94	282.95	0.01	282.94	0.01	282.95	0.02	282.94	0.00	282.94	0.00	282.94	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.94	0.00	282.93	0.00	282.94	0.00
	Dec	282.89	282.91	0.01	282.90	0.01	282.92	0.02	282.90	0.00	282.90	0.00	282.90	0.00	282.89	0.00	282.89	0.00	282.89	0.00	282.89	0.00	282.89	0.00	282.90	0.00
	Annual	282.93	282.95	0.02	282.95	0.02	282.96	0.03	282.95	0.02	282.95	0.02	282.95	0.02	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00
1:25 Dry	Jan	282.85	282.87	0.02	282.85	0.00	282.88	0.04	282.86	0.02	282.86	0.01	282.86	0.02	282.85	0.00	282.85	0.00	282.86	0.02	282.85	0.00	282.84	0.00	282.85	0.00
	Feb	282.83	282.85	0.03	282.84	0.01	282.87	0.04	282.86	0.04	282.86	0.03	282.87	0.04	282.83	0.00	282.83	0.00	282.85	0.02	282.83	0.00	282.83	0.00	282.83	0.00
	Mar	282.81	282.85	0.04	282.84	0.03	282.87	0.05	282.86	0.05	282.86	0.04	282.87	0.06	282.82	0.00	282.81	0.00	282.83	0.02	282.82	0.00	282.81	0.00	282.82	0.00
	Apr	282.81	282.86	0.05	282.85	0.04	282.87	0.06	282.86	0.06	282.86	0.05	282.87	0.06	282.81	0.00	282.80	0.00	282.82	0.02	282.81	0.00	282.80	0.00	282.81	0.00
	May	282.95	282.99	0.04	282.98	0.04	282.99	0.04	282.98	0.04	282.98	0.03	282.99	0.04	282.95	0.00	282.95	0.00	282.96	0.01	282.95	0.00	282.95	0.00	282.95	0.00
	Jun	282.97	282.99	0.02	282.99	0.02	282.99	0.03	282.99	0.02	282.98	0.02	282.99	0.02	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.96	0.00	282.97	0.00
	Jul	282.94	282.97	0.02	282.97	0.02	282.97	0.03	282.96	0.01	282.95	0.01	282.96	0.02	282.94	0.00	282.94	0.00	282.94	0.00	282.94	0.00	282.94	0.00	282.94	0.00
	Aug	282.93	282.96	0.02	282.96	0.02	282.96	0.03	282.94	0.01	282.94	0.01	282.94	0.01	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00
	Sep	282.93	282.96	0.02	282.96	0.02	282.96	0.02	282.94	0.01	282.94	0.01	282.94	0.01	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00
	Oct	282.93	282.95	0.02	282.94	0.02	282.95	0.02	282.94	0.01	282.94	0.01	282.94	0.01	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00	282.93	0.00
	Nov	282.91	282.93	0.02	282.92	0.01	282.93	0.03	282.91	0.01	282.91	0.01	282.91	0.01	282.91	0.00	282.90	0.00	282.91	0.00	282.91	0.00	282.90	0.00	282.91	0.00
	Dec	282.87	282.89	0.02	282.88	0.01	282.90	0.03	282.88	0.01	282.88	0.01	282.88	0.01	282.87	0.00	282.87	0.00	282.87	0.00	282.87	0.00	282.87	0.00	282.88	0.00
	Annual	282.89	282.92	0.03	282.91	0.02	282.93	0.03	282.92	0.02	282.91	0.02	282.92	0.02	282.89	0.00	282.89	0.00	282.90	0.01	282.89	0.00	282.89	0.00	282.90	0.00
1:25 Wet	Jan	282.88	282.89	0.01	282.88	0.00	282.91	0.03	282.88	0.01	282.88	0.00	282.89	0.01	282.88	0.00	282.88	0.00	282.88	0.00	282.88	0.00	282.88	0.00	282.88	0.00
	Feb	282.86	282.88	0.02	282.87	0.01	282.89	0.03	282.87	0.02	282.87	0.01	282.88	0.02	282.86	0.00	282.86	0.00	282.86	0.00	282.86	0.00	282.86	0.00	282.86	0.00
	Mar	282.84	282.88	0.03	282.87	0.02	282.89	0.04	282.88	0.04	282.87	0.03	282.88	0.04	282.84	0.00	282.84	0.00	282.85	0.00	282.85	0.00	282.84	0.00	282.85	0.00
	Apr	282.84	282.88	0.04	282.88	0.04	282.89	0.05	282.88	0.05	282.88	0.04	282.89	0.05	282.84	0.00	282.84	0.00	282.84	0.00	282.84	0.00	282.84	0.00	282.84	0.00
	May	283.03	283.05	0.03	283.05	0.02	283.05	0.03	283.05	0.03	283.05	0.02	283.05	0.03	283.03	0.00	283.02	0.00	283.03	0.00	283.03	0.00	283.02	0.00	283.03	0.00
	Jun	283.10	283.11	0.01	283.11	0.01	283.11	0.01	283.11	0.01	283.11	0.01	283.11	0.01	283.10	0.00	283.10	0.00	283.10	0.00	283.10	0.00	283.10	0.00	283.10	0.00
	Jul	283.07	283.07	0.01	283.07	0.01	283.07	0.01	283.07	0.00	283.07	0.00	283.07	0.01	283.06	0.00	283.06	0.00	283.06	0.00	283.06	0.00	283.06	0.00	283.07	0.00
	Aug	283.06	283.07	0.01	283.07	0.01	283.07	0.01	283.07	0.00	283.07	0.00	283.07	0.00	283.06	0.00	283.06	0.00	283.06	0.00	283.06	0.00	283.06	0.00	283.06	0.00
	Sep	283.05	283.06	0.01	283.06	0.01	283.06	0.01	283.05	0.00	283.05	0.00	283.05	0.00	283.05	0.00	283.05	0.00	283.05	0.00	283.05	0.00	283.05	0.00	283.05	0.00
	Oct	283.01	283.02	0.01	283.02	0.01	283.02	0.01	283.01	0.00	283.01	0.00	283.01	0.00	283.01	0.00	283.01	0.00	283.01	0.00	283.01	0.00	283.01	0.00	283.01	0.00
	Nov	282.96	282.97	0.01	282.97	0.01	282.97	0.01	282.96	0.00	282.96	0.00	282.96	0.00	282.96	0.00	282.96	0.00	282.96	0.00	282.96	0.00	282.96	0.00	282.96	0.00
	Dec	282.91	282.92	0.01	282.92	0.01	282.93	0.02	282.91	0.00	282.91	0.00	282.92	0.00	282.91	0.00	282.91	0.00	282.91	0.00	282.91	0.00	282.91	0.00	282.91	0.00
	Annual	282.97	282.98	0.02	282.98	0.01	282.99	0.02	282.98	0.01	282.98	0.01	282.98	0.01	282.97	0.00	282.97	0.00	282.97	0.00	282.97	0.00	282.96	0.00	282.97	0.00

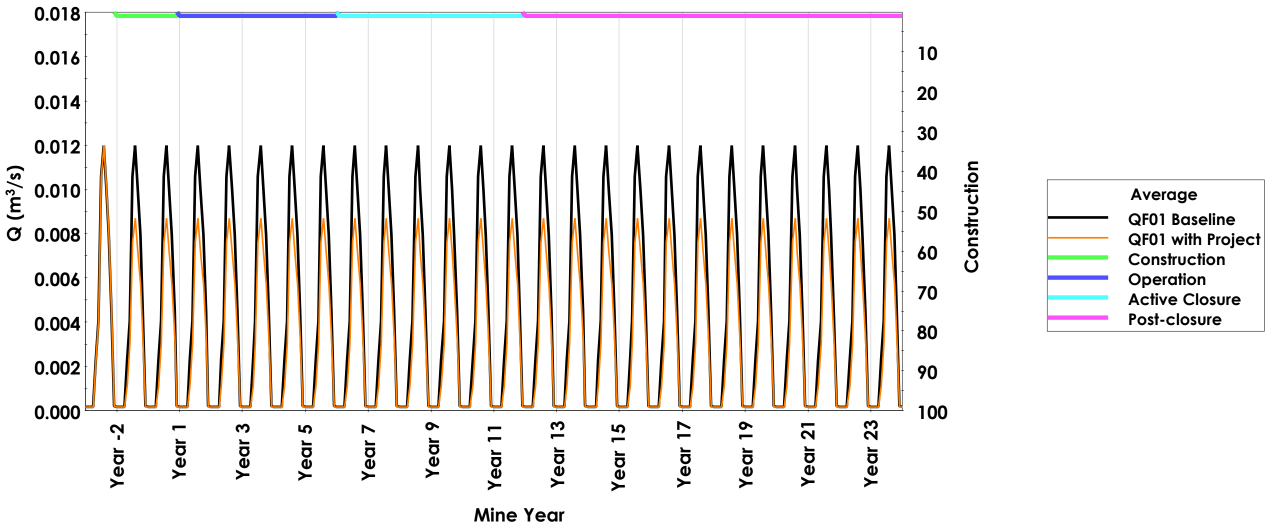
* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Lake Level for Ellystan Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

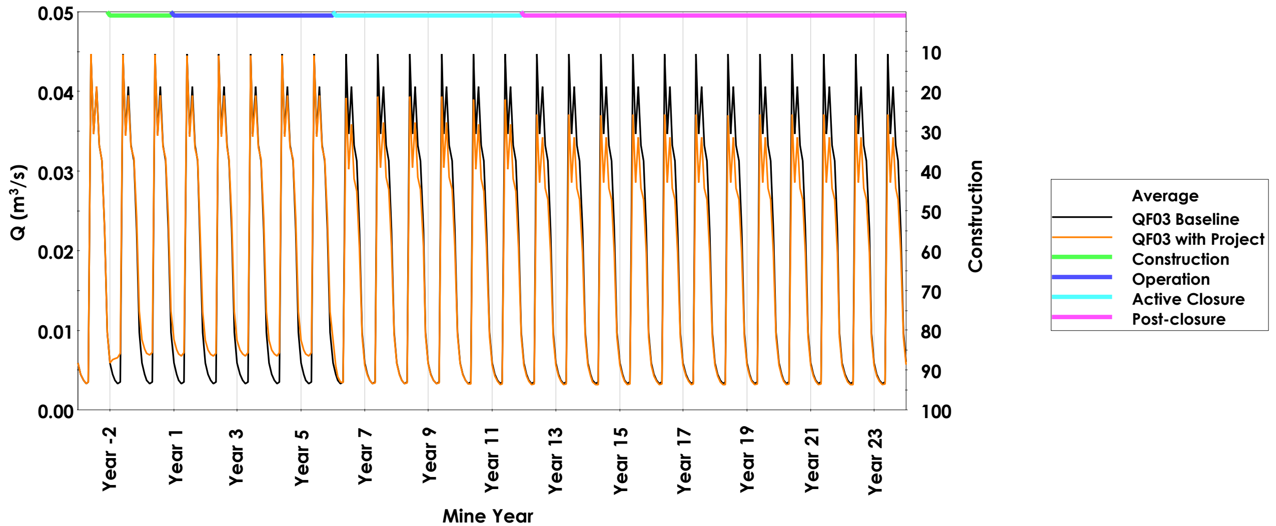
Appendix D GORDON SITE FLOW PLOTS



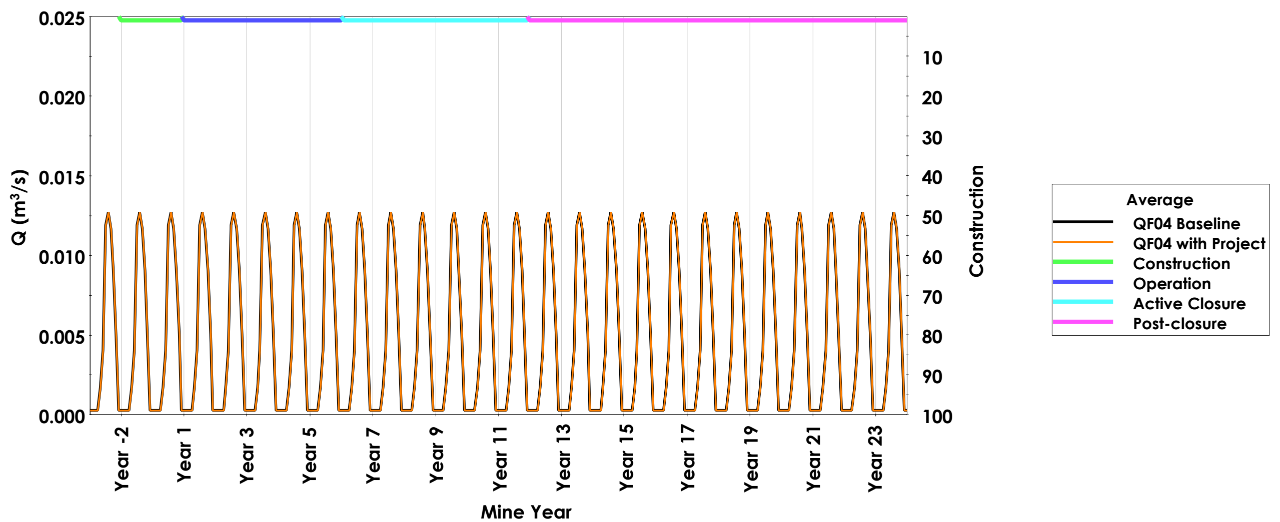
Predicted Streamflow for QF10 – Average Climate Scenario



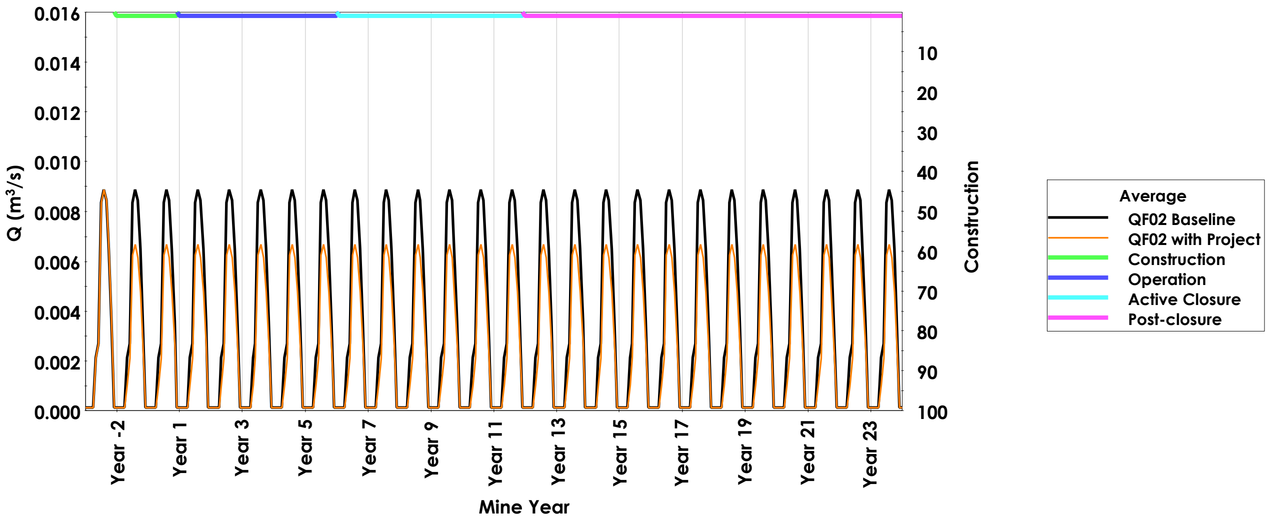
Predicted Streamflow for QF01 – Average Climate Scenario



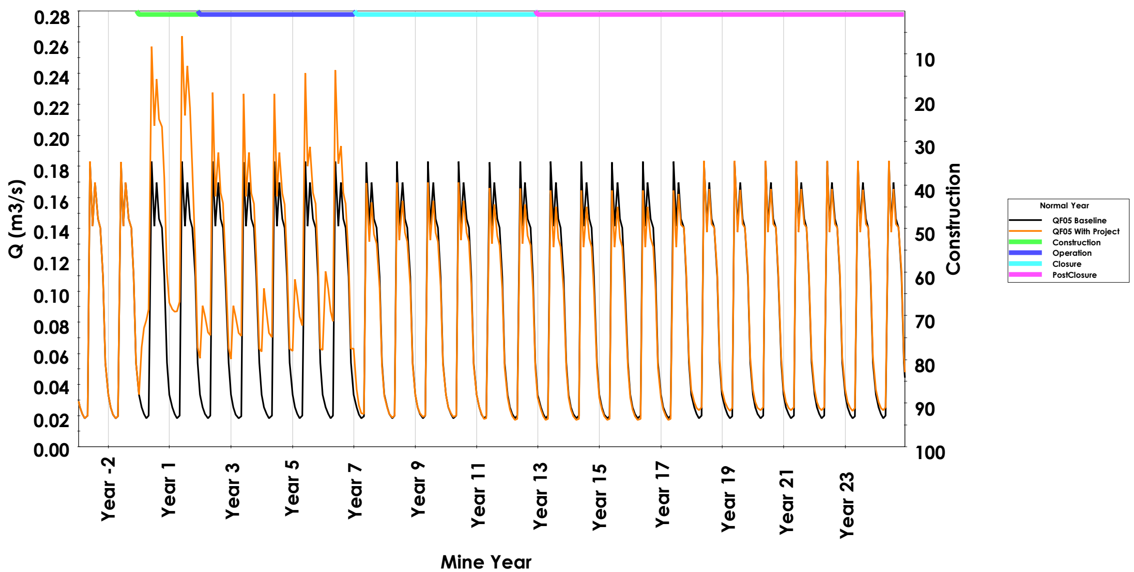
Predicted Streamflow for QF03 – Average Climate Scenario



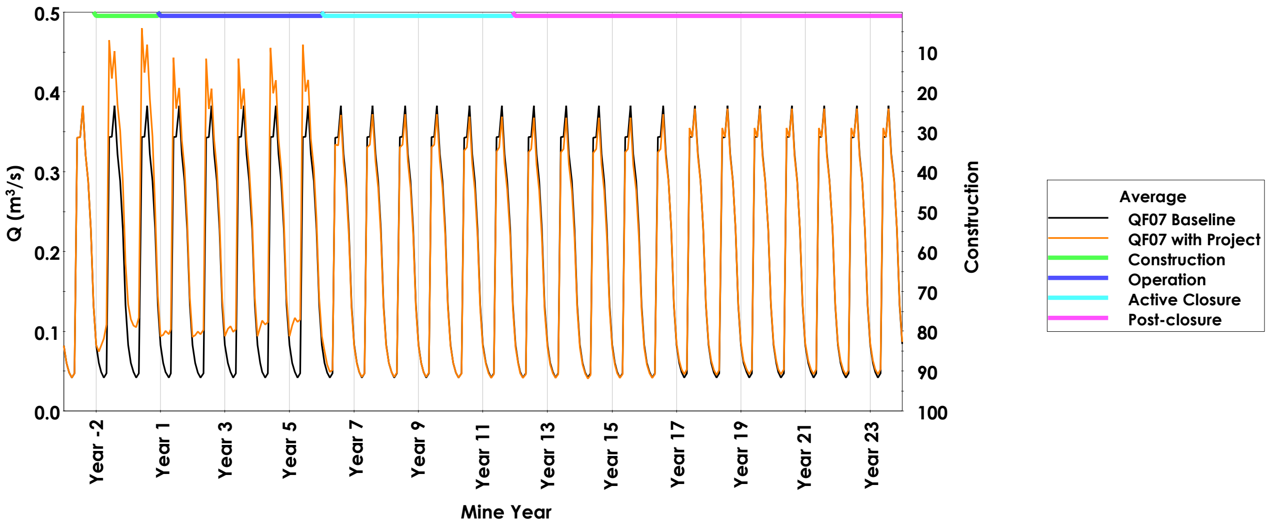
Predicted Streamflow for QF04 – Average Climate Scenario



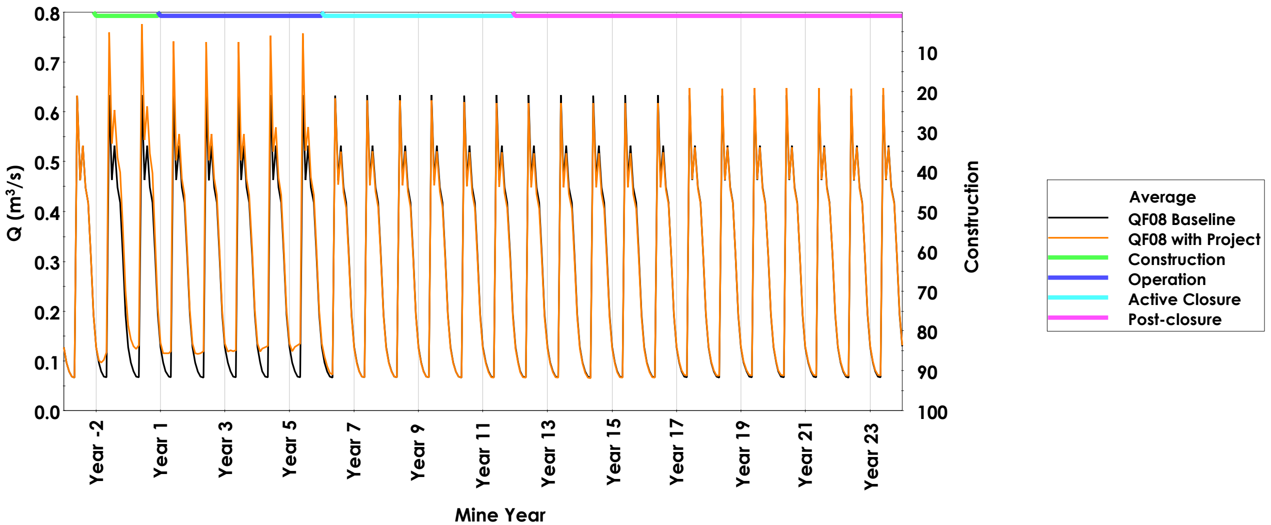
Predicted Streamflow for QF02 – Average Climate Scenario



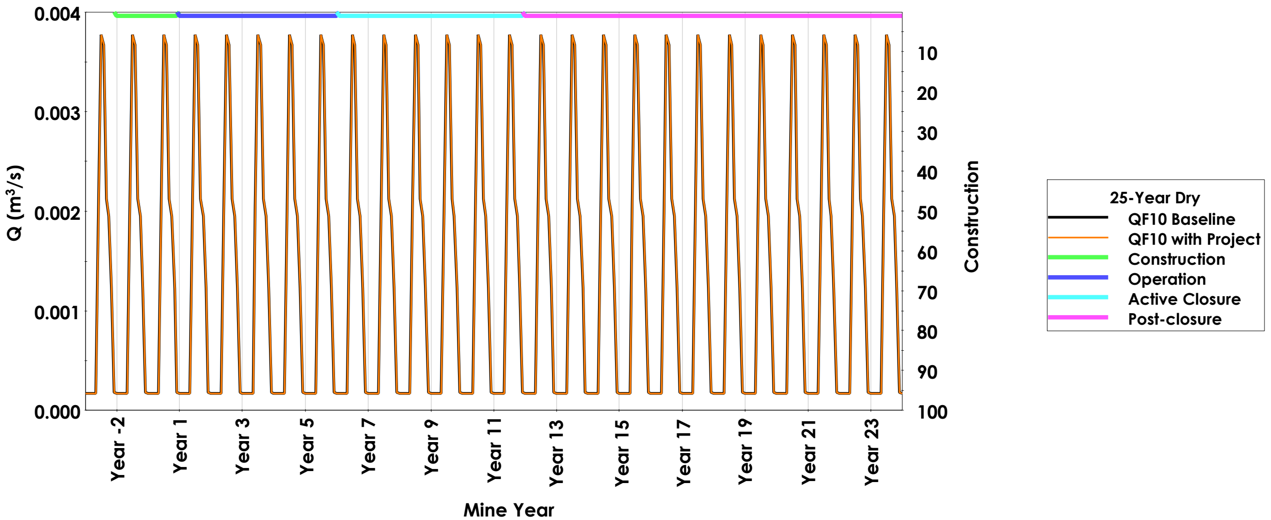
Predicted Streamflow for QF05 – Average Climate Scenario



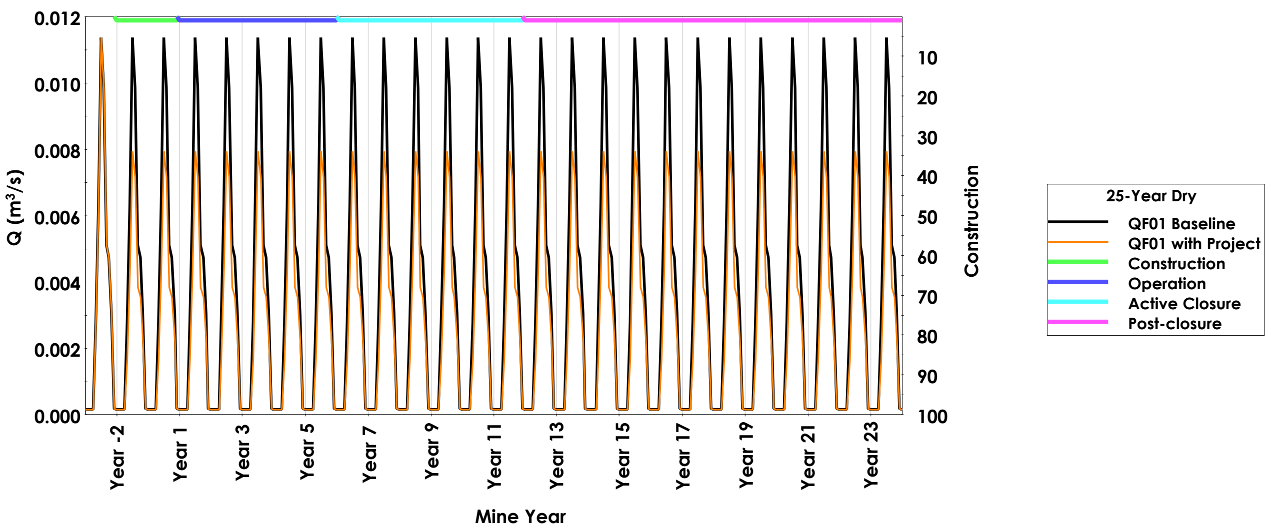
Predicted Streamflow for QF07 – Average Climate Scenario



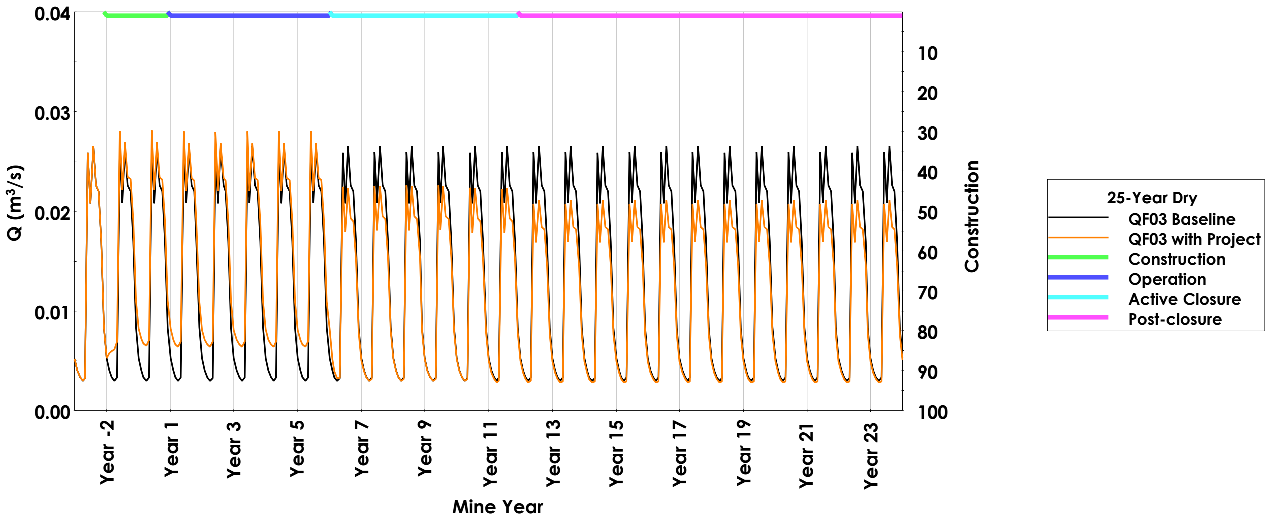
Predicted Streamflow for QF08 – Average Climate Scenario



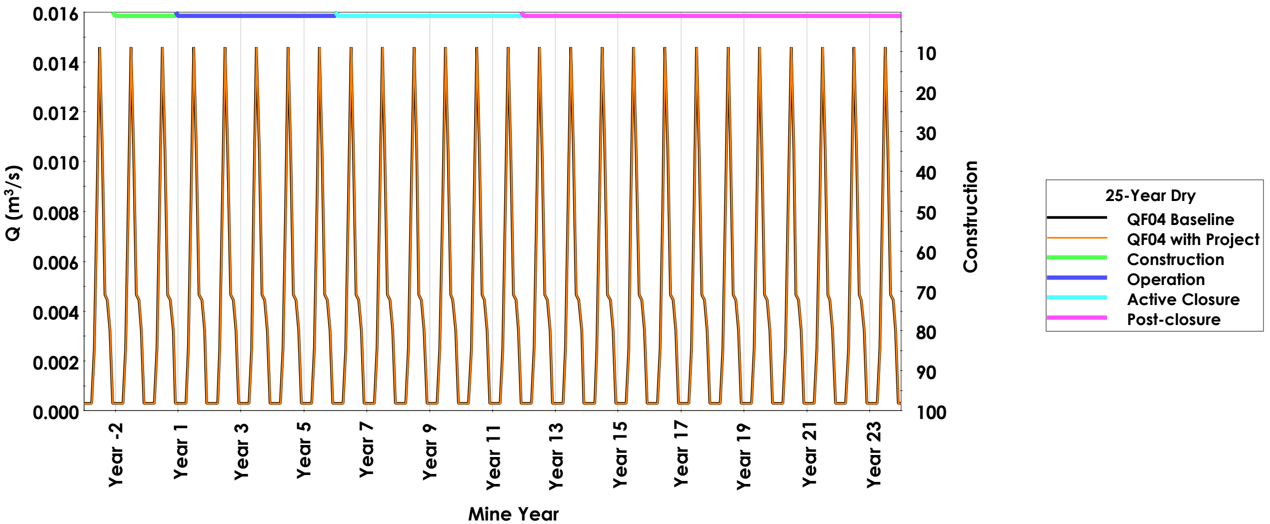
Predicted Streamflow for QF10 – 25-YR Dry Climate Scenario



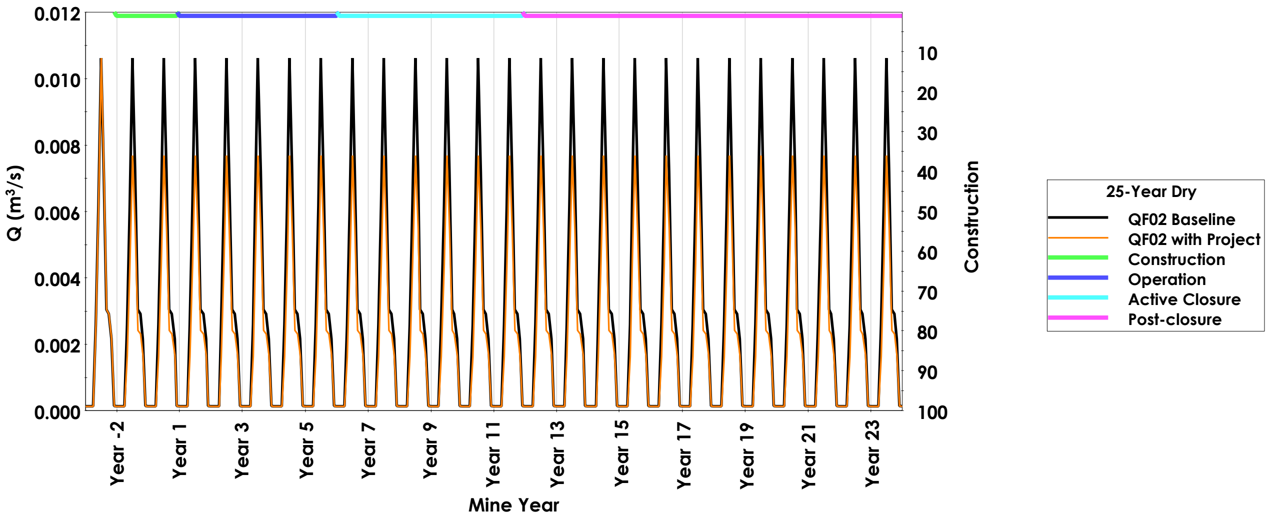
Predicted Streamflow for QF01 – 25-YR Dry Climate Scenario



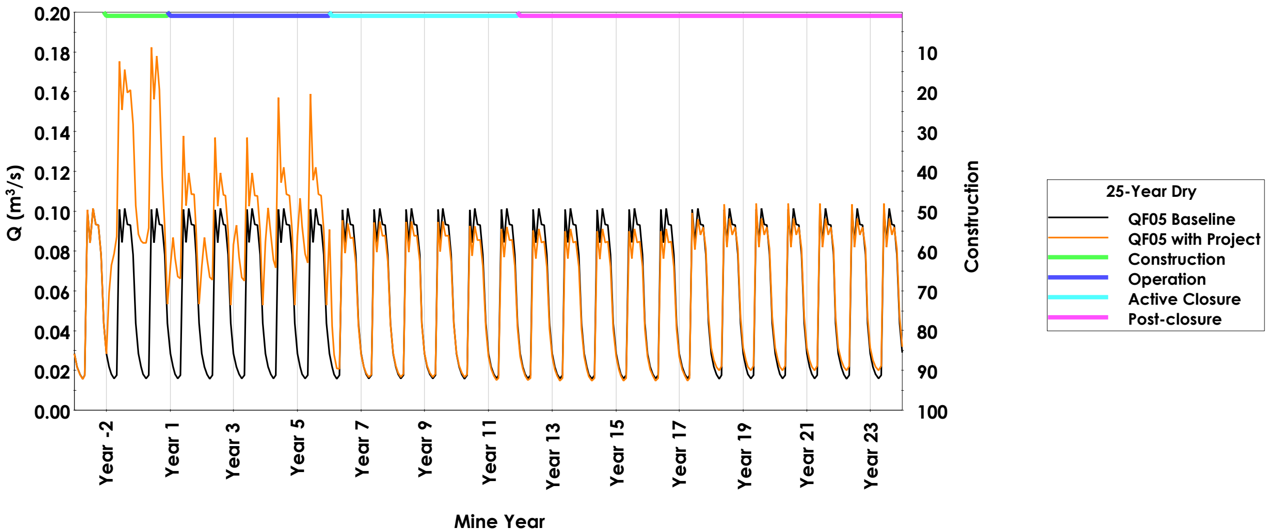
Predicted Streamflow for QF03 – 25-YR Dry Climate Scenario



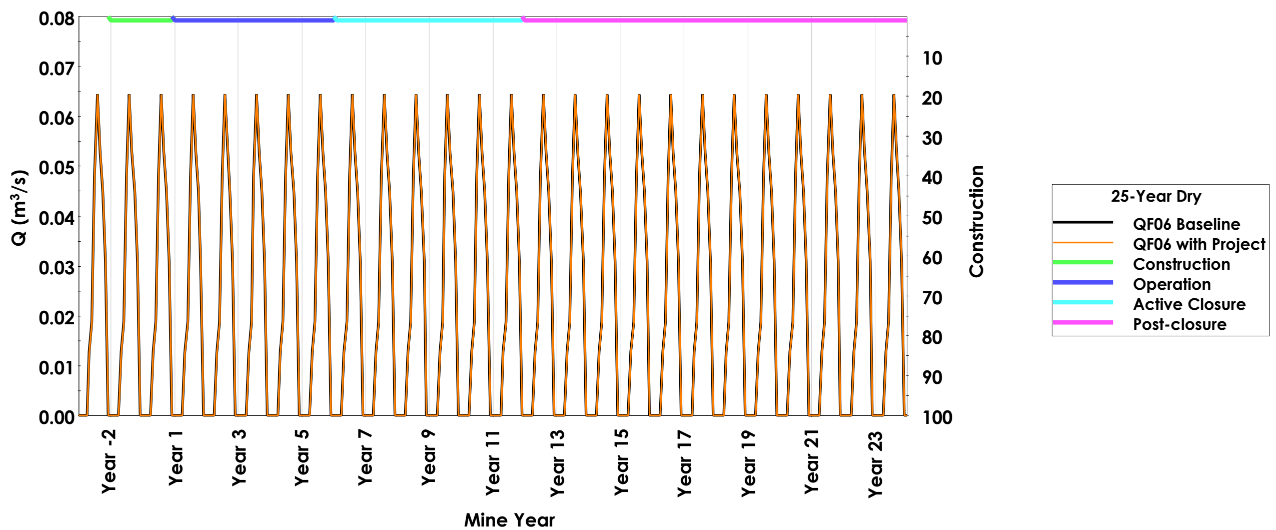
Predicted Streamflow for QF04 – 25-YR Dry Climate Scenario



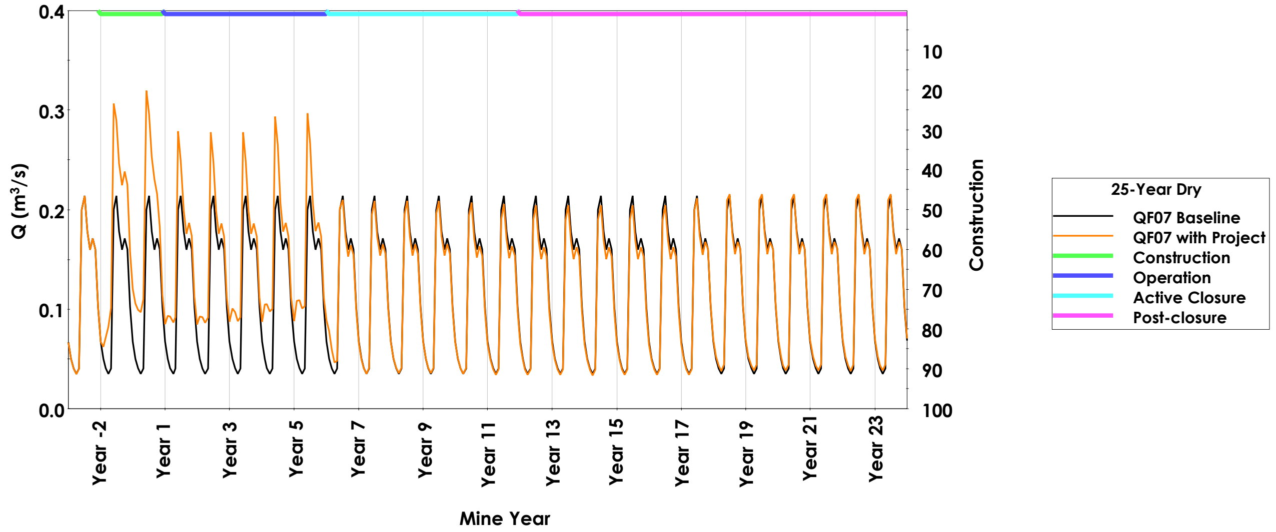
Predicted Streamflow for QF02 – 25-YR Dry Climate Scenario



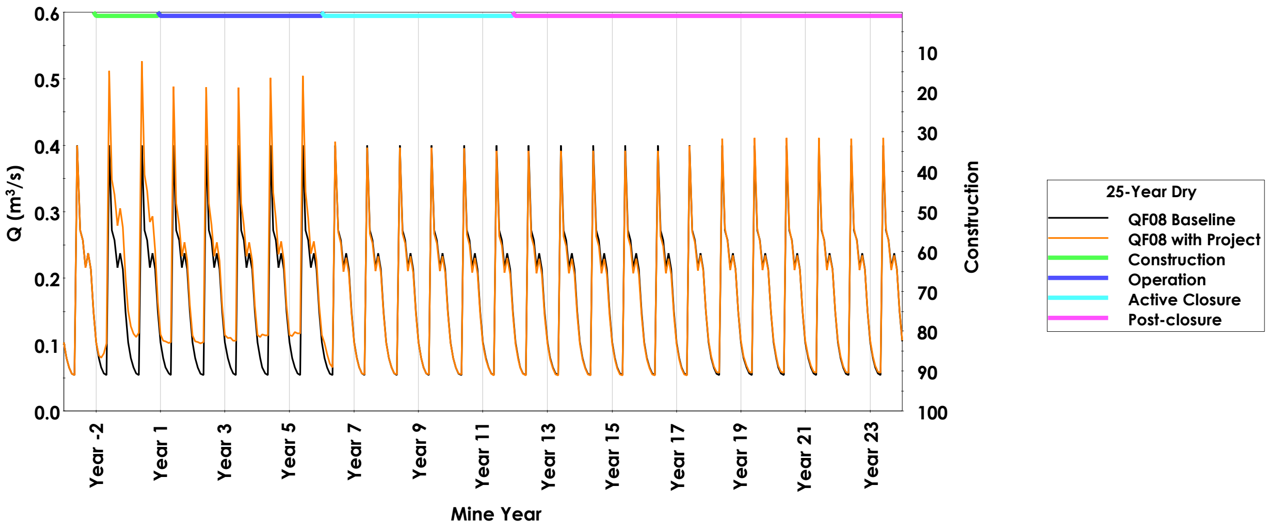
Predicted Streamflow for QF05 – 25-YR Dry Climate Scenario



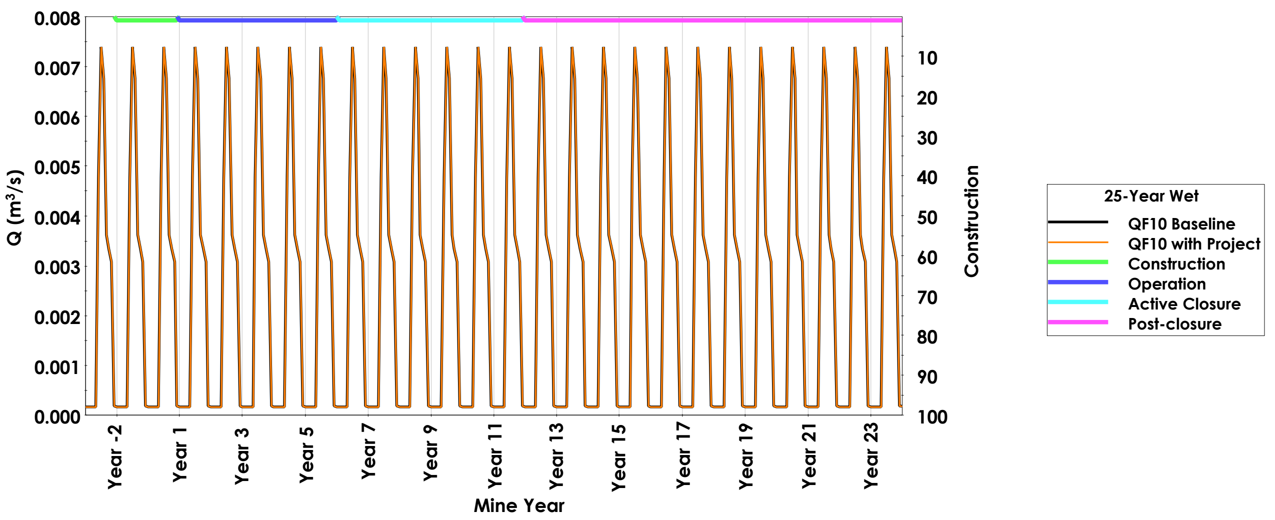
Predicted Streamflow for QF06 – 25-YR Dry Climate Scenario



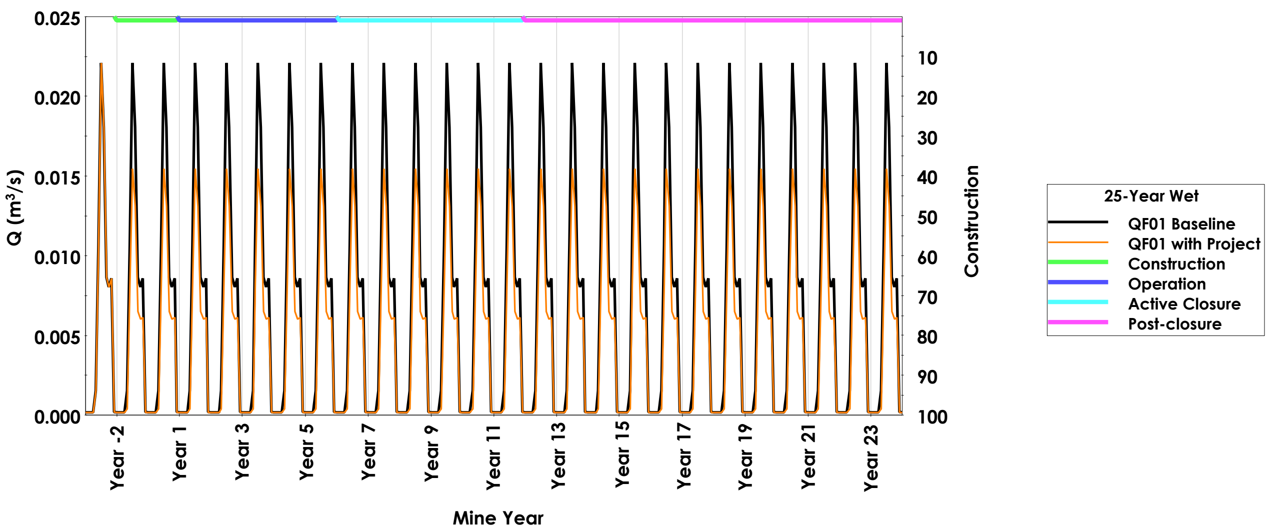
Predicted Streamflow for QF07 – 25-YR Dry Climate Scenario



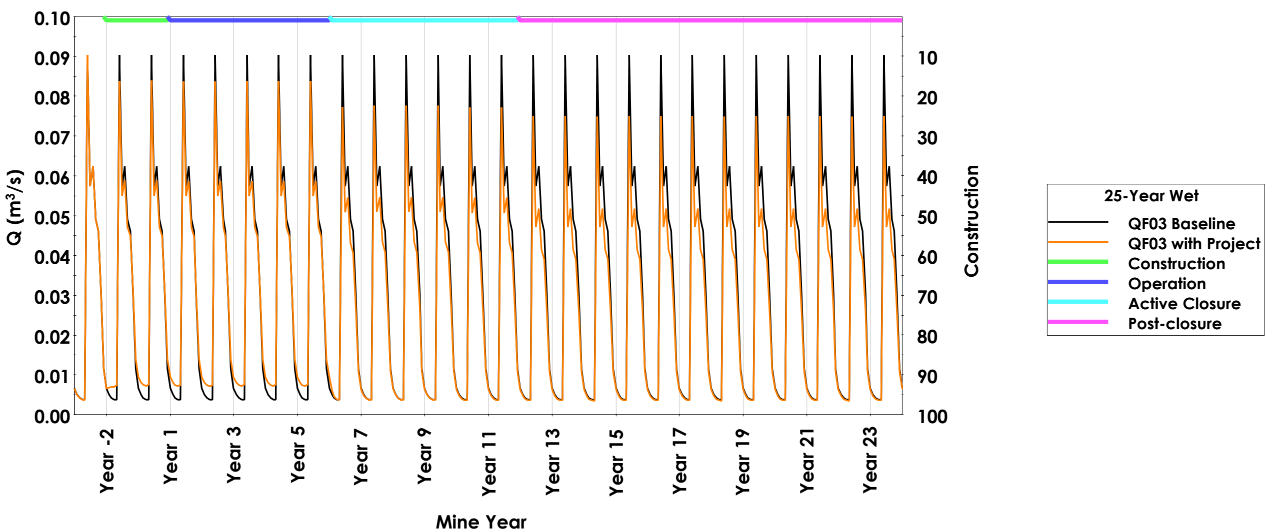
Predicted Streamflow for QF08 – 25-YR Dry Climate Scenario



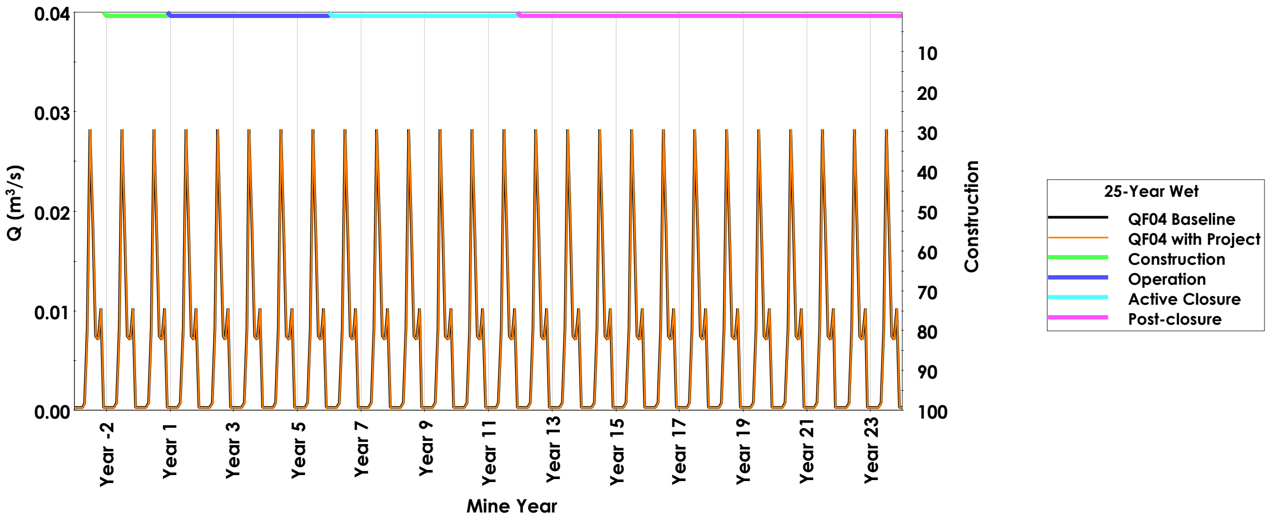
Predicted Streamflow for QF10 – 25-YR Wet Climate Scenario



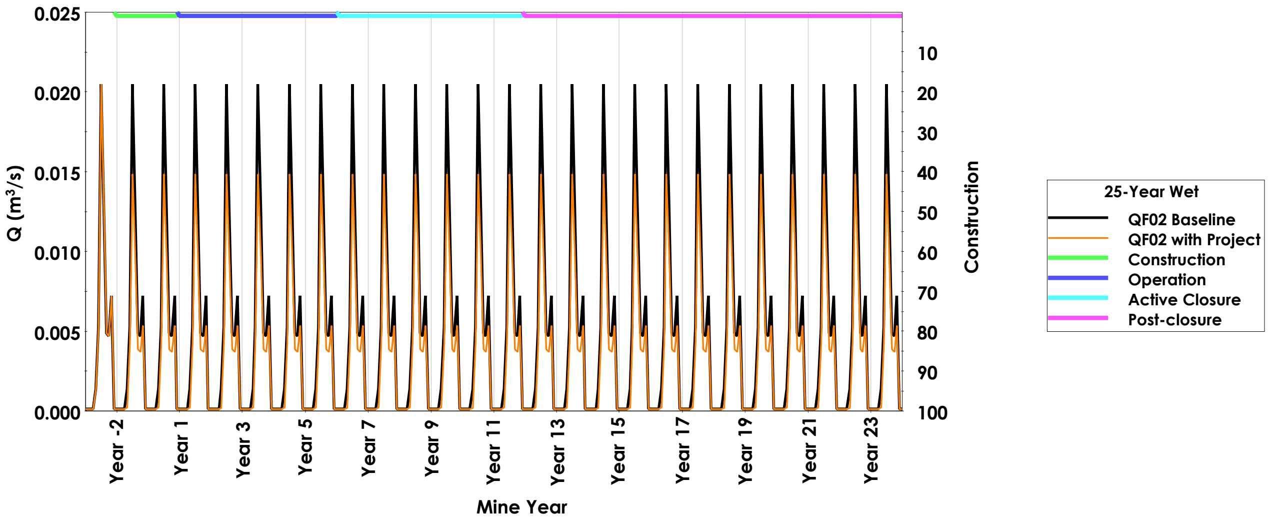
Predicted Streamflow for QF01 – 25-YR Wet Climate Scenario



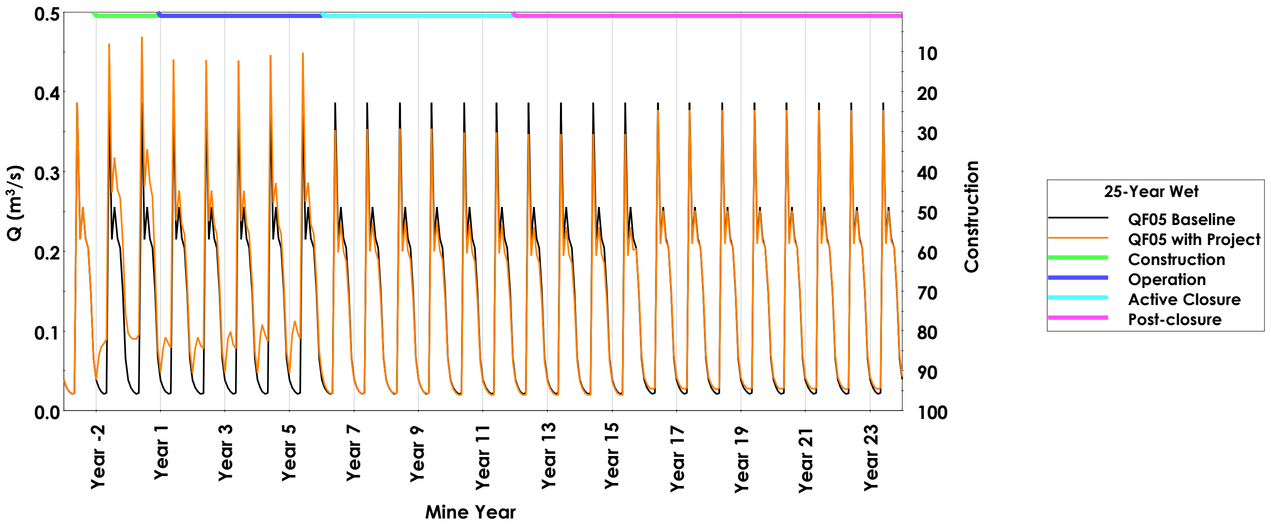
Predicted Streamflow for QF03 – 25-YR Wet Climate Scenario



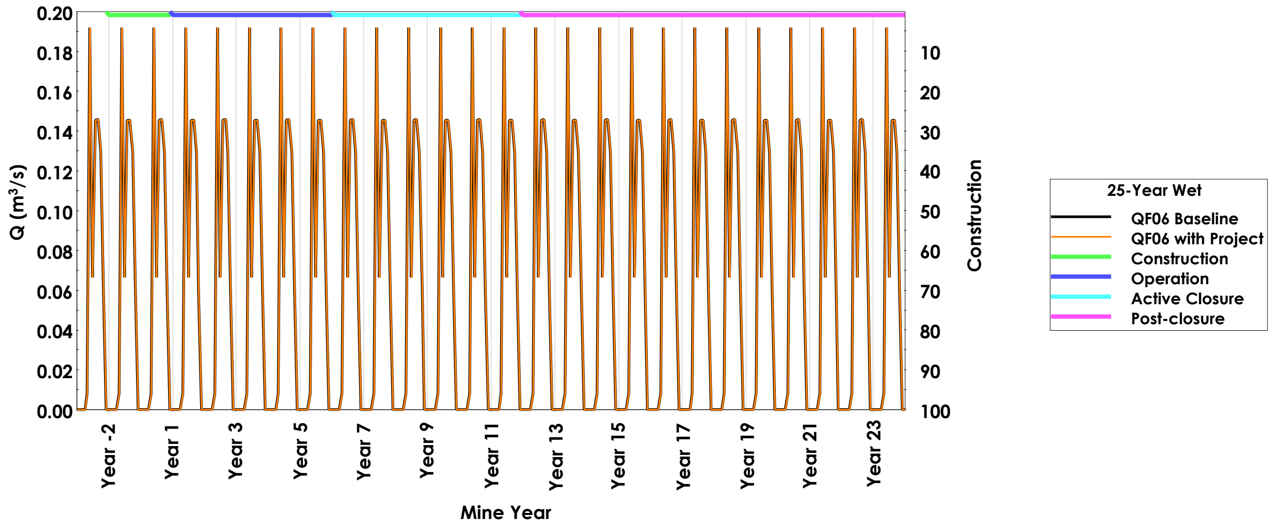
Predicted Streamflow for QF04 – 25-YR Wet Climate Scenario



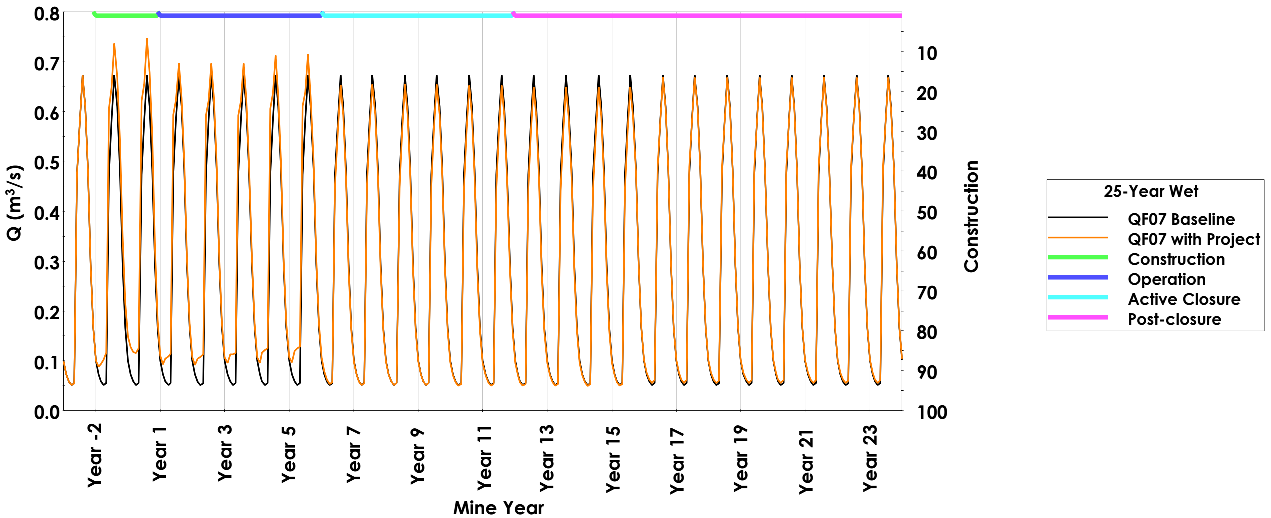
Predicted Streamflow for QF02 – 25-YR Wet Climate Scenario



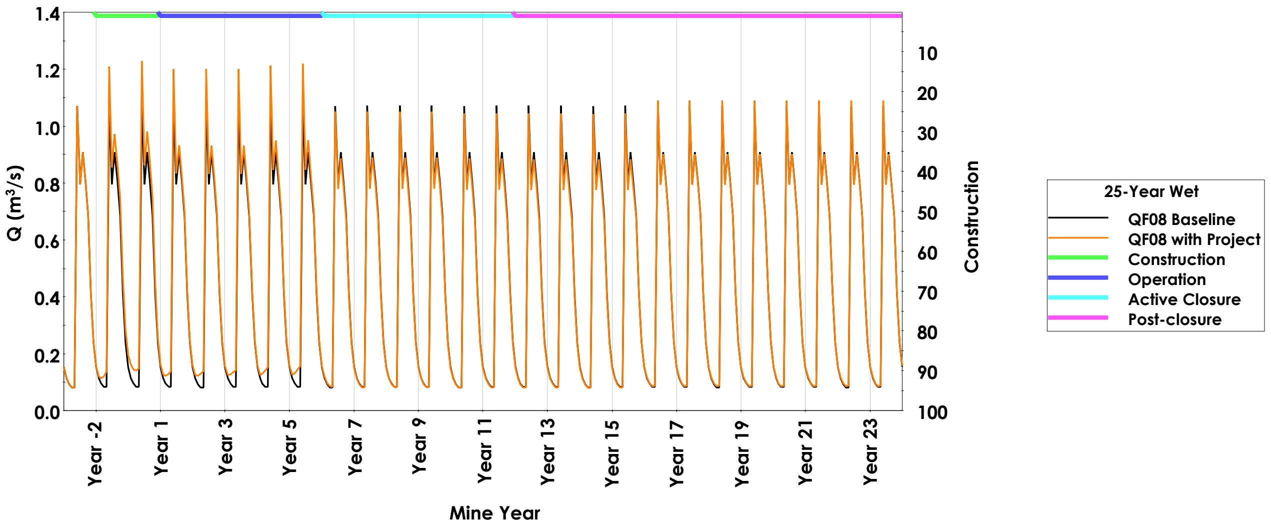
Predicted Streamflow for QF05 – 25-YR Wet Climate Scenario



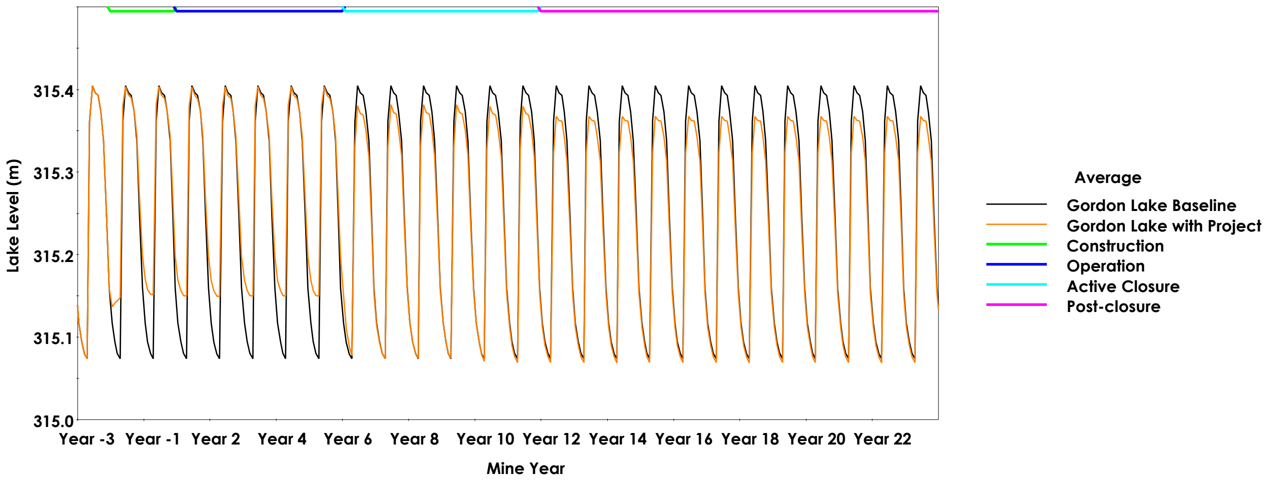
Predicted Streamflow for QF06 – 25-YR Wet Climate Scenario



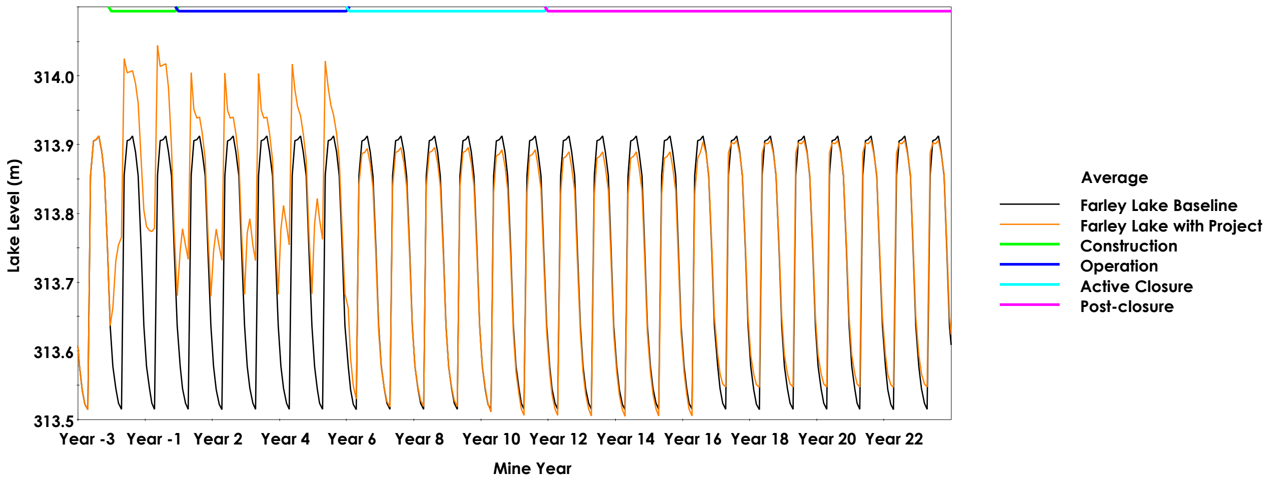
Predicted Streamflow for QF07 – 25-YR Wet Climate Scenario



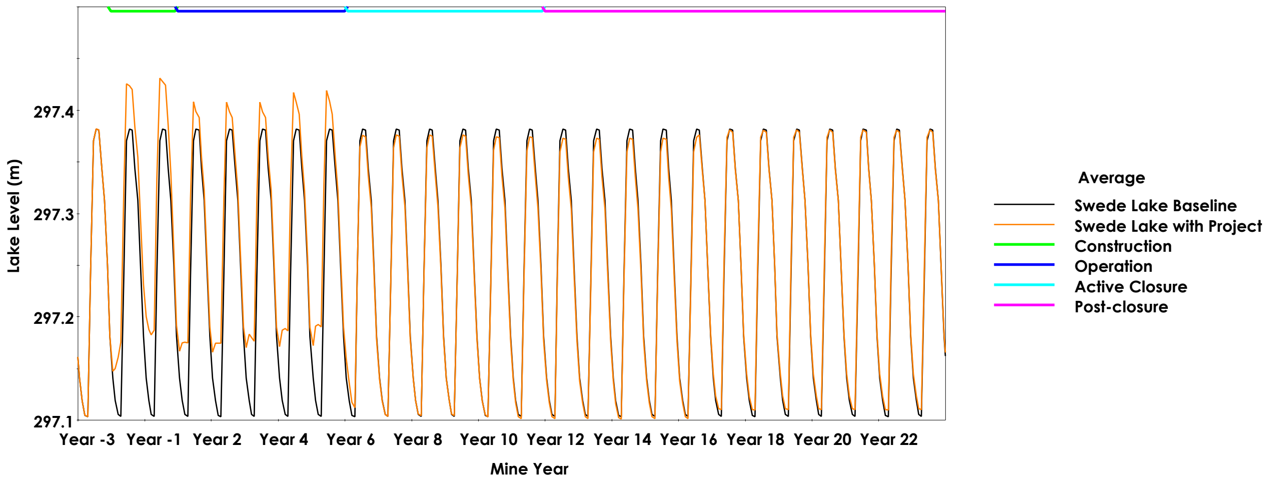
Predicted Streamflow for QF08 – 25-YR Wet Climate Scenario



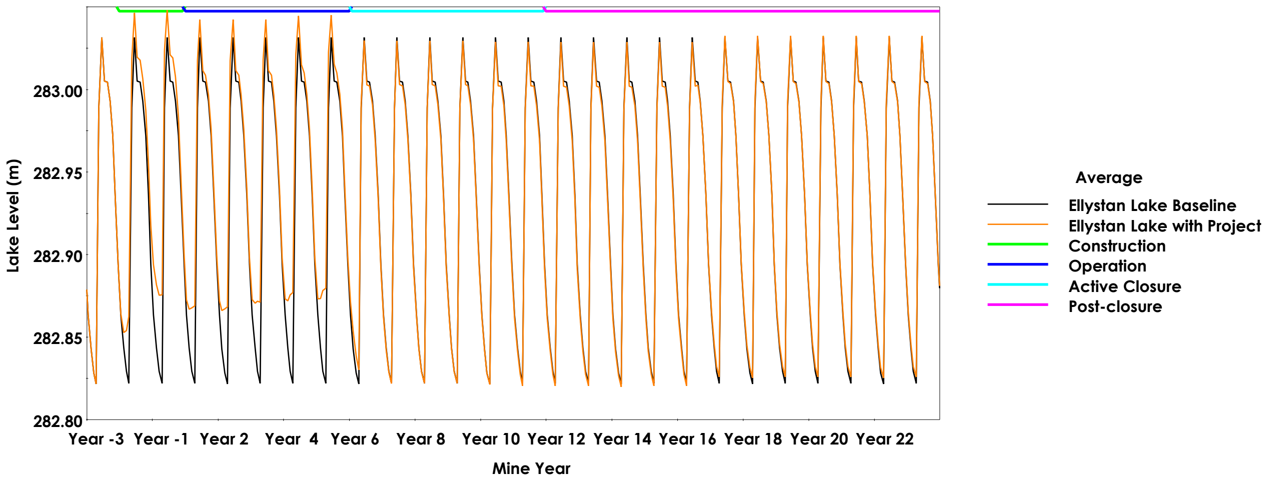
Predicted Lake Level for Gordon Lake – Average Climate Scenario



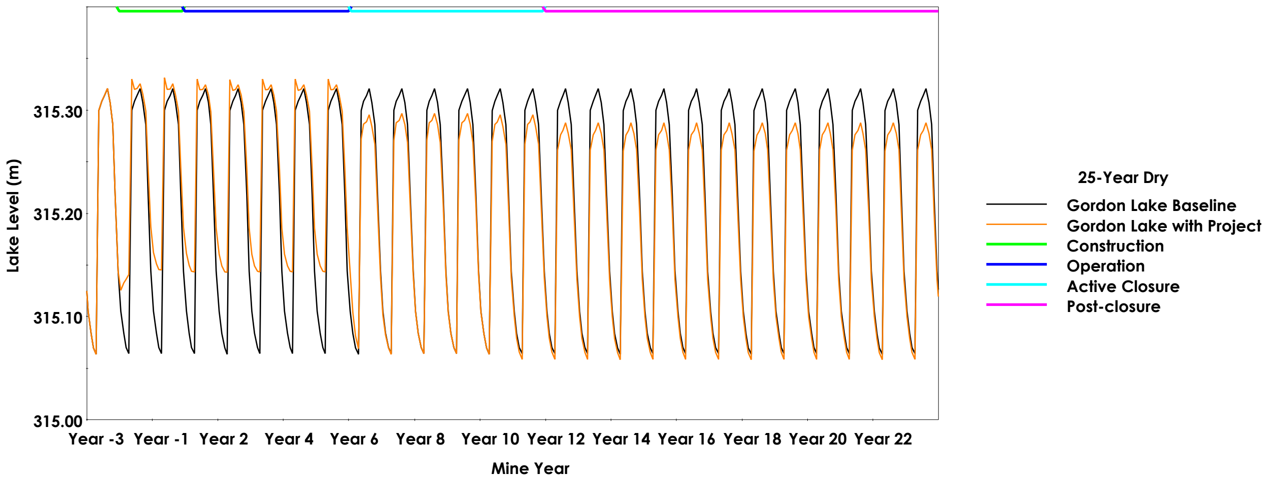
Predicted Lake Level for Farley Lake – Average Climate Scenario



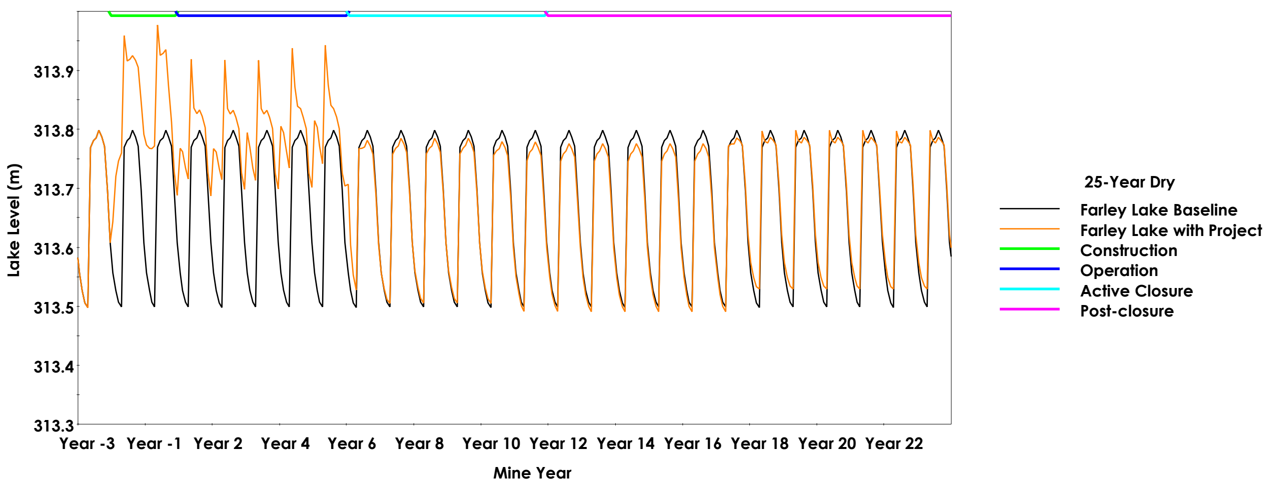
Predicted Lake Level for Swede Lake – Average Climate Scenario



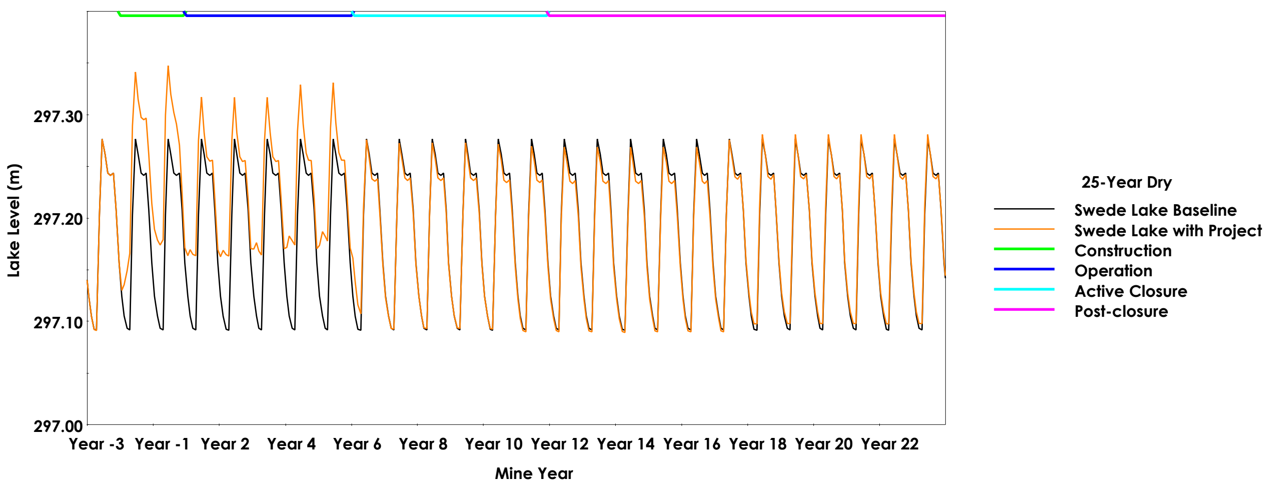
Predicted Lake Level for Ellystan Lake – Average Climate Scenario



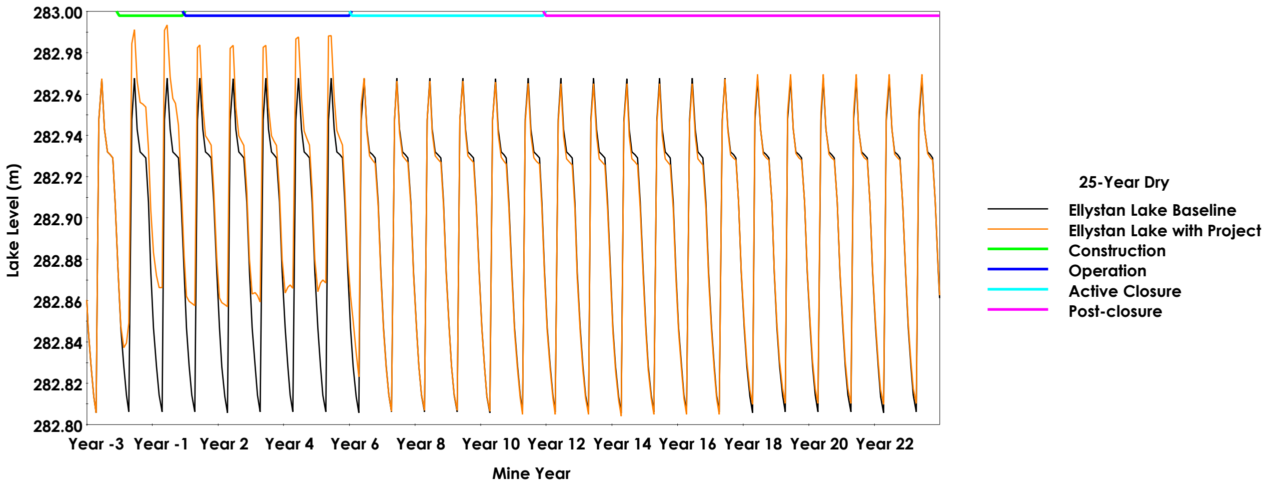
Predicted Lake Level for Gordon Lake – 25-YR Dry Climate Scenario



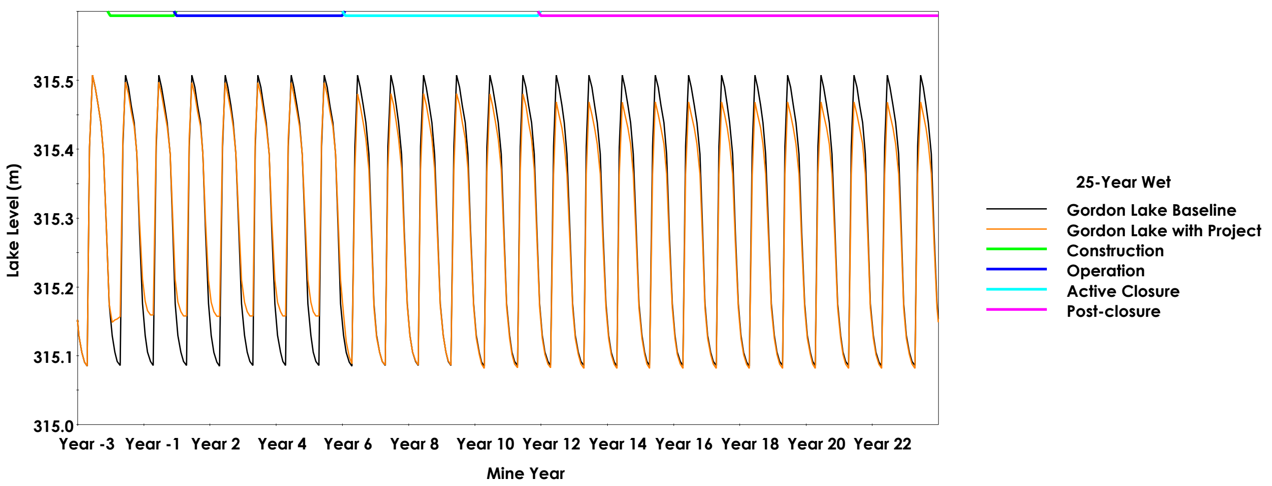
Predicted Lake Level for Farley Lake – 25-YR Dry Climate Scenario



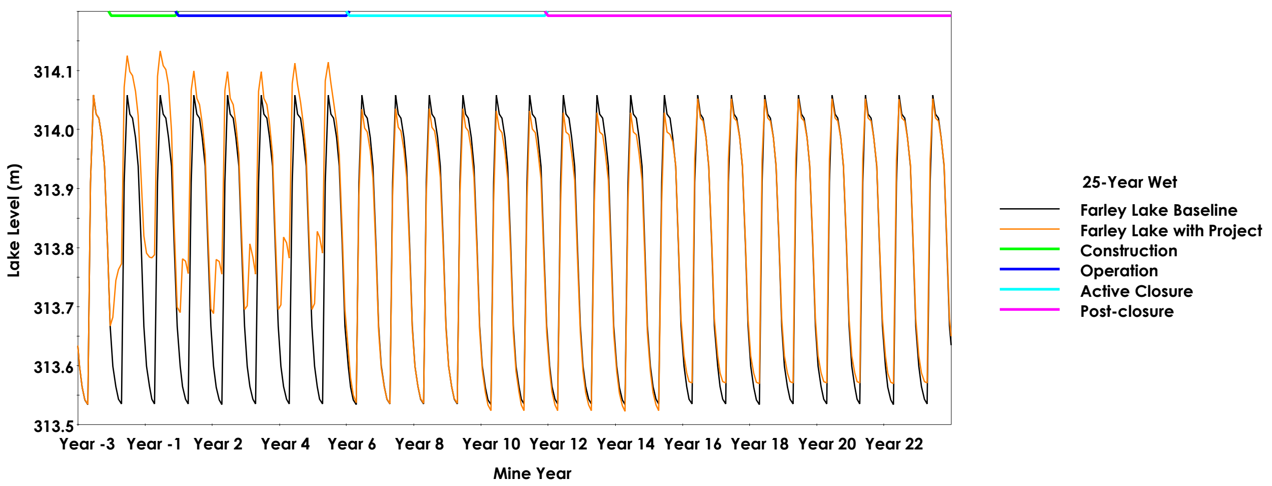
Predicted Lake Level for Swede Lake – 25-YR Dry Climate Scenario



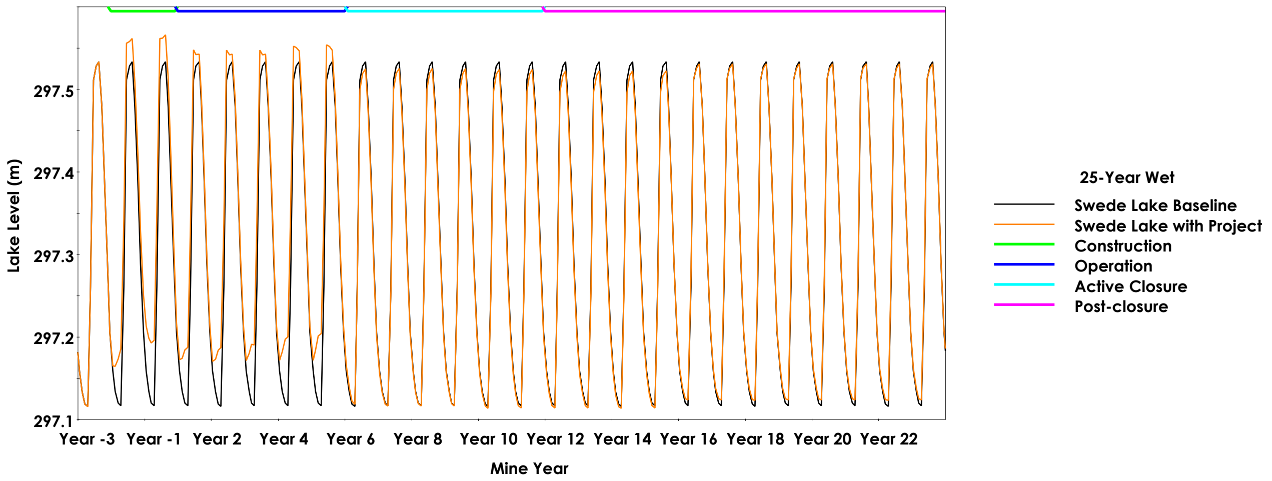
Predicted Lake Level for Ellystan Lake – 25-YR Dry Climate Scenario



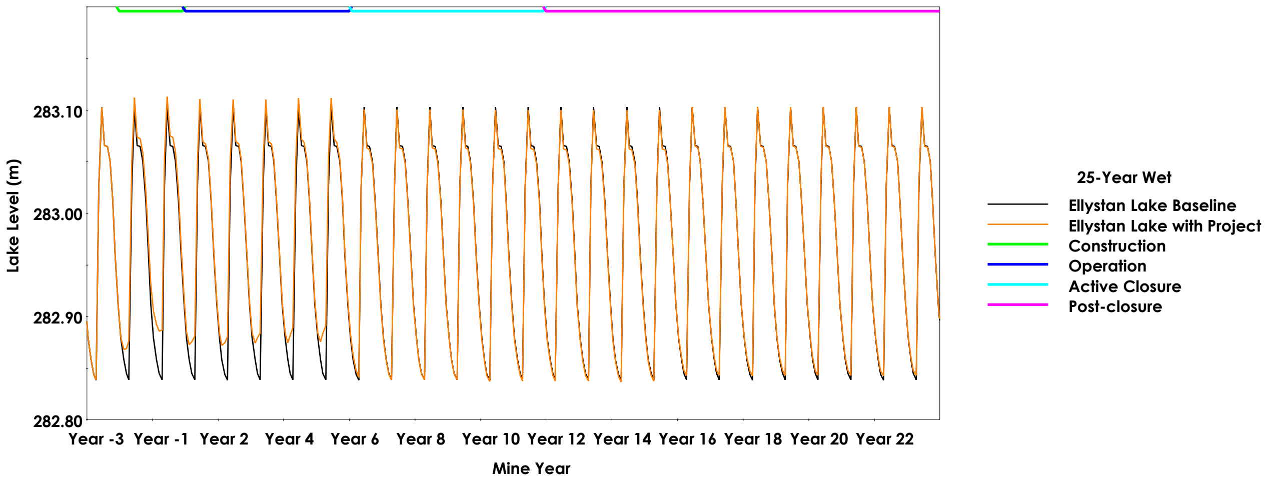
Predicted Lake Level for Gordon Lake – 25-YR Wet Climate Scenario



Predicted Lake Level for Farley Lake – 25-YR Wet Climate Scenario



Predicted Lake Level for Swede Lake – 25-YR Wet Climate Scenario



Predicted Lake Level for Ellystan Lake – 25-YR Wet Climate Scenario

Appendix E WATER QUALITY INPUT TABLES

Table E-1: Parameters selected for water quality model

Parameter name	Parameter Symbol	Name in model	Parameter group	Units	Guidelines/Limits		
					CWQG	MSOG	MDMER
pH	pH	pH	General chemistry	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5
Proton	H+	Proton	General chemistry	mg/L	n/v	n/v	n/v
Acidity Total	Acid	Acidity_T	General chemistry	mg/L	n/v	n/v	n/v
Alkalinity Total	Alk	Alkalinity_T	General chemistry	mg/L	n/v	n/v	n/v
Bromide	Br	Bromide	General chemistry	mg/L	n/v	n/v	n/v
Chloride	Cl	Chloride	General chemistry	mg/L	120	n/v	n/v
Fluoride	F	Fluoride	General chemistry	mg/L	0.12	0.12	n/v
Sulfate	SO_4	Sulfate	General chemistry	mg/L	n/v	n/v	n/v
Phosphorus Total	P(T)	Phosphorus_T	Nutrients	mg/L	Narrative	0.025	n/v
Ammonia Nitrogen Total	$N\text{-}NH_3(T)$	N_Ammonia	Nutrients	N mg/L	Table 2	Equation*	n/v
Nitrite Nitrogen	$N\text{-}NO_2$	N_Nitrite	Nutrients	N mg/L	0.06	0.06	n/v
Nitrate and Nitrite Nitrogen	$N\text{-}NO_3+NO_2$	N_Nitrate_Nitrite	Nutrients	N mg/L	13	n/v	n/v
Cyanide Total	CN(T)	Cyanide_T	General chemistry	mg/L	n/v	n/v	0.5
Cyanide Free	CN(F)	Cyanide_F	General chemistry	mg/L	0.005	0.0052	n/v
WAD** Cyanide	CN(WAD)	Cyanide_WAD	General chemistry	mg/L	n/v	n/v	n/v
Hardness	Hard	Hardness	General chemistry	mg/L	n/v	n/v	n/v
Radium 226	Ra-226	Radium_226	Radioactivity	Bq/L	n/v	n/v	0.37
Total Suspended Solids	TSS	TSS	Supporting	mg/L	n/v	n/v	15
Aluminum Dissolved	Al(D)	Aluminum_D	Trace elements	mg/L	n/v	n/v	n/v
Aluminum Total	Al(T)	Aluminum_T	Trace elements	mg/L	0.005/0.1	0.005/0.1	n/v
Antimony Dissolved	Sb(D)	Antimony_D	Trace elements	mg/L	n/v	n/v	n/v
Antimony Total	Sb(T)	Antimony_T	Trace elements	mg/L	n/v	n/v	n/v
Arsenic Dissolved	As(D)	Arsenic_D	Trace elements	mg/L	n/v	0.15	0.3
Arsenic Total	As(T)	Arsenic_T	Trace elements	mg/L	0.005	n/v	0.3
Barium Dissolved	Ba(D)	Barium_D	Trace elements	mg/L	n/v	n/v	n/v
Barium Total	Ba(T)	Barium_T	Trace elements	mg/L	n/v	n/v	n/v
Beryllium Total	Be(T)	Beryllium_T	Trace elements	mg/L	n/v	n/v	n/v
Boron Dissolved	Be(D)	Boron_D	Trace elements	mg/L	n/v	n/v	n/v
Boron Total	B(T)	Boron_T	Trace elements	mg/L	1.5	1.5	n/v
Cadmium Dissolved	Cd(D)	Cadmium_D	Trace elements	mg/L	n/v	Equation*	n/v
Cadmium Total	Cd(T)	Cadmium_T	Trace elements	mg/L	Equation**	n/v	n/v
Calcium Dissolved	Cd(D)	Calcium_D	General chemistry	mg/L	n/v	n/v	n/v
Chromium Dissolved	Cr(D)	Chromium_D	Trace elements	mg/L	n/v	Equation*	n/v
Chromium Hexavalent Dissolved	Cr(VI)	Chromium_D_Hex	Trace elements	mg/L	0.001	0.001	n/v
Chromium Total	Cr(T)	Chromium_T	Trace elements	mg/L	0.0089	n/v	n/v

See Notes on next page

Parameter name	Parameter Symbol	Name in model	Parameter group	Units	Guidelines/Limits		
					CWQG	MSOG	MMER
Cobalt Dissolved	Co(D)	Cobalt_D	Trace elements	mg/L	n/v	n/v	n/v
Cobalt Total	Co(T)	Cobalt_T	Trace elements	mg/L	n/v	n/v	n/v
Copper Dissolved	Cu(D)	Copper_D	Trace elements	mg/L	n/v	Equation*	0.3
Copper Total	Cu(T)	Copper_T	Trace elements	mg/L	Equation**	n/v	0.3
Iron Dissolved	Fe(D)	Iron_D	Trace elements	mg/L	n/v	n/v	n/v
Iron Total	Fe(T)	Iron_T	Trace elements	mg/L	0.3	0.3	n/v
Lead Dissolved	Pb(D)	Lead_D	Trace elements	mg/L	n/v	Equation*	0.1
Lead Total	Pb(T)	Lead_T	Trace elements	mg/L	Equation**	n/v	0.1
Magnesium Dissolved	Mg(D)	Magnesium_D	General chemistry	mg/L	n/v	n/v	n/v
Manganese Dissolved	Mn(D)	Manganese_D	General chemistry	mg/L	Table 5	n/v	n/v
Manganese Total	Mn(T)	Manganese_T	General chemistry	mg/L	Table 5	n/v	n/v
Mercury Dissolved	Hg(D)	Mercury_D	Trace elements	mg/L	n/v	n/v	n/v
Mercury Total	Hg(T)	Mercury_T	Trace elements	mg/L	0.000026	0.000026	n/v
Molybdenum Dissolved	Mo(D)	Molybdenum_D	Trace elements	mg/L	n/v	n/v	n/v
Molybdenum Total	Mo(T)	Molybdenum_T	Trace elements	mg/L	0.073	0.073	n/v
Nickel Dissolved	Ni(D)	Nickel_D	Trace elements	mg/L	n/v	Equation*	0.5
Nickel Total	Ni(T)	Nickel_T	Trace elements	mg/L	Equation**	n/v	0.5
Potassium Dissolved	K(D)	Potassium_D	General chemistry	mg/L	n/v	n/v	n/v
Selenium Dissolved	Se(D)	Selenium_D	Trace elements	mg/L	n/v	n/v	n/v
Selenium Total	Se(T)	Selenium_T	Trace elements	mg/L	0.001	0.001	n/v
Silicon Dissolved	Si(D)	Silicon_D	General chemistry	mg/L	n/v	n/v	n/v
Silicon Total	Si(T)	Silicon_T	Trace elements	mg/L	n/v	n/v	n/v
Silver Dissolved	Ag(D)	Silver_D	Trace elements	mg/L	n/v	n/v	n/v
Silver Total	Ag(T)	Silver_T	Trace elements	mg/L	0.00025	0.0001	n/v
Sodium Dissolved	Na(D)	Sodium_D	General chemistry	mg/L	n/v	n/v	n/v
Sodium Total	Na(T)	Sodium_T	General chemistry	mg/L	n/v	n/v	n/v
Strontium Dissolved	Sr(D)	Strontium_D	Trace elements	mg/L	n/v	n/v	n/v
Strontium Total	Sr(T)	Strontium_T	Trace elements	mg/L	n/v	n/v	n/v
Thallium Dissolved	Tl(D)	Thallium_D	Trace elements	mg/L	n/v	n/v	n/v
Thallium Total	Tl(T)	Thallium_T	Trace elements	mg/L	0.0008	0.0008	n/v
Uranium Dissolved	U(D)	Uranium_D	Trace elements	mg/L	n/v	n/v	n/v
Uranium Total	U(T)	Uranium_T	Trace elements	mg/L	0.015	0.015	n/v
Vanadium Total	V(T)	Vanadium_T	Trace elements	mg/L	n/v	n/v	n/v
Zinc Dissolved	Zn(D)	Zinc_D	Trace elements	mg/L	Equation**	Equation*	0.5
Zinc Total	Zn(T)	Zinc_T	Trace elements	mg/L	n/v	n/v	0.5

Table E-1: Parameters selected for water quality model

Notes:

The most stringent guideline was selected when two or more guidelines are established for the same parameter under the same jurisdiction (CCME, MWS, or Government of Canada).
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
MSOG - Manitoba Water Quality Standards Objectives and Guidelines for Freshwater Aquatic Life - Manitoba (MWS 2011).
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Schedule 4 - Authorized Limits of Deleterious Substances, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
ᵞ Guidelines are for pH; pH = - Lg[H^+] where [H^+] is a molar concentration of protons.
Equations were used to calculate hardness, pH, temperature, and DOC-dependent guidelines for these parameters as per MWS (Equation*) and CCME (Equation**):

- Total cadmium CWQG-FAL: at hardness > 280 mg/L the guideline is 0.00037 mg/L, at hardness between 17 and 280 mg/L the guideline (in mg/L) is 0.001*[10^(1.016*(log10(Hardness))-1.71)], at hardness < 17 mg/L the guideline is 0.00011 mg/L.
- Total copper CWQG: When the water hardness is 0 to < 82 mg/L the CWQG is 0.002 mg/L, at hardness ≥82 to ≤180 mg/L the CWQG is calculated as CWQG (μg/L) = 0.2 * $e^{\{0.8545[\ln(hardness)]-1.465\}}$, at hardness >180 mg/L the CWQG is 0.004 mg/L, if the hardness was unknown the CWQG was 0.002 mg/L.
- Total lead CWQG: When the hardness is 0 to ≤ 60 mg/L the CWQG is 0.001 mg/L, at hardness >60 to ≤ 180 mg/L the CWQG is calculated as CWQG (μg/L)= $e^{\{1.273[\ln(hardness)]-4.705\}}$, at hardness >180 mg/L the CWQG is 0.007 mg/L, if the hardness was unknown the CWQG was 0.001 mg/L.
- Dissolved manganese CWQG-FAL (mg/L): pH and hardness-dependent guideline calculated based on the CWQG and benchmark calculator in Appendix B or Table 5 of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese (Dissolved) 2019 (CCME 2019).
- Total nickel CWQG: When the water hardness is 0 to ≤ 60 mg/L the CWQG is 0.025 mg/L, at hardness > 60 to ≤ 180 mg/L the CWQG is calculated as CWQG (μg/L) = $e^{\{0.76[\ln(hardness)]+1.06\}}$.
- Dissolved zinc CWQG-FAL: exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625). The value for DOC was set at 0.3 mg/L (i.e., the lowest and most conservative value to calculate the guideline).
- Ammonia MSOG: $[(0.0577/1+10^{7.688-pH})+(2.487/1+10^{pH-7.688})]*a$, where a=2.85 or $a=1.45*10^{0.028*(25-Temperature)}$, whichever is less and pH ≥6.5 and ≤9.0.
- Dissolved cadmium MSOG (μg/L): $[e^{\{0.7409[\ln(Hardness)-4.719\}}]*[1.101672-\{\ln(Hardness)(0.041838\}]$.
- Dissolved chromium MSOG (μg/L): $[(e^{(0.819*(\ln(Hardness)) + 0.6848)})]*[0.86]$
- Dissolved copper MSOG (μg/L): $[e^{\{0.8545[\ln(Hardness)]-1.702\}}]*[0.960]$.
- Dissolved lead MSOG (μg/L): $[e^{\{1.273[\ln(Harness)-4.705\}}]*[1.46203-\{\ln(Hardness)(0.145712)\}]$.
- Dissolved nickel MSOG (μg/L): $[e^{\{0.8460[\ln(Hardness)]+0.0584\}}]*[0.997]$.
- Dissolved zinc MSOG (μg/L): $[e^{\{0.8473\{\ln(Hardness)]+0.884\}}]*[0.986]$.

Manitoba Tier II guidelines for dissolved metals are based on exceedance once in three years, but not more frequent, being acceptable during periods of infrequent and extreme low stream flows.

- CWQG for total phosphorus: Canadian Guidance Frameworks is used for total phosphorus (CCME 2014): ultra-oligotrophic <4 μg/L, oligotrophic 4-10 μg/L, mesotrophic 10-20 μg/L, meso-eutrophic 20-35 μg/L, eutrophic 35-100 μg/L, hyper-eutrophic >100 μg/L.
- Ammonia CWQG: pH and temperature-dependent guideline for total ammonia as N presented in Table 2 of the CWQG guidelines for the protection of aquatic life: Ammonia (CCME 2010). The values from Table 2 are multiplied by 0.8224 to convert them into total ammonia (as N).
- Ammonia MSOG-FAL: pH and temperature-dependent guideline, see Equation 1 values from Table 1 in MWS (2011).
- Nitrate and Nitrite Nitrogen: CWQG for nitrate is applied.
- Aluminum CWQG: 0.1 mg/L if pH>6.5, otherwise 0.005 mg/L.

Table E-2: Chemistry inputs to baseline model cells

Lake Catchment/Mixing cell (Station ID used for initial lake concentration*)	Subcatchment/Source Cell Description	Subcatchment/Cell ID in the water quality model	Water Quality Station ID Used for Source Cell Input*
Gordon_Lake_CT (AQF2)	Gordon Lake southern inlet	QF01_CT	AQF10
	Gordon Lake northern inlet	QF10_CT	AQF2
	Gordon Lake western inlet	QF3sub_CT	AQF2
	South Rock Storage	South_RSA	AQF5
	Background Groundwater Inflow	Gordon_GW_Base_in	Bedrock
	Groundwater Seepage from South Rock Storage	South_RSA_GW	GW - Gordon South MRSA
	Groundwater Seepage from North Rock Storage	North_RSA_GW	GW - Gordon North MRSA
	Gordon Lake	QF03_CT	AQF2
Farley_Lake_West_CT (AQF34)	East Pit Lake overflow	East_Pit_CT	AQF6
	Groundwater Seepage from South Rock Storage	South_RSA_GW	GW - Gordon South MRSA
	Background Groundwater Inflow	Farley_GW_Base_in	Bedrock
	North Rock Storage	North_RSA_CT	AQF26
	South Rock Storage	South_RSA_CT	AQF5
	Farley Lake West	QF05_CT	AQF34
	Farley Lake southwestern inlet	QF02_CT	AQF34
	Farley Lake northwestern inlet	QF05ex5_CT	AQF34
Farley_Lake_East_CT (AQF9)	Farley Lake northern inlet from Marie Lake	QF04_CT	AQF7
	Farley Lake Lake southern inlet from Marnie Lake	QF05ex2_CT	AQF38
	Farley Lake East	QF05sub_CT	AQF9
	Background Groundwater Inflow	Farley_GW_Base_in	Bedrock
Swede_Lake_CT (AQF15)	Simpson Lake Catchment + Simpson Lake	Simpson_Lake_CT	AQF29
	Swede Lake Catchment	FLSA3_CT	AQF15
Ellystan_Lake_CT (AQF20)	Input from White Owl Lake and Mac Lake	FLSA2_CT	AQF20
	Ellystan Lake Catchment	FLSA1_CT	AQF20

Table E-3: Baseline water quality model results for expected case

Location	Units	Guidelines/Limits			Gordon Lake				Gordon Lake				Gordon Lake				Farley Lake West				Farley Lake West			
Source		CWQG	MSOG	MDMER	Observed (AQF2)				Modeled (Post-Closure)				Difference				Observed (AQF34)				Modeled (Post-Closure)			
Statistic					Mean				Mean				%				Mean				Mean			
Season					winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter																								
Temperature, Field***	deg C	n/v	n/v	n/v	0.5	12.0	20.0	7.6	0.5	12.0	20.0	7.6	0.0%	0.0%	0.0%	0.0%	0.3	10.0	20.0	9.7	0.3	10.0	20.0	9.7
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	7.0	7.3	7.6	7.5	7.4	7.3	7.3	7.5	6.3%	0.7%	-3.5%	-0.4%	7.1	7.4	7.9	7.7	7.5	7.5	7.5	7.6
Bromide	mg/L	n/v	n/v	n/v	0.050	0.050	0.050	0.050	0.060	0.041	0.047	0.048	19.1%	-17.9%	-5.5%	-4.1%	0.050	0.050	0.050	0.050	0.055	0.040	0.043	0.044
Chloride	mg/L	120	n/v	n/v	0.25	0.25	0.25	0.38	0.26	0.14	0.14	0.18	4.7%	-42.8%	-42.5%	-52.2%	0.79	0.59	0.43	0.37	0.91	0.56	0.48	0.42
Fluoride	mg/L	0.12	0.12	n/v	0.081	0.051	0.061	0.063	0.071	0.045	0.051	0.053	-12.4%	-11.4%	-16.8%	-15.4%	0.086	0.066	0.072	0.073	0.087	0.060	0.060	0.060
Sulfate	mg/L	n/v	n/v	n/v	3.90	2.80	2.50	3.20	3.06	2.08	1.75	1.83	-21.5%	-25.6%	-30.1%	-42.8%	32.00	24.00	25.00	23.00	50.94	30.71	26.45	23.31
Phosphorus_T	mg/L	Narrative	0.025	n/v	**0.027**	**0.031**	0.025	0.022	**0.029**	**0.036**	**0.027**	0.024	8.6%	15.7%	8.7%	7.6%	0.017	0.025	0.017	0.021	0.022	0.023	0.021	0.019
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.086	0.025	0.028	0.009	0.076	0.037	0.031	0.024	-12.1%	47.1%	10.6%	161.0%	0.038	0.016	0.010	0.020	0.040	0.027	0.022	0.019
N_Nitrite	mg/L	0.06	0.06	n/v	0.012	0.008	0.006	0.014	0.009	0.006	0.006	0.006	-25.7%	-26.4%	-5.5%	-54.3%	0.017	0.007	0.023	0.031	0.029	0.017	0.029	0.028
N_Nitrate	mg/L	13	n/v	n/v	0.025	0.029	0.030	0.041	0.037	0.024	0.026	0.029	49.9%	-17.0%	-12.4%	-30.0%	0.107	0.030	0.031	0.043	0.107	0.065	0.074	0.100
Cyanide_T	mg/L	n/v	n/v	0.5	0.0006	0.0006	0.0006	0.0006	0.0008	0.0005	0.0006	0.0006	31.3%	-23.1%	-8.6%	-2.0%	0.0006	0.0005	0.0006	0.0005	0.0006	0.0004	0.0005	0.0005
Cyanide_F	mg/L	0.005	0.0052	n/v	0.0005	0.0006	0.0010	0.0010	0.0008	0.0005	0.0006	0.0007	68.8%	-26.8%	-42.2%	-33.2%	0.0005	0.0005	0.0006	0.0005	0.0004	0.0003	0.0003	0.0004
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.0005	0.0006	0.0006	0.0006	0.0007	0.0004	0.0005	0.0006	45.5%	-33.1%	-18.2%	-8.6%	0.0005	0.0005	0.0006	0.0005	0.0006	0.0004	0.0004	0.0005
Hardness	mg/L	n/v	n/v	n/v	99.0	66.0	67.0	64.0	65.3	42.1	48.4	49.2	-34.0%	-36.2%	-27.8%	-23.1%	150.0	110.0	110.0	100.0	190.1	116.9	101.1	91.2
Radium_226	Bq/L	n/v	n/v	0.37	0.0048	0.0045	0.0049	0.0045	0.0039	0.0024	0.0026	0.0028	-18.4%	-46.0%	-46.1%	-37.1%	0.0047	0.0052	0.0042	0.0044	0.0049	0.0039	0.0040	0.0039
Aluminum_D	mg/L	n/v	n/v	n/v	0.015	0.019	0.008	0.007	0.011	0.022	0.018	0.011	-26.8%	16.1%	139.5%	66.7%	0.005	0.012	0.004	0.003	0.005	0.005	0.005	0.005
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	0.019	0.068	0.025	0.035	0.033	0.064	0.055	0.033	74.0%	-5.5%	120.1%	-5.4%	0.011	0.013	0.009	0.009	0.010	0.009	0.010	0.009
Antimony_D	mg/L	n/v	n/v	n/v	0.00009	0.00009	0.00008	0.00008	0.00010	0.00007	0.00008	0.00008	6.2%	-23.5%	-1.0%	-2.4%	0.00009	0.00009	0.00008	0.00007	0.00008	0.00007	0.00007	0.00007
Antimony_T	mg/L	n/v	n/v	n/v	0.00009	0.00009	0.00008	0.00008	0.00011	0.00007	0.00008	0.00008	15.6%	-19.9%	4.8%	5.8%	0.00011	0.00009	0.00008	0.00007	0.00011	0.00008	0.00008	0.00008
Arsenic_D	mg/L	n/v	0.15	0.3	0.00049	0.00045	0.00042	0.00033	0.00043	0.00030	0.00034	0.00034	-12.4%	-32.9%	-19.4%	2.0%	0.00170	0.00120	0.00130	0.00110	0.00170	0.00100	0.00083	0.00072
Arsenic_T	mg/L	0.005	n/v	0.3	0.00049	0.00046	0.00045	0.00037	0.00049	0.00033	0.00037	0.00038	-0.4%	-29.3%	-16.8%	3.8%	0.00170	0.00120	0.00130	0.00110	0.00173	0.00102	0.00085	0.00074
Barium_D	mg/L	n/v	n/v	n/v	0.0220	0.0120	0.0086	0.0086	0.0108	0.0080	0.0087	0.0081	-50.9%	-33.3%	0.6%	-6.1%	0.0220	0.0160	0.0140	0.0140	0.0254	0.0158	0.0140	0.0128
Barium_T	mg/L	n/v	n/v	n/v	0.0220	0.0130	0.0096	0.0096	0.0123	0.0089	0.0097	0.0093	-43.9%	-31.9%	0.7%	-3.4%	0.0220	0.0160	0.0140	0.0140	0.0264	0.0165	0.0146	0.0135
Beryllium_T	mg/L	n/v	n/v	n/v	0.00009	0.00009	0.00008	0.00008	0.00010	0.00007	0.00008	0.00008	13.8%	-20.4%	4.4%	4.5%	0.00009	0.00009	0.00008	0.00007	0.00009	0.00007	0.00007	0.00007
Boron_D	mg/L	n/v	n/v	n/v	0.0150	0.0050	0.0050	0.0050	0.0047	0.0030	0.0032	0.0033	-68.6%	-40.0%	-36.3%	-34.9%	0.0160	0.0094	0.0130	0.0110	0.0208	0.0125	0.0104	0.0090
Boron_T	mg/L	1.5	1.5	n/v	0.0200	0.0050	0.0050	0.0088	0.0068	0.0038	0.0037	0.0044	-66.2%	-24.7%	-26.9%	-50.3%	0.0160	0.0098	0.0130	0.0120	0.0221	0.0133	0.0111	0.0095
Cadmium_D	mg/L	n/v	Equation*	n/v	0.000005	0.000005	0.000004	0.000004	0.000003	0.000002	0.000002	0.000002	-43.2%	-63.3%	-50.1%	-48.0%	0.000005	0.000005	0.000004	0.000003	0.000003	0.000002	0.000002	0.000002
Cadmium_T	mg/L	Equation**	n/v	n/v	0.000005	0.000006	0.000005	0.000005	0.000005	0.000004	0.000004	0.000004	2.7%	-41.8%	-19.2%	-31.5%	0.000005	0.000005	0.000004	0.000003	0.000004	0.000003	0.000003	0.000003
Calcium_D	mg/L	n/v	n/v	n/v	29.0	19.0	20.0	18.0	19.6	12.8	14.9	15.0	-32.4%	-32.4%	-25.6%	-16.8%	42.0	30.0	31.0	29.0	52.8	32.6	28.2	25.6
Chromium_D	mg/L	n/v	Equation*	n/v	0.00007	0.00012	0.00006	0.00007	0.00005	0.00007	0.00005	0.00004	-35.2%	-41.9%	-8.4%	-43.3%	0.00005	0.00006	0.00005	0.00005	0.00004	0.00004	0.00004	0.00004
Chromium_D_Hex	mg/L	0.001	0.011	n/v	0.00007	0.00012	0.00006	0.00007	0.00005	0.00008	0.00006	0.00004	-27.7%	-37.1%	-2.1%	-39.9%	0.00005	0.00006	0.00005	0.00008	0.00006	0.00005	0.00005	0.00005
Chromium_T	mg/L	0.0089	n/v	n/v	0.00018	0.00021	0.00014	0.00023	0.00027	0.00019	0.00019	0.00020	50.1%	-10.7%	37.4%	-12.1%	0.00008	0.00009	0.00008	0.00005	0.00008	0.00007	0.00008	0.00007
Cobalt_D	mg/L	n/v	n/v	n/v	0.00029	0.00013	0.00008	0.00008	0.00008	0.00008	0.00009	0.00007	-71.3%	-38.4%	8.4%	-15.8%	0.00010	0.00009	0.00008	0.00007	0.00008	0.00006	0.00006	0.00007
Cobalt_T	mg/L	n/v	n/v	n/v	0.00029	0.00013	0.00009	0.00008	0.00010	0.00009	0.00010	0.00008	-65.3%	-31.0%	9.8%	0.8%	0.00011	0.00009	0.00008	0.00007	0.00009	0.00007	0.00007	0.00007
Copper_D	mg/L	n/v	Equation*	0.3	0.00018	0.00024	0.00026	0.00010	0.00012	0.00009	0.00011	0.00011	-35.4%	-64.1%	-55.9%	5.8%	0.00059	0.00053	0.00044	0.00028	0.00055	0.00036	0.00032	0.00028
Copper_T	mg/L	Equation**	n/v	0.3	0.00028	0.00024	0.00028	0.00033	0.00021	0.00013	0.00014	0.00016	-24.2%	-47.6%	-49.0%	-51.4%	0.00070	0.00055	0.00047	0.00028	0.00067	0.00043	0.00037	0.00033
Iron_D	mg/L	n/v	n/v	n/v	0.64	0.64	0.21	0.15	0.25	0.27	0.28	0.21	-61.4%	-58.4%	32.9%	37.6%	0.12	0.16	0.03	0.04	0.02	0.02	0.02	0.02
Iron_T	mg/L	0.3	0.3	n/v	**0.64**	**1.10**	**0.41**	**0.32**	**0.78**	**1.14**	**0.85**	**0.59**	21.2%	4.0%	106.6%	83.9%	0.12	0.23	0.06	0.07	0.14	0.21	0.16	0.13
Lead_D	mg/L	n/v	Equation*	0.1	0.00004	0.00004	0.00004	0.00004	0.00001	0.00001	0.00001	0.00001	-66.7%	-79.7%	-72.5%	-70.3%	0.00004	0.00004	0.00004	0.00003	0.00002	0.00002	0.00002	0.00002
Lead_T	mg/L	Equation**	n/v	0.1	0.00008	0.00006	0.00011	0.00008	0.00007	0.00004	0.00006	0.00006	-9.9%	-32.2%	-49.3%	-20.2%	0.00004	0.00010	0.00018	0.00003	0.00004	0.00003	0.00004	0.00004
Magnesium_D	mg/L	n/v	n/v	n/v	7.20	4.40	4.50	4.50	3.86	2.47	2.75	2.84	-46.3%	-43.8%	-39.0%	-36.9%	10.00	7.60	7.70	7.60	13.11	8.10	7.06	6.38
Manganese_D	mg/L	0.35	n/v	n/v	0.6900	0.2100	0.0320	0.0210	0.0679	0.0751	0.0733	0.0479	-90.2%	-64.2%	129.0%	128.2%	0.3800	0.1400	0.0036	0.0075	0.3163	0.1779	0.1399	0.1134
Manganese_T	mg/L	0.35	n/v	n/v	0.780	0.270	0.100	0.037	0.099	0.099	0.104	0.075	-87.4%	-63.2%	3.5%	101.6%	0.380	0.160	0.021	0.025	0.339	0.194	0.157	0.132
Mercury_D	mg/L	n/v	n/v	n/v	0.0000014	0.0000017	0.0000014	0.0000008	0.0000012	0.0000012	0.0000013	0.0000010	-16.5%	-30.7%	-8.0%	37.4%	0.0000010	0.0000015	0.0000012	0.0000008	0.0000010	0.0000009	0.0000010	0.0000009
Mercury_T	mg/L	0.000026	2.6E-05	n/v	0.0000018	0.0000019	0.0000014	0.0000008	0.0000015	0.0000015	0.0000017	0.0000013	-16.8%	-19.5%	18.9%	71.1%	0.0000011	0.0000017	0.0000012	0.0000008	0.0000013	0.0000012	0.0000013	0.0000012
Molybdenum_D	mg/L	n/v	n/v	n/v	0.00021	0.00013	0.00012	0.00015	0.00011	0.00007	0.00006	0.00006	-48.0%	-48.5%	-49.1%	-57.9%	0.00042	0.00035	0.00037	0.00035	0.00039	0.00029	0.00027	0.00026
Molybdenum_T	mg/L	0.073	0.073	n/v	0.00023	0.00013	0.00012	0.00017	0.00012	0.00007	0.00007	0.00007	-46.0%	-42.8%	-42.7%	-56.9%	0.00044	0.00035	0.00040	0.00036	0.00043	0.00031	0.00029	0.00028
Nickel_D	mg/L	n/v	Equation*	0.5	0.00032	0.00021	0.00022	0.00022	0.00017	0.00010	0.00012	0.00014	-46.1%	-52.5%	-44.4%	-38.2%	0.00048	0.00036	0.00023	0.00023	0.00046	0.00031	0.00028	0.00026
Nickel_T	mg/L	Equation**	n/v	0.5	0.00032	0.00021	0.00038	0.00034	0.00041	0.00020	0.00027	0.00033	28.5%	-4.0%	-27.8%	-1.7%	0.00059	0.00046	0.00045	0.00023	0.00070	0.00045	0.00040	0.00037
Potassium_D	mg/L	n/v	n/v	n/v	1.50	1.20	0.91	0.91	0.78	0.65	0.67	0.59	-47.7%	-45.6%	-26.4%	-35.6%	3.60	2.80	2.90	2.90	5.13	3.05	2.53	2.16
Selenium_D	mg/L	n/v	n/v	n/v	0.00005	0.00011	0.00004	0.00004	0.00005	0.00006	0.00006	0.00004	-10.5%	-44.7%	53.8%	3.5%	0.00005	0.00005	0.00004	0.00004	0.00005	0.00003	0.00004	0.00004
Selenium_T	mg/L	0.001	0.001	n/v	0.00005	0.00011	0.00004	0.00004	0.00005	0.00006	0.00006	0.00004	-6.5%	-42.7%	59.0%	7.6%	0.00005	0.00005	0.00004	0.00005	0.00005	0.00004	0.00004	0.00004
Silicon_D	mg/L	n/v	n/v	n/v	4.1	2.6	1.7	2.3	3.1	2.2	2.3	2.3	-24.5%	-17.1%	33.1%	-1.3%	3.6	2.4	1.5	2.0	3.3	2.4	2.3	2.3
Silicon_T	mg/L	n/v	n/v	n/v	4.1	2.8	1.7	2.5	3.2	2.2	2.3	2.3	-22.0%	-19.8%	38.1%	-6.1%	3.6	2.5	1.5	2.0	3.4	2.4	2.4	2.4
Silver_D	mg/L	n/v	n/v	n/v	0.000005	0.000011	0.000005	0.000005	0.000004	0.000006	0.000006	0.000004	-10.4%	-43.7%	24.5%	-17.7%	0.000005	0.000005	0.000005	0.000005	0.000005	0.000004	0.000005	0.000004
Silver_T	mg/L	0.00025	0.0001	n/v	0.000005	0.000011	0.000005	0.000005	0.000005	0.000006	0.000006	0.000004	-4.6%	-42.7%	27.1%	-13.8%	0.000005	0.000005	0.000005	0.000005	0.000006	0.000005	0.000005	0.000005
Sodium_D	mg/L	n/v	n/v	n/v	2.3	1.4	1.6	1.6	1.7	1.0	1.1	1.2	-25.3%	-27.6%	-30.8%	-24.5%	5.4	3.9	4.4	4.2	7.7	4.7	4.1	3.8
Sodium_T	mg/L	n/v	n/v	n/v	2.3	1.4	1.6	1.6	1.8	1.0	1.1	1.2	-23.3%	-26.4%	-29.1%	-22.2%	5.5	3.9	4.4	4.3	8.3	5.1	4.4	4.0
Strontium_D	mg/L	n/v	n/v	n/v	0.049	0.032	0.033	0.032	0.030	0.019	0.021	0.022	-39.5%	-41.7%	-35.5%	-31.2%	0.088	0.062	0.066	0.061	0.117	0.070	0.059	0.051
Strontium_T	mg/L	n/v	n/v	n/v	0.050	0.032	0.033	0.033	0.037	0.023	0.025	0.027	-26.2%	-29.5%	-23.6%	-19.0%	0.088	0.064	0.066	0.065	0.125	0.075	0.063	0.055
Thallium_D	mg/L	n/v	n/v	n/v	0.00004	0.00004	0.00003	0.00003	0.00004	0.00003	0.00004	0.00003	-1.3%	-26.5%	11.3%	6.5%	0.00004	0.00004	0.00003	0.00002	0.00003	0.00003	0.00003	0.00003
Thallium_T	mg/L	0.0008	0.0008	n/v	0.00004	0.00004	0.00003	0.00003	0.00005	0.00003	0.00004	0.00004	9.7%	-21.9%	18.4%	15.9%	0.00004	0.00004	0.00003	0.00002	0.00003	0.00003	0.00003	0.00003
Uranium_D	mg/L	n/v	n/v	n/v	0.00005	0.00005	0.00004	0.00004	0.00001	0.00001	0.00001	0.00001	-77.5%	-86.6%	-84.2%	-83.0%	0.00051	0.00035	0.00031	0.00024	0.00038	0.00025	0.00020	0.00017
Uranium_T	mg/L	0.015	0.015	n/v	0.00005	0.00005	0.00004	0.00004	0.00003	0.00002	0.00001	0.00001	-35.3%	-61.7%	-67.7%	-71.9%	0.00051	0.00038	0.00031	0.00025	0.00039	0.00025	0.00021	0.00018
Vanadium_T	mg/L	n/v	n/v	n/v	0.00015	0.00022	0.00019	0.00034	0.00029	0.00020	0.00020	0.00021	90.9%	-11.1%	5.0%	-36.9%	0.00013	0.00013	0.00020	0.00020	0.00018	0.00013	0.00014	0.00014
Zinc_D	mg/L	Equation**	Equation*	0.5	0.00120	0.00097	0.00120	0.00068	0.00057	0.00031	0.00044	0.00048	-52.8%	-68.1%	-63.3%	-30.1%	0.00120	0.00100	0.00110	0.00050	0.00057	0.00042	0.00048	0.00049
Zinc_T	mg/L	n/v	n/v	0.5	0.00150	0.00097	0.00150	0.00120	0.00105	0.00049	0.00082	0.00092	-30.3%	-49.4%	-45.3%	-23.7%	0.00120	0.00100	0.00110	0.00100	0.00098	0.00067	0.00074	0.00081

See notes on last page

Table E-3: Baseline water quality model results for expected case

Location	Units	Guidelines/Limits			Farley Lake West				Farley Lake East				Farley Lake East				Farley Lake East				Swede Lake		
Source		CWQG	MSOG	MDMER	Difference				Observed (AQF9)				Modeled (Post-Closure)				Difference				Observed (AQF15)		
Statistic					%				Mean				Mean				%				Mean		
Season					winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer
Parameter																							
Temperature, Field***	deg C	n/v	n/v	n/v	0.0%	0.0%	0.0%	0.0%	0.5	12.0	21.0	7.9	0.5	12.0	21.0	7.9	0.0%	0.0%	0.0%	0.0%	0.3	11.0	20.0
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	0.1	0.0	0.0	0.0	6.7	7.1	7.4	7.4	7.4	7.3	7.3	7.4	0.1	0.0	0.0	0.0	7.0	7.4	7.7
Bromide	mg/L	n/v	n/v	n/v	10.0%	-19.1%	-14.5%	-11.7%	0.050	0.050	0.050	0.050	0.051	0.038	0.047	0.046	1.9%	-24.4%	-6.6%	-7.3%	0.050	0.050	0.050
Chloride	mg/L	120	n/v	n/v	14.8%	-5.5%	10.5%	13.7%	0.83	0.30	0.25	0.25	0.68	0.29	0.25	0.23	-17.5%	-3.4%	1.1%	-9.3%	0.56	0.25	0.30
Fluoride	mg/L	0.12	0.12	n/v	1.4%	-8.8%	-17.1%	-17.2%	0.086	0.054	0.073	0.075	0.082	0.046	0.059	0.060	-4.4%	-14.2%	-19.0%	-19.5%	0.085	0.069	0.076
Sulfate	mg/L	n/v	n/v	n/v	59.2%	28.0%	5.8%	1.3%	24.00	11.00	15.00	12.00	22.40	8.59	12.16	11.29	-6.7%	-21.9%	-18.9%	-5.9%	7.70	6.00	6.00
Phosphorus_T	mg/L	Narrative	0.025	n/v	28.4%	-9.0%	23.9%	-9.5%	**0.030**	**0.030**	0.018	0.016	**0.026**	**0.028**	0.018	0.015	-12.4%	-5.1%	1.0%	-3.8%	0.016	0.017	0.020
N_Ammonia	mg/L	Table 2	Equation*	n/v	5.4%	66.3%	129.9%	-4.6%	0.240	0.022	0.020	0.036	0.233	0.032	0.018	0.040	-2.9%	45.9%	-7.8%	11.6%	0.009	0.005	0.013
N_Nitrite	mg/L	0.06	0.06	n/v	69.8%	129.1%	26.8%	-10.3%	0.011	0.002	0.005	0.012	0.006	0.002	0.004	0.008	-48.7%	-9.1%	-10.1%	-27.8%	0.011	0.009	0.003
N_Nitrate	mg/L	13	n/v	n/v	-0.5%	115.3%	137.7%	133.2%	0.025	0.029	0.030	0.030	0.022	0.020	0.026	0.036	-10.8%	-29.7%	-14.2%	21.2%	0.090	0.029	0.030
Cyanide_T	mg/L	n/v	n/v	0.5	9.8%	-10.9%	-23.4%	4.6%	0.0005	0.0006	0.0010	0.0013	0.0006	0.0005	0.0005	0.0005	23.5%	-18.8%	-47.7%	-60.6%	0.0005	0.0008	0.0006
Cyanide_F	mg/L	0.005	0.0052	n/v	-10.5%	-38.2%	-46.5%	-26.1%	0.0005	0.0006	0.0010	0.0013	0.0005	0.0004	0.0004	0.0007	6.5%	-27.4%	-55.2%	-47.8%	0.0005	0.0006	0.0010
Cyanide_WAD	mg/L	n/v	n/v	n/v	10.1%	-24.1%	-33.8%	-8.2%	0.0005	0.0006	0.0010	0.0013	0.0005	0.0004	0.0005	0.0005	8.1%	-23.1%	-51.2%	-63.4%	0.0005	0.0006	0.0006
Hardness	mg/L	n/v	n/v	n/v	26.7%	6.3%	-8.1%	-8.8%	140.0	70.0	85.0	80.0	151.1	54.3	67.9	64.5	8.0%	-22.4%	-20.2%	-19.4%	67.0	56.0	52.0
Radium_226	Bq/L	n/v	n/v	0.37	5.1%	-24.7%	-5.7%	-12.3%	0.0081	0.0062	0.0048	0.0051	0.0065	0.0041	0.0048	0.0048	-20.3%	-33.2%	0.2%	-6.0%	0.0064	0.0049	0.0046
Aluminum_D	mg/L	n/v	n/v	n/v	7.1%	-57.8%	49.6%	45.6%	0.010	0.015	0.004	0.005	0.003	0.009	0.005	0.003	-74.3%	-37.8%	10.7%	-37.7%	0.006	0.015	0.006
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	-9.8%	-32.2%	12.4%	-3.0%	0.020	0.022	0.012	0.018	0.009	0.021	0.012	0.014	-53.4%	-4.7%	3.6%	-22.8%	0.011	0.046	0.039
Antimony_D	mg/L	n/v	n/v	n/v	-9.0%	-27.7%	-7.0%	2.5%	0.00009	0.00009	0.00008	0.00008	0.00008	0.00007	0.00008	0.00008	-15.7%	-27.9%	2.6%	-1.0%	0.00009	0.00009	0.00008
Antimony_T	mg/L	n/v	n/v	n/v	2.7%	-9.9%	10.0%	21.7%	0.00015	0.00009	0.00008	0.00010	0.00010	0.00007	0.00009	0.00009	-33.2%	-21.6%	11.4%	-13.6%	0.00013	0.00009	0.00008
Arsenic_D	mg/L	n/v	0.15	0.3	0.2%	-16.6%	-36.2%	-34.3%	0.00100	0.00058	0.00066	0.00049	0.00080	0.00037	0.00046	0.00039	-20.5%	-36.1%	-30.7%	-20.7%	0.00031	0.00028	0.00031
Arsenic_T	mg/L	0.005	n/v	0.3	1.9%	-15.0%	-34.8%	-32.5%	0.00105	0.00058	0.00069	0.00050	0.00082	0.00039	0.00053	0.00046	-21.8%	-32.8%	-23.8%	-8.1%	0.00031	0.00028	0.00033
Barium_D	mg/L	n/v	n/v	n/v	15.3%	-1.5%	-0.3%	-8.9%	0.0270	0.0120	0.0120	0.0120	0.0209	0.0096	0.0114	0.0108	-22.6%	-19.7%	-5.3%	-10.3%	0.0120	0.0086	0.0096
Barium_T	mg/L	n/v	n/v	n/v	19.8%	2.9%	4.5%	-3.9%	0.0270	0.0140	0.0120	0.0130	0.0219	0.0103	0.0120	0.0115	-19.0%	-26.6%	-0.3%	-11.8%	0.0120	0.0098	0.0096
Beryllium_T	mg/L	n/v	n/v	n/v	-2.1%	-24.3%	-4.5%	5.9%	0.00009	0.00009	0.00008	0.00008	0.00008	0.00007	0.00008	0.00008	-9.5%	-26.3%	4.2%	0.8%	0.00009	0.00009	0.00008
Boron_D	mg/L	n/v	n/v	n/v	30.2%	32.8%	-19.7%	-18.0%	0.0120	0.0057	0.0088	0.0074	0.0118	0.0063	0.0080	0.0072	-1.4%	10.1%	-9.5%	-2.8%	0.0110	0.0050	0.0050
Boron_T	mg/L	1.5	1.5	n/v	38.2%	35.3%	-14.9%	-20.5%	0.0190	0.0057	0.0092	0.0090	0.0171	0.0111	0.0099	0.0080	-9.8%	94.2%	7.2%	-11.3%	0.0120	0.0050	0.0050
Cadmium_D	mg/L	n/v	Equation*	n/v	-37.4%	-48.2%	-35.4%	-28.3%	0.000005	0.000006	0.000004	0.000004	0.000002	0.000003	0.000003	0.000003	-48.8%	-48.0%	-21.7%	-29.4%	0.000005	0.000005	0.000004
Cadmium_T	mg/L	Equation**	n/v	n/v	-19.2%	-34.4%	-17.9%	-9.1%	0.000012	0.000007	0.000007	0.000010	0.000004	0.000004	0.000004	0.000004	-64.0%	-36.6%	-36.1%	-59.2%	0.000005	0.000005	0.000005
Calcium_D	mg/L	n/v	n/v	n/v	25.8%	8.6%	-8.9%	-11.9%	39.0	20.0	25.0	22.0	42.1	15.0	18.9	18.0	8.0%	-24.8%	-24.2%	-18.1%	18.0	15.0	14.0
Chromium_D	mg/L	n/v	Equation*	n/v	-16.9%	-38.6%	-16.4%	-24.1%	0.00006	0.00018	0.00005	0.00005	0.00004	0.00008	0.00005	0.00004	-38.5%	-56.9%	-1.0%	-27.0%	0.00005	0.00020	0.00008
Chromium_D_Hex	mg/L	0.001	0.011	n/v	18.5%	-15.8%	8.6%	-32.9%	0.00006	0.00018	0.00005	0.00005	0.00005	0.00008	0.00005	0.00004	-22.4%	-54.4%	9.9%	-15.6%	0.00005	0.00020	0.00008
Chromium_T	mg/L	0.0089	n/v	n/v	2.2%	-24.2%	-9.1%	40.2%	0.00011	0.00022	0.00008	0.00009	0.00009	0.00013	0.00010	0.00008	-17.1%	-39.5%	28.1%	-8.6%	0.00010	0.00022	0.00016
Cobalt_D	mg/L	n/v	n/v	n/v	-21.2%	-35.6%	-15.2%	-2.6%	0.00012	0.00009	0.00008	0.00008	0.00008	0.00007	0.00008	0.00008	-36.2%	-29.9%	-1.8%	-3.4%	0.00009	0.00009	0.00008
Cobalt_T	mg/L	n/v	n/v	n/v	-15.8%	-25.1%	-4.2%	10.6%	0.00015	0.00009	0.00008	0.00008	0.00009	0.00007	0.00008	0.00008	-42.3%	-26.4%	3.8%	2.7%	0.00009	0.00009	0.00008
Copper_D	mg/L	n/v	Equation*	0.3	-7.6%	-32.6%	-28.3%	0.5%	0.00012	0.00027	0.00023	0.00012	0.00008	0.00018	0.00016	0.00010	-29.3%	-34.1%	-30.5%	-15.0%	0.00041	0.00039	0.00049
Copper_T	mg/L	Equation**	n/v	0.3	-4.8%	-21.8%	-20.6%	19.5%	0.00026	0.00038	0.00023	0.00034	0.00021	0.00025	0.00021	0.00024	-18.4%	-33.2%	-10.2%	-30.4%	0.00071	0.00043	0.00049
Iron_D	mg/L	n/v	n/v	n/v	-81.6%	-89.5%	-38.5%	-56.7%	0.47	0.18	0.10	0.09	0.04	0.05	0.03	0.02	-90.5%	-74.9%	-71.5%	-73.7%	0.03	0.08	0.02
Iron_T	mg/L	0.3	0.3	n/v	13.7%	-8.2%	193.4%	80.4%	**0.50**	0.28	0.17	0.13	**0.40**	0.16	0.14	0.12	-19.5%	-43.5%	-15.7%	-4.5%	0.04	0.16	0.08
Lead_D	mg/L	n/v	Equation*	0.1	-54.7%	-61.0%	-49.1%	-46.9%	0.00004	0.00006	0.00006	0.00004	0.00001	0.00002	0.00003	0.00002	-73.8%	-55.9%	-52.8%	-42.8%	0.00004	0.00004	0.00004
Lead_T	mg/L	Equation**	n/v	0.1	3.4%	-65.5%	-79.3%	17.1%	0.00004	0.00007	0.00017	0.00004	0.00002	0.00005	0.00005	0.00003	-51.2%	-36.2%	-71.9%	-15.7%	0.00004	0.00006	0.00004
Magnesium_D	mg/L	n/v	n/v	n/v	31.1%	6.6%	-8.3%	-16.0%	9.70	4.90	6.10	5.90	10.40	3.84	4.81	4.60	7.2%	-21.7%	-21.1%	-22.1%	5.40	4.30	4.10
Manganese_D	mg/L	0.35	n/v	n/v	-16.8%	27.1%	3785.5%	1412.2%	0.5200	0.0450	0.0240	0.0130	0.2313	0.0765	0.0841	0.0723	-55.5%	69.9%	250.6%	456.2%	0.0028	0.0410	0.0038
Manganese_T	mg/L	0.35	n/v	n/v	-10.8%	21.0%	646.7%	426.8%	0.530	0.052	0.033	0.023	0.252	0.091	0.106	0.094	-52.5%	75.2%	220.4%	309.6%	0.005	0.068	0.018
Mercury_D	mg/L	n/v	n/v	n/v	1.8%	-40.3%	-16.0%	16.0%	0.0000021	0.0000014	0.0000014	0.0000008	0.0000011	0.0000009	0.0000010	0.0000009	-49.0%	-34.0%	-25.4%	20.0%	0.0000007	0.0000015	0.0000010
Mercury_T	mg/L	0.000026	2.6E-05	n/v	16.0%	-31.8%	6.9%	44.3%	0.0000023	0.0000019	0.0000014	0.0000008	0.0000018	0.0000012	0.0000012	0.0000011	-21.3%	-34.6%	-10.9%	42.6%	0.0000009	0.0000015	0.0000010
Molybdenum_D	mg/L	n/v	n/v	n/v	-6.4%	-18.0%	-26.5%	-25.4%	0.00020	0.00036	0.00023	0.00031	0.00018	0.00030	0.00027	0.00025	-9.5%	-16.3%	19.5%	-18.0%	0.00081	0.00061	0.00072
Molybdenum_T	mg/L	0.073	0.073	n/v	-2.5%	-11.7%	-26.7%	-21.6%	0.00027	0.00038	0.00027	0.00031	0.00023	0.00034	0.00032	0.00029	-13.2%	-10.9%	18.2%	-6.8%	0.00087	0.00066	0.00074
Nickel_D	mg/L	n/v	Equation*	0.5	-4.3%	-15.0%	21.6%	12.3%	0.00021	0.00021	0.00022	0.00022	0.00019	0.00016	0.00019	0.00019	-8.2%	-24.8%	-14.5%	-14.7%	0.00021	0.00021	0.00022
Nickel_T	mg/L	Equation**	n/v	0.5	17.9%	-2.9%	-11.7%	61.3%	0.00029	0.00021	0.00028	0.00028	0.00030	0.00019	0.00026	0.00027	3.8%	-7.3%	-7.0%	-4.3%	0.00021	0.00021	0.00030
Potassium_D	mg/L	n/v	n/v	n/v	42.6%	8.9%	-12.9%	-25.6%	3.60	2.00	2.40	2.30	3.95	1.43	1.75	1.58	9.7%	-28.4%	-27.2%	-31.4%	1.60	1.40	1.30
Selenium_D	mg/L	n/v	n/v	n/v	-13.4%	-23.6%	-2.1%	-13.1%	0.00005	0.00018	0.00004	0.00004	0.00005	0.00007	0.00005	0.00004	-7.8%	-63.7%	30.4%	5.3%	0.00005	0.00005	0.00004
Selenium_T	mg/L	0.001	0.001	n/v	-3.3%	-23.0%	12.0%	-9.7%	0.00005	0.00018	0.00004	0.00005	0.00005	0.00007	0.00006	0.00004	1.1%	-62.7%	37.5%	-2.2%	0.00005	0.00005	0.00004
Silicon_D	mg/L	n/v	n/v	n/v	-7.4%	-1.2%	55.9%	16.6%	4.0	1.3	0.9	1.6	3.0	1.1	0.9	1.2	-25.2%	-12.3%	3.7%	-22.3%	1.7	1.2	1.2
Silicon_T	mg/L	n/v	n/v	n/v	-5.0%	-2.8%	60.0%	19.7%	4.0	1.5	0.9	1.8	3.1	1.2	1.0	1.4	-22.6%	-18.8%	9.3%	-22.4%	1.7	1.3	1.2
Silver_D	mg/L	n/v	n/v	n/v	-0.1%	-14.2%	-4.6%	-12.2%	0.000005	0.000018	0.000005	0.000005	0.000005	0.000007	0.000006	0.000005	3.5%	-61.6%	18.3%	-3.9%	0.000005	0.000018	0.000005
Silver_T	mg/L	0.00025	0.0001	n/v	15.5%	-1.4%	9.4%	1.1%	0.000005	0.000018	0.000005	0.000005	0.000006	0.000007	0.000006	0.000005	15.7%	-60.4%	25.6%	3.8%	0.000005	0.000018	0.000005
Sodium_D	mg/L	n/v	n/v	n/v	41.8%	21.3%	-6.1%	-10.5%	5.3	2.8	3.5	3.3	5.1	2.1	2.8	2.8	-4.5%	-24.3%	-19.5%	-14.8%	3.0	2.4	2.3
Sodium_T	mg/L	n/v	n/v	n/v	50.9%	30.2%	-0.3%	-8.0%	5.4	2.8	3.7	3.3	6.7	2.5	3.1	2.9	23.2%	-11.9%	-16.5%	-10.8%	3.1	2.4	2.4
Strontium_D	mg/L	n/v	n/v	n/v	33.1%	13.2%	-11.1%	-15.7%	0.081	0.041	0.053	0.047	0.093	0.034	0.042	0.038	14.3%	-17.3%	-21.6%	-18.2%	0.041	0.033	0.033
Strontium_T	mg/L	n/v	n/v	n/v	42.5%	17.2%	-5.1%	-15.4%	0.081	0.041	0.054	0.048	0.099	0.036	0.044	0.041	21.9%	-12.1%	-18.7%	-14.9%	0.042	0.034	0.033
Thallium_D	mg/L	n/v	n/v	n/v	-26.0%	-35.5%	1.3%	31.4%	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003	0.00004	0.00003	-28.4%	-30.4%	14.9%	7.5%	0.00004	0.00004	0.00003
Thallium_T	mg/L	0.0008	0.0008	n/v	-22.0%	-32.8%	5.4%	37.4%	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003	0.00004	0.00004	-25.5%	-29.4%	16.8%	9.6%	0.00004	0.00004	0.00003
Uranium_D	mg/L	n/v	n/v	n/v	-25.1%	-29.5%	-34.0%	-27.1%	0.00021	0.00010	0.00007	0.00007	0.00011	0.00005	0.00004	0.00004	-46.2%	-50.3%	-33.3%	-43.6%	0.00005	0.00005	0.00005
Uranium_T	mg/L	0.015	0.015	n/v	-23.8%	-33.6%	-32.1%	-27.9%	0.00023	0.00013	0.00010	0.00007	0.00013	0.00006	0.00006	0.00005	-44.8%	-50.5%	-34.1%	-29.9%	0.00005	0.00005	0.00005
Vanadium_T	mg/L	n/v	n/v	n/v	37.6%	-0.6%	-32.1%	-27.9%	0.00013	0.00023	0.00016	0.00016	0.00017	0.00010	0.00013	0.00013	33.3%	-55.4%	-19.0%	-16.4%	0.00014	0.00018	0.00030
Zinc_D	mg/L	Equation**	Equation*	0.5	-52.7%	-57.6%	-56.4%	-2.7%	0.00077	0.00094	0.00110	0.00088	0.00034	0.00041	0.00056	0.00055	-55.9%	-56.7%	-49.1%	-38.0%	0.00150	0.00086	0.00120
Zinc_T	mg/L	n/v	n/v	0.5	-18.5%	-33.2%	-33.1%	-19.2%	0.00150	0.00094	0.00190	0.00210	0.00086	0.00086	0.00106	0.00110	-42.4%	-8.5%	-44.0%	-47.5%	0.00150	0.00086	0.00120

See notes on last page

Table E-3: Baseline water quality model results for expected case

Location	Units	Guidelines/Limits			Swede Lake	Swede Lake				Swede Lake				Ellystan Lake				Ellystan Lake				Ellystan Lake			
Source		CWQG	MSOG	MDMER	Observed (AQF15)	Modeled (Post-Closure)				Difference				Observed (AQF20)				Modeled (Post-Closure)				Difference			
Statistic					Mean	Mean				%				Mean				Mean				%			
Season					fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter																									
Temperature, Field***	deg C	n/v	n/v	n/v	8.9	0.3	11.0	20.0	8.9	0.0%	0.0%	0.0%	0.0%	0.7	12.0	18.0	8.1	0.7	12.0	18.0	8.1	0.0%	0.0%	0.0%	0.0%
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	7.6	7.3	7.3	7.3	7.3	0.1	0.0	0.0	0.0	6.9	7.2	7.4	7.6	7.2	7.1	7.2	7.2	0.1	0.0	0.0	0.0
Bromide	mg/L	n/v	n/v	n/v	0.050	0.055	0.045	0.047	0.048	9.8%	-9.9%	-6.3%	-4.2%	0.050	0.050	0.050	0.050	0.053	0.046	0.048	0.048	6.7%	-7.3%	-4.8%	-3.5%
Chloride	mg/L	120	n/v	n/v	0.35	0.39	0.34	0.33	0.32	-31.1%	35.4%	9.5%	-7.4%	0.65	0.31	0.25	0.30	0.40	0.41	0.38	0.37	-38.6%	32.0%	52.9%	21.9%
Fluoride	mg/L	0.12	0.12	n/v	0.077	0.085	0.074	0.074	0.074	-0.5%	6.5%	-3.2%	-4.1%	0.080	0.068	0.074	0.074	0.080	0.068	0.069	0.071	-0.4%	0.4%	-6.2%	-3.8%
Sulfate	mg/L	n/v	n/v	n/v	6.30	6.26	5.07	4.96	4.94	-18.7%	-15.6%	-17.4%	-21.6%	4.70	2.90	3.80	4.00	3.83	3.15	3.13	3.30	-18.5%	8.7%	-17.8%	-17.4%
Phosphorus_T	mg/L	Narrative	0.025	n/v	0.018	0.019	0.016	0.018	0.018	21.8%	-4.2%	-10.1%	0.1%	0.019	0.024	0.024	0.018	0.022	**0.025**	0.023	0.022	16.6%	4.8%	-3.1%	23.6%
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.007	0.009	0.007	0.006	0.006	-6.4%	43.8%	-52.0%	-14.8%	0.014	0.013	0.013	0.011	0.011	0.013	0.012	0.010	-23.4%	-1.3%	-11.3%	-2.6%
N_Nitrite	mg/L	0.06	0.06	n/v	0.022	0.008	0.006	0.006	0.006	-30.6%	-33.6%	134.0%	-71.2%	0.008	0.009	0.007	0.005	0.006	0.005	0.006	0.006	-18.8%	-37.6%	-15.3%	3.5%
N_Nitrate	mg/L	13	n/v	n/v	0.030	0.049	0.055	0.048	0.044	-45.1%	89.4%	61.3%	48.1%	0.156	0.040	0.051	0.037	0.072	0.092	0.078	0.069	-53.9%	131.0%	53.2%	87.1%
Cyanide_T	mg/L	n/v	n/v	0.5	0.0005	0.0006	0.0005	0.0005	0.0006	24.4%	-32.3%	-13.1%	10.1%	0.0011	0.0006	0.0010	0.0013	0.0009	0.0011	0.0009	0.0008	-19.1%	77.4%	-7.8%	-34.8%
Cyanide_F	mg/L	0.005	0.0052	n/v	0.0013	0.0008	0.0006	0.0006	0.0007	58.0%	7.2%	-35.4%	-45.9%	0.0005	0.0006	0.0010	0.0013	0.0008	0.0007	0.0007	0.0007	60.6%	24.1%	-28.4%	-44.6%
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.0005	0.0006	0.0004	0.0005	0.0005	10.7%	-21.5%	-24.4%	-1.4%	0.0005	0.0006	0.0010	0.0013	0.0007	0.0006	0.0006	0.0006	31.0%	4.5%	-39.5%	-53.8%
Hardness	mg/L	n/v	n/v	n/v	54.0	60.4	50.0	49.8	49.1	-9.9%	-10.7%	-4.3%	-9.1%	59.0	35.0	42.0	44.0	46.0	38.7	38.5	40.0	-22.1%	10.5%	-8.3%	-9.2%
Radium_226	Bq/L	n/v	n/v	0.37	0.0049	0.0054	0.0045	0.0045	0.0046	-16.4%	-9.2%	-1.4%	-6.6%	0.0050	0.0045	0.0047	0.0048	0.0049	0.0043	0.0044	0.0044	-1.4%	-5.0%	-6.7%	-7.4%
Aluminum_D	mg/L	n/v	n/v	n/v	0.007	0.007	0.006	0.007	0.006	7.5%	-58.0%	10.0%	-3.3%	0.007	0.030	0.015	0.015	0.012	0.014	0.014	0.012	88.4%	-52.7%	-7.4%	-18.7%
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	0.046	0.037	0.035	0.036	0.035	235.0%	-23.4%	-8.0%	-24.1%	0.033	0.093	0.079	0.062	0.050	0.091	0.072	0.054	50.8%	-2.0%	-8.9%	-13.4%
Antimony_D	mg/L	n/v	n/v	n/v	0.00008	0.00009	0.00008	0.00008	0.00008	-1.9%	-19.0%	-1.7%	-1.2%	0.00009	0.00009	0.00009	0.00008	0.00009	0.00008	0.00008	0.00008	-4.1%	-13.2%	-2.4%	0.6%
Antimony_T	mg/L	n/v	n/v	n/v	0.00008	0.00011	0.00010	0.00010	0.00010	-15.4%	5.5%	21.7%	19.9%	0.00009	0.00009	0.00008	0.00008	0.00009	0.00008	0.00008	0.00008	-1.3%	-10.9%	0.0%	3.0%
Arsenic_D	mg/L	n/v	0.15	0.3	0.00031	0.00023	0.00019	0.00020	0.00020	-25.5%	-31.8%	-34.9%	-35.8%	0.00031	0.00025	0.00031	0.00025	0.00023	0.00020	0.00021	0.00021	-25.5%	-20.2%	-33.0%	-16.1%
Arsenic_T	mg/L	0.005	n/v	0.3	0.00031	0.00031	0.00025	0.00027	0.00027	-0.2%	-11.8%	-18.7%	-12.2%	0.00032	0.00027	0.00033	0.00029	0.00031	0.00026	0.00027	0.00028	-3.8%	-3.9%	-17.3%	-4.2%
Barium_D	mg/L	n/v	n/v	n/v	0.0096	0.0102	0.0083	0.0084	0.0084	-14.7%	-3.0%	-12.8%	-12.0%	0.0120	0.0071	0.0069	0.0077	0.0092	0.0080	0.0081	0.0082	-23.1%	12.9%	17.6%	6.8%
Barium_T	mg/L	n/v	n/v	n/v	0.0099	0.0111	0.0092	0.0092	0.0092	-7.5%	-6.6%	-4.0%	-7.2%	0.0130	0.0094	0.0080	0.0086	0.0106	0.0098	0.0096	0.0095	-18.7%	4.0%	20.2%	10.8%
Beryllium_T	mg/L	n/v	n/v	n/v	0.00008	0.00009	0.00008	0.00008	0.00008	1.6%	-16.3%	1.4%	2.1%	0.00009	0.00009	0.00008	0.00008	0.00009	0.00008	0.00008	0.00008	-1.7%	-11.3%	-0.3%	2.8%
Boron_D	mg/L	n/v	n/v	n/v	0.0050	0.0040	0.0034	0.0032	0.0031	-63.2%	-33.0%	-35.7%	-37.4%	0.0085	0.0050	0.0050	0.0050	0.0035	0.0031	0.0032	0.0031	-59.0%	-37.7%	-36.1%	-37.2%
Boron_T	mg/L	1.5	1.5	n/v	0.0050	0.0051	0.0043	0.0041	0.0038	-57.8%	-13.6%	-18.4%	-23.2%	0.0140	0.0074	0.0050	0.0050	0.0064	0.0072	0.0067	0.0061	-54.1%	-2.0%	34.9%	22.5%
Cadmium_D	mg/L	n/v	Equation*	n/v	0.000004	0.000004	0.000003	0.000004	0.000004	-15.4%	-28.6%	-11.7%	-12.0%	0.000005	0.000005	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	-10.7%	-19.0%	-9.4%	-5.6%
Cadmium_T	mg/L	Equation**	n/v	n/v	0.000004	0.000005	0.000004	0.000004	0.000004	9.1%	-22.5%	-13.5%	12.3%	0.000005	0.000007	0.000005	0.000004	0.000005	0.000004	0.000005	0.000005	6.2%	-35.4%	-4.7%	13.1%
Calcium_D	mg/L	n/v	n/v	n/v	14.0	16.0	13.3	13.2	13.0	-10.9%	-11.4%	-5.4%	-7.0%	16.0	9.5	11.0	12.0	12.2	10.3	10.2	10.6	-23.9%	8.3%	-6.9%	-11.8%
Chromium_D	mg/L	n/v	Equation*	n/v	0.00005	0.00007	0.00006	0.00007	0.00007	41.2%	-68.8%	-6.9%	35.7%	0.00006	0.00017	0.00013	0.00005	0.00009	0.00009	0.00009	0.00009	51.6%	-45.9%	-30.5%	71.5%
Chromium_D_Hex	mg/L	0.001	0.011	n/v	0.00005	0.00007	0.00007	0.00008	0.00007	49.7%	-67.0%	-2.9%	41.2%	0.00006	0.00017	0.00013	0.00005	0.00007	0.00006	0.00006	0.00006	15.8%	-65.2%	-52.5%	25.6%
Chromium_T	mg/L	0.0089	n/v	n/v	0.00024	0.00017	0.00016	0.00016	0.00016	68.0%	-27.6%	0.0%	-34.6%	0.00014	0.00035	0.00027	0.00014	0.00021	0.00023	0.00021	0.00020	49.7%	-35.1%	-21.6%	40.7%
Cobalt_D	mg/L	n/v	n/v	n/v	0.00008	0.00009	0.00007	0.00008	0.00008	-3.8%	-20.4%	-3.4%	-3.1%	0.00009	0.00009	0.00008	0.00008	0.00009	0.00008	0.00008	0.00008	-5.4%	-14.3%	-3.5%	-0.6%
Cobalt_T	mg/L	n/v	n/v	n/v	0.00008	0.00009	0.00008	0.00008	0.00008	-1.1%	-18.2%	-1.1%	-0.8%	0.00009	0.00012	0.00008	0.00008	0.00010	0.00008	0.00009	0.00009	3.9%	-29.5%	5.5%	8.8%
Copper_D	mg/L	n/v	Equation*	0.3	0.00038	0.00042	0.00040	0.00040	0.00039	2.1%	2.4%	-18.5%	3.0%	0.00037	0.00046	0.00050	0.00037	0.00043	0.00037	0.00038	0.00039	15.4%	-20.2%	-23.0%	6.3%
Copper_T	mg/L	Equation**	n/v	0.3	0.00043	0.00056	0.00059	0.00055	0.00052	-20.8%	36.8%	11.9%	19.9%	0.00043	0.00048	0.00053	0.00037	0.00047	0.00042	0.00045	0.00045	10.2%	-13.2%	-15.3%	20.3%
Iron_D	mg/L	n/v	n/v	n/v	0.02	0.02	0.02	0.02	0.02	-13.1%	-72.1%	6.1%	-14.2%	0.15	0.13	0.05	0.04	0.16	0.30	0.22	0.17	6.7%	131.1%	337.6%	374.6%
Iron_T	mg/L	0.3	0.3	n/v	0.08	0.08	0.07	0.08	0.07	112.1%	-55.5%	-3.1%	-11.8%	0.19	0.29	0.15	0.10	0.17	**0.32**	0.24	0.18	-9.8%	9.9%	62.9%	81.5%
Lead_D	mg/L	n/v	Equation*	0.1	0.00004	0.00003	0.00003	0.00003	0.00003	-23.4%	-35.0%	-32.5%	-19.8%	0.00004	0.00004	0.00004	0.00004	0.00003	0.00003	0.00003	0.00003	-17.4%	-24.4%	-14.7%	-13.3%
Lead_T	mg/L	Equation**	n/v	0.1	0.00004	0.00006	0.00006	0.00006	0.00005	39.7%	-1.5%	37.2%	27.8%	0.00005	0.00009	0.00005	0.00004	0.00006	0.00006	0.00007	0.00006	12.0%	-29.0%	36.3%	57.8%
Magnesium_D	mg/L	n/v	n/v	n/v	4.40	4.84	3.99	3.98	3.96	-10.4%	-7.2%	-3.0%	-10.1%	4.50	2.70	3.40	3.60	3.74	3.11	3.09	3.24	-17.0%	15.1%	-9.2%	-10.1%
Manganese_D	mg/L	0.35	n/v	n/v	0.0022	0.0092	0.0093	0.0107	0.0085	226.9%	-77.4%	180.4%	286.7%	0.0610	0.0300	0.0130	0.0046	0.0247	0.0396	0.0314	0.0253	-59.5%	32.0%	141.3%	450.3%
Manganese_T	mg/L	0.35	n/v	n/v	0.012	0.023	0.022	0.025	0.021	346.7%	-68.0%	37.4%	76.6%	0.073	0.081	0.050	0.017	0.047	0.064	0.055	0.047	-35.6%	-20.5%	9.4%	176.4%
Mercury_D	mg/L	n/v	n/v	n/v	0.0000008	0.0000009	0.0000008	0.0000009	0.0000008	25.0%	-47.8%	-14.6%	-1.3%	0.0000008	0.0000018	0.0000014	0.0000009	0.0000009	0.0000009	0.0000009	0.0000009	13.9%	-51.6%	-32.3%	3.5%
Mercury_T	mg/L	0.000026	2.6E-05	n/v	0.0000008	0.0000010	0.0000009	0.0000010	0.0000009	22.9%	-40.0%	-3.9%	9.9%	0.0000010	0.0000022	0.0000014	0.0000009	0.0000013	0.0000013	0.0000013	0.0000012	25.8%	-42.5%	-10.1%	34.1%
Molybdenum_D	mg/L	n/v	n/v	n/v	0.00079	0.00081	0.00082	0.00078	0.00075	0.2%	34.1%	7.8%	-5.3%	0.00052	0.00035	0.00049	0.00046	0.00053	0.00043	0.00044	0.00047	2.6%	23.7%	-10.4%	2.0%
Molybdenum_T	mg/L	0.073	0.073	n/v	0.00083	0.00086	0.00086	0.00082	0.00079	-1.5%	30.7%	10.6%	-5.1%	0.00053	0.00038	0.00054	0.00050	0.00058	0.00047	0.00048	0.00052	10.2%	24.3%	-10.7%	3.5%
Nickel_D	mg/L	n/v	Equation*	0.5	0.00022	0.00022	0.00018	0.00019	0.00019	4.2%	-15.5%	-15.4%	-12.3%	0.00021	0.00021	0.00022	0.00022	0.00021	0.00019	0.00019	0.00019	2.2%	-11.4%	-13.0%	-11.7%
Nickel_T	mg/L	Equation**	n/v	0.5	0.00028	0.00028	0.00022	0.00023	0.00024	32.4%	5.5%	-23.1%	-13.4%	0.00025	0.00031	0.00032	0.00028	0.00029	0.00028	0.00027	0.00027	16.8%	-8.7%	-14.8%	-4.8%
Potassium_D	mg/L	n/v	n/v	n/v	1.30	1.51	1.25	1.25	1.23	-5.9%	-10.7%	-3.9%	-5.7%	1.40	0.98	0.91	1.00	1.10	0.95	0.95	0.95	-21.6%	-2.8%	4.5%	-4.7%
Selenium_D	mg/L	n/v	n/v	n/v	0.00004	0.00004	0.00004	0.00004	0.00004	-9.0%	-20.3%	-5.8%	-8.0%	0.00005	0.00014	0.00012	0.00004	0.00007	0.00007	0.00007	0.00006	43.7%	-46.9%	-41.1%	60.7%
Selenium_T	mg/L	0.001	0.001	n/v	0.00005	0.00005	0.00004	0.00004	0.00004	-9.0%	-12.2%	2.0%	-12.8%	0.00005	0.00014	0.00012	0.00004	0.00007	0.00008	0.00007	0.00007	49.6%	-45.3%	-39.3%	66.2%
Silicon_D	mg/L	n/v	n/v	n/v	1.4	1.5	1.3	1.2	1.2	-13.5%	4.2%	2.6%	-13.4%	1.3	1.0	0.6	0.8	0.9	0.8	0.8	0.8	-29.0%	-16.7%	44.0%	-5.7%
Silicon_T	mg/L	n/v	n/v	n/v	1.6	1.5	1.3	1.3	1.3	-9.1%	-0.8%	6.5%	-20.8%	1.3	1.3	0.7	1.0	1.1	1.0	0.9	0.9	-17.4%	-26.8%	38.4%	-3.1%
Silver_D	mg/L	n/v	n/v	n/v	0.000005	0.000006	0.000005	0.000006	0.000006	21.3%	-69.5%	21.1%	10.5%	0.000005	0.000014	0.000013	0.000005	0.000008	0.000008	0.000008	0.000008	60.7%	-40.8%	-37.7%	52.6%
Silver_T	mg/L	0.00025	0.0001	n/v	0.000005	0.000006	0.000006	0.000006	0.000006	24.2%	-68.8%	23.4%	12.7%	0.000005	0.000014	0.000013	0.000005	0.000008	0.000008	0.000008	0.000008	62.7%	-40.2%	-37.1%	54.2%
Sodium_D	mg/L	n/v	n/v	n/v	2.5	2.7	2.2	2.2	2.2	-11.5%	-9.5%	-5.6%	-12.5%	2.7	1.7	2.0	2.2	2.2	1.8	1.8	1.9	-18.9%	7.6%	-8.9%	-13.4%
Sodium_T	mg/L	n/v	n/v	n/v	2.5	3.0	2.5	2.4	2.4	-3.4%	2.5%	1.8%	-2.7%	2.7	1.7	2.1	2.2	2.4	2.0	2.0	2.1	-10.6%	18.2%	-4.4%	-4.3%
Strontium_D	mg/L	n/v	n/v	n/v	0.035	0.038	0.031	0.031	0.031	-7.7%	-5.6%	-6.0%	-11.6%	0.035	0.022	0.027	0.027	0.029	0.024	0.024	0.025	-18.3%	9.0%	-11.3%	-7.9%
Strontium_T	mg/L	n/v	n/v	n/v	0.035	0.040	0.033	0.033	0.032	-4.8%	-2.8%	-0.7%	-7.2%	0.037	0.023	0.028	0.029	0.031	0.026	0.026	0.027	-14.9%	14.4%	-6.1%	-5.4%
Thallium_D	mg/L	n/v	n/v	n/v	0.00003	0.00004	0.00003	0.00003	0.00003	-11.6%	-26.4%	5.7%	4.2%	0.00004	0.00004	0.00004	0.00003	0.00004	0.00003	0.00004	0.00003	-13.7%	-18.1%	0.1%	6.4%
Thallium_T	mg/L	0.0008	0.0008	n/v	0.00003	0.00004	0.00003	0.00003	0.00003	-10.5%	-25.6%	6.8%	5.3%	0.00004	0.00004	0.00004	0.00003	0.00004	0.00003	0.00004	0.00003	-13.1%	-17.6%	0.7%	7.0%
Uranium_D	mg/L	n/v	n/v	n/v	0.00005	0.00003	0.00003	0.00003	0.00003	-32.4%	-41.2%	-40.7%	-38.9%	0.00005	0.00005	0.00005	0.00005	0.00004	0.00003	0.00004	0.00003	-22.2%	-27.4%	-23.9%	-22.9%
Uranium_T	mg/L	0.015	0.015	n/v	0.00005	0.00004	0.00003	0.00003	0.00003	-24.7%	-34.8%	-36.6%	-34.6%	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	0.00004	-15.4%	-23.5%	-24.6%	-18.2%
Vanadium_T	mg/L	n/v	n/v	n/v	0.00029	0.00024	0.00021	0.00021	0.00021	71.9%	18.2%	-29.7%	-25.9%	0.00021	0.00045	0.00032	0.00030	0.00029	0.00032	0.00029	0.00027	38.3%	-29.6%	-9.0%	-9.5%
Zinc_D	mg/L	Equation**	Equation*	0.5	0.00076	0.00102	0.00101	0.00097	0.00094	-32.2%	17.3%	-19.3%	23.5%	0.00250	0.00110	0.00100	0.00096	0.00103	0.00089	0.00092	0.00093	-58.8%	-18.9%	-7.9%	-3.3%
Zinc_T	mg/L	n/v	n/v	0.5	0.01300	0.00345	0.00385	0.00314	0.00312	130.2%	348.1%	161.9%	-76.0%	0.00310	0.00110	0.00110	0.00110	0.00154	0.00133	0.00124	0.00121	-50.2%	20.6%	12.9%	9.9%

See notes on last page

Table E-3: Baseline water quality model results for expected case

Notes:
Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.
Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.
T and pH are used for calculations of guidelines only and are not modeled.
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
CWQG for total phosphorus: Canadian Guidance Frameworks is used for total phosphorus (CCME 2020): ultra-oligotrophic <4 µg/L, oligotrophic 4-10 µg/L, mesotrophic 10-20 µg/L, meso-eutrophic 20-35 µg/L, eutrophic 35-100 µg/L, hyper-eutrophic >100 µg/L
CWQG for total zinc - most stringent guideline is applied using 0.3 mg/L of dissolved organic carbon (CCME 2020).
CWQG for total and dissolved manganese - most stringent long-term guideline is applied using the lowest hardnes as $CaCO_3$ (35 mg/L) and pH (6.70) (CCME 2019).
MSOG - Manitoba Water Quality Standards, Objectives, and Guidelines for Freshwater Aquatic Life (MSOG-FAL referred to as MSOG), long-term (MWS 2001).
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Schedule 4 - Authorized Limits of Deleterious Substances, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
MDMER is applied for total and dissolved metal concentrations for the purpose of the modeling.
Equation* - MSOG formula for calculation of hardness, pH, and temperature-dependent provincial guidelines (total ammonia as N and dissolved cadmium, chromium, copper, lead, nickel, and zinc) (MWS 2011).
Equation** - CWQG formula for calculation of hardness, pH, temperature, and DOC-dependent federal guidelines (total cadmium, copper, lead, manganese, nickel, and zinc) (CCME 2020).
Table 2 - CWQG guideline for total ammonia as N presented in Table 2 of the CWQG guidelines for the protection of aquatic life: Ammonia (CCME 2010). The values from Table 2 are multiplied by 0.8224 to convert them into total ammonia (as N).
Values exceeding CWQG are double underlined, MSOG are bold, and MDMER are highlighted yellow.
Observed T and observed pH is shown under the modeled T and pH, respectively.

Table E-4: Baseline water quality model results for upper case

Location	Units	Guidelines/Limits			Gordon Lake				Gordon Lake				Gordon Lake				Farley Lake West				Farley Lake West			
Source					Observed (AQF2)				Modeled (Post-Closure)				Difference				Observed (AQF34)				Modeled (Post-Closure)			
Statistic		CWQG	MSOG	MDMER	Mean				Mean				%				Mean				Mean			
Season					winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter																								
Temperature, Field	deg C	n/v	n/v	n/v	0.8	22.0	22.0	12.0	0.8	22.0	22.0	12.0	0.0%	0.0%	0.0%	0.0%	0.6	16.0	21.0	13.0	0.6	16.0	21.0	13.0
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	7.4	7.6	7.9	7.8	7.6	7.6	7.6	7.7	2.8%	0.1%	-4.2%	-1.8%	7.3	7.6	8.2	7.8	7.5	7.6	7.6	7.7
Bromide	mg/L	n/v	n/v	n/v	0.050	0.050	0.050	0.050	0.066	0.043	0.049	0.051	32.8%	-13.1%	-2.7%	1.7%	0.050	0.050	0.050	0.050	0.054	0.040	0.043	0.044
Chloride	mg/L	120	n/v	n/v	0.25	0.25	0.25	0.75	0.46	0.25	0.23	0.29	84.8%	-0.6%	-6.6%	-61.1%	0.87	0.80	0.61	0.57	0.68	0.51	0.51	0.51
Fluoride	mg/L	0.12	0.12	n/v	0.089	0.058	0.066	0.067	0.093	0.060	0.064	0.066	4.9%	2.6%	-3.4%	-1.1%	0.092	0.074	0.075	0.077	0.095	0.071	0.073	0.075
Sulfate	mg/L	n/v	n/v	n/v	6.50	3.60	3.40	4.60	2.67	1.67	1.46	1.40	-58.9%	-53.6%	-57.1%	-69.5%	34.00	29.00	29.00	27.00	32.92	24.85	25.37	25.20
Phosphorus_T	mg/L	Narrative	0.025	n/v	**0.028**	**0.040**	**0.029**	**0.031**	**0.048**	**0.051**	**0.043**	**0.036**	70.1%	27.4%	48.7%	16.5%	0.024	**0.037**	0.024	**0.028**	**0.029**	**0.029**	**0.028**	**0.026**
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.132	0.076	0.076	0.016	0.137	0.081	0.078	0.066	3.8%	6.5%	2.3%	312.5%	0.074	0.045	0.020	0.035	0.062	0.049	0.045	0.042
N_Nitrite	mg/L	0.06	0.06	n/v	0.021	0.027	0.012	0.028	0.022	0.016	0.016	0.016	5.4%	-41.1%	31.0%	-43.3%	0.029	0.024	0.045	0.051	0.045	0.026	0.039	0.042
N_Nitrate	mg/L	13	n/v	n/v	0.025	0.044	0.045	0.075	0.066	0.042	0.045	0.049	166.0%	-4.9%	-0.4%	-35.1%	0.144	0.045	0.046	0.055	0.112	0.075	0.072	0.070
Cyanide_T	mg/L	n/v	n/v	0.5	0.0010	0.0010	0.0009	0.0009	0.0014	0.0008	0.0010	0.0011	47.0%	-16.5%	5.3%	15.2%	0.0009	0.0005	0.0009	0.0005	0.0008	0.0005	0.0006	0.0007
Cyanide_F	mg/L	0.005	0.0052	n/v	0.0005	0.0010	0.0022	0.0022	0.0017	0.0009	0.0011	0.0013	238.7%	-10.5%	-49.7%	-40.5%	0.0005	0.0005	0.0009	0.0005	0.0004	0.0003	0.0003	0.0004
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.0005	0.0010	0.0009	0.0009	0.0013	0.0007	0.0009	0.0010	158.1%	-26.7%	-4.9%	7.6%	0.0005	0.0005	0.0009	0.0005	0.0006	0.0004	0.0004	0.0005
Hardness	mg/L	n/v	n/v	n/v	110.0	72.0	82.0	68.0	95.5	60.9	66.3	67.2	-13.2%	-15.4%	-19.2%	-1.2%	160.0	130.0	130.0	120.0	118.1	88.0	89.9	90.5
Radium_226	Bq/L	n/v	n/v	0.37	0.0050	0.0050	0.0050	0.0050	0.0078	0.0047	0.0048	0.0050	55.8%	-5.7%	-4.4%	0.5%	0.0050	0.0057	0.0050	0.0049	0.0063	0.0047	0.0048	0.0047
Aluminum_D	mg/L	n/v	n/v	n/v	0.022	0.032	0.012	0.010	0.020	0.027	0.025	0.018	-7.2%	-16.0%	105.1%	81.2%	0.005	0.019	0.007	0.004	0.010	0.011	0.011	0.009
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	0.026	**0.110**	0.051	0.080	0.058	0.070	0.073	0.052	123.5%	-36.0%	42.7%	-35.1%	0.014	0.019	0.012	0.010	0.015	0.015	0.016	0.014
Antimony_D	mg/L	n/v	n/v	n/v	0.00010	0.00010	0.00010	0.00010	0.00012	0.00008	0.00009	0.00009	21.5%	-18.3%	-9.1%	-6.4%	0.00010	0.00010	0.00010	0.00010	0.00010	0.00008	0.00008	0.00009
Antimony_T	mg/L	n/v	n/v	n/v	0.00010	0.00010	0.00010	0.00010	0.00013	0.00009	0.00010	0.00010	32.0%	-13.8%	-3.4%	1.2%	0.00014	0.00010	0.00010	0.00010	0.00013	0.00009	0.00010	0.00010
Arsenic_D	mg/L	n/v	0.15	0.3	0.00056	0.00056	0.00047	0.00037	0.00061	0.00042	0.00045	0.00045	8.9%	-25.4%	-3.4%	22.1%	0.00180	0.00140	0.00130	0.00120	0.00188	0.00118	0.00107	0.00098
Arsenic_T	mg/L	0.005	n/v	0.3	0.00057	0.00058	0.00049	0.00041	0.00072	0.00047	0.00052	0.00053	25.5%	-19.8%	5.2%	29.6%	0.00180	0.00140	0.00140	0.00120	0.00192	0.00121	0.00110	0.00101
Barium_D	mg/L	n/v	n/v	n/v	0.0260	0.0160	0.0110	0.0100	0.0165	0.0117	0.0124	0.0117	-36.7%	-26.6%	12.5%	16.8%	0.0240	0.0190	0.0140	0.0150	0.0174	0.0129	0.0134	0.0135
Barium_T	mg/L	n/v	n/v	n/v	0.0260	0.0170	0.0120	0.0120	0.0188	0.0130	0.0139	0.0135	-27.6%	-23.4%	15.5%	12.1%	0.0240	0.0190	0.0140	0.0150	0.0191	0.0141	0.0145	0.0147
Beryllium_T	mg/L	n/v	n/v	n/v	0.00010	0.00010	0.00010	0.00010	0.00014	0.00009	0.00010	0.00010	37.9%	-9.6%	0.6%	4.3%	0.00010	0.00010	0.00010	0.00010	0.00011	0.00008	0.00009	0.00009
Boron_D	mg/L	n/v	n/v	n/v	0.0370	0.0050	0.0050	0.0050	0.0076	0.0049	0.0047	0.0045	-79.6%	-2.2%	-6.9%	-9.9%	0.0250	0.0140	0.0140	0.0160	0.0100	0.0076	0.0078	0.0077
Boron_T	mg/L	1.5	1.5	n/v	0.0420	0.0050	0.0050	0.0200	0.0120	0.0067	0.0060	0.0070	-71.4%	35.0%	19.1%	-65.0%	0.0250	0.0150	0.0140	0.0180	0.0114	0.0086	0.0087	0.0086
Cadmium_D	mg/L	n/v	Equation*	n/v	0.000005	0.000005	0.000005	0.000005	0.000007	0.000004	0.000004	0.000004	32.2%	-19.9%	-15.6%	-12.2%	0.000005	0.000005	0.000005	0.000005	0.000007	0.000006	0.000006	0.000006
Cadmium_T	mg/L	Equation**	n/v	n/v	0.000005	0.000012	0.000006	0.000011	0.000012	0.000008	0.000009	0.000009	147.0%	-30.0%	44.2%	-21.7%	0.000005	0.000005	0.000005	0.000005	0.000007	0.000005	0.000005	0.000005
Calcium_D	mg/L	n/v	n/v	n/v	31.0	22.0	24.0	19.0	28.5	18.5	20.3	20.4	-7.9%	-15.7%	-15.3%	7.3%	47.0	35.0	36.0	32.0	33.6	24.9	25.5	25.7
Chromium_D	mg/L	n/v	Equation*	n/v	0.00012	0.00038	0.00009	0.00011	0.00012	0.00016	0.00014	0.00010	4.1%	-57.5%	53.1%	-7.7%	0.00005	0.00009	0.00005	0.00005	0.00008	0.00007	0.00007	0.00007
Chromium_D_Hex	mg/L	0.001	0.011	n/v	0.00012	0.00038	0.00009	0.00011	0.00013	0.00017	0.00015	0.00011	9.4%	-54.8%	61.9%	-2.7%	0.00005	0.00009	0.00005	0.00012	0.00023	0.00020	0.00021	0.00019
Chromium_T	mg/L	0.0089	n/v	n/v	0.00041	0.00042	0.00027	0.00052	0.00059	0.00038	0.00039	0.00042	44.4%	-8.3%	42.8%	-20.0%	0.00017	0.00017	0.00016	0.00005	0.00016	0.00013	0.00014	0.00013
Cobalt_D	mg/L	n/v	n/v	n/v	0.00045	0.00026	0.00010	0.00010	0.00017	0.00015	0.00016	0.00013	-61.9%	-43.3%	59.9%	33.5%	0.00011	0.00010	0.00010	0.00010	0.00009	0.00006	0.00007	0.00007
Cobalt_T	mg/L	n/v	n/v	n/v	0.00048	0.00028	0.00010	0.00010	0.00022	0.00018	0.00020	0.00017	-54.7%	-36.4%	96.8%	70.0%	0.00012	0.00010	0.00010	0.00010	0.00010	0.00007	0.00007	0.00008
Copper_D	mg/L	n/v	Equation*	0.3	0.00028	0.00035	0.00042	0.00010	0.00027	0.00018	0.00022	0.00021	-2.7%	-48.6%	-48.2%	110.3%	0.00067	0.00072	0.00056	0.00030	0.00039	0.00031	0.00032	0.00030
Copper_T	mg/L	Equation**	n/v	0.3	0.00048	0.00035	0.00042	0.00051	0.00046	0.00028	0.00029	0.00031	-3.1%	-20.9%	-30.5%	-38.4%	0.00090	0.00080	0.00056	0.00030	0.00061	0.00050	0.00048	0.00044
Iron_D	mg/L	n/v	n/v	n/v	0.84	1.30	0.32	0.22	0.76	0.66	0.65	0.52	-9.6%	-49.4%	102.9%	134.3%	0.17	0.21	0.05	0.06	0.22	0.23	0.21	0.18
Iron_T	mg/L	0.3	0.3	n/v	**0.84**	**2.00**	**0.53**	**0.51**	**2.73**	**1.62**	**1.42**	**1.13**	224.5%	-18.9%	168.7%	121.3%	0.17	**0.36**	0.09	0.10	0.20	0.22	0.21	0.18
Lead_D	mg/L	n/v	Equation*	0.1	0.00005	0.00005	0.00005	0.00005	0.00003	0.00002	0.00002	0.00002	-32.6%	-60.6%	-57.6%	-54.7%	0.00005	0.00005	0.00005	0.00004	0.00002	0.00001	0.00001	0.00001
Lead_T	mg/L	Equation**	n/v	0.1	0.00022	0.00012	0.00031	0.00017	0.00021	0.00012	0.00015	0.00016	-6.1%	-3.3%	-52.7%	-5.5%	0.00005	0.00026	0.00053	0.00004	0.00008	0.00006	0.00008	0.00008
Magnesium_D	mg/L	n/v	n/v	n/v	7.90	4.70	5.20	4.90	5.91	3.76	3.93	4.01	-25.2%	-20.1%	-24.3%	-18.3%	11.00	8.70	8.80	8.40	8.53	6.38	6.53	6.55
Manganese_D	mg/L	0.35	n/v	n/v	1.1000	0.6500	0.0820	0.0370	1.1147	0.5783	0.4501	0.3128	1.3%	-11.0%	448.9%	745.4%	0.4500	0.2900	0.0050	0.0094	0.4186	0.2788	0.2734	0.2647
Manganese_T	mg/L	0.35	n/v	n/v	1.300	0.750	0.160	0.059	1.201	0.633	0.519	0.383	-7.6%	-15.6%	224.2%	548.9%	0.460	0.310	0.026	0.040	0.504	0.356	0.352	0.338
Mercury_D	mg/L	n/v	n/v	n/v	0.0000021	0.0000022	0.0000019	0.0000010	0.0000020	0.0000017	0.0000018	0.0000016	-5.9%	-23.3%	-3.9%	62.6%	0.0000013	0.0000023	0.0000016	0.0000009	0.0000019	0.0000015	0.0000017	0.0000017
Mercury_T	mg/L	0.000026	0.000026	n/v	0.0000034	0.0000030	0.0000019	0.0000010	0.0000028	0.0000024	0.0000026	0.0000022	-18.3%	-18.9%	35.8%	119.7%	0.0000013	0.0000027	0.0000016	0.0000009	0.0000025	0.0000026	0.0000026	0.0000023
Molybdenum_D	mg/L	n/v	n/v	n/v	0.00032	0.00021	0.00015	0.00023	0.00030	0.00019	0.00017	0.00017	-5.1%	-10.3%	13.0%	-27.6%	0.00048	0.00040	0.00044	0.00040	0.00045	0.00034	0.00034	0.00033
Molybdenum_T	mg/L	0.073	0.073	n/v	0.00033	0.00023	0.00015	0.00027	0.00034	0.00021	0.00019	0.00019	3.1%	-9.3%	27.3%	-29.1%	0.00049	0.00042	0.00044	0.00040	0.00047	0.00036	0.00035	0.00035
Nickel_D	mg/L	n/v	Equation*	0.5	0.00042	0.00024	0.00025	0.00025	0.00025	0.00015	0.00017	0.00018	-41.2%	-38.6%	-32.1%	-26.2%	0.00058	0.00048	0.00025	0.00025	0.00036	0.00028	0.00028	0.00028
Nickel_T	mg/L	Equation**	n/v	0.5	0.00044	0.00024	0.00071	0.00056	0.00076	0.00038	0.00048	0.00058	73.1%	60.0%	-33.0%	3.8%	0.00066	0.00080	0.00075	0.00025	0.00060	0.00044	0.00045	0.00046
Potassium_D	mg/L	n/v	n/v	n/v	1.80	1.30	1.10	1.10	1.17	0.88	0.91	0.84	-34.8%	-32.1%	-17.4%	-23.6%	3.70	3.10	3.20	3.10	1.91	1.44	1.50	1.51
Selenium_D	mg/L	n/v	n/v	n/v	0.00006	0.00037	0.00005	0.00005	0.00015	0.00018	0.00019	0.00013	176.0%	-51.7%	271.0%	167.6%	0.00006	0.00005	0.00005	0.00005	0.00007	0.00005	0.00005	0.00005
Selenium_T	mg/L	0.001	0.001	n/v	0.00006	0.00037	0.00005	0.00005	0.00015	0.00018	0.00019	0.00013	178.0%	-51.6%	271.9%	169.0%	0.00006	0.00006	0.00005	0.00006	0.00006	0.00004	0.00005	0.00005
Silicon_D	mg/L	n/v	n/v	n/v	4.2	3.6	2.4	2.9	4.2	3.0	3.1	3.1	0.9%	-17.8%	29.6%	6.2%	4.0	3.3	2.3	2.2	3.2	2.4	2.5	2.4
Silicon_T	mg/L	n/v	n/v	n/v	4.2	3.6	2.4	2.9	4.3	3.0	3.2	3.2	3.1%	-16.2%	32.5%	8.7%	4.0	3.4	2.3	2.2	3.3	2.5	2.6	2.5
Silver_D	mg/L	n/v	n/v	n/v	0.000005	0.000037	0.000005	0.000005	0.000015	0.000018	0.000018	0.000013	199.0%	-51.8%	269.9%	164.4%	0.000005	0.000005	0.000005	0.000005	0.000005	0.000004	0.000004	0.000004
Silver_T	mg/L	0.00025	0.0001	n/v	0.000005	0.000037	0.000005	0.000005	0.000015	0.000018	0.000019	0.000013	206.9%	-51.3%	273.7%	169.3%	0.000005	0.000005	0.000005	0.000005	0.000006	0.000005	0.000005	0.000005
Sodium_D	mg/L	n/v	n/v	n/v	2.5	1.5	1.7	1.7	2.7	1.6	1.7	1.7	6.8%	8.1%	-2.1%	2.2%	5.8	4.4	4.9	4.7	5.0	3.7	3.8	3.9
Sodium_T	mg/L	n/v	n/v	n/v	2.5	1.5	1.7	1.7	2.7	1.6	1.7	1.8	8.5%	9.3%	-0.9%	3.9%	5.8	4.4	4.9	4.9	5.1	3.8	3.9	3.9
Strontium_D	mg/L	n/v	n/v	n/v	0.054	0.034	0.037	0.035	0.048	0.030	0.032	0.032	-11.1%	-11.1%	-13.8%	-7.4%	0.093	0.072	0.071	0.070	0.068	0.051	0.051	0.051
Strontium_T	mg/L	n/v	n/v	n/v	0.056	0.034	0.037	0.037	0.060	0.037	0.038	0.039	6.4%	8.0%	2.9%	6.3%	0.093	0.074	0.071	0.073	0.072	0.053	0.054	0.054
Thallium_D	mg/L	n/v	n/v	n/v	0.00005	0.00005	0.00005	0.00005	0.00006	0.00004	0.00005	0.00005	22.5%	-17.7%	-8.5%	-5.9%	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004
Thallium_T	mg/L	0.0008	0.0008	n/v	0.00005	0.00005	0.00005	0.00005	0.00007	0.00004	0.00005	0.00005	33.0%	-13.1%	-2.8%	1.8%	0.00005	0.00005	0.00005	0.00005	0.00006	0.00004	0.00004	0.00005
Uranium_D	mg/L	n/v	n/v	n/v	0.00005	0.00005	0.00005	0.00005	0.00008	0.00005	0.00004	0.00004	55.2%	-9.3%	-16.1%	-14.5%	0.00061	0.00044	0.00039	0.00031	0.00063	0.00049	0.00046	0.00043
Uranium_T	mg/L	0.015	0.015	n/v	0.00005	0.00005	0.00005	0.00005	0.00009	0.00005	0.00005	0.00005	75.2%	-0.1%	-6.2%	-3.4%	0.00061	0.00049	0.00041	0.00031	0.00063	0.00050	0.00047	0.00043
Vanadium_T	mg/L	n/v	n/v	n/v	0.00025	0.00032	0.00026	0.00071	0.00052	0.00033	0.00033	0.00037	106.6%	2.0%	28.3%	-47.9%	0.00021	0.00022	0.00025	0.00025	0.00024	0.00018	0.00019	0.00019
Zinc_D	mg/L	Equation**	Equation*	0.5	0.00210	0.00140	0.00270	0.00120	0.00141	0.00078	0.00097	0.00105	-32.9%	-44.5%	-64.0%	-12.6%	0.00200	0.00140	0.00150	0.00050	0.00114	0.00087	0.00097	0.00096
Zinc_T	mg/L	n/v	n/v	0.5	0.00240	0.00140	0.00310	0.00170	0.00283	0.00138	0.00204	0.00229	17.8%	-1.4%	-34.3%	34.7%	0.00210	0.00140	0.00150	0.00150	0.00122	0.00086	0.00091	0.00096

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Table E-4: Baseline water quality model results for upper case

Location		Guidelines/Limits			Farley Lake West				Farley Lake East				Farley Lake East				Farley Lake East							
Source	Units				Difference				Observed (AQF9)				Modeled (Post-Closure)				Difference				Observed (AQF15)			
Statistic		CWQG	MSOG	MDMER	%				Mean				Mean				%				Mean			
Season					winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter																								
Temperature, Field	deg C	n/v	n/v	n/v	0.0%	0.0%	0.0%	0.0%	0.7	20.0	23.0	13.0	0.7	20.0	23.0	13.0	0.0%	0.0%	0.0%	0.0%	0.5	19.0	21.0	15.0
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	3.2%	0.2%	-7.0%	-1.5%	7.0	7.4	7.6	7.7	7.4	7.6	7.5	7.6	6.3%	3.0%	-0.7%	-1.1%	7.2	7.8	8.1	7.9
Bromide	mg/L	n/v	n/v	n/v	8.8%	-19.9%	-14.3%	-11.4%	0.050	0.050	0.050	0.050	0.045	0.036	0.047	0.047	-9.3%	-27.0%	-5.0%	-6.8%	0.050	0.050	0.050	0.050
Chloride	mg/L	120	n/v	n/v	-21.8%	-35.7%	-15.9%	-11.1%	0.93	0.45	0.25	0.25	0.71	0.30	0.24	0.19	-24.1%	-33.2%	-3.8%	-24.3%	0.66	0.25	0.46	0.51
Fluoride	mg/L	0.12	0.12	n/v	3.6%	-3.7%	-2.2%	-3.0%	0.092	0.068	0.078	0.079	0.089	0.054	0.071	0.074	-2.9%	-20.8%	-8.9%	-6.3%	0.089	0.080	0.081	0.077
Sulfate	mg/L	n/v	n/v	n/v	-3.2%	-14.3%	-12.5%	-6.7%	29.00	17.00	17.00	15.00	26.01	8.96	11.90	12.15	-10.3%	-47.3%	-30.0%	-19.0%	8.50	7.40	6.90	7.40
Phosphorus_T	mg/L	Narrative	0.025	n/v	19.8%	-21.0%	17.0%	-6.8%	**0.050**	**0.044**	0.024	0.024	**0.053**	**0.029**	**0.029**	**0.028**	6.2%	-33.6%	21.5%	17.3%	0.019	0.022	0.023	0.022
N_Ammonia	mg/L	Table 2	Equation*	n/v	-15.6%	8.2%	125.9%	18.7%	0.330	0.039	0.029	0.110	0.283	0.044	0.040	0.102	-14.3%	11.6%	39.2%	-7.4%	0.025	0.005	0.027	0.012
N_Nitrite	mg/L	0.06	0.06	n/v	55.4%	8.7%	-14.3%	-16.9%	0.019	0.004	0.013	0.045	0.014	0.004	0.010	0.017	-26.8%	-12.3%	-20.9%	-62.5%	0.022	0.022	0.005	0.045
N_Nitrate	mg/L	13	n/v	n/v	-22.2%	67.7%	56.6%	26.7%	0.025	0.044	0.045	0.045	0.033	0.031	0.037	0.037	32.1%	-29.8%	-16.9%	-17.5%	0.110	0.044	0.045	0.045
Cyanide_T	mg/L	n/v	n/v	0.5	-5.7%	9.7%	-35.4%	32.1%	0.0005	0.0009	0.0022	0.0025	0.0009	0.0006	0.0007	0.0006	77.1%	-27.4%	-69.5%	-74.7%	0.0005	0.0016	0.0009	0.0005
Cyanide_F	mg/L	0.005	0.0052	n/v	-10.3%	-41.2%	-64.4%	-25.6%	0.0005	0.0009	0.0022	0.0025	0.0007	0.0005	0.0005	0.0008	34.7%	-38.8%	-75.1%	-66.1%	0.0005	0.0009	0.0022	0.0025
Cyanide_WAD	mg/L	n/v	n/v	n/v	20.8%	-21.4%	-52.0%	1.2%	0.0005	0.0009	0.0022	0.0025	0.0007	0.0005	0.0006	0.0005	31.3%	-35.3%	-72.9%	-78.1%	0.0005	0.0009	0.0009	0.0005
Hardness	mg/L	n/v	n/v	n/v	-26.2%	-32.3%	-30.9%	-24.6%	150.0	110.0	93.0	89.0	112.7	48.4	58.6	58.5	-24.9%	-56.0%	-37.0%	-34.3%	71.0	63.0	58.0	58.0
Radium_226	Bq/L	n/v	n/v	0.37	25.3%	-16.8%	-4.2%	-3.6%	0.0200	0.0110	0.0050	0.0052	0.0155	0.0071	0.0077	0.0078	-22.5%	-35.4%	54.7%	50.8%	0.0130	0.0050	0.0050	0.0050
Aluminum_D	mg/L	n/v	n/v	n/v	78.2%	-42.3%	58.0%	124.9%	0.013	0.031	0.006	0.006	0.002	0.009	0.006	0.003	-86.4%	-69.6%	1.2%	-49.1%	0.010	0.030	0.009	0.009
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	3.9%	-17.7%	32.4%	35.6%	0.027	0.031	0.023	0.042	0.022	0.034	0.028	0.031	-18.9%	9.3%	20.2%	-25.7%	0.016	0.058	0.047	0.058
Antimony_D	mg/L	n/v	n/v	n/v	2.9%	-22.1%	-15.8%	-10.2%	0.00010	0.00010	0.00010	0.00010	0.00008	0.00006	0.00007	0.00008	-16.5%	-39.1%	-29.0%	-19.6%	0.00010	0.00010	0.00010	0.00010
Antimony_T	mg/L	n/v	n/v	n/v	-9.0%	-6.2%	-1.6%	4.6%	0.00027	0.00010	0.00010	0.00018	0.00013	0.00008	0.00010	0.00010	-52.0%	-21.4%	1.8%	-43.0%	0.00022	0.00010	0.00010	0.00010
Arsenic_D	mg/L	n/v	0.15	0.3	4.4%	-15.8%	-17.8%	-18.4%	0.00120	0.00071	0.00080	0.00057	0.00121	0.00045	0.00062	0.00056	0.5%	-36.3%	-22.1%	-1.2%	0.00034	0.00032	0.00035	0.00034
Arsenic_T	mg/L	0.005	n/v	0.3	6.7%	-13.7%	-21.6%	-15.9%	0.00126	0.00072	0.00087	0.00059	0.00130	0.00048	0.00067	0.00061	3.5%	-33.6%	-23.3%	2.8%	0.00035	0.00032	0.00036	0.00034
Barium_D	mg/L	n/v	n/v	n/v	-27.4%	-31.9%	-4.5%	-10.0%	0.0320	0.0150	0.0130	0.0140	0.0195	0.0100	0.0118	0.0121	-39.1%	-33.6%	-8.9%	-13.9%	0.0130	0.0098	0.0100	0.0100
Barium_T	mg/L	n/v	n/v	n/v	-20.5%	-25.7%	3.6%	-1.9%	0.0320	0.0170	0.0130	0.0170	0.0210	0.0106	0.0126	0.0130	-34.4%	-37.8%	-2.8%	-23.4%	0.0130	0.0110	0.0100	0.0110
Beryllium_T	mg/L	n/v	n/v	n/v	7.7%	-20.0%	-14.8%	-8.1%	0.00010	0.00010	0.00010	0.00010	0.00009	0.00007	0.00010	0.00009	-7.2%	-25.3%	-4.0%	-6.7%	0.00010	0.00010	0.00010	0.00010
Boron_D	mg/L	n/v	n/v	n/v	-59.9%	-45.7%	-44.5%	-51.7%	0.0190	0.0085	0.0120	0.0150	0.0100	0.0052	0.0054	0.0063	-47.4%	-38.8%	-54.6%	-58.2%	0.0210	0.0050	0.0050	0.0050
Boron_T	mg/L	1.5	1.5	n/v	-54.5%	-42.9%	-37.9%	-52.1%	0.0420	0.0085	0.0130	0.0170	0.0134	0.0162	0.0121	0.0085	-68.1%	90.4%	-7.1%	-50.1%	0.0210	0.0050	0.0050	0.0050
Cadmium_D	mg/L	n/v	Equation*	n/v	47.5%	21.7%	27.6%	23.1%	0.000005	0.000011	0.000005	0.000005	0.000006	0.000006	0.000006	0.000005	14.7%	-46.1%	20.4%	-6.5%	0.000005	0.000005	0.000005	0.000005
Cadmium_T	mg/L	Equation**	n/v	n/v	34.4%	-2.6%	-3.9%	-2.4%	0.000039	0.000015	0.000015	0.000027	0.000020	0.000011	0.000010	0.000009	-49.0%	-26.2%	-31.4%	-68.0%	0.000005	0.000009	0.000006	0.000005
Calcium_D	mg/L	n/v	n/v	n/v	-28.6%	-28.7%	-29.2%	-19.7%	40.0	31.0	28.0	25.0	30.2	13.2	17.1	16.9	-24.6%	-57.4%	-38.9%	-32.4%	19.0	17.0	16.0	16.0
Chromium_D	mg/L	n/v	Equation*	n/v	63.7%	-24.8%	42.4%	37.0%	0.00009	0.00050	0.00005	0.00005	0.00009	0.00019	0.00011	0.00005	-0.1%	-61.8%	115.2%	-7.6%	0.00005	0.00050	0.00013	0.00005
Chromium_D_Hex	mg/L	0.001	0.011	n/v	358.7%	117.6%	325.8%	62.1%	0.00009	0.00050	0.00005	0.00005	0.00016	0.00023	0.00015	0.00008	76.7%	-54.8%	193.1%	58.6%	0.00005	0.00050	0.00013	0.00005
Chromium_T	mg/L	0.0089	n/v	n/v	-4.2%	-22.6%	-11.1%	165.9%	0.00021	0.00050	0.00015	0.00018	0.00024	0.00032	0.00023	0.00017	13.6%	-36.7%	50.6%	-2.9%	0.00014	0.00050	0.00033	0.00055
Cobalt_D	mg/L	n/v	n/v	n/v	-17.2%	-37.0%	-32.2%	-22.4%	0.00019	0.00010	0.00010	0.00010	0.00010	0.00007	0.00008	0.00007	-45.3%	-34.0%	-23.2%	-25.4%	0.00010	0.00010	0.00010	0.00010
Cobalt_T	mg/L	n/v	n/v	n/v	-13.8%	-29.0%	-25.4%	-13.8%	0.00026	0.00010	0.00010	0.00010	0.00012	0.00008	0.00009	0.00010	-54.0%	-23.3%	-5.4%	-4.0%	0.00010	0.00010	0.00010	0.00010
Copper_D	mg/L	n/v	Equation*	0.3	-41.1%	-56.6%	-43.1%	0.9%	0.00018	0.00063	0.00033	0.00018	0.00012	0.00026	0.00023	0.00013	-34.9%	-58.6%	-31.6%	-25.5%	0.00052	0.00046	0.00054	0.00042
Copper_T	mg/L	Equation**	n/v	0.3	-32.8%	-37.9%	-14.1%	45.4%	0.00038	0.00063	0.00033	0.00071	0.00034	0.00032	0.00028	0.00039	-10.1%	-48.6%	-15.4%	-45.1%	0.00120	0.00073	0.00054	0.00053
Iron_D	mg/L	n/v	n/v	n/v	29.4%	7.2%	315.7%	223.8%	0.67	0.31	0.13	0.12	0.60	0.27	0.20	0.13	-9.7%	-11.4%	51.4%	12.2%	0.03	0.11	0.03	0.03
Iron_T	mg/L	0.3	0.3	n/v	20.5%	-37.8%	144.5%	80.3%	**0.67**	**0.42**	0.21	0.18	**0.61**	**0.32**	0.22	0.15	-9.3%	-24.4%	6.7%	-14.3%	0.05	0.21	0.10	0.11
Lead_D	mg/L	n/v	Equation*	0.1	-56.7%	-67.4%	-67.0%	-65.6%	0.00005	0.00010	0.00012	0.00005	0.00001	0.00002	0.00004	0.00003	-68.7%	-76.0%	-65.0%	-40.5%	0.00005	0.00005	0.00006	0.00005
Lead_T	mg/L	Equation**	n/v	0.1	88.7%	-76.1%	-85.8%	80.4%	0.00005	0.00017	0.00056	0.00005	0.00002	0.00007	0.00009	0.00005	-44.9%	-57.8%	-83.5%	16.6%	0.00005	0.00012	0.00006	0.00005
Magnesium_D	mg/L	n/v	n/v	n/v	-22.5%	-26.6%	-25.8%	-22.0%	10.00	7.00	6.80	6.70	8.02	3.51	4.43	4.59	-19.8%	-49.9%	-34.8%	-31.5%	5.90	4.70	4.60	4.80
Manganese_D	mg/L	0.35	n/v	n/v	-7.0%	-3.9%	5367.2%	2716.1%	0.7900	0.1100	0.0310	0.0230	0.5616	0.0886	0.1410	0.1602	-28.9%	-19.5%	354.7%	596.3%	0.0051	0.0820	0.0069	0.0035
Manganese_T	mg/L	0.35	n/v	n/v	9.6%	14.8%	1253.5%	745.4%	0.790	0.120	0.042	0.047	0.639	0.177	0.212	0.219	-19.1%	47.6%	404.1%	365.1%	0.011	0.110	0.023	0.018
Mercury_D	mg/L	n/v	n/v	n/v	46.4%	-36.0%	4.2%	89.2%	0.0000029	0.0000019	0.0000016	0.0000012	0.0000024	0.0000015	0.0000016	0.0000016	-18.9%	-21.4%	2.7%	35.9%	0.0000009	0.0000021	0.0000015	0.0000010
Mercury_T	mg/L	0.000026	0.000026	n/v	95.1%	-2.3%	61.8%	158.4%	0.0000029	0.0000032	0.0000016	0.0000012	0.0000029	0.0000037	0.0000025	0.0000021	0.4%	14.4%	53.6%	78.6%	0.0000010	0.0000021	0.0000015	0.0000010
Molybdenum_D	mg/L	n/v	n/v	n/v	-5.7%	-15.0%	-23.2%	-16.5%	0.00023	0.00044	0.00027	0.00040	0.00028	0.00030	0.00034	0.00033	22.6%	-31.7%	24.5%	-18.1%	0.00087	0.00074	0.00080	0.00088
Molybdenum_T	mg/L	0.073	0.073	n/v	-3.8%	-15.3%	-19.5%	-12.6%	0.00032	0.00048	0.00033	0.00044	0.00037	0.00034	0.00039	0.00039	14.9%	-28.1%	19.5%	-12.2%	0.00100	0.00080	0.00084	0.00095
Nickel_D	mg/L	n/v	Equation*	0.5	-37.9%	-42.5%	13.9%	13.3%	0.00024	0.00024	0.00025	0.00025	0.00018	0.00011	0.00016	0.00017	-26.7%	-54.1%	-36.6%	-31.4%	0.00024	0.00024	0.00025	0.00025
Nickel_T	mg/L	Equation**	n/v	0.5	-9.1%	-45.1%	-40.1%	83.6%	0.00044	0.00024	0.00049	0.00043	0.00036	0.00015	0.00030	0.00033	-18.1%	-37.7%	-38.1%	-22.6%	0.00024	0.00024	0.00055	0.00050
Potassium_D	mg/L	n/v	n/v	n/v	-48.4%	-53.4%	-53.1%	-51.3%	3.90	2.60	2.90	3.10	1.97	0.93	1.18	1.21	-49.4%	-64.4%	-59.5%	-60.9%	1.80	1.40	1.40	1.40
Selenium_D	mg/L	n/v	n/v	n/v	28.1%	7.9%	8.3%	1.2%	0.00006	0.00050	0.00005	0.00005	0.00008	0.00017	0.00011	0.00007	52.9%	-66.6%	124.7%	30.4%	0.00005	0.00005	0.00005	0.00005
Selenium_T	mg/L	0.001	0.001	n/v	5.3%	-20.1%	-4.5%	-21.2%	0.00006	0.00050	0.00005	0.00005	0.00008	0.00016	0.00011	0.00006	38.8%	-67.3%	117.4%	20.2%	0.00006	0.00005	0.00005	0.00005
Silicon_D	mg/L	n/v	n/v	n/v	-20.7%	-25.8%	9.1%	11.0%	4.4	2.4	1.4	2.2	3.5	1.5	1.8	1.9	-19.5%	-38.9%	29.2%	-13.6%	2.3	1.9	1.5	2.1
Silicon_T	mg/L	n/v	n/v	n/v	-17.5%	-25.0%	13.8%	15.6%	4.4	2.5	1.5	2.2	3.7	1.5	1.9	2.0	-17.0%	-38.3%	25.7%	-10.1%	2.3	2.0	1.5	2.3
Silver_D	mg/L	n/v	n/v	n/v	-2.3%	-18.6%	-11.5%	-17.1%	0.000005	0.000050	0.000005	0.000005	0.000004	0.000016	0.000009	0.000004	-16.4%	-67.9%	78.8%	-21.0%	0.000005	0.000050	0.000005	0.000005
Silver_T	mg/L	0.00025	0.0001	n/v	20.3%	-0.2%	9.3%	2.5%	0.000005	0.000050	0.000005	0.000005	0.000005	0.000016	0.000009	0.000004	-6.4%	-67.4%	85.7%	-13.7%	0.000005	0.000050	0.000005	0.000005
Sodium_D	mg/L	n/v	n/v	n/v	-14.2%	-15.3%	-22.0%	-18.0%	5.6	3.8	3.9	3.8	5.7	2.3	2.9	3.1	2.3%	-38.7%	-24.7%	-17.9%	3.3	2.6	2.7	2.6
Sodium_T	mg/L	n/v	n/v	n/v	-12.1%	-13.6%	-20.4%	-19.7%	5.8	3.9	4.0	3.8	5.9	2.4	3.0	3.2	1.3%	-39.6%	-25.4%	-16.5%	3.4	2.8	2.7	2.6
Strontium_D	mg/L	n/v	n/v	n/v	-27.2%	-29.7%	-27.9%	-26.8%	0.087	0.057	0.059	0.054	0.066	0.030	0.036	0.036	-24.2%	-48.1%	-38.7%	-34.0%	0.044	0.037	0.036	0.038
Strontium_T	mg/L	n/v	n/v	n/v	-22.9%	-27.7%	-23.8%	-25.8%	0.087	0.057	0.059	0.057	0.071	0.031	0.038	0.039	-18.3%	-45.7%	-36.2%	-31.2%	0.046	0.039	0.036	0.038
Thallium_D	mg/L	n/v	n/v	n/v	3.0%	-21.9%	-15.5%	-7.2%	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00005	0.00005	-12.5%	-28.0%	-5.8%	-8.2%	0.00005	0.00005	0.00005	0.00005
Thallium_T	mg/L	0.0008	0.0008	n/v	10.5%	-17.0%	-10.2%	-0.8%	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00005	0.00005	-7.0%	-26.3%	-3.0%	-4.1%	0.00005	0.00005	0.00005	0.00005
Uranium_D	mg/L	n/v	n/v	n/v	3.4%	11.3%	18.1%	37.9%	0.00028	0.00019	0.00010	0.00010	0.00034	0.00013	0.00012	0.00010	19.9%	-33.0%	21.9%	2.5%	0.00006	0.00005	0.00005	0.00005
Uranium_T	mg/L	0.015	0.015	n/v	4.0%	1.7%	15.2%	40.3%	0.00031	0.00020	0.00012	0.00010	0.00038	0.00014	0.00014	0.00011	21.9%	-30.9%	14.2%	12.4%	0.00006	0.00005	0.00006	0.00006
Vanadium_T	mg/L	n/v	n/v	n/v	16.4%	-16.5%	-24.4%	-22.9%	0.00021	0.00052	0.00025	0.00025	0.00030	0.00015	0.00018	0.00019	42.6%	-71.0%	-26.4%	-24.8%	0.00024	0.00026	0.00037	0.00036
Zinc_D	mg/L	Equation**	Equation*	0.5	-42.8%	-38.1%	-35.2%	92.8%	0.00150	0.00140	0.00270	0.00150	0.00082	0.00049	0.00101	0.00102	-45.6%	-65.0%	-62.5%	-32.2%	0.00230	0.00140	0.00150	0.00120
Zinc_T	mg/L	n/v	n/v	0.5	-41.7%	-38.9%	-39.7%	-35.8%	0.00270	0.00140	0.00380	0.00460	0.00168	0.00105	0.00171	0.00204	-37.6%	-25.2%	-55.1%	-55.6%	0.00230	0.00140	0.00150	0.04500

Notes on last page

Table E-4: Baseline water quality model results for upper case

Location	Units	Guidelines/Limits																			Ellystan Lake			
Source					Modeled (Post-Closure)				Difference				Observed (AQF20)				Modeled (Post-Closure)				Difference			
Statistic		CWQG	MSOG	MDMER	Mean				%				Mean				Mean				%			
Season					winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter																								
Temperature, Field	deg C	n/v	n/v	n/v	0.5	19.0	21.0	15.0	0.0%	0.0%	0.0%	0.0%	1.0	18.0	20.0	14.0	1.0	18.0	20.0	14.0	0.0%	0.0%	0.0%	0.0%
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	7.4	7.4	7.4	7.5	2.8%	-5.0%	-8.2%	-5.6%	7.3	7.5	7.6	8.0	7.4	7.5	7.5	7.5	1.9%	0.1%	-1.3%	-6.2%
Bromide	mg/L	n/v	n/v	n/v	0.056	0.046	0.048	0.049	12.7%	-7.4%	-3.8%	-1.7%	0.050	0.050	0.050	0.050	0.055	0.048	0.049	0.050	10.3%	-4.3%	-1.7%	-0.3%
Chloride	mg/L	120	n/v	n/v	0.44	0.37	0.37	0.37	-33.8%	46.3%	-20.0%	-27.1%	0.75	0.49	0.25	0.47	0.64	0.53	0.50	0.49	-15.1%	7.1%	101.4%	4.1%
Fluoride	mg/L	0.12	0.12	n/v	0.091	0.075	0.077	0.079	1.9%	-6.6%	-4.6%	2.2%	0.084	0.075	0.077	0.075	0.085	0.074	0.075	0.076	1.5%	-1.6%	-2.2%	1.8%
Sulfate	mg/L	n/v	n/v	n/v	6.19	5.08	5.05	5.05	-27.2%	-31.4%	-26.8%	-31.7%	5.20	4.40	4.40	4.60	4.11	3.55	3.61	3.65	-21.0%	-19.3%	-18.0%	-20.6%
Phosphorus_T	mg/L	Narrative	0.025	n/v	0.023	0.019	0.020	0.020	22.0%	-13.8%	-13.9%	-7.7%	0.024	**0.028**	**0.031**	0.019	**0.025**	**0.027**	**0.028**	**0.026**	5.7%	-2.4%	-11.1%	35.5%
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.023	0.018	0.017	0.017	-9.3%	258.2%	-35.9%	41.9%	0.021	0.019	0.020	0.014	0.045	0.035	0.030	0.027	119.5%	82.1%	47.7%	96.3%
N_Nitrite	mg/L	0.06	0.06	n/v	0.013	0.011	0.010	0.011	-40.8%	-51.6%	122.2%	-76.5%	0.014	0.009	0.009	0.009	0.008	0.006	0.007	0.007	-46.6%	-31.0%	-25.9%	-27.7%
N_Nitrate	mg/L	13	n/v	n/v	0.077	0.075	0.072	0.069	-30.3%	71.6%	59.7%	53.2%	0.164	0.069	0.085	0.063	0.149	0.119	0.111	0.106	-8.8%	72.8%	30.9%	67.2%
Cyanide_T	mg/L	n/v	n/v	0.5	0.0008	0.0007	0.0007	0.0007	58.7%	-58.1%	-22.1%	42.9%	0.0033	0.0009	0.0021	0.0025	0.0043	0.0033	0.0029	0.0027	29.1%	262.8%	37.2%	6.2%
Cyanide_F	mg/L	0.005	0.0052	n/v	0.0014	0.0011	0.0012	0.0012	188.8%	32.9%	-46.8%	-50.1%	0.0005	0.0009	0.0021	0.0025	0.0013	0.0011	0.0011	0.0012	168.5%	25.8%	-45.7%	-52.9%
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.0008	0.0007	0.0007	0.0007	62.8%	-21.4%	-25.3%	41.3%	0.0005	0.0009	0.0021	0.0025	0.0010	0.0008	0.0008	0.0009	91.9%	-10.0%	-60.6%	-65.6%
Hardness	mg/L	n/v	n/v	n/v	50.5	41.9	42.8	42.7	-28.8%	-33.5%	-26.3%	-26.3%	60.0	46.0	48.0	46.0	43.9	38.2	39.0	39.3	-26.8%	-17.1%	-18.8%	-14.5%
Radium_226	Bq/L	n/v	n/v	0.37	0.0095	0.0081	0.0080	0.0080	-26.9%	61.4%	60.0%	60.9%	0.0051	0.0050	0.0050	0.0050	0.0056	0.0048	0.0049	0.0049	9.3%	-4.2%	-2.4%	-1.1%
Aluminum_D	mg/L	n/v	n/v	n/v	0.011	0.010	0.011	0.011	17.9%	-66.1%	24.9%	12.0%	0.007	0.047	0.023	0.018	0.074	0.059	0.086	0.076	932.4%	24.7%	273.5%	320.6%
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	0.047	0.039	0.041	0.042	191.0%	-33.3%	-12.9%	-28.0%	0.070	0.094	**0.110**	0.099	0.097	0.079	**0.109**	0.098	38.2%	-16.1%	-1.1%	-0.9%
Antimony_D	mg/L	n/v	n/v	n/v	0.00010	0.00008	0.00009	0.00009	1.3%	-16.3%	-13.3%	-11.7%	0.00010	0.00010	0.00010	0.00010	0.00007	0.00006	0.00006	0.00006	-29.1%	-38.5%	-36.6%	-35.7%
Antimony_T	mg/L	n/v	n/v	n/v	0.00018	0.00017	0.00016	0.00016	-19.2%	65.7%	60.5%	56.7%	0.00010	0.00010	0.00010	0.00010	0.00011	0.00009	0.00009	0.00009	5.3%	-9.5%	-7.3%	-6.0%
Arsenic_D	mg/L	n/v	0.15	0.3	0.00037	0.00030	0.00030	0.00031	7.7%	-6.8%	-14.3%	-9.3%	0.00033	0.00033	0.00034	0.00030	0.00031	0.00027	0.00028	0.00028	-5.4%	-17.4%	-16.5%	-5.6%
Arsenic_T	mg/L	0.005	n/v	0.3	0.00034	0.00028	0.00028	0.00029	-1.7%	-12.5%	-21.5%	-15.0%	0.00038	0.00037	0.00035	0.00032	0.00036	0.00031	0.00031	0.00031	-6.1%	-16.9%	-10.7%	-3.2%
Barium_D	mg/L	n/v	n/v	n/v	0.0091	0.0075	0.0076	0.0076	-30.2%	-23.7%	-24.3%	-23.6%	0.0140	0.0086	0.0075	0.0086	0.0097	0.0084	0.0085	0.0086	-30.6%	-2.1%	14.0%	0.0%
Barium_T	mg/L	n/v	n/v	n/v	0.0103	0.0085	0.0086	0.0086	-21.1%	-23.0%	-14.2%	-21.5%	0.0150	0.0130	0.0092	0.0098	0.0134	0.0114	0.0112	0.0111	-10.4%	-12.6%	22.2%	13.1%
Beryllium_T	mg/L	n/v	n/v	n/v	0.00011	0.00009	0.00010	0.00010	12.5%	-7.5%	-3.9%	-1.9%	0.00010	0.00010	0.00010	0.00010	0.00011	0.00010	0.00010	0.00010	9.9%	-4.7%	-2.0%	-0.7%
Boron_D	mg/L	n/v	n/v	n/v	0.0073	0.0061	0.0061	0.0062	-65.1%	21.7%	22.9%	23.8%	0.0210	0.0050	0.0050	0.0050	0.0073	0.0063	0.0063	0.0063	-65.1%	25.5%	26.3%	26.9%
Boron_T	mg/L	1.5	1.5	n/v	0.0034	0.0030	0.0029	0.0027	-83.7%	-40.0%	-42.8%	-45.7%	0.0330	0.0150	0.0050	0.0050	0.0195	0.0157	0.0144	0.0131	-40.8%	4.9%	188.1%	162.3%
Cadmium_D	mg/L	n/v	Equation*	n/v	0.000005	0.000004	0.000005	0.000005	7.5%	-11.2%	-7.0%	-6.0%	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	7.0%	-7.1%	-4.4%	-3.0%
Cadmium_T	mg/L	Equation**	n/v	n/v	0.000007	0.000006	0.000006	0.000006	32.4%	-33.6%	1.2%	14.7%	0.000005	0.000014	0.000006	0.000005	0.000008	0.000007	0.000007	0.000007	53.1%	-52.2%	14.2%	35.9%
Calcium_D	mg/L	n/v	n/v	n/v	13.6	11.2	11.5	11.5	-28.4%	-33.9%	-28.3%	-28.0%	17.0	13.0	13.0	12.0	12.0	10.5	10.7	10.8	-29.3%	-19.3%	-17.5%	-10.3%
Chromium_D	mg/L	n/v	Equation*	n/v	0.00015	0.00013	0.00015	0.00014	203.0%	-73.4%	15.4%	184.1%	0.00010	0.00043	0.00039	0.00005	0.00015	0.00013	0.00014	0.00014	57.4%	-68.9%	-62.8%	181.1%
Chromium_D_Hex	mg/L	0.001	0.011	n/v	0.00021	0.00018	0.00019	0.00019	310.7%	-64.8%	47.7%	270.3%	0.00010	0.00043	0.00039	0.00005	0.00017	0.00014	0.00015	0.00015	78.9%	-67.0%	-62.8%	200.1%
Chromium_T	mg/L	0.0089	n/v	n/v	0.00037	0.00032	0.00033	0.00033	163.6%	-36.2%	-0.5%	-40.6%	0.00032	0.00055	0.00049	0.00019	0.00039	0.00041	0.00040	0.00037	23.1%	-25.6%	-18.7%	96.2%
Cobalt_D	mg/L	n/v	n/v	n/v	0.00010	0.00008	0.00008	0.00008	-3.3%	-20.0%	-17.1%	-15.7%	0.00010	0.00010	0.00010	0.00010	0.00010	0.00009	0.00009	0.00009	0.8%	-12.2%	-9.5%	-8.3%
Cobalt_T	mg/L	n/v	n/v	n/v	0.00010	0.00008	0.00008	0.00008	-2.8%	-20.0%	-17.4%	-15.8%	0.00010	0.00020	0.00010	0.00010	0.00012	0.00011	0.00011	0.00011	23.1%	-46.4%	9.2%	8.5%
Copper_D	mg/L	n/v	Equation*	0.3	0.00043	0.00036	0.00038	0.00039	-17.6%	-22.5%	-30.0%	-8.3%	0.00045	0.00066	0.00062	0.00050	0.00032	0.00028	0.00029	0.00029	-29.9%	-58.0%	-53.6%	-42.3%
Copper_T	mg/L	Equation**	n/v	0.3	0.00103	0.00103	0.00098	0.00093	-13.9%	40.7%	80.8%	76.0%	0.00069	0.00070	0.00062	0.00054	0.00065	0.00057	0.00059	0.00058	-6.2%	-18.0%	-4.4%	8.3%
Iron_D	mg/L	n/v	n/v	n/v	0.05	0.05	0.05	0.05	62.6%	-57.3%	45.6%	44.3%	0.27	0.18	0.07	0.04	0.13	0.11	0.11	0.10	-51.9%	-38.9%	45.4%	147.2%
Iron_T	mg/L	0.3	0.3	n/v	0.12	0.11	0.12	0.11	146.4%	-48.4%	15.3%	0.6%	**0.30**	**0.34**	0.20	0.13	0.30	0.28	0.27	0.25	-2.3%	-17.6%	33.1%	92.1%
Lead_D	mg/L	n/v	Equation*	0.1	0.00004	0.00003	0.00003	0.00003	-18.4%	-34.2%	-44.1%	-26.0%	0.00005	0.00005	0.00005	0.00005	0.00002	0.00002	0.00002	0.00002	-47.5%	-50.9%	-48.7%	-51.2%
Lead_T	mg/L	Equation**	n/v	0.1	0.00010	0.00010	0.00010	0.00010	132.9%	-18.6%	81.8%	91.5%	0.00009	0.00020	0.00006	0.00005	0.00012	0.00013	0.00013	0.00012	32.3%	-36.5%	124.1%	169.2%
Magnesium_D	mg/L	n/v	n/v	n/v	4.27	3.51	3.57	3.60	-27.7%	-25.2%	-22.3%	-25.0%	4.80	3.40	3.80	3.90	3.60	3.10	3.14	3.19	-25.0%	-9.0%	-17.4%	-18.1%
Manganese_D	mg/L	0.35	n/v	n/v	0.0183	0.0166	0.0181	0.0165	259.5%	-79.7%	161.9%	371.3%	0.0990	0.0990	0.0190	0.0094	0.1133	0.0883	0.0785	0.0704	14.4%	-10.8%	312.9%	649.1%
Manganese_T	mg/L	0.35	n/v	n/v	0.045	0.040	0.043	0.040	308.2%	-63.9%	85.2%	122.2%	0.130	0.200	0.069	0.029	0.192	0.151	0.137	0.126	47.7%	-24.4%	98.8%	333.3%
Mercury_D	mg/L	n/v	n/v	n/v	0.0000016	0.0000013	0.0000014	0.0000014	78.1%	-36.0%	-4.5%	43.4%	0.0000013	0.0000026	0.0000019	0.0000012	0.0000015	0.0000013	0.0000014	0.0000014	12.0%	-49.1%	-25.2%	15.7%
Mercury_T	mg/L	0.000026	0.000026	n/v	0.0000018	0.0000015	0.0000016	0.0000016	78.2%	-26.4%	9.5%	59.8%	0.0000014	0.0000034	0.0000019	0.0000012	0.0000017	0.0000016	0.0000017	0.0000016	21.0%	-53.7%	-12.0%	35.0%
Molybdenum_D	mg/L	n/v	n/v	n/v	0.00114	0.00109	0.00106	0.00103	30.9%	46.9%	32.1%	17.2%	0.00058	0.00058	0.00057	0.00052	0.00062	0.00053	0.00054	0.00055	7.0%	-8.4%	-4.4%	6.1%
Molybdenum_T	mg/L	0.073	0.073	n/v	0.00124	0.00119	0.00115	0.00112	24.1%	48.2%	36.8%	18.1%	0.00058	0.00060	0.00058	0.00054	0.00067	0.00057	0.00058	0.00059	14.8%	-5.0%	0.6%	9.5%
Nickel_D	mg/L	n/v	Equation*	0.5	0.00023	0.00019	0.00019	0.00020	-4.7%	-21.9%	-22.0%	-20.1%	0.00024	0.00024	0.00025	0.00025	0.00024	0.00020	0.00021	0.00021	-1.3%	-14.6%	-15.8%	-14.4%
Nickel_T	mg/L	Equation**	n/v	0.5	0.00032	0.00025	0.00026	0.00028	33.6%	4.6%	-52.9%	-44.6%	0.00039	0.00053	0.00063	0.00048	0.00062	0.00051	0.00048	0.00047	60.1%	-4.4%	-23.5%	-3.1%
Potassium_D	mg/L	n/v	n/v	n/v	1.00	0.82	0.84	0.85	-44.7%	-41.4%	-40.1%	-39.6%	1.50	1.20	1.10	1.10	0.96	0.85	0.87	0.87	-36.0%	-29.5%	-21.1%	-21.1%
Selenium_D	mg/L	n/v	n/v	n/v	0.00005	0.00004	0.00004	0.00004	-4.2%	-19.6%	-14.9%	-15.2%	0.00005	0.00041	0.00039	0.00005	0.00028	0.00023	0.00021	0.00020	466.2%	-44.9%	-45.7%	293.0%
Selenium_T	mg/L	0.001	0.001	n/v	0.00005	0.00004	0.00005	0.00005	-5.1%	-10.4%	-5.8%	-10.0%	0.00005	0.00041	0.00039	0.00005	0.00029	0.00023	0.00021	0.00020	473.0%	-44.2%	-45.0%	298.7%
Silicon_D	mg/L	n/v	n/v	n/v	1.9	1.6	1.6	1.6	-17.9%	-17.7%	4.3%	-25.3%	1.5	2.0	0.8	1.3	1.3	1.2	1.2	1.2	-10.7%	-40.8%	48.6%	-9.8%
Silicon_T	mg/L	n/v	n/v	n/v	2.0	1.6	1.6	1.7	-13.5%	-17.6%	9.9%	-28.0%	1.7	2.2	1.0	1.4	1.5	1.3	1.3	1.3	-11.6%	-39.8%	37.0%	-6.1%
Silver_D	mg/L	n/v	n/v	n/v	0.000011	0.000011	0.000012	0.000011	129.4%	-79.0%	134.2%	114.7%	0.000005	0.000041	0.000039	0.000005	0.000027	0.000022	0.000021	0.000020	438.1%	-46.4%	-45.2%	308.7%
Silver_T	mg/L	0.00025	0.0001	n/v	0.000012	0.000011	0.000012	0.000011	131.5%	-78.8%	135.9%	116.5%	0.000005	0.000041	0.000039	0.000005	0.000027	0.000022	0.000021	0.000020	439.6%	-46.2%	-45.1%	309.9%
Sodium_D	mg/L	n/v	n/v	n/v	2.9	2.4	2.4	2.4	-13.0%	-9.5%	-12.2%	-7.6%	2.8	2.1	2.2	2.3	2.3	2.0	2.0	2.1	-16.9%	-4.8%	-8.1%	-10.8%
Sodium_T	mg/L	n/v	n/v	n/v	3.3	2.7	2.8	2.8	-2.9%	-2.6%	2.2%	6.5%	3.0	2.1	2.3	2.3	2.7	2.3	2.3	2.3	-11.0%	9.0%	0.5%	2.0%
Strontium_D	mg/L	n/v	n/v	n/v	0.032	0.026	0.027	0.027	-27.5%	-28.9%	-25.6%	-28.7%	0.037	0.028	0.030	0.029	0.027	0.023	0.024	0.024	-27.5%	-17.3%	-21.3%	-17.5%
Strontium_T	mg/L	n/v	n/v	n/v	0.034	0.028	0.028	0.028	-26.6%	-28.3%	-21.2%	-25.1%	0.040	0.029	0.030	0.031	0.029	0.025	0.026	0.026	-26.5%	-12.3%	-14.2%	-15.9%
Thallium_D	mg/L	n/v	n/v	n/v	0.00006	0.00005	0.00005	0.00005	11.9%	-8.1%	-4.5%	-2.4%	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	9.9%	-4.7%	-2.0%	-0.7%
Thallium_T	mg/L	0.0008	0.0008	n/v	0.00006	0.00005	0.00005	0.00005	14.3%	-6.2%	-2.6%	-0.4%	0.00005	0.00005	0.00005	0.00005	0.00006	0.00005	0.00005	0.00005	11.2%	-3.5%	-0.9%	0.4%
Uranium_D	mg/L	n/v	n/v	n/v	0.00005	0.00004	0.00004	0.00004	-3.1%	-11.0%	-14.5%	-12.0%	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00005	0.00005	0.3%	-12.8%	-9.9%	-8.7%
Uranium_T	mg/L	0.015	0.015	n/v	0.00006	0.00005	0.00005	0.00005	-0.3%	-5.6%	-17.2%	-13.1%	0.00005	0.00005	0.00006	0.00005	0.00005	0.00005	0.00005	0.00005	7.6%	-6.9%	-15.6%	-2.2%
Vanadium_T	mg/L	n/v	n/v	n/v	0.00034	0.00030	0.00030	0.00030	43.4%	15.8%	-19.0%	-16.4%	0.00037	0.00082	0.00045	0.00040	0.00070	0.00057	0.00053	0.00051	88.8%	-30.9%	18.7%	26.8%
Zinc_D	mg/L	Equation**	Equation*	0.5	0.00165	0.00154	0.00150	0.00147	-28.4%	9.9%	-0.1%	22.7%	0.00580	0.00160	0.00150	0.00150	0.00048	0.00042	0.00040	0.00038	-91.7%	-73.6%	-73.4%	-74.5%
Zinc_T	mg/L	n/v	n/v	0.5	0.01298	0.01355	0.01204	0.01168	464.5%	867.9%	702.3%	-74.0%	0.00750	0.00160	0.00150	0.00150	0.00315	0.00275	0.00254	0.00240	-58.0%	72.1%	69.1%	60.1%

Notes on last page

Table E-4: Baseline water quality model results for upper case

Notes:
Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.
Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.
T and pH are used for calculations of guidelines only and are not modeled.
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
CWQG for total phosphorus: Canadian Guidance Frameworks is used for total phosphorus (CCME 2020): ultra-oligotrophic <4 µg/L, oligotrophic 4-10 µg/L, mesotrophic 10-20 µg/L, meso-eutrophic 20-35 µg/L, eutrophic 35-100 µg/L, hyper-eutrophic >100 µg/L
CWQG for total zinc - most stringent guideline is applied using 0.3 mg/L of dissolved organic carbon (CCME 2020).
CWQG for total and dissolved manganese - most stringent long-term guideline is applied using the lowest hardnes as $CaCO_3$ (35 mg/L) and pH (6.70) (CCME 2019).
MSOG - Manitoba Water Quality Standards, Objectives, and Guidelines for Freshwater Aquatic Life (MSOG-FAL referred to as MSOG), long-term (MWS 2001).
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Schedule 4 - Authorized Limits of Deleterious Substances, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
MDMER is applied for total and dissolved metal concentrations for the purpose of the modeling.
Equation* - MSOG formula for calculation of hardness, pH, and temperature-dependent provincial guidelines (total ammonia as N and dissolved cadmium, chromium, copper, lead, nickel, and zinc) (MWS 2011).
Equation** - CWQG formula for calculation of hardness, pH, temperature, and DOC-dependent federal guidelines (total cadmium, copper, lead, manganese, nickel, and zinc) (CCME 2020).
Table 2 - CWQG guideline for total ammonia as N presented in Table 2 of the CWQG guidelines for the protection of aquatic life: Ammonia (CCME 2010). The values from Table 2 are multiplied by 0.8224 to convert them into total ammonia (as N).
Values exceeding CWQG are double underlined, MSOG are bold, and MDMER are highlighted yellow.
Observed T and observed pH is shown under the modeled T and pH, respectively.

Table E-5: Unscaled average weighted leaching rates from field bins

Phase		Construction, Operation & Closure		Post-closure	
Material/Averaging period	Units	2015-2018 Rock Average	2015-2018 Ore Average	2018 Rock Average	2018 Rock Average
Case		Expected and Upper	Expected and Upper	Upper	Expected
Surface area	excluding -0.001 mm	7.5	2.0	5.1	6.0
	including -0.001 mm	34.1	38.7	34.1	34.1
Proton	µg/kg/week	4.4E-08	4.9E-08	3.8E-08	3.9E-08
Acidity_T	µg/kg/week	0	0	0	0
Alkalinity_T	µg/kg/week	1440	1249	1212	489
Bromide	µg/kg/week	0	0	0	0
Chloride	µg/kg/week	0	0	0	0
Fluoride	µg/kg/week	1.4	2.6	1.4	1.4
Sulfate	µg/kg/week	1794	9165	1888	1093
Phosphorus_T	µg/kg/week	0.035	0.14	0.035	0.026
N_Ammonia	µg/kg/week	0	0	0	0
N_Nitrite	µg/kg/week	0	0	0	0
N_Nitrate_Nitrite	µg/kg/week	0	0	0	0
Cyanide_T	µg/kg/week	0	0	0	0
Cyanide_F	µg/kg/week	0	0	0	0
Cyanide_WAD	µg/kg/week	0	0	0	0
Hardness	µg/kg/week	0	0	0	0
Radium_226	µg/kg/week	0	0	0	0
Aluminum_D	µg/kg/week	0.89	0.78	0.67	0.53
Aluminum_T	µg/kg/week	0.89	0.78	0.67	0.53
Antimony_D	µg/kg/week	0.022	0.011	0.012	0.008
Antimony_T	µg/kg/week	0.022	0.011	0.012	0.008
Arsenic_D	µg/kg/week	0.23	0.023	0.38	0.097
Arsenic_T	µg/kg/week	0.23	0.023	0.38	0.097
Barium_D	µg/kg/week	0.33	1.10	0.32	0.22
Barium_T	µg/kg/week	0.33	1.10	0.32	0.22
Beryllium_T	µg/kg/week	0.0022	0.0040	0.0024	0.0016
Boron_D	µg/kg/week	0.97	1.1	0.72	0.16
Boron_T	µg/kg/week	0.97	1.1	0.72	0.16
Cadmium_D	µg/kg/week	0.00011	0.00020	0.00012	0.000081
Cadmium_T	µg/kg/week	0.00011	0.00020	0.00012	0.000081
Calcium_D	µg/kg/week	528	2608	758	499
Chromium_D	µg/kg/week	0.0014	0.0022	0.0020	0.0012
Chromium_D_Hex	µg/kg/week	0.0014	0.0022	0.0020	0.0012
Chromium_T	µg/kg/week	0.0014	0.0022	0.0020	0.0012
Cobalt_D	µg/kg/week	0.0023	0.0049	0.0024	0.0016
Cobalt_T	µg/kg/week	0.0023	0.0049	0.0024	0.0016
Copper_D	µg/kg/week	0.024	0.036	0.023	0.019
Copper_T	µg/kg/week	0.024	0.036	0.023	0.019
Iron_D	µg/kg/week	0.15	0.21	0.13	0.10
Iron_T	µg/kg/week	0.15	0.21	0.13	0.10
Lead_D	µg/kg/week	0.0011	0.0018	0.0011	0.0007
Lead_T	µg/kg/week	0.0011	0.0018	0.0011	0.0007
Magnesium_D	µg/kg/week	94	311	105	49
Manganese_D	µg/kg/week	0.022	1.9	0.015	0.010
Manganese_T	µg/kg/week	0.022	1.9	0.015	0.010
Mercury_D	µg/kg/week	0.000011	0.000017	0.000011	0.0000074
Mercury_T	µg/kg/week	0.000011	0.000017	0.000011	0.0000074
Molybdenum_D	µg/kg/week	0.089	0.030	0.075	0.032
Molybdenum_T	µg/kg/week	0.089	0.030	0.075	0.032
Nickel_D	µg/kg/week	0.014	0.030	0.011	0.008
Nickel_T	µg/kg/week	0.014	0.030	0.011	0.008
Potassium_D	µg/kg/week	272	590	293	118
Selenium_D	µg/kg/week	0.0088	0.012	0.0060	0.0027
Selenium_T	µg/kg/week	0.0088	0.012	0.0060	0.0027
Silicon_D	µg/kg/week	35	45	32	16
Silicon_T	µg/kg/week	35	45	32	16
Silver_D	µg/kg/week	0.00011	0.00026	0.00012	0.000081
Silver_T	µg/kg/week	0.00011	0.00026	0.00012	0.000081
Sodium_D	µg/kg/week	612	603	409	138
Sodium_T	µg/kg/week	612	603	409	138
Strontium_D	µg/kg/week	2.2	7.3	3.0	1.6
Strontium_T	µg/kg/week	2.2	7.3	3.0	1.6
Thallium_D	µg/kg/week	0.0011	0.0020	0.0011	0.0008
Thallium_T	µg/kg/week	0.0011	0.0020	0.0011	0.0008
Uranium_D	µg/kg/week	0.076	0.043	0.053	0.038
Uranium_T	µg/kg/week	0.076	0.043	0.053	0.038
Vanadium_T	µg/kg/week	0.0075	0.0042	0.0037	0.0029
Zinc_D	µg/kg/week	0.017	0.031	0.014	0.0087
Zinc_T	µg/kg/week	0.017	0.031	0.014	0.0087

Table E-6: Mined rock and ore tonnages

Model Year	Unit	12	13	14	15	16	17	18	19	20	21	22	23	24	140
Mine Plan Period		-1	1	2	3	4	5	6	7	8	9	10	11	12	138
Reference Date (year end)		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2150
Mine Phase		Construction	Operation					Closure						Post-Closure	
Mine (Waste) Rock	kt	1,784	11,902	13,406	11,957	8,730	2,294	-	-	-	-	-	-	-	-
Ore Mined	kt	29	1,246	2,256	1,775	1,769	930	-	-	-	-	-	-	-	-
Rock + Ore Mined	kt	1,813	13,147	15,662	13,733	10,499	3,225	-	-	-	-	-	-	-	-
Mine rock in stockpile	kt	1,784	13,686	27,092	39,049	47,779	50,073	50,073	50,073	50,073	50,073	50,073	50,073	50,073	50,073
Ore in stockpile	kt	29	261	1,018	1,293	1,562	992	-	-	-	-	-	-	-	-

Table E-7: Mass flushed to pit lake from submerged rubble

Parameter	Mass, g/tonne	Parameter	Mass, g/tonne
Proton	5.4E-08	Cobalt_T	0.00092
Acidity_T	35	Copper_D	0.0031
Alkalinity_T	426	Copper_T	0.0031
Bromide	0.15	Iron_D	2.1
Chloride	9.7	Iron_T	2.4
Fluoride	0.26	Lead_D	0.00014
Sulfate	342	Lead_T	0.00024
Phosphorus_T	0.068	Magnesium_D	60
N_Ammonia	0.34	Manganese_D	2.2
N_Nitrite	0.13	Manganese_T	2.3
N_Nitrate_Nitrite	0.27	Mercury_D	3.0E-06
Cyanide_T	0.0011	Mercury_T	3.0E-06
Cyanide_F	0.0010	Molybdenum_D	0.0024
Cyanide_WAD	0.0010	Molybdenum_T	0.0025
Hardness	692	Nickel_D	0.0022
Radium_226	0.021	Nickel_T	0.0023
TSS	5.7	Potassium_D	17
Aluminum_D	0.011	Selenium_D	0.00014
Aluminum_T	0.025	Selenium_T	0.00014
Antimony_D	0.00021	Silicon_D	13
Antimony_T	0.00024	Silicon_T	13
Arsenic_D	0.0099	Silver_D	0.000010
Arsenic_T	0.0099	Silver_T	0.000010
Barium_D	0.070	Sodium_D	45
Barium_T	0.070	Sodium_T	45
Beryllium_T	0.00021	Strontium_D	0.56
Boron_D	0.14	Strontium_T	0.56
Boron_T	0.15	Thallium_D	0.00010
Cadmium_D	0.000025	Thallium_T	0.00010
Cadmium_T	0.000025	Uranium_D	0.0072
Calcium_D	178	Uranium_T	0.0073
Chromium_D	0.00011	Vanadium_T	0.00065
Chromium_D_Hex	0.00011	Zinc_D	0.0035
Chromium_T	0.00042	Zinc_T	0.0039
Cobalt_D	0.00085		

Table E-8: Direct transfer rates from pit lake (1/yr).

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Model annual rate	Literature annual rate		Source/Assumption
														Geomean	Geometric Standard Deviation	
Proton	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Acidity_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Alkalinity_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Bromide	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.00	0.10	0.20	6.9	Bird et al., 1993 - Table 3
Chloride	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Fluoride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	-	-	No removal
Sulfate	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Phosphorus_T	0.00	0.00	0.00	0.00	9.14	9.14	9.14	9.14	9.14	9.14	0.00	0.00	4.6	1.5	6.9	Bird et al., 1993 - Table 3
N_Ammonia	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.040	-	-	Calculated from Stantec, 2017c.
N_Nitrite	0.00	0.00	0.00	0.00	0.15	0.15	0.15	0.15	0.15	0.15	0.00	0.00	0.15	-	-	Calculated from Stantec, 2017c.
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.00	0.060	-	-	Calculated from Stantec, 2017c.
Cyanide_T	0.00	0.00	0.00	0.00	0.07	0.07	0.07	0.07	0.07	0.07	0.00	0.00	0.070	-	-	Calculated from Stantec, 2017c.
Cyanide_F	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.10	-	-	Calculated from Stantec, 2017c.
Cyanide_WAD	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.10	-	-	Calculated from Stantec, 2017c.
Hardness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	-	-	No removal
Radium_226	0.00	0.00	0.00	0.00	2.60	2.60	2.60	2.60	2.60	2.60	0.00	0.00	1.3	1.3	4.7	Bird et al., 1993 - Table 3
Aluminum_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Aluminum_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Antimony_D	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.10	0.10	7.2	Bird et al., 1993 - Table 3
Antimony_T	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.10	0.10	7.2	Bird et al., 1993 - Table 3
Arsenic_D	0.00	0.00	0.00	0.00	0.46	0.46	0.46	0.46	0.46	0.46	0.00	0.00	0.23	-	-	Calculated from Dessouki et al., 2005
Arsenic_T	0.00	0.00	0.00	0.00	0.46	0.46	0.46	0.46	0.46	0.46	0.00	0.00	0.23	-	-	Calculated from Dessouki et al., 2006
Barium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Barium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Beryllium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	1.9	3.7	Assumed to be =Ca
Boron_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.20	6.9	Assumed to be =Ca
Boron_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.20	6.9	Assumed to be =Ca
Cadmium_D	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.00	0.00	0.18	1.0	4.7	Assumed to be =Co
Cadmium_T	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.00	0.00	0.18	1.0	4.7	Assumed to be =Co
Calcium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.0050	13.1	Bird et al., 1993 - Table 3
Chromium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	2.0	16.1	Assumed to be =Ca
Chromium_D_Hex	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	2.0	16.1	Assumed to be =Ca
Chromium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	2.00	16.1	Assumed to be =Ca
Cobalt_D	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.00	0.00	0.18	1.00	-	Calculated from Dessouki et al., 2005
Cobalt_T	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.00	0.00	0.18	1.00	-	Calculated from Dessouki et al., 2006
Copper_D	0.00	0.00	0.00	0.00	0.62	0.62	0.62	0.62	0.62	0.62	0.00	0.00	0.31	0.30	1.5	Ni in Bird et al., 1993 - Table 3
Copper_T	0.00	0.00	0.00	0.00	0.62	0.62	0.62	0.62	0.62	0.62	0.00	0.00	0.31	0.30	1.5	Ni in Bird et al., 1993 - Table 4
Iron_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	2.0	16.1	Assumed to be =Ca
Iron_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	2.0	16.1	Assumed to be =Ca
Lead_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	1.9	3.7	Assumed to be =Ca
Lead_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	1.9	3.7	Assumed to be =Ca
Magnesium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	1.9	3.7	Assumed to be =Ca
Manganese_D	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.00	0.00	0.15	1.7	9.9	Assumed to be = Ni
Manganese_T	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.00	0.00	0.15	1.7	9.9	Assumed to be = Ni
Mercury_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	9.8	-	Assumed to be =Ca
Mercury_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	10.8	-	Assumed to be =Ca
Molybdenum_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	1.0	6.9	Assumed to be =Ca
Molybdenum_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	1.0	6.9	Assumed to be =Ca
Nickel_D	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.00	0.00	0.15	0.30	1.5	1/2 from Bird et al., 1993 - Table 3
Nickel_T	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.00	0.00	0.15	0.30	1.5	1/2 from Bird et al., 1993 - Table 3
Potassium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.0030	11	Assumed to be =Ca
Selenium_D	0.00	0.00	0.00	0.00	0.22	0.22	0.22	0.22	0.22	0.22	0.00	0.00	0.11	3.1	6.6	Dessouki et al., 2005
Selenium_T	0.00	0.00	0.00	0.00	0.22	0.22	0.22	0.22	0.22	0.22	0.00	0.00	0.11	3.1	6.6	Dessouki et al., 2005
Silicon_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.10	1.2	Assumed to be =Ca
Silicon_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.10	1.2	Assumed to be =Ca
Silver_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Silver_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Sodium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Sodium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumed to be =Ca
Strontium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.10	31.7	Assumed to be =Ca
Strontium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	0.10	31.7	Assumed to be =Ca
Thallium_D	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	4.9	3.3	Assumed to be =Ca
Thallium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	4.9	3.3	Assumed to be =Ca
Uranium_D	0.00	0.00	0.00	0.00	0.28	0.28	0.28	0.28	0.28	0.28	0.00	0.00	0.14	0.50	3	Calculated from Dessouki et al., 2005
Uranium_T	0.00	0.00	0.00	0.00	0.28	0.28	0.28	0.28	0.28	0.28	0.00	0.00	0.14	0.50	3	Calculated from Dessouki et al., 2006
Vanadium_T	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.0050	-	-	Assumption could be 0
Zinc_D	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.00	0.00	0.18	1.0	6.9	Assumed to be =Co
Zinc_T	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.00	0.00	0.18	1.0	6.9	Assumed to be =Co

Appendix F WATER QUALITY INPUTS

Table F-1: Water quality model results for expected case

Name inmodel	Units	South_RSA Groundwater Geomean	North_RSA Groundwater Geomean	Overburden Groundwater Geomean	Bedrock Groundwater Geomean	AQF1 Mean Fall since all Winter is "NULL"	AQF1 Mean Spring	AQF1 Mean Summer	AQF1 Mean Fall	AQF2 Mean Winter	AQF2 Mean Spring	AQF2 Mean Summer	AQF2 Mean Fall	AQF4 deep Mean Winter	AQF4 deep Mean Spring	AQF4 deep Mean Summer	AQF4 deep Mean Fall	AQF4 shallow Mean Winter	AQF4 shallow Mean Spring	AQF4 shallow Mean Summer	AQF4 shallow Mean Fall
Number of samples collected for analysis		15	14	60	63	0	4	3	3	6	7	5	6	19	17	17	20	27	19	15	16
pH	pH Unit	7.2	6.8	7.6	7.5	7.2	6.6	6.6	7.2	7	7.3	7.6	7.5	6.3	7.3	7.3	7.3	7.3	7.7	7.7	7.6
T	deg C	2.7	2.3	5.6	2.7	4.8	3.3	8.4	4.8	0.45	12	20	7.6	3.6	3.6	3.6	3.7	1.7	8	15	8.1
Proton	mg/L	6.65E-08	1.76E-07	2.55E-08	3.24E-08	6.31E-08	2.51E-07	2.51E-07	6.31E-08	1.00E-07	5.01E-08	2.51E-08	3.16E-08	5.01E-07	5.01E-08	5.01E-08	5.01E-08	5.01E-08	2.00E-08	2.00E-08	2.51E-08
Acidity_T	mg/L	21.0	25.5	7.0	4.5	5.2	6.7	9.2	5.2	15	5.5	2.8	2.7	13	11	9.4	5.9	8.3	4.1	2.4	2.4
Alkalinity_T	mg/L	333	256	141	152	49	41	59	49	100	62	61	62	220	220	230	220	120	120	120	110
Bromide	mg/L	0.16	0.07	0.05	0.05	0	0.05	0.05	0	0.05	0.05	0.05	0.05	0.05	0.05	0.064	0.061	0.05	0.05	0.05	0.05
Chloride	mg/L	9.10	5.48	0.94	0.57	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.38	2.9	2.8	3.1	3.2	0.4	0.46	0.31	0.28
Fluoride	mg/L	0.112	0.069	0.139	0.136	0	0.036	0.046	0	0.081	0.051	0.061	0.063	0.13	0.13	0.14	0.14	0.084	0.078	0.076	0.082
Sulfate	mg/L	624	287	28	16	1.2	0.68	0.83	1.2	3.9	2.8	2.5	3.2	160	150	170	170	25	31	22	26
Phosphorus_T	mg/L	0.016	0.104	0.011	0.023	0.005	0.015	0.008	0.005	0.0268	0.031	0.025	0.022	0.041	0.03	0.038	0.034	0.013	0.012	0.0088	0.009
N_Ammonia	N mg/L	0.157	0.458	0.190	0.085	0.007	0.016	0.012	0.007	0.086	0.025	0.028	0.0092	0.17	0.17	0.19	0.17	0.017	0.0056	0.0097	0.0075
N_Nitrite	N mg/L	0.019	0.009	0.010	0.013	0.006	0.001	0.003	0.006	0.012	0.008	0.006	0.014	0.027	0.017	0.020	0.018	0.008	0.006	0.012	0.016
N_Nitrate_Nitrite	N mg/L	0.444	0.107	0.082	0.067	0.025	0.041	0.025	0.025	0.025	0.029	0.03	0.041	0.043	0.055	0.033	0.034	0.085	0.042	0.033	0.032
Cyanide_T	mg/L	0.00050	0.00050	0.00055	0.00054	0.00180	0.00070	0.00120	0.00180	0.00060	0.00064	0.00063	0.00063	0.00050	0.00050	0.00050	0.00050	0.00058	0.00050	0.00050	0.00050
Cyanide_F	mg/L	0.00050	0.00050	0.00060	0.00056	0.00180	**0.00070**	0.00120	0.00180	0.00050	**0.00064**	0.00100	**0.00100**	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Cyanide_WAD	mg/L	0.00050	0.00050	0.00055	0.00054	0.00180	0.00070	0.00120	0.00180	0.00050	0.00064	**0.00063**	**0.00063**	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Hardness	mg/L	1013	469	161	164	52	45	62	52	99	66	67	64	340	320	350	340	140	140	120	120
Radium_226	Bq/L	0.020	0.026	0.053	0.029	0.01	0.005	0.005	0.01	0.0048	0.0045	0.0049	0.0045	0.0049	0.005	0.0043	0.0052	0.0049	0.005	0.0032	0.0048
Aluminum_D	mg/L	0.0029	0.0147	0.0070	0.0040	0.03200	0.05100	0.03400	0.03200	0.01500	0.01900	0.00760	0.00650	0.00190	0.00160	0.00240	**0.00400**	0.00780	0.01100	0.00490	0.00390
Aluminum_T	mg/L	0.00289	0.01466	0.00696	0.00404	0.0380	0.1000	0.0400	0.0380	0.0190	0.0680	0.0250	0.0346	0.0039	0.0270	0.0054	0.0040	0.0120	0.0270	0.0270	0.0180
Antimony_D	mg/L	0.000212	0.000107	0.000060	0.000054	0.000100	0.000100	0.000100	0.000100	0.000092	0.000093	0.000080	0.000080	0.000075	0.000083	0.000061	**0.000070**	**0.000086**	**0.000086**	**0.000050**	**0.000050**
Antimony_T	mg/L	0.000212	0.000107	0.000060	0.000054	0.000100	0.000100	0.000100	0.000100	0.000092	0.000093	0.000080	0.000080	0.000075	0.000083	0.000069	0.000070	0.000086	0.000086	0.000050	0.000050
Arsenic_D	mg/L	0.00054	0.00121	0.00042	0.00057	0.00014	**0.00015**	**0.00013**	0.00014	**0.00049**	0.00045	0.00042	0.00033	**0.00560**	0.00440	**0.00610**	0.00530	0.00190	0.00160	**0.00210**	**0.00210**
Arsenic_T	mg/L	0.00054	0.00121	0.00042	0.00057	0.00014	0.00015	0.00013	0.00014	0.00049	0.00046	0.00045	0.00037	0.00560	0.00530	0.00610	0.00580	0.00190	0.00180	0.00210	0.00210
Barium_D	mg/L	0.0626	0.0945	0.0395	0.0213	0.01000	0.00900	0.01100	0.01000	**0.02200**	0.01200	0.00860	0.00860	0.03900	0.03600	0.04200	0.04200	**0.01800**	0.01500	0.01400	0.01300
Barium_T	mg/L	0.0626	0.0945	0.0395	0.0213	0.01000	0.01000	0.01200	0.01000	0.02200	0.01300	0.00960	0.00960	0.03900	0.03700	0.04200	0.04400	0.01800	0.01500	0.01400	0.01300
Beryllium_T	mg/L	0.000050	0.000050	0.000055	0.000067	0.0001	0.0001	0.0001	0.0001	0.000092	0.000093	0.00008	0.00008	0.000075	0.000083	0.00005	0.00005	0.000086	0.000086	0.00005	0.00005
Boron_D	mg/L	0.04015	0.02303	0.00861	0.00947	0.00500	0.00500	0.00500	0.00500	0.01500	0.00500	0.00500	0.00500	**0.08800**	0.09100	0.09400	0.09300	**0.01300**	**0.01200**	0.00990	**0.00750**
Boron_T	mg/L	0.04015	0.02303	0.00861	0.00947	0.00500	0.00500	0.00500	0.00500	0.02000	0.00500	0.00500	0.00880	0.08800	0.09300	0.10000	0.10000	0.01300	0.01200	0.01000	0.00750
Cadmium_D	mg/L	0.000039	0.000006	0.000007	0.000007	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000004	0.000004	**0.000005**	0.000004	0.000003	0.000004	**0.000008**	**0.000005**	**0.000004**	0.000004
Cadmium_T	mg/L	0.000039	0.000006	0.000007	0.000007	0.000005	0.000006	0.000005	0.000005	0.000005	0.000006	0.000005	0.000005	0.000005	0.000005	0.000006	0.000004	0.000008	0.000005	0.000004	0.000005
Calcium_D	mg/L	286	128	42	47	17	15	21	17	29	19	20	18	85	81	89	86	39	40	35	36
Chromium_D	mg/L	0.000050	0.000293	0.000112	0.000186	0.000050	0.000190	0.000050	0.000050	0.000070	0.000120	0.000060	0.000066	0.000050	0.000050	0.000074	0.000055	0.000054	0.000110	0.000057	0.000056
Chromium_D_He	mg/L	0.000050	0.000293	0.000112	0.000186	**0.000050**	**0.000190**	**0.000050**	**0.000050**	**0.000070**	**0.000120**	**0.000060**	**0.000066**	**0.000050**	**0.000050**	**0.000074**	**0.000055**	**0.000054**	**0.000120**	**0.000057**	**0.000056**
Chromium_T	mg/L	0.000050	0.000293	0.000112	0.000186	0.000110	0.000240	0.000100	0.000110	0.000180	0.000210	0.000140	0.000230	0.000075	0.000120	0.000100	0.000059	0.000081	0.000110	0.000240	0.000085
Cobalt_D	mg/L	0.000487	0.000122	0.000120	0.000076	0.000100	0.000100	0.000100	0.000100	0.000290	0.000130	0.000080	0.000080	**0.000190**	0.000140	**0.000200**	**0.000270**	**0.000230**	0.000091	**0.000050**	**0.000050**
Cobalt_T	mg/L	0.000487	0.000122	0.000120	0.000076	0.000100	0.000140	0.000100	0.000100	0.000290	0.000130	0.000090	0.000080	0.000190	0.000150	0.000200	0.000270	0.000230	0.000094	0.000050	0.000050
Copper_D	mg/L	0.000286	0.000486	0.000842	0.000358	0.000410	0.000630	**0.000430**	0.000410	0.000180	**0.000240**	0.000260	0.000100	0.000220	0.000190	0.000120	0.000190	**0.001200**	0.000940	0.001000	**0.000930**
Copper_T	mg/L	0.000286	0.000486	0.000842	0.000358	0.000420	0.000760	0.000430	0.000420	0.000280	0.000240	0.000280	0.000330	0.000270	0.000290	0.000610	0.000450	0.001200	0.001100	0.001100	0.000930
Iron_D	mg/L	0.188	2.165	0.034	0.159	0.200	0.130	0.120	0.200	**0.640**	0.640	0.210	0.150	1.400	0.650	1.400	0.880	0.078	0.087	0.035	0.018
Iron_T	mg/L	0.188	2.165	0.034	0.159	0.230	0.300	0.170	0.230	0.640	1.100	0.410	0.320	1.400	1.500	1.700	1.600	0.100	0.220	0.110	0.058
Lead_D	mg/L	0.000025	0.000025	0.000035	0.000049	0.000045	0.000045	0.000045	0.000045	0.000042	0.000042	0.000037	0.000037	0.000035	0.000038	0.000029	**0.000025**	0.000047	**0.000043**	0.000035	**0.000039**
Lead_T	mg/L	0.000025	0.000025	0.000035	0.000049	0.000045	0.000120	0.000045	0.000045	0.000081	0.000058	0.000110	0.000078	0.000035	0.000046	0.000130	0.000025	0.000047	0.000043	0.000130	0.000039
Magnesium_D	mg/L	74.8	29.2	9.6	10.3	2.1	1.8	2.3	2.1	7.2	4.4	4.5	4.5	31.0	30.0	32.0	31.0	9.8	9.9	8.5	8.6
Manganese_D	mg/L	0.4271	0.2602	0.0840	0.0579	0.0160	0.0130	0.0230	0.0160	0.6900	0.2100	0.0320	0.0210	0.9000	0.6500	**1.0000**	1.1000	**0.2200**	0.0510	0.0066	0.0690
Manganese_T	mg/L	0.4271	0.2602	0.0840	0.0579	0.0170	0.0250	0.0280	0.0170	0.7800	0.2700	0.1000	0.0370	0.9300	0.7000	1.0000	1.2000	0.2200	0.1000	0.0300	0.0830
Mercury_D	mg/L	0.0000004	0.0000006	0.0000010	0.0000012	0.0000010	0.0000027	**0.0000014**	0.0000010	0.0000014	0.0000017	**0.0000014**	0.0000008	**0.0000003**	**0.0000006**	0.0000006	**0.0000004**	0.0000009	0.0000010	0.0000009	0.0000006
Mercury_T	mg/L	0.0000004	0.0000006	0.0000010	0.0000012	0.0000014	0.0000032	0.0000014	0.0000014	0.0000018	0.0000019	0.0000014	0.0000008	0.0000003	0.0000006	0.0000006	0.0000004	0.0000009	0.0000011	0.0000010	0.0000006
Molybdenum_D	mg/L	0.0023	0.0008	0.0027	0.0022	0.000090	0.000100	**0.000100**	0.000090	0.000210	**0.000130**	**0.000120**	0.000150	**0.000840**	0.000860	0.000930	0.000920	0.000370	**0.000400**	0.000390	**0.000420**
Molybdenum_T	mg/L	0.0023	0.0008	0.0027	0.0022	0.00010	0.00010	0.00010	0.00010	0.00023	0.00013	0.00012	0.00017	0.00084	0.00091	0.00099	0.00100	0.00040	0.00040	0.00040	0.00042
Nickel_D	mg/L	0.00168	0.00054	0.00073	0.00027	0.00020	0.00026	0.00020	0.00020	**0.00032**	**0.00021**	0.00022	0.00022	0.00044	0.00037	0.00043	**0.00042**	**0.00130**	0.00095	0.00100	**0.00100**
Nickel_T	mg/L	0.00168	0.00054	0.00073	0.00027	0.00020	0.00043	0.00020	0.00020	0.00032	0.00021	0.00038	0.00034	0.00048	0.00049	0.00044	0.00042	0.00130	0.00110	0.00130	0.00100
Potassium_D	mg/L	9.00	4.64	3.36	2.44	0.530	0.780	0.400	0.530	1.500	1.200	0.910	0.910	7.100	7.000	7.500	7.400	2.700	3.100	3.100	3.100
Selenium_D	mg/L	0.000113	0.000131	0.000078	0.000069	0.000050	0.000140	0.000050	0.000050	**0.000051**	0.000110	**0.000040**	0.000040	**0.000047**	0.000042	**0.000025**	**0.000025**	**0.000054**	**0.000043**	**0.000038**	**0.000043**
Selenium_T	mg/L	0.000113	0.000131	0.000078	0.000069	0.000050	0.000140	0.000050	0.000050	0.000051	0.000110	0.000040	0.000040	0.000047	0.000042	0.000025	0.000025	0.000054	0.000043	0.000038	0.000043
Silicon_D	mg/L	5.53	7.04	5.98	7.15	5.10	4.10	4.90	5.10	**4.10**	2.60	1.70	2.30	**7.00**	7.10	7.40	7.30	**3.70**	3.30	2.60	3.10
Silicon_T	mg/L	5.53	7.04	5.98	7.15	5.30	4.20	4.90	5.30	4.10	2.80	1.70	2.50	7.00	7.30	8.00	7.60	3.70	3.40	3.00	3.10
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000074	0.0000050	0.0000140	0.0000050	0.0000050	0.0000050	0.0000110	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	**0.0000050**	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000074	0.0000050	0.0000140	0.0000050	0.0000050	0.0000050	0.0000110	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Sodium_D	mg/L	37.20	44.99	9.91	7.11	1.40	**1.20**	1.50	1.40	**2.30**	1.40	1.60	1.60	22.00	21.00	23.00	23.00	4.00	**3.90**	3.40	3.60
Sodium_T	mg/L	37.20	44.99	9.91	7.11	1.50	1.20	1.60	1.50	2.30	1.40	1.60	1.60	22.00	22.00	24.00	26.00	4.20	3.90	3.60	3.70
Strontium_D	mg/L	0.644	0.216	0.070	0.099	0.022	0.018	0.027	0.022	0.049	0.032	**0.033**	0.032	0.280	0.270	0.300	0.280	0.077	**0.076**	0.067	**0.072**
Strontium_T	mg/L	0.644	0.216	0.070	0.099	0.022	0.019	0.027	0.022	0.050	0.032	0.033	0.033	0.280	0.290	0.310	0.300	0.079	0.076	0.073	0.072
Thallium_D	mg/L	0.000013	0.000024	0.000022	0.000026	0.0000500	0.0000500	0.0000500	0.0000500	0.0000430	0.0000440	0.0000320	0.0000320	0.0000280	0.0000350	**0.0000050**	**0.0000050**	**0.0000380**	**0.0000370**	**0.0000050**	**0.0000050**
Thallium_T	mg/L	0.000013	0.000024	0.000022	0.000026	0.0000500	0.0000500	0.0000500	0.0000500	0.0000430	0.0000440	0.0000320	0.0000320	0.0000280	0.0000350	0.0000050	0.0000050	0.0000380	0.0000370	0.0000050	0.0000050
Uranium_D	mg/L	0.0075	0.0013	0.0008	0.0012	0.0000500	0.0000500	0.0000500	0.0000500	0.0000470	0.0000470	0.0000390	0.0000380	**0.0025000**	0.0025000	**0.0027000**	0.0028000	0.0004300	**0.0005600**	0.0004100	0.0004500
Uranium_T	mg/L	0.0075	0.0013	0.0008	0.0012	0.0000500	0.0000500	0.0000500	0.0000500	0.0000470	0.0000470	0.0000400	0.0000390	0.0025000	0.0027000	0.0027000	0.0030000	0.0004800	0.0005600	0.0004400	0.0004700
Vanadium_T	mg/L	0.00024	0.00092	0.00036	0.00027	0.000100	0.000240	0.000100	0.000100	0.000150	0.000220	0.000190	0.000340	0.000190	0.000230	0.000250	0.000250	0.000250	0.000140	0.000250	0.000250
Zinc_D	mg/L	0.0005	0.0005	0.0031	0.0025	**0.00070**	0.00100	0.00130	**0.00070**	0.00120	**0.00097**	0.00120	0.00068	0.00063	0.00086	0.00110	0.00140	0.00160	**0.00093**	0.00150	**0.00150**
Zinc_T	mg/L	0.0005	0.0005	0.0031	0.0025	0.00070	0.00200	0.00130	0.00070	0.00150	0.00097	0.00150	0.00120	0.00110	0.00110	0.00230	0.00190	0.00170	0.00093	0.00220	0.00150

Table F-1: Water quality model results for expected case

Name inmodel	Units	AQF5	AQF5	AQF5	AQF5	AQF6-shallow	AQF6-shallow	AQF6-shallow	AQF6-shallow	AQF6-Deep	AQF6-Deep	AQF6-Deep	AQF6-Deep	AQF7	AQF7	AQF7	AQF7	AQF8	AQF8	AQF8	AQF8
		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples collected for analysis		**5**	**6**	**3**	**3**	**25**	**18**	**14**	**15**	**12**	**15**	**15**	**21**	**6**	**5**	**2**	**3**	**4**	**5**	**3**	**4**
pH	pH Unit	7	8	8.1	7.7	7.3	7.7	8.1	7.8	7.2	7.3	7.4	7.3	7	7.1	7.1	7.4	6.4	7.4	7	7.3
T	deg C	0.42	16	20	9.8	0.97	9.1	19	9	3.1	3.1	3.3	3.3	0.45	12	18	8.1	0.33	14	18	8.3
Proton	mg/L	1.00E-07	1.00E-08	7.94E-09	2.00E-08	5.01E-08	2.00E-08	7.94E-09	1.58E-08	6.31E-08	5.01E-08	3.98E-08	5.01E-08	1.00E-07	7.94E-08	7.94E-08	3.98E-08	3.98E-07	3.98E-08	1.00E-07	5.01E-08
Acidity_T	mg/L	20	3.1	2.1	3.2	8.4	2.2	1	2.2	13	7.7	8	7	5.3	2.3	2.3	2.3	52	6.2	8.4	5
Alkalinity_T	mg/L	240	120	73	71	130	110	110	120	200	190	200	200	23	19	21	19	190	69	100	96
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.067	0.058	0.071	0.069	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	4.3	2.5	2.1	2.5	0.72	0.78	0.51	0.78	5.5	5.3	6	6.1	0.25	0.25	0.25	0.25	1.3	0.5	0.25	0.69
Fluoride	mg/L	0.07	0.072	0.078	0.08	0.088	0.076	0.076	0.079	0.12	0.13	0.13	0.13	0.048	0.041	0.045	0.049	0.066	0.063	0.081	0.074
Sulfate	mg/L	770	420	460	500	39	43	36	44	180	170	190	190	1.1	0.85	0.75	0.91	40	45	36	29
Phosphorus_T	mg/L	0.027	0.027	0.015	0.011	0.0096	0.0079	0.0048	0.0049	0.021	0.013	0.013	0.021	0.0134	0.017	0.005	0.0087	0.033	0.02	0.022	0.011
N_Ammonia	N mg/L	0.15	0.005	0.013	0.013	0.012	0.0065	0.017	0.01	0.13	0.12	0.14	0.14	0.028	0.019	0.005	0.005	0.68	0.019	0.009	0.01
N_Nitrite	N mg/L	0.023	0.005	0.001	0.009	0.011	0.008	0.015	0.019	0.038	0.009	0.012	0.019	0.011	0.006	0.007	0.002	0.007	0.002	0.003	0.003
N_Nitrate_Nitrite	N mg/L	0.082	0.025	0.025	0.025	0.13	0.062	0.077	0.036	0.047	0.047	0.15	0.047	0.052	0.033	0.025	0.025	0.025	0.025	0.025	0.025
Cyanide_T	mg/L	0.00050	0.00090	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00067	0.00070	0.00050	0.00050	0.00050	0.00070	0.00120	0.00130
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	**0.00070**	0.00050	0.00180	0.00050	**0.00070**	0.00120	**0.00130**
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00070	0.00050	**0.00050**	0.00050	0.00070	0.00120	0.00130
Hardness	mg/L	950	510	500	490	160	150	140	160	340	330	360	340	21	19	19	18	200	110	130	120
Radium_226	Bq/L	0.005	0.0031	0.005	0.0031	0.0046	0.0035	0.003	0.0051	0.0085	0.0067	0.0057	0.0071	0.005	0.005	0.005	0.005	0.0065	0.0062	0.005	0.005
Aluminum_D	mg/L	0.00690	0.01300	0.00250	0.00100	0.00500	0.00810	0.00530	0.00440	0.00160	0.00260	0.00220	0.00190	0.01000	0.01600	0.01200	0.01800	0.04800	0.03600	0.01100	0.01200
Aluminum_T	mg/L	0.0320	0.0130	0.0025	0.0010	0.0110	0.0400	0.0370	0.0140	0.0038	0.0056	0.0056	0.0058	0.0176	0.0400	0.0170	0.0410	0.1900	0.0670	0.0570	0.0630
Antimony_D	mg/L	0.000100	0.000280	0.000100	0.000100	0.000089	**0.000075**	**0.000050**	**0.000050**	0.000075	0.000080	0.000060	**0.000050**	0.000100	**0.000100**	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100
Antimony_T	mg/L	0.000100	0.000280	0.000100	0.000100	0.000100	0.000075	0.000050	0.000050	0.000075	0.000080	0.000078	0.000050	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100
Arsenic_D	mg/L	0.00230	0.00160	0.00120	0.00100	**0.00220**	0.00180	0.00270	0.00220	**0.00460**	0.00480	0.00490	0.00450	0.00020	0.00017	0.00021	0.00021	**0.00072**	**0.00069**	**0.00064**	0.00042
Arsenic_T	mg/L	0.00230	0.00160	0.00120	0.00100	0.00220	0.00210	0.00280	0.00240	0.00460	0.00480	0.00530	0.00510	0.00022	0.00020	0.00022	0.00023	0.00072	0.00069	0.00064	0.00050
Barium_D	mg/L	0.05500	0.02700	0.02200	0.02100	**0.01700**	0.01500	**0.01400**	**0.01400**	**0.03300**	0.03400	0.03500	0.03400	0.01000	0.00740	0.00630	0.00650	**0.03400**	0.01500	0.01800	0.01500
Barium_T	mg/L	0.04200	0.02700	0.02200	0.02100	0.01700	0.01500	0.01400	0.01400	0.03300	0.03400	0.03700	0.03500	0.01200	0.00830	0.00630	0.00730	0.03400	0.01500	0.01800	0.01500
Beryllium_T	mg/L	0.0001	0.00005	0.00005	0.00005	0.000088	0.000075	0.00005	0.00005	0.000075	0.00008	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron_D	mg/L	0.06900	0.03900	0.04700	0.03600	**0.01600**	0.01500	**0.01200**	**0.00850**	**0.06100**	0.06000	0.06400	0.06300	0.01000	0.00500	0.00500	0.00500	0.01500	**0.00740**	**0.00970**	0.00500
Boron_T	mg/L	0.05600	0.03900	0.04700	0.03600	0.01600	0.01500	0.01200	0.00850	0.06100	0.06300	0.06900	0.06700	0.01100	0.00500	0.00500	0.00500	0.02600	0.00740	0.00970	0.00700
Cadmium_D	mg/L	0.000005	0.000014	0.000005	0.000005	**0.000008**	**0.000006**	**0.000003**	**0.000003**	**0.000004**	**0.000004**	0.000004	**0.000003**	0.000005	0.000005	0.000005	0.000005	0.000007	0.000005	0.000005	0.000005
Cadmium_T	mg/L	0.000005	0.000014	0.000005	0.000005	0.000008	0.000006	0.000003	0.000003	0.000004	0.000004	0.000007	0.000003	0.000008	0.000007	0.000005	0.000005	0.000007	0.000005	0.000007	0.000005
Calcium_D	mg/L	230	120	110	110	46	43	40	45	90	88	95	91	5.6	4.8	5.4	4.7	56	31	36	32
Chromium_D	mg/L	0.000050	0.001100	0.000050	0.000050	0.000050	0.000110	0.000074	0.000058	0.000050	0.000061	0.000075	0.000053	0.000050	0.000170	0.000050	0.000050	0.000190	0.000200	0.000067	0.000050
Chromium_D_He	mg/L	0.000050	0.001100	0.000050	0.000050	**0.000050**	**0.000110**	**0.000074**	**0.000058**	**0.000050**	**0.000061**	**0.000075**	**0.000053**	**0.000050**	**0.000170**	**0.000050**	**0.000050**	**0.000190**	**0.000200**	**0.000067**	**0.000050**
Chromium_T	mg/L	0.000130	0.001100	0.000050	0.000050	0.000076	0.000150	0.000260	0.000078	0.000087	0.000130	0.000190	0.000071	0.000130	0.000280	0.000050	0.000100	0.000440	0.000230	0.000200	0.000170
Cobalt_D	mg/L	0.000170	0.000190	0.000100	0.000100	**0.000088**	0.000085	**0.000050**	**0.000050**	0.000230	0.000250	0.000210	0.000200	0.000100	0.000100	0.000100	0.000100	0.000190	0.000120	0.000100	0.000100
Cobalt_T	mg/L	0.000100	0.000190	0.000100	0.000100	0.000088	0.000087	0.000050	0.000050	0.000250	0.000260	0.000220	0.000200	0.000100	0.000100	0.000100	0.000100	0.000220	0.000120	0.000100	0.000100
Copper_D	mg/L	0.000160	0.000460	0.000380	0.000160	0.001600	0.000990	0.001000	**0.001000**	0.000290	0.000310	0.000320	0.000240	0.000240	0.000320	**0.000100**	0.000180	0.000130	0.000250	0.000230	**0.000140**
Copper_T	mg/L	0.000380	0.000460	0.000380	0.000160	0.001600	0.001100	0.001200	0.001000	0.000390	0.000340	0.000760	0.000350	0.000360	0.000320	0.000100	0.000310	0.000300	0.000340	0.000430	0.000140
Iron_D	mg/L	0.130	0.100	0.025	0.013	0.057	0.063	0.031	0.019	0.720	0.650	0.780	0.470	0.054	0.068	0.014	0.036	0.760	0.140	0.077	0.051
Iron_T	mg/L	0.230	0.100	0.025	0.013	0.070	0.200	0.120	0.051	0.810	0.710	0.990	0.960	0.123	0.140	0.036	0.110	1.000	0.220	0.160	0.110
Lead_D	mg/L	0.000045	0.000130	0.000045	0.000045	**0.000040**	**0.000054**	0.000081	**0.000025**	0.000042	0.000037	0.000032	**0.000025**	0.000045	0.000045	0.000045	0.000045	0.000067	0.000045	0.000045	0.000045
Lead_T	mg/L	0.000045	0.000130	0.000045	0.000045	0.000040	0.000054	0.000140	0.000025	0.000063	0.000037	0.000170	0.000025	0.000098	0.000090	0.000045	0.000045	0.000110	0.000045	0.000065	0.000045
Magnesium_D	mg/L	91.0	52.0	53.0	54.0	12.0	11.0	9.4	11.0	29.0	27.0	29.0	28.0	1.7	1.6	1.6	1.6	15.0	8.5	9.6	8.5
Manganese_D	mg/L	1.4000	0.2200	0.0210	0.0250	**0.0230**	0.0190	0.0048	0.0033	0.7600	0.8100	0.7800	0.7800	0.0880	0.0240	0.0028	0.0083	**0.7300**	0.0540	0.0230	0.0120
Manganese_T	mg/L	1.1000	0.2200	0.0210	0.0250	0.0230	0.0400	0.0210	0.0070	0.7600	0.8100	0.8900	0.8400	0.1300	0.0370	0.0150	0.0270	0.7300	0.0590	0.0310	0.0150
Mercury_D	mg/L	0.0000014	0.0000008	0.0000020	0.0000004	**0.0000011**	0.0000012	0.0000009	**0.0000004**	**0.0000007**	0.0000008	0.0000005	**0.0000004**	0.0000009	**0.0000011**	**0.0000010**	0.0000007	0.0000033	0.0000013	0.0000012	0.0000007
Mercury_T	mg/L	0.0000014	0.0000006	0.0000020	0.0000004	0.0000011	0.0000025	0.0000010	0.0000004	0.0000007	0.0000013	0.0000007	0.0000004	0.0000009	0.0000011	0.0000010	0.0000008	0.0000038	0.0000018	0.0000012	0.0000008
Molybdenum_D	mg/L	0.000370	0.000800	0.000580	0.000440	0.000480	**0.000500**	**0.000450**	**0.000470**	0.000970	0.000940	0.000860	**0.000900**	0.000050	0.000050	0.000075	0.000050	0.000050	0.000290	0.000140	0.000180
Molybdenum_T	mg/L	0.00026	0.00080	0.00058	0.00044	0.00051	0.00050	0.00045	0.00047	0.00110	0.00110	0.00100	0.00090	0.00010	0.00010	0.00010	0.00010	0.00010	0.00030	0.00014	0.00018
Nickel_D	mg/L	0.00240	0.00210	0.00089	0.00068	0.00110	0.00081	0.00071	0.00073	0.00047	0.00051	0.00051	**0.00034**	0.00020	0.00020	0.00020	0.00020	0.00048	0.00030	0.00027	0.00020
Nickel_T	mg/L	0.00150	0.00210	0.00089	0.00068	0.00110	0.00093	0.00110	0.00075	0.00058	0.00055	0.00063	0.00034	0.00023	0.00020	0.00020	0.00020	0.00063	0.00041	0.00038	0.00020
Potassium_D	mg/L	24.000	15.000	16.000	16.000	3.700	3.600	3.400	3.800	8.800	8.400	8.900	8.800	0.730	0.650	0.630	0.580	4.000	2.700	2.100	2.400
Selenium_D	mg/L	0.001700	0.000050	0.000050	0.000070	**0.000059**	**0.000042**	0.000048	0.000052	**0.000045**	**0.000043**	**0.000030**	**0.000033**	0.000050	0.000140	0.000050	0.000050	0.000050	0.000140	0.000050	0.000050
Selenium_T	mg/L	0.000050	0.000050	0.000050	0.000070	0.000059	0.000042	0.000065	0.000054	0.000045	0.000043	0.000030	0.000033	0.000050	0.000140	0.000050	0.000050	0.000050	0.000140	0.000050	0.000050
Silicon_D	mg/L	3.60	1.60	0.35	0.36	**3.80**	3.10	2.60	**2.90**	**5.40**	5.50	5.50	5.80	1.10	0.55	0.50	0.62	6.90	1.20	0.78	2.20
Silicon_T	mg/L	2.70	1.60	0.35	0.36	3.80	3.20	2.70	2.90	5.40	5.60	6.30	6.00	1.20	0.58	0.50	0.68	7.00	1.30	0.86	2.20
Silver_D	mg/L	0.0000050	0.0001100	0.0000050	0.0000050	0.0000050	**0.0000050**	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000140	0.0000050	0.0000050	0.0000050	0.0000140	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0001100	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000140	0.0000050	0.0000050	0.0000050	0.0000140	0.0000050	0.0000050
Sodium_D	mg/L	56.00	29.00	31.00	32.00	5.70	5.50	**3.90**	**5.00**	23.00	22.00	24.00	24.00	1.40	**1.10**	1.20	1.20	**9.70**	7.20	7.40	**5.50**
Sodium_T	mg/L	44.00	29.00	31.00	32.00	5.80	5.50	3.90	5.00	23.00	23.00	26.00	26.00	1.40	1.10	1.20	1.20	9.70	7.30	7.90	5.50
Strontium_D	mg/L	0.510	0.280	0.290	0.290	0.097	**0.090**	**0.077**	**0.085**	**0.270**	0.270	0.300	0.290	0.018	0.014	**0.015**	0.014	0.100	0.062	**0.073**	**0.065**
Strontium_T	mg/L	0.450	0.280	0.290	0.290	0.099	0.090	0.077	0.085	0.270	0.280	0.320	0.310	0.018	0.015	0.015	0.015	0.110	0.063	0.073	0.065
Thallium_D	mg/L	0.0000500	0.0001400	0.0000500	0.0000500	**0.0000390**	**0.0000280**	**0.0000050**	**0.0000050**	0.0000280	0.0000320	**0.0000050**	**0.0000050**	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500
Thallium_T	mg/L	0.0000500	0.0001400	0.0000500	0.0000500	0.0000390	0.0000280	0.0000050	0.0000050	0.0000280	0.0000320	0.0000050	0.0000050	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000500
Uranium_D	mg/L	0.0032000	0.0018000	0.0011000	0.0010000	0.0008400	**0.0009600**	**0.0005000**	**0.0007300**	**0.0042000**	0.0043000	**0.0043000**	**0.0044000**	0.0000500	0.0000500	0.0000500	0.0000500	0.0001300	0.0002200	0.0001400	0.0002100
Uranium_T	mg/L	0.0015000	0.0018000	0.0011000	0.0010000	0.0009000	0.0009600	0.0005000	0.0007300	0.0042000	0.0043000	0.0043000	0.0044000	0.0000500	0.0000500	0.0000500	0.0000500	0.0001300	0.0002400	0.0001500	0.0002300
Vanadium_T	mg/L	0.000100	0.0001	0.0001	0.0001	0.000140	0.000210	0.000250	0.000250	0.000210	0.000190	0.000250	0.000250	0.000190	0.000100	0.000100	0.000100	0.000550	0.000260	0.000220	0.000240
Zinc_D	mg/L	0.00078	0.00140	0.00310	0.00050	0.00130	**0.00190**	0.00130	0.00120	0.00078	**0.00110**	0.00120	0.00064	0.00230	0.00140	0.00050	**0.00120**	0.00160	**0.00120**	0.00190	**0.00070**
Zinc_T	mg/L	0.00150	0.00140	0.00310	0.00050	0.00130	0.00190	0.00150	0.00150	0.00120	0.00110	0.00240	0.00150	0.00270	0.00350	0.00085	0.00120	0.00310	0.00120	0.00210	0.00070

Table F-1: Water quality model results for expected case

Name inmodel	Units	AQF9	AQF9	AQF9	AQF9	AQF10	AQF10	AQF10	AQF10	AQF11	AQF11	AQF11	AQF11	AQF13	AQF13	AQF13	AQF13	AQF15	AQF15	AQF15	AQF15
		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
		Winter	Spring	Summer	Fall	Fall since all Winter is "NULL"	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples collected for analysis		7	7	5	5	0	6	5	5	6	5	6	5	6	8	5	5	6	7	5	5
pH	pH Unit	6.7	7.1	7.4	7.4	7	6.2	6.2	7	6.9	7.2	7.6	7.4	6.9	6.9	7.3	7.4	7	7.4	7.7	7.6
T	deg C	0.47	12	21	7.9	5.2	6.9	13	5.2	0.35	10	20	9.1	0.43	9.7	19	9.7	0.28	11	20	8.9
Proton	mg/L	2.00E-07	7.94E-08	3.98E-08	3.98E-08	1.00E-07	6.31E-07	6.31E-07	1.00E-07	1.26E-07	6.31E-08	2.51E-08	3.98E-08	1.26E-07	1.26E-07	5.01E-08	3.98E-08	1.00E-07	3.98E-08	2.00E-08	2.51E-08
Acidity_T	mg/L	22	5	3.9	4	8.2	10	14	8.2	6.4	3.7	1.8	3.3	4.5	4.4	2	2.7	5.6	3.4	2.1	2.1
Alkalinity_T	mg/L	130	60	78	73	32	22	34	32	54	43	42	43	34	33	29	29	66	50	50	51
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	0.83	0.3	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.3	0.25	0.25	0.56	0.25	0.3	0.35
Fluoride	mg/L	0.086	0.054	0.073	0.075	0.047	0.04	0.051	0.047	0.09	0.074	0.078	0.082	0.043	0.042	0.038	0.042	0.085	0.069	0.076	0.077
Sulfate	mg/L	24	11	15	12	0.36	0.38	0.15	0.36	1.1	0.86	0.88	0.87	0.54	2.6	0.43	0.51	7.7	6	6	6.3
Phosphorus_T	mg/L	0.03	0.03	0.018	0.016	0.015	0.021	0.026	0.015	0.015	0.021	0.016	0.027	0.012	0.011	0.013	0.012	0.016	0.017	0.02	0.018
N_Ammonia	N mg/L	0.24	0.022	0.02	0.036	0.009	0.016	0.015	0.009	0.018	0.0084	0.0072	0.0098	0.026	0.013	0.0096	0.0076	0.0093	0.005	0.013	0.0068
N_Nitrite	N mg/L	0.011	0.002	0.005	0.012	0.007	0.011	0.006	0.007	0.006	0.010	0.008	0.011	0.010	0.009	0.005	0.007	0.011	0.009	0.003	0.022
N_Nitrate_Nitrite	N mg/L	0.025	0.029	0.03	0.03	0.03	0.029	0.03	0.03	0.12	0.035	0.03	0.03	0.081	0.047	0.03	0.03	0.09	0.029	0.03	0.03
Cyanide_T	mg/L	0.00050	0.00057	0.00100	0.00130	0.00130	0.00058	0.00100	0.00130	0.00050	0.00050	0.00130	0.00130	0.00050	0.00057	0.00090	0.00130	0.00050	0.00076	0.00063	0.00050
Cyanide_F	mg/L	0.00050	0.00057	0.00100	0.00130	0.00130	0.00058	0.00090	0.00130	0.00050	0.00050	0.00130	0.00130	0.00050	0.00057	0.00090	0.00130	0.00050	0.00057	0.00100	0.00130
Cyanide_WAD	mg/L	0.00050	0.00057	0.00100	0.00130	0.00130	0.00058	0.00090	0.00130	0.00050	0.00050	0.00130	0.00130	0.00050	0.00057	0.00090	0.00130	0.00050	0.00057	0.00063	0.00050
Hardness	mg/L	140	70	85	80	36	29	40	36	54	44	43	42	32	35	28	28	67	56	52	54
Radium_226	Bq/L	0.0081	0.0062	0.0048	0.0051	0.0044	0.0052	0.0038	0.0044	0.0092	0.0047	0.0045	0.0093	0.0059	0.0048	0.0047	0.0045	0.0064	0.0049	0.0046	0.0049
Aluminum_D	mg/L	0.01000	0.01500	0.00440	0.00500	0.09700	0.09800	0.12000	0.09700	0.00920	0.02400	0.01400	0.00920	0.00350	0.01800	0.00670	0.00440	0.00630	0.01500	0.00640	0.00670
Aluminum_T	mg/L	0.0200	0.0215	0.0120	0.0180	0.1000	0.1300	0.1400	0.1000	0.0140	0.0450	0.0250	0.0220	0.0059	0.0380	0.0160	0.0190	0.0110	0.0460	0.0390	0.0460
Antimony_D	mg/L	0.000092	0.000093	0.000080	0.000080	0.000080	0.000092	0.000080	0.000080	0.000092	0.000090	0.000083	0.000080	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080
Antimony_T	mg/L	0.000150	0.000093	0.000080	0.000100	0.000080	0.000092	0.000080	0.000080	0.000092	0.000090	0.000083	0.000080	0.000130	0.000093	0.000080	0.000080	0.000130	0.000093	0.000080	0.000080
Arsenic_D	mg/L	0.00100	0.00058	0.00066	0.00049	0.00030	0.00031	0.00041	0.00030	0.00026	0.00024	0.00026	0.00023	0.00028	0.00025	0.00025	0.00026	0.00031	0.00028	0.00031	0.00031
Arsenic_T	mg/L	0.00105	0.00058	0.00069	0.00050	0.00038	0.00031	0.00046	0.00038	0.00026	0.00027	0.00026	0.00026	0.00028	0.00026	0.00026	0.00026	0.00031	0.00028	0.00033	0.00031
Barium_D	mg/L	0.02700	0.01200	0.01200	0.01200	0.00690	0.00640	0.00920	0.00690	0.00990	0.00810	0.00680	0.00720	0.00890	0.00790	0.00670	0.00690	0.01200	0.00860	0.00960	0.00960
Barium_T	mg/L	0.02700	0.01400	0.01200	0.01300	0.00740	0.00690	0.01000	0.00740	0.00990	0.00870	0.00680	0.00740	0.00890	0.00880	0.00770	0.00760	0.01200	0.00980	0.00960	0.00990
Beryllium_T	mg/L	0.000092	0.000093	0.00008	0.00008	0.00008	0.000092	0.00008	0.00008	0.000092	0.00009	0.000083	0.00008	0.000092	0.000093	0.00008	0.00008	0.000092	0.000093	0.00008	0.00008
Boron_D	mg/L	0.01200	0.00570	0.00880	0.00740	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00720	0.00500	0.00500	0.00500	0.01100	0.00500	0.00500	0.00500
Boron_T	mg/L	0.01900	0.00570	0.00920	0.00900	0.00500	0.00500	0.00500	0.00500	0.00820	0.00500	0.02600	0.00500	0.00950	0.00500	0.00500	0.00500	0.01200	0.00500	0.00500	0.00500
Cadmium_D	mg/L	0.000005	0.000006	0.000004	0.000004	0.000004	0.000005	0.000006	0.000004	0.000005	0.000005	0.000004	0.000004	0.000005	0.000005	0.000004	0.000004	0.000005	0.000005	0.000004	0.000004
Cadmium_T	mg/L	0.000012	0.000007	0.000007	0.000010	0.000004	0.000005	0.000008	0.000004	0.000005	0.000005	0.000008	0.000004	0.000005	0.000005	0.000006	0.000004	0.000005	0.000005	0.000005	0.000004
Calcium_D	mg/L	39	20	25	22	10	7.8	11	10	15	12	12	12	9.5	9.9	8.1	8.3	18	15	14	14
Chromium_D	mg/L	0.000058	0.000180	0.000050	0.000050	0.000170	0.000220	0.000220	0.000170	0.000050	0.000074	0.000150	0.000098	0.000050	0.000190	0.000064	0.000050	0.000050	0.000200	0.000078	0.000050
Chromium_D_He	mg/L	0.000058	0.000180	0.000050	0.000050	0.000170	0.000220	0.000220	0.000170	0.000050	0.000074	0.000150	0.000098	0.000050	0.000190	0.000064	0.000050	0.000050	0.000200	0.000078	0.000050
Chromium_T	mg/L	0.000110	0.000220	0.000076	0.000092	0.000400	0.000290	0.000430	0.000400	0.000073	0.000160	0.000210	0.000110	0.000060	0.000220	0.000100	0.000064	0.000100	0.000220	0.000160	0.000240
Cobalt_D	mg/L	0.000120	0.000093	0.000080	0.000080	0.000100	0.000160	0.000370	0.000100	0.000092	0.000090	0.000083	0.000080	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080
Cobalt_T	mg/L	0.000150	0.000093	0.000080	0.000080	0.000230	0.000170	0.000530	0.000230	0.000092	0.000090	0.000083	0.000080	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080
Copper_D	mg/L	0.000120	0.000270	0.000230	0.000120	0.000170	0.000280	0.000270	0.000170	0.000400	0.000390	0.000400	0.000310	0.000280	0.000240	0.000250	0.000160	0.000410	0.000390	0.000490	0.000380
Copper_T	mg/L	0.000260	0.000380	0.000230	0.000340	0.000210	0.000320	0.000320	0.000210	0.000550	0.000390	0.000400	0.000310	0.000320	0.000240	0.000250	0.000320	0.000710	0.000430	0.000490	0.000430
Iron_D	mg/L	0.470	0.180	0.100	0.091	0.360	0.310	0.450	0.360	0.057	0.260	0.070	0.074	0.005	0.068	0.010	0.014	0.025	0.078	0.023	0.024
Iron_T	mg/L	0.501	0.280	0.170	0.130	0.620	0.400	0.820	0.620	0.069	0.390	0.110	0.140	0.010	0.140	0.055	0.068	0.036	0.160	0.080	0.079
Lead_D	mg/L	0.000042	0.000056	0.000064	0.000037	0.000037	0.000042	0.000055	0.000037	0.000042	0.000041	0.000038	0.000037	0.000042	0.000042	0.000037	0.000037	0.000042	0.000042	0.000044	0.000037
Lead_T	mg/L	0.000042	0.000074	0.000170	0.000037	0.000057	0.000120	0.000100	0.000057	0.000042	0.000270	0.000089	0.000037	0.000065	0.000042	0.000037	0.000044	0.000042	0.000058	0.000044	0.000043
Magnesium_D	mg/L	9.7	4.9	6.1	5.9	2.8	2.1	2.9	2.8	4.1	3.2	3.1	3.1	1.9	2.1	1.6	1.7	5.4	4.3	4.1	4.4
Manganese_D	mg/L	0.5200	0.0450	0.0240	0.0130	0.0180	0.0330	0.0890	0.0180	0.0300	0.0320	0.0076	0.0054	0.0014	0.0240	0.0041	0.0032	0.0028	0.0410	0.0038	0.0022
Manganese_T	mg/L	0.5300	0.0520	0.0330	0.0230	0.0530	0.0380	0.1200	0.0530	0.0310	0.0780	0.0210	0.0180	0.0056	0.0500	0.0580	0.0440	0.0051	0.0680	0.0180	0.0120
Mercury_D	mg/L	0.0000021	0.0000014	0.0000014	0.0000008	0.0000015	0.0000032	0.0000017	0.0000015	0.0000009	0.0000017	0.0000013	0.0000009	0.0000004	0.0000011	0.0000008	0.0000005	0.0000007	0.0000015	0.0000010	0.0000008
Mercury_T	mg/L	0.0000023	0.0000019	0.0000014	0.0000008	0.0000015	0.0000032	0.0000021	0.0000015	0.0000009	0.0000020	0.0000013	0.0000009	0.0000005	0.0000016	0.0000008	0.0000005	0.0000009	0.0000015	0.0000010	0.0000008
Molybdenum_D	mg/L	0.000200	0.000360	0.000230	0.000310	0.000120	0.000140	0.000140	0.000120	0.001300	0.001200	0.001200	0.001200	0.000046	0.000096	0.000069	0.000052	0.000810	0.000610	0.000720	0.000790
Molybdenum_T	mg/L	0.00027	0.00038	0.00027	0.00031	0.00012	0.00015	0.00022	0.00012	0.00140	0.00130	0.00130	0.00130	0.00009	0.00013	0.00009	0.00008	0.00087	0.00066	0.00074	0.00083
Nickel_D	mg/L	0.00021	0.00021	0.00022	0.00022	0.00034	0.00033	0.00059	0.00034	0.00021	0.00021	0.00027	0.00022	0.00021	0.00029	0.00022	0.00022	0.00021	0.00021	0.00022	0.00022
Nickel_T	mg/L	0.00029	0.00021	0.00028	0.00028	0.00067	0.00060	0.00076	0.00067	0.00021	0.00021	0.00040	0.00029	0.00021	0.00044	0.00029	0.00022	0.00021	0.00021	0.00030	0.00028
Potassium_D	mg/L	3.600	2.000	2.400	2.300	0.140	0.530	0.170	0.140	1.000	0.900	0.840	0.830	0.800	0.880	0.680	0.670	1.600	1.400	1.300	1.300
Selenium_D	mg/L	0.000051	0.000180	0.000040	0.000040	0.000045	0.000120	0.000058	0.000045	0.000054	0.000045	0.000047	0.000053	0.000050	0.000180	0.000040	0.000049	0.000046	0.000045	0.000040	0.000040
Selenium_T	mg/L	0.000051	0.000180	0.000040	0.000046	0.000054	0.000130	0.000058	0.000054	0.000054	0.000050	0.000047	0.000054	0.000053	0.000180	0.000040	0.000049	0.000051	0.000045	0.000040	0.000046
Silicon_D	mg/L	4.00	1.30	0.91	1.60	5.10	2.40	4.50	5.10	2.00	1.60	1.30	1.70	0.33	0.48	0.28	0.39	1.70	1.20	1.20	1.40
Silicon_T	mg/L	4.00	1.50	0.94	1.80	5.20	2.50	4.60	5.20	2.00	1.70	1.40	1.80	0.33	0.61	0.29	0.44	1.70	1.30	1.20	1.60
Silver_D	mg/L	0.0000050	0.0000180	0.0000050	0.0000050	0.0000050	0.0000130	0.0000050	0.0000050	0.0000050	0.0000050	0.0000130	0.0000050	0.0000050	0.0000180	0.0000050	0.0000050	0.0000050	0.0000180	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000180	0.0000050	0.0000050	0.0000050	0.0000130	0.0000050	0.0000050	0.0000050	0.0000050	0.0000130	0.0000050	0.0000050	0.0000180	0.0000050	0.0000050	0.0000050	0.0000180	0.0000050	0.0000050
Sodium_D	mg/L	5.30	2.80	3.50	3.30	1.80	1.30	1.60	1.80	2.00	1.60	1.60	1.70	1.30	1.30	1.10	1.10	3.00	2.40	2.30	2.50
Sodium_T	mg/L	5.40	2.80	3.70	3.30	1.90	1.30	1.80	1.90	2.00	1.60	1.70	1.70	1.40	1.30	1.10	1.10	3.10	2.40	2.40	2.50
Strontium_D	mg/L	0.081	0.041	0.053	0.047	0.019	0.015	0.021	0.019	0.031	0.025	0.026	0.024	0.017	0.018	0.014	0.015	0.041	0.033	0.033	0.035
Strontium_T	mg/L	0.081	0.041	0.054	0.048	0.020	0.016	0.022	0.020	0.031	0.025	0.026	0.026	0.017	0.019	0.015	0.016	0.042	0.034	0.033	0.035
Thallium_D	mg/L	0.0000430	0.0000440	0.0000320	0.0000320	0.0000320	0.0000430	0.0000320	0.0000320	0.0000430	0.0000410	0.0000350	0.0000320	0.0000430	0.0000440	0.0000320	0.0000320	0.0000430	0.0000440	0.0000320	0.0000320
Thallium_T	mg/L	0.0000430	0.0000440	0.0000320	0.0000320	0.0000320	0.0000430	0.0000320	0.0000320	0.0000430	0.0000410	0.0000350	0.0000320	0.0000430	0.0000440	0.0000320	0.0000320	0.0000430	0.0000440	0.0000320	0.0000320
Uranium_D	mg/L	0.0002100	0.0001000	0.0000660	0.0000650	0.0000320	0.0000440	0.0000350	0.0000320	0.0000550	0.0000550	0.0000790	0.0000620	0.0000430	0.0000580	0.0000320	0.0000320	0.0000510	0.0000490	0.0000500	0.0000480
Uranium_T	mg/L	0.0002300	0.0001300	0.0000980	0.0000650	0.0000330	0.0000440	0.0000360	0.0000330	0.0000560	0.0000800	0.0000840	0.0000650	0.0000430	0.0000580	0.0000320	0.0000320	0.0000520	0.0000500	0.0000530	0.0000510
Vanadium_T	mg/L	0.000130	0.000230	0.000160	0.000160	0.000330	0.000440	0.000420	0.000330	0.000130	0.000150	0.000150	0.000180	0.000130	0.000140	0.000160	0.000160	0.000140	0.000180	0.000300	0.000290
Zinc_D	mg/L	0.00077	0.00094	0.00110	0.00088	0.00110	0.00110	0.00140	0.00110	0.00110	0.00090	0.00100	0.00066	0.00130	0.00097	0.00070	0.00050	0.00150	0.00086	0.00120	0.00076
Zinc_T	mg/L	0.00150	0.00094	0.00190	0.00210	0.00170	0.00110	0.00470	0.00170	0.00110	0.00090	0.00100	0.00140	0.00170	0.00097	0.00150	0.00100	0.00150	0.00086	0.00120	0.01300

Table F-1: Water quality model results for expected case

Name inmodel	Units	AQF16 Mean Winter	AQF16 Mean Spring	AQF16 Mean Summer	AQF16 Mean Fall	AQF18 Mean Winter	AQF18 Mean Spring	AQF18 Mean Summer	AQF18 Mean Fall	AQF20 Mean Winter	AQF20 Mean Spring	AQF20 Mean Summer	AQF20 Mean Fall	AQF23 Mean Winter	AQF23 Mean Spring	AQF23 Mean Summer	AQF23 Mean Fall	AQF26 Mean Winter	AQF26 Mean Spring	AQF26 Mean Summer	AQF26 Mean Fall
Number of samples collected for analysis		7	6	4	5	6	7	5	6	6	5	7	5	1	7	5	5	5	3	3	3
pH	pH Unit	7	7.4	7.9	7.7	7	7.3	7.8	7.4	6.9	7.2	7.4	7.6	7	6.7	6.8	7	6.6	7.7	7.6	7.9
T	deg C	0.48	12	19	9.8	0.3	11	20	8.6	0.68	12	18	8.1	0	5.4	13	6	0.26	15	20	11
Proton	mg/L	1.00E-07	3.98E-08	1.26E-08	2.00E-08	1.00E-07	5.01E-08	1.58E-08	3.98E-08	1.26E-07	6.31E-08	3.98E-08	2.51E-08	1.00E-07	2.00E-07	1.58E-07	1.00E-07	2.51E-07	2.00E-08	2.51E-08	1.26E-08
Acidity_T	mg/L	5.8	4.3	2.3	2.4	4.6	3.3	1.5	2.1	7.9	3.2	2	2.6	18	6.1	7	5.6	46	8.7	5.6	5
Alkalinity_T	mg/L	65	46	50	52	44	33	34	35	58	32	41	43	140	38	60	53	260	110	150	160
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	0.56	0.3	0.25	0.32	0.63	0.25	0.25	0.25	0.65	0.31	0.25	0.3	0.97	0.25	0.25	0.25	3.8	1.3	1.5	1.8
Fluoride	mg/L	0.087	0.068	0.077	0.071	0.09	0.071	0.076	0.08	0.08	0.06767	0.074	0.074	0.082	0.047	0.064	0.057	0.041	0.048	0.058	0.054
Sulfate	mg/L	7.4	5.2	6.3	6.4	0.8	0.59	0.6	0.64	4.7	2.9	3.8	4	28	4.9	2.2	5.9	570	230	240	260
Phosphorus_T	mg/L	0.018	0.021	0.02	0.02	0.023	0.018	0.019	0.018	0.019	0.024	0.024	0.018	0.00503	0.01	0.012	0.00503	0.054	0.04	0.023	0.037
N_Ammonia	N mg/L	0.014	0.0064	0.005	0.034	0.018	0.009	0.0068	0.005	0.01425	0.013	0.013	0.01075	0.22	0.0085	0.016	0.0074	1.6	0.051	0.07	0.068
N_Nitrite	N mg/L	0.011	0.009	0.006	0.012	0.018	0.009	0.011	0.011	0.008	0.009	0.007	0.005	0.013	0.010	0.025	0.006	0.014	0.002	0.025	0.004
N_Nitrate_Nitrite	N mg/L	0.1	0.025	0.025	0.025	0.11	0.029	0.03	0.059	0.156	0.04	0.051	0.037	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Cyanide_T	mg/L	0.00050	0.00058	0.00110	0.00110	0.00050	0.00057	0.00100	0.00100	0.00110	0.00060	0.00100	0.00130	0.00050	0.00057	0.00090	0.00130	0.00050	0.00050	0.00050	0.00050
Cyanide_F	mg/L	0.00050	0.00058	0.00110	0.00110	0.00050	0.00057	0.00100	0.00100	0.00050	0.00060	0.00100	0.00130	0.00050	0.00057	0.00090	0.00130	0.00050	0.00050	0.00050	0.00050
Cyanide_WAD	mg/L	0.00050	0.00058	0.00110	0.00110	0.00050	0.00057	0.00100	0.00100	0.00050	0.00060	0.00100	0.00130	0.00050	0.00057	0.00090	0.00130	0.00050	0.00050	0.00050	0.00050
Hardness	mg/L	68	51	54	54	42	34	33	33	59	35	42	44	160	45	65	57	680	300	330	320
Radium_226	Bq/L	0.0046	0.0052	0.006	0.0037	0.0048	0.005	0.0045	0.0051	0.005	0.0045	0.0047	0.0048	0.021	0.005	0.0044	0.004	0.034	0.011	0.005	0.005
Aluminum_D	mg/L	0.00630	0.03800	0.00480	0.00650	0.00360	0.01700	0.00530	0.00540	0.00660	0.03000	0.01500	0.01500	0.02600	0.04700	0.05800	0.03700	0.08200	0.05200	0.03200	0.02900
Aluminum_T	mg/L	0.0160	0.0910	0.0340	0.0540	0.0110	0.0750	0.0500	0.0460	0.0329	0.0930	0.0790	0.0620	0.0434	0.0506	0.0680	0.0740	0.0830	0.0890	0.0320	0.0290
Antimony_D	mg/L	0.000110	0.000100	0.000120	0.000088	0.000092	0.000093	0.000080	0.000080	0.000092	0.000090	0.000083	0.000080	0.000100	0.000093	0.000080	0.000080	0.000100	0.000100	0.000100	0.000100
Antimony_T	mg/L	0.000110	0.000100	0.000120	0.000088	0.000092	0.000093	0.000080	0.000130	0.000092	0.000090	0.000083	0.000080	0.000100	0.000093	0.000080	0.000080	0.000100	0.000100	0.000100	0.000100
Arsenic_D	mg/L	0.00033	0.00028	0.00030	0.00031	0.00036	0.00026	0.00033	0.00027	0.00031	0.00025	0.00031	0.00025	0.00043	0.00025	0.00073	0.00043	0.00710	0.00240	0.00350	0.00230
Arsenic_T	mg/L	0.00038	0.00028	0.00030	0.00034	0.00036	0.00026	0.00034	0.00041	0.00032	0.00027	0.00033	0.00029	0.00043	0.00025	0.00074	0.00043	0.00710	0.00240	0.00350	0.00230
Barium_D	mg/L	0.01200	0.00860	0.00930	0.00930	0.00930	0.00650	0.00700	0.00720	0.01200	0.00710	0.00690	0.00770	0.03800	0.00960	0.01400	0.01100	0.07200	0.02200	0.03600	0.03400
Barium_T	mg/L	0.01200	0.00950	0.00950	0.00970	0.00930	0.00780	0.00820	0.00810	0.01300	0.00940	0.00800	0.00860	0.06800	0.01000	0.01400	0.01300	0.07200	0.02200	0.03600	0.03400
Beryllium_T	mg/L	0.000092	0.0001	0.000088	0.000088	0.000092	0.000093	0.00008	0.00008	0.000092	0.00009	0.000083	0.00008	0.0001	0.000093	0.00008	0.00008	0.00010	0.0001	0.00005	0.00005
Boron_D	mg/L	0.00850	0.00500	0.00500	0.00500	0.00930	0.00500	0.00500	0.00500	0.00850	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.02000	0.03800	0.03400	0.02500
Boron_T	mg/L	0.00850	0.00500	0.00500	0.00500	0.01400	0.00500	0.00500	0.00500	0.01400	0.00740	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.02000	0.03800	0.03400	0.02500
Cadmium_D	mg/L	0.000005	0.000005	0.000004	0.000004	0.000005	0.000005	0.000004	0.000004	0.000005	0.000005	0.000004	0.000004	0.000005	0.000005	0.000005	0.000004	0.000005	0.000005	0.000005	0.000005
Cadmium_T	mg/L	0.000005	0.000006	0.000004	0.000004	0.000005	0.000005	0.000010	0.000012	0.000005	0.000007	0.000005	0.000004	0.000030	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Calcium_D	mg/L	18	14	15	14	10	8.4	8.5	9.3	16	9.5	11	12	46	14	20	18	160	65	81	75
Chromium_D	mg/L	0.000060	0.000240	0.000050	0.000065	0.000050	0.000190	0.000050	0.000084	0.000060	0.000170	0.000130	0.000050	0.000050	0.000210	0.000160	0.000100	0.000260	0.000180	0.000120	0.000120
Chromium_D_He	mg/L	0.000060	0.000240	0.000050	0.000065	0.000050	0.000190	0.000050	0.000084	0.000060	0.000170	0.000130	0.000050	0.000050	0.000210	0.000160	0.000100	0.000260	0.000180	0.000120	0.000120
Chromium_T	mg/L	0.000110	0.000300	0.000090	0.000120	0.000063	0.000250	0.000110	0.000180	0.000140	0.000350	0.000270	0.000140	0.005600	0.000270	0.000240	0.000190	0.000310	0.000230	0.000120	0.000120
Cobalt_D	mg/L	0.000092	0.000130	0.000088	0.000088	0.000092	0.000093	0.000080	0.000080	0.000092	0.000090	0.000083	0.000080	0.001500	0.000093	0.000470	0.000450	0.000310	0.000100	0.000100	0.000100
Cobalt_T	mg/L	0.000092	0.000140	0.000088	0.000088	0.000092	0.000093	0.000080	0.000080	0.000092	0.000120	0.000083	0.000080	0.003300	0.000093	0.000520	0.000620	0.000310	0.000100	0.000100	0.000100
Copper_D	mg/L	0.000440	0.000490	0.000410	0.000450	0.000470	0.000430	0.000500	0.000380	0.000370	0.000460	0.000500	0.000370	0.000100	0.000210	0.000140	0.000120	0.000100	0.001300	0.000360	0.000200
Copper_T	mg/L	0.000600	0.000490	0.000410	0.000450	0.000530	0.000430	0.000570	0.000450	0.000430	0.000480	0.000530	0.000370	0.003000	0.000220	0.000140	0.000140	0.000100	0.001400	0.000360	0.000200
Iron_D	mg/L	0.030	0.120	0.019	0.023	0.014	0.082	0.013	0.028	0.150	0.130	0.051	0.036	2.400	0.099	0.530	0.550	2.100	0.340	0.310	0.300
Iron_T	mg/L	0.050	0.190	0.068	0.083	0.034	0.180	0.100	0.130	0.189	0.290	0.150	0.100	6.100	0.150	0.720	1.400	2.100	0.340	0.310	0.300
Lead_D	mg/L	0.000042	0.000045	0.000040	0.000040	0.000042	0.000042	0.000043	0.000043	0.000042	0.000041	0.000038	0.000037	0.000045	0.000042	0.000037	0.000037	0.000045	0.000045	0.000045	0.000045
Lead_T	mg/L	0.000059	0.000230	0.000040	0.000066	0.000042	0.000064	0.000073	0.000094	0.000053	0.000089	0.000050	0.000037	0.001300	0.000042	0.000048	0.000059	0.000045	0.000045	0.000045	0.000045
Magnesium_D	mg/L	5.6	3.9	4.2	4.5	3.9	3.0	2.9	3.0	4.5	2.7	3.4	3.6	9.7	2.3	3.1	3.0	71.0	31.0	32.0	32.0
Manganese_D	mg/L	0.0040	0.0300	0.0027	0.0024	0.0013	0.0096	0.0006	0.0012	0.0610	0.0300	0.0130	0.0046	1.1000	0.0028	0.0910	0.1000	0.8900	0.0500	0.1200	0.0830
Manganese_T	mg/L	0.0077	0.0500	0.0150	0.0130	0.0059	0.0270	0.0320	0.0210	0.0730	0.0810	0.0500	0.0170	1.2000	0.0120	0.0990	0.1500	0.9200	0.0500	0.1200	0.0830
Mercury_D	mg/L	0.0000007	0.0000026	0.0000010	0.0000008	0.0000006	0.0000012	0.0000008	0.0000006	0.0000008	0.0000018	0.0000014	0.0000009	0.0000035	0.0000016	0.0000019	0.0000013	0.0000019	0.0000012	0.0000028	0.0000010
Mercury_T	mg/L	0.0000008	0.0000026	0.0000010	0.0000008	0.0000006	0.0000014	0.0000008	0.0000006	0.0000010	0.0000022	0.0000014	0.0000009	0.0000130	0.0000019	0.0000020	0.0000013	0.0000019	0.0000021	0.0000028	0.0000010
Molybdenum_D	mg/L	0.000880	0.001000	0.000750	0.000880	0.001100	0.000750	0.000960	0.000840	0.000520	0.000350	0.000490	0.000460	0.000290	0.000230	0.000260	0.000240	0.000100	0.000650	0.000180	0.000210
Molybdenum_T	mg/L	0.00088	0.00110	0.00076	0.00088	0.00110	0.00078	0.00098	0.00093	0.00053	0.00038	0.00054	0.00050	0.00050	0.00025	0.00030	0.00029	0.00010	0.00072	0.00018	0.00021
Nickel_D	mg/L	0.00021	0.00040	0.00021	0.00021	0.00021	0.00021	0.00022	0.00022	0.00021	0.00021	0.00022	0.00022	0.00057	0.00021	0.00022	0.00022	0.00088	0.00110	0.00064	0.00048
Nickel_T	mg/L	0.00025	0.00057	0.00021	0.00021	0.00021	0.00021	0.00022	0.00038	0.00025	0.00031	0.00032	0.00028	0.00410	0.00021	0.00034	0.00032	0.00091	0.00120	0.00064	0.00048
Potassium_D	mg/L	1.700	1.200	1.300	1.300	1.000	0.820	0.780	0.790	1.400	0.980	0.910	1.000	3.400	0.940	0.510	0.670	21.000	11.000	12.000	12.000
Selenium_D	mg/L	0.000046	0.000200	0.000044	0.000044	0.000053	0.000045	0.000040	0.000040	0.000046	0.000140	0.000120	0.000040	0.000050	0.000045	0.000046	0.000040	0.000050	0.000050	0.000050	0.000050
Selenium_T	mg/L	0.000050	0.000200	0.000044	0.000044	0.000053	0.000045	0.000040	0.000110	0.000046	0.000140	0.000120	0.000040	0.000050	0.000052	0.000046	0.000040	0.000050	0.000050	0.000050	0.000050
Silicon_D	mg/L	1.70	1.10	1.10	1.20	1.00	0.95	0.70	0.65	1.30	0.98	0.55	0.82	4.60	3.20	5.50	6.00	6.20	1.10	1.10	1.50
Silicon_T	mg/L	1.70	1.40	1.20	1.30	1.00	1.10	0.83	0.76	1.30	1.30	0.68	0.95	10.00	3.20	5.70	6.10	6.20	1.10	1.10	1.50
Silver_D	mg/L	0.0000050	0.0000200	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000140	0.0000130	0.0000050	0.0000050	0.0000180	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000200	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000110	0.0000050	0.0000140	0.0000130	0.0000050	0.0000050	0.0000180	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Sodium_D	mg/L	3.10	2.20	2.40	2.50	2.20	1.60	1.60	1.70	2.70	1.70	2.00	2.20	5.10	1.90	2.20	2.50	64.00	31.00	41.00	43.00
Sodium_T	mg/L	3.10	2.20	2.40	2.50	2.20	1.60	1.70	1.70	2.70	1.70	2.10	2.20	5.60	1.90	2.20	2.50	64.00	31.00	41.00	43.00
Strontium_D	mg/L	0.040	0.031	0.034	0.035	0.030	0.024	0.025	0.024	0.035	0.022	0.027	0.027	0.091	0.022	0.033	0.029	0.330	0.160	0.200	0.210
Strontium_T	mg/L	0.042	0.032	0.034	0.035	0.030	0.024	0.025	0.024	0.037	0.023	0.028	0.029	0.091	0.023	0.035	0.031	0.330	0.160	0.200	0.210
Thallium_D	mg/L	0.0000430	0.0000500	0.0000390	0.0000390	0.0000430	0.0000440	0.0000320	0.0000320	0.0000430	0.0000410	0.0000350	0.0000320	0.0000500	0.0000440	0.0000320	0.0000320	0.0000500	0.0000500	0.0000500	0.0000500
Thallium_T	mg/L	0.0000430	0.0000500	0.0000390	0.0000390	0.0000430	0.0000440	0.0000320	0.0000900	0.0000430	0.0000410	0.0000350	0.0000320	0.0000500	0.0000440	0.0000320	0.0000320	0.0000500	0.0000500	0.0000500	0.0000500
Uranium_D	mg/L	0.0000500	0.0000630	0.0000510	0.0000500	0.0000450	0.0000450	0.0000380	0.0000370	0.0000480	0.0000460	0.0000460	0.0000450	0.0002100	0.0000440	0.0000320	0.0000320	0.0002800	0.0003200	0.0002100	0.0002900
Uranium_T	mg/L	0.0000520	0.0000700	0.0000530	0.0000520	0.0000450	0.0000460	0.0000410	0.0000400	0.0000490	0.0000480	0.0000510	0.0000470	0.0003500	0.0000440	0.0000320	0.0000330	0.0002800	0.0003200	0.0002100	0.0002900
Vanadium_T	mg/L	0.000150	0.000310	0.000300	0.000370	0.000130	0.000170	0.000260	0.000240	0.000210	0.000450	0.000320	0.000300	0.005900	0.000220	0.000280	0.000390	0.000700	0.000400	0.0001	0.0001
Zinc_D	mg/L	0.00110	0.00083	0.00120	0.00130	0.00120	0.00086	0.00050	0.00170	0.00250	0.00110	0.00100	0.00096	0.00240	0.00150	0.00090	0.00050	0.00050	0.00140	0.00280	0.00050
Zinc_T	mg/L	0.00190	0.00083	0.00120	0.00190	0.00120	0.00086	0.00130	0.00300	0.00310	0.00110	0.00110	0.00110	0.01500	0.00150	0.00350	0.00210	0.00050	0.00140	0.00280	0.00050

Table F-1: Water quality model results for expected case

Name inmodel	Units	AQF28	AQF28	AQF28	AQF28	AQF29	AQF29	AQF29	AQF29	AQF34	AQF34	AQF34	AQF34	AQF36	AQF36	AQF36	AQF36	AQF38	AQF38	AQF38	AQF38
		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples collected for analysis		6	5	5	5	5	3	3	4	6	5	4	3	5	3	2	1	1	3	4	2
pH	pH Unit	6.8	7	7.8	7.7	7.1	7.4	8	7.5	7.1	7.4	7.9	7.7	6.8	7.3	8.2	7.8	6.7	7	7.3	7.2
T	deg C	0.35	12	21	7.7	0.36	10	19	10	0.27	10	20	9.7	0.36	10	19	12	0.1	13	19	11
Proton	mg/L	1.58E-07	1.00E-07	1.58E-08	2.00E-08	7.94E-08	3.98E-08	1.00E-08	3.16E-08	7.94E-08	3.98E-08	1.26E-08	2.00E-08	1.58E-07	5.01E-08	6.31E-09	1.58E-08	2.00E-07	1.00E-07	5.01E-08	6.31E-08
Acidity_T	mg/L	21	3.2	2.2	2.5	5.2	2.9	1.5	2.3	9.9	4.4	2.2	2.7	9.3	5.2	1	2.3	5.3	3.8	2.1	2.5
Alkalinity_T	mg/L	120	34	41	45	41	30	33	35	130	89	92	95	52	31	48	48	38	26	28	28
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	0.31	0.25	0.25	0.25	0.61	0.25	0.25	0.47	0.79	0.59	0.43	0.37	0.3	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fluoride	mg/L	0.098	0.052	0.074	0.074	0.088	0.071	0.079	0.078	0.086	0.066	0.072	0.073	0.061	0.055	0.073	0.071	0.092	0.076	0.087	0.095
Sulfate	mg/L	4.4	2.4	2.3	2.8	0.79	0.62	0.61	0.71	32	24	25	23	2.5	2.3	4.4	4.1	0.15	0.15	0.15	0.15
Phosphorus_T	mg/L	0.0184	0.016	0.017	0.012	0.017	0.015	0.02	0.02	0.017	0.025	0.017	0.021	0.013	0.014	0.015	0.026	0.015	0.015	0.014	0.014
N_Ammonia	N mg/L	0.05633	0.0072	0.0096	0.014	0.012	0.0077	0.005	0.0073	0.038	0.016	0.0095	0.02	0.027	0.0077	0.008	0.011	0.094	0.011	0.0083	0.047
N_Nitrite	N mg/L	0.013	0.005	0.005	0.007	0.024	0.004	0.007	0.004	0.017	0.007	0.023	0.031	0.008	0.002	0.012	0.000	0.025	0.021	0.008	0.012
N_Nitrate_Nitrite	N mg/L	0.035	0.03	0.051	0.03	0.09	0.025	0.025	0.025	0.1072	0.03	0.031	0.043	0.21	0.025	0.025	0.025	0.025	0.033	0.031	0.025
Cyanide_T	mg/L	0.00064	0.00050	0.00070	0.00100	0.00076	0.00050	0.00050	0.00083	0.00058	0.00050	0.00063	0.00050	0.00060	0.00050	0.00050	0.00050	0.00050	0.00050	0.00063	0.00050
Cyanide_F	mg/L	0.00050	0.00050	0.00070	0.00100	0.00050	0.00050	0.00120	0.00130	0.00050	0.00050	0.00063	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00063	0.00050
Cyanide_WAD	mg/L	0.00050	0.00050	0.00070	0.00100	0.00050	0.00050	0.00050	0.00083	0.00050	0.00050	0.00063	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00063	0.00050
Hardness	mg/L	110	38	42	46	38	32	33	33	150	110	110	100	50	34	49	48	35	26	27	26
Radium_226	Bq/L	0.0048	0.0053	0.0048	0.0044	0.0048	0.005	0.005	0.0065	0.0047	0.0052	0.0042	0.0044	0.005	0.005	0.005	0.005	0.011	0.0041	0.0043	0.0064
Aluminum_D	mg/L	0.05500	0.07700	0.04000	0.02900	0.00250	0.01300	0.01100	0.00410	0.00470	0.01200	0.00360	0.00320	0.01100	0.02300	0.00310	0.00290	0.01100	0.02600	0.00980	0.00680
Aluminum_T	mg/L	0.0558	0.1000	0.0620	0.0440	0.0110	0.0480	0.0420	0.0400	0.0110	0.0131	0.0088	0.0093	0.0170	0.0410	0.0170	0.0150	0.0150	0.0460	0.0270	0.0210
Antimony_D	mg/L	0.000092	0.000090	0.000080	0.000080	0.000100	0.000100	0.000100	0.000100	0.000092	0.000090	0.000075	0.000067	0.000100	0.000100	0.000100	0.000100	0.000050	0.000083	0.000075	0.000075
Antimony_T	mg/L	0.000092	0.000090	0.000080	0.000080	0.000100	0.000100	0.000100	0.000100	0.000110	0.000090	0.000075	0.000067	0.000100	0.000100	0.000100	0.000100	0.000050	0.000083	0.000075	0.000075
Arsenic_D	mg/L	0.00033	0.00023	0.00031	0.00026	0.00032	0.00025	0.00034	0.00031	0.00170	0.00120	0.00130	0.00110	0.00031	0.00018	0.00026	0.00005	0.00027	0.00018	0.00021	0.00021
Arsenic_T	mg/L	0.00033	0.00024	0.00031	0.00027	0.00032	0.00026	0.00034	0.00035	0.00170	0.00120	0.00130	0.00110	0.00031	0.00018	0.00027	0.00027	0.00028	0.00020	0.00024	0.00024
Barium_D	mg/L	0.02200	0.00610	0.00800	0.00750	0.00850	0.00630	0.00720	0.00680	0.02200	0.01600	0.01400	0.01400	0.01100	0.00730	0.00800	0.00810	0.01500	0.00930	0.00930	0.00950
Barium_T	mg/L	0.02600	0.00650	0.00860	0.00800	0.00850	0.00710	0.00780	0.00760	0.02200	0.01600	0.01400	0.01400	0.01100	0.00730	0.00810	0.00840	0.01600	0.01000	0.01100	0.01100
Beryllium_T	mg/L	0.000092	0.00009	0.00008	0.00008	0.0001	0.0001	0.0001	0.0001	0.000092	0.00009	0.000075	0.000067	0.0001	0.0001	0.0001	0.0001	0.00005	0.000083	0.000075	0.000075
Boron_D	mg/L	0.00820	0.00500	0.00500	0.00500	0.00740	0.00500	0.00500	0.00500	0.01600	0.00940	0.01300	0.01100	0.01700	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500	0.00500
Boron_T	mg/L	0.01100	0.00500	0.00500	0.00500	0.03400	0.00500	0.00500	0.00500	0.01600	0.00980	0.01300	0.01200	0.02000	0.00800	0.00500	0.00500	0.00500	0.04200	0.00500	0.00500
Cadmium_D	mg/L	0.000005	0.000005	0.000004	0.000004	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000004	0.000003	0.000005	0.000005	0.000005	0.000005	0.000003	0.000004	0.000004	0.000004
Cadmium_T	mg/L	0.000007	0.000005	0.000004	0.000004	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000004	0.000003	0.000005	0.000005	0.000005	0.000005	0.000003	0.000004	0.000007	0.000004
Calcium_D	mg/L	32	11	12	13	9.4	8.3	8.5	8.4	42	30	31	29	15	9.8	14	13	9.9	7.7	7.6	7.2
Chromium_D	mg/L	0.000220	0.000160	0.000140	0.000110	0.000050	0.000050	0.000120	0.000050	0.000050	0.000060	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Chromium_D_ He	mg/L	0.000220	0.000160	0.000140	0.000110	0.000050	0.000050	0.000120	0.000050	0.000050	0.000060	0.000050	0.000077	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Chromium_T	mg/L	0.000290	0.000220	0.000190	0.000150	0.000050	0.000077	0.000120	0.000120	0.000083	0.000092	0.000083	0.000050	0.000078	0.000050	0.000075	0.000050	0.000050	0.000093	0.000130	0.000140
Cobalt_D	mg/L	0.000250	0.000090	0.000080	0.000080	0.000100	0.000100	0.000100	0.000100	0.000100	0.000090	0.000075	0.000067	0.000100	0.000100	0.000100	0.000100	0.000050	0.000083	0.000075	0.000075
Cobalt_T	mg/L	0.000260	0.000090	0.000080	0.000080	0.000100	0.000100	0.000100	0.000100	0.000110	0.000090	0.000075	0.000067	0.000100	0.000100	0.000100	0.000100	0.000050	0.000083	0.000075	0.000075
Copper_D	mg/L	0.000100	0.000320	0.000310	0.000200	0.000430	0.000370	0.000510	0.000460	0.000590	0.000530	0.000440	0.000280	0.000390	0.000330	0.000400	0.000410	0.000250	0.000160	0.000150	0.000200
Copper_T	mg/L	0.000240	0.000320	0.000330	0.000340	0.000500	0.000370	0.000510	0.000530	0.000700	0.000550	0.000470	0.000280	0.000390	0.000530	0.000470	0.000410	0.000250	0.000270	0.000190	0.000220
Iron_D	mg/L	0.124	0.260	0.082	0.059	0.009	0.037	0.019	0.024	0.122	0.160	0.030	0.043	0.100	0.070	0.005	0.031	0.079	0.120	0.026	0.011
Iron_T	mg/L	0.124	0.380	0.170	0.120	0.026	0.100	0.095	0.130	0.122	0.230	0.056	0.073	0.130	0.100	0.057	0.140	0.120	0.280	0.180	0.130
Lead_D	mg/L	0.000042	0.000041	0.000037	0.000037	0.000045	0.000045	0.000045	0.000045	0.000042	0.000041	0.000035	0.000032	0.000045	0.000045	0.000045	0.000045	0.000025	0.000038	0.000035	0.000035
Lead_T	mg/L	0.000054	0.000041	0.000046	0.000037	0.000045	0.000270	0.000068	0.000058	0.000042	0.000096	0.000180	0.000032	0.000140	0.000220	0.000045	0.000045	0.000025	0.000058	0.000068	0.000035
Magnesium_D	mg/L	7.8	2.8	3.2	3.6	3.5	2.8	3.0	3.0	10.0	7.6	7.7	7.6	3.4	2.4	3.6	3.8	2.4	1.8	1.9	1.9
Manganese_D	mg/L	0.3200	0.0079	0.0031	0.0025	0.0011	0.0061	0.0010	0.0005	0.3800	0.1400	0.0036	0.0075	0.0093	0.0069	0.0010	0.0007	0.0041	0.0220	0.0012	0.0007
Manganese_T	mg/L	0.3200	0.0220	0.0240	0.0130	0.0040	0.0200	0.0330	0.0310	0.3800	0.1600	0.0210	0.0250	0.0110	0.0100	0.0190	0.0320	0.0240	0.0630	0.0900	0.0570
Mercury_D	mg/L	0.0000015	0.0000024	0.0000019	0.0000011	0.0000006	0.0000009	0.0000007	0.0000005	0.0000010	0.0000015	0.0000012	0.0000008	0.0000008	0.0000014	0.0000006	0.0000007	0.0000008	0.0000020	0.0000010	0.0000008
Mercury_T	mg/L	0.0000021	0.0000032	0.0000019	0.0000015	0.0000006	0.0000009	0.0000007	0.0000005	0.0000011	0.0000017	0.0000012	0.0000008	0.0000010	0.0000014	0.0000006	0.0000007	0.0000008	0.0000020	0.0000014	0.0000008
Molybdenum_D	mg/L	0.000400	0.000230	0.000280	0.000270	0.001000	0.000780	0.000980	0.001100	0.000420	0.000350	0.000370	0.000350	0.000260	0.000220	0.000470	0.000490	0.002500	0.001800	0.002500	0.002300
Molybdenum_T	mg/L	0.00043	0.00024	0.00033	0.00029	0.00110	0.00083	0.00100	0.00110	0.00044	0.00035	0.00040	0.00036	0.00026	0.00022	0.00049	0.00052	0.00250	0.00190	0.00270	0.00250
Nickel_D	mg/L	0.00021	0.00021	0.00022	0.00022	0.00020	0.00020	0.00020	0.00020	0.00048	0.00036	0.00023	0.00023	0.00020	0.00020	0.00020	0.00020	0.00025	0.00022	0.00023	0.00023
Nickel_T	mg/L	0.00026	0.00021	0.00022	0.00022	0.00020	0.00020	0.00020	0.00020	0.00059	0.00046	0.00045	0.00023	0.00020	0.00020	0.00020	0.00020	0.00025	0.00022	0.00036	0.00023
Potassium_D	mg/L	1.500	0.880	0.790	0.830	0.930	0.750	0.800	0.800	3.600	2.800	2.900	2.900	1.100	1.000	1.200	1.200	0.840	0.630	0.630	0.570
Selenium_D	mg/L	0.000130	0.000052	0.000092	0.000066	0.000050	0.000050	0.000050	0.000050	0.000052	0.000045	0.000038	0.000042	0.000050	0.000050	0.000050	0.000050	0.000057	0.000042	0.000038	0.000038
Selenium_T	mg/L	0.000130	0.000067	0.000100	0.000078	0.000050	0.000050	0.000050	0.000050	0.000052	0.000051	0.000038	0.000046	0.000050	0.000050	0.000050	0.000050	0.000086	0.000042	0.000038	0.000038
Silicon_D	mg/L	6.10	1.30	0.70	0.92	0.81	0.76	0.70	0.85	3.60	2.40	1.50	2.00	1.20	0.55	0.67	1.30	1.30	0.75	0.66	0.73
Silicon_T	mg/L	6.10	1.30	0.74	0.92	0.84	0.85	0.77	0.89	3.60	2.50	1.50	2.00	1.30	0.58	0.74	1.30	1.30	0.80	0.69	0.81
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Sodium_D	mg/L	3.60	1.40	1.80	2.00	2.00	1.50	1.70	1.70	5.40	3.90	4.40	4.20	2.10	1.40	2.10	2.20	1.60	1.10	1.30	1.30
Sodium_T	mg/L	3.60	1.50	1.90	2.00	2.00	1.50	1.70	1.70	5.50	3.90	4.40	4.30	2.10	1.40	2.20	2.20	1.80	1.20	1.40	1.30
Strontium_D	mg/L	0.045	0.016	0.019	0.020	0.028	0.023	0.025	0.025	0.088	0.062	0.066	0.061	0.028	0.019	0.028	0.029	0.026	0.018	0.020	0.018
Strontium_T	mg/L	0.046	0.016	0.020	0.020	0.028	0.023	0.025	0.025	0.088	0.064	0.066	0.065	0.029	0.019	0.028	0.030	0.026	0.019	0.020	0.020
Thallium_D	mg/L	0.0000430	0.0000410	0.0000320	0.0000320	0.0000500	0.0000500	0.0000500	0.0000500	0.0000430	0.0000410	0.0000280	0.0000200	0.0000500	0.0000500	0.0000500	0.0000500	0.0000050	0.0000350	0.0000280	0.0000280
Thallium_T	mg/L	0.0000430	0.0000410	0.0000320	0.0000320	0.0000500	0.0000500	0.0000500	0.0000500	0.0000430	0.0000410	0.0000280	0.0000200	0.0000500	0.0000500	0.0000500	0.0000500	0.0000050	0.0000350	0.0000280	0.0000280
Uranium_D	mg/L	0.0002100	0.0000530	0.0000520	0.0000540	0.0000500	0.0000500	0.0000500	0.0000500	0.0005100	0.0003500	0.0003100	0.0002400	0.0000500	0.0000500	0.0000500	0.0000500	0.0000120	0.0000370	0.0000320	0.0000280
Uranium_T	mg/L	0.0002100	0.0000640	0.0000570	0.0000560	0.0000500	0.0000500	0.0000500	0.0000500	0.0005100	0.0003800	0.0003100	0.0002500	0.0000500	0.0000500	0.0000500	0.0000500	0.0000140	0.0000370	0.0000340	0.0000330
Vanadium_T	mg/L	0.000600	0.000400	0.000270	0.000240	0.000100	0.000100	0.000150	0.000190	0.000130	0.000130	0.000200	0.000200	0.000100	0.000100	0.000100	0.000100	0.000250	0.000150	0.000180	0.000180
Zinc_D	mg/L	0.00140	0.00082	0.00190	0.00150	0.00092	0.00050	0.00050	0.00050	0.00120	0.00100	0.00110	0.00050	0.00150	0.00073	0.00075	0.00050	0.00150	0.00100	0.00180	0.00050
Zinc_T	mg/L	0.00200	0.00100	0.00240	0.00230	0.00130	0.00050	0.00100	0.00070	0.00120	0.00100	0.00110	0.00100	0.00220	0.00073	0.00075	0.00140	0.00150	0.00100	0.00380	0.00230

Table F-1: Water quality model results for expected case

Notes:
AQF1 to AQF38 are surface water sites.
T and pH are used for calculations of guidelines only and are not modeled.
Alkalinity and acidity are not modeled but tracked for potential future geochemical modeling.
NULL - no water was available for sampling.
Values highlighted yellow were flaged as discrepancies and resolved by removing outliers (values higher than Q3+1.5xIQR or lower than Q1-1.5xIQR, where Q3 is quartile 3, Q1 is quartile 1, IQR is inter-quartile range (Q3-Q1)) through application of water quality QAQC procedures.
n/v - no value or guideline is not established.
Assumptions:
If no analytical value was available then a zero value is used for the model, except for total metals, which are equal to dissolved metals.
If dissolved metal was greater than total metal then total metal concentration is used for the model (shown in green font).
If chromium VI was greater than dissolved chromium then dissolved chromium concentration is used for the model (shown in green font).
If free cyanide was greater than WAD cyanide then WAD cyanide is used for the model (shown in green font).
If WAD cyanide was greater than total cyanide then total cyanide is used for the model (shown in green font).

Table F-2: Water quality model results for upper case

Name in model	Units	South_RSA Groundwater	North_RSA Groundwater	Overburden Groundwater	Bedrock Groundwater	AQF1	AQF1	AQF1	AQF1	AQF2	AQF2	AQF2	AQF2	AQF4 deep	AQF4 deep	AQF4 deep	AQF4 deep	AQF4 shallow	AQF4 shallow	AQF4 shallow	AQF4 shallow	AQF5	AQF5
		Geo 95th %ile	Geo 95th %ile	Geo 95th %ile	Geo 95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile
						Fall since all Winter is "NULL"	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Number of samples collected for analysis		15	14	60	63	0	4	3	3	6	7	5	6	19	17	17	20	27	19	15	16	5	6
pH	pH Unit	7.26	7.05	9.00	7.85	8.1	7.7	6.9	8.1	7.4	7.6	7.9	7.8	7.5	7.4	7.4	7.4	7.7	8.1	8.1	8	7.1	8.2
T	deg C	3.58	2.44	10.40	5.00	6.4	7	9.3	6.4	0.78	22	22	12	4.1	4	4	4.2	3.7	17	20	12	0.96	19
Proton	mg/L	5.54E-08	8.85E-08	1.01E-09	1.41E-08	7.94E-09	2.00E-08	1.26E-07	7.94E-09	3.98E-08	2.51E-08	1.26E-08	1.58E-08	3.16E-08	3.98E-08	3.98E-08	3.98E-08	2.00E-08	7.94E-09	7.94E-09	1.00E-08	7.94E-08	6.31E-09
Acidity_T	mg/L	24.8	100.3	22.3	18.4	8.0	9.7	12.0	8.0	19.0	9.1	3.0	3.3	17.0	16.0	14.0	8.8	16.0	8.5	5.7	3.5	27.0	5.2
Alkalinity_T	mg/L	354	362	184	254	57	50	68	57	110	66	69	67	240	250	250	240	130	170	200	130	310	150
Bromide	mg/L	0.445625469	0.096593633	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	14.2	8.7	6.0	3.4	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.75	3.9	3.9	3.9	4	0.56	1.3	0.55	0.43	4.8	3
Fluoride	mg/L	0.124	0.091	0.291	0.244	0.045	0.041	0.048	0.045	0.089	0.058	0.066	0.067	0.15	0.15	0.14	0.15	0.093	0.098	0.094	0.087	0.12	0.077
Sulfate	mg/L	1631	409	215	171	1.5	0.99	0.91	1.5	6.5	3.6	3.4	4.6	210	200	200	210	43	55	43	37	870	470
Phosphorus_T	mg/L	0.02	0.15	0.05	0.31	0.005	0.025	0.013	0.005	0.028	0.04	0.029	0.031	0.06	0.051	0.06	0.052	0.025	0.025	0.023	0.014	0.036	0.037
N_Ammonia	N mg/L	0.35	0.92	0.44	0.39	0.011	0.027	0.025	0.011	0.1324	0.076	0.076	0.016	0.25	0.24	0.22	0.23	0.048	0.008	0.016	0.019	0.22	0.005
N_Nitrite	N mg/L	0.041	0.034	0.038	0.066	0.0098	0.0034	0.0090	0.0098	0.0210	0.0270	0.0120	0.0280	0.0640	0.0370	0.0500	0.0340	0.0300	0.0150	0.0280	0.0420	0.0590	0.0100
N_Nitrate_Nitrite	N mg/L	5.91	0.39	0.53	0.21	0.025	0.0810	0.0250	0.0250	0.0250	0.0440	0.0450	0.0750	0.1100	0.1400	0.0500	0.0540	0.1400	0.0670	0.0500	0.0500	0.2500	0.0250
Cyanide_T	mg/L	0.00050	0.00050	0.00078	0.00076	0.0025	0.00100	0.00230	0.00250	0.00095	0.00100	0.00093	0.00093	0.00050	0.00050	0.00050	0.00050	0.00095	0.00050	0.00050	0.00050	0.00050	0.00160
Cyanide_F	mg/L	0.00050	0.00050	0.00109	0.00089	0.0025	0.00100	0.00230	0.00250	0.00050	0.00100	0.00220	0.00220	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Cyanide_WAD	mg/L	0.00050	0.00050	0.00078	0.00076	0.0025	0.00100	0.00230	0.00250	0.00050	0.00100	0.00093	0.00093	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Hardness	mg/L	1765	678	319	399	59	57	69	59	110	72	82	68	410	390	410	390	170	220	170	160	1100	540
Radium_226	Bq/L	0.05	0.03	0.12	0.11	0.018	0.005	0.005	0.018	0.005	0.005	0.005	0.005	0.0073	0.005	0.0076	0.0083	0.0063	0.005	0.0032	0.0054	0.005	0.0031
Aluminum_D	mg/L	0.004	0.017	0.019	0.049	0.0340	0.0720	0.0380	0.0340	0.0220	0.0320	0.0120	0.0100	0.0036	0.0031	0.0047	0.0065	0.0170	0.0300	0.0085	0.0081	0.0210	0.0320
Aluminum_T	mg/L	0.004	0.017	0.019	0.049	0.0460	0.2400	0.0440	0.0460	0.0260	0.1100	0.0510	0.0804	0.0086	0.1300	0.0077	0.0065	0.0300	0.0430	0.0390	0.0240	0.0320	0.0320
Antimony_D	mg/L	0.000777	0.000211	0.000101	0.000076	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00005	0.00005	0.00010	0.00082
Antimony_T	mg/L	0.000777	0.000211	0.000101	0.000076	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00012	0.00012	0.00010	0.00010	0.00005	0.00005	0.00010	0.00082
Arsenic_D	mg/L	0.0009	0.0018	0.0016	0.0016	0.00016	0.00021	0.00014	0.00016	0.00056	0.00056	0.00047	0.00037	0.00870	0.00700	0.00730	0.00650	0.00230	0.00190	0.00280	0.00230	0.00230	0.00230
Arsenic_T	mg/L	0.0009	0.0018	0.0016	0.0016	0.00016	0.00021	0.00014	0.00016	0.00057	0.00058	0.00049	0.00041	0.00870	0.00700	0.00730	0.00650	0.00230	0.00190	0.00280	0.00230	0.00230	0.00230
Barium_D	mg/L	0.120	0.212	0.090	0.050	0.0110	0.0110	0.0130	0.0110	0.0260	0.0160	0.0110	0.0100	0.0460	0.0440	0.0460	0.0510	0.0230	0.0160	0.0150	0.0140	0.0420	0.0290
Barium_T	mg/L	0.120	0.212	0.090	0.050	0.0110	0.0130	0.0130	0.0110	0.0260	0.0170	0.0120	0.0120	0.0460	0.0460	0.0470	0.0510	0.0230	0.0160	0.0160	0.0140	0.0420	0.0290
Beryllium_T	mg/L	0.00005	0.00005	0.00008	0.00021	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.0001	0.0001	0.00005	0.00005	0.0001	0.00005
Boron_D	mg/L	0.071	0.031	0.031	0.035	0.0050	0.0050	0.0050	0.0050	0.0370	0.0050	0.0050	0.0050	0.1200	0.1300	0.1300	0.1300	0.0200	0.0150	0.0180	0.0140	0.0560	0.0490
Boron_T	mg/L	0.071	0.031	0.031	0.035	0.0050	0.0050	0.0050	0.0050	0.0420	0.0050	0.0050	0.0200	0.1300	0.1300	0.1300	0.1300	0.0210	0.0150	0.0180	0.0140	0.0560	0.0490
Cadmium_D	mg/L	0.00011	0.00001	0.00002	0.00013	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000008	0.000005	0.000005	0.000005	0.000022	0.000006	0.000005	0.000007	0.000005	0.000041
Cadmium_T	mg/L	0.00011	0.00001	0.00002	0.00013	0.000005	0.000011	0.000005	0.000005	0.000005	0.000012	0.000006	0.000011	0.000008	0.000009	0.000013	0.000008	0.000022	0.000006	0.000007	0.000008	0.000005	0.000041
Calcium_D	mg/L	470	207	92	110	20	19	23	20	31	22	24	19	98	96	100	95	46	64	48	45	280	130
Chromium_D	mg/L	0.00005	0.00074	0.00037	0.00094	0.000050	0.000430	0.000050	0.000050	0.000120	0.000380	0.000090	0.000110	0.000050	0.000050	0.000180	0.000077	0.000073	0.000250	0.000088	0.000081	0.00005	0.004100
Chromium_D_ Hex	mg/L	0.00005	0.00074	0.00037	0.00094	0.000050	0.000430	0.000050	0.000050	0.000120	0.000380	0.000090	0.000110	0.000050	0.000050	0.000180	0.000077	0.000073	0.000400	0.000088	0.000081	0.000050	0.004100
Chromium_T	mg/L	0.00005	0.00074	0.00037	0.00094	0.000120	0.000470	0.000150	0.000120	0.000410	0.000420	0.000270	0.000520	0.000160	0.000310	0.000200	0.000092	0.000160	0.000250	0.000580	0.000120	0.000130	0.004100
Cobalt_D	mg/L	0.00054	0.00014	0.00058	0.00026	0.000100	0.000100	0.000100	0.000100	0.000450	0.000260	0.000100	0.000100	0.000680	0.000380	0.000610	0.000920	0.000780	0.000100	0.000050	0.000050	0.000100	0.000410
Cobalt_T	mg/L	0.00054	0.00014	0.00058	0.00026	0.000100	0.000250	0.000100	0.000100	0.000480	0.000280	0.000100	0.000100	0.000680	0.000390	0.000610	0.000920	0.000900	0.000110	0.000050	0.000050	0.000100	0.000410
Copper_D	mg/L	0.00074	0.00202	0.00616	0.00437	0.000470	0.000750	0.000480	0.000470	0.000280	0.000350	0.000420	0.000100	0.000550	0.000530	0.000180	0.000480	0.001900	0.001300	0.001300	0.001100	0.000350	0.000520
Copper_T	mg/L	0.00074	0.00202	0.00616	0.00437	0.000470	0.001200	0.000480	0.000470	0.000480	0.000350	0.000420	0.000510	0.000550	0.000730	0.001200	0.000940	0.002000	0.001400	0.001300	0.001100	0.000380	0.000520
Iron_D	mg/L	0.22	33.47	0.96	5.32	0.400	0.170	0.190	0.400	0.840	1.300	0.320	0.220	2.400	1.900	2.300	2.200	0.200	0.170	0.100	0.044	0.210	0.120
Iron_T	mg/L	0.22	33.47	0.96	5.32	0.460	0.660	0.290	0.460	0.840	2.000	0.530	0.510	2.400	2.500	2.600	2.300	0.270	0.350	0.170	0.064	0.230	0.120
Lead_D	mg/L	0.00003	0.00003	0.00012	0.00080	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000250	0.0000820	0.0000500	0.0000450	0.0000880	0.0000450	0.0003700
Lead_T	mg/L	0.00003	0.00003	0.00012	0.00080	0.0000450	0.0002100	0.0000450	0.0000450	0.0002200	0.0001200	0.0003100	0.0001700	0.0000450	0.0000860	0.0003800	0.0000250	0.0000870	0.0000500	0.0002700	0.0000880	0.0000450	0.0003700
Magnesium_D	mg/L	155	36	20	30	2.4	2.2	2.6	2.4	7.9	4.7	5.2	4.9	39	37	37	38	13	15	13	12	100	60
Manganese_D	mg/L	0.47	1.58	0.44	0.47	0.0370	0.0190	0.0410	0.0370	1.1000	0.6500	0.0820	0.0370	2.6000	1.5000	2.2000	3.1000	0.9800	0.0820	0.0130	0.1200	1.1000	0.6200
Manganese_T	mg/L	0.47	1.58	0.44	0.47	0.0370	0.0600	0.0480	0.0370	1.3000	0.7500	0.1600	0.0590	2.7000	1.5000	2.2000	3.1000	0.9900	0.1500	0.0350	0.1200	1.1000	0.6200
Mercury_D	mg/L	0.0000006	0.0000012	0.0000020	0.0000073	0.0000014	0.0000031	0.0000016	0.0000014	0.0000021	0.0000022	0.0000019	0.0000010	0.0000005	0.0000009	0.0000009	0.0000007	0.0000016	0.0000016	0.0000014	0.0000008	0.0000022	0.0000006
Mercury_T	mg/L	0.0000006	0.0000012	0.0000020	0.0000073	0.0000021	0.0000047	0.0000016	0.0000021	0.0000034	0.0000030	0.0000019	0.0000010	0.0000005	0.0000009	0.0000009	0.0000008	0.0000016	0.0000018	0.0000014	0.0000008	0.0000022	0.0000006
Molybdenum_D	mg/L	0.0051	0.0022	0.0088	0.0072	0.00010	0.00010	0.00010	0.00010	0.00032	0.00021	0.00015	0.00023	0.00100	0.00100	0.00100	0.00120	0.00054	0.00049	0.00052	0.00053	0.00026	0.00099
Molybdenum_T	mg/L	0.0051	0.0022	0.0088	0.0072	0.00010	0.00010	0.00010	0.00010	0.00033	0.00023	0.00015	0.00027	0.00100	0.00110	0.00110	0.00130	0.00058	0.00049	0.00056	0.00053	0.00026	0.00099
Nickel_D	mg/L	0.00257	0.00132	0.00344	0.00079	0.00020	0.00044	0.00020	0.00020	0.00042	0.00024	0.00025	0.00025	0.00086	0.00078	0.00084	0.00085	0.00210	0.00120	0.00130	0.00110	0.00150	0.00320
Nickel_T	mg/L	0.00257	0.00132	0.00344	0.00079	0.00020	0.00091	0.00020	0.00020	0.00044	0.00024	0.00071	0.00056	0.00096	0.00088	0.00095	0.00085	0.00210	0.00130	0.00200	0.00110	0.00150	0.00320
Potassium_D	mg/L	14.8	7.5	4.6	4.1	0.55	1.1	0.43	0.55	1.8	1.3	1.1	1.1	8.2	8.2	8.2	8.3	3.7	4.5	4	3.9	27	16
Selenium_D	mg/L	0.00012	0.00023	0.00035	0.00023	0.000050	0.000410	0.000050	0.000050	0.000055	0.000370	0.000050	0.000050	0.000067	0.000050	0.000025	0.000025	0.000066	0.000050	0.000061	0.000068	0.000050	0.000050
Selenium_T	mg/L	0.00012	0.00023	0.00035	0.00023	0.000050	0.000410	0.000050	0.000050	0.000055	0.000370	0.000050	0.000050	0.000067	0.000050	0.000025	0.000025	0.000066	0.000050	0.000061	0.000068	0.000050	0.000050
Silicon_D	mg/L	7.3	12	10	10	5.30	4.80	5.30	5.30	4.20	3.60	2.40	2.90	8.20	8.50	8.90	8.40	4.20	3.70	3.60	3.40	2.70	2.70
Silicon_T	mg/L	7.3	12	10	10	5.50	4.80	5.50	5.50	4.20	3.60	2.40	2.90	8.20	8.70	8.90	8.40	4.20	3.70	3.90	3.40	2.70	2.70
Silver_D	mg/L	0.000005	0.000005	0.000005	0.000036	0.0000050	0.0000410	0.0000050	0.0000050	0.0000050	0.0000370	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0004100
Silver_T	mg/L	0.000005	0.000005	0.000005	0.000036	0.0000050	0.0000410	0.0000050	0.0000050	0.0000050	0.0000370	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0004100
Sodium_D	mg/L	113	47	33	19	1.6	1.4	1.5	1.6	2.5	1.5	1.7	1.7	29.0	29.0	30.0	29.0	5.6	5.1	5.6	4.6	44.0	34.0
Sodium_T	mg/L	113	47	33	19	1.6	1.4	1.6	1.6	2.5	1.5	1.7	1.7	29.0	29.0	30.0	33.0	5.8	5.1	5.7	4.6	44.0	34.0
Strontium_D	mg/L	1.15	0.24	0.18	0.30	0.0270	0.0250	0.0300	0.0270	0.0540	0.0340	0.0370	0.0350	0.3500	0.3500	0.3700	0.3500	0.0990	0.0920	0.1000	0.0870	0.4500	0.3100
Strontium_T	mg/L	1.15	0.24	0.18	0.30	0.0270	0.0250	0.0300	0.0270	0.0560	0.0340	0.0370	0.0370	0.3500	0.3800	0.3700	0.3600	0.1000	0.0920	0.1100	0.0870	0.4500	0.3100
Thallium_D	mg/L	0.000015	0.000046	0.000042	0.000046	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000005	0.000005	0.000050	0.000050	0.000005	0.000005	0.000050	0.000410
Thallium_T	mg/L	0.000015	0.000046	0.000042	0.000046	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000005	0.000005	0.000050	0.000050	0.000005	0.000005	0.000050	0.000410
Uranium_D	mg/L	0.048	0.003	0.005	0.011	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.003200	0.003000	0.003100	0.003600	0.000830	0.000790	0.000870	0.000680	0.001500	0.002100
Uranium_T	mg/L	0.048	0.003	0.005	0.011	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.003200	0.003200	0.003100	0.003700	0.000860	0.000790	0.000870	0.000680	0.001500	0.002100
Vanadium_T	mg/L	0.00025	0.00298	0.00139	0.00089	0.0001	0.00056	0.0001	0.0001	0.00025	0.00032	0.00026	0.00071	0.00025	0.00053	0.00025	0.00025	0.00027	0.00025	0.00025	0.00025	0.00010	0.0001
Zinc_D	mg/L	0.001	0.001	0.022	0.018	0.00100	0.00200	0.00150	0.00100	0.00210	0.00140	0.00270	0.00120	0.00100	0.00140	0.00260	0.00280	0.00310	0.00150	0.00330	0.00150	0.00130	0.00230
Zinc_T	mg/L	0.001	0.001	0.022	0.018	0.00100	0.00530	0.00150	0.00100	0.00240	0.00140	0.00310	0.00170	0.00150	0.00150	0.00360	0.00280	0.00400	0.00150	0.00330	0.00150	0.00150	0.00230

See notes on last page

Table F-2: Water quality model results for upper case

Name in model	Units	AQF5	AQF5	AQF6-shallow	AQF6-shallow	AQF6-shallow	AQF6-shallow	AQF6-Deep	AQF6-Deep	AQF6-Deep	AQF6-Deep	AQF7	AQF7	AQF7	AQF7	AQF8	AQF8	AQF8	AQF8	AQF9	AQF9	AQF9	AQF9
		95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile
		Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples collected for analysis		3	3	25	18	14	15	12	15	15	21	6	5	2	3	4	5	3	4	7	7	5	5
pH	pH Unit	8.4	8	7.6	8.1	8.2	8.2	7.6	7.4	7.6	7.5	7.7	7.6	7.5	7.8	6.5	8.2	7.3	7.5	7	7.4	7.6	7.7
T	deg C	21	16	2.6	17	20	13	3.3	3.4	4.1	4.3	1.2	19	19	12	0.49	19	19	11	0.68	20	23	13
Proton	mg/L	3.98E-09	1.00E-08	2.51E-08	7.94E-09	6.31E-09	6.31E-09	2.51E-08	3.98E-08	2.51E-08	3.16E-08	2.00E-08	2.51E-08	3.16E-08	1.58E-08	3.16E-07	6.31E-09	5.01E-08	3.16E-08	1.00E-07	3.98E-08	2.51E-08	2.00E-08
Acidity_T	mg/L	2.8	5.8	12.0	4.3	1.0	4.0	20.0	14.0	14.0	14.0	7.9	3.5	2.4	2.5	71.0	8.9	14.0	7.8	29.0	8.1	6.7	5.8
Alkalinity_T	mg/L	81	85	150	130	120	140	240	220	230	230	28	20	21	20	210	81	110	120	130	77	86	82
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	2.4	2.7	1.1	0.95	0.83	1.2	8	7.6	8.4	8.6	0.25	0.25	0.25	0.25	1.4	0.64	0.25	0.79	0.93	0.45	0.25	0.25
Fluoride	mg/L	0.081	0.08	0.095	0.083	0.084	0.086	0.14	0.15	0.14	0.15	0.052	0.045	0.046	0.049	0.08	0.074	0.084	0.074	0.092	0.068	0.078	0.079
Sulfate	mg/L	500	530	54	51	46	60	240	240	240	250	1.4	0.87	0.79	0.92	72	55	49	39	29	17	17	15
Phosphorus_T	mg/L	0.016	0.011	0.015	0.02	0.0055	0.005	0.034	0.026	0.038	0.035	0.02425	0.029	0.005	0.015	0.033	0.024	0.032	0.017	0.05	0.044	0.024	0.024
N_Ammonia	N mg/L	0.019	0.014	0.022	0.013	0.026	0.019	0.24	0.22	0.22	0.23	0.051	0.03	0.005	0.005	0.82	0.052	0.012	0.013	0.33	0.039	0.029	0.11
N_Nitrite	N mg/L	0.0010	0.0120	0.0260	0.0260	0.0260	0.0430	0.0950	0.0230	0.0270	0.0360	0.0215	0.0099	0.0110	0.0055	0.0140	0.0049	0.0064	0.0056	0.0194	0.0044	0.0130	0.0450
N_Nitrate_Nitrite	N mg/L	0.0250	0.0250	0.1600	0.0890	0.2500	0.0600	0.1200	0.1100	0.3300	0.1200	0.0760	0.0510	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0440	0.0450	0.0450
Cyanide_T	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00130	0.00100	0.00050	0.00050	0.00050	0.00100	0.00230	0.00240	0.00050	0.00085	0.00220	0.00250
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00100	0.00050	0.00250	0.00050	0.00100	0.00230	0.00240	0.00050	0.00085	0.00220	0.00250
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00100	0.00050	0.00050	0.00050	0.00100	0.00230	0.00240	0.00050	0.00085	0.00220	0.00250
Hardness	mg/L	500	520	180	170	160	190	430	410	440	430	27	20	19	19	230	130	130	150	150	110	93	89
Radium_226	Bq/L	0.005	0.0031	0.005	0.0035	0.003	0.0069	0.015	0.011	0.012	0.014	0.005	0.005	0.005	0.005	0.01	0.0092	0.005	0.005	0.02	0.011	0.005	0.0052
Aluminum_D	mg/L	0.0049	0.0014	0.0071	0.0170	0.0065	0.0059	0.0023	0.0048	0.0031	0.0048	0.0130	0.0180	0.0160	0.0220	0.0520	0.0530	0.0110	0.0150	0.0130	0.0307	0.0064	0.0058
Aluminum_T	mg/L	0.0049	0.0014	0.0180	0.0810	0.0620	0.0180	0.0057	0.0110	0.0098	0.0110	0.0272	0.0600	0.0180	0.0440	0.4500	0.1300	0.1200	0.0860	0.0270	0.0307	0.0230	0.0420
Antimony_D	mg/L	0.00010	0.00010	0.00010	0.00010	0.00005	0.00005	0.00010	0.00010	0.00010	0.00005	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Antimony_T	mg/L	0.00010	0.00010	0.00015	0.00010	0.00005	0.00005	0.00010	0.00010	0.00018	0.00005	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00027	0.00010	0.00010	0.00018
Arsenic_D	mg/L	0.00140	0.00120	0.00240	0.00200	0.00300	0.00250	0.00640	0.00720	0.00650	0.00600	0.00023	0.00021	0.00021	0.00022	0.00087	0.00110	0.00069	0.00055	0.00120	0.00071	0.00080	0.00057
Arsenic_T	mg/L	0.00140	0.00120	0.00240	0.00260	0.00300	0.00260	0.00640	0.00720	0.00710	0.00700	0.00030	0.00022	0.00022	0.00024	0.00093	0.00110	0.00070	0.00057	0.00126	0.00072	0.00087	0.00059
Barium_D	mg/L	0.0240	0.0220	0.0180	0.0160	0.0140	0.0140	0.0410	0.0440	0.0410	0.0410	0.0170	0.0087	0.0066	0.0067	0.0370	0.0180	0.0190	0.0190	0.0320	0.0150	0.0130	0.0140
Barium_T	mg/L	0.0240	0.0220	0.0180	0.0160	0.0140	0.0140	0.0410	0.0450	0.0430	0.0410	0.0200	0.0092	0.0066	0.0076	0.0370	0.0180	0.0210	0.0190	0.0320	0.0170	0.0130	0.0170
Beryllium_T	mg/L	0.00005	0.00005	0.0001	0.0001	0.00005	0.00005	0.0001	0.0001	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron_D	mg/L	0.0470	0.0400	0.0250	0.0180	0.0130	0.0130	0.0860	0.0810	0.0880	0.0840	0.0230	0.0050	0.0050	0.0050	0.0190	0.0110	0.0130	0.0050	0.0190	0.0085	0.0120	0.0150
Boron_T	mg/L	0.0470	0.0400	0.0250	0.0180	0.0130	0.0130	0.0860	0.0880	0.0880	0.0840	0.0300	0.0050	0.0050	0.0050	0.0410	0.0110	0.0130	0.0100	0.0420	0.0085	0.0130	0.0170
Cadmium_D	mg/L	0.000005	0.000005	0.000023	0.000011	0.000003	0.000003	0.000005	0.000005	0.000009	0.000004	0.000005	0.000005	0.000005	0.000005	0.000010	0.000005	0.000005	0.000005	0.000005	0.000011	0.000005	0.000005
Cadmium_T	mg/L	0.000005	0.000005	0.000023	0.000011	0.000003	0.000003	0.000005	0.000005	0.000020	0.000004	0.000014	0.000015	0.000005	0.000005	0.000011	0.000005	0.000010	0.000005	0.000039	0.000015	0.000015	0.000027
Calcium_D	mg/L	110	120	51	50	48	55	110	110	120	110	7.4	5	5.6	5	63	36	36	42	40	31	28	25
Chromium_D	mg/L	0.000050	0.000050	0.000050	0.000280	0.000140	0.000092	0.000050	0.000130	0.000180	0.000050	0.000050	0.000440	0.000050	0.000050	0.000220	0.000430	0.000095	0.000050	0.000088	0.000500	0.000050	0.000050
Chromium_D_ Hex	mg/L	0.000050	0.000050	0.000050	0.000330	0.000140	0.000092	0.000050	0.000130	0.000180	0.000050	0.000050	0.000440	0.000050	0.000050	0.000220	0.000430	0.000095	0.000050	0.000088	0.000500	0.000050	0.000050
Chromium_T	mg/L	0.000050	0.000050	0.000170	0.000280	0.000420	0.000140	0.000250	0.000470	0.000700	0.000140	0.000280	0.000690	0.000050	0.000190	0.000850	0.000440	0.000380	0.000220	0.000210	0.000500	0.000150	0.000180
Cobalt_D	mg/L	0.000100	0.000100	0.000100	0.000100	0.000050	0.000050	0.000410	0.000610	0.000380	0.000360	0.000100	0.000100	0.000100	0.000100	0.000310	0.000190	0.000100	0.000100	0.000190	0.000100	0.000100	0.000100
Cobalt_T	mg/L	0.000100	0.000100	0.000100	0.000120	0.000050	0.000050	0.000460	0.000630	0.000380	0.000360	0.000100	0.000100	0.000100	0.000100	0.000380	0.000200	0.000100	0.000100	0.000260	0.000100	0.000100	0.000100
Copper_D	mg/L	0.000630	0.000260	0.002900	0.001200	0.001200	0.001100	0.000870	0.000880	0.001000	0.000820	0.000360	0.000580	0.000100	0.000310	0.000210	0.000280	0.000450	0.000200	0.000180	0.000630	0.000330	0.000180
Copper_T	mg/L	0.000630	0.000260	0.002900	0.001400	0.001300	0.001100	0.000870	0.001000	0.003100	0.000900	0.000640	0.000630	0.000100	0.000530	0.000540	0.000420	0.000850	0.000200	0.000380	0.000630	0.000330	0.000710
Iron_D	mg/L	0.032	0.014	0.100	0.150	0.062	0.035	1.200	1.100	1.100	1.200	0.160	0.100	0.022	0.046	1.000	0.300	0.082	0.052	0.668	0.310	0.130	0.120
Iron_T	mg/L	0.032	0.014	0.110	0.340	0.140	0.054	1.500	1.200	1.400	1.200	0.327	0.190	0.037	0.140	1.500	0.460	0.210	0.140	0.668	0.420	0.210	0.180
Lead_D	mg/L	0.0000450	0.0000450	0.0000450	0.0001100	0.0002500	0.0000250	0.0000820	0.0000450	0.0000510	0.0000250	0.0000450	0.0000450	0.0000450	0.0000450	0.0001200	0.0000450	0.0000450	0.0000450	0.0000450	0.0000960	0.0001200	0.0000450
Lead_T	mg/L	0.0000450	0.0000450	0.0000450	0.0001100	0.0003200	0.0000250	0.0001900	0.0000450	0.0004600	0.0000250	0.0002400	0.0001900	0.0000450	0.0000450	0.0002100	0.0000450	0.0000980	0.0000450	0.0000450	0.0001700	0.0005600	0.0000450
Magnesium_D	mg/L	53	58	13	12	11	13	38	35	36	38	2	1.7	1.7	1.6	18	9.7	10	11	10	7	6.8	6.7
Manganese_D	mg/L	0.0280	0.0290	0.0500	0.0590	0.0120	0.0055	1.1000	1.4000	1.0000	1.0000	0.3800	0.0660	0.0035	0.0140	0.9900	0.1600	0.0310	0.0150	0.7900	0.1100	0.0310	0.0230
Manganese_T	mg/L	0.0280	0.0290	0.0500	0.0810	0.0250	0.0074	1.1000	1.4000	1.1000	1.1000	0.5100	0.0730	0.0200	0.0370	0.9900	0.1700	0.0340	0.0210	0.7900	0.1200	0.0420	0.0470
Mercury_D	mg/L	0.0000027	0.0000005	0.0000024	0.0000027	0.0000011	0.0000005	0.0000012	0.0000015	0.0000010	0.0000009	0.0000014	0.0000014	0.0000011	0.0000011	0.0000041	0.0000017	0.0000015	0.0000010	0.0000029	0.0000019	0.0000016	0.0000012
Mercury_T	mg/L	0.0000027	0.0000005	0.0000024	0.0000086	0.0000011	0.0000005	0.0000012	0.0000028	0.0000011	0.0000009	0.0000015	0.0000014	0.0000011	0.0000013	0.0000041	0.0000028	0.0000017	0.0000010	0.0000029	0.0000032	0.0000016	0.0000012
Molybdenum_D	mg/L	0.00068	0.00047	0.00065	0.00063	0.00046	0.00051	0.00170	0.00150	0.00120	0.00120	0.00005	0.00005	0.00010	0.00005	0.00005	0.00031	0.00019	0.00020	0.00023	0.00044	0.00027	0.00040
Molybdenum_T	mg/L	0.00068	0.00047	0.00068	0.00063	0.00046	0.00051	0.00170	0.00180	0.00130	0.00120	0.00010	0.00010	0.00010	0.00010	0.00010	0.00031	0.00022	0.00022	0.00032	0.00048	0.00033	0.00044
Nickel_D	mg/L	0.00110	0.00082	0.00130	0.00100	0.00081	0.00079	0.00073	0.00079	0.00082	0.00069	0.00020	0.00020	0.00020	0.00020	0.00088	0.00048	0.00038	0.00020	0.00024	0.00024	0.00025	0.00025
Nickel_T	mg/L	0.00110	0.00082	0.00130	0.00120	0.00140	0.00079	0.00086	0.00079	0.00110	0.00069	0.00035	0.00020	0.00020	0.00020	0.00097	0.00089	0.00054	0.00020	0.00044	0.00024	0.00049	0.00043
Potassium_D	mg/L	17	16	4.4	4	3.8	4.3	11	10	10	11	0.8	0.76	0.64	0.6	4.3	3.2	2.2	2.7	3.9	2.6	2.9	3.1
Selenium_D	mg/L	0.000050	0.000100	0.000089	0.000050	0.000060	0.000056	0.000059	0.000057	0.000057	0.000060	0.000050	0.000410	0.000050	0.000050	0.000050	0.000410	0.000050	0.000050	0.000055	0.000500	0.000050	0.000050
Selenium_T	mg/L	0.000050	0.000100	0.000089	0.000051	0.000070	0.000071	0.000059	0.000057	0.000057	0.000060	0.000050	0.000410	0.000050	0.000050	0.000050	0.000410	0.000050	0.000050	0.000055	0.000500	0.000050	0.000052
Silicon_D	mg/L	0.42	0.49	4.20	3.50	2.70	3.10	6.90	6.80	6.80	7.00	2.40	0.66	0.53	0.64	7.30	2.20	1.10	2.30	4.40	2.40	1.40	2.20
Silicon_T	mg/L	0.42	0.49	4.20	3.50	2.70	3.10	6.90	7.00	7.40	7.00	2.40	0.76	0.54	0.69	7.30	2.30	1.10	2.40	4.40	2.50	1.50	2.20
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000410	0.0000050	0.0000050	0.0000050	0.0000410	0.0000050	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000410	0.0000050	0.0000050	0.0000050	0.0000410	0.0000050	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050
Sodium_D	mg/L	31.0	33.0	7.0	6.4	4.1	5.3	31.0	30.0	31.0	31.0	1.6	1.2	1.2	1.2	12.0	9.0	9.1	6.4	5.6	3.8	3.9	3.8
Sodium_T	mg/L	31.0	33.0	7.0	6.6	4.1	5.3	31.0	31.0	31.0	31.0	1.6	1.2	1.2	1.2	12.0	9.0	9.8	6.4	5.8	3.9	4.0	3.8
Strontium_D	mg/L	0.3000	0.3000	0.1100	0.1100	0.0800	0.0900	0.3700	0.3700	0.4000	0.3800	0.0220	0.0150	0.0160	0.0150	0.1200	0.0700	0.0760	0.0830	0.0870	0.0570	0.0590	0.0540
Strontium_T	mg/L	0.3000	0.3000	0.1100	0.1100	0.0800	0.0900	0.3700	0.3700	0.4000	0.3900	0.0220	0.0160	0.0160	0.0150	0.1200	0.0730	0.0760	0.0830	0.0870	0.0570	0.0590	0.0570
Thallium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000005	0.000005	0.000050	0.000050	0.000005	0.000005	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Thallium_T	mg/L	0.000050	0.000050	0.000050	0.000050	0.000005	0.000005	0.000050	0.000050	0.000005	0.000005	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Uranium_D	mg/L	0.001500	0.001200	0.001300	0.001300	0.000550	0.000770	0.005500	0.005900	0.005600	0.005800	0.000050	0.000050	0.000050	0.000050	0.000240	0.000320	0.000170	0.000320	0.000280	0.000190	0.000098	0.000097
Uranium_T	mg/L	0.001500	0.001200	0.001300	0.001300	0.000550	0.000770	0.005500	0.005900	0.005600	0.005800	0.000050	0.000050	0.000050	0.000050	0.000250	0.000350	0.000190	0.000340	0.000310	0.000200	0.000120	0.000097
Vanadium_T	mg/L	0.0001	0.0001	0.00025	0.00027	0.00025	0.00025	0.00038	0.00035	0.00025	0.00025	0.00038	0.0001	0.0001	0.0001	0.001	0.00037	0.00043	0.00035	0.00021	0.00052	0.00025	0.00025
Zinc_D	mg/L	0.00580	0.00050	0.00200	0.00350	0.00150	0.00150	0.00150	0.00150	0.00290	0.00120	0.00290	0.00250	0.00050	0.00210	0.00400	0.00150	0.00280	0.00100	0.00150	0.00140	0.00270	0.00150
Zinc_T	mg/L	0.00580	0.00050	0.00200	0.00350	0.00150	0.00150	0.00150	0.00150	0.00450	0.00150	0.00590	0.00740	0.00120	0.00210	0.00640	0.00150	0.00280	0.00100	0.00270	0.00140	0.00380	0.00460

See notes on last page

Table F-2: Water quality model results for upper case

Name in model	Units	AQF10	AQF10	AQF10	AQF10	AQF11	AQF11	AQF11	AQF11	AQF13	AQF13	AQF13	AQF13	AQF15	AQF15	AQF15	AQF15	AQF16	AQF16	AQF16	AQF16	AQF18	AQF18
		95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile
		Fall since all Winter is "NULL"	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Number of samples collected for analysis		0	6	5	5	6	5	6	5	6	8	5	5	6	7	5	5	7	6	4	5	6	7
pH	pH Unit	7.8	6.4	6.3	7.8	7.1	7.7	8	7.7	7.3	7.3	7.8	7.7	7.2	7.8	8.1	7.9	7.2	7.7	8.2	7.9	7.1	7.7
T	deg C	11	11	14	11	1.2	17	21	16	0.88	15	21	14	0.53	19	21	15	0.85	19	21	13	0.73	17
Proton	mg/L	1.58E-08	3.98E-07	5.01E-07	1.58E-08	7.94E-08	2.00E-08	1.00E-08	2.00E-08	5.01E-08	5.01E-08	1.58E-08	2.00E-08	6.31E-08	1.58E-08	7.94E-09	1.26E-08	6.31E-08	2.00E-08	6.31E-09	1.26E-08	7.94E-08	2.00E-08
Acidity_T	mg/L	13.0	15.0	21.0	13.0	9.3	6.1	2.6	5.0	5.7	7.5	3.0	3.5	8.3	5.5	3.1	2.5	9.2	8.0	2.6	3.1	6.6	6.8
Alkalinity_T	mg/L	41	30	39	41	59	45	45	45	38	59	31	30	69	54	55	55	68	55	55	54	46	38
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.45	0.25	0.25	0.66	0.25	0.46	0.51	0.66	0.47	0.25	0.48	0.69	0.25
Fluoride	mg/L	0.047	0.048	0.054	0.047	0.098	0.078	0.082	0.085	0.049	0.058	0.042	0.045	0.089	0.08	0.081	0.077	0.093	0.079	0.082	0.076	0.099	0.077
Sulfate	mg/L	0.74	1.1	0.15	0.74	1.2	0.94	0.94	1	0.66	10	0.48	0.57	8.5	7.4	6.9	7.4	8.1	7.5	7	7.4	0.91	0.67
Phosphorus_T	mg/L	0.025	0.029	0.061	0.025	0.018	0.027	0.021	0.044	0.019	0.017	0.017	0.015	0.019	0.022	0.023	0.022	0.022	0.028	0.022	0.026	0.04	0.025
N_Ammonia	N mg/L	0.021	0.033	0.02	0.021	0.039	0.015	0.011	0.024	0.055	0.025	0.014	0.015	0.025	0.005	0.027	0.012	0.034	0.011	0.005	0.1	0.05	0.019
N_Nitrite	N mg/L	0.0160	0.0240	0.0079	0.0160	0.0110	0.0310	0.0220	0.0360	0.0230	0.0300	0.0120	0.0130	0.0220	0.0220	0.0046	0.0450	0.0260	0.0250	0.0110	0.0230	0.0410	0.0180
N_Nitrate_Nitrite	N mg/L	0.0450	0.0440	0.0450	0.0450	0.1600	0.0520	0.0450	0.0450	0.1100	0.1100	0.0450	0.0450	0.1100	0.0440	0.0450	0.0450	0.1200	0.0250	0.0250	0.0250	0.1400	0.0440
Cyanide_T	mg/L	0.00250	0.00088	0.00220	0.00250	0.00050	0.00050	0.00250	0.00250	0.00050	0.00085	0.00210	0.00250	0.00050	0.00160	0.00093	0.00050	0.00050	0.00088	0.00230	0.00230	0.00050	0.00085
Cyanide_F	mg/L	0.00250	0.00088	0.00210	0.00250	0.00050	0.00050	0.00250	0.00250	0.00050	0.00085	0.00210	0.00250	0.00050	0.00085	0.00220	0.00250	0.00050	0.00088	0.00230	0.00230	0.00050	0.00085
Cyanide_WAD	mg/L	0.00250	0.00088	0.00210	0.00250	0.00050	0.00050	0.00250	0.00250	0.00050	0.00085	0.00210	0.00250	0.00050	0.00085	0.00093	0.00050	0.00050	0.00088	0.00230	0.00230	0.00050	0.00085
Hardness	mg/L	42	36	44	42	60	48	47	47	35	67	30	29	71	63	58	58	74	62	60	58	44	40
Radium_226	Bq/L	0.005	0.0058	0.005	0.005	0.019	0.005	0.005	0.02	0.0098	0.005	0.005	0.005	0.013	0.005	0.005	0.005	0.005	0.0058	0.01	0.005	0.005	0.005
Aluminum_D	mg/L	0.1400	0.1100	0.1400	0.1400	0.0110	0.0340	0.0220	0.0190	0.0041	0.0510	0.0093	0.0060	0.0096	0.0300	0.0089	0.0094	0.0089	0.1300	0.0062	0.0077	0.0042	0.0350
Aluminum_T	mg/L	0.1500	0.1800	0.1900	0.1500	0.0170	0.0590	0.0340	0.0290	0.0075	0.0800	0.0190	0.0300	0.0160	0.0580	0.0470	0.0580	0.0320	0.2400	0.0430	0.0680	0.0170	0.1300
Antimony_D	mg/L	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00018	0.00010	0.00021	0.00010	0.00010	0.00010
Antimony_T	mg/L	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00023	0.00010	0.00010	0.00010	0.00022	0.00010	0.00010	0.00010	0.00018	0.00010	0.00022	0.00010	0.00010	0.00010
Arsenic_D	mg/L	0.00034	0.00038	0.00053	0.00034	0.00028	0.00026	0.00029	0.00026	0.00032	0.00041	0.00026	0.00027	0.00034	0.00032	0.00035	0.00034	0.00036	0.00031	0.00032	0.00039	0.00040	0.00031
Arsenic_T	mg/L	0.00055	0.00038	0.00069	0.00055	0.00028	0.00037	0.00029	0.00031	0.00032	0.00041	0.00028	0.00027	0.00035	0.00032	0.00036	0.00034	0.00058	0.00031	0.00032	0.00039	0.00040	0.00031
Barium_D	mg/L	0.0079	0.0081	0.0110	0.0079	0.0100	0.0091	0.0073	0.0076	0.0094	0.0120	0.0070	0.0073	0.0130	0.0098	0.0100	0.0100	0.0130	0.0097	0.0099	0.0100	0.0098	0.0071
Barium_T	mg/L	0.0090	0.0089	0.0140	0.0090	0.0100	0.0096	0.0077	0.0076	0.0094	0.0130	0.0083	0.0083	0.0130	0.0110	0.0100	0.0110	0.0130	0.0110	0.0099	0.0110	0.0099	0.0082
Beryllium_T	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron_D	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0150	0.0050	0.0050	0.0050	0.0210	0.0050	0.0050	0.0050	0.0210	0.0050	0.0050	0.0050	0.0160	0.0050
Boron_T	mg/L	0.0050	0.0050	0.0050	0.0050	0.0190	0.0050	0.0990	0.0050	0.0160	0.0050	0.0050	0.0050	0.0210	0.0050	0.0050	0.0050	0.0210	0.0050	0.0050	0.0050	0.0370	0.0050
Cadmium_D	mg/L	0.000005	0.000006	0.000009	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Cadmium_T	mg/L	0.000005	0.000006	0.000012	0.000005	0.000005	0.000005	0.000019	0.000005	0.000005	0.000005	0.000009	0.000005	0.000005	0.000009	0.000006	0.000005	0.000005	0.000011	0.000005	0.000005	0.000005	0.000005
Calcium_D	mg/L	12	10	12	12	17	13	14	13	10	18	9.2	8.9	19	17	16	16	20	16	17	15	11	10
Chromium_D	mg/L	0.000250	0.000430	0.000250	0.000250	0.000050	0.000120	0.000410	0.000140	0.000050	0.000500	0.000110	0.000050	0.000050	0.000500	0.000130	0.000050	0.000095	0.000500	0.000050	0.000100	0.000050	0.000500
Chromium_D_ Hex	mg/L	0.000250	0.000430	0.000250	0.000250	0.000050	0.000120	0.000410	0.000140	0.000050	0.000500	0.000110	0.000050	0.000050	0.000500	0.000130	0.000050	0.000095	0.000500	0.000050	0.000100	0.000050	0.000500
Chromium_T	mg/L	0.000970	0.000460	0.000670	0.000970	0.000130	0.000240	0.000470	0.000210	0.000095	0.000500	0.000260	0.000110	0.000140	0.000500	0.000330	0.000550	0.000200	0.000500	0.000140	0.000200	0.000110	0.000500
Cobalt_D	mg/L	0.000190	0.000280	0.000760	0.000190	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000230	0.000100	0.000100	0.000100	0.000100
Cobalt_T	mg/L	0.000400	0.000310	0.001200	0.000400	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000270	0.000100	0.000100	0.000100	0.000100
Copper_D	mg/L	0.000250	0.000380	0.000460	0.000250	0.000570	0.000510	0.000570	0.000370	0.000520	0.000330	0.000270	0.000280	0.000520	0.000460	0.000540	0.000420	0.000480	0.000800	0.000480	0.000510	0.000540	0.000540
Copper_T	mg/L	0.000250	0.000460	0.000560	0.000250	0.000970	0.000670	0.000570	0.000380	0.000540	0.000330	0.000270	0.000460	0.001200	0.000730	0.000540	0.000530	0.000870	0.000800	0.000530	0.000510	0.000640	0.000540
Iron_D	mg/L	0.450	0.370	0.540	0.450	0.083	0.380	0.140	0.140	0.005	0.150	0.017	0.028	0.032	0.110	0.034	0.032	0.046	0.340	0.031	0.030	0.017	0.130
Iron_T	mg/L	1.100	0.570	1.600	1.100	0.099	0.540	0.170	0.230	0.017	0.250	0.071	0.090	0.050	0.210	0.100	0.110	0.084	0.450	0.090	0.120	0.048	0.290
Lead_D	mg/L	0.0000450	0.0000450	0.0000830	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000570	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450
Lead_T	mg/L	0.0001100	0.0003400	0.0001800	0.0001100	0.0000450	0.0009500	0.0002600	0.0000450	0.0001500	0.0000450	0.0000450	0.0000570	0.0000450	0.0001200	0.0000570	0.0000510	0.0001200	0.0008700	0.0000450	0.0001100	0.0000450	0.0001500
Magnesium_D	mg/L	3.3	2.7	3.4	3.3	4.6	3.4	3.4	3.4	2.1	4.4	1.6	1.7	5.9	4.7	4.6	4.8	5.9	4.7	4.7	4.9	4.1	3.5
Manganese_D	mg/L	0.0380	0.0690	0.2000	0.0380	0.0480	0.1000	0.0160	0.0100	0.0019	0.0710	0.0070	0.0065	0.0051	0.0820	0.0069	0.0035	0.0072	0.0670	0.0054	0.0036	0.0022	0.0350
Manganese_T	mg/L	0.1300	0.0750	0.3000	0.1300	0.0490	0.1800	0.0310	0.0260	0.0120	0.0890	0.0730	0.0580	0.0110	0.1100	0.0230	0.0180	0.0140	0.0870	0.0190	0.0180	0.0085	0.0530
Mercury_D	mg/L	0.0000020	0.0000044	0.0000022	0.0000020	0.0000012	0.0000020	0.0000018	0.0000011	0.0000006	0.0000021	0.0000010	0.0000011	0.0000009	0.0000021	0.0000015	0.0000010	0.0000009	0.0000048	0.0000015	0.0000010	0.0000007	0.0000019
Mercury_T	mg/L	0.0000020	0.0000044	0.0000027	0.0000020	0.0000012	0.0000029	0.0000018	0.0000011	0.0000006	0.0000031	0.0000010	0.0000011	0.0000010	0.0000021	0.0000015	0.0000010	0.0000010	0.0000058	0.0000015	0.0000010	0.0000007	0.0000023
Molybdenum_D	mg/L	0.00015	0.00021	0.00023	0.00015	0.00150	0.00130	0.00140	0.00140	0.00005	0.00027	0.00010	0.00006	0.00087	0.00074	0.00080	0.00088	0.00096	0.00230	0.00082	0.00093	0.00120	0.00083
Molybdenum_T	mg/L	0.00016	0.00025	0.00042	0.00016	0.00150	0.00130	0.00140	0.00140	0.00010	0.00027	0.00010	0.00010	0.00100	0.00080	0.00084	0.00095	0.00096	0.00250	0.00082	0.00093	0.00120	0.00086
Nickel_D	mg/L	0.00050	0.00049	0.00078	0.00050	0.00024	0.00024	0.00044	0.00025	0.00024	0.00050	0.00025	0.00025	0.00024	0.00024	0.00025	0.00025	0.00024	0.00071	0.00024	0.00024	0.00024	0.00024
Nickel_T	mg/L	0.00160	0.00097	0.00120	0.00160	0.00024	0.00024	0.00089	0.00052	0.00024	0.00100	0.00052	0.00025	0.00024	0.00024	0.00055	0.00050	0.00039	0.00100	0.00024	0.00024	0.00024	0.00024
Potassium_D	mg/L	0.29	0.78	0.42	0.29	1.1	0.92	0.93	0.87	0.86	1.8	0.71	0.71	1.8	1.4	1.4	1.4	1.8	1.4	1.3	1.4	1.1	0.97
Selenium_D	mg/L	0.000052	0.000390	0.000076	0.000052	0.000066	0.000050	0.000060	0.000059	0.000051	0.000500	0.000050	0.000064	0.000050	0.000050	0.000050	0.000050	0.000050	0.000500	0.000050	0.000050	0.000063	0.000050
Selenium_T	mg/L	0.000060	0.000390	0.000077	0.000060	0.000066	0.000051	0.000060	0.000061	0.000061	0.000500	0.000050	0.000064	0.000056	0.000050	0.000050	0.000052	0.000052	0.000500	0.000050	0.000050	0.000063	0.000050
Silicon_D	mg/L	6.20	3.60	5.30	6.20	2.40	2.10	1.70	2.00	0.44	1.30	0.36	0.58	2.30	1.90	1.50	2.10	2.30	2.00	1.50	1.70	1.10	1.30
Silicon_T	mg/L	6.40	3.80	5.60	6.40	2.40	2.20	1.80	2.10	0.44	1.40	0.38	0.60	2.30	2.00	1.50	2.30	2.40	2.20	1.50	1.80	1.10	1.40
Silver_D	mg/L	0.0000050	0.0000390	0.0000050	0.0000050	0.0000050	0.0000050	0.0000390	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000390	0.0000050	0.0000050	0.0000050	0.0000050	0.0000390	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000050
Sodium_D	mg/L	2.0	1.6	1.9	2.0	2.1	1.7	1.8	1.8	1.5	2.5	1.2	1.2	3.3	2.6	2.7	2.6	3.3	2.5	2.6	2.8	2.4	1.7
Sodium_T	mg/L	2.2	1.6	2.0	2.2	2.1	1.7	1.8	1.8	1.5	2.5	1.2	1.2	3.4	2.8	2.7	2.6	3.4	2.5	2.7	2.8	2.4	1.7
Strontium_D	mg/L	0.0240	0.0200	0.0240	0.0240	0.0330	0.0270	0.0270	0.0270	0.0180	0.0370	0.0160	0.0160	0.0440	0.0370	0.0360	0.0380	0.0430	0.0380	0.0360	0.0380	0.0320	0.0270
Strontium_T	mg/L	0.0240	0.0200	0.0260	0.0240	0.0330	0.0270	0.0270	0.0270	0.0190	0.0380	0.0170	0.0160	0.0460	0.0390	0.0360	0.0380	0.0440	0.0390	0.0360	0.0380	0.0330	0.0270
Thallium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Thallium_T	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Uranium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000072	0.000071	0.000110	0.000083	0.000050	0.000120	0.000050	0.000050	0.000055	0.000050	0.000052	0.000050	0.000051	0.000110	0.000053	0.000050	0.000050	0.000050
Uranium_T	mg/L	0.000050	0.000050	0.000050	0.000050	0.000078	0.000110	0.000110	0.000087	0.000050	0.000120	0.000050	0.000050	0.000058	0.000051	0.000058	0.000055	0.000057	0.000140	0.000059	0.000055	0.000050	0.000050
Vanadium_T	mg/L	0.00052	0.00059	0.00075	0.00052	0.00021	0.00024	0.00025	0.00025	0.00021	0.00024	0.00025	0.00025	0.00024	0.00026	0.00037	0.00036	0.00025	0.00059	0.00037	0.00049	0.00021	0.00029
Zinc_D	mg/L	0.00130	0.00150	0.00240	0.00130	0.00170	0.00140	0.00150	0.00110	0.00210	0.00140	0.00130	0.00050	0.00230	0.00140	0.00150	0.00120	0.00150	0.00100	0.00170	0.00220	0.00170	0.00140
Zinc_T	mg/L	0.00340	0.00150	0.01300	0.00340	0.00170	0.00140	0.00150	0.00270	0.00320	0.00140	0.00280	0.00150	0.00230	0.00140	0.00150	0.04500	0.00500	0.00100	0.00170	0.00450	0.00170	0.00140

See notes on last page

Table F-2: Water quality model results for upper case

Name in model	Units	AQF18	AQF18	AQF20	AQF20	AQF20	AQF20	AQF23	AQF23	AQF23	AQF23	AQF26	AQF26	AQF26	AQF26	AQF28	AQF28	AQF28	AQF28	AQF29	AQF29	AQF29	AQF29
		95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile
		Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples collected for analysis		5	6	6	5	7	5	1	7	5	5	5	3	3	3	6	5	5	5	5	3	3	4
pH	pH Unit	8.4	7.8	7.3	7.5	7.6	8	7	6.9	7	7.3	6.7	8.2	7.7	7.9	7.1	7.2	8.3	8	7.5	7.8	8.5	8
T	deg C	21	13	1	18	20	14	0	11	15	10	0.62	19	22	18	0.75	18	23	12	1	17	20	13
Proton	mg/L	3.98E-09	1.58E-08	5.01E-08	3.16E-08	2.51E-08	1.00E-08	1.00E-07	1.26E-07	1.00E-07	5.01E-08	2.00E-07	6.31E-09	2.00E-08	1.26E-08	7.94E-08	6.31E-08	5.01E-09	1.00E-08	3.16E-08	1.58E-08	3.16E-09	1.00E-08
Acidity_T	mg/L	2.2	2.2	11.0	4.9	2.4	3.4	18.0	8.9	11.0	7.8	56.0	11.0	7.7	7.2	27.0	5.2	2.8	3.9	7.4	4.8	2.4	4.3
Alkalinity_T	mg/L	35	36	62	40	47	45	140	46	70	64	290	120	170	160	150	38	48	47	44	32	35	36
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	0.25	0.25	0.75	0.49	0.25	0.47	0.97	0.25	0.25	0.25	4.3	1.6	1.6	1.9	0.51	0.25	0.25	0.25	0.67	0.25	0.25	0.55
Fluoride	mg/L	0.079	0.082	0.084	0.0748	0.077	0.075	0.082	0.055	0.067	0.061	0.041	0.053	0.061	0.054	0.11	0.067	0.076	0.077	0.091	0.077	0.08	0.078
Sulfate	mg/L	0.66	0.75	5.2	4.4	4.4	4.6	28	5.6	3.1	8.5	670	270	260	270	6	2.9	2.7	3.2	0.82	0.74	0.62	0.76
Phosphorus_T	mg/L	0.024	0.027	0.024	0.0276	0.031	0.019	0.00516	0.017	0.025	0.00516	0.073	0.055	0.025	0.037	0.022	0.024	0.021	0.016	0.024	0.018	0.023	0.023
N_Ammonia	N mg/L	0.012	0.005	0.0205	0.019	0.02	0.0138	0.22	0.021	0.021	0.012	1.8	0.11	0.074	0.11	0.07375	0.014	0.013	0.04	0.019	0.012	0.005	0.013
N_Nitrite	N mg/L	0.0260	0.0320	0.0143	0.0094	0.0088	0.0090	0.0130	0.0190	0.0250	0.0130	0.0250	0.0029	0.0250	0.0067	0.0410	0.0094	0.0220	0.0190	0.0780	0.0050	0.0100	0.0076
N_Nitrate_Nitrite	N mg/L	0.0450	0.1500	0.1638	0.0690	0.0850	0.0634	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0700	0.0450	0.1100	0.0450	0.1100	0.0250	0.0250	0.0250
Cyanide_T	mg/L	0.00220	0.00220	0.00330	0.00090	0.00210	0.00250	0.00050	0.00085	0.00210	0.00250	0.00050	0.00050	0.00050	0.00050	0.00110	0.00050	0.00100	0.00220	0.00150	0.00050	0.00050	0.00100
Cyanide_F	mg/L	0.00220	0.00220	0.00050	0.00090	0.00210	0.00250	0.00050	0.00085	0.00210	0.00250	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00100	0.00220	0.00050	0.00050	0.00230	0.00230
Cyanide_WAD	mg/L	0.00220	0.00220	0.00050	0.00090	0.00210	0.00250	0.00050	0.00085	0.00210	0.00250	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00100	0.00220	0.00050	0.00050	0.00050	0.00100
Hardness	mg/L	36	35	60	46	48	46	160	56	73	65	810	320	350	330	150	46	50	48	40	35	34	34
Radium_226	Bq/L	0.005	0.0054	0.0051	0.005	0.005	0.005	0.021	0.005	0.005	0.005	0.034	0.011	0.005	0.005	0.005	0.0059	0.005	0.005	0.005	0.005	0.005	0.01
Aluminum_D	mg/L	0.0069	0.0089	0.0072	0.0470	0.0230	0.0180	0.0260	0.0564	0.0740	0.0470	0.0830	0.0580	0.0380	0.0340	0.0633	0.0980	0.0510	0.0350	0.0040	0.0220	0.0180	0.0049
Aluminum_T	mg/L	0.0640	0.0740	0.0703	0.0941	0.1100	0.0990	0.0506	0.0564	0.0800	0.1700	0.0830	0.0890	0.0380	0.0340	0.0633	0.1100	0.0860	0.0590	0.0210	0.0510	0.0460	0.0430
Antimony_D	mg/L	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Antimony_T	mg/L	0.00010	0.00030	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Arsenic_D	mg/L	0.00037	0.00031	0.00033	0.00033	0.00034	0.00030	0.00043	0.00031	0.00096	0.00072	0.00710	0.00240	0.00380	0.00310	0.00036	0.00027	0.00032	0.00029	0.00034	0.00026	0.00038	0.00035
Arsenic_T	mg/L	0.00039	0.00062	0.00038	0.00037	0.00035	0.00032	0.00043	0.00031	0.00096	0.00072	0.00710	0.00240	0.00380	0.00310	0.00036	0.00029	0.00032	0.00029	0.00034	0.00028	0.00038	0.00035
Barium_D	mg/L	0.0073	0.0074	0.0140	0.0086	0.0075	0.0086	0.0380	0.0120	0.0150	0.0140	0.0720	0.0220	0.0390	0.0380	0.0370	0.0083	0.0094	0.0078	0.0089	0.0067	0.0072	0.0072
Barium_T	mg/L	0.0084	0.0089	0.0150	0.0130	0.0092	0.0098	0.0680	0.0120	0.0160	0.0200	0.0720	0.0220	0.0390	0.0380	0.0490	0.0089	0.0100	0.0085	0.0089	0.0074	0.0081	0.0081
Beryllium_T	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron_D	mg/L	0.0050	0.0050	0.0210	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0200	0.0380	0.0360	0.0280	0.0150	0.0050	0.0050	0.0050	0.0150	0.0050	0.0050	0.0050
Boron_T	mg/L	0.0050	0.0050	0.0330	0.0150	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0200	0.0380	0.0360	0.0280	0.0230	0.0050	0.0050	0.0050	0.1200	0.0050	0.0050	0.0050
Cadmium_D	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Cadmium_T	mg/L	0.000018	0.000033	0.000005	0.000014	0.000006	0.000005	0.000030	0.000009	0.000006	0.000007	0.000005	0.000005	0.000005	0.000005	0.000011	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Calcium_D	mg/L	9.1	13	17	13	13	12	46	17	24	21	190	73	89	77	44	13	14	14	9.9	9.1	8.8	8.8
Chromium_D	mg/L	0.000050	0.000190	0.000095	0.000430	0.000390	0.000050	0.000050	0.000500	0.000200	0.000120	0.0003	0.000200	0.000160	0.000130	0.000370	0.000190	0.000160	0.000170	0.000050	0.000050	0.000170	0.000050
Chromium_D_ Hex	mg/L	0.000050	0.000190	0.000095	0.000430	0.000390	0.000050	0.000050	0.000500	0.000200	0.000120	0.000300	0.000200	0.000160	0.000130	0.000370	0.000190	0.000160	0.000170	0.000050	0.000050	0.000180	0.000050
Chromium_T	mg/L	0.000170	0.000290	0.000320	0.000550	0.000490	0.000190	0.005600	0.000500	0.000430	0.000320	0.000310	0.000230	0.000160	0.000130	0.000520	0.000260	0.000230	0.000200	0.000050	0.000120	0.000170	0.000200
Cobalt_D	mg/L	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.001500	0.000100	0.000710	0.001100	0.000310	0.000100	0.000100	0.000100	0.000370	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100
Cobalt_T	mg/L	0.000100	0.000100	0.000100	0.000200	0.000100	0.000100	0.003300	0.000100	0.000780	0.001700	0.000310	0.000100	0.000100	0.000100	0.000370	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100
Copper_D	mg/L	0.000630	0.000680	0.000450	0.000660	0.000620	0.000500	0.000100	0.000320	0.000230	0.000200	0.000100	0.001400	0.000550	0.000270	0.000100	0.000380	0.000480	0.000410	0.000480	0.000410	0.000550	0.000590
Copper_T	mg/L	0.000630	0.000690	0.000690	0.000700	0.000620	0.000540	0.003000	0.000320	0.000230	0.000230	0.000100	0.001400	0.000550	0.000270	0.000330	0.000410	0.000480	0.000530	0.000620	0.000410	0.000550	0.000760
Iron_D	mg/L	0.021	0.057	0.270	0.180	0.073	0.040	2.400	0.160	0.880	1.300	2.100	0.340	0.380	0.320	0.146	0.440	0.110	0.075	0.019	0.052	0.024	0.033
Iron_T	mg/L	0.120	0.180	0.305	0.344	0.200	0.130	6.100	0.300	1.200	4.600	2.100	0.340	0.380	0.320	0.146	0.540	0.200	0.150	0.041	0.120	0.110	0.140
Lead_D	mg/L	0.0000520	0.0000510	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450	0.0000450
Lead_T	mg/L	0.0001700	0.0002400	0.0000940	0.0002000	0.0000600	0.0000450	0.0013000	0.0000450	0.0000710	0.0001200	0.0000450	0.0000450	0.0000450	0.0000450	0.0000840	0.0000450	0.0000830	0.0000450	0.0000450	0.0004600	0.0001100	0.0000880
Magnesium_D	mg/L	3.2	3.2	4.8	3.4	3.8	3.9	9.7	2.7	3.4	3.3	82	35	33	34	10	3.3	3.7	3.7	3.7	3	3.4	3.1
Manganese_D	mg/L	0.0010	0.0030	0.0990	0.0990	0.0190	0.0094	1.1000	0.0057	0.1600	0.2900	0.9200	0.0500	0.1400	0.1100	0.6500	0.0160	0.0038	0.0037	0.0018	0.0150	0.0015	0.0007
Manganese_T	mg/L	0.0460	0.0330	0.1300	0.2000	0.0690	0.0290	1.2000	0.0360	0.1700	0.4500	0.9200	0.0500	0.1400	0.1100	0.6500	0.0380	0.0300	0.0180	0.0070	0.0270	0.0420	0.0370
Mercury_D	mg/L	0.0000010	0.0000007	0.0000013	0.0000026	0.0000019	0.0000012	0.0000035	0.0000018	0.0000024	0.0000020	0.0000032	0.0000017	0.0000041	0.0000016	0.0000019	0.0000034	0.0000024	0.0000016	0.0000007	0.0000015	0.0000010	0.0000005
Mercury_T	mg/L	0.0000010	0.0000007	0.0000014	0.0000034	0.0000019	0.0000012	0.0000130	0.0000026	0.0000024	0.0000020	0.0000032	0.0000021	0.0000041	0.0000016	0.0000033	0.0000041	0.0000025	0.0000019	0.0000007	0.0000015	0.0000010	0.0000005
Molybdenum_D	mg/L	0.00110	0.00100	0.00058	0.00058	0.00057	0.00052	0.00029	0.00030	0.00032	0.00036	0.00010	0.00072	0.00019	0.00026	0.00051	0.00033	0.00034	0.00036	0.00100	0.00082	0.00110	0.00110
Molybdenum_T	mg/L	0.00110	0.00110	0.00058	0.00060	0.00058	0.00054	0.00050	0.00030	0.00035	0.00055	0.00010	0.00072	0.00019	0.00026	0.00052	0.00040	0.00038	0.00037	0.00110	0.00087	0.00110	0.00120
Nickel_D	mg/L	0.00025	0.00025	0.00024	0.00024	0.00025	0.00025	0.00057	0.00024	0.00025	0.00025	0.00091	0.00120	0.00072	0.00051	0.00024	0.00024	0.00025	0.00025	0.00020	0.00020	0.00020	0.00020
Nickel_T	mg/L	0.00025	0.00073	0.00039	0.00053	0.00063	0.00048	0.00410	0.00024	0.00073	0.00050	0.00091	0.00120	0.00072	0.00051	0.00049	0.00024	0.00025	0.00025	0.00020	0.00020	0.00020	0.00020
Potassium_D	mg/L	0.82	0.83	1.5	1.2	1.1	1.1	3.4	1.2	0.57	0.85	24	12	13	12	1.9	0.96	0.9	1	0.97	0.8	0.84	0.83
Selenium_D	mg/L	0.000050	0.000050	0.000050	0.000410	0.000390	0.000050	0.000050	0.000050	0.000052	0.000050	0.000050	0.000050	0.000050	0.000050	0.000180	0.000057	0.000110	0.000100	0.000050	0.000050	0.000050	0.000050
Selenium_T	mg/L	0.000050	0.000310	0.000050	0.000410	0.000390	0.000050	0.000050	0.000056	0.000052	0.000050	0.000050	0.000050	0.000050	0.000050	0.000180	0.000100	0.000130	0.000110	0.000050	0.000050	0.000050	0.000050
Silicon_D	mg/L	0.90	1.00	1.50	2.00	0.80	1.30	4.60	3.80	6.90	7.10	6.20	1.10	1.20	1.90	6.90	2.00	1.10	1.50	0.90	0.91	0.79	0.88
Silicon_T	mg/L	0.99	1.20	1.70	2.20	0.97	1.40	10.00	3.80	7.30	7.30	6.20	1.10	1.20	1.90	7.00	2.00	1.10	1.50	0.93	0.96	0.90	0.95
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000410	0.0000390	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000280	0.0000050	0.0000410	0.0000390	0.0000050	0.0000050	0.0000500	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Sodium_D	mg/L	1.8	1.7	2.8	2.1	2.2	2.3	5.1	2.1	2.4	2.6	64.0	31.0	43.0	44.0	4.3	1.8	2.0	2.1	2.1	1.6	1.8	1.7
Sodium_T	mg/L	1.8	1.8	3.0	2.1	2.3	2.3	5.6	2.2	2.6	2.8	64.0	31.0	43.0	44.0	4.3	1.8	2.2	2.1	2.1	1.6	1.8	1.7
Strontium_D	mg/L	0.0260	0.0250	0.0370	0.0280	0.0300	0.0290	0.0910	0.0280	0.0390	0.0350	0.3300	0.1600	0.2200	0.2200	0.0590	0.0190	0.0220	0.0220	0.0290	0.0250	0.0260	0.0260
Strontium_T	mg/L	0.0260	0.0260	0.0400	0.0290	0.0300	0.0310	0.0910	0.0290	0.0390	0.0360	0.3300	0.1600	0.2200	0.2200	0.0620	0.0200	0.0220	0.0220	0.0290	0.0250	0.0260	0.0260
Thallium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Thallium_T	mg/L	0.000050	0.000280	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Uranium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000210	0.000050	0.000050	0.000050	0.000280	0.000320	0.000240	0.000370	0.000290	0.000062	0.000069	0.000073	0.000050	0.000050	0.000050	0.000050
Uranium_T	mg/L	0.000050	0.000050	0.000050	0.000050	0.000057	0.000050	0.000350	0.000050	0.000050	0.000050	0.000280	0.000320	0.000240	0.000370	0.000300	0.000100	0.000078	0.000074	0.000050	0.000050	0.000050	0.000050
Vanadium_T	mg/L	0.00031	0.00032	0.00037	0.00082	0.00045	0.0004	0.0059	0.00047	0.00031	0.001	0.0007	0.0004	0.0001	0.0001	0.0017	0.00053	0.00032	0.00025	0.0001	0.0001	0.00024	0.00028
Zinc_D	mg/L	0.00050	0.00510	0.00580	0.00160	0.00150	0.00150	0.00240	0.00330	0.00180	0.00050	0.00050	0.00140	0.00450	0.00050	0.00210	0.00150	0.00370	0.00260	0.00140	0.00050	0.00050	0.00050
Zinc_T	mg/L	0.00200	0.00600	0.00750	0.00160	0.00150	0.00150	0.01500	0.00390	0.01000	0.00580	0.00050	0.00140	0.00450	0.00050	0.00380	0.00160	0.00580	0.00450	0.00280	0.00050	0.00140	0.00120

See notes on last page

Table F-2: Water quality model results for upper case

Name in model	Units	AQF34	AQF34	AQF34	AQF34	AQF36	AQF36	AQF36	AQF36	AQF38	AQF38	AQF38	AQF38
		95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile	95th %ile
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples collected for analysis		6	5	4	3	5	3	2	1	1	3	4	2
pH	pH Unit	7.3	7.6	8.2	7.8	6.9	7.9	8.2	7.8	6.7	7.2	7.7	7.4
T	deg C	0.55	16	21	13	0.72	16	20	12	0.1	19	21	12
Proton	mg/L	5.01E-08	2.51E-08	6.31E-09	1.58E-08	1.26E-07	1.26E-08	6.31E-09	1.58E-08	2.00E-07	6.31E-08	2.00E-08	3.98E-08
Acidity_T	mg/L	12.0	8.8	3.1	2.9	13.0	7.6	1.0	2.3	5.3	5.5	2.2	2.5
Alkalinity_T	mg/L	140	100	99	100	54	39	49	48	38	27	31	30
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride	mg/L	0.87	0.8	0.61	0.57	0.47	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fluoride	mg/L	0.092	0.074	0.075	0.077	0.063	0.069	0.075	0.071	0.092	0.091	0.097	0.1
Sulfate	mg/L	34	29	29	27	3.6	4.3	4.5	4.1	0.15	0.15	0.15	0.15
Phosphorus_T	mg/L	0.024	0.037	0.024	0.028	0.017	0.017	0.015	0.026	0.015	0.0135	0.018	0.016
N_Ammonia	N mg/L	0.074	0.045	0.02	0.035	0.046	0.012	0.011	0.011	0.094	0.016	0.016	0.084
N_Nitrite	N mg/L	0.0290	0.0240	0.0450	0.0510	0.0150	0.0038	0.0190	0.0000	**0.0250**	0.0440	0.0190	0.0170
N_Nitrate_Nitrite	N mg/L	0.1443	0.0450	0.0460	0.0550	0.2300	0.0250	0.0250	0.0250	0.0250	0.0480	0.0460	0.0250
Cyanide_T	mg/L	0.00088	0.00050	0.00093	0.00050	0.00090	0.00050	0.00050	0.00050	0.00050	0.00050	0.00093	0.00050
Cyanide_F	mg/L	0.00050	0.00050	0.00093	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00093	0.00050
Cyanide_WAD	mg/L	0.00050	0.00050	0.00093	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00093	0.00050
Hardness	mg/L	160	130	130	120	53	48	50	48	35	30	30	27
Radium_226	Bq/L	0.005	0.0057	0.005	0.0049	0.005	0.005	0.005	0.005	0.011	0.0049	0.005	0.0076
Aluminum_D	mg/L	0.0054	**0.0187**	0.0069	0.0041	0.0150	0.0350	0.0037	0.0029	0.0110	0.0380	0.0110	0.0073
Aluminum_T	mg/L	0.0140	0.0187	0.0120	0.0100	0.0220	0.0520	0.0220	0.0150	0.0150	0.0520	0.0300	0.0210
Antimony_D	mg/L	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00005	0.00010	0.00010	0.00010
Antimony_T	mg/L	0.00014	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00005	0.00010	0.00010	0.00010
Arsenic_D	mg/L	**0.00180**	0.00140	0.00130	**0.00120**	0.00036	**0.00024**	0.00026	0.00005	0.00027	0.00021	0.00024	0.00021
Arsenic_T	mg/L	0.00180	0.00140	0.00140	0.00120	0.00047	0.00024	0.00028	0.00027	0.00028	0.00022	0.00025	0.00028
Barium_D	mg/L	0.0240	**0.0190**	**0.0140**	0.0150	0.0130	**0.0086**	**0.0081**	0.0081	0.0150	0.0099	0.0100	0.0098
Barium_T	mg/L	0.0240	0.0190	0.0140	0.0150	0.0130	0.0086	0.0081	0.0084	0.0160	0.0100	0.0120	0.0110
Beryllium_T	mg/L	0.0001	0.0001	0.0001	0.000095	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.000098
Boron_D	mg/L	**0.0250**	0.0140	0.0140	0.0160	0.0490	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Boron_T	mg/L	0.0250	0.0150	0.0140	0.0180	0.0550	0.0130	0.0050	0.0050	0.0050	0.1000	0.0050	0.0050
Cadmium_D	mg/L	0.000005	**0.000005**	0.000005	0.000005	**0.000005**	0.000005	0.000005	0.000005	0.000003	0.000005	0.000005	0.000005
Cadmium_T	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000003	0.000005	0.000013	0.000005
Calcium_D	mg/L	47	35	36	32	15	13	14	13	9.9	8.6	8.6	7.6
Chromium_D	mg/L	0.000050	0.000090	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Chromium_D_ Hex	mg/L	**0.000050**	**0.000090**	**0.000050**	**0.000120**	**0.000050**	**0.000050**	**0.000050**	**0.000050**	**0.000050**	**0.000050**	**0.000050**	**0.000050**
Chromium_T	mg/L	0.000170	0.000170	0.000160	0.000050	0.000120	0.000050	0.000098	0.000050	0.000050	0.000120	0.000170	0.000210
Cobalt_D	mg/L	0.000110	0.000100	0.000100	0.000095	0.000100	0.000100	0.000100	0.000100	0.000050	0.000100	0.000100	0.000098
Cobalt_T	mg/L	0.000120	0.000100	0.000100	0.000095	0.000100	0.000100	0.000100	0.000100	0.000050	0.000100	0.000100	0.000098
Copper_D	mg/L	0.000670	0.000720	0.000560	**0.000300**	**0.000620**	0.000370	0.000440	0.000410	**0.000250**	0.000270	**0.000250**	**0.000220**
Copper_T	mg/L	0.000900	0.000800	0.000560	0.000300	0.000620	0.000940	0.000510	0.000410	0.000250	0.000310	0.000250	0.000220
Iron_D	mg/L	**0.170**	0.210	0.051	0.056	0.180	0.120	0.005	0.031	0.079	0.180	0.041	0.011
Iron_T	mg/L	0.170	0.360	0.085	0.100	0.220	0.170	0.067	0.140	0.120	0.280	0.220	0.140
Lead_D	mg/L	0.0000450	0.0000450	0.0000450	0.0000430	0.0000450	0.0000450	0.0000450	0.0000450	0.0000250	0.0000450	0.0000450	0.0000440
Lead_T	mg/L	0.0000450	0.0002600	0.0005300	0.0000430	0.0003800	0.0005100	0.0000450	0.0000450	0.0000250	0.0000970	0.0001400	0.0000440
Magnesium_D	mg/L	11	8.7	8.8	8.4	3.7	3.5	3.7	3.8	2.4	2	2.1	2
Manganese_D	mg/L	0.4500	0.2900	0.0050	0.0094	0.0210	0.0091	0.0011	0.0007	0.0041	0.0500	0.0016	0.0008
Manganese_T	mg/L	0.4600	0.3100	0.0260	0.0400	0.0240	0.0130	0.0400	0.0320	0.0240	0.0860	0.1000	0.0590
Mercury_D	mg/L	0.0000013	0.0000023	**0.0000016**	**0.0000009**	0.0000013	0.0000022	**0.0000007**	**0.0000007**	0.0000008	0.0000020	0.0000013	**0.0000010**
Mercury_T	mg/L	0.0000013	0.0000027	0.0000016	0.0000009	0.0000015	0.0000023	0.0000007	0.0000007	0.0000008	0.0000024	0.0000022	0.0000010
Molybdenum_D	mg/L	0.00048	0.00040	0.00044	0.00040	**0.00035**	**0.00042**	0.00050	0.00049	0.00250	0.00240	**0.00310**	0.00230
Molybdenum_T	mg/L	0.00049	0.00042	0.00044	0.00040	0.00035	0.00042	0.00051	0.00052	0.00250	0.00250	0.00310	0.00260
Nickel_D	mg/L	0.00058	0.00048	0.00025	0.00025	0.00020	0.00020	0.00020	0.00020	0.00025	0.00025	0.00025	0.00025
Nickel_T	mg/L	0.00066	0.00080	0.00075	0.00025	0.00020	0.00020	0.00020	0.00020	0.00025	0.00025	0.00069	0.00025
Potassium_D	mg/L	3.7	3.1	3.2	3.1	1.2	1.2	1.2	1.2	0.84	0.63	0.66	0.58
Selenium_D	mg/L	**0.000057**	0.000050	0.000050	0.000052	0.000050	0.000050	0.000050	0.000050	0.000057	0.000050	**0.000050**	0.000049
Selenium_T	mg/L	0.000057	0.000055	0.000050	0.000062	0.000050	0.000050	0.000050	0.000050	0.000086	0.000050	0.000050	0.000049
Silicon_D	mg/L	4.00	3.30	2.30	2.20	1.40	0.68	0.81	1.30	1.30	1.00	0.86	0.83
Silicon_T	mg/L	4.00	3.40	2.30	2.20	1.40	0.70	0.88	1.30	1.30	1.10	0.91	0.92
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050
Sodium_D	mg/L	**5.8**	**4.4**	**4.9**	4.7	2.2	**1.9**	2.2	2.2	1.6	**1.3**	1.4	1.3
Sodium_T	mg/L	5.8	4.4	4.9	4.9	2.3	1.9	2.3	2.2	1.8	1.3	1.5	1.4
Strontium_D	mg/L	**0.0930**	0.0720	**0.0710**	0.0700	0.0310	**0.0270**	**0.0290**	0.0290	0.0260	**0.0200**	**0.0230**	0.0190
Strontium_T	mg/L	0.0930	0.0740	0.0710	0.0730	0.0310	0.0270	0.0290	0.0300	0.0260	0.0200	0.0230	0.0210
Thallium_D	mg/L	0.000050	0.000050	0.000050	0.000046	0.000050	0.000050	0.000050	0.000050	0.000005	0.000050	0.000050	0.000048
Thallium_T	mg/L	0.000050	0.000050	0.000050	0.000046	0.000050	0.000050	0.000050	0.000050	0.000005	0.000050	0.000050	0.000048
Uranium_D	mg/L	**0.000610**	0.000440	0.000390	0.000310	0.000050	0.000050	0.000050	0.000050	0.000012	0.000050	0.000050	0.000048
Uranium_T	mg/L	0.000610	0.000490	0.000410	0.000310	0.000050	0.000050	0.000050	0.000050	0.000014	0.000050	0.000050	0.000048
Vanadium_T	mg/L	0.00021	0.00022	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.00025	0.00024	0.00025	0.00024
Zinc_D	mg/L	0.00200	**0.00140**	**0.00150**	0.00050	0.00220	**0.00110**	**0.00098**	0.00050	**0.00150**	**0.00150**	0.00380	0.00050
Zinc_T	mg/L	0.00210	0.00140	0.00150	0.00150	0.00530	0.00110	0.00098	0.00140	0.00150	0.00150	0.00730	0.00340

See notes on last page

Table F-2: Water quality model results for upper case

Notes:
AQF1 to AQF38 are surface water sites.
T and pH are used for calculations of guidelines only and are not modeled.
Values highlighted yellow were flaged as discrepancies and resolved by removing outliers (values higher than Q3+1.5xIQR or lower than Q1-1.5xIQR, where Q3 is quartile 3, Q1 is quartile 1, IQR is inter-quartile range (Q3-Q1)) through application of water quality QAQC procedures.
n/v - no value or guideline is not established.
Assumptions:
n/v - no value or guideline is not established.
Assumptions:
If no analytical value was available then a zero value is used for the model, except for total metals, which are equal to dissolved metals.
If dissolved metal was greater than total metal then total metal concentration is used for the model (shown in green font).
If chromium VI was greater than dissolved chromium then dissolved chromium concentration is used for the model (shown in green font).
If free cyanide was greater than WAD cyanide then WAD cyanide is used for the model (shown in green font).
If WAD cyanide was greater than total cyanide then total cyanide is used for the model (shown in green font).

Appendix G REMOVAL FACTORS AND MASS ADDITION IN THE LAKES

Appendix G-1: Removal factors and mass addition in the lakes - Expected Case

Parameter	Gordon Lake Expected Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.74	0.77	0.73	0.72	0.71	0.78	0.90	0.92	0.91	0.89	0.77	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.09	0.72	0.73	0.71	0.69	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.26	0.34	0.23	0.21	0.00	0.00	0.00	0.00	0.02	0.03	0.32	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.67	0.72	0.69	0.69	0.53	0.47	0.48	0.47	0.00	0.00	0.67	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	6.6 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.70	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	12 kg	0 kg
N_Nitrite	0.67	0.71	0.67	0.67	0.11	0.12	0.44	0.37	0.00	0.00	0.69	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.67	0.71	0.67	0.67	0.11	0.12	0.14	0.14	0.00	0.00	0.69	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.51	0.56	0.48	0.47	0.16	0.09	0.17	0.28	0.33	0.37	0.55	0.53	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_F	0.83	0.85	0.82	0.82	0.32	0.20	0.17	0.28	0.33	0.37	0.85	0.84	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_WAD	0.80	0.82	0.79	0.78	0.32	0.20	0.17	0.28	0.33	0.37	0.82	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Hardness	0.13	0.24	0.14	0.15	0.16	0.13	0.04	0.08	0.26	0.25	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.65	0.71	0.69	0.70	0.55	0.47	0.46	0.45	0.44	0.45	0.63	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.41	0.41	0.41	0.41	0.36	0.36	0.87	0.87	0.37	0.37	0.41	0.41	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.99	0.99	0.99	0.85	0.00	0.65	1.00	1.00	1.00	0.99	0.99	0.99	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.99	0.99	0.99	0.00	0.00	0.00	1.00	1.00	1.00	0.99	0.99	0.99	0 kg	0 kg	0 kg	0 kg	7.0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0kg	0 kg
Antimony_D	0.31	0.38	0.28	0.26	0.00	0.03	0.10	0.11	0.12	0.11	0.36	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.25	0.33	0.21	0.20	0.00	0.00	0.00	0.00	0.01	0.01	0.30	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_D	0.19	0.29	0.19	0.00	0.00	0.00	0.13	0.14	0.00	0.00	0.23	0.20	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.18	0.28	0.17	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.22	0.19	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.20	0.28	0.26	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.15	0.17	0.14	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.29	0.37	0.27	0.26	0.00	0.00	0.00	0.02	0.05	0.05	0.33	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.00	0.00	0.00	0.00	0.47	0.36	0.38	0.37	0.38	0.36	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.47	0.36	0.34	0.31	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.74	0.78	0.76	0.77	0.62	0.55	0.56	0.55	0.55	0.53	0.73	0.73	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.74	0.78	0.76	0.77	0.17	0.08	0.55	0.54	0.15	0.13	0.73	0.73	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Calcium_D	0.12	0.24	0.13	0.14	0.08	0.06	0.01	0.04	0.26	0.25	0.14	0.12	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.41	0.47	0.39	0.38	0.05	0.90	0.90	0.90	0.90	0.90	0.45	0.42	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.08	0.18	0.04	0.02	0.00	0.90	0.90	0.90	0.90	0.90	0.15	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.41	0.47	0.39	0.38	0.05	0.04	0.40	0.41	0.00	0.00	0.45	0.42	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.02	0.14	0.01	0.00	0.11	0.08	0.68	0.74	0.77	0.74	0.08	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.02	0.14	0.01	0.00	0.11	0.08	0.68	0.74	0.77	0.74	0.08	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.75	0.80	0.78	0.79	0.63	0.57	0.49	0.48	0.87	0.87	0.73	0.74	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.60	0.67	0.64	0.66	0.63	0.57	0.49	0.48	0.36	0.34	0.57	0.58	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.14	0.27	0.20	0.23	0.00	0.00	0.62	0.58	0.70	0.67	0.10	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.57	0.58	0.56	0.00	0.00	0 kg	0 kg	0 kg	0 kg	250 kg	0 kg	0 kg	0 kg	0 kg	0 kg	30 kg	0 kg
Lead_D	0.83	0.86	0.86	0.87	0.80	0.74	0.74	0.72	0.72	0.71	0.80	0.81	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.48	0.57	0.53	0.55	0.63	0.59	0.00	0.00	0.45	0.41	0.46	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.17	0.27	0.17	0.18	0.26	0.24	0.20	0.22	0.28	0.28	0.18	0.17	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.67	0.84	0.81	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.47	0.79	0.76	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_D	0.49	0.55	0.48	0.48	0.15	0.29	0.38	0.36	0.70	0.67	0.52	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.00	0.12	0.00	0.00	0.00	0.00	0.38	0.36	0.66	0.63	0.04	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.61	0.69	0.67	0.70	0.70	0.63	0.73	0.72	0.55	0.54	0.56	0.58	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.61	0.69	0.67	0.69	0.68	0.59	0.73	0.72	0.48	0.47	0.55	0.57	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.59	0.64	0.58	0.58	0.65	0.63	0.51	0.52	0.53	0.50	0.62	0.61	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.59	0.64	0.58	0.58	0.65	0.63	0.00	0.03	0.28	0.31	0.62	0.61	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.12	0.22	0.11	0.10	0.01	0.10	0.29	0.29	0.29	0.27	0.15	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.70	0.73	0.69	0.68	0.00	0.00	0.81	0.77	0.73	0.69	0.72	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.70	0.73	0.69	0.68	0.00	0.00	0.80	0.76	0.72	0.67	0.72	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.30	0.39	0.29	0.29	0.09	0.08	0.40	0.43	0.33	0.34	0.34	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.30	0.39	0.29	0.29	0.09	0.08	0.40	0.43	0.33	0.34	0.34	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.79	0.82	0.79	0.79	0.00	0.00	0.86	0.82	0.79	0.75	0.81	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.75	0.78	0.75	0.75	0.00	0.00	0.81	0.77	0.73	0.68	0.76	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.29	0.40	0.33	0.35	0.42	0.33	0.25	0.26	0.27	0.27	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.29	0.40	0.33	0.35	0.42	0.33	0.25	0.26	0.27	0.27	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_D	0.24	0.35	0.27	0.28	0.28	0.23	0.15	0.17	0.31	0.30	0.25	0.24	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.04	0.18	0.09	0.11	0.20	0.10	0.03	0.05	0.07	0.07	0.02	0.02	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.31	0.38	0.28	0.26	0.00	0.03	0.10	0.11	0.12	0.11	0.36	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.94	0.95	0.95	0.95	0.93	0.91	0.91	0.90	0.89	0.89	0.92	0.93	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.50	0.50	0.50	0.95	0.93	0.90	0.89	0.88	0.88	0.87	0.50	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.62	0.66	0.61	0.60	0.21	0.24	0.41	0.43	0.00	0.00	0.65	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.70	0.75	0.73	0.74	0.77	0.70	0.42	0.44	0.73	0.71	0.69	0.69	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.70	0.75	0.73	0.74	0.77	0.70	0.31	0.44	0.72	0.70	0.69	0.69	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-1: Removal factors and mass addition in the lakes - Expected Case

Parameter	Farley Lake - West Expected Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.27	0.36	0.80	0.80	0.67	0.65	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	2936 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	83347 kg	0 kg
Bromide	0.11	0.15	0.14	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1.1 kg	0 kg
Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	472 kg	0 kg
Fluoride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	13 kg	0 kg
Sulfate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	28103 kg	0 kg
Phosphorus_T	0.50	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0 kg	0 kg	0 kg	0 kg	14 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.41	0.40	0.64	0.64	0.23	0.20	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	13 kg	0 kg
N_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	15kg	15 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	20 kg	16 kg	50 kg	0 kg	0 kg	0 kg
Cyanide_T	0.25	0.29	0.27	0.26	0.14	0.13	0.00	0.00	0.23	0.25	0.29	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_F	0.55	0.57	0.56	0.55	0.40	0.39	0.26	0.29	0.46	0.47	0.57	0.56	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_WAD	0.43	0.46	0.45	0.44	0.24	0.22	0.03	0.06	0.29	0.32	0.45	0.44	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Hardness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	93615 kg	0 kg
Radium_226	0.23	0.29	0.29	0.30	0.00	0.00	0.18	0.19	0.14	0.13	0.23	0.23	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.93	0.93	0.93	0.93	0.87	0.87	0.93	0.93	0.93	0.93	0.93	0.93	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.89	0.90	0.90	0.90	0.76	0.78	0.92	0.91	0.85	0.84	0.84	0.89	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.83	0.84	0.84	0.84	0.76	0.78	0.86	0.86	0.85	0.84	0.84	0.84	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.03	0.08	0.06	0.05	0.00	0.00	0.07	0.09	0.20	0.19	0.07	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00020 kg	0 kg
Antimony_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.015 kg	0 kg
Arsenic_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1.0 kg	0 kg
Arsenic_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1.0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	12 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	12 kg	0 kg
Beryllium_T	0.01	0.05	0.04	0.03	0.00	0.00	0.04	0.06	0.17	0.16	0.05	0.03	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0037 kg	0 kg
Boron_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	12 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	13 kg	0 kg
Cadmium_D	0.27	0.32	0.33	0.34	0.15	0.14	0.29	0.29	0.38	0.37	0.27	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.27	0.32	0.33	0.34	0.15	0.14	0.29	0.29	0.38	0.37	0.27	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Calcium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	25582 kg	0 kg
Chromium_D	0.67	0.68	0.68	0.69	0.57	0.57	0.62	0.62	0.77	0.76	0.68	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.61	0.63	0.62	0.62	0.44	0.49	0.59	0.59	0.36	0.33	0.63	0.62	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.67	0.68	0.68	0.69	0.57	0.57	0.62	0.62	0.77	0.76	0.68	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.31	0.35	0.34	0.34	0.30	0.27	0.41	0.43	0.51	0.51	0.35	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.30	0.33	0.32	0.34	0.30	0.27	0.41	0.43	0.51	0.51	0.33	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.24 kg	0 kg
Copper_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.30 kg	0 kg
Iron_D	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0 kg	0 kg	0 kg	0 kg	2000 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_D	0.54	0.57	0.57	0.59	0.18	0.15	0.27	0.27	0.56	0.56	0.53	0.53	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.54	0.57	0.57	0.59	0.00	0.00	0.00	0.00	0.56	0.56	0.53	0.53	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	6373 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	219 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	219 kg	0 kg
Mercury_D	0.49	0.52	0.51	0.50	0.05	0.09	0.38	0.38	0.58	0.56	0.52	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.46	0.49	0.48	0.48	0.01	0.08	0.38	0.38	0.58	0.56	0.49	0.48	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.060 kg	0 kg
Molybdenum_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.073 kg	0 kg
Nickel_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.17 kg	0 kg
Nickel_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.27 kg	0 kg
Potassium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	3104 kg	0 kg
Selenium_D	0.20	0.20	0.20	0.31	0.21	0.24	0.41	0.44	0.37	0.34	0.20	0.20	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.20	0.20	0.20	0.31	0.12	0.16	0.41	0.44	0.32	0.20	0.20	0.20	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	365 kg	0 kg
Silicon_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	368 kg	0 kg
Silver_D	0.36	0.39	0.38	0.37	0.21	0.28	0.32	0.32	0.31	0.28	0.39	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.27	0.31	0.30	0.29	0.11	0.18	0.22	0.22	0.20	0.17	0.30	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	3716 kg	0 kg
Sodium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	4239 kg	0 kg
Strontium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	65 kg	0 kg
Strontium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	70 kg	0 kg
Thallium_D	0.00	0.05	0.03	0.02	0.00	0.00	0.24	0.25	0.47	0.46	0.03	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.00	0.03	0.02	0.01	0.00	0.00	0.22	0.23	0.45	0.45	0.01	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.18 kg	0 kg
Uranium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.18 kg	0 kg
Vanadium_T	0.59	0.61	0.60	0.61	0.52	0.53	0.29	0.28	0.28	0.26	0.61	0.60	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.46	0.50	0.50	0.51	0.44	0.40	0.35	0.39	0.66	0.66	0.47	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.46	0.50	0.50	0.51	0.44	0.40	0.35	0.39	0.46	0.46	0.47	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-1: Removal factors and mass addition in the lakes - Expected Case

Parameter	Farley Lake - East Expected Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	6.1E-06 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.053 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1100 kg	0 kg
Bromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.095 kg	0 kg
Chloride	0.00	0.06	0.00	0.00	0.01	0.30	0.42	0.39	0.37	0.35	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.2 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.2 kg	0.2 kg	0 kg	0 kg	0.40 kg	0.2 kg
Sulfate	0.41	0.49	0.45	0.37	0.00	0.38	0.15	0.10	0.26	0.26	0.39	0.42	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	00 kg	0 kg
Phosphorus_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.8 kg	0.4 kg	0.4kg	0.4 kg	5 kg	5 kg	0 kg	0 kg	0 kg	0 kg	0.70 kg	0.8 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20 kg	10 kg	10 kg	10 kg	0 kg	0 kg	0 kg	0 kg	10 kg	10 kg	50 kg	20 kg
N_Nitrite	0.80	0.81	0.79	0.77	0.86	0.89	0.68	0.72	0.46	0.49	0.80	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.80	0.81	0.79	0.77	0.30	0.60	0.49	0.45	0.43	0.41	0.80	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.038 kg	0 kg
Cyanide_F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.027 kg	0 kg
Cyanide_WAD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.027 kg	0 kg
Hardness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.063 kg	0 kg
Radium_226	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.033 kg	0 kg
TSS	0.90	0.90	0.90	0.90	0.82	0.82	0.92	0.92	0.93	0.93	0.90	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.48	0.60	0.62	0.62	0.00	0.16	0.70	0.67	0.64	0.64	0.49	0.42	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.06	0.27	0.28	0.30	0.00	0.16	0.44	0.35	0.16	0.19	0.24	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0020 kg	0 kg
Arsenic_D	0.38	0.45	0.39	0.31	0.00	0.25	0.20	0.14	0.33	0.30	0.35	0.40	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.38	0.45	0.39	0.31	0.00	0.24	0.07	0.00	0.24	0.21	0.35	0.40	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.17 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.28 kg	0 kg
Beryllium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00034 kg	0 kg
Boron_D	0.26	0.35	0.29	0.24	0.00	0.14	0.01	0.00	0.09	0.06	0.30	0.29	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.23	0.38	0.38	0.39	0.00	0.00	0.20	0.20	0.18	0.15	0.32	0.19	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00047 kg	0 kg
Calcium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.021 kg	0 kg
Chromium_D	0.26	0.39	0.37	0.36	0.00	0.00	0.37	0.25	0.21	0.19	0.38	0.26	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.26	0.39	0.37	0.36	0.00	0.00	0.37	0.25	0.21	0.19	0.38	0.26	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0020 kg	0 kg
Cobalt_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00015 kg	0 kg
Cobalt_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0012 kg	0 kg
Copper_D	0.82	0.85	0.85	0.85	0.16	0.35	0.43	0.36	0.68	0.66	0.82	0.82	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.65	0.71	0.70	0.69	0.00	0.15	0.43	0.36	0.12	0.16	0.66	0.64	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	13 kg	0 kg
Iron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20 kg	20 kg	10 kg	10 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	70 kg	40 kg
Lead_D	0.54	0.64	0.64	0.65	0.00	0.00	0.00	0.00	0.41	0.39	0.56	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.54	0.64	0.64	0.65	0.00	0.00	0.00	0.00	0.41	0.39	0.56	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00097 kg	0 kg
Magnesium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	50 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	2.0 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	2.0 kg	0 kg
Mercury_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	1E-05 kg	1E-05 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.000029 kg	2.0E-05 kg
Mercury_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9E-05 kg	3E-05 kg	3E-05 kg	3E-05 kg	9E-05 kg	5E-05 kg	0 kg	0 kg	0 kg	0 kg	0.00009 kg	9.0E-05 kg
Molybdenum_D	0.68	0.75	0.76	0.76	0.00	0.13	0.50	0.52	0.37	0.34	0.70	0.66	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.58	0.67	0.68	0.68	0.00	0.13	0.45	0.47	0.37	0.34	0.62	0.56	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.50	0.56	0.52	0.49	0.08	0.36	0.24	0.23	0.22	0.19	0.57	0.52	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.47	0.53	0.49	0.45	0.08	0.36	0.17	0.15	0.13	0.10	0.52	0.48	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	51 kg	0 kg
Selenium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0029 kg	0 kg
Selenium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0029 kg	0 kg
Silicon_D	0.00	0.00	0.00	0.00	0.00	0.27	0.51	0.50	0.14	0.17	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.00	0.00	0.00	0.00	0.00	0.17	0.49	0.49	0.05	0.08	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00026 kg	0 kg
Silver_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00027 kg	0 kg
Sodium_D	0.17	0.28	0.22	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.19	0.18	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	40 kg	0 kg
Strontium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.16 kg	0 kg
Strontium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.31 kg	0 kg
Thallium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00014 kg	0 kg
Thallium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.00014 kg	0 kg
Uranium_D	0.68	0.74	0.74	0.73	0.54	0.65	0.76	0.75	0.74	0.74	0.62	0.65	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.64	0.72	0.72	0.70	0.40	0.53	0.64	0.61	0.73	0.73	0.57	0.61	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0021 kg	0 kg
Zinc_D	0.58	0.67	0.68	0.70	0.45	0.52	0.09	0.05	0.31	0.32	0.61	0.54	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.21	0.38	0.39	0.43	0.45	0.52	0.00	0.00	0.00	0.00	0.29	0.16	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-1: Removal factors and mass addition in the lakes - Expected Case

Parameter	Swede Lake Expected Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	8.5E-05 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.15	0.14	0.48	0.48	0.48	0.47	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Alkalinity_T	0.01	0.05	0.05	0.05	0.11	0.11	0.13	0.14	0.12	0.11	0.00	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.08	0.12	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.09	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	177 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	43 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.29	0.32	0.32	0.31	0.33	0.34	0.35	0.37	0.35	0.34	0.29	0.29	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	0.11	0.40	0.80	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	3 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.81	0.82	0.83	0.83	0.88	0.88	0.68	0.67	0.82	0.82	0.80	0.81	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.93 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	144 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.28	0.31	0.31	0.30	0.00	0.00	0.00	0.00	0.18	0.18	0.29	0.29	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_F	0.48	0.50	0.49	0.48	0.15	0.14	0.00	0.00	0.18	0.18	0.50	0.49	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_WAD	0.39	0.42	0.41	0.40	0.15	0.14	0.00	0.00	0.18	0.18	0.41	0.40	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Hardness	0.09	0.13	0.13	0.12	0.10	0.10	0.18	0.19	0.16	0.15	0.08	0.09	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.00	0.00	0.00	0.00	0.02	0.02	0.10	0.11	0.06	0.06	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.44	0.47	0.47	0.47	0.04	0.06	0.13	0.13	0.00	0.00	0.45	0.44	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.80	0.80	0.80	0.27	0.00	0.00	0.25	0.24	0.19	0.50	0.80	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.80	0.80	0 kg	0 kg	0 kg	0 kg	40 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.07	0.11	0.10	0.09	0.00	0.00	0.08	0.09	0.10	0.09	0.09	0.08	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.070 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_D	0.50	0.50	0.47	0.47	0.41	0.41	0.34	0.36	0.70	0.70	0.50	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.50	0.50	0.47	0.47	0.41	0.41	0.00	0.00	0.70	0.70	0.50	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.07	0.11	0.11	0.10	0.20	0.20	0.14	0.15	0.14	0.13	0.07	0.07	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.07	0.11	0.11	0.10	0.10	0.10	0.14	0.15	0.13	0.12	0.07	0.07	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.05	0.09	0.08	0.08	0.00	0.00	0.04	0.06	0.07	0.07	0.06	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.06	0.13	0.14	0.15	0.56	0.55	0.55	0.55	0.54	0.52	0.00	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.06	0.13	0.14	0.15	0.56	0.55	0.55	0.55	0.54	0.52	0.00	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.21	0.24	0.24	0.23	0.00	0.00	0.06	0.07	0.23	0.22	0.22	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.21	0.24	0.24	0.23	0.00	0.00	0.00	0.00	0.23	0.22	0.22	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Calcium_D	0.10	0.15	0.14	0.14	0.12	0.12	0.19	0.20	0.21	0.20	0.10	0.10	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.90	0.90	0.90	0.90	0.00	0.00	0.13	0.12	0.42	0.40	0.90	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.44	0.46	0.45	0.44	0.00	0.00	0.13	0.12	0.42	0.40	0.46	0.45	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.90	0 kg	0 kg	0 kg	0 kg	0.21 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.09	0.13	0.13	0.12	0.00	0.00	0.09	0.10	0.11	0.11	0.10	0.10	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.09	0.13	0.13	0.12	0.00	0.00	0.09	0.10	0.11	0.11	0.10	0.10	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.57 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.3 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.90	0.90	0.90	0.71	0.00	0.00	0.69	0.70	0.68	0.67	0.90	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.90	0.90	0.90	0.60	0.00	0.00	0.60	0.60	0.60	0.60	0.90	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_D	0.32	0.34	0.34	0.33	0.00	0.00	0.22	0.24	0.26	0.24	0.34	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.32	0.34	0.34	0.33	0.00	0.00	0.22	0.24	0.26	0.24	0.34	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.01	0.06	0.06	0.05	0.07	0.07	0.13	0.14	0.08	0.07	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.96	0.97	0.97	0.97	0.39	0.39	0.95	0.95	0.97	0.97	0.96	0.96	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_T	0.95	0.95	0.95	0.95	0.15	0.16	0.78	0.79	0.86	0.85	0.95	0.95	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_D	0.49	0.51	0.50	0.50	0.00	0.00	0.16	0.17	0.31	0.29	0.50	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.36	0.39	0.38	0.38	0.00	0.00	0.16	0.17	0.31	0.29	0.37	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.5 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.6 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.24	0.27	0.26	0.26	0.09	0.09	0.00	0.00	0.00	0.00	0.26	0.25	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.24	0.27	0.26	0.26	0.09	0.09	0.00	0.00	0.00	0.00	0.26	0.25	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.12	0.16	0.16	0.16	0.09	0.09	0.18	0.19	0.19	0.18	0.12	0.12	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.25	0.28	0.28	0.27	0.14	0.16	0.25	0.26	0.28	0.27	0.26	0.26	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.14	0.18	0.17	0.16	0.10	0.13	0.25	0.26	0.15	0.14	0.16	0.15	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	299 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	83 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.34	0.37	0.36	0.35	0.00	0.00	0.31	0.31	0.30	0.28	0.36	0.35	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.34	0.37	0.36	0.35	0.00	0.00	0.31	0.31	0.30	0.28	0.36	0.35	0 kg	0 kg	0 kg	0 kg	5.7E-05 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.04	0.09	0.08	0.07	0.09	0.09	0.14	0.16	0.07	0.06	0.04	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.04	0.04	0.03	0.08	0.08	0.09	0.11	0.07	0.06	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_D	0.11	0.15	0.15	0.15	0.15	0.15	0.16	0.17	0.13	0.12	0.10	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.08	0.12	0.12	0.12	0.12	0.12	0.16	0.17	0.12	0.11	0.07	0.08	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.02	0.07	0.06	0.05	0.00	0.00	0.16	0.18	0.18	0.18	0.04	0.03	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.02	0.06	0.05	0.05	0.00	0.00	0.16	0.17	0.18	0.17	0.03	0.03	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.48	0.50	0.50	0.50	0.41	0.42	0.40	0.41	0.43	0.41	0.47	0.47	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.48	0.50	0.50	0.50	0.41	0.42	0.40	0.41	0.43	0.41	0.47	0.47	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.22 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.9 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	11 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-1: Removal factors and mass addition in the lakes - Expected Case

Parameter	Ellystan Lake Expected Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.00025 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	15079 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.31	0.30	0.10	0.12	0.09	0.09	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.06	0.08	0.08	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	814 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.00	0.03	0.03	0.02	0.04	0.03	0.00	0.00	0.00	0.00	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.18	0.21	0.21	0.21	0.43	0.41	0.22	0.24	0.21	0.21	0.18	0.18	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.95	0 kg	0 kg	0 kg	0 kg	80 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	40 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrite	0.07	0.09	0.10	0.10	0.00	0.00	0.05	0.09	0.27	0.26	0.06	0.07	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	390 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	3.8 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.80 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_WAD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.83 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Hardness	0.00	0.00	0.00	0.00	0.28	0.27	0.13	0.14	0.11	0.12	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.09	0.11	0.10	0.10	0.06	0.07	0.04	0.05	0.04	0.03	0.09	0.09	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	19843 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.90	0.90	0.90	0.90	0.00	0.00	0.95	0.95	0.90	0.90	0.90	0.90	0 kg	0 kg	0 kg	0 kg	28 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.90	0.90	0.90	0.90	0.00	0.00	0.95	0.95	0.90	0.90	0.90	0.90	0 kg	0 kg	0 kg	0 kg	550 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.16	0.18	0.18	0.18	0.07	0.08	0.16	0.17	0.20	0.20	0.17	0.17	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.16	0.18	0.18	0.18	0.07	0.08	0.16	0.17	0.20	0.20	0.17	0.17	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.13 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.66 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	8.3 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.04	0.06	0.06	0.05	0.00	0.00	0.04	0.06	0.10	0.09	0.05	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.00	0.00	0.00	0.00	0.21	0.20	0.21	0.21	0.22	0.21	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	18 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.12	0.14	0.14	0.13	0.00	0.00	0.03	0.05	0.17	0.17	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.12	0.14	0.14	0.13	0.00	0.00	0.00	0.00	0.17	0.17	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Calcium_D	0.00	0.00	0.00	0.00	0.28	0.27	0.16	0.18	0.11	0.11	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.15 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.00	0.00	0.00	0.00	0.34	0.37	0.10	0.09	0.18	0.17	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.58 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.05	0.07	0.06	0.06	0.00	0.00	0.05	0.06	0.10	0.10	0.06	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.0018 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.29	0.31	0.31	0.30	0.10	0.12	0.04	0.05	0.34	0.33	0.30	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.29	0.31	0.31	0.30	0.10	0.12	0.04	0.05	0.34	0.33	0.30	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.30	0.00	0.00	0.00	0.00	0.00	0.95	0.95	0.90	0.90	0.50	0.50	0 kg	0 kg	0 kg	0 kg	2000 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.30	0.00	0.00	0.00	0.00	0.00	0.95	0.95	0.90	0.90	0.50	0.50	0 kg	0 kg	0 kg	0 kg	2000 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_D	0.31	0.32	0.31	0.31	0.00	0.00	0.40	0.38	0.52	0.50	0.34	0.32	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.31	0.32	0.31	0.31	0.00	0.00	0.40	0.38	0.52	0.50	0.34	0.32	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.00	0.00	0.00	0.00	0.30	0.28	0.09	0.11	0.07	0.07	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	226 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	296 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_D	0.37	0.39	0.38	0.38	0.00	0.00	0.00	0.00	0.20	0.19	0.39	0.38	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.0016 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.28	0.30	0.30	0.29	0.43	0.42	0.18	0.20	0.25	0.26	0.27	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.28	0.30	0.30	0.29	0.41	0.39	0.13	0.15	0.22	0.23	0.27	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.08	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.38 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.00	0.01	0.01	0.01	0.19	0.19	0.25	0.26	0.19	0.19	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.19 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.19 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.02	0.04	0.04	0.04	0.12	0.10	0.49	0.49	0.25	0.26	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.02	0.04	0.04	0.04	0.00	0.00	0.40	0.40	0.17	0.18	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.016 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.016 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.00	0.00	0.00	0.00	0.23	0.21	0.07	0.09	0.02	0.02	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.00	0.00	0.00	0.23	0.21	0.03	0.05	0.02	0.02	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_D	0.00	0.02	0.02	0.02	0.28	0.26	0.10	0.12	0.13	0.13	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.00	0.00	0.00	0.00	0.24	0.22	0.06	0.08	0.05	0.06	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.01	0.03	0.02	0.02	0.00	0.00	0.12	0.13	0.21	0.20	0.02	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.01	0.03	0.02	0.02	0.00	0.00	0.12	0.13	0.21	0.20	0.02	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.10	0.13	0.12	0.12	0.01	0.02	0.03	0.05	0.07	0.07	0.11	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.10	0.13	0.12	0.12	0.00	0.01	0.00	0.00	0.06	0.06	0.11	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.82 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.00	0.00	0.00	0.00	0.58	0.57	0.57	0.57	0.57	0.57	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.00	0.00	0.00	0.00	0.58	0.57	0.57	0.57	0.57	0.57	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-2: Removal factors and mass addition in the lakes - Upper Case

Parameter	Gordon Lake Dry Upper Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.74	0.77	0.73	0.72	0.71	0.78	0.90	0.92	0.91	0.89	0.77	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.09	0.72	0.73	0.71	0.69	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.26	0.34	0.23	0.21	0.00	0.00	0.00	0.00	0.02	0.03	0.32	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.67	0.72	0.69	0.69	0.53	0.47	0.48	0.47	0.00	0.00	0.67	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.84	0.86	0.85	0.85	0.88	0.86	0.87	0.87	0.83	0.83	0.83	0.83	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.50	0.50	0.50	0.50	0.00	0.00	0.90	0.50	0.50	0.50	0.50	0.50	0 kg	0 kg	0 kg	0 kg	6.6 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.70	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	12 kg	0 kg
N_Nitrite	0.67	0.71	0.67	0.67	0.11	0.12	0.44	0.37	0.00	0.00	0.69	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.67	0.71	0.67	0.67	0.11	0.12	0.14	0.14	0.00	0.00	0.69	0.67	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.51	0.56	0.48	0.47	0.16	0.09	0.17	0.28	0.33	0.37	0.55	0.53	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_F	0.83	0.85	0.82	0.82	0.32	0.20	0.17	0.28	0.33	0.37	0.85	0.84	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_WAD	0.80	0.82	0.79	0.78	0.32	0.20	0.17	0.28	0.33	0.37	0.82	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Hardness	0.13	0.24	0.14	0.15	0.16	0.13	0.04	0.08	0.26	0.25	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.65	0.71	0.69	0.70	0.55	0.47	0.46	0.45	0.44	0.45	0.63	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.41	0.41	0.41	0.41	0.36	0.36	0.87	0.87	0.37	0.37	0.41	0.41	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.95	0.95	0.95	0.85	0.00	0.65	0.95	0.95	0.95	0.95	0.99	0.99	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.95	0.95	0.95	0.00	0.00	0.00	0.95	0.95	0.95	0.95	0.99	0.99	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.31	0.38	0.28	0.26	0.00	0.03	0.10	0.11	0.12	0.11	0.36	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.25	0.33	0.21	0.20	0.00	0.00	0.00	0.00	0.01	0.01	0.30	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_D	0.19	0.29	0.19	0.00	0.00	0.00	0.13	0.14	0.00	0.00	0.23	0.20	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.18	0.28	0.17	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.22	0.19	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.20	0.28	0.26	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.15	0.17	0.14	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.29	0.37	0.27	0.26	0.00	0.00	0.00	0.02	0.05	0.05	0.33	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.00	0.00	0.00	0.00	0.47	0.36	0.38	0.37	0.38	0.36	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.47	0.36	0.34	0.31	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.74	0.78	0.76	0.77	0.62	0.55	0.56	0.55	0.55	0.53	0.73	0.73	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.74	0.78	0.76	0.77	0.17	0.08	0.55	0.54	0.15	0.13	0.73	0.73	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Calcium_D	0.12	0.24	0.13	0.14	0.08	0.06	0.01	0.04	0.26	0.25	0.14	0.12	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.67	0.71	0.67	0.38	0.05	0.90	0.90	0.90	0.90	0.90	0.69	0.68	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.67	0.71	0.67	0.02	0.00	0.90	0.90	0.90	0.90	0.90	0.69	0.68	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.41	0.47	0.39	0.38	0.05	0.04	0.40	0.41	0.00	0.00	0.45	0.42	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.02	0.14	0.01	0.00	0.11	0.08	0.68	0.74	0.77	0.74	0.08	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.02	0.14	0.01	0.00	0.11	0.08	0.68	0.74	0.77	0.74	0.08	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.75	0.80	0.78	0.79	0.63	0.57	0.49	0.48	0.87	0.87	0.73	0.74	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.60	0.67	0.64	0.66	0.63	0.57	0.49	0.48	0.36	0.34	0.57	0.58	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.14	0.27	0.20	0.23	0.00	0.00	0.62	0.58	0.70	0.67	0.10	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.57	0.58	0.56	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	300 kg	0 kg
Lead_D	0.83	0.86	0.86	0.87	0.80	0.74	0.74	0.72	0.72	0.71	0.80	0.81	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.48	0.57	0.53	0.55	0.63	0.59	0.00	0.00	0.45	0.41	0.46	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.17	0.27	0.17	0.18	0.26	0.24	0.20	0.22	0.28	0.28	0.18	0.17	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.98	0.98	0.98	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	200 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.47	0.79	0.76	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	200 kg	0 kg
Mercury_D	0.49	0.55	0.48	0.48	0.15	0.29	0.38	0.36	0.70	0.67	0.52	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.00	0.12	0.00	0.00	0.00	0.00	0.38	0.36	0.66	0.63	0.04	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.61	0.69	0.67	0.70	0.70	0.63	0.73	0.72	0.55	0.54	0.56	0.58	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.61	0.69	0.67	0.69	0.68	0.59	0.73	0.72	0.48	0.47	0.55	0.57	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.59	0.64	0.58	0.58	0.65	0.63	0.51	0.52	0.53	0.50	0.62	0.61	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.59	0.64	0.58	0.58	0.65	0.63	0.00	0.03	0.28	0.31	0.62	0.61	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.12	0.22	0.11	0.10	0.01	0.10	0.29	0.29	0.29	0.27	0.15	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.70	0.73	0.69	0.68	0.00	0.00	0.81	0.77	0.73	0.69	0.72	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.70	0.73	0.69	0.68	0.00	0.00	0.80	0.76	0.72	0.67	0.72	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.30	0.39	0.29	0.29	0.09	0.08	0.40	0.43	0.33	0.34	0.34	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.30	0.39	0.29	0.29	0.09	0.08	0.40	0.43	0.33	0.34	0.34	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.79	0.82	0.79	0.79	0.00	0.00	0.86	0.82	0.79	0.75	0.81	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.75	0.78	0.75	0.75	0.00	0.00	0.81	0.77	0.73	0.68	0.76	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.29	0.40	0.33	0.35	0.42	0.33	0.25	0.26	0.27	0.27	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.29	0.40	0.33	0.35	0.42	0.33	0.25	0.26	0.27	0.27	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_D	0.24	0.35	0.27	0.28	0.28	0.23	0.15	0.17	0.31	0.30	0.25	0.24	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.04	0.18	0.09	0.11	0.20	0.10	0.03	0.05	0.07	0.07	0.02	0.02	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.31	0.38	0.28	0.26	0.00	0.03	0.10	0.11	0.12	0.11	0.36	0.33	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.24	0.33	0.21	0.20	0.00	0.00	0.00	0.00	0.01	0.01	0.30	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.94	0.95	0.95	0.95	0.93	0.91	0.91	0.90	0.89	0.89	0.92	0.93	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.93	0.95	0.95	0.95	0.93	0.90	0.89	0.88	0.88	0.87	0.91	0.92	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.62	0.66	0.61	0.60	0.21	0.24	0.41	0.43	0.00	0.00	0.65	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.70	0.75	0.73	0.74	0.77	0.70	0.42	0.44	0.73	0.71	0.69	0.69	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.70	0.75	0.73	0.74	0.77	0.70	0.31	0.44	0.72	0.70	0.69	0.69	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-2: Removal factors and mass addition in the lakes - Upper Case

Parameter	Farley Lake - West Dry Upper Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.28	0.33	0.84	0.84	0.58	0.56	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	5.2E-06 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.60	0.62	0.61	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1614 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.19	0.23	0.23	0.22	0.00	0.00	0.01	0.04	0.05	0.05	0.22	0.20	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.08	0.13	0.13	0.13	0.07	0.07	0.08	0.10	0.08	0.08	0.09	0.08	0 kg	0 kg	0 kg	0 kg	1.5 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.02	0.10	0.11	0.13	0.00	0.00	0.00	0.00	0.06	0.05	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.98	0.98	0.98	0.98	0.00	0.50	0.70	0.70	0.40	0.50	0.98	0.98	0 kg	0 kg	0 kg	0 kg	5 kg	0 kg	0 kg	0 kg	0.12 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.34	0.33	0.70	0.70	0.48	0.47	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	20 kg	0 kg	10 kg	0 kg	0 kg	0 kg
N_Nitrite	0.99	0.99	0.99	0.99	0.70	0.70	0.20	0.20	0.00	0.00	0.99	0.99	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	26 kg	0 kg
Cyanide_T	0.36	0.39	0.38	0.37	0.51	0.50	0.09	0.13	0.55	0.57	0.39	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.045 kg	0 kg
Cyanide_F	0.79	0.80	0.80	0.79	0.71	0.71	0.48	0.51	0.75	0.75	0.79	0.79	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.018 kg	0 kg
Cyanide_WAD	0.70	0.71	0.71	0.70	0.59	0.57	0.22	0.25	0.62	0.63	0.70	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.018 kg	0 kg
Hardness	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.63	0.66	0.67	0.68	0.50	0.49	0.55	0.55	0.56	0.55	0.62	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.93	0.93	0.93	0.93	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.95	0.96	0.96	0.96	0.40	0.81	0.95	0.95	0.96	0.96	0.95	0.95	0.90 kg	0.90 kg	0.90 kg	0.90 kg	0.30 kg	0.30 kg	0.70 kg	0.70 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.95	0.95	0.95	0.95	0.40	0.75	0.95	0.95	0.95	0.95	0.95	0.95	0.90 kg	0.90 kg	0.90 kg	0.90 kg	0.30 kg	0.30 kg	0.70 kg	0.70 kg	0 kg	0 kg	0.90 kg	0.90 kg
Antimony_D	0.21	0.25	0.25	0.24	0.00	0.04	0.06	0.08	0.14	0.13	0.24	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0055 kg	0 kg
Arsenic_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.24	0.28	0.28	0.27	0.04	0.05	0.07	0.09	0.15	0.15	0.26	0.25	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.73	0.75	0.75	0.76	0.67	0.67	0.67	0.66	0.67	0.67	0.72	0.72	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.73	0.75	0.75	0.76	0.67	0.67	0.67	0.66	0.67	0.67	0.72	0.72	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0022 kg	0 kg
Calcium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.83	0.84	0.84	0.84	0.63	0.66	0.81	0.81	0.88	0.88	0.83	0.83	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.83	0.84	0.84	0.84	0.63	0.66	0.81	0.81	0.60	0.59	0.83	0.83	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.65	0.67	0.67	0.68	0.58	0.58	0.61	0.61	0.88	0.88	0.66	0.65	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.65	0.67	0.67	0.67	0.63	0.62	0.62	0.63	0.66	0.67	0.66	0.65	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.65	0.67	0.67	0.67	0.63	0.62	0.62	0.63	0.66	0.67	0.66	0.65	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.00	0.00	0.00	0.00	0.10	0.10	0.20	0.20	0.69	0.69	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.00	0.00	0.00	0.00	0.10	0.10	0.20	0.20	0.69	0.69	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.00 kg	0.00 kg	0.00 kg	0.00 kg	120 kg	0.00 kg	0.00 kg	0.00 kg	0.00 kg	0.00 kg	0 kg	0.00 kg
Iron_T	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.00 kg	0.00 kg	0.00 kg	0.00 kg	120 kg	0.00 kg	0.00 kg	0.00 kg	0.00 kg	0.00 kg	0 kg	0.00 kg
Lead_D	0.88	0.89	0.89	0.89	0.80	0.79	0.79	0.79	0.85	0.85	0.87	0.87	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.88	0.89	0.89	0.89	0.14	0.11	0.00	0.00	0.85	0.85	0.87	0.87	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	50 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	90 kg	0 kg
Mercury_D	0.65	0.67	0.66	0.66	0.21	0.22	0.48	0.49	0.71	0.70	0.65	0.65	0 kg	0 kg	0 kg	0 kg	0.00096 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.63	0.65	0.65	0.65	0.07	0.10	0.48	0.49	0.71	0.70	0.64	0.63	0 kg	0 kg	0 kg	0 kg	0.00096 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.50	0.54	0.56	0.56	0.51	0.49	0.45	0.45	0.49	0.48	0.48	0.49	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.50	0.54	0.55	0.56	0.49	0.48	0.45	0.45	0.49	0.48	0.48	0.49	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.65	0.66	0.66	0.66	0.61	0.62	0.63	0.65	0.64	0.63	0.66	0.65	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.65	0.66	0.66	0.66	0.56	0.57	0.63	0.64	0.56	0.55	0.66	0.65	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.08	0.13	0.13	0.14	0.05	0.05	0.35	0.36	0.39	0.39	0.09	0.08	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.07	0.12	0.12	0.13	0.02	0.01	0.34	0.35	0.39	0.38	0.08	0.07	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.76	0.77	0.77	0.77	0.71	0.74	0.75	0.74	0.74	0.72	0.77	0.76	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.72	0.73	0.73	0.73	0.65	0.67	0.68	0.68	0.68	0.67	0.72	0.72	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	40 kg	0 kg
Strontium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.21	0.25	0.24	0.23	0.00	0.03	0.06	0.08	0.16	0.15	0.23	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.18	0.22	0.21	0.20	0.00	0.00	0.00	0.02	0.11	0.11	0.20	0.19	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.33	0.40	0.42	0.44	0.46	0.43	0.50	0.50	0.60	0.60	0.28	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.33	0.40	0.42	0.44	0.38	0.35	0.50	0.50	0.60	0.60	0.28	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.62	0.64	0.64	0.65	0.54	0.54	0.48	0.48	0.47	0.47	0.63	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.73	0.75	0.75	0.76	0.78	0.77	0.75	0.76	0.90	0.90	0.73	0.73	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.73	0.75	0.75	0.76	0.78	0.77	0.75	0.76	0.77	0.76	0.73	0.73	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-2: Removal factors and mass addition in the lakes - Upper Case

Parameter	Farley Lake - East Dry Upper Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	5.2E-06 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1614 kg	0 kg
Alkalinity_T	0.07	0.18	0.07	0.04	0.00	0.12	0.06	0.05	0.09	0.09	0.02	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.20	0.27	0.14	0.13	0.00	0.00	0.00	0.04	0.05	0.04	0.29	0.24	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.08	0.21	0.12	0.12	0.21	0.31	0.63	0.62	0.62	0.62	0.02	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.36	0.47	0.43	0.44	0.26	0.28	0.29	0.27	0.37	0.38	0.23	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20 kg	5 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	20 kg	20 kg	65 kg	20 kg
N_Nitrite	0.76	0.79	0.76	0.76	0.81	0.82	0.47	0.47	0.34	0.33	0.75	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.76	0.79	0.76	0.76	0.30	0.40	0.38	0.35	0.34	0.33	0.75	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.045 kg	0 kg
Cyanide_F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.018 kg	0 kg
Cyanide_WAD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.018 kg	0 kg
Hardness	0.13	0.24	0.15	0.13	0.00	0.00	0.15	0.13	0.17	0.17	0.06	0.11	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.83	0.83	0.83	0.83	0.63	0.63	0.88	0.88	0.93	0.93	0.83	0.83	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.81	0.85	0.85	0.87	0.20	0.06	0.83	0.82	0.84	0.84	0.74	0.77	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.8 kg	0 kg	0 kg	0 kg	4 kg	0 kg	0 kg	0 kg
Antimony_D	0.20	0.27	0.13	0.12	0.11	0.33	0.28	0.18	0.12	0.07	0.29	0.24	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0055 kg	0 kg
Arsenic_D	0.28	0.37	0.29	0.26	0.09	0.17	0.06	0.03	0.30	0.29	0.11	0.25	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.24	0.34	0.24	0.22	0.08	0.15	0.00	0.00	0.27	0.26	0.06	0.20	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.24	0.32	0.21	0.20	0.00	0.00	0.02	0.06	0.07	0.06	0.30	0.26	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.18	0.27	0.16	0.16	0.08	0.26	0.29	0.27	0.07	0.05	0.18	0.19	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.70	0.76	0.74	0.76	0.00	0.00	0.50	0.49	0.49	0.49	0.64	0.66	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0022 kg	0 kg
Calcium_D	0.18	0.29	0.20	0.18	0.00	0.00	0.09	0.07	0.17	0.18	0.12	0.16	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.40	0.50	0.46	0.48	0.00	0.00	0.71	0.61	0.54	0.50	0.36	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.40	0.50	0.46	0.48	0.00	0.00	0.71	0.61	0.54	0.50	0.36	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.00	0.08	0.00	0.02	0.12	0.14	0.17	0.19	0.20	0.19	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.86	0.88	0.88	0.89	0.29	0.28	0.59	0.54	0.75	0.75	0.83	0.84	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.71	0.77	0.76	0.77	0.29	0.28	0.59	0.54	0.04	0.08	0.66	0.68	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_D	0.87	0.90	0.89	0.90	0.39	0.27	0.05	0.01	0.77	0.77	0.84	0.86	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.87	0.90	0.89	0.90	0.30	0.26	0.00	0.00	0.77	0.77	0.84	0.86	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.17	0.28	0.18	0.17	0.00	0.05	0.10	0.09	0.11	0.11	0.10	0.15	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	60 kg	60 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	60 kg	60 kg
Mercury_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.00096 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.00096 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.78	0.83	0.82	0.83	0.38	0.34	0.62	0.63	0.44	0.41	0.75	0.76	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.70	0.76	0.75	0.76	0.35	0.31	0.54	0.55	0.40	0.38	0.67	0.68	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.58	0.63	0.58	0.58	0.42	0.50	0.36	0.36	0.37	0.37	0.57	0.58	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.43	0.49	0.42	0.41	0.42	0.50	0.04	0.07	0.18	0.16	0.41	0.42	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.48	0.56	0.52	0.54	0.00	0.00	0.65	0.50	0.39	0.31	0.47	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.48	0.56	0.52	0.54	0.00	0.00	0.64	0.49	0.38	0.31	0.47	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	40 kg	0 kg
Strontium_D	0.18	0.29	0.21	0.20	0.00	0.13	0.13	0.12	0.21	0.21	0.12	0.16	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.16	0.27	0.19	0.18	0.00	0.13	0.13	0.11	0.13	0.13	0.09	0.14	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.19	0.25	0.12	0.10	0.00	0.00	0.00	0.04	0.05	0.03	0.27	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.18	0.25	0.11	0.09	0.00	0.00	0.00	0.02	0.04	0.02	0.27	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.75	0.81	0.81	0.82	0.71	0.68	0.83	0.82	0.82	0.82	0.67	0.72	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.72	0.79	0.78	0.79	0.70	0.66	0.79	0.78	0.82	0.82	0.63	0.68	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.73	0.79	0.78	0.80	0.72	0.71	0.19	0.12	0.53	0.55	0.69	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.50	0.61	0.59	0.63	0.72	0.71	0.13	0.00	0.00	0.00	0.43	0.45	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-2: Removal factors and mass addition in the lakes - Upper Case

Parameter	Swede Lake Dry Upper Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	5.8E-05 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.12	0.12	0.51	0.51	0.61	0.60	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Alkalinity_T	0.21	0.25	0.24	0.24	0.26	0.26	0.27	0.28	0.29	0.29	0.22	0.22	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.15	0.18	0.18	0.17	0.00	0.00	0.01	0.03	0.04	0.04	0.16	0.15	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	38 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Fluoride	0.04	0.08	0.08	0.07	0.00	0.00	0.00	0.00	0.06	0.06	0.05	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.44	0.47	0.47	0.46	0.42	0.42	0.47	0.48	0.45	0.45	0.45	0.45	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.70	0.70	0.70	0.70	0.20	0.20	0.20	0.20	0.20	0.20	0.70	0.70	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.75	0.77	0.76	0.76	0.94	0.94	0.20	0.50	0.85	0.85	0.74	0.75	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrite	0.28	0.32	0.32	0.32	0.17	0.15	0.82	0.82	0.00	0.00	0.25	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	126 kg	0 kg	0 kg	0 kg	0.0 kg	0 kg	0 kg	0 kg
Cyanide_T	0.55	0.57	0.57	0.56	0.00	0.00	0.05	0.06	0.49	0.48	0.55	0.55	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_F	0.55	0.57	0.57	0.56	0.00	0.00	0.05	0.06	0.49	0.48	0.55	0.55	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cyanide_WAD	0.55	0.57	0.57	0.56	0.00	0.00	0.05	0.06	0.49	0.48	0.55	0.55	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Hardness	0.28	0.31	0.30	0.30	0.23	0.24	0.31	0.33	0.33	0.33	0.28	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	2.1 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.90	0.90	0.90	0.90	0.70	0.71	0.74	0.75	0.53	0.53	0.90	0.90	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_D	0.61	0.63	0.62	0.62	0.00	0.00	0.42	0.42	0.39	0.37	0.63	0.62	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.61	0.63	0.62	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.62	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.17	0.20	0.20	0.19	0.01	0.03	0.05	0.07	0.08	0.07	0.18	0.18	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.20 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_D	0.54	0.57	0.56	0.56	0.48	0.48	0.45	0.46	0.48	0.48	0.54	0.55	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.53	0.55	0.55	0.54	0.48	0.48	0.43	0.44	0.48	0.48	0.53	0.53	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_D	0.26	0.29	0.29	0.28	0.33	0.33	0.33	0.35	0.35	0.35	0.27	0.26	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Barium_T	0.26	0.29	0.29	0.28	0.25	0.25	0.33	0.35	0.29	0.29	0.27	0.26	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Beryllium_T	0.15	0.19	0.18	0.17	0.00	0.00	0.02	0.04	0.05	0.05	0.17	0.16	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.39	0.43	0.44	0.44	0.83	0.83	0.83	0.83	0.83	0.82	0.36	0.38	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_T	0.39	0.43	0.44	0.44	0.83	0.83	0.83	0.83	0.83	0.82	0.36	0.38	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_D	0.57	0.59	0.59	0.59	0.14	0.15	0.43	0.44	0.52	0.51	0.58	0.57	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.57	0.59	0.59	0.59	0.14	0.15	0.43	0.44	0.52	0.51	0.58	0.57	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Calcium_D	0.30	0.33	0.33	0.32	0.25	0.25	0.32	0.33	0.34	0.34	0.31	0.31	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.69	0.70	0.69	0.69	0.00	0.00	0.16	0.17	0.68	0.67	0.70	0.69	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.69	0.70	0.69	0.69	0.00	0.00	0.16	0.17	0.68	0.67	0.70	0.69	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.13 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.29	0.32	0.32	0.32	0.16	0.17	0.18	0.19	0.20	0.20	0.30	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.29	0.32	0.32	0.32	0.16	0.17	0.18	0.19	0.20	0.20	0.30	0.30	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.032 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.8 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.86	0.86	0.86	0.86	0.43	0.43	0.83	0.83	0.84	0.84	0.86	0.86	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_T	0.82	0.83	0.83	0.83	0.15	0.16	0.61	0.61	0.57	0.57	0.83	0.82	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_D	0.62	0.63	0.63	0.62	0.29	0.29	0.46	0.48	0.54	0.54	0.64	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.62	0.63	0.63	0.62	0.00	0.00	0.46	0.48	0.54	0.54	0.64	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.18	0.22	0.21	0.21	0.22	0.22	0.26	0.27	0.25	0.25	0.19	0.19	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.97	0.97	0.97	0.97	0.40	0.41	0.95	0.95	0.98	0.98	0.97	0.97	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_T	0.94	0.94	0.94	0.94	0.28	0.29	0.86	0.86	0.89	0.89	0.94	0.94	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_D	0.63	0.64	0.64	0.64	0.00	0.00	0.27	0.28	0.52	0.52	0.64	0.63	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.56	0.58	0.58	0.57	0.00	0.00	0.27	0.28	0.52	0.52	0.57	0.57	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.5 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	1.7 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.45	0.47	0.47	0.46	0.33	0.33	0.00	0.01	0.03	0.03	0.46	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.45	0.47	0.47	0.46	0.33	0.33	0.00	0.00	0.00	0.00	0.46	0.46	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Potassium_D	0.28	0.31	0.31	0.30	0.33	0.33	0.35	0.36	0.37	0.37	0.29	0.29	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.56	0.58	0.57	0.57	0.48	0.49	0.45	0.46	0.51	0.51	0.56	0.56	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_T	0.43	0.45	0.44	0.44	0.39	0.42	0.44	0.45	0.42	0.41	0.44	0.43	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_D	0.08	0.12	0.11	0.11	0.07	0.08	0.30	0.31	0.03	0.03	0.09	0.08	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.08	0.12	0.11	0.11	0.05	0.05	0.30	0.31	0.00	0.00	0.09	0.08	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.64	0.65	0.64	0.64	0.00	0.00	0.63	0.63	0.62	0.61	0.65	0.64	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_T	0.64	0.65	0.64	0.64	0.00	0.00	0.63	0.63	0.62	0.61	0.65	0.64	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_D	0.15	0.19	0.18	0.18	0.21	0.20	0.19	0.20	0.14	0.14	0.16	0.15	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.05	0.04	0.04	0.03	0.03	0.08	0.10	0.14	0.14	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_D	0.28	0.31	0.31	0.30	0.28	0.28	0.31	0.32	0.30	0.29	0.29	0.28	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.24	0.28	0.27	0.27	0.24	0.24	0.31	0.32	0.30	0.29	0.25	0.25	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.14	0.18	0.18	0.17	0.00	0.00	0.01	0.03	0.04	0.04	0.16	0.15	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.14	0.18	0.17	0.16	0.00	0.00	0.00	0.02	0.04	0.04	0.16	0.15	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.60	0.62	0.62	0.62	0.59	0.59	0.56	0.56	0.58	0.57	0.60	0.60	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.60	0.62	0.62	0.62	0.59	0.59	0.54	0.55	0.57	0.57	0.60	0.60	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.23 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	2.0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	32 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix G-2: Removal factors and mass addition in the lakes - Upper Case

Parameter	Ellystan Lake Dry Upper Case																							
	Removal Fractions												Monthly Mass Addition											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Proton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	9.3E-06 kg	0 kg
Acidity_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	14559 kg	0 kg
Alkalinity_T	0.00	0.00	0.00	0.00	0.24	0.23	0.11	0.12	0.17	0.17	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Bromide	0.13	0.15	0.15	0.14	0.00	0.01	0.02	0.04	0.04	0.04	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	979 kg	0 kg
Fluoride	0.06	0.08	0.08	0.08	0.04	0.04	0.03	0.04	0.07	0.07	0.07	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sulfate	0.27	0.29	0.29	0.29	0.30	0.29	0.29	0.30	0.27	0.27	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Phosphorus_T	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	0.95	0.95	0.95	0.95	0 kg	0 kg	0 kg	0 kg	50 kg	25 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Ammonia	0.00	0.00	0.00	0.00	0.80	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	151 kg	0 kg
N_Nitrite	0.00	0.25	0.25	0.26	0.42	0.40	0.45	0.46	0.45	0.45	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
N_Nitrate_Nitrite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	341 kg	0 kg
Cyanide_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	15 kg	0 kg
Cyanide_F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.030 kg	0 kg
Cyanide_WAD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.030 kg	0 kg
Hardness	0.08	0.10	0.10	0.10	0.19	0.19	0.17	0.18	0.21	0.21	0.08	0.08	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Radium_226	0.37	0.39	0.39	0.39	0.30	0.30	0.30	0.31	0.31	0.31	0.37	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
TSS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	43269 kg	0 kg
Aluminum_D	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0.50	0.80	0.80	0.90	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	355 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Aluminum_T	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0.50	0.80	0.80	0.90	0.80	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	355 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_D	0.41	0.42	0.42	0.42	0.33	0.32	0.33	0.33	0.34	0.34	0.41	0.41	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Antimony_T	0.41	0.42	0.42	0.42	0.33	0.32	0.33	0.33	0.34	0.34	0.41	0.41	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_D	0.12	0.15	0.15	0.14	0.00	0.00	0.00	0.00	0.30	0.30	0.12	0.12	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Arsenic_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.16 kg	0 kg
Barium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1.7 kg	0 kg
Barium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	12 kg	0 kg
Beryllium_T	0.13	0.15	0.15	0.14	0.01	0.01	0.02	0.04	0.05	0.04	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Boron_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	2.1 kg	0 kg
Boron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	59 kg	0 kg
Cadmium_D	0.13	0.15	0.15	0.15	0.01	0.01	0.02	0.04	0.05	0.05	0.14	0.14	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cadmium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.0018 kg	0 kg
Calcium_D	0.04	0.06	0.06	0.06	0.16	0.16	0.17	0.18	0.25	0.25	0.04	0.04	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.90	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_D_Hex	0.00	0.00	0.00	0.00	0.54	0.55	0.01	0.01	0.10	0.10	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Chromium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.90	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0.82 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_D	0.13	0.15	0.14	0.14	0.00	0.01	0.02	0.04	0.04	0.04	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Cobalt_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.042 kg	0 kg
Copper_D	0.37	0.38	0.38	0.38	0.27	0.28	0.37	0.37	0.45	0.45	0.37	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Copper_T	0.37	0.38	0.38	0.38	0.27	0.28	0.37	0.37	0.45	0.45	0.37	0.37	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Iron_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	250 kg	0 kg
Iron_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	400 kg	0 kg	0 kg	0 kg	0 kg	0 kg	350 kg	0 kg
Lead_D	0.42	0.43	0.42	0.41	0.11	0.10	0.65	0.64	0.72	0.71	0.44	0.43	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Lead_T	0.42	0.43	0.42	0.41	0.00	0.00	0.65	0.64	0.72	0.71	0.44	0.43	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Magnesium_D	0.06	0.08	0.08	0.08	0.24	0.23	0.15	0.16	0.15	0.15	0.06	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Manganese_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	397 kg	0 kg
Manganese_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	599 kg	0 kg
Mercury_D	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Mercury_T	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50	0 kg	0 kg	0 kg	0 kg	0.00042 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_D	0.43	0.44	0.44	0.44	0.33	0.32	0.35	0.35	0.40	0.40	0.42	0.43	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Molybdenum_T	0.43	0.44	0.44	0.44	0.33	0.32	0.35	0.35	0.40	0.40	0.42	0.43	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_D	0.10	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.10	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Nickel_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1.2 kg	0 kg
Potassium_D	0.04	0.07	0.07	0.06	0.13	0.13	0.21	0.22	0.22	0.22	0.05	0.05	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Selenium_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.80 kg	0 kg
Selenium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.80 kg	0 kg
Silicon_D	0.14	0.17	0.17	0.17	0.00	0.00	0.48	0.48	0.15	0.16	0.14	0.14	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silicon_T	0.07	0.09	0.09	0.09	0.00	0.00	0.39	0.39	0.13	0.13	0.06	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Silver_D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.052 kg	0 kg
Silver_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0.052 kg	0 kg
Sodium_D	0.06	0.09	0.08	0.08	0.20	0.19	0.16	0.17	0.13	0.13	0.06	0.06	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Sodium_T	0.00	0.01	0.01	0.01	0.19	0.18	0.11	0.13	0.13	0.13	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_D	0.09	0.12	0.11	0.11	0.22	0.21	0.16	0.17	0.21	0.21	0.10	0.09	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Strontium_T	0.01	0.04	0.03	0.03	0.18	0.18	0.16	0.17	0.14	0.14	0.01	0.01	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_D	0.13	0.15	0.15	0.14	0.00	0.01	0.02	0.04	0.04	0.04	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Thallium_T	0.13	0.15	0.15	0.14	0.00	0.01	0.02	0.04	0.04	0.04	0.14	0.13	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_D	0.18	0.20	0.20	0.19	0.06	0.06	0.04	0.05	0.10	0.10	0.19	0.18	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Uranium_T	0.18	0.20	0.20	0.19	0.06	0.06	0.00	0.00	0.10	0.10	0.19	0.18	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Vanadium_T	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	1.5 kg	0 kg
Zinc_D	0.27	0.30	0.30	0.30	0.83	0.82	0.83	0.83	0.83	0.83	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg
Zinc_T	0.27	0.30	0.30	0.30	0.83	0.82	0.83	0.83	0.83	0.83	0.26	0.27	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg	0 kg

Appendix H SUMMARY OF WATER QUALITY MODEL PREDICTIONS

Summary Table

Appendix Title and Model Scenari	Notes	Cells Included
Gordon Site Receiving Environment Predicted Water Quality for the Expected Case	Monthly mean, median and maximums for each project phase; percent increase from baseline; Indicate parameters that exceed water quality guidelines CCME short: **Bold** CCME long: *Italic* MWQG short: Single Underline MWQG long: Grey Background	Gordon_Lake_CT, Farley_Lake_East_CT, Farley_Lake_West_CT, Susan_lake_CT, Swede_Lake_CT, Ellistan_Lake
Gordon Site Receiving Environment Predicted Water Quality for the Upper Case		Gordon_Lake_CT, Farley_Lake_East_CT, Farley_Lake_West_CT, Susan_lake_CT, Swede_Lake_CT, Ellistan_Lake
Gordon Site Contact Water Quality for the Expected Case	Monthly mean, median and maximums for each project phase; Indicate parameters that exceed water quality guidelines CCME short: **Bold** MWQG short: *Italic* MDMER: Single Underline	Collection_Pond, Upper_OP_CT, East_mixed, Wendy_mixed, Farely_wells_CT, Gordon_wells_CT
Gordon Site Contact Water Quality for the Upper Case		Collection_Pond, Upper_OP_CT, East_mixed, Wendy_mixed, Farely_wells_CT, Gordon_wells_CT

Notes for contact water discharges:

Dashed lines represent "not applicable" (no discharge)
Bold font indicates the monthly average concentration exceeds the short-term CWQG.
Italic font indicates the monthly average concentration exceeds the short-term MSOG.
Underline indicates monthly average concentration exceeds the metal and diamond mine effluent regulations.
CWQG-FAL = Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life by Canadian Council of Ministers of the Environment (CCME 2020).
MSOG-FAL = Manitoba Water Quality Standards Objectives and Guidelines for Freshwater Aquatic Life - Manitoba (MWS 2011).
[a] Manitoba Tier II guidelines for dissolved metals are based on exceedance once in three years, but not more frequent, being acceptable during periods of infrequent and extreme low stream flows.
* Equations were used to calculate hardness (as $CaCO_3$), pH, DOC, and temperature-dependent guidelines for these parameters as per MWS (2011) and CCME (2020).
- Ammonia MSOG-FAL: pH and temperature-dependent guideline. Values used for screening are based on Equation 1 values from Table 1 in MWS (2011)
- Ammonia CWQG-FAL: pH and temperature-dependent guideline. Values used for screening are based on Table 1 in CCME (2010) and converted to ammonia (as N) by multiplying the unionized ammonia (NH_3) guidelines by 0.8224.
- Dissolved cadmium MSOG-FAL (mg/L): 0.001*[(exp(0.7409*(ln(Hardness))-4.719))*(1.101672-(ln(Hardness)*0.041838))]
- Dissolved chromium MSOG-FAL (mg/L): 0.001*[(exp(0.819*(ln(Hardness)) + 0.6848))*(0.86)]
- Dissolved copper MSOG-FAL (mg/L): 0.001*[exp(0.8545[ln(Hardness)]-1.702]*[0.960]
- Dissolved lead MSOG-FAL (mg/L): 0.001*[(exp(1.273*(ln(Hardness)) - 4.705))*((1.46203-(ln(Hardness))*0.145712))]
- Dissolved nickel MSOG-FAL (mg/L): 0.001*[(exp(0.846*(ln(Hardness))+0.0584))*(0.997)]
- Dissolved manganese CWQG-FAL (mg/L): pH and hardness-dependent guideline. Values used for screening are based on Table 5 in CCME (2019).
- Dissolved zinc MSOG-FAL (mg/L): 0.001*[(exp(0.8473*(ln(Hardness))+0.884))*(0.986)]
- Dissolved zinc CWQG-FAL: exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625). The value for DOC was set at 0.3 mg/L (i.e., the lowest and most conservative value to calculate the guideline)
- Total cadmium CWQG-FAL: at hardness > 280 mg/L the guideline is 0.00037 mg/L; at hardness between 17 and 280 mg/L the guideline (in mg/L) is 0.001*[10^(1.016*(log10(Hardness))-1.71)]; at hardness < 17 mg/L the guideline is 0.00011 mg/L.
- Total copper CWQG-FAL: at hardness > 180 mg/L the guideline is 0.004 mg/L; at hardness between 82 and 180 mg/L the guideline (in mg/L) is 0.001*0.2*[exp(0.8545*(ln(Hardness]))-1.465)]; at hardness < 82 mg/L the guideline is 0.002 mg/L.
- Total lead CWQG-FAL: at hardness > 180 mg/L the guideline is 0.007 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(1.273*(ln(Hardness]))-4.705)]; at hardness < 60 mg/L the guideline is 0.001 mg/L.
- Total nickel CWQG-FAL: at hardness > 180 mg/L the guideline is 0.15 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(0.76*(ln(Hardness]))+1.06))]; at hardness < 60 mg/L the guideline is 0.025 mg/L.
Significant figures do not correlate with the error of the modeling.
* Change between mean baseline and project in percent.

Notes for receiving environment:

Dashed lines represent "not applicable".
Bold font indicates the monthly average concentration exceeds the short-term CWQG.
Italic font indicates the monthly average concentration exceeds the long-term CWQG.
Underline indicates monthly average concentration exceeds the short-term MSOG.
Shaded background indicates the monthly average concentration exceeds the long-term MSOG.
CWQG-FAL = Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life by Canadian Council of Ministers of the Environment (CCME 2020).
MSOG-FAL = Manitoba Water Quality Standards Objectives and Guidelines for Freshwater Aquatic Life - Manitoba (MWS 2011).
[a] Manitoba Tier II guidelines for dissolved metals are based on exceedance once in three years, but not more frequent, being acceptable during periods of infrequent and extreme low stream flows.
* Equations were used to calculate hardness (as $CaCO_3$), pH, DOC, and temperature-dependent guidelines for these parameters as per MWS (2011) and CCME (2020).
- Ammonia MSOG-FAL: pH and temperature-dependent guideline. Values used for screening are based on Equation 1 values from Table 1 in MWS (2011)
- Ammonia CWQG-FAL: pH and temperature-dependent guideline. Values used for screening are based on Table 1 in CCME (2010) and converted to ammonia (as N) by multiplying the unionized ammonia (NH_3) guidelines by 0.8224.
- Dissolved cadmium MSOG-FAL (mg/L): 0.001*[(exp(0.7409*(ln(Hardness))-4.719))*(1.101672-(ln(Hardness)*0.041838))]
- Dissolved chromium MSOG-FAL (mg/L): 0.001*[(exp(0.819*(ln(Hardness)) + 0.6848))*(0.86)]
- Dissolved copper MSOG-FAL (mg/L): 0.001*[exp(0.8545[ln(Hardness)]-1.702]*[0.960]
- Dissolved lead MSOG-FAL (mg/L): 0.001*[(exp(1.273*(ln(Hardness)) - 4.705))*((1.46203-(ln(Hardness))*0.145712))]
- Dissolved nickel MSOG-FAL (mg/L): 0.001*[(exp(0.846*(ln(Hardness))+0.0584))*(0.997)]
- Dissolved manganese CWQG-FAL (mg/L): pH and hardness-dependent guideline. Values used for screening are based on Table 5 in CCME (2019).
- Dissolved zinc MSOG-FAL (mg/L): 0.001*[(exp(0.8473*(ln(Hardness))+0.884))*(0.986)]
- Dissolved zinc CWQG-FAL: exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625). The value for DOC was set at 0.3 mg/L (i.e., the lowest and most conservative value to calculate the guideline)
- Total cadmium CWQG-FAL: at hardness > 280 mg/L the guideline is 0.00037 mg/L; at hardness between 17 and 280 mg/L the guideline (in mg/L) is 0.001*[10^(1.016*(log10(Hardness))-1.71)]; at hardness < 17 mg/L the guideline is 0.00011 mg/L.
- Total copper CWQG-FAL: at hardness > 180 mg/L the guideline is 0.004 mg/L; at hardness between 82 and 180 mg/L the guideline (in mg/L) is 0.001*0.2*[exp(0.8545*(ln(Hardness]))-1.465)]; at hardness < 82 mg/L the guideline is 0.002 mg/L.
- Total lead CWQG-FAL: at hardness > 180 mg/L the guideline is 0.007 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(1.273*(ln(Hardness]))-4.705)]; at hardness < 60 mg/L the guideline is 0.001 mg/L.
- Total nickel CWQG-FAL: at hardness > 180 mg/L the guideline is 0.15 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(0.76*(ln(Hardness]))+1.06))]; at hardness < 60 mg/L the guideline is 0.025 mg/L.
Significant figures do not correlate with the error of the modeling.
* Change between mean baseline and project in percent.

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cl	Construction	Jan	2	1.986	1.986	1.986	3.647	3.647	3.647	0.569	0.569	0.572	0.574	0.574	0.575	0.545	0.545	0.545	-	-	-
Cl	Construction	Feb	2	1.909	1.909	1.909	3.550	3.550	3.550	0.569	0.569	0.572	0.574	0.574	0.576	0.526	0.526	0.526	-	-	-
Cl	Construction	Mar	2	1.786	1.786	1.786	3.446	3.446	3.446	0.568	0.568	0.572	0.575	0.575	0.578	0.441	0.441	0.441	-	-	-
Cl	Construction	Apr	2	1.205	1.205	1.205	3.327	3.327	3.327	0.567	0.567	0.572	0.576	0.576	0.580	0.388	0.388	0.573	-	-	-
Cl	Construction	May	2	-	-	-	3.196	3.196	3.196	0.566	0.566	0.572	0.578	0.578	0.583	0.486	0.486	0.557	-	-	-
Cl	Construction	Jun	2	-	-	-	3.052	3.052	3.052	0.565	0.565	0.572	0.579	0.579	0.586	0.439	0.439	0.491	-	-	-
Cl	Construction	Jul	2	-	-	-	2.886	2.886	2.886	0.564	0.564	0.572	0.581	0.581	0.589	0.395	0.395	0.423	-	-	-
Cl	Construction	Aug	2	-	-	-	2.686	2.686	2.686	0.564	0.564	0.572	0.583	0.583	0.593	0.387	0.387	0.416	-	-	-
Cl	Construction	Sep	2	-	-	-	2.432	2.432	2.432	0.563	0.563	0.572	0.584	0.584	0.596	0.382	0.382	0.415	-	-	-
Cl	Construction	Oct	2	-	-	-	2.054	2.054	2.054	0.563	0.563	0.571	0.586	0.586	0.599	0.392	0.392	0.446	-	-	-
Cl	Construction	Nov	2	-	-	-	0.818	0.818	0.818	0.562	0.562	0.570	0.588	0.588	0.603	0.451	0.451	0.456	-	-	-
Cl	Construction	Dec	2	-	-	-	-	-	-	0.561	0.561	0.568	0.590	0.590	0.606	0.515	0.515	0.552	-	-	-
Cl	Operations	Jan	5	-	-	-	-	-	-	0.535	0.540	0.553	0.569	0.579	0.608	0.319	0.380	0.507	-	-	-
Cl	Operations	Feb	5	-	-	-	-	-	-	0.534	0.539	0.553	0.568	0.579	0.610	0.409	0.432	0.508	-	-	-
Cl	Operations	Mar	5	-	-	-	-	-	-	0.533	0.538	0.552	0.567	0.578	0.612	0.549	0.534	0.572	-	-	-
Cl	Operations	Apr	5	-	-	-	-	-	-	0.533	0.538	0.552	0.566	0.578	0.613	0.571	0.581	0.601	-	-	-
Cl	Operations	May	5	-	-	-	-	-	-	0.532	0.537	0.551	0.565	0.577	0.613	0.540	0.547	0.566	-	-	-
Cl	Operations	Jun	5	-	-	-	-	-	-	0.532	0.537	0.551	0.565	0.576	0.613	0.509	0.508	0.523	-	-	-
Cl	Operations	Jul	5	-	-	-	-	-	-	0.532	0.536	0.551	0.564	0.575	0.612	0.475	0.465	0.483	-	-	-
Cl	Operations	Aug	5	-	-	-	-	-	-	0.532	0.536	0.551	0.563	0.574	0.610	0.483	0.470	0.488	-	-	-
Cl	Operations	Sep	5	-	-	-	-	-	-	0.533	0.537	0.551	0.563	0.573	0.609	0.488	0.470	0.489	-	-	-
Cl	Operations	Oct	5	-	-	-	-	-	-	0.533	0.537	0.550	0.562	0.572	0.606	0.435	0.387	0.439	-	-	-
Cl	Operations	Nov	5	-	-	-	-	-	-	0.533	0.537	0.549	0.562	0.571	0.604	0.356	0.317	0.362	-	-	-
Cl	Operations	Dec	5	-	-	-	-	-	-	0.533	0.536	0.548	0.561	0.570	0.601	0.311	0.305	0.316	-	-	-
Cl	Closure	Jan	6	-	-	-	-	-	-	0.557	0.554	0.572	0.561	0.563	0.570	-	-	-	-	-	-
Cl	Closure	Feb	6	-	-	-	-	-	-	0.559	0.554	0.572	0.562	0.563	0.570	-	-	-	-	-	-
Cl	Closure	Mar	6	-	-	-	-	-	-	0.560	0.555	0.572	0.562	0.563	0.570	-	-	-	-	-	-
Cl	Closure	Apr	6	-	-	-	-	-	-	0.562	0.555	0.572	0.563	0.563	0.570	-	-	-	-	-	-
Cl	Closure	May	6	-	-	-	-	-	-	0.564	0.556	0.572	0.563	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Jun	6	-	-	-	-	-	-	0.565	0.556	0.572	0.563	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Jul	6	-	-	-	-	-	-	0.566	0.556	0.572	0.563	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Aug	6	-	-	-	-	-	-	0.567	0.557	0.572	0.564	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Sep	6	-	-	-	-	-	-	0.568	0.558	0.572	0.564	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Oct	6	-	-	-	-	-	-	0.569	0.558	0.572	0.564	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Nov	6	-	-	-	-	-	-	0.570	0.559	0.572	0.564	0.564	0.570	-	-	-	-	-	-
Cl	Closure	Dec	6	-	-	-	-	-	-	0.570	0.560	0.572	0.565	0.564	0.570	-	-	-	-	-	-
Cl	Post-Closure	Jan	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.810	0.841
Cl	Post-Closure	Feb	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.810	0.841
Cl	Post-Closure	Mar	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.810	0.840
Cl	Post-Closure	Apr	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.819	0.809	0.840
Cl	Post-Closure	May	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.819	0.809	0.840
Cl	Post-Closure	Jun	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.819	0.809	0.840
Cl	Post-Closure	Jul	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.810	0.840
Cl	Post-Closure	Aug	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.812	0.842
Cl	Post-Closure	Sep	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.807	0.842
Cl	Post-Closure	Oct	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.811	0.842
Cl	Post-Closure	Nov	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.811	0.841
Cl	Post-Closure	Dec	117	-	-	-	-	-	-	0.572	0.572	0.572	0.572	0.572	0.572	-	-	-	0.820	0.811	0.841
F	Construction	Jan	2	0.1141	0.1141	0.1141	0.1082	0.1082	0.1082	0.1358	0.1358	0.1359	0.1359	0.1359	0.1359	0.1114	0.1114	0.1114	-	-	-
F	Construction	Feb	2	0.1149	0.1149	0.1149	0.1089	0.1089	0.1089	0.1357	0.1357	0.1359	0.1359	0.1359	0.1359	0.1087	0.1087	0.1087	-	-	-
F	Construction	Mar	2	0.1161	0.1161	0.1161	0.1096	0.1096	0.1096	0.1357	0.1357	0.1359	0.1358	0.1358	0.1359	0.0908	0.0908	0.0908	-	-	-
F	Construction	Apr	2	0.0968	0.0968	0.0968	0.1104	0.1104	0.1104	0.1356	0.1356	0.1359	0.1358	0.1358	0.1359	0.0751	0.0751	0.1201	-	-	-
F	Construction	May	2	-	-	-	0.1112	0.1112	0.1112	0.1355	0.1355	0.1359	0.1358	0.1358	0.1359	0.0905	0.0905	0.1181	-	-	-
F	Construction	Jun	2	-	-	-	0.1123	0.1123	0.1123	0.1355	0.1355	0.1359	0.1357	0.1357	0.1359	0.0830	0.0830	0.1046	-	-	-
F	Construction	Jul	2	-	-	-	0.1134	0.1134	0.1134	0.1355	0.1355	0.1359	0.1357	0.1357	0.1359	0.0768	0.0768	0.0914	-	-	-
F	Construction	Aug	2	-	-	-	0.1149	0.1149	0.1149	0.1354	0.1354	0.1359	0.1357	0.1357	0.1359	0.0767	0.0767	0.0901	-	-	-
F	Construction	Sep	2	-	-	-	0.1164	0.1164	0.1164	0.1354	0.1354	0.1359	0.1356	0.1356	0.1359	0.0760	0.0760	0.0894	-	-	-
F	Construction	Oct	2	-	-	-	0.1180	0.1180	0.1180	0.1354	0.1354	0.1358	0.1356	0.1356	0.1359	0.0782	0.0782	0.0960	-	-	-
F	Construction	Nov	2	-	-	-	0.0625	0.0625	0.0625	0.1354	0.1354	0.1358	0.1356	0.1356	0.1359	0.0906	0.0906	0.0954	-	-	-
F	Construction	Dec	2	-	-	-	-	-	-	0.1354	0.1354	0.1357	0.1356	0.1356	0.1359	0.1055	0.1055	0.1099	-	-	-
F	Operations	Jan	5	-	-	-	-	-	-	0.1344	0.1346	0.1351	0.1353	0.1353	0.1356	0.1625	0.1747	0.2405	-	-	-
F	Operations	Feb	5	-	-	-	-	-	-	0.1344	0.1346	0.1351	0.1353	0.1353	0.1357	0.1432	0.1458	0.1749	-	-	-
F	Operations	Mar	5	-	-	-	-	-	-	0.1344	0.1346	0.1351	0.1354	0.1353	0.1358	0.1503	0.1362	0.1513	-	-	-
F	Operations	Apr	5	-	-	-	-	-	-	0.1343	0.1345	0.1351	0.1354	0.1354	0.1359	0.1543	0.1457	0.1593	-	-	-
F	Operations	May	5	-	-	-	-	-	-	0.1342	0.1344	0.1350	0.1354	0.1354	0.1360	0.1540	0.1465	0.1614	-	-	-
F	Operations	Jun	5	-	-	-	-	-	-	0.1341	0.1343	0.1350	0.1354	0.1354	0.1360	0.1620	0.1499	0.1674	-	-	-
F	Operations	Jul	5	-	-	-	-	-	-	0.1341	0.1343	0.1350	0.1353	0.1354	0.1361	0.1691	0.1534	0.1770	-	-	-
F	Operations	Aug	5	-	-	-	-	-	-	0.1341	0.1342	0.1349	0.1353	0.1354	0.1362	0.1647	0.1519	0.1750	-	-	-
F	Operations	Sep	5	-	-	-	-	-	-	0.1341	0.1343	0.1350	0.1354	0.1355	0.1362	0.1707	0.1576	0.1822	-	-	-
F	Operations	Oct	5	-	-	-	-	-	-	0.1341	0.1343	0.1350	0.1354	0.1354	0.1362	0.1874	0.1670	0.2018	-	-	-
F	Operations	Nov	5	-	-	-	-	-	-	0.1342	0.1344	0.1350	0.1355	0.1355	0.1363	0.2078	0.1785	0.2222	-	-	-
F	Operations	Dec	5	-	-	-	-	-	-	0.1343	0.1344	0.1350	0.1356	0.1355	0.1363	0.2220	0.1893	0.2336	-	-	-
F	Closure	Jan	6	-	-	-	-	-	-	0.1352	0.1351	0.1359	0.1356	0.1358	0.1368	-	-	-	-	-	-
F	Closure	Feb	6	-	-	-	-	-	-	0.1354	0.1352	0.1359	0.1356	0.1358	0.1368	-	-	-	-	-	-
F	Closure	Mar	6	-	-	-	-	-	-	0.1355	0.1352	0.1359	0.1356	0.1358	0.1368	-	-	-	-	-	-
F	Closure	Apr	6	-	-	-	-	-	-	0.1355	0.1352	0.1359	0.1356	0.1358	0.1368	-	-	-	-	-	-
F	Closure	May	6	-	-	-	-	-	-	0.1356	0.1352	0.1359	0.1356	0.1358	0.1367	-	-	-	-	-	-
F	Closure	Jun	6	-	-	-	-	-	-	0.1357	0.1352	0.1359	0.1356	0.1358	0.1367	-	-	-	-	-	-
F	Closure	Jul	6	-	-	-	-	-	-	0.1357	0.1352	0.1359	0.1356	0.1358	0.1367	-	-	-	-	-	-
F	Closure	Aug	6	-	-	-	-	-	-	0.1358	0.1352	0.1359	0.1356	0.1358	0.1367	-	-	-	-	-	-
F	Closure	Sep	6	-	-	-	-	-	-	0.1358	0.1353	0.1359	0.1356	0.1357	0.1367	-	-	-	-	-	-
F	Closure	Oct	6	-	-	-	-	-	-	0.1358	0.1353	0.1359	0.1356	0.1357	0.1367	-	-	-	-	-	-
F	Closure	Nov	6	-	-	-	-	-	-	0.1359	0.1353	0.1359	0.1356	0.1357	0.1367	-	-	-	-	-	-
F	Closure	Dec	6	-	-	-	-	-	-	0.1359	0.1354	0.1359	0.1356	0.1357	0.1367	-	-	-	-	-	-
F	Post-Closure	Jan	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1711	0.1693	0.1712
F	Post-Closure	Feb	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1710	0.1693	0.1711
F	Post-Closure	Mar	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1709	0.1692	0.1711
F	Post-Closure	Apr	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1708	0.1690	0.1709
F	Post-Closure	May	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1708	0.1690	0.1709
F	Post-Closure	Jun	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1708	0.1691	0.1709
F	Post-Closure	Jul	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1710	0.1693	0.1711
F	Post-Closure	Aug	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1711	0.1695	0.1712
F	Post-Closure	Sep	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1712	0.1687	0.1713
F	Post-Closure	Oct	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1712	0.1695	0.1713
F	Post-Closure	Nov	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1711	0.1694	0.1713
F	Post-Closure	Dec	117	-	-	-	-	-	-	0.1359	0.1359	0.1359	0.1359	0.1359	0.1359	-	-	-	0.1711	0.1694	0.1712
P, Tot	Construction	Jan	2	0.0309	0.0309	0.0309	0.0167	0.0167	0.0167	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	0.0166	0.0166	0.0166	-	-	-
P, Tot	Construction	Feb	2	0.0302	0.0302	0.0302	0.0168	0.0168	0.0168	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	0.0162	0.0162	0.0162	-	-	-
P, Tot	Construction	Mar	2	0.0292	0.0292	0.0292	0.0169	0.0169	0.0169	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	0.0133	0.0133	0.0133	-	-	-
P, Tot	Construction	Apr	2	0.0217	0.0217	0.0217	0.0171	0.0171	0.0171	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0106	0.0106	0.0181	-	-	-
P, Tot	Construction	May	2	-	-	-	0.0172	0.0172	0.0172	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0124	0.0124	0.0179	-	-	-
P, Tot	Construction	Jun	2	-	-	-	0.0173	0.0173	0.0173	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0118	0.0118	0.0158	-	-	-
P, Tot	Construction	Jul	2	-	-	-	0.0175	0.0175	0.0175	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0114	0.0114	0.0137	-	-	-
P, Tot	Construction	Aug	2	-	-	-	0.0177	0.0177	0.0177	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0118	0.0118	0.0136	-	-	-
P, Tot	Construction	Sep	2	-	-	-	0.0179	0.0179	0.0179	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0112	0.0112	0.0130	-	-	-
P, Tot	Construction	Oct	2	-	-	-	0.0182	0.0182	0.0182	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0112	0.0112	0.0140	-	-	-
P, Tot	Construction	Nov	2	-	-	-	0.0096	0.0096	0.0096	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0129	0.0129	0.0138	-	-	-
P, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0234	0.0234	0.0235	0.0155	0.0155	0.0162	-	-	-
P, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0227	0.0228	0.0233	0.0147	0.0143	0.0163	-	-	-
P, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0227	0.0228	0.0232	0.0151	0.0151	0.0162	-	-	-
P, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0227	0.0228	0.0232	0.0182	0.0176	0.0197	-	-	-
P, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0226	0.0228	0.0232	0.0190	0.0193	0.0204	-	-	-
P, Tot	Operations	May	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0226	0.0228	0.0232	0.0185	0.0188	0.0202	-	-	-
P, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0226	0.0227	0.0232	0.0184	0.0180	0.0196	-	-	-
P, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0226	0.0227	0.0231	0.0177	0.0171	0.0191	-	-	-
P, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0226	0.0227	0.0231	0.0177	0.0171	0.0189	-	-	-
P, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0234	0.0234	0.0235	0.0226	0.0227	0.0231	0.0175	0.0168	0.0188	-	-	-
P, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0234	0.0234	0.0235	0.0226	0.0227	0.0231	0.0163	0.0147	0.0180	-	-	-
P, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0234	0.0234	0.0235	0.0226	0.0227	0.0231	0.0145	0.0131	0.0167	-	-	-
P, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0234	0.0234	0.0235	0.0226	0.0227	0.0230	0.0134	0.0130	0.0159	-	-	-
P, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0228	0.0229	0.0233	-	-	-	-	-	-
P, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0228	0.0229	0.0233	-	-	-	-	-	-
P, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0228	0.0229	0.0233	-	-	-	-	-	-
P, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0228	0.0229	0.0234	-	-	-	-	-	-
P, Tot	Closure	May	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0229	0.0229	0.0234	-	-	-	-	-	-
P, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0229	0.0229	0.0234	-	-	-	-	-	-
P, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0229	0.0229	0.0234	-	-	-	-	-	-
P, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0230	0.0230	0.0234	-	-	-	-	-	-
P, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0230	0.0230	0.0234	-	-	-	-	-	-
P, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0230	0.0230	0.0234	-	-	-	-	-	-
P, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0231	0.0230	0.0234	-	-	-	-	-	-
P, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0231	0.0230	0.0234	-	-	-	-	-	-
P, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0061	0.0055	0.0061
P, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0061	0.0055	0.0061
P, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0061	0.0055	0.0061
P, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0055	0.0060
P, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
P, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235	-	-	-	0.0060	0.0054	0.0060
NH3 (as N)	Construction	Jan	2	0.1156	0.1156	0.1156	0.0857	0.0857	0.0857	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	0.0941	0.0941	0.0941	-	-	-
NH3 (as N)	Construction	Feb	2	0.1147	0.1147	0.1147	0.0861	0.0861	0.0861	0.0852	0.0852	0.0853	0.0853	0.0853	0.0853	0.0967	0.0967	0.0967	-	-	-
NH3 (as N)	Construction	Mar	2	0.1133	0.1133	0.1133	0.0866	0.0866	0.0866	0.0852	0.0852	0.0853	0.0853	0.0853	0.0853	0.0829	0.0829	0.0829	-	-	-
NH3 (as N)	Construction	Apr	2	0.0891	0.0891	0.0891	0.0872	0.0872	0.0872	0.0851	0.0851	0.0853	0.0853	0.0853	0.0853	0.0697	0.0697	0.0997	-	-	-
NH3 (as N)	Construction	May	2	-	-	-	0.0878	0.0878	0.0878	0.0851	0.0851	0.0853	0.0853	0.0853	0.0853	0.0886	0.0886	0.0989	-	-	-
NH3 (as N)	Construction	Jun	2	-	-	-	0.0885	0.0885	0.0885	0.0850	0.0850	0.0853	0.0853	0.0853	0.0853	0.0805	0.0805	0.0922	-	-	-
NH3 (as N)	Construction	Jul	2	-	-	-	0.0893	0.0893	0.0893	0.0850	0.0850	0.0853	0.0853	0.0853	0.0853	0.0737	0.0737	0.0855	-	-	-
NH3 (as N)	Construction	Aug	2	-	-	-	0.0903	0.0903	0.0903	0.0849	0.0849	0.0853	0.0853	0.0853	0.0853	0.0719	0.0719	0.0854	-	-	-
NH3 (as N)	Construction	Sep	2	-	-	-	0.0914	0.0914	0.0914	0.0849	0.0849	0.0853	0.0852	0.0852	0.0853	0.0705	0.0705	0.0854	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
NH3 (as N)	Construction	Oct	2	-	-	-	0.0925	0.0925	0.0925	0.0849	0.0849	0.0853	0.0852	0.0852	0.0853	0.0719	0.0719	0.0911	-	-	-
NH3 (as N)	Construction	Nov	2	-	-	-	0.0488	0.0488	0.0488	0.0848	0.0848	0.0853	0.0852	0.0852	0.0853	0.0852	0.0852	0.0974	-	-	-
NH3 (as N)	Construction	Dec	2	-	-	-	-	-	-	0.0848	0.0848	0.0853	0.0851	0.0851	0.0853	0.0972	0.0972	0.1036	-	-	-
NH3 (as N)	Operations	Jan	5	-	-	-	-	-	-	0.0835	0.0837	0.0844	0.0849	0.0848	0.0859	0.4622	0.3836	0.5713	-	-	-
NH3 (as N)	Operations	Feb	5	-	-	-	-	-	-	0.0835	0.0838	0.0844	0.0849	0.0849	0.0859	0.2763	0.2670	0.3444	-	-	-
NH3 (as N)	Operations	Mar	5	-	-	-	-	-	-	0.0835	0.0838	0.0844	0.0848	0.0849	0.0860	0.1795	0.1776	0.2122	-	-	-
NH3 (as N)	Operations	Apr	5	-	-	-	-	-	-	0.0835	0.0837	0.0844	0.0848	0.0849	0.0860	0.1880	0.1760	0.2111	-	-	-
NH3 (as N)	Operations	May	5	-	-	-	-	-	-	0.0834	0.0837	0.0844	0.0848	0.0850	0.0861	0.2122	0.1892	0.2148	-	-	-
NH3 (as N)	Operations	Jun	5	-	-	-	-	-	-	0.0834	0.0836	0.0843	0.0847	0.0850	0.0861	0.2275	0.2121	0.2574	-	-	-
NH3 (as N)	Operations	Jul	5	-	-	-	-	-	-	0.0833	0.0835	0.0843	0.0847	0.0850	0.0862	0.2442	0.2308	0.2839	-	-	-
NH3 (as N)	Operations	Aug	5	-	-	-	-	-	-	0.0833	0.0835	0.0842	0.0846	0.0850	0.0862	0.2231	0.2170	0.2692	-	-	-
NH3 (as N)	Operations	Sep	5	-	-	-	-	-	-	0.0832	0.0834	0.0842	0.0847	0.0850	0.0862	0.2268	0.2287	0.2937	-	-	-
NH3 (as N)	Operations	Oct	5	-	-	-	-	-	-	0.0832	0.0834	0.0842	0.0847	0.0850	0.0862	0.2889	0.2941	0.4118	-	-	-
NH3 (as N)	Operations	Nov	5	-	-	-	-	-	-	0.0832	0.0834	0.0842	0.0848	0.0851	0.0862	0.3542	0.3572	0.4709	-	-	-
NH3 (as N)	Operations	Dec	5	-	-	-	-	-	-	0.0833	0.0835	0.0842	0.0849	0.0851	0.0861	0.4234	0.3992	0.5127	-	-	-
NH3 (as N)	Closure	Jan	6	-	-	-	-	-	-	0.0843	0.0843	0.0853	0.0848	0.0848	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	Feb	6	-	-	-	-	-	-	0.0844	0.0843	0.0853	0.0848	0.0848	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	Mar	6	-	-	-	-	-	-	0.0845	0.0844	0.0853	0.0848	0.0848	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	Apr	6	-	-	-	-	-	-	0.0846	0.0844	0.0853	0.0848	0.0848	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	May	6	-	-	-	-	-	-	0.0847	0.0844	0.0853	0.0848	0.0848	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	Jun	6	-	-	-	-	-	-	0.0848	0.0845	0.0853	0.0849	0.0848	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	Jul	6	-	-	-	-	-	-	0.0849	0.0845	0.0853	0.0849	0.0847	0.0861	-	-	-	-	-	-
NH3 (as N)	Closure	Aug	6	-	-	-	-	-	-	0.0850	0.0845	0.0853	0.0848	0.0847	0.0860	-	-	-	-	-	-
NH3 (as N)	Closure	Sep	6	-	-	-	-	-	-	0.0850	0.0845	0.0853	0.0847	0.0847	0.0859	-	-	-	-	-	-
NH3 (as N)	Closure	Oct	6	-	-	-	-	-	-	0.0851	0.0845	0.0853	0.0847	0.0847	0.0859	-	-	-	-	-	-
NH3 (as N)	Closure	Nov	6	-	-	-	-	-	-	0.0851	0.0845	0.0853	0.0847	0.0846	0.0858	-	-	-	-	-	-
NH3 (as N)	Closure	Dec	6	-	-	-	-	-	-	0.0852	0.0846	0.0853	0.0848	0.0846	0.0857	-	-	-	-	-	-
NH3 (as N)	Post-Closure	Jan	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0919	0.0897	0.0924
NH3 (as N)	Post-Closure	Feb	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0898	0.0924
NH3 (as N)	Post-Closure	Mar	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0898	0.0924
NH3 (as N)	Post-Closure	Apr	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0898	0.0924
NH3 (as N)	Post-Closure	May	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0898	0.0924
NH3 (as N)	Post-Closure	Jun	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0897	0.0924
NH3 (as N)	Post-Closure	Jul	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0898	0.0924
NH3 (as N)	Post-Closure	Aug	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0900	0.0925
NH3 (as N)	Post-Closure	Sep	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0920	0.0895	0.0925
NH3 (as N)	Post-Closure	Oct	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0919	0.0898	0.0924
NH3 (as N)	Post-Closure	Nov	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0919	0.0897	0.0924
NH3 (as N)	Post-Closure	Dec	117	-	-	-	-	-	-	0.0853	0.0853	0.0853	0.0853	0.0853	0.0853	-	-	-	0.0919	0.0897	0.0924
NO2 (as N)	Construction	Jan	2	0.0201	0.0201	0.0201	0.0276	0.0276	0.0276	0.0129	0.0129	0.0130	0.0130	0.0130	0.0130	0.0109	0.0109	0.0109	-	-	-
NO2 (as N)	Construction	Feb	2	0.0196	0.0196	0.0196	0.0271	0.0271	0.0271	0.0129	0.0129	0.0130	0.0130	0.0130	0.0130	0.0115	0.0115	0.0115	-	-	-
NO2 (as N)	Construction	Mar	2	0.0189	0.0189	0.0189	0.0265	0.0265	0.0265	0.0129	0.0129	0.0130	0.0130	0.0130	0.0130	0.0097	0.0097	0.0097	-	-	-
NO2 (as N)	Construction	Apr	2	0.0138	0.0138	0.0138	0.0259	0.0259	0.0259	0.0129	0.0129	0.0130	0.0130	0.0130	0.0130	0.0072	0.0072	0.0117	-	-	-
NO2 (as N)	Construction	May	2	-	-	-	0.0252	0.0252	0.0252	0.0128	0.0128	0.0130	0.0130	0.0130	0.0130	0.0090	0.0090	0.0120	-	-	-
NO2 (as N)	Construction	Jun	2	-	-	-	0.0244	0.0244	0.0244	0.0128	0.0128	0.0130	0.0130	0.0130	0.0130	0.0090	0.0090	0.0116	-	-	-
NO2 (as N)	Construction	Jul	2	-	-	-	0.0236	0.0236	0.0236	0.0128	0.0128	0.0130	0.0130	0.0130	0.0130	0.0094	0.0094	0.0114	-	-	-
NO2 (as N)	Construction	Aug	2	-	-	-	0.0225	0.0225	0.0225	0.0128	0.0128	0.0130	0.0130	0.0130	0.0130	0.0099	0.0099	0.0116	-	-	-
NO2 (as N)	Construction	Sep	2	-	-	-	0.0212	0.0212	0.0212	0.0128	0.0128	0.0129	0.0130	0.0130	0.0130	0.0094	0.0094	0.0112	-	-	-
NO2 (as N)	Construction	Oct	2	-	-	-	0.0192	0.0192	0.0192	0.0128	0.0128	0.0129	0.0130	0.0130	0.0131	0.0092	0.0092	0.0117	-	-	-
NO2 (as N)	Construction	Nov	2	-	-	-	0.0086	0.0086	0.0086	0.0128	0.0128	0.0129	0.0130	0.0130	0.0131	0.0106	0.0106	0.0127	-	-	-
NO2 (as N)	Construction	Dec	2	-	-	-	-	-	-	0.0127	0.0127	0.0129	0.0130	0.0130	0.0131	0.0118	0.0118	0.0133	-	-	-
NO2 (as N)	Operations	Jan	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0131	0.0801	0.0650	0.0999	-	-	-
NO2 (as N)	Operations	Feb	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0131	0.0457	0.0434	0.0581	-	-	-
NO2 (as N)	Operations	Mar	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0131	0.0262	0.0262	0.0324	-	-	-
NO2 (as N)	Operations	Apr	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0130	0.0274	0.0255	0.0319	-	-	-
NO2 (as N)	Operations	May	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0130	0.0328	0.0286	0.0333	-	-	-
NO2 (as N)	Operations	Jun	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0130	0.0360	0.0332	0.0417	-	-	-
NO2 (as N)	Operations	Jul	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0130	0.0397	0.0373	0.0473	-	-	-
NO2 (as N)	Operations	Aug	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0130	0.0357	0.0348	0.0446	-	-	-
NO2 (as N)	Operations	Sep	5	-	-	-	-	-	-	0.0122	0.0123	0.0126	0.0128	0.0128	0.0129	0.0360	0.0366	0.0488	-	-	-
NO2 (as N)	Operations	Oct	5	-	-	-	-	-	-	0.0122	0.0123	0.0125	0.0129	0.0128	0.0129	0.0490	0.0493	0.0715	-	-	-
NO2 (as N)	Operations	Nov	5	-	-	-	-	-	-	0.0122	0.0123	0.0125	0.0129	0.0128	0.0129	0.0602	0.0612	0.0826	-	-	-
NO2 (as N)	Operations	Dec	5	-	-	-	-	-	-	0.0122	0.0123	0.0125	0.0129	0.0128	0.0129	0.0729	0.0687	0.0896	-	-	-
NO2 (as N)	Closure	Jan	6	-	-	-	-	-	-	0.0127	0.0126	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Feb	6	-	-	-	-	-	-	0.0127	0.0126	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Mar	6	-	-	-	-	-	-	0.0127	0.0126	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Apr	6	-	-	-	-	-	-	0.0128	0.0126	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	May	6	-	-	-	-	-	-	0.0128	0.0126	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Jun	6	-	-	-	-	-	-	0.0128	0.0126	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Jul	6	-	-	-	-	-	-	0.0129	0.0127	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Aug	6	-	-	-	-	-	-	0.0129	0.0127	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Sep	6	-	-	-	-	-	-	0.0129	0.0127	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Oct	6	-	-	-	-	-	-	0.0129	0.0127	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Nov	6	-	-	-	-	-	-	0.0129	0.0127	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Closure	Dec	6	-	-	-	-	-	-	0.0129	0.0127	0.0129	0.0128	0.0128	0.0129	-	-	-	-	-	-
NO2 (as N)	Post-Closure	Jan	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Feb	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Mar	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Apr	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	May	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Jun	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Jul	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Aug	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Sep	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Oct	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Nov	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
NO2 (as N)	Post-Closure	Dec	117	-	-	-	-	-	-	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	-	-	-	0.0099	0.0095	0.0100
N_NO3_NO2	Construction	Jan	2	0.0580	0.0580	0.0580	0.0782	0.0782	0.0782	0.0669	0.0669	0.0672	0.0672	0.0672	0.0672	0.0857	0.0857	0.0857	-	-	-
N_NO3_NO2	Construction	Feb	2	0.0585	0.0585	0.0585	0.0778	0.0778	0.0778	0.0668	0.0668	0.0672	0.0672	0.0672	0.0672	0.1261	0.1261	0.1261	-	-	-
N_NO3_NO2	Construction	Mar	2	0.0593	0.0593	0.0593	0.0774	0.0774	0.0774	0.0667	0.0667	0.0672	0.0672	0.0672	0.0672	0.1140	0.1140	0.1140	-	-	-
N_NO3_NO2	Construction	Apr	2	0.0497	0.0497	0.0497	0.0769	0.0769	0.0769	0.0666	0.0666	0.0672	0.0672	0.0672	0.0672	0.0560	0.0560	0.0988	-	-	-
N_NO3_NO2	Construction	May	2	-	-	-	0.0764	0.0764	0.0764	0.0666	0.0666	0.0672	0.0672	0.0672	0.0672	0.0735	0.0735	0.1183	-	-	-
N_NO3_NO2	Construction	Jun	2	-	-	-	0.0758	0.0758	0.0758	0.0665	0.0665	0.0672	0.0671	0.0671	0.0672	0.0886	0.0886	0.1473	-	-	-
N_NO3_NO2	Construction	Jul	2	-	-	-	0.0752	0.0752	0.0752	0.0665	0.0665	0.0672	0.0671	0.0671	0.0672	0.1026	0.1026	0.1741	-	-	-
N_NO3_NO2	Construction	Aug	2	-	-	-	0.0744	0.0744	0.0744	0.0664	0.0664	0.0672	0.0671	0.0671	0.0672	0.1066	0.1066	0.1812	-	-	-
N_NO3_NO2	Construction	Sep	2	-	-	-	0.0733	0.0733	0.0733	0.0664	0.0664	0.0671	0.0671	0.0671	0.0672	0.1088	0.1088	0.1856	-	-	-
N_NO3_NO2	Construction	Oct	2	-	-	-	0.0714	0.0714	0.0714	0.0663	0.0663	0.0670	0.0671	0.0671	0.0672	0.1127	0.1127	0.1942	-	-	-
N_NO3_NO2	Construction	Nov	2	-	-	-	0.0359	0.0359	0.0359	0.0662	0.0662	0.0669	0.0670	0.0670	0.0672	0.1407	0.1407	0.2370	-	-	-
N_NO3_NO2	Construction	Dec	2	-	-	-	-	-	-	0.0661	0.0661	0.0668	0.0670	0.0670	0.0672	0.1481	0.1481	0.2399	-	-	-
N_NO3_NO2	Operations	Jan	5	-	-	-	-	-	-	0.0636	0.0641	0.0654	0.0703	0.0747	0.0892	3.2970	2.5670	4.1610	-	-	-
N_NO3_NO2	Operations	Feb	5	-	-	-	-	-	-	0.0636	0.0640	0.0654	0.0710	0.0750	0.0895	1.7320	1.5855	2.2680	-	-	-
N_NO3_NO2	Operations	Mar	5	-	-	-	-	-	-	0.0635	0.0639	0.0653	0.0718	0.0754	0.0898	0.7316	0.7587	1.0180	-	-	-
N_NO3_NO2	Operations	Apr	5	-	-	-	-	-	-	0.0634	0.0639	0.0653	0.0726	0.0758	0.0901	0.7627	0.6919	0.9815	-	-	-
N_NO3_NO2	Operations	May	5	-	-	-	-	-	-	0.0634	0.0638	0.0652	0.0734	0.0762	0.0903	1.0350	0.8449	1.0590	-	-	-
N_NO3_NO2	Operations	Jun	5	-	-	-	-	-	-	0.0634	0.0638	0.0652	0.0743	0.0766	0.0905	1.1950	1.0735	1.4580	-	-	-
N_NO3_NO2	Operations	Jul	5	-	-	-	-	-	-	0.0634	0.0638	0.0652	0.0752	0.0769	0.0906	1.3680	1.2731	1.7260	-	-	-
N_NO3_NO2	Operations	Aug	5	-	-	-	-	-	-	0.0635	0.0639	0.0652	0.0762	0.0773	0.0907	1.1900	1.1577	1.6030	-	-	-
N_NO3_NO2	Operations	Sep	5	-	-	-	-	-	-	0.0635	0.0639	0.0652	0.0771	0.0778	0.0907	1.2160	1.2538	1.8070	-	-	-
N_NO3_NO2	Operations	Oct	5	-	-	-	-	-	-	0.0636	0.0639	0.0652	0.0781	0.0782	0.0907	1.9150	1.8718	2.8980	-	-	-
N_NO3_NO2	Operations	Nov	5	-	-	-	-	-	-	0.0636	0.0639	0.0650	0.0791	0.0786	0.0908	2.3750	2.4480	3.4230	-	-	-
N_NO3_NO2	Operations	Dec	5	-	-	-	-	-	-	0.0636	0.0638	0.0649	0.0801	0.0790	0.0907	2.9620	2.7830	3.7180	-	-	-
N_NO3_NO2	Closure	Jan	6	-	-	-	-	-	-	0.0658	0.0655	0.0672	0.0708	0.0753	0.0906	-	-	-	-	-	-
N_NO3_NO2	Closure	Feb	6	-	-	-	-	-	-	0.0660	0.0655	0.0672	0.0703	0.0750	0.0905	-	-	-	-	-	-
N_NO3_NO2	Closure	Mar	6	-	-	-	-	-	-	0.0662	0.0655	0.0672	0.0698	0.0746	0.0903	-	-	-	-	-	-
N_NO3_NO2	Closure	Apr	6	-	-	-	-	-	-	0.0663	0.0656	0.0672	0.0693	0.0743	0.0901	-	-	-	-	-	-
N_NO3_NO2	Closure	May	6	-	-	-	-	-	-	0.0665	0.0656	0.0672	0.0689	0.0740	0.0898	-	-	-	-	-	-
N_NO3_NO2	Closure	Jun	6	-	-	-	-	-	-	0.0666	0.0657	0.0672	0.0685	0.0736	0.0894	-	-	-	-	-	-
N_NO3_NO2	Closure	Jul	6	-	-	-	-	-	-	0.0667	0.0657	0.0672	0.0682	0.0733	0.0890	-	-	-	-	-	-
N_NO3_NO2	Closure	Aug	6	-	-	-	-	-	-	0.0668	0.0658	0.0672	0.0679	0.0729	0.0886	-	-	-	-	-	-
N_NO3_NO2	Closure	Sep	6	-	-	-	-	-	-	0.0669	0.0659	0.0672	0.0677	0.0726	0.0881	-	-	-	-	-	-
N_NO3_NO2	Closure	Oct	6	-	-	-	-	-	-	0.0669	0.0659	0.0672	0.0675	0.0722	0.0877	-	-	-	-	-	-
N_NO3_NO2	Closure	Nov	6	-	-	-	-	-	-	0.0670	0.0660	0.0672	0.0674	0.0719	0.0871	-	-	-	-	-	-
N_NO3_NO2	Closure	Dec	6	-	-	-	-	-	-	0.0670	0.0661	0.0672	0.0672	0.0716	0.0865	-	-	-	-	-	-
N_NO3_NO2	Post-Closure	Jan	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0775
N_NO3_NO2	Post-Closure	Feb	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0775
N_NO3_NO2	Post-Closure	Mar	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0775
N_NO3_NO2	Post-Closure	Apr	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0774
N_NO3_NO2	Post-Closure	May	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0774
N_NO3_NO2	Post-Closure	Jun	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0774
N_NO3_NO2	Post-Closure	Jul	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0736	0.0774
N_NO3_NO2	Post-Closure	Aug	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0738	0.0775
N_NO3_NO2	Post-Closure	Sep	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0733	0.0775
N_NO3_NO2	Post-Closure	Oct	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0736	0.0775
N_NO3_NO2	Post-Closure	Nov	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0735	0.0775
N_NO3_NO2	Post-Closure	Dec	117	-	-	-	-	-	-	0.0672	0.0672	0.0672	0.0672	0.0672	0.0672	-	-	-	0.0765	0.0736	0.0775
CN, Tot	Construction	Jan	2	0.00053	0.00053	0.00053	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00051	0.00051	0.00051	-	-	-
CN, Tot	Construction	Feb	2	0.00053	0.00053	0.00053	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00046	0.00046	0.00046	-	-	-
CN, Tot	Construction	Mar	2	0.00052	0.00052	0.00052	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00038	0.00038	0.00038	-	-	-
CN, Tot	Construction	Apr	2	0.00042	0.00042	0.00042	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00035	0.00035	0.00049	-	-	-
CN, Tot	Construction	May	2	-	-	-	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00046	0.00046	0.00047	-	-	-
CN, Tot	Construction	Jun	2	-	-	-	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00042	0.00042	0.00042	-	-	-
CN, Tot	Construction	Jul	2	-	-	-	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00042	0.00042	0.00045	-	-	-
CN, Tot	Construction	Aug	2	-	-	-	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00045	0.00045	0.00050	-	-	-
CN, Tot	Construction	Sep	2	-	-	-	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00048	0.00048	0.00055	-	-	-
CN, Tot	Construction	Oct	2	-	-	-	0.00050	0.00050	0.00050	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00051	0.00051	0.00059	-	-	-
CN, Tot	Construction	Nov	2	-	-	-	0.00026	0.00026	0.00026	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00065	-	-	-
CN, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00051	0.00051	0.00058	-	-	-
CN, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00032	0.00036	0.00044	-	-	-
CN, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00036	0.00038	0.00044	-	-	-
CN, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00047	0.00046	0.00048	-	-	-
CN, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00048	0.00049	0.00051	-	-	-
CN, Tot	Operations	May	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00046	0.00047	0.00048	-	-	-
CN, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00044	0.00044	0.00045	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CN, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00043	0.00042	0.00043	-	-	-
CN, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00054	0.00044	0.00043	0.00044	-	-	-
CN, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00053	0.00053	0.00046	0.00045	0.00046	-	-	-
CN, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00052	0.00053	0.00044	0.00041	0.00044	-	-	-
CN, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00052	0.00053	0.00038	0.00035	0.00038	-	-	-
CN, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00052	0.00052	0.00053	0.00052	0.00052	0.00053	0.00033	0.00032	0.00033	-	-	-
CN, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00053	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00053	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00053	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00053	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	May	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00054	0.00053	0.00054	0.00053	0.00053	0.00054	-	-	-	-	-	-
CN, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	-	-	-	0.00047	0.00046	0.00047
CN, Free	Construction	Jan	2	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00055	0.00055	0.00056	0.00056	0.00056	0.00056	0.00053	0.00053	0.00053	-	-	-
CN, Free	Construction	Feb	2	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00055	0.00055	0.00056	0.00056	0.00056	0.00056	0.00048	0.00048	0.00048	-	-	-
CN, Free	Construction	Mar	2	0.00051	0.00051	0.00051	0.00050	0.00050	0.00050	0.00055	0.00055	0.00056	0.00056	0.00056	0.00056	0.00040	0.00040	0.00040	-	-	-
CN, Free	Construction	Apr	2	0.00042	0.00042	0.00042	0.00050	0.00050	0.00050	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00036	0.00036	0.00051	-	-	-
CN, Free	Construction	May	2	-	-	-	0.00051	0.00051	0.00051	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00047	0.00047	0.00050	-	-	-
CN, Free	Construction	Jun	2	-	-	-	0.00051	0.00051	0.00051	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00044	0.00044	0.00044	-	-	-
CN, Free	Construction	Jul	2	-	-	-	0.00051	0.00051	0.00051	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00043	0.00043	0.00046	-	-	-
CN, Free	Construction	Aug	2	-	-	-	0.00051	0.00051	0.00051	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00045	0.00045	0.00050	-	-	-
CN, Free	Construction	Sep	2	-	-	-	0.00051	0.00051	0.00051	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00049	0.00049	0.00055	-	-	-
CN, Free	Construction	Oct	2	-	-	-	0.00051	0.00051	0.00051	0.00055	0.00055	0.00056	0.00055	0.00055	0.00056	0.00052	0.00052	0.00059	-	-	-
CN, Free	Construction	Nov	2	-	-	-	0.00027	0.00027	0.00027	0.00055	0.00055	0.00055	0.00055	0.00055	0.00056	0.00055	0.00055	0.00066	-	-	-
CN, Free	Construction	Dec	2	-	-	-	-	-	-	0.00055	0.00055	0.00055	0.00055	0.00055	0.00056	0.00052	0.00052	0.00060	-	-	-
CN, Free	Operations	Jan	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00052	0.00052	0.00054	0.00033	0.00037	0.00046	-	-	-
CN, Free	Operations	Feb	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00052	0.00052	0.00054	0.00038	0.00040	0.00046	-	-	-
CN, Free	Operations	Mar	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00052	0.00052	0.00054	0.00049	0.00048	0.00051	-	-	-
CN, Free	Operations	Apr	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00052	0.00052	0.00054	0.00051	0.00051	0.00053	-	-	-
CN, Free	Operations	May	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00052	0.00052	0.00054	0.00048	0.00049	0.00050	-	-	-
CN, Free	Operations	Jun	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00054	0.00046	0.00046	0.00047	-	-	-
CN, Free	Operations	Jul	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00054	0.00044	0.00044	0.00045	-	-	-
CN, Free	Operations	Aug	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00054	0.00045	0.00044	0.00045	-	-	-
CN, Free	Operations	Sep	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00054	0.00048	0.00047	0.00048	-	-	-
CN, Free	Operations	Oct	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00053	0.00045	0.00042	0.00045	-	-	-
CN, Free	Operations	Nov	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00053	0.00039	0.00036	0.00040	-	-	-
CN, Free	Operations	Dec	5	-	-	-	-	-	-	0.00052	0.00053	0.00054	0.00051	0.00052	0.00053	0.00034	0.00033	0.00034	-	-	-
CN, Free	Closure	Jan	6	-	-	-	-	-	-	0.00054	0.00054	0.00056	0.00052	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Feb	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00052	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Mar	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00052	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Apr	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00053	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	May	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00053	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Jun	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00053	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Jul	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00053	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Aug	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00053	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Sep	6	-	-	-	-	-	-	0.00055	0.00054	0.00056	0.00053	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Oct	6	-	-	-	-	-	-	0.00055	0.00055	0.00056	0.00054	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Nov	6	-	-	-	-	-	-	0.00055	0.00055	0.00056	0.00054	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Closure	Dec	6	-	-	-	-	-	-	0.00055	0.00055	0.00056	0.00054	0.00053	0.00055	-	-	-	-	-	-
CN, Free	Post-Closure	Jan	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Feb	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Mar	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Apr	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	May	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Jun	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Jul	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Aug	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Sep	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Oct	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Nov	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
CN, Free	Post-Closure	Dec	117	-	-	-	-	-	-	0.00056	0.00056	0.00056	0.00056	0.00056	0.00056	-	-	-	0.00041	0.00039	0.00041
Al, Tot	Construction	Jan	2	0.007	0.007	0.007	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.016	0.016	0.016	-	-	-
Al, Tot	Construction	Feb	2	0.007	0.007	0.007	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.013	0.013	0.013	-	-	-
Al, Tot	Construction	Mar	2	0.006	0.006	0.006	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.014	0.014	0.014	-	-	-
Al, Tot	Construction	Apr	2	0.005	0.005	0.005	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.015	0.015	0.021	-	-	-
Al, Tot	Construction	May	2	-	-	-	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.029	0.029	0.046	-	-	-
Al, Tot	Construction	Jun	2	-	-	-	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.033	0.033	0.049	-	-	-
Al, Tot	Construction	Jul	2	-	-	-	0.006	0.006	0.006	0.004	0.004	0.005	0.004	0.004	0.004	0.038	0.038	0.054	-	-	-
Al, Tot	Construction	Aug	2	-	-	-	0.006	0.006	0.006	0.004	0.004	0.005	0.004	0.004	0.004	0.040	0.040	0.058	-	-	-
Al, Tot	Construction	Sep	2	-	-	-	0.006	0.006	0.006	0.004	0.004	0.005	0.004	0.004	0.004	0.038	0.038	0.057	-	-	-
Al, Tot	Construction	Oct	2	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.036	0.036	0.054	-	-	-
Al, Tot	Construction	Nov	2	-	-	-	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.033	0.033	0.047	-	-	-
Al, Tot	Construction	Dec	2	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	0.020	0.020	0.025	-	-	-
Al, Tot	Operations	Jan	5	-	-	-	-	-	-	0.005	0.004	0.005	0.004	0.004	0.004	0.053	0.044	0.063	-	-	-
Al, Tot	Operations	Feb	5	-	-	-	-	-	-	0.005	0.004	0.005	0.004	0.004	0.004	0.030	0.028	0.035	-	-	-
Al, Tot	Operations	Mar	5	-	-	-	-	-	-	0.005	0.004	0.005	0.004	0.004	0.004	0.016	0.016	0.019	-	-	-
Al, Tot	Operations	Apr	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.014	0.014	0.016	-	-	-
Al, Tot	Operations	May	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.017	0.017	0.019	-	-	-
Al, Tot	Operations	Jun	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.021	0.022	0.025	-	-	-
Al, Tot	Operations	Jul	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.026	0.027	0.032	-	-	-
Al, Tot	Operations	Aug	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.026	0.027	0.031	-	-	-
Al, Tot	Operations	Sep	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.027	0.029	0.035	-	-	-
Al, Tot	Operations	Oct	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.037	0.041	0.052	-	-	-
Al, Tot	Operations	Nov	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.049	0.051	0.057	-	-	-
Al, Tot	Operations	Dec	5	-	-	-	-	-	-	0.005	0.005	0.005	0.004	0.004	0.004	0.057	0.055	0.057	-	-	-
Al, Tot	Closure	Jan	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Feb	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Mar	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Apr	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	May	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Jun	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Jul	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Aug	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Sep	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Oct	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Nov	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Closure	Dec	6	-	-	-	-	-	-	0.004	0.004	0.005	0.004	0.004	0.004	-	-	-	-	-	-
Al, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.028	0.031
Al, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.027	0.031
Al, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.027	0.031
Al, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.028	0.027	0.031
Al, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.028	0.027	0.031
Al, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.028	0.028	0.032
Al, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.028	0.031
Al, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.028	0.031
Al, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.027	0.031
Al, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.028	0.031
Al, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.028	0.031
Al, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.004	0.004	0.004	0.004	0.004	0.004	-	-	-	0.029	0.028	0.031
Sb, Diss	Construction	Jan	2	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	-	-	-
Sb, Diss	Construction	Feb	2	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00008	-	-	-
Sb, Diss	Construction	Mar	2	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00008	-	-	-
Sb, Diss	Construction	Apr	2	0.00006	0.00006	0.00006	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00009	-	-	-
Sb, Diss	Construction	May	2	-	-	-	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00013	0.00013	0.00019	-	-	-
Sb, Diss	Construction	Jun	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00013	0.00013	0.00017	-	-	-
Sb, Diss	Construction	Jul	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00013	0.00013	0.00015	-	-	-
Sb, Diss	Construction	Aug	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00012	0.00012	0.00014	-	-	-
Sb, Diss	Construction	Sep	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00011	0.00012	-	-	-
Sb, Diss	Construction	Oct	2	-	-	-	0.00006	0.00006	0.00006	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00011	0.00012	-	-	-
Sb, Diss	Construction	Nov	2	-	-	-	0.00003	0.00003	0.00003	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00011	0.00011	-	-	-
Sb, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00009	0.00009	0.00010	-	-	-
Sb, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00157	0.00177	0.00379	-	-	-
Sb, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00096	0.00108	0.00219	-	-	-
Sb, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00061	0.00055	0.00090	-	-	-
Sb, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00060	0.00053	0.00084	-	-	-
Sb, Diss	Operations	May	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00068	0.00068	0.00109	-	-	-
Sb, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00084	0.00092	0.00162	-	-	-
Sb, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00107	0.00112	0.00192	-	-	-
Sb, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00099	0.00102	0.00171	-	-	-
Sb, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00108	0.00111	0.00179	-	-	-
Sb, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00152	0.00158	0.00244	-	-	-
Sb, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00211	0.00209	0.00331	-	-	-
Sb, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00253	0.00241	0.00390	-	-	-
Sb, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00009	-	-	-	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sb, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	May	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00097	0.00103
Sb, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00097	0.00103
Sb, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00097	0.00103
Sb, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Construction	Jan	2	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	-	-	-
Sb, Tot	Construction	Feb	2	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00008	-	-	-
Sb, Tot	Construction	Mar	2	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00008	-	-	-
Sb, Tot	Construction	Apr	2	0.00006	0.00006	0.00006	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00009	-	-	-
Sb, Tot	Construction	May	2	-	-	-	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00013	0.00013	0.00019	-	-	-
Sb, Tot	Construction	Jun	2	-	-	-	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00014	0.00014	0.00018	-	-	-
Sb, Tot	Construction	Jul	2	-	-	-	0.00008	0.00008	0.00008	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00013	0.00013	0.00016	-	-	-
Sb, Tot	Construction	Aug	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00012	0.00012	0.00014	-	-	-
Sb, Tot	Construction	Sep	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00012	0.00012	0.00013	-	-	-
Sb, Tot	Construction	Oct	2	-	-	-	0.00007	0.00007	0.00007	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00011	0.00011	0.00012	-	-	-
Sb, Tot	Construction	Nov	2	-	-	-	0.00003	0.00003	0.00003	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00011	0.00011	0.00012	-	-	-
Sb, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00009	0.00009	0.00010	-	-	-
Sb, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00158	0.00177	0.00380	-	-	-
Sb, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00007	0.00096	0.00109	0.00220	-	-	-
Sb, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00061	0.00055	0.00090	-	-	-
Sb, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00060	0.00053	0.00084	-	-	-
Sb, Tot	Operations	May	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00068	0.00068	0.00109	-	-	-
Sb, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00085	0.00092	0.00162	-	-	-
Sb, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00108	0.00112	0.00193	-	-	-
Sb, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00006	0.00008	0.00099	0.00102	0.00171	-	-	-
Sb, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00008	0.00109	0.00111	0.00179	-	-	-
Sb, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00008	0.00152	0.00158	0.00245	-	-	-
Sb, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00008	0.00211	0.00209	0.00332	-	-	-
Sb, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00008	0.00253	0.00241	0.00390	-	-	-
Sb, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Closure	May	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00009	-	-	-	-	-	-
Sb, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00006	0.00007	0.00010	-	-	-	-	-	-
Sb, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00099	0.00103
Sb, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
Sb, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00103	0.00098	0.00103
As, Diss	Construction	Jan	2	0.0029	0.0029	0.0029	0.0026	0.0026	0.0026	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	-	-	-
As, Diss	Construction	Feb	2	0.0028	0.0028	0.0028	0.0025	0.0025	0.0025	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0007	-	-	-
As, Diss	Construction	Mar	2	0.0026	0.0026	0.0026	0.0024	0.0024	0.0024	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0008	-	-	-
As, Diss	Construction	Apr	2	0.0017	0.0017	0.0017	0.0023	0.0023	0.0023	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0009	-	-	-
As, Diss	Construction	May	2	-	-	-	0.0023	0.0023	0.0023	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0012	0.0012	0.0017	-	-	-
As, Diss	Construction	Jun	2	-	-	-	0.0022	0.0022	0.0022	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0012	0.0012	0.0015	-	-	-
As, Diss	Construction	Jul	2	-	-	-	0.0020	0.0020	0.0020	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0012	0.0012	0.0014	-	-	-
As, Diss	Construction	Aug	2	-	-	-	0.0019	0.0019	0.0019	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0011	0.0011	0.0012	-	-	-
As, Diss	Construction	Sep	2	-	-	-	0.0017	0.0017	0.0017	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0011	0.0011	0.0011	-	-	-
As, Diss	Construction	Oct	2	-	-	-	0.0015	0.0015	0.0015	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0010	0.0010	0.0010	-	-	-
As, Diss	Construction	Nov	2	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0010	0.0010	0.0011	-	-	-
As, Diss	Construction	Dec	2	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0009	0.0009	0.0010	-	-	-
As, Diss	Operations	Jan	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0165	0.0162	0.0297	-	-	-
As, Diss	Operations	Feb	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0100	0.0096	0.0162	-	-	-
As, Diss	Operations	Mar	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0055	0.0046	0.0064	-	-	-
As, Diss	Operations	Apr	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0052	0.0044	0.0063	-	-	-
As, Diss	Operations	May	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0066	0.0055	0.0080	-	-	-
As, Diss	Operations	Jun	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0088	0.0073	0.0099	-	-	-
As, Diss	Operations	Jul	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0113	0.0093	0.0125	-	-	-
As, Diss	Operations	Aug	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0104	0.0089	0.0119	-	-	-
As, Diss	Operations	Sep	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0114	0.0098	0.0129	-	-	-
As, Diss	Operations	Oct	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0160	0.0142	0.0177	-	-	-
As, Diss	Operations	Nov	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0221	0.0186	0.0238	-	-	-
As, Diss	Operations	Dec	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0261	0.0209	0.0275	-	-	-
As, Diss	Closure	Jan	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Feb	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Mar	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Apr	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	May	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Jun	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Jul	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Aug	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Sep	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Oct	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Nov	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Closure	Dec	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0048	0.0046	0.0048
As, Tot	Construction	Jan	2	0.0032	0.0032	0.0032	0.0027	0.0027	0.0027	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0008	0.0008	0.0008	-	-	-
As, Tot	Construction	Feb	2	0.0030	0.0030	0.0030	0.0027	0.0027	0.0027	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0009	0.0009	0.0009	-	-	-
As, Tot	Construction	Mar	2	0.0028	0.0028	0.0028	0.0026	0.0026	0.0026	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0010	0.0010	0.0010	-	-	-
As, Tot	Construction	Apr	2	0.0018	0.0018	0.0018	0.0025	0.0025	0.0025	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0009	0.0009	0.0010	-	-	-
As, Tot	Construction	May	2	-	-	-	0.0024	0.0024	0.0024	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0015	0.0015	0.0020	-	-	-
As, Tot	Construction	Jun	2	-	-	-	0.0023	0.0023	0.0023	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0015	0.0015	0.0019	-	-	-
As, Tot	Construction	Jul	2	-	-	-	0.0022	0.0022	0.0022	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0015	0.0015	0.0017	-	-	-
As, Tot	Construction	Aug	2	-	-	-	0.0020	0.0020	0.0020	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0014	0.0014	0.0016	-	-	-
As, Tot	Construction	Sep	2	-	-	-	0.0018	0.0018	0.0018	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0014	0.0014	0.0015	-	-	-
As, Tot	Construction	Oct	2	-	-	-	0.0016	0.0016	0.0016	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0013	0.0013	0.0014	-	-	-
As, Tot	Construction	Nov	2	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0013	0.0013	0.0013	-	-	-
As, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0011	0.0011	0.0012	-	-	-
As, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0168	0.0165	0.0301	-	-	-
As, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0102	0.0098	0.0164	-	-	-
As, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0056	0.0047	0.0065	-	-	-
As, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0053	0.0045	0.0064	-	-	-
As, Tot	Operations	May	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0067	0.0056	0.0081	-	-	-
As, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0090	0.0075	0.0100	-	-	-
As, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0114	0.0095	0.0127	-	-	-
As, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0106	0.0091	0.0121	-	-	-
As, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0116	0.0101	0.0131	-	-	-
As, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0162	0.0145	0.0180	-	-	-
As, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	0.0225	0.0189	0.0241	-	-	-
As, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	0.0265	0.0213	0.0278	-	-	-
As, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0007	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	May	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-
As, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0007	0.0008	-	-	-	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
As, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
As, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	-	-	-	0.0050	0.0048	0.0050
Ba, Tot	Construction	Jan	2	0.0314	0.0314	0.0314	0.0269	0.0269	0.0269	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	0.0223	0.0223	0.0223	-	-	-
Ba, Tot	Construction	Feb	2	0.0310	0.0310	0.0310	0.0268	0.0268	0.0268	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	0.0216	0.0216	0.0216	-	-	-
Ba, Tot	Construction	Mar	2	0.0302	0.0302	0.0302	0.0267	0.0267	0.0267	0.0213	0.0213	0.0213	0.0213	0.0213	0.0214	0.0188	0.0188	0.0188	-	-	-
Ba, Tot	Construction	Apr	2	0.0231	0.0231	0.0231	0.0266	0.0266	0.0266	0.0213	0.0213	0.0213	0.0213	0.0213	0.0214	0.0174	0.0174	0.0229	-	-	-
Ba, Tot	Construction	May	2	-	-	-	0.0264	0.0264	0.0264	0.0213	0.0213	0.0213	0.0214	0.0214	0.0214	0.0229	0.0229	0.0235	-	-	-
Ba, Tot	Construction	Jun	2	-	-	-	0.0262	0.0262	0.0262	0.0212	0.0212	0.0213	0.0214	0.0214	0.0214	0.0203	0.0203	0.0205	-	-	-
Ba, Tot	Construction	Jul	2	-	-	-	0.0261	0.0261	0.0261	0.0212	0.0212	0.0213	0.0214	0.0214	0.0214	0.0183	0.0183	0.0186	-	-	-
Ba, Tot	Construction	Aug	2	-	-	-	0.0259	0.0259	0.0259	0.0212	0.0212	0.0213	0.0214	0.0214	0.0214	0.0178	0.0178	0.0178	-	-	-
Ba, Tot	Construction	Sep	2	-	-	-	0.0255	0.0255	0.0255	0.0212	0.0212	0.0213	0.0214	0.0214	0.0215	0.0173	0.0173	0.0176	-	-	-
Ba, Tot	Construction	Oct	2	-	-	-	0.0250	0.0250	0.0250	0.0212	0.0212	0.0213	0.0214	0.0214	0.0215	0.0174	0.0174	0.0187	-	-	-
Ba, Tot	Construction	Nov	2	-	-	-	0.0126	0.0126	0.0126	0.0212	0.0212	0.0213	0.0214	0.0214	0.0215	0.0197	0.0197	0.0204	-	-	-
Ba, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0212	0.0212	0.0213	0.0214	0.0214	0.0215	0.0216	0.0216	0.0230	-	-	-
Ba, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0210	0.0210	0.0212	0.0216	0.0216	0.0217	0.0389	0.0440	0.0737	-	-	-
Ba, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0210	0.0210	0.0212	0.0216	0.0216	0.0218	0.0317	0.0345	0.0502	-	-	-
Ba, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0210	0.0210	0.0212	0.0216	0.0216	0.0218	0.0310	0.0294	0.0361	-	-	-
Ba, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0210	0.0210	0.0212	0.0216	0.0216	0.0218	0.0317	0.0308	0.0362	-	-	-
Ba, Tot	Operations	May	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0216	0.0218	0.0314	0.0317	0.0388	-	-	-
Ba, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0216	0.0218	0.0336	0.0341	0.0454	-	-	-
Ba, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0217	0.0216	0.0219	0.0361	0.0360	0.0491	-	-	-
Ba, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0216	0.0219	0.0349	0.0346	0.0458	-	-	-
Ba, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0216	0.0219	0.0364	0.0359	0.0471	-	-	-
Ba, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0217	0.0219	0.0416	0.0406	0.0556	-	-	-
Ba, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0217	0.0219	0.0486	0.0465	0.0668	-	-	-
Ba, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0210	0.0210	0.0211	0.0216	0.0217	0.0220	0.0541	0.0514	0.0747	-	-	-
Ba, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0212	0.0211	0.0213	0.0216	0.0217	0.0222	-	-	-	-	-	-
Ba, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0212	0.0212	0.0213	0.0216	0.0217	0.0222	-	-	-	-	-	-
Ba, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0212	0.0212	0.0213	0.0215	0.0216	0.0222	-	-	-	-	-	-
Ba, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0212	0.0212	0.0213	0.0215	0.0216	0.0222	-	-	-	-	-	-
Ba, Tot	Closure	May	6	-	-	-	-	-	-	0.0212	0.0212	0.0213	0.0215	0.0216	0.0222	-	-	-	-	-	-
Ba, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0212	0.0212	0.0213	0.0215	0.0216	0.0222	-	-	-	-	-	-
Ba, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0213	0.0212	0.0213	0.0214	0.0216	0.0221	-	-	-	-	-	-
Ba, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0213	0.0212	0.0213	0.0214	0.0216	0.0221	-	-	-	-	-	-
Ba, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0213	0.0212	0.0213	0.0214	0.0216	0.0221	-	-	-	-	-	-
Ba, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0213	0.0212	0.0213	0.0214	0.0216	0.0221	-	-	-	-	-	-
Ba, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0213	0.0212	0.0213	0.0214	0.0216	0.0221	-	-	-	-	-	-
Ba, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0213	0.0212	0.0213	0.0214	0.0216	0.0222	-	-	-	-	-	-
Ba, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0474	0.0486
Ba, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0474	0.0486
Ba, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0474	0.0486
Ba, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0474	0.0486
Ba, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0474	0.0485
Ba, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0474	0.0486
Ba, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0485	0.0475	0.0486
Ba, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0486	0.0476	0.0487
Ba, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0486	0.0473	0.0487
Ba, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0486	0.0475	0.0487
Ba, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0486	0.0474	0.0487
Ba, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0213	0.0213	0.0213	0.0213	0.0213	0.0213	-	-	-	0.0486	0.0474	0.0487
B, Tot	Construction	Jan	2	0.0603	0.0603	0.0603	0.0435	0.0435	0.0435	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	0.0085	0.0085	0.0085	-	-	-
B, Tot	Construction	Feb	2	0.0574	0.0574	0.0574	0.0424	0.0424	0.0424	0.0095	0.0095	0.0095	0.0095	0.0095	0.0096	0.0086	0.0086	0.0086	-	-	-
B, Tot	Construction	Mar	2	0.0528	0.0528	0.0528	0.0412	0.0412	0.0412	0.0095	0.0095	0.0095	0.0095	0.0095	0.0096	0.0079	0.0079	0.0079	-	-	-
B, Tot	Construction	Apr	2	0.0336	0.0336	0.0336	0.0398	0.0398	0.0398	0.0094	0.0094	0.0095	0.0096	0.0096	0.0097	0.0069	0.0069	0.0090	-	-	-
B, Tot	Construction	May	2	-	-	-	0.0383	0.0383	0.0383	0.0094	0.0094	0.0095	0.0096	0.0096	0.0097	0.0096	0.0096	0.0099	-	-	-
B, Tot	Construction	Jun	2	-	-	-	0.0367	0.0367	0.0367	0.0094	0.0094	0.0095	0.0096	0.0096	0.0098	0.0092	0.0092	0.0094	-	-	-
B, Tot	Construction	Jul	2	-	-	-	0.0348	0.0348	0.0348	0.0094	0.0094	0.0095	0.0097	0.0097	0.0099	0.0088	0.0088	0.0089	-	-	-
B, Tot	Construction	Aug	2	-	-	-	0.0325	0.0325	0.0325	0.0094	0.0094	0.0095	0.0097	0.0097	0.0099	0.0084	0.0084	0.0088	-	-	-
B, Tot	Construction	Sep	2	-	-	-	0.0296	0.0296	0.0296	0.0094	0.0094	0.0095	0.0097	0.0097	0.0100	0.0081	0.0081	0.0088	-	-	-
B, Tot	Construction	Oct	2	-	-	-	0.0253	0.0253	0.0253	0.0094	0.0094	0.0095	0.0098	0.0098	0.0101	0.0081	0.0081	0.0091	-	-	-
B, Tot	Construction	Nov	2	-	-	-	0.0103	0.0103	0.0103	0.0094	0.0094	0.0095	0.0098	0.0098	0.0101	0.0089	0.0089	0.0093	-	-	-
B, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0099	0.0099	0.0102	0.0090	0.0090	0.0092	-	-	-
B, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0102	0.0102	0.0106	0.0732	0.0827	0.1721	-	-	-
B, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0102	0.0102	0.0106	0.0469	0.0528	0.1017	-	-	-
B, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0102	0.0102	0.0106	0.0330	0.0300	0.0459	-	-	-
B, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0102	0.0102	0.0107	0.0329	0.0298	0.0439	-	-	-
B, Tot	Operations	May	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0103	0.0103	0.0107	0.0360	0.0363	0.0546	-	-	-
B, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0103	0.0103	0.0108	0.0434	0.0464	0.0776	-	-	-
B, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0092	0.0093	0.0094	0.0103	0.0103	0.0108	0.0532	0.0549	0.0908	-	-	-
B, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0092	0.0093	0.0093	0.0103	0.0103	0.0109	0.0495	0.0505	0.0811	-	-	-
B, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0092	0.0093	0.0093	0.0103	0.0103	0.0109	0.0537	0.0543	0.0846	-	-	-
B, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0092	0.0093	0.0093	0.0103	0.0103	0.0109	0.0726	0.0744	0.1134	-	-	-
B, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0092	0.0093	0.0094	0.0102	0.0103	0.0110	0.0979	0.0964	0.1511	-	-	-
B, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0093	0.0093	0.0094	0.0102	0.0103	0.0110	0.1160	0.1102	0.1763	-	-	-
B, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0104	0.0104	0.0116	-	-	-	-	-	-
B, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0104	0.0104	0.0116	-	-	-	-	-	-
B, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0103	0.0104	0.0116	-	-	-	-	-	-
B, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0102	0.0104	0.0116	-	-	-	-	-	-
B, Tot	Closure	May	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0101	0.0104	0.0116	-	-	-	-	-	-
B, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0101	0.0103	0.0115	-	-	-	-	-	-
B, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0100	0.0103	0.0115	-	-	-	-	-	-
B, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0100	0.0103	0.0114	-	-	-	-	-	-
B, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0094	0.0094	0.0095	0.0099	0.0103	0.0114	-	-	-	-	-	-
B, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0095	0.0094	0.0095	0.0099	0.0102	0.0115	-	-	-	-	-	-
B, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0095	0.0094	0.0095	0.0098	0.0102	0.0115	-	-	-	-	-	-
B, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0095	0.0094	0.0095	0.0098	0.0102	0.0115	-	-	-	-	-	-
B, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0716	0.0684	0.0718
B, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0716	0.0684	0.0718
B, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0715	0.0683	0.0717
B, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0715	0.0683	0.0717
B, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0715	0.0683	0.0717
B, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0715	0.0684	0.0717
B, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0716	0.0686	0.0718
B, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0717	0.0688	0.0719
B, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0717	0.0683	0.0719
B, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0717	0.0685	0.0719
B, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0717	0.0685	0.0719
B, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0095	0.0095	0.0095	0.0095	0.0095	0.0095	-	-	-	0.0716	0.0684	0.0719
Cd, Diss	Construction	Jan	2	0.000006	0.000006	0.000006	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Cd, Diss	Construction	Feb	2	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Cd, Diss	Construction	Mar	2	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Cd, Diss	Construction	Apr	2	0.000005	0.000005	0.000005	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000006	-	-	-
Cd, Diss	Construction	May	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Cd, Diss	Construction	Jun	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Cd, Diss	Construction	Jul	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Cd, Diss	Construction	Aug	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Cd, Diss	Construction	Sep	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Cd, Diss	Construction	Oct	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Cd, Diss	Construction	Nov	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Cd, Diss	Construction	Dec	2	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Cd, Diss	Operations	Jan	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000013	0.000022	-	-	-
Cd, Diss	Operations	Feb	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000010	0.000015	-	-	-
Cd, Diss	Operations	Mar	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000008	0.000011	-	-	-
Cd, Diss	Operations	Apr	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000011	-	-	-
Cd, Diss	Operations	May	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000012	-	-	-
Cd, Diss	Operations	Jun	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000010	0.000014	-	-	-
Cd, Diss	Operations	Jul	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000011	0.000015	-	-	-
Cd, Diss	Operations	Aug	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000010	0.000014	-	-	-
Cd, Diss	Operations	Sep	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000011	0.000014	-	-	-
Cd, Diss	Operations	Oct	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000012	0.000012	0.000017	-	-	-
Cd, Diss	Operations	Nov	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000015	0.000014	0.000021	-	-	-
Cd, Diss	Operations	Dec	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000016	0.000015	0.000023	-	-	-
Cd, Diss	Closure	Jan	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Feb	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Mar	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Apr	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	May	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Jun	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Jul	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Aug	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Sep	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Oct	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Nov	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Closure	Dec	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cd, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000009	0.000009	0.000009
Cd, Tot	Construction	Jan	2	0.000006	0.000006	0.000006	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	0.000008	0.000008	-	-	-
Cd, Tot	Construction	Feb	2	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	0.000008	0.000008	-	-	-
Cd, Tot	Construction	Mar	2	0.000006	0.000006	0.000006	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	0.000008	0.000008	-	-	-
Cd, Tot	Construction	Apr	2	0.000005	0.000005	0.000005	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	-	-	-
Cd, Tot	Construction	May	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000010	0.000012	-	-	-
Cd, Tot	Construction	Jun	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000010	-	-	-
Cd, Tot	Construction	Jul	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000010	-	-	-
Cd, Tot	Construction	Aug	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000009	-	-	-
Cd, Tot	Construction	Sep	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	0.000008	0.000009	-	-	-
Cd, Tot	Construction	Oct	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	0.000008	0.000008	-	-	-
Cd, Tot	Construction	Nov	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000009	-	-	-
Cd, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000008	0.000008	0.000008	-	-	-
Cd, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000016	0.000017	0.000028	-	-	-
Cd, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000012	0.000012	0.000018	-	-	-
Cd, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000010	0.000012	-	-	-
Cd, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000010	0.000012	-	-	-
Cd, Tot	Operations	May	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000011	0.000013	-	-	-
Cd, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000012	0.000015	-	-	-
Cd, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000013	0.000013	0.000017	-	-	-
Cd, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000012	0.000013	0.000016	-	-	-
Cd, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000013	0.000013	0.000017	-	-	-
Cd, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000015	0.000016	0.000020	-	-	-
Cd, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000019	0.000018	0.000025	-	-	-
Cd, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000021	0.000020	0.000028	-	-	-
Cd, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	May	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Cd, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000012	0.000011	0.000012
Cd, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000012	0.000011	0.000012
Cd, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000012	0.000011	0.000012
Cd, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cd, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000011	0.000011	0.000011
Cr, Diss	Construction	Jan	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00014	0.00014	0.00014	-	-	-
Cr, Diss	Construction	Feb	2	0.00006	0.00006	0.00006	0.00006	0.00006	0.00006	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00014	0.00014	0.00014	-	-	-
Cr, Diss	Construction	Mar	2	0.00007	0.00007	0.00007	0.00006	0.00006	0.00006	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00011	0.00011	0.00011	-	-	-
Cr, Diss	Construction	Apr	2	0.00008	0.00008	0.00008	0.00006	0.00006	0.00006	0.00018	0.00018	0.00019	0.00019	0.00019	0.00019	0.00009	0.00009	0.00015	-	-	-
Cr, Diss	Construction	May	2	-	-	-	0.00007	0.00007	0.00007	0.00018	0.00018	0.00019	0.00019	0.00019	0.00019	0.00012	0.00012	0.00015	-	-	-
Cr, Diss	Construction	Jun	2	-	-	-	0.00007	0.00007	0.00007	0.00018	0.00018	0.00019	0.00019	0.00019	0.00019	0.00012	0.00012	0.00014	-	-	-
Cr, Diss	Construction	Jul	2	-	-	-	0.00008	0.00008	0.00008	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00012	-	-	-
Cr, Diss	Construction	Aug	2	-	-	-	0.00009	0.00009	0.00009	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00012	-	-	-
Cr, Diss	Construction	Sep	2	-	-	-	0.00010	0.00010	0.00010	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00011	-	-	-
Cr, Diss	Construction	Oct	2	-	-	-	0.00011	0.00011	0.00011	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00012	-	-	-
Cr, Diss	Construction	Nov	2	-	-	-	0.00006	0.00006	0.00006	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00012	0.00012	0.00012	-	-	-
Cr, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00013	0.00013	0.00014	-	-	-
Cr, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00017	0.00017	0.00018	0.00015	0.00018	0.00024	-	-	-
Cr, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00015	0.00016	0.00019	-	-	-
Cr, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00017	0.00016	0.00019	-	-	-
Cr, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00017	0.00017	0.00019	-	-	-
Cr, Diss	Operations	May	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00017	0.00018	0.00020	-	-	-
Cr, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00017	0.00018	0.00018	0.00021	-	-	-
Cr, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00017	0.00018	0.00018	0.00022	-	-	-
Cr, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00017	0.00018	0.00017	0.00021	-	-	-
Cr, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00018	0.00018	0.00021	-	-	-
Cr, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00019	0.00017	0.00023	-	-	-
Cr, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00019	0.00018	0.00024	-	-	-
Cr, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00019	0.00019	0.00026	-	-	-
Cr, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	May	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00017	0.00018	-	-	-	-	-	-
Cr, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Construction	Jan	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00014	0.00014	0.00014	-	-	-
Cr (VI), Diss	Construction	Feb	2	0.00006	0.00006	0.00006	0.00006	0.00006	0.00006	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00014	0.00014	0.00014	-	-	-
Cr (VI), Diss	Construction	Mar	2	0.00007	0.00007	0.00007	0.00006	0.00006	0.00006	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00011	0.00011	0.00011	-	-	-
Cr (VI), Diss	Construction	Apr	2	0.00008	0.00008	0.00008	0.00006	0.00006	0.00006	0.00018	0.00018	0.00019	0.00019	0.00019	0.00019	0.00009	0.00009	0.00015	-	-	-
Cr (VI), Diss	Construction	May	2	-	-	-	0.00007	0.00007	0.00007	0.00018	0.00018	0.00019	0.00019	0.00019	0.00019	0.00012	0.00012	0.00015	-	-	-
Cr (VI), Diss	Construction	Jun	2	-	-	-	0.00007	0.00007	0.00007	0.00018	0.00018	0.00019	0.00019	0.00019	0.00019	0.00012	0.00012	0.00014	-	-	-
Cr (VI), Diss	Construction	Jul	2	-	-	-	0.00008	0.00008	0.00008	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00012	-	-	-
Cr (VI), Diss	Construction	Aug	2	-	-	-	0.00009	0.00009	0.00009	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00012	-	-	-
Cr (VI), Diss	Construction	Sep	2	-	-	-	0.00010	0.00010	0.00010	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00011	-	-	-
Cr (VI), Diss	Construction	Oct	2	-	-	-	0.00011	0.00011	0.00011	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00011	0.00011	0.00012	-	-	-
Cr (VI), Diss	Construction	Nov	2	-	-	-	0.00006	0.00006	0.00006	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00012	0.00012	0.00012	-	-	-
Cr (VI), Diss	Construction	Dec	2	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00018	0.00018	0.00019	0.00013	0.00013	0.00014	-	-	-
Cr (VI), Diss	Operations	Jan	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00017	0.00017	0.00018	0.00015	0.00018	0.00024	-	-	-
Cr (VI), Diss	Operations	Feb	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00015	0.00016	0.00019	-	-	-
Cr (VI), Diss	Operations	Mar	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00017	0.00016	0.00019	-	-	-
Cr (VI), Diss	Operations	Apr	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00017	0.00017	0.00019	-	-	-
Cr (VI), Diss	Operations	May	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00018	0.00017	0.00018	0.00020	-	-	-
Cr (VI), Diss	Operations	Jun	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00017	0.00018	0.00018	0.00021	-	-	-
Cr (VI), Diss	Operations	Jul	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00017	0.00018	0.00018	0.00022	-	-	-
Cr (VI), Diss	Operations	Aug	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00017	0.00017	0.00018	0.00017	0.00021	-	-	-
Cr (VI), Diss	Operations	Sep	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00018	0.00018	0.00021	-	-	-
Cr (VI), Diss	Operations	Oct	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00019	0.00017	0.00023	-	-	-
Cr (VI), Diss	Operations	Nov	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00019	0.00018	0.00024	-	-	-
Cr (VI), Diss	Operations	Dec	5	-	-	-	-	-	-	0.00017	0.00017	0.00018	0.00016	0.00016	0.00017	0.00019	0.00019	0.00026	-	-	-
Cr (VI), Diss	Closure	Jan	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Feb	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Mar	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Apr	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	May	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Jun	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Jul	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Aug	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Sep	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Oct	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Nov	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Closure	Dec	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00017	0.00018	-	-	-	-	-	-
Cr (VI), Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr (VI), Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00025	0.00025	0.00028
Cr, Tot	Construction	Jan	2	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00033	0.00033	0.00033	-	-	-
Cr, Tot	Construction	Feb	2	0.00008	0.00008	0.00008	0.00009	0.00009	0.00009	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00034	0.00034	0.00034	-	-	-
Cr, Tot	Construction	Mar	2	0.00009	0.00009	0.00009	0.00009	0.00009	0.00009	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00038	0.00038	0.00038	-	-	-
Cr, Tot	Construction	Apr	2	0.00009	0.00009	0.00009	0.00009	0.00009	0.00009	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00046	0.00046	0.00064	-	-	-
Cr, Tot	Construction	May	2	-	-	-	0.00010	0.00010	0.00010	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00071	0.00071	0.00119	-	-	-
Cr, Tot	Construction	Jun	2	-	-	-	0.00010	0.00010	0.00010	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00058	0.00058	0.00090	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cr, Tot	Construction	Jul	2	-	-	-	0.00010	0.00010	0.00010	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00049	0.00049	0.00067	-	-	-
Cr, Tot	Construction	Aug	2	-	-	-	0.00011	0.00011	0.00011	0.00019	0.00019	0.00019	0.00018	0.00018	0.00019	0.00043	0.00043	0.00055	-	-	-
Cr, Tot	Construction	Sep	2	-	-	-	0.00012	0.00012	0.00012	0.00019	0.00019	0.00019	0.00018	0.00018	0.00019	0.00039	0.00039	0.00049	-	-	-
Cr, Tot	Construction	Oct	2	-	-	-	0.00012	0.00012	0.00012	0.00019	0.00019	0.00019	0.00018	0.00018	0.00019	0.00037	0.00037	0.00045	-	-	-
Cr, Tot	Construction	Nov	2	-	-	-	0.00007	0.00007	0.00007	0.00019	0.00019	0.00019	0.00018	0.00018	0.00019	0.00040	0.00040	0.00047	-	-	-
Cr, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00018	0.00018	0.00019	0.00036	0.00036	0.00038	-	-	-
Cr, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00055	0.00053	0.00073	-	-	-
Cr, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00038	0.00039	0.00047	-	-	-
Cr, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00030	0.00032	0.00039	-	-	-
Cr, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00031	0.00030	0.00032	-	-	-
Cr, Tot	Operations	May	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00026	0.00026	0.00029	-	-	-
Cr, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00028	0.00029	0.00032	-	-	-
Cr, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00032	0.00032	0.00035	-	-	-
Cr, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00032	0.00032	0.00034	-	-	-
Cr, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00034	0.00033	0.00035	-	-	-
Cr, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00040	0.00041	0.00043	-	-	-
Cr, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00018	0.00050	0.00050	0.00055	-	-	-
Cr, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00018	0.00018	0.00018	0.00017	0.00017	0.00017	0.00061	0.00059	0.00067	-	-	-
Cr, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00018	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	May	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00017	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00017	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00018	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00018	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00018	0.00018	-	-	-	-	-	-
Cr, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00019	0.00018	0.00019	0.00018	0.00018	0.00018	-	-	-	-	-	-
Cr, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cr, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cr, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cr, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cr, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00064
Cr, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00053	0.00064
Cr, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00053	0.00062
Cr, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00053	0.00063
Cr, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cr, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00053	0.00063
Cr, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cr, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	-	-	-	0.00054	0.00052	0.00063
Cu, Diss	Construction	Jan	2	0.00056	0.00056	0.00056	0.00078	0.00078	0.00078	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00041	0.00041	0.00041	-	-	-
Cu, Diss	Construction	Feb	2	0.00055	0.00055	0.00055	0.00077	0.00077	0.00077	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00040	0.00040	0.00040	-	-	-
Cu, Diss	Construction	Mar	2	0.00054	0.00054	0.00054	0.00076	0.00076	0.00076	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00035	0.00035	0.00035	-	-	-
Cu, Diss	Construction	Apr	2	0.00042	0.00042	0.00042	0.00074	0.00074	0.00074	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00030	0.00030	0.00042	-	-	-
Cu, Diss	Construction	May	2	-	-	-	0.00073	0.00073	0.00073	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00041	0.00041	0.00043	-	-	-
Cu, Diss	Construction	Jun	2	-	-	-	0.00071	0.00071	0.00071	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00041	0.00041	0.00041	-	-	-
Cu, Diss	Construction	Jul	2	-	-	-	0.00069	0.00069	0.00069	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00039	0.00039	0.00040	-	-	-
Cu, Diss	Construction	Aug	2	-	-	-	0.00067	0.00067	0.00067	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00038	0.00038	0.00039	-	-	-
Cu, Diss	Construction	Sep	2	-	-	-	0.00064	0.00064	0.00064	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00037	0.00037	0.00037	-	-	-
Cu, Diss	Construction	Oct	2	-	-	-	0.00059	0.00059	0.00059	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00037	0.00037	0.00039	-	-	-
Cu, Diss	Construction	Nov	2	-	-	-	0.00028	0.00028	0.00028	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00040	0.00040	0.00041	-	-	-
Cu, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00035	0.00035	0.00035	0.00036	0.00036	0.00036	0.00041	0.00041	0.00043	-	-	-
Cu, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00035	0.00035	0.00036	0.00195	0.00220	0.00441	-	-	-
Cu, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00035	0.00035	0.00036	0.00132	0.00147	0.00267	-	-	-
Cu, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00035	0.00035	0.00036	0.00102	0.00093	0.00135	-	-	-
Cu, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00035	0.00035	0.00036	0.00102	0.00095	0.00130	-	-	-
Cu, Diss	Operations	May	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00035	0.00036	0.00109	0.00110	0.00157	-	-	-
Cu, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00035	0.00035	0.00128	0.00135	0.00213	-	-	-
Cu, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00034	0.00035	0.00151	0.00154	0.00244	-	-	-
Cu, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00034	0.00035	0.00142	0.00144	0.00220	-	-	-
Cu, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00034	0.00035	0.00152	0.00153	0.00229	-	-	-
Cu, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00034	0.00035	0.00198	0.00201	0.00299	-	-	-
Cu, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00035	0.00035	0.00258	0.00253	0.00390	-	-	-
Cu, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00034	0.00035	0.00035	0.00302	0.00287	0.00451	-	-	-
Cu, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00034	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00035	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00035	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00035	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	May	6	-	-	-	-	-	-	0.00035	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00035	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00035	0.00034	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00036	0.00035	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00036	0.00035	0.00036	0.00035	0.00035	0.00036	-	-	-	-	-	-
Cu, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00108	0.00103	0.00108
Cu, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00103	0.00109
Cu, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00103	0.00109
Cu, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00104	0.00109
Cu, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00104	0.00109
Cu, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00103	0.00109
Cu, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00104	0.00109
Cu, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00104	0.00109
Cu, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00109	0.00103	0.00109
Cu, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00108	0.00103	0.00108
Cu, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00108	0.00103	0.00108
Cu, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00108	0.00103	0.00108
Cu, Tot	Construction	Jan	2	0.00059	0.00059	0.00059	0.00084	0.00084	0.00084	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00050	0.00050	0.00050	-	-	-
Cu, Tot	Construction	Feb	2	0.00058	0.00058	0.00058	0.00083	0.00083	0.00083	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00050	0.00050	0.00050	-	-	-
Cu, Tot	Construction	Mar	2	0.00057	0.00057	0.00057	0.00081	0.00081	0.00081	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	0.00048	0.00048	0.00048	-	-	-
Cu, Tot	Construction	Apr	2	0.00043	0.00043	0.00043	0.00080	0.00080	0.00080	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00049	0.00049	0.00050	-	-	-
Cu, Tot	Construction	May	2	-	-	-	0.00078	0.00078	0.00078	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00071	0.00071	0.00096	-	-	-
Cu, Tot	Construction	Jun	2	-	-	-	0.00076	0.00076	0.00076	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00064	0.00064	0.00081	-	-	-
Cu, Tot	Construction	Jul	2	-	-	-	0.00074	0.00074	0.00074	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00057	0.00057	0.00068	-	-	-
Cu, Tot	Construction	Aug	2	-	-	-	0.00071	0.00071	0.00071	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00053	0.00053	0.00059	-	-	-
Cu, Tot	Construction	Sep	2	-	-	-	0.00068	0.00068	0.00068	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00050	0.00050	0.00054	-	-	-
Cu, Tot	Construction	Oct	2	-	-	-	0.00062	0.00062	0.00062	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00049	0.00049	0.00051	-	-	-
Cu, Tot	Construction	Nov	2	-	-	-	0.00029	0.00029	0.00029	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00053	0.00053	0.00057	-	-	-
Cu, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00036	0.00052	0.00052	0.00054	-	-	-
Cu, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00033	0.00034	0.00035	0.00036	0.00036	0.00036	0.00214	0.00237	0.00465	-	-	-
Cu, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00033	0.00034	0.00035	0.00036	0.00036	0.00036	0.00143	0.00158	0.00281	-	-	-
Cu, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00033	0.00034	0.00035	0.00035	0.00036	0.00036	0.00109	0.00101	0.00140	-	-	-
Cu, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00035	0.00036	0.00036	0.00109	0.00101	0.00136	-	-	-
Cu, Tot	Operations	May	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00035	0.00036	0.00036	0.00114	0.00114	0.00160	-	-	-
Cu, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00035	0.00036	0.00036	0.00132	0.00140	0.00218	-	-	-
Cu, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00035	0.00036	0.00036	0.00157	0.00161	0.00251	-	-	-
Cu, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00036	0.00036	0.00037	0.00148	0.00150	0.00226	-	-	-
Cu, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00036	0.00036	0.00037	0.00159	0.00160	0.00236	-	-	-
Cu, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00036	0.00036	0.00037	0.00207	0.00211	0.00308	-	-	-
Cu, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00033	0.00034	0.00034	0.00036	0.00036	0.00037	0.00273	0.00269	0.00405	-	-	-
Cu, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00033	0.00033	0.00034	0.00036	0.00036	0.00037	0.00322	0.00306	0.00472	-	-	-
Cu, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	May	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00035	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00036	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00036	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00036	0.00035	0.00036	0.00036	0.00036	0.00038	-	-	-	-	-	-
Cu, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00110	0.00116
Cu, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00110	0.00116
Cu, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00111	0.00116
Cu, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00117	0.00111	0.00117
Cu, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00117	0.00111	0.00117
Cu, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00111	0.00116
Cu, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00111	0.00116
Cu, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00111	0.00116
Cu, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00110	0.00116
Cu, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00110	0.00116
Cu, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00110	0.00116
Cu, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00036	0.00036	0.00036	0.00036	0.00036	0.00036	-	-	-	0.00116	0.00110	0.00116
Fe, Tot	Construction	Jan	2	0.374	0.374	0.374	0.374	0.374	0.374	0.161	0.161	0.163	0.159	0.159	0.159	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Feb	2	0.374	0.374	0.374	0.374	0.374	0.374	0.162	0.162	0.164	0.159	0.159	0.159	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Mar	2	0.374	0.374	0.374	0.374	0.374	0.374	0.162	0.162	0.165	0.159	0.159	0.159	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Apr	2	0.212	0.212	0.212	0.374	0.374	0.374	0.163	0.163	0.166	0.159	0.159	0.159	0.355	0.355	0.482	-	-	-
Fe, Tot	Construction	May	2	-	-	-	0.374	0.374	0.374	0.163	0.163	0.167	0.158	0.158	0.159	0.383	0.383	0.489	-	-	-
Fe, Tot	Construction	Jun	2	-	-	-	0.374	0.374	0.374	0.163	0.163	0.168	0.158	0.158	0.159	0.398	0.398	0.489	-	-	-
Fe, Tot	Construction	Jul	2	-	-	-	0.374	0.374	0.374	0.164	0.164	0.168	0.158	0.158	0.159	0.446	0.446	0.489	-	-	-
Fe, Tot	Construction	Aug	2	-	-	-	0.374	0.374	0.374	0.164	0.164	0.168	0.158	0.158	0.159	0.452	0.452	0.489	-	-	-
Fe, Tot	Construction	Sep	2	-	-	-	0.374	0.374	0.374	0.164	0.164	0.168	0.158	0.158	0.159	0.454	0.454	0.489	-	-	-
Fe, Tot	Construction	Oct	2	-	-	-	0.374	0.374	0.374	0.164	0.164	0.167	0.157	0.157	0.159	0.443	0.443	0.489	-	-	-
Fe, Tot	Construction	Nov	2	-	-	-	0.212	0.212	0.212	0.164	0.164	0.167	0.157	0.157	0.159	0.468	0.468	0.489	-	-	-
Fe, Tot	Construction	Dec	2	-	-	-	-	-	-	0.164	0.164	0.166	0.157	0.157	0.159	0.453	0.453	0.489	-	-	-
Fe, Tot	Operations	Jan	5	-	-	-	-	-	-	0.171	0.169	0.171	0.144	0.146	0.155	0.489	0.467	0.489	-	-	-
Fe, Tot	Operations	Feb	5	-	-	-	-	-	-	0.171	0.169	0.171	0.144	0.146	0.154	0.435	0.419	0.469	-	-	-
Fe, Tot	Operations	Mar	5	-	-	-	-	-	-	0.171	0.170	0.172	0.144	0.146	0.153	0.314	0.330	0.446	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Fe, Tot	Operations	Apr	5	-	-	-	-	-	-	0.172	0.170	0.172	0.143	0.145	0.153	0.289	0.292	0.312	-	-	-
Fe, Tot	Operations	May	5	-	-	-	-	-	-	0.172	0.171	0.173	0.143	0.145	0.152	0.248	0.251	0.263	-	-	-
Fe, Tot	Operations	Jun	5	-	-	-	-	-	-	0.173	0.171	0.173	0.143	0.145	0.152	0.280	0.283	0.305	-	-	-
Fe, Tot	Operations	Jul	5	-	-	-	-	-	-	0.173	0.172	0.174	0.143	0.145	0.152	0.347	0.356	0.384	-	-	-
Fe, Tot	Operations	Aug	5	-	-	-	-	-	-	0.173	0.172	0.174	0.142	0.144	0.151	0.338	0.352	0.382	-	-	-
Fe, Tot	Operations	Sep	5	-	-	-	-	-	-	0.173	0.172	0.173	0.142	0.144	0.151	0.371	0.392	0.431	-	-	-
Fe, Tot	Operations	Oct	5	-	-	-	-	-	-	0.172	0.171	0.173	0.142	0.144	0.150	0.458	0.468	0.489	-	-	-
Fe, Tot	Operations	Nov	5	-	-	-	-	-	-	0.172	0.171	0.172	0.142	0.144	0.150	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Dec	5	-	-	-	-	-	-	0.171	0.170	0.172	0.142	0.144	0.150	0.489	0.489	0.489	-	-	-
Fe, Tot	Closure	Jan	6	-	-	-	-	-	-	0.164	0.165	0.171	0.146	0.148	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Feb	6	-	-	-	-	-	-	0.164	0.165	0.172	0.146	0.148	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Mar	6	-	-	-	-	-	-	0.163	0.165	0.172	0.147	0.148	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Apr	6	-	-	-	-	-	-	0.162	0.165	0.172	0.147	0.148	0.157	-	-	-	-	-	-
Fe, Tot	Closure	May	6	-	-	-	-	-	-	0.162	0.165	0.173	0.148	0.149	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Jun	6	-	-	-	-	-	-	0.161	0.165	0.173	0.149	0.149	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Jul	6	-	-	-	-	-	-	0.161	0.165	0.174	0.149	0.149	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Aug	6	-	-	-	-	-	-	0.161	0.164	0.174	0.150	0.149	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Sep	6	-	-	-	-	-	-	0.160	0.164	0.173	0.150	0.149	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Oct	6	-	-	-	-	-	-	0.160	0.164	0.173	0.151	0.150	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Nov	6	-	-	-	-	-	-	0.160	0.164	0.172	0.152	0.150	0.157	-	-	-	-	-	-
Fe, Tot	Closure	Dec	6	-	-	-	-	-	-	0.160	0.163	0.172	0.152	0.150	0.157	-	-	-	-	-	-
Fe, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.292
Fe, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.291
Fe, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.291
Fe, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.291
Fe, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.290	0.284	0.291
Fe, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.291
Fe, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.291
Fe, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.285	0.292
Fe, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.283	0.292
Fe, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.292
Fe, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.292
Fe, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.159	0.159	0.159	0.159	0.159	0.159	-	-	-	0.291	0.284	0.292
Pb, Diss	Construction	Jan	2	0.000039	0.000039	0.000039	0.000041	0.000041	0.000041	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000039	0.000039	0.000039	-	-	-
Pb, Diss	Construction	Feb	2	0.000040	0.000040	0.000040	0.000041	0.000041	0.000041	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000038	0.000038	0.000038	-	-	-
Pb, Diss	Construction	Mar	2	0.000040	0.000040	0.000040	0.000041	0.000041	0.000041	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000032	0.000032	0.000032	-	-	-
Pb, Diss	Construction	Apr	2	0.000033	0.000033	0.000033	0.000041	0.000041	0.000041	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000027	0.000027	0.000041	-	-	-
Pb, Diss	Construction	May	2	-	-	-	0.000042	0.000042	0.000042	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000035	0.000035	0.000041	-	-	-
Pb, Diss	Construction	Jun	2	-	-	-	0.000042	0.000042	0.000042	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000034	0.000034	0.000037	-	-	-
Pb, Diss	Construction	Jul	2	-	-	-	0.000042	0.000042	0.000042	0.000048	0.000048	0.000048	0.000048	0.000048	0.000049	0.000032	0.000032	0.000034	-	-	-
Pb, Diss	Construction	Aug	2	-	-	-	0.000042	0.000042	0.000042	0.000048	0.000048	0.000048	0.000048	0.000048	0.000049	0.000032	0.000032	0.000033	-	-	-
Pb, Diss	Construction	Sep	2	-	-	-	0.000042	0.000042	0.000042	0.000047	0.000047	0.000048	0.000048	0.000048	0.000049	0.000031	0.000031	0.000033	-	-	-
Pb, Diss	Construction	Oct	2	-	-	-	0.000042	0.000042	0.000042	0.000047	0.000047	0.000048	0.000048	0.000048	0.000048	0.000031	0.000031	0.000034	-	-	-
Pb, Diss	Construction	Nov	2	-	-	-	0.000022	0.000022	0.000022	0.000047	0.000047	0.000048	0.000048	0.000048	0.000048	0.000035	0.000035	0.000035	-	-	-
Pb, Diss	Construction	Dec	2	-	-	-	-	-	-	0.000047	0.000047	0.000048	0.000048	0.000048	0.000048	0.000038	0.000038	0.000040	-	-	-
Pb, Diss	Operations	Jan	5	-	-	-	-	-	-	0.000044	0.000045	0.000046	0.000044	0.000044	0.000047	0.000095	0.000108	0.000197	-	-	-
Pb, Diss	Operations	Feb	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000044	0.000044	0.000047	0.000072	0.000079	0.000127	-	-	-
Pb, Diss	Operations	Mar	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000044	0.000044	0.000046	0.000065	0.000061	0.000080	-	-	-
Pb, Diss	Operations	Apr	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000044	0.000044	0.000046	0.000066	0.000064	0.000079	-	-	-
Pb, Diss	Operations	May	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000044	0.000044	0.000046	0.000068	0.000069	0.000089	-	-	-
Pb, Diss	Operations	Jun	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000046	0.000075	0.000078	0.000111	-	-	-
Pb, Diss	Operations	Jul	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000046	0.000084	0.000085	0.000123	-	-	-
Pb, Diss	Operations	Aug	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000046	0.000080	0.000080	0.000113	-	-	-
Pb, Diss	Operations	Sep	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000046	0.000084	0.000084	0.000117	-	-	-
Pb, Diss	Operations	Oct	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000046	0.000101	0.000100	0.000144	-	-	-
Pb, Diss	Operations	Nov	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000046	0.000123	0.000119	0.000179	-	-	-
Pb, Diss	Operations	Dec	5	-	-	-	-	-	-	0.000044	0.000044	0.000046	0.000043	0.000044	0.000045	0.000140	0.000133	0.000202	-	-	-
Pb, Diss	Closure	Jan	6	-	-	-	-	-	-	0.000046	0.000046	0.000048	0.000045	0.000045	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Feb	6	-	-	-	-	-	-	0.000047	0.000046	0.000048	0.000045	0.000045	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Mar	6	-	-	-	-	-	-	0.000047	0.000046	0.000048	0.000045	0.000045	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Apr	6	-	-	-	-	-	-	0.000047	0.000046	0.000048	0.000045	0.000045	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	May	6	-	-	-	-	-	-	0.000047	0.000046	0.000048	0.000045	0.000045	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Jun	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000045	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Jul	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000045	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Aug	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Sep	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Oct	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Nov	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Closure	Dec	6	-	-	-	-	-	-	0.000048	0.000047	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000109	0.000113
Pb, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000109	0.000113
Pb, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000109	0.000113
Pb, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000113	0.000110	0.000113
Pb, Tot	Construction	Jan	2	0.000039	0.000039	0.000039	0.000054	0.000054	0.000054	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000071	0.000071	0.000071	-	-	-
Pb, Tot	Construction	Feb	2	0.000040	0.000040	0.000040	0.000054	0.000054	0.000054	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000072	0.000072	0.000072	-	-	-
Pb, Tot	Construction	Mar	2	0.000040	0.000040	0.000040	0.000053	0.000053	0.000053	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000077	0.000077	0.000077	-	-	-
Pb, Tot	Construction	Apr	2	0.000033	0.000033	0.000033	0.000053	0.000053	0.000053	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000099	0.000099	0.000136	-	-	-
Pb, Tot	Construction	May	2	-	-	-	0.000052	0.000052	0.000052	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000151	0.000151	0.000250	-	-	-
Pb, Tot	Construction	Jun	2	-	-	-	0.000052	0.000052	0.000052	0.000048	0.000048	0.000049	0.000048	0.000048	0.000049	0.000119	0.000119	0.000185	-	-	-
Pb, Tot	Construction	Jul	2	-	-	-	0.000051	0.000051	0.000051	0.000048	0.000048	0.000048	0.000048	0.000048	0.000049	0.000092	0.000092	0.000131	-	-	-
Pb, Tot	Construction	Aug	2	-	-	-	0.000051	0.000051	0.000051	0.000048	0.000048	0.000048	0.000048	0.000048	0.000049	0.000077	0.000077	0.000100	-	-	-
Pb, Tot	Construction	Sep	2	-	-	-	0.000050	0.000050	0.000050	0.000048	0.000048	0.000048	0.000048	0.000048	0.000049	0.000068	0.000068	0.000084	-	-	-
Pb, Tot	Construction	Oct	2	-	-	-	0.000048	0.000048	0.000048	0.000048	0.000048	0.000048	0.000048	0.000048	0.000048	0.000063	0.000063	0.000075	-	-	-
Pb, Tot	Construction	Nov	2	-	-	-	0.000024	0.000024	0.000024	0.000048	0.000048	0.000048	0.000048	0.000048	0.000048	0.000073	0.000073	0.000084	-	-	-
Pb, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000048	0.000048	0.000048	0.000074	0.000074	0.000079	-	-	-
Pb, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000047	0.000047	0.000048	0.000045	0.000046	0.000048	0.000155	0.000162	0.000271	-	-	-
Pb, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000046	0.000047	0.000048	0.000045	0.000046	0.000047	0.000109	0.000116	0.000172	-	-	-
Pb, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000090	0.000088	0.000099	-	-	-
Pb, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000090	0.000085	0.000097	-	-	-
Pb, Tot	Operations	May	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000079	0.000080	0.000099	-	-	-
Pb, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000086	0.000090	0.000123	-	-	-
Pb, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000098	0.000101	0.000138	-	-	-
Pb, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000094	0.000096	0.000127	-	-	-
Pb, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000046	0.000047	0.000047	0.000045	0.000046	0.000047	0.000099	0.000101	0.000132	-	-	-
Pb, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000047	0.000047	0.000047	0.000045	0.000046	0.000047	0.000122	0.000125	0.000164	-	-	-
Pb, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000047	0.000047	0.000047	0.000045	0.000046	0.000047	0.000162	0.000160	0.000217	-	-	-
Pb, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000047	0.000047	0.000047	0.000045	0.000046	0.000047	0.000200	0.000190	0.000262	-	-	-
Pb, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000046	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	May	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000046	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000047	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000047	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000047	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000047	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000048	0.000048	0.000048	0.000047	0.000047	0.000048	-	-	-	-	-	-
Pb, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000157
Pb, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000145	0.000157
Pb, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000157
Pb, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000158
Pb, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000158
Pb, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000159
Pb, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000155
Pb, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000151	0.000146	0.000156
Pb, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000151	0.000145	0.000157
Pb, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000151	0.000146	0.000158
Pb, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000157
Pb, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000049	0.000049	0.000049	0.000049	0.000048	0.000049	-	-	-	0.000150	0.000146	0.000157
Mn, Diss	Construction	Jan	2	0.646	0.646	0.646	0.475	0.475	0.475	0.058	0.058	0.058	0.058	0.058	0.059	0.073	0.073	0.073	-	-	-
Mn, Diss	Construction	Feb	2	0.613	0.613	0.613	0.462	0.462	0.462	0.058	0.058	0.058	0.059	0.059	0.059	0.071	0.071	0.071	-	-	-
Mn, Diss	Construction	Mar	2	0.560	0.560	0.560	0.448	0.448	0.448	0.058	0.058	0.058	0.059	0.059	0.060	0.068	0.068	0.068	-	-	-
Mn, Diss	Construction	Apr	2	0.349	0.349	0.349	0.431	0.431	0.431	0.058	0.058	0.058	0.059	0.059	0.061	0.087	0.087	0.106	-	-	-
Mn, Diss	Construction	May	2	-	-	-	0.413	0.413	0.413	0.058	0.058	0.058	0.060	0.060	0.061	0.123	0.123	0.190	-	-	-
Mn, Diss	Construction	Jun	2	-	-	-	0.394	0.394	0.394	0.058	0.058	0.058	0.060	0.060	0.062	0.089	0.089	0.131	-	-	-
Mn, Diss	Construction	Jul	2	-	-	-	0.371	0.371	0.371	0.058	0.058	0.058	0.061	0.061	0.063	0.068	0.068	0.092	-	-	-
Mn, Diss	Construction	Aug	2	-	-	-	0.344	0.344	0.344	0.058	0.058	0.058	0.061	0.061	0.064	0.060	0.060	0.075	-	-	-
Mn, Diss	Construction	Sep	2	-	-	-	0.309	0.309	0.309	0.058	0.058	0.058	0.062	0.062	0.065	0.054	0.054	0.065	-	-	-
Mn, Diss	Construction	Oct	2	-	-	-	0.257	0.257	0.257	0.058	0.058	0.058	0.062	0.062	0.066	0.051	0.051	0.057	-	-	-
Mn, Diss	Construction	Nov	2	-	-	-	0.100	0.100	0.100	0.058	0.058	0.058	0.063	0.063	0.067	0.062	0.062	0.071	-	-	-
Mn, Diss	Construction	Dec	2	-	-	-	-	-	-	0.058	0.058	0.058	0.063	0.063	0.068	0.070	0.070	0.078	-	-	-
Mn, Diss	Operations	Jan	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.066	0.069	0.067	0.069	0.076	-	-	-
Mn, Diss	Operations	Feb	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.066	0.069	0.064	0.065	0.069	-	-	-
Mn, Diss	Operations	Mar	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.066	0.069	0.069	0.069	0.070	-	-	-
Mn, Diss	Operations	Apr	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.066	0.070	0.071	0.070	0.073	-	-	-
Mn, Diss	Operations	May	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.066	0.070	0.057	0.057	0.060	-	-	-
Mn, Diss	Operations	Jun	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.070	0.054	0.052	0.055	-	-	-
Mn, Diss	Operations	Jul	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.070	0.054	0.052	0.055	-	-	-
Mn, Diss	Operations	Aug	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.069	0.054	0.053	0.055	-	-	-
Mn, Diss	Operations	Sep	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.069	0.054	0.052	0.055	-	-	-
Mn, Diss	Operations	Oct	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.069	0.050	0.046	0.052	-	-	-
Mn, Diss	Operations	Nov	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.068	0.054	0.050	0.057	-	-	-
Mn, Diss	Operations	Dec	5	-	-	-	-	-	-	0.057	0.057	0.057	0.064	0.065	0.068	0.065	0.062	0.068	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Mn, Diss	Closure	Jan	6	-	-	-	-	-	-	0.057	0.057	0.058	0.062	0.062	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Feb	6	-	-	-	-	-	-	0.057	0.057	0.058	0.062	0.062	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Mar	6	-	-	-	-	-	-	0.057	0.057	0.058	0.062	0.062	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Apr	6	-	-	-	-	-	-	0.057	0.057	0.058	0.062	0.062	0.064	-	-	-	-	-	-
Mn, Diss	Closure	May	6	-	-	-	-	-	-	0.057	0.057	0.058	0.062	0.062	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Jun	6	-	-	-	-	-	-	0.058	0.057	0.058	0.062	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Jul	6	-	-	-	-	-	-	0.058	0.057	0.058	0.061	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Aug	6	-	-	-	-	-	-	0.058	0.057	0.058	0.061	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Sep	6	-	-	-	-	-	-	0.058	0.057	0.058	0.061	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Oct	6	-	-	-	-	-	-	0.058	0.057	0.058	0.061	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Nov	6	-	-	-	-	-	-	0.058	0.057	0.058	0.061	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Closure	Dec	6	-	-	-	-	-	-	0.058	0.057	0.058	0.060	0.061	0.064	-	-	-	-	-	-
Mn, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.068
Mn, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.068	0.063	0.068
Mn, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.068
Mn, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.064	0.067
Mn, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Mn, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.058	0.058	0.058	0.058	0.058	0.059	-	-	-	0.067	0.063	0.067
Hg, Diss	Construction	Jan	2	0.0000005	0.0000005	0.0000005	0.0000008	0.0000008	0.0000008	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Feb	2	0.0000006	0.0000006	0.0000006	0.0000008	0.0000008	0.0000008	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Mar	2	0.0000006	0.0000006	0.0000006	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Apr	2	0.0000006	0.0000006	0.0000006	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	May	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Jun	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Jul	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Aug	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Sep	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Oct	2	-	-	-	0.0000010	0.0000010	0.0000010	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Nov	2	-	-	-	0.0000005	0.0000005	0.0000005	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Construction	Dec	2	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Operations	Jan	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000003	-	-	-
Hg, Diss	Operations	Feb	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Diss	Operations	Mar	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Operations	Apr	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Diss	Operations	May	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Diss	Operations	Jun	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Diss	Operations	Jul	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Diss	Operations	Aug	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Diss	Operations	Sep	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Diss	Operations	Oct	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	-	-	-
Hg, Diss	Operations	Nov	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	-	-	-
Hg, Diss	Operations	Dec	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000003	-	-	-
Hg, Diss	Closure	Jan	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Feb	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Mar	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Apr	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	May	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Jun	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Jul	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Aug	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Sep	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Oct	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Nov	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Closure	Dec	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Construction	Jan	2	0.0000005	0.0000005	0.0000005	0.0000008	0.0000008	0.0000008	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Feb	2	0.0000006	0.0000006	0.0000006	0.0000008	0.0000008	0.0000008	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Mar	2	0.0000006	0.0000006	0.0000006	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Apr	2	0.0000006	0.0000006	0.0000006	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	May	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000003	-	-	-
Hg, Tot	Construction	Jun	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	-	-	-
Hg, Tot	Construction	Jul	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Construction	Aug	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Sep	2	-	-	-	0.0000009	0.0000009	0.0000009	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Oct	2	-	-	-	0.0000010	0.0000010	0.0000010	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Nov	2	-	-	-	0.0000005	0.0000005	0.0000005	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-
Hg, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000003	-	-	-
Hg, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	-	-	-
Hg, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	May	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	-	-	-
Hg, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	-	-	-
Hg, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	-	-	-
Hg, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000003	-	-	-
Hg, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	May	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	-	-	-
Hg, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Hg, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	-	-	-	0.000002	0.000002	0.000002
Mo, Tot	Construction	Jan	2	0.0007	0.0007	0.0007	0.0009	0.0009	0.0009	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0019	0.0019	0.0019	-	-	-
Mo, Tot	Construction	Feb	2	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0019	0.0019	0.0019	-	-	-
Mo, Tot	Construction	Mar	2	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0016	0.0016	0.0016	-	-	-
Mo, Tot	Construction	Apr	2	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0013	0.0013	0.0021	-	-	-
Mo, Tot	Construction	May	2	-	-	-	0.0011	0.0011	0.0011	0.0021	0.0021	0.0022	0.0022	0.0022	0.0022	0.0017	0.0017	0.0021	-	-	-
Mo, Tot	Construction	Jun	2	-	-	-	0.0011	0.0011	0.0011	0.0021	0.0021	0.0022	0.0022	0.0022	0.0022	0.0016	0.0016	0.0019	-	-	-
Mo, Tot	Construction	Jul	2	-	-	-	0.0012	0.0012	0.0012	0.0021	0.0021	0.0022	0.0022	0.0022	0.0022	0.0014	0.0014	0.0017	-	-	-
Mo, Tot	Construction	Aug	2	-	-	-	0.0013	0.0013	0.0013	0.0021	0.0021	0.0022	0.0022	0.0022	0.0022	0.0014	0.0014	0.0017	-	-	-
Mo, Tot	Construction	Sep	2	-	-	-	0.0014	0.0014	0.0014	0.0021	0.0021	0.0022	0.0022	0.0022	0.0022	0.0014	0.0014	0.0017	-	-	-
Mo, Tot	Construction	Oct	2	-	-	-	0.0015	0.0015	0.0015	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	0.0014	0.0014	0.0018	-	-	-
Mo, Tot	Construction	Nov	2	-	-	-	0.0009	0.0009	0.0009	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	0.0016	0.0016	0.0018	-	-	-
Mo, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	0.0018	0.0018	0.0018	-	-	-
Mo, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0021	0.0021	0.0072	0.0082	0.0160	-	-	-
Mo, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0051	0.0057	0.0099	-	-	-
Mo, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0041	0.0038	0.0054	-	-	-
Mo, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0042	0.0039	0.0053	-	-	-
Mo, Tot	Operations	May	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0044	0.0045	0.0062	-	-	-
Mo, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0021	0.0020	0.0021	0.0050	0.0053	0.0081	-	-	-
Mo, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0058	0.0059	0.0092	-	-	-
Mo, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0055	0.0056	0.0084	-	-	-
Mo, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0059	0.0059	0.0087	-	-	-
Mo, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0074	0.0075	0.0112	-	-	-
Mo, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0095	0.0093	0.0144	-	-	-
Mo, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0020	0.0020	0.0021	0.0020	0.0020	0.0021	0.0110	0.0105	0.0165	-	-	-
Mo, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0021	-	-	-	-	-	-
Mo, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0021	-	-	-	-	-	-
Mo, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	May	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0021	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0022	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Mo, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0022	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0022	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0022	0.0021	0.0022	0.0021	0.0021	0.0022	-	-	-	-	-	-
Mo, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0077	0.0075	0.0078
Mo, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0077	0.0075	0.0078
Mo, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0077	0.0075	0.0078
Mo, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Mo, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	-	-	-	0.0078	0.0075	0.0078
Ni, Diss	Construction	Jan	2	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-
Ni, Diss	Construction	Feb	2	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-
Ni, Diss	Construction	Mar	2	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-
Ni, Diss	Construction	Apr	2	0.0005	0.0005	0.0005	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-
Ni, Diss	Construction	May	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	-	-	-
Ni, Diss	Construction	Jun	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	-	-	-
Ni, Diss	Construction	Jul	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	-	-	-
Ni, Diss	Construction	Aug	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	-	-	-
Ni, Diss	Construction	Sep	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	-	-	-
Ni, Diss	Construction	Oct	2	-	-	-	0.0005	0.0005	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	-	-	-
Ni, Diss	Construction	Nov	2	-	-	-	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	-	-	-
Ni, Diss	Construction	Dec	2	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	-	-	-
Ni, Diss	Operations	Jan	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0012	0.0014	0.0027	-	-	-
Ni, Diss	Operations	Feb	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0009	0.0009	0.0017	-	-	-
Ni, Diss	Operations	Mar	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0007	0.0006	0.0009	-	-	-
Ni, Diss	Operations	Apr	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0007	0.0007	0.0009	-	-	-
Ni, Diss	Operations	May	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0007	0.0007	0.0010	-	-	-
Ni, Diss	Operations	Jun	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0008	0.0009	0.0013	-	-	-
Ni, Diss	Operations	Jul	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0010	0.0010	0.0015	-	-	-
Ni, Diss	Operations	Aug	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0009	0.0009	0.0014	-	-	-
Ni, Diss	Operations	Sep	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0010	0.0010	0.0014	-	-	-
Ni, Diss	Operations	Oct	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0013	0.0013	0.0018	-	-	-
Ni, Diss	Operations	Nov	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0016	0.0016	0.0024	-	-	-
Ni, Diss	Operations	Dec	5	-	-	-	-	-	-	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0019	0.0018	0.0027	-	-	-
Ni, Diss	Closure	Jan	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Feb	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Mar	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Apr	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	May	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Jun	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Jul	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Aug	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Sep	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Oct	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Nov	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Closure	Dec	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0008	0.0008	0.0008
Ni, Tot	Construction	Jan	2	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0005	-	-	-
Ni, Tot	Construction	Feb	2	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0005	-	-	-
Ni, Tot	Construction	Mar	2	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0005	-	-	-
Ni, Tot	Construction	Apr	2	0.0005	0.0005	0.0005	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0006	-	-	-
Ni, Tot	Construction	May	2	-	-	-	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0008	0.0008	0.0012	-	-	-
Ni, Tot	Construction	Jun	2	-	-	-	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0007	0.0007	0.0010	-	-	-
Ni, Tot	Construction	Jul	2	-	-	-	0.0007	0.0007	0.0007	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0006	0.0006	0.0008	-	-	-
Ni, Tot	Construction	Aug	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0006	0.0006	0.0007	-	-	-
Ni, Tot	Construction	Sep	2	-	-	-	0.0006	0.0006	0.0006	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0006	0.0006	0.0007	-	-	-
Ni, Tot	Construction	Oct	2	-	-	-	0.0005	0.0005	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0006	-	-	-
Ni, Tot	Construction	Nov	2	-	-	-	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0006	0.0006	0.0007	-	-	-
Ni, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0006	-	-	-
Ni, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0015	0.0016	0.0030	-	-	-
Ni, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0010	0.0011	0.0019	-	-	-
Ni, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0008	0.0008	0.0010	-	-	-
Ni, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0008	0.0007	0.0009	-	-	-
Ni, Tot	Operations	May	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0008	0.0008	0.0011	-	-	-
Ni, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0009	0.0010	0.0014	-	-	-
Ni, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0011	0.0011	0.0016	-	-	-
Ni, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0010	0.0010	0.0015	-	-	-
Ni, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0011	0.0011	0.0015	-	-	-
Ni, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0014	0.0014	0.0020	-	-	-
Ni, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0018	0.0018	0.0026	-	-	-
Ni, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0022	0.0021	0.0030	-	-	-
Ni, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	May	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	-	-	-
Ni, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Ni, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	-	-	-	0.0010	0.0009	0.0010
Se, Tot	Construction	Jan	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-
Se, Tot	Construction	Feb	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-
Se, Tot	Construction	Mar	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-
Se, Tot	Construction	Apr	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00006	0.00006	0.00007	-	-	-
Se, Tot	Construction	May	2	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00009	0.00009	0.00010	-	-	-
Se, Tot	Construction	Jun	2	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00009	0.00009	0.00010	-	-	-
Se, Tot	Construction	Jul	2	-	-	-	0.00005	0.00005	0.00005	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00009	0.00009	0.00009	-	-	-
Se, Tot	Construction	Aug	2	-	-	-	0.00006	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	-	-	-
Se, Tot	Construction	Sep	2	-	-	-	0.00006	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	-	-	-
Se, Tot	Construction	Oct	2	-	-	-	0.00006	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	-	-	-
Se, Tot	Construction	Nov	2	-	-	-	0.00003	0.00003	0.00003	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	-	-	-
Se, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	-	-	-
Se, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00006	0.00007	0.00007	0.00007	0.00007	0.00007	0.00068	0.00077	0.00161	-	-	-
Se, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00043	0.00049	0.00095	-	-	-
Se, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00030	0.00027	0.00042	-	-	-
Se, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00030	0.00027	0.00040	-	-	-
Se, Tot	Operations	May	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00033	0.00033	0.00050	-	-	-
Se, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00040	0.00043	0.00072	-	-	-
Se, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00049	0.00051	0.00084	-	-	-
Se, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00045	0.00046	0.00075	-	-	-
Se, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00049	0.00050	0.00078	-	-	-
Se, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00067	0.00069	0.00105	-	-	-
Se, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00091	0.00090	0.00141	-	-	-
Se, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00006	0.00006	0.00007	0.00007	0.00007	0.00007	0.00109	0.00103	0.00165	-	-	-
Se, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	May	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00008	-	-	-	-	-	-
Se, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Se, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Se, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	-	-	-	0.00042	0.00040	0.00042
Ag, Tot	Construction	Jan	2	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Ag, Tot	Construction	Feb	2	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Ag, Tot	Construction	Mar	2	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Ag, Tot	Construction	Apr	2	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000006	-	-	-
Ag, Tot	Construction	May	2	-	-	-	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Ag, Tot	Construction	Jun	2	-	-	-	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Ag, Tot	Construction	Jul	2	-	-	-	0.000005	0.000005	0.000005	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Ag, Tot	Construction	Aug	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Ag, Tot	Construction	Sep	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Ag, Tot	Construction	Oct	2	-	-	-	0.000006	0.000006	0.000006	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Ag, Tot	Construction	Nov	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Ag, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Ag, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000013	0.000023	-	-	-
Ag, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000010	0.000015	-	-	-
Ag, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000008	0.000011	-	-	-
Ag, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000009	0.000011	-	-	-
Ag, Tot	Operations	May	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000009	0.000010	0.000012	-	-	-
Ag, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000011	0.000014	-	-	-
Ag, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000011	0.000015	-	-	-
Ag, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000010	0.000010	0.000014	-	-	-
Ag, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000011	0.000011	0.000014	-	-	-
Ag, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000013	0.000012	0.000017	-	-	-
Ag, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000015	0.000014	0.000021	-	-	-
Ag, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000016	0.000016	0.000023	-	-	-
Ag, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	May	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Ag, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ag, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000015	0.000014	0.000015
Ta, Tot	Construction	Jan	2	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	-	-	-
Ta, Tot	Construction	Feb	2	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	-	-	-
Ta, Tot	Construction	Mar	2	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	-	-	-
Ta, Tot	Construction	Apr	2	0.00002	0.00002	0.00002	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	-	-	-
Ta, Tot	Construction	May	2	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Jun	2	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Jul	2	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Aug	2	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Sep	2	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Oct	2	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Nov	2	-	-	-	0.00001	0.00001	0.00001	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-
Ta, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00010	0.00011	0.00021	-	-	-
Ta, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00007	0.00007	0.00013	-	-	-
Ta, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00005	0.00005	0.00007	-	-	-
Ta, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00005	0.00005	0.00007	-	-	-
Ta, Tot	Operations	May	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00006	0.00006	0.00008	-	-	-
Ta, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00006	0.00007	0.00010	-	-	-
Ta, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00008	0.00008	0.00012	-	-	-
Ta, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00007	0.00007	0.00011	-	-	-
Ta, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00008	0.00008	0.00011	-	-	-
Ta, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00010	0.00010	0.00014	-	-	-
Ta, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00013	0.00012	0.00019	-	-	-
Ta, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00015	0.00014	0.00022	-	-	-
Ta, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	May	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	-	-	-
Ta, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
Ta, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	-	-	-	0.00011	0.00010	0.00011
U, Tot	Construction	Jan	2	0.0018	0.0018	0.0018	0.0029	0.0029	0.0029	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0009	0.0009	0.0009	-	-	-
U, Tot	Construction	Feb	2	0.0017	0.0017	0.0017	0.0029	0.0029	0.0029	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0009	0.0009	0.0009	-	-	-
U, Tot	Construction	Mar	2	0.0017	0.0017	0.0017	0.0028	0.0028	0.0028	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0008	0.0008	0.0008	-	-	-
U, Tot	Construction	Apr	2	0.0012	0.0012	0.0012	0.0027	0.0027	0.0027	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0007	0.0010	-	-	-
U, Tot	Construction	May	2	-	-	-	0.0026	0.0026	0.0026	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0009	0.0009	0.0010	-	-	-
U, Tot	Construction	Jun	2	-	-	-	0.0026	0.0026	0.0026	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0008	0.0008	0.0010	-	-	-
U, Tot	Construction	Jul	2	-	-	-	0.0025	0.0025	0.0025	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0007	0.0009	-	-	-
U, Tot	Construction	Aug	2	-	-	-	0.0023	0.0023	0.0023	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0007	0.0009	-	-	-
U, Tot	Construction	Sep	2	-	-	-	0.0022	0.0022	0.0022	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0007	0.0009	-	-	-
U, Tot	Construction	Oct	2	-	-	-	0.0019	0.0019	0.0019	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0007	0.0007	0.0009	-	-	-
U, Tot	Construction	Nov	2	-	-	-	0.0008	0.0008	0.0008	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0008	0.0008	0.0009	-	-	-
U, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0009	0.0009	0.0010	-	-	-
U, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0058	0.0066	0.0134	-	-	-
U, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0038	0.0043	0.0080	-	-	-
U, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0029	0.0026	0.0039	-	-	-
U, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0029	0.0026	0.0037	-	-	-
U, Tot	Operations	May	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0031	0.0031	0.0046	-	-	-
U, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0036	0.0039	0.0063	-	-	-
U, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0044	0.0045	0.0073	-	-	-
U, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0041	0.0041	0.0065	-	-	-
U, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0044	0.0044	0.0068	-	-	-
U, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0058	0.0059	0.0090	-	-	-
U, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0077	0.0076	0.0119	-	-	-
U, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0091	0.0086	0.0138	-	-	-
U, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	May	6	-	-	-	-	-	-	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	-	-	-
U, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0037	0.0035	0.0037
U, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0037	0.0035	0.0037
U, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0037	0.0035	0.0037
U, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0037
U, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
U, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	-	-	-	0.0036	0.0035	0.0036
Zn, Diss	Construction	Jan	2	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0021	0.0021	0.0021	-	-	-
Zn, Diss	Construction	Feb	2	0.0011	0.0011	0.0011	0.0010	0.0010	0.0010	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0021	0.0021	0.0021	-	-	-
Zn, Diss	Construction	Mar	2	0.0012	0.0012	0.0012	0.0011	0.0011	0.0011	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0017	0.0017	0.0017	-	-	-

Appendix H-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Zn, Diss	Construction	Apr	2	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0015	0.0015	0.0023	-	-	-
Zn, Diss	Construction	May	2	-	-	-	0.0012	0.0012	0.0012	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0018	0.0018	0.0023	-	-	-
Zn, Diss	Construction	Jun	2	-	-	-	0.0013	0.0013	0.0013	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0017	0.0017	0.0020	-	-	-
Zn, Diss	Construction	Jul	2	-	-	-	0.0014	0.0014	0.0014	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0016	0.0016	0.0017	-	-	-
Zn, Diss	Construction	Aug	2	-	-	-	0.0015	0.0015	0.0015	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0015	0.0015	0.0017	-	-	-
Zn, Diss	Construction	Sep	2	-	-	-	0.0016	0.0016	0.0016	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0015	0.0015	0.0017	-	-	-
Zn, Diss	Construction	Oct	2	-	-	-	0.0017	0.0017	0.0017	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0015	0.0015	0.0018	-	-	-
Zn, Diss	Construction	Nov	2	-	-	-	0.0010	0.0010	0.0010	0.0024	0.0024	0.0024	0.0024	0.0024	0.0025	0.0018	0.0018	0.0018	-	-	-
Zn, Diss	Construction	Dec	2	-	-	-	-	-	-	0.0024	0.0024	0.0024	0.0024	0.0024	0.0025	0.0020	0.0020	0.0021	-	-	-
Zn, Diss	Operations	Jan	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0022	0.0024	0.0024	0.0028	0.0041	-	-	-
Zn, Diss	Operations	Feb	5	-	-	-	-	-	-	0.0022	0.0023	0.0024	0.0022	0.0022	0.0023	0.0023	0.0025	0.0032	-	-	-
Zn, Diss	Operations	Mar	5	-	-	-	-	-	-	0.0022	0.0023	0.0024	0.0022	0.0022	0.0023	0.0026	0.0025	0.0029	-	-	-
Zn, Diss	Operations	Apr	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0027	0.0027	0.0030	-	-	-
Zn, Diss	Operations	May	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0027	0.0027	0.0031	-	-	-
Zn, Diss	Operations	Jun	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0027	0.0027	0.0033	-	-	-
Zn, Diss	Operations	Jul	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0028	0.0027	0.0034	-	-	-
Zn, Diss	Operations	Aug	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0027	0.0027	0.0033	-	-	-
Zn, Diss	Operations	Sep	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0028	0.0027	0.0033	-	-	-
Zn, Diss	Operations	Oct	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0029	0.0027	0.0036	-	-	-
Zn, Diss	Operations	Nov	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0030	0.0028	0.0040	-	-	-
Zn, Diss	Operations	Dec	5	-	-	-	-	-	-	0.0022	0.0023	0.0023	0.0022	0.0022	0.0023	0.0032	0.0030	0.0042	-	-	-
Zn, Diss	Closure	Jan	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0022	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Feb	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0022	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Mar	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0022	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Apr	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0022	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	May	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Jun	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Jul	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Aug	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Sep	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Oct	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Nov	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Closure	Dec	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0021	0.0020	0.0021
Zn, Tot	Construction	Jan	2	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-
Zn, Tot	Construction	Feb	2	0.0014	0.0014	0.0014	0.0013	0.0013	0.0013	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0024	0.0024	0.0024	-	-	-
Zn, Tot	Construction	Mar	2	0.0015	0.0015	0.0015	0.0013	0.0013	0.0013	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0022	0.0022	0.0022	-	-	-
Zn, Tot	Construction	Apr	2	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0022	0.0022	0.0025	-	-	-
Zn, Tot	Construction	May	2	-	-	-	0.0014	0.0014	0.0014	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	0.0030	0.0030	0.0036	-	-	-
Zn, Tot	Construction	Jun	2	-	-	-	0.0015	0.0015	0.0015	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0025	0.0025	0.0029	-	-	-
Zn, Tot	Construction	Jul	2	-	-	-	0.0016	0.0016	0.0016	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0023	0.0023	0.0026	-	-	-
Zn, Tot	Construction	Aug	2	-	-	-	0.0016	0.0016	0.0016	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0024	0.0024	0.0027	-	-	-
Zn, Tot	Construction	Sep	2	-	-	-	0.0017	0.0017	0.0017	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0022	0.0022	0.0025	-	-	-
Zn, Tot	Construction	Oct	2	-	-	-	0.0019	0.0019	0.0019	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0021	0.0021	0.0022	-	-	-
Zn, Tot	Construction	Nov	2	-	-	-	0.0011	0.0011	0.0011	0.0024	0.0024	0.0025	0.0024	0.0024	0.0025	0.0023	0.0023	0.0026	-	-	-
Zn, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0024	0.0024	0.0024	0.0024	0.0024	0.0025	0.0025	0.0025	0.0027	-	-	-
Zn, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0023	0.0024	0.0030	0.0034	0.0048	-	-	-
Zn, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0023	0.0024	0.0027	0.0029	0.0036	-	-	-
Zn, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0023	0.0024	0.0029	0.0028	0.0031	-	-	-
Zn, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0023	0.0024	0.0029	0.0029	0.0032	-	-	-
Zn, Tot	Operations	May	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0023	0.0023	0.0027	0.0028	0.0032	-	-	-
Zn, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0022	0.0023	0.0028	0.0028	0.0034	-	-	-
Zn, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0023	0.0023	0.0024	0.0022	0.0022	0.0023	0.0030	0.0030	0.0036	-	-	-
Zn, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0023	0.0023	0.0023	0.0022	0.0022	0.0023	0.0029	0.0029	0.0035	-	-	-
Zn, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0023	0.0023	0.0023	0.0022	0.0022	0.0023	0.0030	0.0029	0.0035	-	-	-
Zn, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0023	0.0023	0.0023	0.0022	0.0022	0.0023	0.0031	0.0030	0.0038	-	-	-
Zn, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0023	0.0023	0.0023	0.0022	0.0022	0.0023	0.0034	0.0033	0.0044	-	-	-
Zn, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0023	0.0023	0.0023	0.0022	0.0022	0.0023	0.0038	0.0036	0.0048	-	-	-
Zn, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	May	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0023	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0024	0.0024	0.0025	0.0024	0.0023	0.0024	-	-	-	-	-	-
Zn, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0023	0.0024
Zn, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0023	0.0024
Zn, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0023	0.0024
Zn, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0023	0.0024
Zn, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024
Zn, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	-	-	-	0.0024	0.0022	0.0024

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
Unit				Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L
Cl	Construction	Jan	2	2.743	2.743	2.743	5.367	5.367	5.367	3.365	3.365	3.385	3.382	3.382	3.385	3.140	3.140	3.140	-	-	-
Cl	Construction	Feb	2	2.797	2.797	2.797	5.314	5.314	5.314	3.359	3.359	3.385	3.381	3.381	3.385	3.056	3.056	3.056	-	-	-
Cl	Construction	Mar	2	2.882	2.882	2.882	5.257	5.257	5.257	3.353	3.353	3.385	3.379	3.379	3.385	2.519	2.519	2.519	-	-	-
Cl	Construction	Apr	2	2.510	2.510	2.510	5.191	5.191	5.191	3.347	3.347	3.385	3.377	3.377	3.385	2.065	2.065	3.401	-	-	-
Cl	Construction	May	2	-	-	-	5.116	5.116	5.116	3.341	3.341	3.385	3.374	3.374	3.385	2.442	2.442	3.331	-	-	-
Cl	Construction	Jun	2	-	-	-	5.038	5.038	5.038	3.337	3.337	3.385	3.371	3.371	3.385	2.242	2.242	2.914	-	-	-
Cl	Construction	Jul	2	-	-	-	4.948	4.948	4.948	3.333	3.333	3.384	3.367	3.367	3.385	2.044	2.044	2.485	-	-	-
Cl	Construction	Aug	2	-	-	-	4.838	4.838	4.838	3.329	3.329	3.382	3.364	3.364	3.385	2.032	2.032	2.442	-	-	-
Cl	Construction	Sep	2	-	-	-	4.693	4.693	4.693	3.325	3.325	3.378	3.360	3.360	3.385	2.022	2.022	2.433	-	-	-
Cl	Construction	Oct	2	-	-	-	4.460	4.460	4.460	3.321	3.321	3.373	3.355	3.355	3.384	2.104	2.104	2.631	-	-	-
Cl	Construction	Nov	2	-	-	-	2.166	2.166	2.166	3.316	3.316	3.365	3.351	3.351	3.383	2.465	2.465	2.600	-	-	-
Cl	Construction	Dec	2	-	-	-	-	-	-	3.310	3.310	3.356	3.347	3.347	3.381	2.932	2.932	3.080	-	-	-
Cl	Operations	Jan	5	-	-	-	-	-	-	3.145	3.179	3.261	3.172	3.192	3.305	1.730	2.117	2.962	-	-	-
Cl	Operations	Feb	5	-	-	-	-	-	-	3.142	3.175	3.259	3.166	3.188	3.299	2.353	2.490	2.961	-	-	-
Cl	Operations	Mar	5	-	-	-	-	-	-	3.138	3.171	3.256	3.161	3.185	3.294	3.239	3.144	3.395	-	-	-
Cl	Operations	Apr	5	-	-	-	-	-	-	3.134	3.166	3.254	3.156	3.182	3.288	3.378	3.448	3.573	-	-	-
Cl	Operations	May	5	-	-	-	-	-	-	3.131	3.162	3.252	3.151	3.179	3.284	3.226	3.271	3.391	-	-	-
Cl	Operations	Jun	5	-	-	-	-	-	-	3.129	3.159	3.250	3.147	3.175	3.279	3.035	3.031	3.123	-	-	-
Cl	Operations	Jul	5	-	-	-	-	-	-	3.129	3.158	3.249	3.143	3.172	3.274	2.815	2.753	2.866	-	-	-
Cl	Operations	Aug	5	-	-	-	-	-	-	3.130	3.157	3.248	3.139	3.169	3.270	2.869	2.786	2.899	-	-	-
Cl	Operations	Sep	5	-	-	-	-	-	-	3.132	3.158	3.246	3.135	3.165	3.265	2.896	2.775	2.903	-	-	-
Cl	Operations	Oct	5	-	-	-	-	-	-	3.134	3.158	3.243	3.132	3.162	3.261	2.549	2.246	2.576	-	-	-
Cl	Operations	Nov	5	-	-	-	-	-	-	3.135	3.158	3.238	3.129	3.159	3.256	2.013	1.771	2.051	-	-	-
Cl	Operations	Dec	5	-	-	-	-	-	-	3.136	3.157	3.231	3.126	3.156	3.252	1.677	1.651	1.738	-	-	-
Cl	Closure	Jan	6	-	-	-	-	-	-	3.284	3.266	3.381	3.169	3.206	3.351	-	-	-	-	-	-
Cl	Closure	Feb	6	-	-	-	-	-	-	3.296	3.270	3.381	3.175	3.209	3.351	-	-	-	-	-	-
Cl	Closure	Mar	6	-	-	-	-	-	-	3.307	3.272	3.381	3.182	3.212	3.351	-	-	-	-	-	-
Cl	Closure	Apr	6	-	-	-	-	-	-	3.318	3.275	3.381	3.191	3.216	3.352	-	-	-	-	-	-
Cl	Closure	May	6	-	-	-	-	-	-	3.328	3.278	3.381	3.200	3.219	3.352	-	-	-	-	-	-
Cl	Closure	Jun	6	-	-	-	-	-	-	3.338	3.281	3.381	3.210	3.223	3.352	-	-	-	-	-	-
Cl	Closure	Jul	6	-	-	-	-	-	-	3.346	3.284	3.381	3.220	3.226	3.352	-	-	-	-	-	-
Cl	Closure	Aug	6	-	-	-	-	-	-	3.353	3.288	3.381	3.230	3.230	3.353	-	-	-	-	-	-
Cl	Closure	Sep	6	-	-	-	-	-	-	3.359	3.291	3.381	3.240	3.233	3.353	-	-	-	-	-	-
Cl	Closure	Oct	6	-	-	-	-	-	-	3.364	3.295	3.381	3.250	3.237	3.353	-	-	-	-	-	-
Cl	Closure	Nov	6	-	-	-	-	-	-	3.368	3.299	3.381	3.260	3.239	3.353	-	-	-	-	-	-
Cl	Closure	Dec	6	-	-	-	-	-	-	3.371	3.303	3.381	3.269	3.243	3.353	-	-	-	-	-	-
Cl	Post-Closure	Jan	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.634	3.643	3.822
Cl	Post-Closure	Feb	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.633	3.642	3.818
Cl	Post-Closure	Mar	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.632	3.640	3.805
Cl	Post-Closure	Apr	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.631	3.637	3.790
Cl	Post-Closure	May	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.630	3.636	3.780
Cl	Post-Closure	Jun	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.630	3.636	3.778
Cl	Post-Closure	Jul	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.632	3.638	3.782
Cl	Post-Closure	Aug	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.634	3.642	3.787
Cl	Post-Closure	Sep	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.635	3.625	3.786
Cl	Post-Closure	Oct	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.635	3.645	3.839
Cl	Post-Closure	Nov	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.634	3.643	3.829
Cl	Post-Closure	Dec	117	-	-	-	-	-	-	3.385	3.385	3.385	3.385	3.384	3.385	-	-	-	3.634	3.643	3.826
F	Construction	Jan	2	0.1323	0.1323	0.1323	0.1248	0.1248	0.1248	0.2436	0.2436	0.2440	0.2438	0.2438	0.2440	0.2038	0.2038	0.2038	-	-	-
F	Construction	Feb	2	0.1383	0.1383	0.1383	0.1285	0.1285	0.1285	0.2435	0.2435	0.2440	0.2437	0.2437	0.2440	0.1996	0.1996	0.1996	-	-	-
F	Construction	Mar	2	0.1478	0.1478	0.1478	0.1324	0.1324	0.1324	0.2433	0.2433	0.2440	0.2436	0.2436	0.2440	0.1659	0.1659	0.1659	-	-	-
F	Construction	Apr	2	0.1389	0.1389	0.1389	0.1368	0.1368	0.1368	0.2432	0.2432	0.2440	0.2434	0.2434	0.2440	0.1351	0.1351	0.2218	-	-	-
F	Construction	May	2	-	-	-	0.1416	0.1416	0.1416	0.2431	0.2431	0.2440	0.2432	0.2432	0.2440	0.1604	0.1604	0.2182	-	-	-
F	Construction	Jun	2	-	-	-	0.1472	0.1472	0.1472	0.2430	0.2430	0.2440	0.2430	0.2430	0.2440	0.1478	0.1478	0.1927	-	-	-
F	Construction	Jul	2	-	-	-	0.1535	0.1535	0.1535	0.2429	0.2429	0.2440	0.2427	0.2427	0.2440	0.1358	0.1358	0.1667	-	-	-
F	Construction	Aug	2	-	-	-	0.1612	0.1612	0.1612	0.2428	0.2428	0.2439	0.2425	0.2425	0.2440	0.1350	0.1350	0.1640	-	-	-
F	Construction	Sep	2	-	-	-	0.1704	0.1704	0.1704	0.2428	0.2428	0.2438	0.2422	0.2422	0.2440	0.1338	0.1338	0.1631	-	-	-
F	Construction	Oct	2	-	-	-	0.1827	0.1827	0.1827	0.2428	0.2428	0.2437	0.2420	0.2420	0.2439	0.1384	0.1384	0.1755	-	-	-
F	Construction	Nov	2	-	-	-	0.1033	0.1033	0.1033	0.2428	0.2428	0.2436	0.2417	0.2417	0.2438	0.1619	0.1619	0.1740	-	-	-
F	Construction	Dec	2	-	-	-	-	-	-	0.2427	0.2427	0.2434	0.2414	0.2414	0.2437	0.1920	0.1920	0.1989	-	-	-
F	Operations	Jan	5	-	-	-	-	-	-	0.2406	0.2410	0.2421	0.2363	0.2366	0.2387	0.2624	0.2566	0.2954	-	-	-
F	Operations	Feb	5	-	-	-	-	-	-	0.2406	0.2410	0.2421	0.2361	0.2366	0.2385	0.2368	0.2312	0.2434	-	-	-
F	Operations	Mar	5	-	-	-	-	-	-	0.2405	0.2410	0.2421	0.2360	0.2365	0.2382	0.2521	0.2341	0.2530	-	-	-
F	Operations	Apr	5	-	-	-	-	-	-	0.2404	0.2408	0.2421	0.2359	0.2365	0.2380	0.2602	0.2521	0.2666	-	-	-
F	Operations	May	5	-	-	-	-	-	-	0.2403	0.2407	0.2420	0.2358	0.2364	0.2379	0.2537	0.2487	0.2599	-	-	-
F	Operations	Jun	5	-	-	-	-	-	-	0.2401	0.2405	0.2419	0.2357	0.2364	0.2378	0.2582	0.2464	0.2603	-	-	-
F	Operations	Jul	5	-	-	-	-	-	-	0.2399	0.2403	0.2418	0.2357	0.2363	0.2377	0.2612	0.2434	0.2619	-	-	-
F	Operations	Aug	5	-	-	-	-	-	-	0.2399	0.2403	0.2418	0.2357	0.2363	0.2377	0.2611	0.2434	0.2615	-	-	-
F	Operations	Sep	5	-	-	-	-	-	-	0.2399	0.2403	0.2418	0.2357	0.2362	0.2376	0.2690	0.2504	0.2697	-	-	-
F	Operations	Oct	5	-	-	-	-	-	-	0.2400	0.2404	0.2418	0.2357	0.2362	0.2376	0.2791	0.2502	0.2797	-	-	-
F	Operations	Nov	5	-	-	-	-	-	-	0.2401	0.2405	0.2419	0.2357	0.2361	0.2376	0.2865	0.2515	0.2869	-	-	-
F	Operations	Dec	5	-	-	-	-	-	-	0.2403	0.2406	0.2419	0.2357	0.2361	0.2376	0.2910	0.2605	0.2915	-	-	-
F	Closure	Jan	6	-	-	-	-	-	-	0.2424	0.2422	0.2439	0.2372	0.2384	0.2429	-	-	-	-	-	-
F	Closure	Feb	6	-	-	-	-	-	-	0.2426	0.2423	0.2439	0.2374	0.2385	0.2429	-	-	-	-	-	-
F	Closure	Mar	6	-	-	-	-	-	-	0.2428	0.2423	0.2439	0.2377	0.2386	0.2429	-	-	-	-	-	-
F	Closure	Apr	6	-	-	-	-	-	-	0.2430	0.2424	0.2439	0.2379	0.2387	0.2429	-	-	-	-	-	-
F	Closure	May	6	-	-	-	-	-	-	0.2432	0.2424	0.2439	0.2380	0.2388	0.2429	-	-	-	-	-	-
F	Closure	Jun	6	-	-	-	-	-	-	0.2433	0.2424	0.2439	0.2382	0.2389	0.2429	-	-	-	-	-	-
F	Closure	Jul	6	-	-	-	-	-	-	0.2434	0.2424	0.2439	0.2385	0.2390	0.2430	-	-	-	-	-	-
F	Closure	Aug	6	-	-	-	-	-	-	0.2435	0.2424	0.2439	0.2389	0.2392	0.2430	-	-	-	-	-	-
F	Closure	Sep	6	-	-	-	-	-	-	0.2436	0.2424	0.2439	0.2392	0.2393	0.2430	-	-	-	-	-	-
F	Closure	Oct	6	-	-	-	-	-	-	0.2437	0.2425	0.2439	0.2395	0.2394	0.2430	-	-	-	-	-	-
F	Closure	Nov	6	-	-	-	-	-	-	0.2438	0.2426	0.2439	0.2398	0.2394	0.2430	-	-	-	-	-	-
F	Closure	Dec	6	-	-	-	-	-	-	0.2438	0.2427	0.2439	0.2401	0.2395	0.2430	-	-	-	-	-	-
F	Post-Closure	Jan	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2683	0.2677	0.2684
F	Post-Closure	Feb	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2683	0.2676	0.2683
F	Post-Closure	Mar	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2682	0.2674	0.2682
F	Post-Closure	Apr	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2680	0.2672	0.2680
F	Post-Closure	May	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2679	0.2671	0.2680
F	Post-Closure	Jun	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2680	0.2672	0.2680
F	Post-Closure	Jul	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2682	0.2675	0.2682
F	Post-Closure	Aug	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2684	0.2678	0.2684
F	Post-Closure	Sep	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2685	0.2665	0.2686
F	Post-Closure	Oct	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2685	0.2678	0.2685
F	Post-Closure	Nov	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2684	0.2678	0.2685
F	Post-Closure	Dec	117	-	-	-	-	-	-	0.2440	0.2440	0.2440	0.2440	0.2440	0.2440	-	-	-	0.2684	0.2677	0.2684
P, Tot	Construction	Jan	2	0.0522	0.0522	0.0522	0.0302	0.0302	0.0302	0.3117	0.3117	0.3132	0.3126	0.3126	0.3132	0.1916	0.1916	0.1916	-	-	-
P, Tot	Construction	Feb	2	0.0630	0.0630	0.0630	0.0371	0.0371	0.0371	0.3112	0.3112	0.3132	0.3123	0.3123	0.3132	0.1925	0.1925	0.1925	-	-	-
P, Tot	Construction	Mar	2	0.0804	0.0804	0.0804	0.0446	0.0446	0.0446	0.3108	0.3108	0.3132	0.3119	0.3119	0.3132	0.1564	0.1564	0.1564	-	-	-
P, Tot	Construction	Apr	2	0.1000	0.1000	0.1000	0.0530	0.0530	0.0530	0.3103	0.3103	0.3132	0.3115	0.3115	0.3132	0.1154	0.1154	0.2223	-	-	-
P, Tot	Construction	May	2	-	-	-	0.0622	0.0622	0.0622	0.3099	0.3099	0.3132	0.3109	0.3109	0.3132	0.1177	0.1177	0.2165	-	-	-
P, Tot	Construction	Jun	2	-	-	-	0.0726	0.0726	0.0726	0.3095	0.3095	0.3131	0.3103	0.3103	0.3132	0.1027	0.1027	0.1848	-	-	-
P, Tot	Construction	Jul	2	-	-	-	0.0845	0.0845	0.0845	0.3090	0.3090	0.3130	0.3095	0.3095	0.3131	0.0890	0.0890	0.1533	-	-	-
P, Tot	Construction	Aug	2	-	-	-	0.0989	0.0989	0.0989	0.3087	0.3087	0.3129	0.3088	0.3088	0.3131	0.0895	0.0895	0.1504	-	-	-
P, Tot	Construction	Sep	2	-	-	-	0.1166	0.1166	0.1166	0.3082	0.3082	0.3126	0.3080	0.3080	0.3131	0.0879	0.0879	0.1487	-	-	-
P, Tot	Construction	Oct	2	-	-	-	0.1414	0.1414	0.1414	0.3078	0.3078	0.3122	0.3072	0.3072	0.3129	0.0934	0.0934	0.1628	-	-	-
P, Tot	Construction	Nov	2	-	-	-	0.0901	0.0901	0.0901	0.3073	0.3073	0.3116	0.3063	0.3063	0.3127	0.1223	0.1223	0.1599	-	-	-
P, Tot	Construction	Dec	2	-	-	-	-	-	-	0.3069	0.3069	0.3109	0.3054	0.3054	0.3124	0.1721	0.1721	0.1748	-	-	-
P, Tot	Operations	Jan	5	-	-	-	-	-	-	0.2925	0.2955	0.3026	0.2745	0.2779	0.2968	0.0992	0.1286	0.1891	-	-	-
P, Tot	Operations	Feb	5	-	-	-	-	-	-	0.2923	0.2953	0.3024	0.2736	0.2773	0.2954	0.1487	0.1587	0.1908	-	-	-
P, Tot	Operations	Mar	5	-	-	-	-	-	-	0.2922	0.2951	0.3023	0.2728	0.2767	0.2941	0.2109	0.2047	0.2241	-	-	-
P, Tot	Operations	Apr	5	-	-	-	-	-	-	0.2922	0.2949	0.3022	0.2719	0.2760	0.2928	0.2210	0.2265	0.2358	-	-	-
P, Tot	Operations	May	5	-	-	-	-	-	-	0.2921	0.2948	0.3021	0.2712	0.2755	0.2917	0.2120	0.2145	0.2246	-	-	-
P, Tot	Operations	Jun	5	-	-	-	-	-	-	0.2920	0.2945	0.3020	0.2704	0.2749	0.2906	0.1987	0.1968	0.2038	-	-	-
P, Tot	Operations	Jul	5	-	-	-	-	-	-	0.2918	0.2943	0.3019	0.2698	0.2743	0.2897	0.1833	0.1770	0.1859	-	-	-
P, Tot	Operations	Aug	5	-	-	-	-	-	-	0.2917	0.2941	0.3017	0.2692	0.2738	0.2888	0.1870	0.1794	0.1891	-	-	-
P, Tot	Operations	Sep	5	-	-	-	-	-	-	0.2916	0.2939	0.3014	0.2687	0.2733	0.2880	0.1861	0.1764	0.1883	-	-	-
P, Tot	Operations	Oct	5	-	-	-	-	-	-	0.2916	0.2937	0.3011	0.2682	0.2729	0.2873	0.1594	0.1363	0.1631	-	-	-
P, Tot	Operations	Nov	5	-	-	-	-	-	-	0.2915	0.2935	0.3006	0.2679	0.2725	0.2867	0.1202	0.1022	0.1250	-	-	-
P, Tot	Operations	Dec	5	-	-	-	-	-	-	0.2915	0.2934	0.3001	0.2675	0.2721	0.2861	0.0982	0.0945	0.1004	-	-	-
P, Tot	Closure	Jan	6	-	-	-	-	-	-	0.3038	0.3026	0.3128	0.2775	0.2830	0.3075	-	-	-	-	-	-
P, Tot	Closure	Feb	6	-	-	-	-	-	-	0.3048	0.3029	0.3128	0.2790	0.2836	0.3076	-	-	-	-	-	-
P, Tot	Closure	Mar	6	-	-	-	-	-	-	0.3058	0.3033	0.3128	0.2804	0.2842	0.3076	-	-	-	-	-	-
P, Tot	Closure	Apr	6	-	-	-	-	-	-	0.3067	0.3036	0.3128	0.2820	0.2848	0.3077	-	-	-	-	-	-
P, Tot	Closure	May	6	-	-	-	-	-	-	0.3077	0.3040	0.3128	0.2836	0.2854	0.3077	-	-	-	-	-	-
P, Tot	Closure	Jun	6	-	-	-	-	-	-	0.3085	0.3043	0.3128	0.2852	0.2859	0.3077	-	-	-	-	-	-
P, Tot	Closure	Jul	6	-	-	-	-	-	-	0.3093	0.3045	0.3128	0.2869	0.2865	0.3077	-	-	-	-	-	-
P, Tot	Closure	Aug	6	-	-	-	-	-	-	0.3100	0.3048	0.3128	0.2886	0.2871	0.3077	-	-	-	-	-	-
P, Tot	Closure	Sep	6	-	-	-	-	-	-	0.3105	0.3050	0.3128	0.2902	0.2877	0.3078	-	-	-	-	-	-
P, Tot	Closure	Oct	6	-	-	-	-	-	-	0.3111	0.3053	0.3128	0.2918	0.2883	0.3078	-	-	-	-	-	-
P, Tot	Closure	Nov	6	-	-	-	-	-	-	0.3114	0.3056	0.3128	0.2934	0.2889	0.3078	-	-	-	-	-	-
P, Tot	Closure	Dec	6	-	-	-	-	-	-	0.3117	0.3059	0.3128	0.2949	0.2895	0.3078	-	-	-	-	-	-
P, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3130	0.3132	-	-	-	0.0575	0.0533	0.0575
P, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3130	0.3132	-	-	-	0.0577	0.0535	0.0577
P, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3130	0.3132	-	-	-	0.0578	0.0536	0.0578
P, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3130	0.3132	-	-	-	0.0579	0.0538	0.0579
P, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3130	0.3132	-	-	-	0.0577	0.0536	0.0578
P, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3130	0.3132	-	-	-	0.0575	0.0532	0.0575
P, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3131	0.3132	-	-	-	0.0574	0.0531	0.0574
P, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3131	0.3132	-	-	-	0.0573	0.0532	0.0573
P, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3131	0.3132	-	-	-	0.0573	0.0530	0.0573
P, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3131	0.3132	-	-	-	0.0572	0.0530	0.0572
P, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3131	0.3132	-	-	-	0.0573	0.0530	0.0573
P, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.3132	0.3132	0.3132	0.3132	0.3131	0.3132	-	-	-	0.0574	0.0532	0.0574
NH3 (as N)	Construction	Jan	2	0.1831	0.1831	0.1831	0.1610	0.1610	0.1610	0.3859	0.3859	0.3866	0.3862	0.3862	0.3866	0.3191	0.3191	0.3191	-	-	-
NH3 (as N)	Construction	Feb	2	0.1939	0.1939	0.1939	0.1679	0.1679	0.1679	0.3857	0.3857	0.3866	0.3860	0.3860	0.3866	0.3239	0.3239	0.3239	-	-	-
NH3 (as N)	Construction	Mar	2	0.2110	0.2110	0.2110	0.1753	0.1753	0.1753	0.3854	0.3854	0.3866	0.3858	0.3858	0.3866	0.2697	0.2697	0.2697	-	-	-
NH3 (as N)	Construction	Apr	2	0.2055	0.2055	0.2055	0.1835	0.1835	0.1835	0.3852	0.3852	0.3866	0.3855	0.3855	0.3866	0.2102	0.2102	0.3537	-	-	-
NH3 (as N)	Construction	May	2	-	-	-	0.1926	0.1926	0.1926	0.3849	0.3849	0.3866	0.3851	0.3851	0.3866	0.2436	0.2436	0.3494	-	-	-
NH3 (as N)	Construction	Jun	2	-	-	-	0.2029	0.2029	0.2029	0.3846	0.3846	0.3866	0.3846	0.3846	0.3866	0.2224	0.2224	0.3131	-	-	-
NH3 (as N)	Construction	Jul	2	-	-	-	0.2147	0.2147	0.2147	0.3843	0.3843	0.3866	0.3841	0.3841	0.3866	0.2011	0.2011	0.2750	-	-	-
NH3 (as N)	Construction	Aug	2	-	-	-	0.2291	0.2291	0.2291	0.3840	0.3840	0.3865	0.3836	0.3836	0.3866	0.1982	0.1982	0.2722	-	-	-
NH3 (as N)	Construction	Sep	2	-	-	-	0.2464	0.2464	0.2464	0.3838	0.3838	0.3863	0.3830	0.3830	0.3866	0.1969	0.1969	0.2724	-	-	-
NH3 (as N)	Construction	Oct	2	-	-	-	0.2700	0.2700	0.2700	0.3835	0.3835	0.3861	0.3823	0.3823	0.3865	0.2058	0.2058	0.2942	-	-	-
NH3 (as N)	Construction	Nov	2	-	-	-	0.1562	0.1562	0.1562	0.3834	0.3834	0.3859	0.3817	0.3817	0.3863	0.2514	0.2514	0.3020	-	-	-
NH3 (as N)	Construction	Dec	2	-	-	-	-	-	-	0.3832	0.3832	0.3855	0.3810	0.3810	0.3861	0.3100	0.3100	0.3233	-	-	-
NH3 (as N)	Operations	Jan	5	-	-	-	-	-	-	0.3755	0.3771	0.3808	0.3645	0.3663	0.3748	0.8939	0.7912	1.0920	-	-	-
NH3 (as N)	Operations	Feb	5	-	-	-	-	-	-	0.3756	0.3772	0.3809	0.3640	0.3660	0.3739	0.5983	0.6048	0.7231	-	-	-
NH3 (as N)	Operations	Mar	5	-	-	-	-	-	-	0.3757	0.3772	0.3809	0.3636	0.3657	0.3731	0.4986	0.4799	0.5475	-	-	-
NH3 (as N)	Operations	Apr	5	-	-	-	-	-	-	0.3757	0.3772	0.3809	0.3633	0.3655	0.3724	0.5231	0.4946	0.5536	-	-	-
NH3 (as N)	Operations	May	5	-	-	-	-	-	-	0.3756	0.3770	0.3809	0.3630	0.3653	0.3717	0.5495	0.5107	0.5541	-	-	-
NH3 (as N)	Operations	Jun	5	-	-	-	-	-	-	0.3754	0.3768	0.3808	0.3628	0.3651	0.3712	0.5667	0.5382	0.6125	-	-	-
NH3 (as N)	Operations	Jul	5	-	-	-	-	-	-	0.3751	0.3764	0.3806	0.3626	0.3649	0.3708	0.5834	0.5553	0.6415	-	-	-
NH3 (as N)	Operations	Aug	5	-	-	-	-	-	-	0.3748	0.3761	0.3804	0.3624	0.3647	0.3704	0.5483	0.5321	0.6167	-	-	-
NH3 (as N)	Operations	Sep	5	-	-	-	-	-	-	0.3745	0.3758	0.3802	0.3622	0.3645	0.3701	0.5562	0.5524	0.6580	-	-	-
NH3 (as N)	Operations	Oct	5	-	-	-	-	-	-	0.3744	0.3756	0.3801	0.3620	0.3643	0.3698	0.6241	0.6396	0.8244	-	-	-
NH3 (as N)	Operations	Nov	5	-	-	-	-	-	-	0.3744	0.3756	0.3800	0.3618	0.3641	0.3695	0.7356	0.7251	0.9099	-	-	-
NH3 (as N)	Operations	Dec	5	-	-	-	-	-	-	0.3746	0.3757	0.3799	0.3617	0.3639	0.3693	0.8385	0.7923	0.9900	-	-	-
NH3 (as N)	Closure	Jan	6	-	-	-	-	-	-	0.3807	0.3806	0.3864	0.3657	0.3691	0.3831	-	-	-	-	-	-
NH3 (as N)	Closure	Feb	6	-	-	-	-	-	-	0.3813	0.3808	0.3864	0.3663	0.3694	0.3832	-	-	-	-	-	-
NH3 (as N)	Closure	Mar	6	-	-	-	-	-	-	0.3819	0.3811	0.3864	0.3669	0.3697	0.3832	-	-	-	-	-	-
NH3 (as N)	Closure	Apr	6	-	-	-	-	-	-	0.3825	0.3813	0.3864	0.3676	0.3700	0.3833	-	-	-	-	-	-
NH3 (as N)	Closure	May	6	-	-	-	-	-	-	0.3831	0.3815	0.3864	0.3682	0.3703	0.3833	-	-	-	-	-	-
NH3 (as N)	Closure	Jun	6	-	-	-	-	-	-	0.3837	0.3816	0.3864	0.3687	0.3707	0.3833	-	-	-	-	-	-
NH3 (as N)	Closure	Jul	6	-	-	-	-	-	-	0.3841	0.3817	0.3864	0.3695	0.3710	0.3834	-	-	-	-	-	-
NH3 (as N)	Closure	Aug	6	-	-	-	-	-	-	0.3846	0.3818	0.3864	0.3705	0.3713	0.3834	-	-	-	-	-	-
NH3 (as N)	Closure	Sep	6	-	-	-	-	-	-	0.3850	0.3819	0.3864	0.3715	0.3716	0.3834	-	-	-	-	-	-
NH3 (as N)	Closure	Oct	6	-	-	-	-	-	-	0.3853	0.3820	0.3864	0.3725	0.3719	0.3834	-	-	-	-	-	-
NH3 (as N)	Closure	Nov	6	-	-	-	-	-	-	0.3856	0.3821	0.3864	0.3735	0.3722	0.3834	-	-	-	-	-	-
NH3 (as N)	Closure	Dec	6	-	-	-	-	-	-	0.3858	0.3823	0.3864	0.3745	0.3725	0.3834	-	-	-	-	-	-
NH3 (as N)	Post-Closure	Jan	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2920	0.2883	0.2984
NH3 (as N)	Post-Closure	Feb	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2921	0.2884	0.2984
NH3 (as N)	Post-Closure	Mar	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2921	0.2884	0.2984
NH3 (as N)	Post-Closure	Apr	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2921	0.2883	0.2984
NH3 (as N)	Post-Closure	May	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2921	0.2882	0.2983

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
Unit				Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L	Median mg/L	Mean mg/L	Max mg/L
NH3 (as N)	Post-Closure	Jun	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2920	0.2881	0.2981
NH3 (as N)	Post-Closure	Jul	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2920	0.2881	0.2981
NH3 (as N)	Post-Closure	Aug	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2921	0.2883	0.2980
NH3 (as N)	Post-Closure	Sep	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2921	0.2871	0.2987
NH3 (as N)	Post-Closure	Oct	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2919	0.2883	0.2984
NH3 (as N)	Post-Closure	Nov	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2919	0.2882	0.2983
NH3 (as N)	Post-Closure	Dec	117	-	-	-	-	-	-	0.3866	0.3866	0.3866	0.3866	0.3865	0.3866	-	-	-	0.2919	0.2882	0.2984
NO2 (as N)	Construction	Jan	2	0.0521	0.0521	0.0521	0.0688	0.0688	0.0688	0.0657	0.0657	0.0661	0.0660	0.0660	0.0661	0.0482	0.0482	0.0482	-	-	-
NO2 (as N)	Construction	Feb	2	0.0524	0.0524	0.0524	0.0684	0.0684	0.0684	0.0656	0.0656	0.0661	0.0659	0.0659	0.0661	0.0500	0.0500	0.0500	-	-	-
NO2 (as N)	Construction	Mar	2	0.0528	0.0528	0.0528	0.0680	0.0680	0.0680	0.0655	0.0655	0.0661	0.0658	0.0658	0.0661	0.0415	0.0415	0.0415	-	-	-
NO2 (as N)	Construction	Apr	2	0.0437	0.0437	0.0437	0.0675	0.0675	0.0675	0.0654	0.0654	0.0661	0.0657	0.0657	0.0661	0.0303	0.0303	0.0542	-	-	-
NO2 (as N)	Construction	May	2	-	-	-	0.0670	0.0670	0.0670	0.0654	0.0654	0.0661	0.0656	0.0656	0.0661	0.0345	0.0345	0.0544	-	-	-
NO2 (as N)	Construction	Jun	2	-	-	-	0.0664	0.0664	0.0664	0.0653	0.0653	0.0661	0.0655	0.0655	0.0661	0.0329	0.0329	0.0498	-	-	-
NO2 (as N)	Construction	Jul	2	-	-	-	0.0658	0.0658	0.0658	0.0652	0.0652	0.0661	0.0654	0.0654	0.0661	0.0306	0.0306	0.0445	-	-	-
NO2 (as N)	Construction	Aug	2	-	-	-	0.0651	0.0651	0.0651	0.0652	0.0652	0.0660	0.0652	0.0652	0.0661	0.0305	0.0305	0.0442	-	-	-
NO2 (as N)	Construction	Sep	2	-	-	-	0.0640	0.0640	0.0640	0.0651	0.0651	0.0660	0.0651	0.0651	0.0661	0.0303	0.0303	0.0443	-	-	-
NO2 (as N)	Construction	Oct	2	-	-	-	0.0622	0.0622	0.0622	0.0650	0.0650	0.0659	0.0649	0.0649	0.0660	0.0317	0.0317	0.0477	-	-	-
NO2 (as N)	Construction	Nov	2	-	-	-	0.0311	0.0311	0.0311	0.0649	0.0649	0.0657	0.0648	0.0648	0.0660	0.0390	0.0390	0.0496	-	-	-
NO2 (as N)	Construction	Dec	2	-	-	-	-	-	-	0.0648	0.0648	0.0656	0.0646	0.0646	0.0659	0.0482	0.0482	0.0527	-	-	-
NO2 (as N)	Operations	Jan	5	-	-	-	-	-	-	0.0620	0.0626	0.0640	0.0587	0.0596	0.0630	0.2078	0.1760	0.2574	-	-	-
NO2 (as N)	Operations	Feb	5	-	-	-	-	-	-	0.0620	0.0625	0.0640	0.0586	0.0595	0.0628	0.1281	0.1258	0.1592	-	-	-
NO2 (as N)	Operations	Mar	5	-	-	-	-	-	-	0.0619	0.0624	0.0639	0.0585	0.0594	0.0625	0.0905	0.0882	0.1043	-	-	-
NO2 (as N)	Operations	Apr	5	-	-	-	-	-	-	0.0618	0.0624	0.0639	0.0583	0.0593	0.0623	0.0948	0.0889	0.1044	-	-	-
NO2 (as N)	Operations	May	5	-	-	-	-	-	-	0.0618	0.0623	0.0639	0.0582	0.0592	0.0621	0.1055	0.0953	0.1067	-	-	-
NO2 (as N)	Operations	Jun	5	-	-	-	-	-	-	0.0618	0.0623	0.0638	0.0581	0.0590	0.0619	0.1119	0.1048	0.1248	-	-	-
NO2 (as N)	Operations	Jul	5	-	-	-	-	-	-	0.0618	0.0623	0.0638	0.0580	0.0589	0.0617	0.1182	0.1118	0.1352	-	-	-
NO2 (as N)	Operations	Aug	5	-	-	-	-	-	-	0.0619	0.0623	0.0638	0.0579	0.0588	0.0615	0.1088	0.1056	0.1286	-	-	-
NO2 (as N)	Operations	Sep	5	-	-	-	-	-	-	0.0619	0.0623	0.0638	0.0578	0.0588	0.0614	0.1105	0.1108	0.1393	-	-	-
NO2 (as N)	Operations	Oct	5	-	-	-	-	-	-	0.0619	0.0623	0.0637	0.0578	0.0587	0.0612	0.1336	0.1380	0.1893	-	-	-
NO2 (as N)	Operations	Nov	5	-	-	-	-	-	-	0.0619	0.0623	0.0636	0.0577	0.0586	0.0611	0.1636	0.1638	0.2139	-	-	-
NO2 (as N)	Operations	Dec	5	-	-	-	-	-	-	0.0619	0.0623	0.0635	0.0577	0.0586	0.0610	0.1921	0.1812	0.2321	-	-	-
NO2 (as N)	Closure	Jan	6	-	-	-	-	-	-	0.0644	0.0641	0.0660	0.0596	0.0606	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Feb	6	-	-	-	-	-	-	0.0646	0.0641	0.0660	0.0598	0.0607	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Mar	6	-	-	-	-	-	-	0.0648	0.0642	0.0660	0.0600	0.0608	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Apr	6	-	-	-	-	-	-	0.0650	0.0642	0.0660	0.0603	0.0609	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	May	6	-	-	-	-	-	-	0.0652	0.0643	0.0660	0.0606	0.0610	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Jun	6	-	-	-	-	-	-	0.0653	0.0643	0.0660	0.0609	0.0611	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Jul	6	-	-	-	-	-	-	0.0654	0.0644	0.0660	0.0612	0.0612	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Aug	6	-	-	-	-	-	-	0.0656	0.0645	0.0660	0.0615	0.0613	0.0650	-	-	-	-	-	-
NO2 (as N)	Closure	Sep	6	-	-	-	-	-	-	0.0657	0.0645	0.0660	0.0618	0.0614	0.0651	-	-	-	-	-	-
NO2 (as N)	Closure	Oct	6	-	-	-	-	-	-	0.0657	0.0646	0.0660	0.0621	0.0615	0.0651	-	-	-	-	-	-
NO2 (as N)	Closure	Nov	6	-	-	-	-	-	-	0.0658	0.0647	0.0660	0.0624	0.0616	0.0651	-	-	-	-	-	-
NO2 (as N)	Closure	Dec	6	-	-	-	-	-	-	0.0658	0.0647	0.0660	0.0627	0.0617	0.0651	-	-	-	-	-	-
NO2 (as N)	Post-Closure	Jan	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0660	0.0661	-	-	-	0.0408	0.0397	0.0416
NO2 (as N)	Post-Closure	Feb	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0660	0.0661	-	-	-	0.0409	0.0397	0.0416
NO2 (as N)	Post-Closure	Mar	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0660	0.0661	-	-	-	0.0409	0.0397	0.0416
NO2 (as N)	Post-Closure	Apr	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0409	0.0397	0.0416
NO2 (as N)	Post-Closure	May	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0409	0.0397	0.0416
NO2 (as N)	Post-Closure	Jun	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0409	0.0397	0.0416
NO2 (as N)	Post-Closure	Jul	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0409	0.0396	0.0416
NO2 (as N)	Post-Closure	Aug	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0409	0.0397	0.0415
NO2 (as N)	Post-Closure	Sep	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0408	0.0396	0.0416
NO2 (as N)	Post-Closure	Oct	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0408	0.0397	0.0416
NO2 (as N)	Post-Closure	Nov	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0408	0.0397	0.0416
NO2 (as N)	Post-Closure	Dec	117	-	-	-	-	-	-	0.0661	0.0661	0.0661	0.0661	0.0661	0.0661	-	-	-	0.0408	0.0397	0.0416
N_NO3_NO2	Construction	Jan	2	0.1239	0.1239	0.1239	0.1371	0.1371	0.1371	0.2074	0.2074	0.2085	0.2083	0.2083	0.2085	0.3841	0.3841	0.3841	-	-	-
N_NO3_NO2	Construction	Feb	2	0.1321	0.1321	0.1321	0.1411	0.1411	0.1411	0.2071	0.2071	0.2085	0.2081	0.2081	0.2085	0.6059	0.6059	0.6059	-	-	-
N_NO3_NO2	Construction	Mar	2	0.1451	0.1451	0.1451	0.1454	0.1454	0.1454	0.2068	0.2068	0.2085	0.2080	0.2080	0.2085	0.5546	0.5546	0.5546	-	-	-
N_NO3_NO2	Construction	Apr	2	0.1438	0.1438	0.1438	0.1502	0.1502	0.1502	0.2065	0.2065	0.2085	0.2078	0.2078	0.2085	0.2535	0.2535	0.4455	-	-	-
N_NO3_NO2	Construction	May	2	-	-	-	0.1553	0.1553	0.1553	0.2063	0.2063	0.2085	0.2075	0.2075	0.2085	0.3439	0.3439	0.5543	-	-	-
N_NO3_NO2	Construction	Jun	2	-	-	-	0.1611	0.1611	0.1611	0.2061	0.2061	0.2085	0.2072	0.2072	0.2085	0.4318	0.4318	0.7249	-	-	-
N_NO3_NO2	Construction	Jul	2	-	-	-	0.1678	0.1678	0.1678	0.2060	0.2060	0.2085	0.2069	0.2069	0.2085	0.5145	0.5145	0.8842	-	-	-
N_NO3_NO2	Construction	Aug	2	-	-	-	0.1759	0.1759	0.1759	0.2058	0.2058	0.2083	0.2066	0.2066	0.2085	0.5361	0.5361	0.9241	-	-	-
N_NO3_NO2	Construction	Sep	2	-	-	-	0.1856	0.1856	0.1856	0.2056	0.2056	0.2081	0.2063	0.2063	0.2085	0.5483	0.5483	0.9486	-	-	-
N_NO3_NO2	Construction	Oct	2	-	-	-	0.1986	0.1986	0.1986	0.2054	0.2054	0.2078	0.2059	0.2059	0.2084	0.5673	0.5673	0.9895	-	-	-
N_NO3_NO2	Construction	Nov	2	-	-	-	0.1120	0.1120	0.1120	0.2051	0.2051	0.2074	0.2055	0.2055	0.2083	0.7089	0.7089	1.2250	-	-	-
N_NO3_NO2	Construction	Dec	2	-	-	-	-	-	-	0.2048	0.2048	0.2069	0.2052	0.2052	0.2082	0.7325	0.7325	1.2350	-	-	-
N_NO3_NO2	Operations	Jan	5	-	-	-	-	-	-	0.1966	0.1982	0.2024	0.2214	0.2401	0.3068	17.9600	13.9602	22.6900	-	-	-
N_NO3_NO2	Operations	Feb	5	-	-	-	-	-	-	0.1963	0.1979	0.2022	0.2249	0.2419	0.3083	9.4030	8.5908	12.3300	-	-	-
N_NO3_NO2	Operations	Mar	5	-	-	-	-	-	-	0.1960	0.1977	0.2021	0.2284	0.2436	0.3094	3.9000	4.0556	5.4670	-	-	-
N_NO3_NO2	Operations	Apr	5	-	-	-	-	-	-	0.1958	0.1974	0.2019	0.2323	0.2453	0.3103	4.0650	3.6824	5.2660	-	-	-
N_NO3_NO2	Operations	May	5	-	-	-	-	-	-	0.1957	0.1972	0.2018	0.2363	0.2471	0.3110	5.5620	4.5234	5.6940	-	-	-
N_NO3_NO2	Operations	Jun	5	-	-	-	-	-	-	0.1957	0.1972	0.2018	0.2404	0.2489	0.3115	6.4400	5.7770	7.8790	-	-	-
N_NO3_NO2	Operations	Jul	5	-	-	-	-	-	-	0.1958	0.1972	0.2018	0.2447	0.2507	0.3118	7.3910	6.8766	9.3550	-	-	-
N_NO3_NO2	Operations	Aug	5	-	-	-	-	-	-	0.1960	0.1973	0.2018	0.2491	0.2526	0.3119	6.4210	6.2454	8.6800	-	-	-
N_NO3_NO2	Operations	Sep	5	-	-	-	-	-	-	0.1961	0.1974	0.2017	0.2535	0.2544	0.3119	6.5620	6.7724	9.7980	-	-	-
N_NO3_NO2	Operations	Oct	5	-	-	-	-	-	-	0.1963	0.1974	0.2016	0.2580	0.2563	0.3118	10.4100	10.1610	15.7800	-	-	-
N_NO3_NO2	Operations	Nov	5	-	-	-	-	-	-	0.1963	0.1974	0.2012	0.2624	0.2582	0.3115	12.9300	13.3188	18.6500	-	-	-
N_NO3_NO2	Operations	Dec	5	-	-	-	-	-	-	0.1962	0.1972	0.2008	0.2667	0.2600	0.3110	16.1300	15.1544	20.2600	-	-	-
N_NO3_NO2	Closure	Jan	6	-	-	-	-	-	-	0.2038	0.2027	0.2083	0.2221	0.2424	0.3104	-	-	-	-	-	-
N_NO3_NO2	Closure	Feb	6	-	-	-	-	-	-	0.2044	0.2028	0.2083	0.2198	0.2410	0.3096	-	-	-	-	-	-
N_NO3_NO2	Closure	Mar	6	-	-	-	-	-	-	0.2049	0.2029	0.2083	0.2177	0.2395	0.3086	-	-	-	-	-	-
N_NO3_NO2	Closure	Apr	6	-	-	-	-	-	-	0.2054	0.2030	0.2083	0.2158	0.2381	0.3074	-	-	-	-	-	-
N_NO3_NO2	Closure	May	6	-	-	-	-	-	-	0.2059	0.2032	0.2083	0.2141	0.2366	0.3059	-	-	-	-	-	-
N_NO3_NO2	Closure	Jun	6	-	-	-	-	-	-	0.2063	0.2033	0.2083	0.2126	0.2351	0.3042	-	-	-	-	-	-
N_NO3_NO2	Closure	Jul	6	-	-	-	-	-	-	0.2067	0.2036	0.2083	0.2114	0.2336	0.3024	-	-	-	-	-	-
N_NO3_NO2	Closure	Aug	6	-	-	-	-	-	-	0.2070	0.2038	0.2083	0.2103	0.2321	0.3003	-	-	-	-	-	-
N_NO3_NO2	Closure	Sep	6	-	-	-	-	-	-	0.2073	0.2040	0.2083	0.2094	0.2306	0.2980	-	-	-	-	-	-
N_NO3_NO2	Closure	Oct	6	-	-	-	-	-	-	0.2075	0.2042	0.2083	0.2087	0.2292	0.2956	-	-	-	-	-	-
N_NO3_NO2	Closure	Nov	6	-	-	-	-	-	-	0.2077	0.2044	0.2083	0.2081	0.2278	0.2931	-	-	-	-	-	-
N_NO3_NO2	Closure	Dec	6	-	-	-	-	-	-	0.2079	0.2046	0.2083	0.2076	0.2264	0.2903	-	-	-	-	-	-
N_NO3_NO2	Post-Closure	Jan	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3259	0.3377
N_NO3_NO2	Post-Closure	Feb	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3259	0.3377
N_NO3_NO2	Post-Closure	Mar	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3259	0.3377
N_NO3_NO2	Post-Closure	Apr	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2085	0.2085	-	-	-	0.3363	0.3259	0.3377
N_NO3_NO2	Post-Closure	May	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3258	0.3376
N_NO3_NO2	Post-Closure	Jun	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3362	0.3257	0.3375
N_NO3_NO2	Post-Closure	Jul	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3259	0.3376
N_NO3_NO2	Post-Closure	Aug	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2085	0.2085	-	-	-	0.3364	0.3264	0.3377
N_NO3_NO2	Post-Closure	Sep	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3365	0.3251	0.3379
N_NO3_NO2	Post-Closure	Oct	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3364	0.3261	0.3377
N_NO3_NO2	Post-Closure	Nov	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3260	0.3376
N_NO3_NO2	Post-Closure	Dec	117	-	-	-	-	-	-	0.2085	0.2085	0.2085	0.2085	0.2084	0.2085	-	-	-	0.3363	0.3260	0.3377
CN, Tot	Construction	Jan	2	0.00066	0.00066	0.00066	0.00050	0.00050	0.00050	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-
CN, Tot	Construction	Feb	2	0.00066	0.00066	0.00066	0.00051	0.00051	0.00051	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00067	0.00067	0.00067	-	-	-
CN, Tot	Construction	Mar	2	0.00067	0.00067	0.00067	0.00052	0.00052	0.00052	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00055	0.00055	0.00055	-	-	-
CN, Tot	Construction	Apr	2	0.00055	0.00055	0.00055	0.00053	0.00053	0.00053	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00052	0.00052	0.00069	-	-	-
CN, Tot	Construction	May	2	-	-	-	0.00054	0.00054	0.00054	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00068	0.00068	0.00070	-	-	-
CN, Tot	Construction	Jun	2	-	-	-	0.00055	0.00055	0.00055	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	0.00062	0.00062	0.00065	-	-	-
CN, Tot	Construction	Jul	2	-	-	-	0.00056	0.00056	0.00056	0.00076	0.00076	0.00076	0.00075	0.00075	0.00076	0.00069	0.00069	0.00078	-	-	-
CN, Tot	Construction	Aug	2	-	-	-	0.00057	0.00057	0.00057	0.00075	0.00075	0.00076	0.00075	0.00075	0.00076	0.00078	0.00078	0.00095	-	-	-
CN, Tot	Construction	Sep	2	-	-	-	0.00059	0.00059	0.00059	0.00075	0.00075	0.00076	0.00075	0.00075	0.00076	0.00084	0.00084	0.00105	-	-	-
CN, Tot	Construction	Oct	2	-	-	-	0.00061	0.00061	0.00061	0.00075	0.00075	0.00076	0.00075	0.00075	0.00076	0.00088	0.00088	0.00110	-	-	-
CN, Tot	Construction	Nov	2	-	-	-	0.00033	0.00033	0.00033	0.00075	0.00075	0.00076	0.00075	0.00075	0.00076	0.00089	0.00089	0.00114	-	-	-
CN, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00075	0.00075	0.00076	0.00078	0.00078	0.00093	-	-	-
CN, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00073	0.00074	0.00075	0.00071	0.00072	0.00074	0.00049	0.00054	0.00064	-	-	-
CN, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00073	0.00074	0.00075	0.00071	0.00072	0.00074	0.00053	0.00055	0.00063	-	-	-
CN, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00073	0.00073	0.00075	0.00071	0.00072	0.00074	0.00067	0.00065	0.00069	-	-	-
CN, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00071	0.00072	0.00074	0.00069	0.00070	0.00072	-	-	-
CN, Tot	Operations	May	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00071	0.00071	0.00074	0.00065	0.00066	0.00068	-	-	-
CN, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00071	0.00071	0.00073	0.00062	0.00062	0.00063	-	-	-
CN, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00071	0.00071	0.00073	0.00064	0.00063	0.00065	-	-	-
CN, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00071	0.00071	0.00073	0.00066	0.00065	0.00066	-	-	-
CN, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00073	0.00074	0.00074	0.00071	0.00071	0.00073	0.00068	0.00067	0.00069	-	-	-
CN, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00073	0.00074	0.00074	0.00071	0.00071	0.00073	0.00066	0.00064	0.00067	-	-	-
CN, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00071	0.00071	0.00073	0.00059	0.00056	0.00059	-	-	-
CN, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00073	0.00073	0.00074	0.00070	0.00071	0.00073	0.00052	0.00051	0.00052	-	-	-
CN, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00072	0.00072	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00072	0.00072	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00072	0.00072	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00072	0.00072	0.00075	-	-	-	-	-	-
CN, Tot	Closure	May	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00072	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00073	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00075	0.00075	0.00076	0.00073	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00076	0.00075	0.00076	0.00073	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00076	0.00075	0.00076	0.00073	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00076	0.00075	0.00076	0.00073	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00076	0.00075	0.00076	0.00074	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00076	0.00075	0.00076	0.00074	0.00073	0.00075	-	-	-	-	-	-
CN, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00076	0.00076	0.00076	0.00076	0.00076	0.00076	-	-	-	0.00068	0.00067	0.00068
CN, Free	Construction	Jan	2	0.00051	0.00051	0.00051	0.00051	0.00051	0.00051	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-
CN, Free	Construction	Feb	2	0.00053	0.00053	0.00053	0.00052	0.00052	0.00052	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00080	0.00080	0.00080	-	-	-
CN, Free	Construction	Mar	2	0.00056	0.00056	0.00056	0.00053	0.00053	0.00053	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00066	0.00066	0.00066	-	-	-
CN, Free	Construction	Apr	2	0.00052	0.00052	0.00052	0.00054	0.00054	0.00054	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00060	0.00060	0.00083	-	-	-
CN, Free	Construction	May	2	-	-	-	0.00056	0.00056	0.00056	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00079	0.00079	0.00081	-	-	-
CN, Free	Construction	Jun	2	-	-	-	0.00058	0.00058	0.00058	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00072	0.00072	0.00072	-	-	-
CN, Free	Construction	Jul	2	-	-	-	0.00060	0.00060	0.00060	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00078	0.00078	0.00085	-	-	-
CN, Free	Construction	Aug	2	-	-	-	0.00062	0.00062	0.00062	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00086	0.00086	0.00102	-	-	-
CN, Free	Construction	Sep	2	-	-	-	0.00065	0.00065	0.00065	0.00088	0.00088	0.00089	0.00088	0.00088	0.00089	0.00092	0.00092	0.00112	-	-	-
CN, Free	Construction	Oct	2	-	-	-	0.00069	0.00069	0.00069	0.00088	0.00088	0.00089	0.00087	0.00087	0.00089	0.00097	0.00097	0.00117	-	-	-
CN, Free	Construction	Nov	2	-	-	-	0.00039	0.00039	0.00039	0.00088	0.00088	0.00089	0.00087	0.00087	0.00089	0.00099	0.00099	0.00124	-	-	-
CN, Free	Construction	Dec	2	-	-	-	-	-	-	0.00088	0.00088	0.00088	0.00087	0.00087	0.00089	0.00090	0.00090	0.00106	-	-	-
CN, Free	Operations	Jan	5	-	-	-	-	-	-	0.00084	0.00085	0.00087	0.00079	0.00080	0.00085	0.00056	0.00063	0.00076	-	-	-
CN, Free	Operations	Feb	5	-	-	-	-	-	-	0.00084	0.00085	0.00086	0.00079	0.00080	0.00085	0.00063	0.00066	0.00075	-	-	-
CN, Free	Operations	Mar	5	-	-	-	-	-	-	0.00084	0.00084	0.00086	0.00079	0.00080	0.00084	0.00080	0.00078	0.00083	-	-	-
CN, Free	Operations	Apr	5	-	-	-	-	-	-	0.00084	0.00084	0.00086	0.00079	0.00080	0.00084	0.00083	0.00085	0.00087	-	-	-
CN, Free	Operations	May	5	-	-	-	-	-	-	0.00084	0.00084	0.00086	0.00079	0.00080	0.00084	0.00079	0.00080	0.00082	-	-	-
CN, Free	Operations	Jun	5	-	-	-	-	-	-	0.00084	0.00084	0.00086	0.00079	0.00080	0.00083	0.00075	0.00075	0.00076	-	-	-
CN, Free	Operations	Jul	5	-	-	-	-	-	-	0.00084	0.00084	0.00086	0.00078	0.00079	0.00083	0.00076	0.00075	0.00077	-	-	-
CN, Free	Operations	Aug	5	-	-	-	-	-	-	0.00084	0.00085	0.00086	0.00078	0.00079	0.00083	0.00077	0.00076	0.00078	-	-	-
CN, Free	Operations	Sep	5	-	-	-	-	-	-	0.00084	0.00085	0.00086	0.00078	0.00079	0.00083	0.00081	0.00079	0.00081	-	-	-
CN, Free	Operations	Oct	5	-	-	-	-	-	-	0.00084	0.00085	0.00086	0.00078	0.00079	0.00083	0.00077	0.00073	0.00078	-	-	-
CN, Free	Operations	Nov	5	-	-	-	-	-	-	0.00084	0.00085	0.00086	0.00078	0.00079	0.00082	0.00068	0.00064	0.00068	-	-	-
CN, Free	Operations	Dec	5	-	-	-	-	-	-	0.00084	0.00084	0.00086	0.00078	0.00079	0.00082	0.00059	0.00058	0.00059	-	-	-
CN, Free	Closure	Jan	6	-	-	-	-	-	-	0.00087	0.00087	0.00089	0.00080	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	Feb	6	-	-	-	-	-	-	0.00087	0.00087	0.00089	0.00081	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	Mar	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00081	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	Apr	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00081	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	May	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00082	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	Jun	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00082	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	Jul	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00083	0.00082	0.00087	-	-	-	-	-	-
CN, Free	Closure	Aug	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00083	0.00083	0.00087	-	-	-	-	-	-
CN, Free	Closure	Sep	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00083	0.00083	0.00087	-	-	-	-	-	-
CN, Free	Closure	Oct	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00084	0.00083	0.00087	-	-	-	-	-	-

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CN, Free	Closure	Nov	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00084	0.00083	0.00087	-	-	-	-	-	-
CN, Free	Closure	Dec	6	-	-	-	-	-	-	0.00088	0.00087	0.00089	0.00084	0.00083	0.00087	-	-	-	-	-	-
CN, Free	Post-Closure	Jan	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Feb	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Mar	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Apr	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	May	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Jun	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Jul	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Aug	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Sep	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Oct	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Nov	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
CN, Free	Post-Closure	Dec	117	-	-	-	-	-	-	0.00089	0.00089	0.00089	0.00089	0.00089	0.00089	-	-	-	0.00068	0.00066	0.00068
Al, Tot	Construction	Jan	2	0.017	0.017	0.017	0.011	0.011	0.011	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.048	0.048	-	-	-
Al, Tot	Construction	Feb	2	0.018	0.018	0.018	0.012	0.012	0.012	0.049	0.049	0.049	0.049	0.049	0.049	0.044	0.044	0.044	-	-	-
Al, Tot	Construction	Mar	2	0.020	0.020	0.020	0.013	0.013	0.013	0.049	0.049	0.049	0.049	0.049	0.049	0.040	0.040	0.040	-	-	-
Al, Tot	Construction	Apr	2	0.016	0.016	0.016	0.014	0.014	0.014	0.049	0.049	0.049	0.049	0.049	0.049	0.036	0.036	0.043	-	-	-
Al, Tot	Construction	May	2	-	-	-	0.015	0.015	0.015	0.049	0.049	0.049	0.049	0.049	0.049	0.054	0.054	0.063	-	-	-
Al, Tot	Construction	Jun	2	-	-	-	0.017	0.017	0.017	0.049	0.049	0.049	0.049	0.049	0.049	0.056	0.056	0.066	-	-	-
Al, Tot	Construction	Jul	2	-	-	-	0.018	0.018	0.018	0.049	0.049	0.049	0.049	0.049	0.049	0.059	0.059	0.071	-	-	-
Al, Tot	Construction	Aug	2	-	-	-	0.020	0.020	0.020	0.049	0.049	0.049	0.048	0.048	0.049	0.061	0.061	0.075	-	-	-
Al, Tot	Construction	Sep	2	-	-	-	0.023	0.023	0.023	0.048	0.048	0.049	0.048	0.048	0.049	0.063	0.063	0.078	-	-	-
Al, Tot	Construction	Oct	2	-	-	-	0.026	0.026	0.026	0.048	0.048	0.049	0.048	0.048	0.049	0.064	0.064	0.080	-	-	-
Al, Tot	Construction	Nov	2	-	-	-	0.016	0.016	0.016	0.048	0.048	0.049	0.048	0.048	0.049	0.064	0.064	0.079	-	-	-
Al, Tot	Construction	Dec	2	-	-	-	-	-	-	0.048	0.048	0.049	0.048	0.048	0.049	0.052	0.052	0.060	-	-	-
Al, Tot	Operations	Jan	5	-	-	-	-	-	-	0.045	0.046	0.047	0.043	0.044	0.047	0.078	0.071	0.086	-	-	-
Al, Tot	Operations	Feb	5	-	-	-	-	-	-	0.045	0.046	0.047	0.043	0.043	0.046	0.058	0.057	0.061	-	-	-
Al, Tot	Operations	Mar	5	-	-	-	-	-	-	0.045	0.046	0.047	0.043	0.043	0.046	0.047	0.048	0.048	-	-	-
Al, Tot	Operations	Apr	5	-	-	-	-	-	-	0.045	0.046	0.047	0.043	0.043	0.046	0.050	0.049	0.050	-	-	-
Al, Tot	Operations	May	5	-	-	-	-	-	-	0.045	0.046	0.047	0.042	0.043	0.046	0.050	0.050	0.051	-	-	-
Al, Tot	Operations	Jun	5	-	-	-	-	-	-	0.046	0.046	0.047	0.042	0.043	0.046	0.052	0.053	0.055	-	-	-
Al, Tot	Operations	Jul	5	-	-	-	-	-	-	0.046	0.046	0.047	0.042	0.043	0.045	0.055	0.056	0.058	-	-	-
Al, Tot	Operations	Aug	5	-	-	-	-	-	-	0.046	0.046	0.047	0.042	0.043	0.045	0.055	0.056	0.058	-	-	-
Al, Tot	Operations	Sep	5	-	-	-	-	-	-	0.046	0.046	0.047	0.042	0.043	0.045	0.059	0.060	0.063	-	-	-
Al, Tot	Operations	Oct	5	-	-	-	-	-	-	0.046	0.046	0.047	0.042	0.043	0.045	0.067	0.070	0.076	-	-	-
Al, Tot	Operations	Nov	5	-	-	-	-	-	-	0.045	0.046	0.047	0.042	0.043	0.045	0.076	0.077	0.079	-	-	-
Al, Tot	Operations	Dec	5	-	-	-	-	-	-	0.045	0.046	0.047	0.042	0.043	0.045	0.082	0.080	0.083	-	-	-
Al, Tot	Closure	Jan	6	-	-	-	-	-	-	0.048	0.047	0.049	0.043	0.044	0.048	-	-	-	-	-	-
Al, Tot	Closure	Feb	6	-	-	-	-	-	-	0.048	0.047	0.049	0.044	0.044	0.048	-	-	-	-	-	-
Al, Tot	Closure	Mar	6	-	-	-	-	-	-	0.048	0.047	0.049	0.044	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Apr	6	-	-	-	-	-	-	0.048	0.047	0.049	0.044	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	May	6	-	-	-	-	-	-	0.048	0.048	0.049	0.044	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Jun	6	-	-	-	-	-	-	0.048	0.048	0.049	0.045	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Jul	6	-	-	-	-	-	-	0.048	0.048	0.049	0.045	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Aug	6	-	-	-	-	-	-	0.048	0.048	0.049	0.045	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Sep	6	-	-	-	-	-	-	0.049	0.048	0.049	0.045	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Oct	6	-	-	-	-	-	-	0.049	0.048	0.049	0.046	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Nov	6	-	-	-	-	-	-	0.049	0.048	0.049	0.046	0.045	0.048	-	-	-	-	-	-
Al, Tot	Closure	Dec	6	-	-	-	-	-	-	0.049	0.048	0.049	0.046	0.045	0.048	-	-	-	-	-	-
Al, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.055	0.055	0.056
Al, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.055	0.055	0.056
Al, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.055	0.055	0.056
Al, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Al, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.049	0.049	0.049	0.049	0.049	0.049	-	-	-	0.056	0.055	0.056
Sb, Diss	Construction	Jan	2	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00011	0.00011	0.00011	-	-	-
Sb, Diss	Construction	Feb	2	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00011	0.00011	0.00011	-	-	-
Sb, Diss	Construction	Mar	2	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00012	0.00012	0.00012	-	-	-
Sb, Diss	Construction	Apr	2	0.00007	0.00007	0.00007	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00012	0.00012	0.00014	-	-	-
Sb, Diss	Construction	May	2	-	-	-	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00020	0.00020	0.00027	-	-	-
Sb, Diss	Construction	Jun	2	-	-	-	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00020	0.00020	0.00025	-	-	-
Sb, Diss	Construction	Jul	2	-	-	-	0.00009	0.00009	0.00009	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00019	0.00019	0.00022	-	-	-
Sb, Diss	Construction	Aug	2	-	-	-	0.00009	0.00009	0.00009	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00018	0.00018	0.00020	-	-	-
Sb, Diss	Construction	Sep	2	-	-	-	0.00009	0.00009	0.00009	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00017	0.00017	0.00018	-	-	-
Sb, Diss	Construction	Oct	2	-	-	-	0.00009	0.00009	0.00009	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00016	0.00016	0.00017	-	-	-
Sb, Diss	Construction	Nov	2	-	-	-	0.00004	0.00004	0.00004	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00017	0.00017	0.00017	-	-	-
Sb, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00014	0.00014	0.00015	-	-	-
Sb, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00009	0.00243	0.00273	0.00586	-	-	-
Sb, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00009	0.00148	0.00167	0.00339	-	-	-
Sb, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00009	0.00094	0.00084	0.00138	-	-	-
Sb, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00093	0.00082	0.00130	-	-	-
Sb, Diss	Operations	May	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00104	0.00105	0.00168	-	-	-
Sb, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00130	0.00141	0.00250	-	-	-
Sb, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00166	0.00173	0.00297	-	-	-
Sb, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00153	0.00157	0.00263	-	-	-
Sb, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00167	0.00171	0.00276	-	-	-
Sb, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00235	0.00244	0.00378	-	-	-
Sb, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00007	0.00007	0.00008	0.00008	0.00008	0.00010	0.00326	0.00323	0.00512	-	-	-
Sb, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00007	0.00007	0.00007	0.00008	0.00009	0.00010	0.00390	0.00372	0.00602	-	-	-
Sb, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Closure	May	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	-	-	-	-	-	-
Sb, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	-	-	-	-	-	-
Sb, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	-	-	-	-	-	-
Sb, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	-	-	-	-	-	-
Sb, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	-	-	-	-	-	-
Sb, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00012	-	-	-	-	-	-
Sb, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00164	0.00171
Sb, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00170	0.00163	0.00170
Sb, Tot	Construction	Jan	2	0.00010	0.00010	0.00010	0.00012	0.00012	0.00012	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00011	0.00011	0.00011	-	-	-
Sb, Tot	Construction	Feb	2	0.00010	0.00010	0.00010	0.00012	0.00012	0.00012	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00011	0.00011	0.00011	-	-	-
Sb, Tot	Construction	Mar	2	0.00010	0.00010	0.00010	0.00012	0.00012	0.00012	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00012	0.00012	0.00012	-	-	-
Sb, Tot	Construction	Apr	2	0.00007	0.00007	0.00007	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00012	0.00012	0.00014	-	-	-
Sb, Tot	Construction	May	2	-	-	-	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00020	0.00020	0.00028	-	-	-
Sb, Tot	Construction	Jun	2	-	-	-	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00020	0.00020	0.00026	-	-	-
Sb, Tot	Construction	Jul	2	-	-	-	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00019	0.00019	0.00023	-	-	-
Sb, Tot	Construction	Aug	2	-	-	-	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00018	0.00018	0.00020	-	-	-
Sb, Tot	Construction	Sep	2	-	-	-	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00017	0.00017	0.00019	-	-	-
Sb, Tot	Construction	Oct	2	-	-	-	0.00010	0.00010	0.00010	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00017	0.00017	0.00017	-	-	-
Sb, Tot	Construction	Nov	2	-	-	-	0.00005	0.00005	0.00005	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00017	0.00017	0.00017	-	-	-
Sb, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00014	0.00014	0.00015	-	-	-
Sb, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00010	0.00243	0.00273	0.00587	-	-	-
Sb, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00010	0.00148	0.00168	0.00339	-	-	-
Sb, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00010	0.00094	0.00084	0.00138	-	-	-
Sb, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	0.00093	0.00082	0.00130	-	-	-
Sb, Tot	Operations	May	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	0.00104	0.00105	0.00168	-	-	-
Sb, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	0.00130	0.00142	0.00250	-	-	-
Sb, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	0.00166	0.00173	0.00297	-	-	-
Sb, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	0.00153	0.00158	0.00263	-	-	-
Sb, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00011	0.00168	0.00171	0.00276	-	-	-
Sb, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00011	0.00235	0.00244	0.00378	-	-	-
Sb, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00011	0.00326	0.00323	0.00513	-	-	-
Sb, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00009	0.00012	0.00391	0.00372	0.00602	-	-	-
Sb, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00010	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00010	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00010	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	May	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00009	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00010	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00013	-	-	-	-	-	-
Sb, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00009	0.00013	-	-	-	-	-	-
Sb, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00164	0.00171
Sb, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00164	0.00171
Sb, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
Sb, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	-	-	-	0.00171	0.00163	0.00171
As, Diss	Construction	Jan	2	0.006	0.006	0.006	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Feb	2	0.005	0.005	0.005	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Mar	2	0.005	0.005	0.005	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Apr	2	0.003	0.003	0.003	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	May	2	-	-	-	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	-	-	-
As, Diss	Construction	Jun	2	-	-	-	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	-	-	-
As, Diss	Construction	Jul	2	-	-	-	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Aug	2	-	-	-	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Sep	2	-	-	-	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Oct	2	-	-	-	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Nov	2	-	-	-	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Construction	Dec	2	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Diss	Operations	Jan	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.025	0.020	0.032	-	-	-
As, Diss	Operations	Feb	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.014	0.012	0.018	-	-	-
As, Diss	Operations	Mar	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.007	0.006	0.008	-	-	-
As, Diss	Operations	Apr	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.006	0.006	0.008	-	-	-
As, Diss	Operations	May	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.008	0.007	0.009	-	-	-
As, Diss	Operations	Jun	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.010	0.009	0.011	-	-	-
As, Diss	Operations	Jul	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.013	0.011	0.013	-	-	-
As, Diss	Operations	Aug	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.013	0.011	0.013	-	-	-
As, Diss	Operations	Sep	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.014	0.012	0.014	-	-	-
As, Diss	Operations	Oct	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.019	0.018	0.022	-	-	-
As, Diss	Operations	Nov	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.025	0.023	0.025	-	-	-
As, Diss	Operations	Dec	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.029	0.025	0.030	-	-	-
As, Diss	Closure	Jan	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Feb	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Mar	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
As, Diss	Closure	Apr	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	May	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Jun	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Jul	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Aug	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Sep	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Oct	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Nov	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Closure	Dec	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.005	0.005	0.005
As, Tot	Construction	Jan	2	0.006	0.006	0.006	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Feb	2	0.005	0.005	0.005	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Mar	2	0.005	0.005	0.005	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Apr	2	0.003	0.003	0.003	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	May	2	-	-	-	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	-	-	-
As, Tot	Construction	Jun	2	-	-	-	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	-	-	-
As, Tot	Construction	Jul	2	-	-	-	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	-	-	-
As, Tot	Construction	Aug	2	-	-	-	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Sep	2	-	-	-	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Oct	2	-	-	-	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Nov	2	-	-	-	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Construction	Dec	2	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-
As, Tot	Operations	Jan	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.025	0.020	0.033	-	-	-
As, Tot	Operations	Feb	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.015	0.012	0.018	-	-	-
As, Tot	Operations	Mar	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.007	0.006	0.008	-	-	-
As, Tot	Operations	Apr	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.006	0.006	0.008	-	-	-
As, Tot	Operations	May	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.008	0.007	0.009	-	-	-
As, Tot	Operations	Jun	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.010	0.009	0.011	-	-	-
As, Tot	Operations	Jul	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.013	0.012	0.014	-	-	-
As, Tot	Operations	Aug	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.013	0.011	0.013	-	-	-
As, Tot	Operations	Sep	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.014	0.013	0.014	-	-	-
As, Tot	Operations	Oct	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.019	0.018	0.022	-	-	-
As, Tot	Operations	Nov	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.025	0.023	0.026	-	-	-
As, Tot	Operations	Dec	5	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.030	0.026	0.030	-	-	-
As, Tot	Closure	Jan	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Feb	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Mar	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Apr	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	May	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Jun	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Jul	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Aug	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Sep	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Oct	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Nov	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Closure	Dec	6	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	-	-	-
As, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
As, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.002	0.002	0.002	0.002	0.002	0.002	-	-	-	0.006	0.005	0.006
Ba, Tot	Construction	Jan	2	0.0383	0.0383	0.0383	0.0327	0.0327	0.0327	0.0498	0.0498	0.0499	0.0498	0.0498	0.0499	0.0488	0.0488	0.0488	-	-	-
Ba, Tot	Construction	Feb	2	0.0392	0.0392	0.0392	0.0334	0.0334	0.0334	0.0497	0.0497	0.0499	0.0498	0.0498	0.0499	0.0474	0.0474	0.0474	-	-	-
Ba, Tot	Construction	Mar	2	0.0406	0.0406	0.0406	0.0341	0.0341	0.0341	0.0497	0.0497	0.0499	0.0498	0.0498	0.0499	0.0401	0.0401	0.0401	-	-	-
Ba, Tot	Construction	Apr	2	0.0359	0.0359	0.0359	0.0350	0.0350	0.0350	0.0497	0.0497	0.0499	0.0497	0.0497	0.0499	0.0347	0.0347	0.0516	-	-	-
Ba, Tot	Construction	May	2	-	-	-	0.0359	0.0359	0.0359	0.0497	0.0497	0.0499	0.0497	0.0497	0.0499	0.0434	0.0434	0.0505	-	-	-
Ba, Tot	Construction	Jun	2	-	-	-	0.0369	0.0369	0.0369	0.0496	0.0496	0.0499	0.0497	0.0497	0.0499	0.0394	0.0394	0.0449	-	-	-
Ba, Tot	Construction	Jul	2	-	-	-	0.0382	0.0382	0.0382	0.0496	0.0496	0.0499	0.0496	0.0496	0.0499	0.0360	0.0360	0.0395	-	-	-
Ba, Tot	Construction	Aug	2	-	-	-	0.0396	0.0396	0.0396	0.0496	0.0496	0.0498	0.0496	0.0496	0.0499	0.0355	0.0355	0.0390	-	-	-
Ba, Tot	Construction	Sep	2	-	-	-	0.0414	0.0414	0.0414	0.0496	0.0496	0.0498	0.0495	0.0495	0.0499	0.0351	0.0351	0.0388	-	-	-
Ba, Tot	Construction	Oct	2	-	-	-	0.0437	0.0437	0.0437	0.0495	0.0495	0.0498	0.0495	0.0495	0.0498	0.0359	0.0359	0.0415	-	-	-
Ba, Tot	Construction	Nov	2	-	-	-	0.0243	0.0243	0.0243	0.0495	0.0495	0.0498	0.0495	0.0495	0.0498	0.0412	0.0412	0.0416	-	-	-
Ba, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0495	0.0495	0.0497	0.0494	0.0494	0.0498	0.0466	0.0466	0.0492	-	-	-
Ba, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0489	0.0490	0.0493	0.0486	0.0487	0.0490	0.0670	0.0769	0.1191	-	-	-
Ba, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0489	0.0490	0.0493	0.0486	0.0487	0.0489	0.0595	0.0645	0.0867	-	-	-
Ba, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0489	0.0490	0.0494	0.0486	0.0487	0.0489	0.0631	0.0602	0.0720	-	-	-
Ba, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0489	0.0490	0.0493	0.0487	0.0487	0.0489	0.0650	0.0640	0.0729	-	-	-
Ba, Tot	Operations	May	5	-	-	-	-	-	-	0.0489	0.0490	0.0493	0.0487	0.0487	0.0488	0.0640	0.0648	0.0764	-	-	-
Ba, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0487	0.0487	0.0488	0.0670	0.0673	0.0851	-	-	-
Ba, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0487	0.0487	0.0488	0.0695	0.0687	0.0894	-	-	-
Ba, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0487	0.0487	0.0488	0.0678	0.0667	0.0846	-	-	-
Ba, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0487	0.0486	0.0488	0.0703	0.0688	0.0868	-	-	-
Ba, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0487	0.0486	0.0488	0.0764	0.0733	0.0982	-	-	-
Ba, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0486	0.0486	0.0488	0.0841	0.0797	0.1123	-	-	-
Ba, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0488	0.0489	0.0493	0.0486	0.0486	0.0488	0.0903	0.0861	0.1221	-	-	-
Ba, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0494	0.0493	0.0498	0.0490	0.0491	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0494	0.0494	0.0498	0.0491	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0495	0.0494	0.0498	0.0491	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0495	0.0494	0.0498	0.0491	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	May	6	-	-	-	-	-	-	0.0496	0.0494	0.0498	0.0492	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0496	0.0494	0.0498	0.0492	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0497	0.0494	0.0498	0.0492	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0497	0.0494	0.0498	0.0492	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0497	0.0494	0.0498	0.0492	0.0492	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0498	0.0494	0.0498	0.0493	0.0493	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0498	0.0495	0.0498	0.0493	0.0493	0.0497	-	-	-	-	-	-
Ba, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0498	0.0495	0.0498	0.0493	0.0493	0.0497	-	-	-	-	-	-
Ba, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0931	0.0913	0.0932
Ba, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0930	0.0913	0.0932
Ba, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0930	0.0913	0.0932
Ba, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0929	0.0912	0.0931
Ba, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0929	0.0912	0.0931
Ba, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0929	0.0913	0.0931
Ba, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0930	0.0914	0.0932
Ba, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0931	0.0916	0.0933
Ba, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0932	0.0911	0.0934
Ba, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0932	0.0914	0.0933
Ba, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0931	0.0914	0.0933
Ba, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0499	0.0499	0.0499	0.0499	0.0499	0.0499	-	-	-	0.0931	0.0914	0.0933
B, Tot	Construction	Jan	2	0.0902	0.0902	0.0902	0.0625	0.0625	0.0625	0.0348	0.0348	0.0349	0.0349	0.0349	0.0349	0.0280	0.0280	0.0280	-	-	-
B, Tot	Construction	Feb	2	0.0869	0.0869	0.0869	0.0615	0.0615	0.0615	0.0348	0.0348	0.0349	0.0349	0.0349	0.0349	0.0280	0.0280	0.0280	-	-	-
B, Tot	Construction	Mar	2	0.0817	0.0817	0.0817	0.0605	0.0605	0.0605	0.0348	0.0348	0.0349	0.0349	0.0349	0.0349	0.0242	0.0242	0.0242	-	-	-
B, Tot	Construction	Apr	2	0.0558	0.0558	0.0558	0.0593	0.0593	0.0593	0.0348	0.0348	0.0349	0.0349	0.0349	0.0349	0.0198	0.0198	0.0307	-	-	-
B, Tot	Construction	May	2	-	-	-	0.0580	0.0580	0.0580	0.0347	0.0347	0.0349	0.0349	0.0349	0.0349	0.0245	0.0245	0.0307	-	-	-
B, Tot	Construction	Jun	2	-	-	-	0.0565	0.0565	0.0565	0.0347	0.0347	0.0349	0.0349	0.0349	0.0349	0.0229	0.0229	0.0282	-	-	-
B, Tot	Construction	Jul	2	-	-	-	0.0549	0.0549	0.0549	0.0347	0.0347	0.0349	0.0349	0.0349	0.0349	0.0210	0.0210	0.0255	-	-	-
B, Tot	Construction	Aug	2	-	-	-	0.0529	0.0529	0.0529	0.0346	0.0346	0.0349	0.0349	0.0349	0.0349	0.0203	0.0203	0.0251	-	-	-
B, Tot	Construction	Sep	2	-	-	-	0.0503	0.0503	0.0503	0.0346	0.0346	0.0349	0.0349	0.0349	0.0349	0.0199	0.0199	0.0250	-	-	-
B, Tot	Construction	Oct	2	-	-	-	0.0464	0.0464	0.0464	0.0346	0.0346	0.0349	0.0349	0.0349	0.0349	0.0204	0.0204	0.0266	-	-	-
B, Tot	Construction	Nov	2	-	-	-	0.0215	0.0215	0.0215	0.0346	0.0346	0.0348	0.0349	0.0349	0.0349	0.0236	0.0236	0.0267	-	-	-
B, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0346	0.0346	0.0348	0.0349	0.0349	0.0349	0.0273	0.0273	0.0277	-	-	-
B, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0340	0.0341	0.0344	0.0345	0.0344	0.0348	0.1207	0.1374	0.2721	-	-	-
B, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0340	0.0341	0.0344	0.0344	0.0344	0.0348	0.0837	0.0935	0.1669	-	-	-
B, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0340	0.0341	0.0344	0.0344	0.0344	0.0348	0.0669	0.0618	0.0878	-	-	-
B, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0340	0.0341	0.0344	0.0344	0.0344	0.0348	0.0675	0.0632	0.0855	-	-	-
B, Tot	Operations	May	5	-	-	-	-	-	-	0.0339	0.0340	0.0344	0.0343	0.0344	0.0348	0.0715	0.0722	0.1013	-	-	-
B, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0339	0.0340	0.0344	0.0343	0.0344	0.0349	0.0823	0.0865	0.1350	-	-	-
B, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0338	0.0340	0.0344	0.0343	0.0344	0.0350	0.0961	0.0980	0.1541	-	-	-
B, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0338	0.0339	0.0343	0.0344	0.0344	0.0350	0.0906	0.0915	0.1393	-	-	-
B, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0338	0.0339	0.0343	0.0344	0.0344	0.0351	0.0970	0.0972	0.1449	-	-	-
B, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0338	0.0339	0.0343	0.0345	0.0345	0.0351	0.1242	0.1254	0.1873	-	-	-
B, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0339	0.0340	0.0343	0.0345	0.0345	0.0352	0.1603	0.1568	0.2427	-	-	-
B, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0339	0.0340	0.0344	0.0345	0.0345	0.0352	0.1864	0.1775	0.2797	-	-	-
B, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0344	0.0344	0.0349	0.0350	0.0350	0.0359	-	-	-	-	-	-
B, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0345	0.0344	0.0349	0.0349	0.0350	0.0359	-	-	-	-	-	-
B, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0346	0.0345	0.0349	0.0348	0.0350	0.0360	-	-	-	-	-	-
B, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0346	0.0345	0.0349	0.0348	0.0350	0.0360	-	-	-	-	-	-
B, Tot	Closure	May	6	-	-	-	-	-	-	0.0347	0.0345	0.0349	0.0348	0.0350	0.0359	-	-	-	-	-	-
B, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0347	0.0345	0.0349	0.0347	0.0350	0.0359	-	-	-	-	-	-
B, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0347	0.0345	0.0349	0.0348	0.0350	0.0358	-	-	-	-	-	-
B, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0348	0.0345	0.0349	0.0348	0.0350	0.0358	-	-	-	-	-	-
B, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0348	0.0345	0.0349	0.0348	0.0350	0.0358	-	-	-	-	-	-
B, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0348	0.0345	0.0349	0.0348	0.0350	0.0358	-	-	-	-	-	-
B, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0348	0.0345	0.0349	0.0348	0.0350	0.0358	-	-	-	-	-	-
B, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0349	0.0346	0.0349	0.0348	0.0350	0.0359	-	-	-	-	-	-
B, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1336	0.1287	0.1339
B, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1335	0.1287	0.1339
B, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1334	0.1286	0.1338
B, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1333	0.1286	0.1337
B, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1333	0.1286	0.1336
B, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1333	0.1287	0.1337
B, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1335	0.1290	0.1339
B, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1337	0.1293	0.1341
B, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1338	0.1286	0.1342
B, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1337	0.1289	0.1341
B, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1337	0.1288	0.1340
B, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0349	0.0349	0.0349	0.0349	0.0349	0.0349	-	-	-	0.1336	0.1288	0.1340
Cd, Diss	Construction	Jan	2	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00008	0.00008	0.00008	-	-	-
Cd, Diss	Construction	Feb	2	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00008	0.00008	0.00008	-	-	-
Cd, Diss	Construction	Mar	2	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00006	0.00006	0.00006	-	-	-
Cd, Diss	Construction	Apr	2	0.00004	0.00004	0.00004	0.00002	0.00002	0.00002	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00009	-	-	-
Cd, Diss	Construction	May	2	-	-	-	0.00003	0.00003	0.00003	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00009	-	-	-
Cd, Diss	Construction	Jun	2	-	-	-	0.00003	0.00003	0.00003	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00004	0.00004	0.00008	-	-	-
Cd, Diss	Construction	Jul	2	-	-	-	0.00004	0.00004	0.00004	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00003	0.00003	0.00006	-	-	-
Cd, Diss	Construction	Aug	2	-	-	-	0.00004	0.00004	0.00004	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00003	0.00003	0.00006	-	-	-
Cd, Diss	Construction	Sep	2	-	-	-	0.00005	0.00005	0.00005	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00003	0.00003	0.00006	-	-	-
Cd, Diss	Construction	Oct	2	-	-	-	0.00006	0.00006	0.00006	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00004	0.00004	0.00007	-	-	-
Cd, Diss	Construction	Nov	2	-	-	-	0.00004	0.00004	0.00004	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00007	-	-	-
Cd, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00007	0.00007	0.00007	-	-	-
Cd, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00006	0.00006	0.00008	-	-	-
Cd, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00007	0.00007	0.00008	-	-	-
Cd, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00009	0.00010	-	-	-
Cd, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00010	0.00010	-	-	-
Cd, Diss	Operations	May	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00009	0.00010	-	-	-
Cd, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00009	0.00009	-	-	-
Cd, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00008	0.00009	-	-	-
Cd, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00008	0.00009	-	-	-

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cd, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00008	0.00009	-	-	-
Cd, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00007	0.00007	0.00008	-	-	-
Cd, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00006	0.00006	0.00007	-	-	-
Cd, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00006	0.00005	0.00007	-	-	-
Cd, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00012	0.00012	0.00013	0.00011	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00012	0.00012	0.00013	0.00011	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	May	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00005	0.00006
Cd, Tot	Construction	Jan	2	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00008	0.00008	0.00008	-	-	-
Cd, Tot	Construction	Feb	2	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00008	0.00008	0.00008	-	-	-
Cd, Tot	Construction	Mar	2	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00007	0.00007	0.00007	-	-	-
Cd, Tot	Construction	Apr	2	0.00004	0.00004	0.00004	0.00002	0.00002	0.00002	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00009	-	-	-
Cd, Tot	Construction	May	2	-	-	-	0.00003	0.00003	0.00003	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00009	-	-	-
Cd, Tot	Construction	Jun	2	-	-	-	0.00003	0.00003	0.00003	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00008	-	-	-
Cd, Tot	Construction	Jul	2	-	-	-	0.00004	0.00004	0.00004	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00004	0.00004	0.00007	-	-	-
Cd, Tot	Construction	Aug	2	-	-	-	0.00004	0.00004	0.00004	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00004	0.00004	0.00006	-	-	-
Cd, Tot	Construction	Sep	2	-	-	-	0.00005	0.00005	0.00005	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00004	0.00004	0.00006	-	-	-
Cd, Tot	Construction	Oct	2	-	-	-	0.00006	0.00006	0.00006	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00004	0.00004	0.00007	-	-	-
Cd, Tot	Construction	Nov	2	-	-	-	0.00004	0.00004	0.00004	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00005	0.00005	0.00007	-	-	-
Cd, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	0.00007	0.00007	0.00007	-	-	-
Cd, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00006	0.00007	0.00008	-	-	-
Cd, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00007	0.00007	0.00008	-	-	-
Cd, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00009	0.00010	-	-	-
Cd, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00010	0.00010	0.00010	-	-	-
Cd, Tot	Operations	May	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00009	0.00010	-	-	-
Cd, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00009	0.00009	0.00009	-	-	-
Cd, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00008	0.00009	-	-	-
Cd, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00008	0.00009	-	-	-
Cd, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00008	0.00009	-	-	-
Cd, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00008	0.00007	0.00009	-	-	-
Cd, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00007	0.00006	0.00008	-	-	-
Cd, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00012	0.00012	0.00012	0.00011	0.00011	0.00012	0.00006	0.00006	0.00007	-	-	-
Cd, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00012	0.00012	0.00013	0.00011	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00011	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	May	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00013	0.00012	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00012	0.00012	0.00013	-	-	-	-	-	-
Cd, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cd, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00013	0.00013	0.00013	0.00013	0.00013	0.00013	-	-	-	0.00006	0.00006	0.00006
Cr, Diss	Construction	Jan	2	0.00007	0.00007	0.00007	0.00006	0.00006	0.00006	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	0.00063	0.00063	0.00063	-	-	-
Cr, Diss	Construction	Feb	2	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00093	0.00093	0.00094	0.00094	0.00094	0.00094	0.00062	0.00062	0.00062	-	-	-
Cr, Diss	Construction	Mar	2	0.00018	0.00018	0.00018	0.00011	0.00011	0.00011	0.00093	0.00093	0.00094	0.00094	0.00094	0.00094	0.00051	0.00051	0.00051	-	-	-
Cr, Diss	Construction	Apr	2	0.00027	0.00027	0.00027	0.00014	0.00014	0.00014	0.00093	0.00093	0.00094	0.00094	0.00094	0.00094	0.00039	0.00039	0.00071	-	-	-
Cr, Diss	Construction	May	2	-	-	-	0.00017	0.00017	0.00017	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00044	0.00044	0.00070	-	-	-
Cr, Diss	Construction	Jun	2	-	-	-	0.00020	0.00020	0.00020	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00042	0.00042	0.00061	-	-	-
Cr, Diss	Construction	Jul	2	-	-	-	0.00024	0.00024	0.00024	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00037	0.00037	0.00051	-	-	-
Cr, Diss	Construction	Aug	2	-	-	-	0.00029	0.00029	0.00029	0.00092	0.00092	0.00094	0.00093	0.00093	0.00094	0.00035	0.00035	0.00050	-	-	-
Cr, Diss	Construction	Sep	2	-	-	-	0.00035	0.00035	0.00035	0.00092	0.00092	0.00094	0.00093	0.00093	0.00094	0.00034	0.00034	0.00049	-	-	-
Cr, Diss	Construction	Oct	2	-	-	-	0.00043	0.00043	0.00043	0.00092	0.00092	0.00094	0.00092	0.00092	0.00094	0.00036	0.00036	0.00054	-	-	-
Cr, Diss	Construction	Nov	2	-	-	-	0.00028	0.00028	0.00028	0.00092	0.00092	0.00094	0.00092	0.00092	0.00094	0.00044	0.00044	0.00053	-	-	-
Cr, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00092	0.00092	0.00093	0.00092	0.00092	0.00094	0.00058	0.00058	0.00058	-	-	-
Cr, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00082	0.00083	0.00089	0.00053	0.00054	0.00063	-	-	-
Cr, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00082	0.00083	0.00089	0.00057	0.00058	0.00063	-	-	-
Cr, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00081	0.00082	0.00088	0.00071	0.00069	0.00077	-	-	-
Cr, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00081	0.00082	0.00088	0.00074	0.00075	0.00080	-	-	-
Cr, Diss	Operations	May	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00081	0.00082	0.00087	0.00072	0.00073	0.00079	-	-	-
Cr, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00085	0.00087	0.00090	0.00080	0.00082	0.00087	0.00072	0.00070	0.00076	-	-	-
Cr, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00082	0.00087	0.00067	0.00064	0.00072	-	-	-
Cr, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00082	0.00086	0.00067	0.00064	0.00071	-	-	-
Cr, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00067	0.00064	0.00072	-	-	-
Cr, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00062	0.00055	0.00069	-	-	-
Cr, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00054	0.00048	0.00062	-	-	-
Cr, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00049	0.00048	0.00058	-	-	-
Cr, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00090	0.00090	0.00094	0.00083	0.00084	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00091	0.00090	0.00094	0.00083	0.00085	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00091	0.00090	0.00094	0.00084	0.00085	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00091	0.00090	0.00094	0.00084	0.00085	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	May	6	-	-	-	-	-	-	0.00092	0.00090	0.00094	0.00085	0.00085	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00092	0.00090	0.00094	0.00085	0.00085	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00092	0.00091	0.00094	0.00086	0.00086	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00086	0.00086	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00087	0.00086	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00087	0.00086	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00088	0.00086	0.00092	-	-	-	-	-	-
Cr, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00088	0.00087	0.00092	-	-	-	-	-	-
Cr, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00079	0.00079	0.00081
Cr, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00079	0.00079	0.00081
Cr, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00079	0.00079	0.00082
Cr, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00079	0.00082
Cr, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Construction	Jan	2	0.00007	0.00007	0.00007	0.00006	0.00006	0.00006	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	0.00063	0.00063	0.00063	-	-	-
Cr (VI), Diss	Construction	Feb	2	0.00011	0.00011	0.00011	0.00008	0.00008	0.00008	0.00093	0.00093	0.00094	0.00094	0.00094	0.00094	0.00062	0.00062	0.00062	-	-	-
Cr (VI), Diss	Construction	Mar	2	0.00018	0.00018	0.00018	0.00011	0.00011	0.00011	0.00093	0.00093	0.00094	0.00094	0.00094	0.00094	0.00051	0.00051	0.00051	-	-	-
Cr (VI), Diss	Construction	Apr	2	0.00027	0.00027	0.00027	0.00014	0.00014	0.00014	0.00093	0.00093	0.00094	0.00094	0.00094	0.00094	0.00039	0.00039	0.00071	-	-	-
Cr (VI), Diss	Construction	May	2	-	-	-	0.00017	0.00017	0.00017	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00044	0.00044	0.00070	-	-	-
Cr (VI), Diss	Construction	Jun	2	-	-	-	0.00020	0.00020	0.00020	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00042	0.00042	0.00061	-	-	-
Cr (VI), Diss	Construction	Jul	2	-	-	-	0.00024	0.00024	0.00024	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00037	0.00037	0.00051	-	-	-
Cr (VI), Diss	Construction	Aug	2	-	-	-	0.00029	0.00029	0.00029	0.00092	0.00092	0.00094	0.00093	0.00093	0.00094	0.00035	0.00035	0.00050	-	-	-
Cr (VI), Diss	Construction	Sep	2	-	-	-	0.00035	0.00035	0.00035	0.00092	0.00092	0.00094	0.00093	0.00093	0.00094	0.00034	0.00034	0.00049	-	-	-
Cr (VI), Diss	Construction	Oct	2	-	-	-	0.00043	0.00043	0.00043	0.00092	0.00092	0.00094	0.00092	0.00092	0.00094	0.00036	0.00036	0.00054	-	-	-
Cr (VI), Diss	Construction	Nov	2	-	-	-	0.00028	0.00028	0.00028	0.00092	0.00092	0.00094	0.00092	0.00092	0.00094	0.00044	0.00044	0.00053	-	-	-
Cr (VI), Diss	Construction	Dec	2	-	-	-	-	-	-	0.00092	0.00092	0.00093	0.00092	0.00092	0.00094	0.00058	0.00058	0.00058	-	-	-
Cr (VI), Diss	Operations	Jan	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00082	0.00083	0.00089	0.00053	0.00054	0.00063	-	-	-
Cr (VI), Diss	Operations	Feb	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00082	0.00083	0.00089	0.00057	0.00058	0.00063	-	-	-
Cr (VI), Diss	Operations	Mar	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00081	0.00082	0.00088	0.00071	0.00069	0.00077	-	-	-
Cr (VI), Diss	Operations	Apr	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00081	0.00082	0.00088	0.00074	0.00075	0.00080	-	-	-
Cr (VI), Diss	Operations	May	5	-	-	-	-	-	-	0.00086	0.00087	0.00090	0.00081	0.00082	0.00087	0.00072	0.00073	0.00079	-	-	-
Cr (VI), Diss	Operations	Jun	5	-	-	-	-	-	-	0.00085	0.00087	0.00090	0.00080	0.00082	0.00087	0.00072	0.00070	0.00076	-	-	-
Cr (VI), Diss	Operations	Jul	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00082	0.00087	0.00067	0.00064	0.00072	-	-	-
Cr (VI), Diss	Operations	Aug	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00082	0.00086	0.00067	0.00064	0.00071	-	-	-
Cr (VI), Diss	Operations	Sep	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00067	0.00064	0.00072	-	-	-
Cr (VI), Diss	Operations	Oct	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00062	0.00055	0.00069	-	-	-
Cr (VI), Diss	Operations	Nov	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00054	0.00048	0.00062	-	-	-
Cr (VI), Diss	Operations	Dec	5	-	-	-	-	-	-	0.00085	0.00086	0.00089	0.00080	0.00081	0.00086	0.00049	0.00048	0.00058	-	-	-
Cr (VI), Diss	Closure	Jan	6	-	-	-	-	-	-	0.00090	0.00090	0.00094	0.00083	0.00084	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Feb	6	-	-	-	-	-	-	0.00091	0.00090	0.00094	0.00083	0.00085	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Mar	6	-	-	-	-	-	-	0.00091	0.00090	0.00094	0.00084	0.00085	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Apr	6	-	-	-	-	-	-	0.00091	0.00090	0.00094	0.00084	0.00085	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	May	6	-	-	-	-	-	-	0.00092	0.00090	0.00094	0.00085	0.00085	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Jun	6	-	-	-	-	-	-	0.00092	0.00090	0.00094	0.00085	0.00085	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Jul	6	-	-	-	-	-	-	0.00092	0.00091	0.00094	0.00086	0.00086	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Aug	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00086	0.00086	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Sep	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00087	0.00086	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Oct	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00087	0.00086	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Nov	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00088	0.00086	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Closure	Dec	6	-	-	-	-	-	-	0.00093	0.00091	0.00094	0.00088	0.00087	0.00092	-	-	-	-	-	-
Cr (VI), Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00079	0.00079	0.00081
Cr (VI), Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00079	0.00079	0.00081
Cr (VI), Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00079	0.00079	0.00082
Cr (VI), Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00079	0.00082
Cr (VI), Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr (VI), Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00080	0.00080	0.00082
Cr, Tot	Construction	Jan	2	0.00017	0.00017	0.00017	0.00023	0.00023	0.00023	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	0.00084	0.00084	0.00084	-	-	-
Cr, Tot	Construction	Feb	2	0.00021	0.00021	0.00021	0.00025	0.00025	0.00025	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	0.00084	0.00084	0.00084	-	-	-
Cr, Tot	Construction	Mar	2	0.00026	0.00026	0.00026	0.00027	0.00027	0.00027	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	0.00079	0.00079	0.00079	-	-	-
Cr, Tot	Construction	Apr	2	0.00032	0.00032	0.00032	0.00029	0.00029	0.00029	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	0.00078	0.00078	0.00084	-	-	-
Cr, Tot	Construction	May	2	-	-	-	0.00031	0.00031	0.00031	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00107	0.00107	0.00135	-	-	-
Cr, Tot	Construction	Jun	2	-	-	-	0.00034	0.00034	0.00034	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00090	0.00090	0.00106	-	-	-
Cr, Tot	Construction	Jul	2	-	-	-	0.00037	0.00037	0.00037	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00077	0.00077	0.00083	-	-	-
Cr, Tot	Construction	Aug	2	-	-	-	0.00040	0.00040	0.00040	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00070	0.00070	0.00071	-	-	-
Cr, Tot	Construction	Sep	2	-	-	-	0.00045	0.00045	0.00045	0.00093	0.00093	0.00094	0.00093	0.00093	0.00094	0.00068	0.00068	0.00069	-	-	-
Cr, Tot	Construction	Oct	2	-	-	-	0.00051	0.00051	0.00051	0.00093	0.00093	0.00094	0.00092	0.00092	0.00094	0.00068	0.00068	0.00072	-	-	-
Cr, Tot	Construction	Nov	2	-	-	-	0.00031	0.00031	0.00031	0.00093	0.00093	0.00094	0.00092	0.00092	0.00094	0.00078	0.00078	0.00079	-	-	-
Cr, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00093	0.00093	0.00094	0.00092	0.00092	0.00094	0.00083	0.00083	0.00086	-	-	-
Cr, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00090	0.00091	0.00092	0.00084	0.00085	0.00090	0.00086	0.00091	0.00105	-	-	-

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cr, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00090	0.00091	0.00092	0.00083	0.00084	0.00089	0.00083	0.00082	0.00087	-	-	-
Cr, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00090	0.00091	0.00092	0.00083	0.00084	0.00089	0.00087	0.00086	0.00089	-	-	-
Cr, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00083	0.00084	0.00089	0.00089	0.00089	0.00092	-	-	-
Cr, Tot	Operations	May	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00083	0.00084	0.00088	0.00081	0.00082	0.00086	-	-	-
Cr, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00083	0.00084	0.00088	0.00081	0.00081	0.00086	-	-	-
Cr, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00082	0.00084	0.00088	0.00081	0.00080	0.00086	-	-	-
Cr, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00082	0.00083	0.00087	0.00080	0.00079	0.00085	-	-	-
Cr, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00082	0.00083	0.00087	0.00083	0.00082	0.00088	-	-	-
Cr, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00082	0.00083	0.00087	0.00084	0.00081	0.00090	-	-	-
Cr, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00082	0.00083	0.00087	0.00087	0.00084	0.00096	-	-	-
Cr, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00090	0.00090	0.00092	0.00082	0.00083	0.00087	0.00094	0.00090	0.00103	-	-	-
Cr, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00092	0.00092	0.00094	0.00084	0.00086	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00093	0.00092	0.00094	0.00085	0.00086	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00093	0.00092	0.00094	0.00085	0.00086	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00093	0.00092	0.00094	0.00085	0.00086	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	May	6	-	-	-	-	-	-	0.00093	0.00092	0.00094	0.00086	0.00086	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00093	0.00092	0.00094	0.00086	0.00087	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00093	0.00092	0.00094	0.00087	0.00087	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00094	0.00092	0.00094	0.00087	0.00087	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00094	0.00093	0.00094	0.00088	0.00087	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00094	0.00093	0.00094	0.00088	0.00087	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00094	0.00093	0.00094	0.00089	0.00087	0.00093	-	-	-	-	-	-
Cr, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00094	0.00093	0.00094	0.00089	0.00088	0.00093	-	-	-	-	-	-
Cr, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00113
Cr, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00113
Cr, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00111
Cr, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00108	0.00112
Cr, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cr, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00094	0.00094	0.00094	0.00094	0.00094	0.00094	-	-	-	0.00110	0.00109	0.00112
Cu, Diss	Construction	Jan	2	0.00110	0.00110	0.00110	0.00168	0.00168	0.00168	0.00434	0.00434	0.00437	0.00436	0.00436	0.00437	0.00376	0.00376	0.00376	-	-	-
Cu, Diss	Construction	Feb	2	0.00129	0.00129	0.00129	0.00177	0.00177	0.00177	0.00433	0.00433	0.00437	0.00436	0.00436	0.00437	0.00369	0.00369	0.00369	-	-	-
Cu, Diss	Construction	Mar	2	0.00159	0.00159	0.00159	0.00187	0.00187	0.00187	0.00432	0.00432	0.00437	0.00435	0.00435	0.00437	0.00306	0.00306	0.00306	-	-	-
Cu, Diss	Construction	Apr	2	0.00189	0.00189	0.00189	0.00197	0.00197	0.00197	0.00431	0.00431	0.00437	0.00435	0.00435	0.00437	0.00246	0.00246	0.00412	-	-	-
Cu, Diss	Construction	May	2	-	-	-	0.00209	0.00209	0.00209	0.00431	0.00431	0.00437	0.00434	0.00434	0.00437	0.00288	0.00288	0.00406	-	-	-
Cu, Diss	Construction	Jun	2	-	-	-	0.00223	0.00223	0.00223	0.00430	0.00430	0.00437	0.00433	0.00433	0.00437	0.00266	0.00266	0.00358	-	-	-
Cu, Diss	Construction	Jul	2	-	-	-	0.00238	0.00238	0.00238	0.00429	0.00429	0.00437	0.00432	0.00432	0.00437	0.00244	0.00244	0.00308	-	-	-
Cu, Diss	Construction	Aug	2	-	-	-	0.00256	0.00256	0.00256	0.00428	0.00428	0.00437	0.00431	0.00431	0.00437	0.00242	0.00242	0.00302	-	-	-
Cu, Diss	Construction	Sep	2	-	-	-	0.00279	0.00279	0.00279	0.00427	0.00427	0.00436	0.00430	0.00430	0.00437	0.00240	0.00240	0.00301	-	-	-
Cu, Diss	Construction	Oct	2	-	-	-	0.00310	0.00310	0.00310	0.00427	0.00427	0.00435	0.00429	0.00429	0.00437	0.00249	0.00249	0.00324	-	-	-
Cu, Diss	Construction	Nov	2	-	-	-	0.00182	0.00182	0.00182	0.00426	0.00426	0.00434	0.00428	0.00428	0.00437	0.00293	0.00293	0.00321	-	-	-
Cu, Diss	Construction	Dec	2	-	-	-	-	-	-	0.00425	0.00425	0.00433	0.00427	0.00427	0.00436	0.00352	0.00352	0.00363	-	-	-
Cu, Diss	Operations	Jan	5	-	-	-	-	-	-	0.00396	0.00402	0.00416	0.00385	0.00390	0.00415	0.00467	0.00548	0.00819	-	-	-
Cu, Diss	Operations	Feb	5	-	-	-	-	-	-	0.00396	0.00402	0.00416	0.00384	0.00389	0.00413	0.00439	0.00477	0.00620	-	-	-
Cu, Diss	Operations	Mar	5	-	-	-	-	-	-	0.00396	0.00401	0.00415	0.00383	0.00388	0.00412	0.00485	0.00464	0.00553	-	-	-
Cu, Diss	Operations	Apr	5	-	-	-	-	-	-	0.00396	0.00401	0.00415	0.00382	0.00387	0.00410	0.00501	0.00498	0.00563	-	-	-
Cu, Diss	Operations	May	5	-	-	-	-	-	-	0.00395	0.00401	0.00415	0.00381	0.00387	0.00408	0.00496	0.00504	0.00589	-	-	-
Cu, Diss	Operations	Jun	5	-	-	-	-	-	-	0.00395	0.00400	0.00415	0.00380	0.00386	0.00407	0.00515	0.00516	0.00642	-	-	-
Cu, Diss	Operations	Jul	5	-	-	-	-	-	-	0.00395	0.00400	0.00415	0.00379	0.00385	0.00406	0.00524	0.00517	0.00665	-	-	-
Cu, Diss	Operations	Aug	5	-	-	-	-	-	-	0.00395	0.00400	0.00414	0.00378	0.00384	0.00404	0.00513	0.00503	0.00633	-	-	-
Cu, Diss	Operations	Sep	5	-	-	-	-	-	-	0.00395	0.00400	0.00414	0.00377	0.00384	0.00403	0.00529	0.00516	0.00647	-	-	-
Cu, Diss	Operations	Oct	5	-	-	-	-	-	-	0.00395	0.00399	0.00413	0.00377	0.00383	0.00402	0.00560	0.00532	0.00718	-	-	-
Cu, Diss	Operations	Nov	5	-	-	-	-	-	-	0.00395	0.00399	0.00412	0.00376	0.00383	0.00402	0.00596	0.00562	0.00800	-	-	-
Cu, Diss	Operations	Dec	5	-	-	-	-	-	-	0.00395	0.00399	0.00411	0.00376	0.00382	0.00401	0.00626	0.00601	0.00857	-	-	-
Cu, Diss	Closure	Jan	6	-	-	-	-	-	-	0.00419	0.00417	0.00436	0.00389	0.00397	0.00429	-	-	-	-	-	-
Cu, Diss	Closure	Feb	6	-	-	-	-	-	-	0.00421	0.00417	0.00436	0.00390	0.00397	0.00429	-	-	-	-	-	-
Cu, Diss	Closure	Mar	6	-	-	-	-	-	-	0.00423	0.00418	0.00436	0.00392	0.00398	0.00429	-	-	-	-	-	-
Cu, Diss	Closure	Apr	6	-	-	-	-	-	-	0.00425	0.00418	0.00436	0.00394	0.00399	0.00429	-	-	-	-	-	-
Cu, Diss	Closure	May	6	-	-	-	-	-	-	0.00427	0.00419	0.00436	0.00396	0.00400	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Jun	6	-	-	-	-	-	-	0.00428	0.00420	0.00436	0.00399	0.00401	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Jul	6	-	-	-	-	-	-	0.00430	0.00420	0.00436	0.00401	0.00401	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Aug	6	-	-	-	-	-	-	0.00431	0.00421	0.00436	0.00403	0.00402	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Sep	6	-	-	-	-	-	-	0.00432	0.00421	0.00436	0.00405	0.00403	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Oct	6	-	-	-	-	-	-	0.00433	0.00422	0.00436	0.00407	0.00404	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Nov	6	-	-	-	-	-	-	0.00434	0.00422	0.00436	0.00410	0.00404	0.00430	-	-	-	-	-	-
Cu, Diss	Closure	Dec	6	-	-	-	-	-	-	0.00434	0.00423	0.00436	0.00412	0.00405	0.00430	-	-	-	-	-	-
Cu, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00364	0.00347	0.00364
Cu, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00364	0.00347	0.00364
Cu, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00365	0.00348	0.00365
Cu, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00366	0.00349	0.00366
Cu, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00365	0.00349	0.00365
Cu, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00365	0.00348	0.00365
Cu, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00365	0.00348	0.00365
Cu, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00364	0.00349	0.00364
Cu, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00364	0.00347	0.00364
Cu, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00363	0.00346	0.00363
Cu, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00363	0.00346	0.00363
Cu, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00363	0.00346	0.00363
Cu, Tot	Construction	Jan	2	0.00114	0.00114	0.00114	0.00168	0.00168	0.00168	0.00434	0.00434	0.00437	0.00436	0.00436	0.00437	0.00385	0.00385	0.00385	-	-	-
Cu, Tot	Construction	Feb	2	0.00132	0.00132	0.00132	0.00177	0.00177	0.00177	0.00434	0.00434	0.00437	0.00436	0.00436	0.00437	0.00379	0.00379	0.00379	-	-	-
Cu, Tot	Construction	Mar	2	0.00162	0.00162	0.00162	0.00187	0.00187	0.00187	0.00433	0.00433	0.00437	0.00436	0.00436	0.00437	0.00319	0.00319	0.00319	-	-	-
Cu, Tot	Construction	Apr	2	0.00191	0.00191	0.00191	0.00197	0.00197	0.00197	0.00432	0.00432	0.00437	0.00435	0.00435	0.00437	0.00264	0.00264	0.00418	-	-	-
Cu, Tot	Construction	May	2	-	-	-	0.00209	0.00209	0.00209	0.00431	0.00431	0.00437	0.00434	0.00434	0.00437	0.00318	0.00318	0.00410	-	-	-
Cu, Tot	Construction	Jun	2	-	-	-	0.00223	0.00223	0.00223	0.00431	0.00431	0.00437	0.00434	0.00434	0.00437	0.00290	0.00290	0.00364	-	-	-
Cu, Tot	Construction	Jul	2	-	-	-	0.00238	0.00238	0.00238	0.00430	0.00430	0.00437	0.00433	0.00433	0.00437	0.00262	0.00262	0.00316	-	-	-
Cu, Tot	Construction	Aug	2	-	-	-	0.00256	0.00256	0.00256	0.00429	0.00429	0.00437	0.00432	0.00432	0.00437	0.00257	0.00257	0.00311	-	-	-
Cu, Tot	Construction	Sep	2	-	-	-	0.00279	0.00279	0.00279	0.00429	0.00429	0.00436	0.00431	0.00431	0.00437	0.00253	0.00253	0.00309	-	-	-
Cu, Tot	Construction	Oct	2	-	-	-	0.00310	0.00310	0.00310	0.00428	0.00428	0.00436	0.00430	0.00430	0.00437	0.00260	0.00260	0.00332	-	-	-
Cu, Tot	Construction	Nov	2	-	-	-	0.00182	0.00182	0.00182	0.00428	0.00428	0.00435	0.00429	0.00429	0.00437	0.00306	0.00306	0.00331	-	-	-
Cu, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00427	0.00427	0.00433	0.00428	0.00428	0.00436	0.00363	0.00363	0.00374	-	-	-
Cu, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00404	0.00409	0.00420	0.00396	0.00399	0.00418	0.00487	0.00565	0.00843	-	-	-
Cu, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00404	0.00408	0.00420	0.00395	0.00398	0.00417	0.00450	0.00488	0.00634	-	-	-
Cu, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00403	0.00408	0.00420	0.00394	0.00398	0.00415	0.00493	0.00472	0.00559	-	-	-
Cu, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00403	0.00407	0.00419	0.00393	0.00397	0.00414	0.00508	0.00504	0.00569	-	-	-
Cu, Tot	Operations	May	5	-	-	-	-	-	-	0.00403	0.00407	0.00419	0.00392	0.00396	0.00413	0.00501	0.00508	0.00592	-	-	-
Cu, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00402	0.00407	0.00419	0.00391	0.00396	0.00412	0.00519	0.00521	0.00647	-	-	-
Cu, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00402	0.00406	0.00419	0.00390	0.00395	0.00411	0.00530	0.00523	0.00671	-	-	-
Cu, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00402	0.00406	0.00418	0.00390	0.00395	0.00410	0.00519	0.00510	0.00639	-	-	-
Cu, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00402	0.00406	0.00418	0.00389	0.00394	0.00409	0.00535	0.00523	0.00654	-	-	-
Cu, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00403	0.00406	0.00418	0.00389	0.00394	0.00409	0.00569	0.00543	0.00727	-	-	-
Cu, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00403	0.00406	0.00417	0.00388	0.00393	0.00408	0.00610	0.00577	0.00815	-	-	-
Cu, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00403	0.00406	0.00416	0.00388	0.00393	0.00407	0.00646	0.00620	0.00877	-	-	-
Cu, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00423	0.00420	0.00436	0.00398	0.00405	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00424	0.00421	0.00436	0.00399	0.00405	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00426	0.00421	0.00436	0.00400	0.00406	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00427	0.00422	0.00436	0.00402	0.00406	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	May	6	-	-	-	-	-	-	0.00429	0.00422	0.00436	0.00404	0.00407	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00430	0.00423	0.00436	0.00405	0.00408	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00431	0.00423	0.00436	0.00407	0.00408	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00432	0.00424	0.00436	0.00409	0.00409	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00433	0.00424	0.00436	0.00411	0.00410	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00434	0.00425	0.00436	0.00413	0.00410	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00434	0.00425	0.00436	0.00414	0.00411	0.00431	-	-	-	-	-	-
Cu, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00435	0.00426	0.00436	0.00416	0.00411	0.00431	-	-	-	-	-	-
Cu, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00371	0.00354	0.00371
Cu, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00372	0.00354	0.00372
Cu, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00372	0.00355	0.00372
Cu, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00373	0.00357	0.00373
Cu, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00373	0.00356	0.00373
Cu, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00372	0.00356	0.00372
Cu, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00372	0.00355	0.00372
Cu, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00372	0.00356	0.00372
Cu, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00372	0.00354	0.00372
Cu, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00371	0.00353	0.00371
Cu, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00370	0.00353	0.00370
Cu, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00437	0.00437	0.00437	0.00437	0.00437	0.00437	-	-	-	0.00371	0.00354	0.00371
Fe, Tot	Construction	Jan	2	0.374	0.374	0.374	0.374	0.374	0.374	5.313	5.313	5.321	5.311	5.311	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Feb	2	0.374	0.374	0.374	0.374	0.374	0.374	5.310	5.310	5.321	5.306	5.306	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Mar	2	0.374	0.374	0.374	0.374	0.374	0.374	5.306	5.306	5.321	5.299	5.299	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Apr	2	0.212	0.212	0.212	0.374	0.374	0.374	5.302	5.302	5.321	5.291	5.291	5.321	0.359	0.359	0.489	-	-	-
Fe, Tot	Construction	May	2	-	-	-	0.374	0.374	0.374	5.297	5.297	5.321	5.281	5.281	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Jun	2	-	-	-	0.374	0.374	0.374	5.292	5.292	5.321	5.270	5.270	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Jul	2	-	-	-	0.374	0.374	0.374	5.287	5.287	5.321	5.257	5.257	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Aug	2	-	-	-	0.374	0.374	0.374	5.281	5.281	5.320	5.243	5.243	5.321	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Sep	2	-	-	-	0.374	0.374	0.374	5.277	5.277	5.318	5.228	5.228	5.320	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Oct	2	-	-	-	0.374	0.374	0.374	5.273	5.273	5.316	5.212	5.212	5.317	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Nov	2	-	-	-	0.212	0.212	0.212	5.271	5.271	5.313	5.195	5.195	5.314	0.489	0.489	0.489	-	-	-
Fe, Tot	Construction	Dec	2	-	-	-	-	-	-	5.269	5.269	5.309	5.178	5.178	5.309	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Jan	5	-	-	-	-	-	-	5.142	5.169	5.229	4.572	4.641	5.017	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Feb	5	-	-	-	-	-	-	5.145	5.171	5.231	4.554	4.628	4.989	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Mar	5	-	-	-	-	-	-	5.148	5.173	5.232	4.537	4.616	4.964	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Apr	5	-	-	-	-	-	-	5.148	5.172	5.232	4.521	4.604	4.939	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	May	5	-	-	-	-	-	-	5.145	5.168	5.230	4.506	4.592	4.916	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Jun	5	-	-	-	-	-	-	5.140	5.162	5.227	4.492	4.581	4.895	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Jul	5	-	-	-	-	-	-	5.134	5.156	5.224	4.479	4.570	4.876	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Aug	5	-	-	-	-	-	-	5.127	5.149	5.220	4.468	4.560	4.858	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Sep	5	-	-	-	-	-	-	5.123	5.144	5.217	4.458	4.551	4.842	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Oct	5	-	-	-	-	-	-	5.121	5.142	5.215	4.449	4.542	4.828	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Nov	5	-	-	-	-	-	-	5.122	5.142	5.214	4.441	4.533	4.814	0.489	0.489	0.489	-	-	-
Fe, Tot	Operations	Dec	5	-	-	-	-	-	-	5.126	5.144	5.213	4.434	4.525	4.801	0.489	0.489	0.489	-	-	-
Fe, Tot	Closure	Jan	6	-	-	-	-	-	-	5.225	5.224	5.318	4.629	4.736	5.213	-	-	-	-	-	-
Fe, Tot	Closure	Feb	6	-	-	-	-	-	-	5.235	5.229	5.318	4.656	4.747	5.214	-	-	-	-	-	-
Fe, Tot	Closure	Mar	6	-	-	-	-	-	-	5.245	5.233	5.318	4.684	4.758	5.215	-	-	-	-	-	-
Fe, Tot	Closure	Apr	6	-	-	-	-	-	-	5.255	5.237	5.318	4.714	4.769	5.215	-	-	-	-	-	-
Fe, Tot	Closure	May	6	-	-	-	-	-	-	5.265	5.240	5.318	4.745	4.781	5.216	-	-	-	-	-	-
Fe, Tot	Closure	Jun	6	-	-	-	-	-	-	5.274	5.241	5.318	4.777	4.792	5.216	-	-	-	-	-	-
Fe, Tot	Closure	Jul	6	-	-	-	-	-	-	5.282	5.242	5.318	4.809	4.804	5.217	-	-	-	-	-	-
Fe, Tot	Closure	Aug	6	-	-	-	-	-	-	5.289	5.243	5.318	4.841	4.816	5.217	-	-	-	-	-	-
Fe, Tot	Closure	Sep	6	-	-	-	-	-	-	5.295	5.244	5.318	4.873	4.827	5.217	-	-	-	-	-	-
Fe, Tot	Closure	Oct	6	-	-	-	-	-	-	5.300	5.245	5.318	4.904	4.839	5.217	-	-	-	-	-	-
Fe, Tot	Closure	Nov	6	-	-	-	-	-	-	5.304	5.248	5.318	4.935	4.850	5.217	-	-	-	-	-	-
Fe, Tot	Closure	Dec	6	-	-	-	-	-	-	5.307	5.251	5.318	4.964	4.861	5.218	-	-	-	-	-	-
Fe, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.068	3.119	3.950
Fe, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.069	3.119	3.943
Fe, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.067	3.117	3.921
Fe, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.067	3.114	3.896
Fe, Tot	Post-Closure	May	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.066	3.112	3.878
Fe, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.066	3.112	3.864
Fe, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.067	3.111	3.850
Fe, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.067	3.111	3.836
Fe, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.067	3.100	3.820
Fe, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.067	3.119	3.976
Fe, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.318	5.321	-	-	-	3.066	3.118	3.961
Fe, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	5.321	5.321	5.321	5.321	5.319	5.321	-	-	-	3.067	3.118	3.955
Pb, Diss	Construction	Jan	2	0.000071	0.000071	0.000071	0.000077	0.000077	0.000077	0.000791	0.000791	0.000797	0.000795	0.000795	0.000797	0.000484	0.000484	0.000484	-	-	-
Pb, Diss	Construction	Feb	2	0.000102	0.000102	0.000102	0.000094	0.000094	0.000094	0.000789	0.000789	0.000797	0.000795	0.000795	0.000797	0.000488	0.000488	0.000488	-	-	-
Pb, Diss	Construction	Mar	2	0.000151	0.000151	0.000151	0.000113	0.000113	0.000113	0.000788	0.000788	0.000797	0.000794	0.000794	0.000797	0.000398	0.000398	0.000398	-	-	-
Pb, Diss	Construction	Apr	2	0.000221	0.000221	0.000221	0.000134	0.000134	0.000134	0.000786	0.000786	0.000797	0.000792	0.000792	0.000797	0.000294	0.000294	0.000563	-	-	-
Pb, Diss	Construction	May	2	-	-	-	0.000157	0.000157	0.000157	0.000784	0.000784	0.000797	0.000791	0.000791	0.000797	0.000300	0.000300	0.000548	-	-	-
Pb, Diss	Construction	Jun	2	-	-	-	0.000184	0.000184	0.000184	0.000782	0.000782	0.000797	0.000789	0.000789	0.000797	0.000261	0.000261	0.000469	-	-	-

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Pb, Diss	Construction	Jul	2	-	-	-	0.000214	0.000214	0.000214	0.000781	0.000781	0.000797	0.000787	0.000787	0.000797	0.000222	0.000222	0.000388	-	-	-
Pb, Diss	Construction	Aug	2	-	-	-	0.000250	0.000250	0.000250	0.000779	0.000779	0.000796	0.000785	0.000785	0.000797	0.000220	0.000220	0.000380	-	-	-
Pb, Diss	Construction	Sep	2	-	-	-	0.000295	0.000295	0.000295	0.000778	0.000778	0.000795	0.000783	0.000783	0.000797	0.000218	0.000218	0.000379	-	-	-
Pb, Diss	Construction	Oct	2	-	-	-	0.000357	0.000357	0.000357	0.000776	0.000776	0.000793	0.000780	0.000780	0.000796	0.000235	0.000235	0.000415	-	-	-
Pb, Diss	Construction	Nov	2	-	-	-	0.000228	0.000228	0.000228	0.000774	0.000774	0.000791	0.000778	0.000778	0.000796	0.000309	0.000309	0.000408	-	-	-
Pb, Diss	Construction	Dec	2	-	-	-	-	-	-	0.000773	0.000773	0.000789	0.000775	0.000775	0.000795	0.000436	0.000436	0.000445	-	-	-
Pb, Diss	Operations	Jan	5	-	-	-	-	-	-	0.000717	0.000729	0.000756	0.000686	0.000696	0.000751	0.000460	0.000438	0.000502	-	-	-
Pb, Diss	Operations	Feb	5	-	-	-	-	-	-	0.000716	0.000728	0.000755	0.000683	0.000694	0.000747	0.000476	0.000469	0.000504	-	-	-
Pb, Diss	Operations	Mar	5	-	-	-	-	-	-	0.000715	0.000727	0.000754	0.000681	0.000692	0.000743	0.000570	0.000550	0.000621	-	-	-
Pb, Diss	Operations	Apr	5	-	-	-	-	-	-	0.000715	0.000726	0.000754	0.000678	0.000691	0.000740	0.000595	0.000604	0.000645	-	-	-
Pb, Diss	Operations	May	5	-	-	-	-	-	-	0.000714	0.000725	0.000753	0.000676	0.000689	0.000736	0.000573	0.000583	0.000635	-	-	-
Pb, Diss	Operations	Jun	5	-	-	-	-	-	-	0.000714	0.000724	0.000753	0.000674	0.000687	0.000733	0.000567	0.000554	0.000614	-	-	-
Pb, Diss	Operations	Jul	5	-	-	-	-	-	-	0.000714	0.000724	0.000752	0.000672	0.000686	0.000731	0.000534	0.000515	0.000589	-	-	-
Pb, Diss	Operations	Aug	5	-	-	-	-	-	-	0.000714	0.000723	0.000752	0.000671	0.000684	0.000728	0.000534	0.000514	0.000583	-	-	-
Pb, Diss	Operations	Sep	5	-	-	-	-	-	-	0.000714	0.000723	0.000751	0.000669	0.000683	0.000726	0.000538	0.000514	0.000588	-	-	-
Pb, Diss	Operations	Oct	5	-	-	-	-	-	-	0.000714	0.000722	0.000750	0.000668	0.000682	0.000724	0.000500	0.000445	0.000566	-	-	-
Pb, Diss	Operations	Nov	5	-	-	-	-	-	-	0.000714	0.000722	0.000748	0.000667	0.000680	0.000722	0.000439	0.000392	0.000525	-	-	-
Pb, Diss	Operations	Dec	5	-	-	-	-	-	-	0.000714	0.000721	0.000746	0.000666	0.000679	0.000720	0.000406	0.000393	0.000501	-	-	-
Pb, Diss	Closure	Jan	6	-	-	-	-	-	-	0.000762	0.000757	0.000795	0.000694	0.000710	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Feb	6	-	-	-	-	-	-	0.000766	0.000758	0.000795	0.000698	0.000712	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Mar	6	-	-	-	-	-	-	0.000769	0.000759	0.000795	0.000702	0.000713	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Apr	6	-	-	-	-	-	-	0.000773	0.000760	0.000795	0.000707	0.000715	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	May	6	-	-	-	-	-	-	0.000776	0.000762	0.000795	0.000711	0.000717	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Jun	6	-	-	-	-	-	-	0.000780	0.000763	0.000795	0.000716	0.000719	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Jul	6	-	-	-	-	-	-	0.000782	0.000764	0.000795	0.000721	0.000720	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Aug	6	-	-	-	-	-	-	0.000785	0.000765	0.000795	0.000725	0.000722	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Sep	6	-	-	-	-	-	-	0.000787	0.000766	0.000795	0.000730	0.000724	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Oct	6	-	-	-	-	-	-	0.000789	0.000767	0.000795	0.000735	0.000725	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Nov	6	-	-	-	-	-	-	0.000790	0.000768	0.000795	0.000739	0.000727	0.000781	-	-	-	-	-	-
Pb, Diss	Closure	Dec	6	-	-	-	-	-	-	0.000792	0.000769	0.000795	0.000744	0.000729	0.000781	-	-	-	-	-	-
Pb, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000569	0.000611
Pb, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000569	0.000611
Pb, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000569	0.000608
Pb, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000569	0.000606
Pb, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000566	0.000568	0.000604
Pb, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000566	0.000568	0.000604
Pb, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000569	0.000604
Pb, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000569	0.000605
Pb, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000567	0.000566	0.000604
Pb, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000567	0.000570	0.000614
Pb, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000567	0.000569	0.000612
Pb, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000567	0.000569	0.000612
Pb, Tot	Construction	Jan	2	0.000073	0.000073	0.000073	0.000143	0.000143	0.000143	0.000793	0.000793	0.000797	0.000795	0.000795	0.000797	0.000520	0.000520	0.000520	-	-	-
Pb, Tot	Construction	Feb	2	0.000103	0.000103	0.000103	0.000158	0.000158	0.000158	0.000792	0.000792	0.000797	0.000795	0.000795	0.000797	0.000523	0.000523	0.000523	-	-	-
Pb, Tot	Construction	Mar	2	0.000153	0.000153	0.000153	0.000175	0.000175	0.000175	0.000791	0.000791	0.000797	0.000794	0.000794	0.000797	0.000444	0.000444	0.000444	-	-	-
Pb, Tot	Construction	Apr	2	0.000222	0.000222	0.000222	0.000193	0.000193	0.000193	0.000789	0.000789	0.000797	0.000792	0.000792	0.000797	0.000367	0.000367	0.000583	-	-	-
Pb, Tot	Construction	May	2	-	-	-	0.000214	0.000214	0.000214	0.000788	0.000788	0.000797	0.000791	0.000791	0.000797	0.000425	0.000425	0.000563	-	-	-
Pb, Tot	Construction	Jun	2	-	-	-	0.000237	0.000237	0.000237	0.000787	0.000787	0.000797	0.000790	0.000790	0.000797	0.000362	0.000362	0.000489	-	-	-
Pb, Tot	Construction	Jul	2	-	-	-	0.000263	0.000263	0.000263	0.000786	0.000786	0.000796	0.000788	0.000788	0.000797	0.000297	0.000297	0.000411	-	-	-
Pb, Tot	Construction	Aug	2	-	-	-	0.000295	0.000295	0.000295	0.000786	0.000786	0.000796	0.000786	0.000786	0.000797	0.000275	0.000275	0.000403	-	-	-
Pb, Tot	Construction	Sep	2	-	-	-	0.000335	0.000335	0.000335	0.000785	0.000785	0.000795	0.000784	0.000784	0.000797	0.000266	0.000266	0.000401	-	-	-
Pb, Tot	Construction	Oct	2	-	-	-	0.000389	0.000389	0.000389	0.000784	0.000784	0.000795	0.000782	0.000782	0.000796	0.000278	0.000278	0.000436	-	-	-
Pb, Tot	Construction	Nov	2	-	-	-	0.000239	0.000239	0.000239	0.000783	0.000783	0.000793	0.000780	0.000780	0.000796	0.000357	0.000357	0.000439	-	-	-
Pb, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000782	0.000782	0.000791	0.000777	0.000777	0.000795	0.000477	0.000477	0.000481	-	-	-
Pb, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000748	0.000755	0.000772	0.000700	0.000709	0.000756	0.000518	0.000495	0.000538	-	-	-
Pb, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000748	0.000755	0.000772	0.000698	0.000707	0.000753	0.000522	0.000507	0.000530	-	-	-
Pb, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000747	0.000754	0.000771	0.000696	0.000705	0.000749	0.000596	0.000578	0.000641	-	-	-
Pb, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000746	0.000753	0.000771	0.000693	0.000704	0.000746	0.000620	0.000626	0.000663	-	-	-
Pb, Tot	Operations	May	5	-	-	-	-	-	-	0.000746	0.000752	0.000770	0.000691	0.000702	0.000743	0.000587	0.000597	0.000647	-	-	-
Pb, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000745	0.000751	0.000770	0.000690	0.000701	0.000740	0.000582	0.000571	0.000630	-	-	-
Pb, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000745	0.000751	0.000770	0.000688	0.000699	0.000738	0.000551	0.000533	0.000606	-	-	-
Pb, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000745	0.000751	0.000769	0.000687	0.000698	0.000736	0.000550	0.000532	0.000599	-	-	-
Pb, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000746	0.000751	0.000769	0.000685	0.000697	0.000734	0.000556	0.000534	0.000606	-	-	-
Pb, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000746	0.000751	0.000768	0.000684	0.000696	0.000732	0.000524	0.000474	0.000590	-	-	-
Pb, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000746	0.000751	0.000767	0.000683	0.000695	0.000731	0.000482	0.000437	0.000568	-	-	-
Pb, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000746	0.000751	0.000766	0.000683	0.000694	0.000729	0.000470	0.000454	0.000565	-	-	-
Pb, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000776	0.000772	0.000796	0.000707	0.000721	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000778	0.000773	0.000796	0.000711	0.000723	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000781	0.000774	0.000796	0.000714	0.000724	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000783	0.000774	0.000796	0.000718	0.000726	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	May	6	-	-	-	-	-	-	0.000785	0.000775	0.000796	0.000722	0.000727	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000787	0.000776	0.000796	0.000726	0.000729	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000788	0.000776	0.000796	0.000730	0.000730	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000790	0.000777	0.000796	0.000735	0.000732	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000791	0.000778	0.000796	0.000739	0.000733	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000792	0.000778	0.000796	0.000743	0.000735	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000793	0.000779	0.000796	0.000747	0.000736	0.000783	-	-	-	-	-	-
Pb, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000794	0.000780	0.000796	0.000751	0.000737	0.000783	-	-	-	-	-	-
Pb, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000612	0.000612	0.000621
Pb, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000611	0.000612	0.000621
Pb, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000796	0.000797	-	-	-	0.000611	0.000611	0.000619
Pb, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000611	0.000611	0.000618
Pb, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000611	0.000611	0.000618
Pb, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000611	0.000611	0.000618
Pb, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000611	0.000611	0.000618
Pb, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000612	0.000612	0.000619
Pb, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000612	0.000609	0.000619
Pb, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000612	0.000612	0.000623
Pb, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000612	0.000612	0.000622
Pb, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	0.000797	-	-	-	0.000612	0.000612	0.000621
Mn, Diss	Construction	Jan	2	1.992	1.992	1.992	0.699	0.699	0.699	0.474	0.474	0.475	0.473	0.473	0.473	0.385	0.385	0.385	-	-	-
Mn, Diss	Construction	Feb	2	1.904	1.904	1.904	0.691	0.691	0.691	0.474	0.474	0.475	0.473	0.473	0.474	0.377	0.377	0.377	-	-	-
Mn, Diss	Construction	Mar	2	1.764	1.764	1.764	0.682	0.682	0.682	0.474	0.474	0.475	0.473	0.473	0.474	0.318	0.318	0.318	-	-	-
Mn, Diss	Construction	Apr	2	1.152	1.152	1.152	0.672	0.672	0.672	0.474	0.474	0.474	0.474	0.474	0.474	0.279	0.279	0.414	-	-	-
Mn, Diss	Construction	May	2	-	-	-	0.661	0.661	0.661	0.473	0.473	0.473	0.474	0.474	0.474	0.335	0.335	0.395	-	-	-
Mn, Diss	Construction	Jun	2	-	-	-	0.648	0.648	0.648	0.473	0.473	0.473	0.474	0.474	0.475	0.280	0.280	0.340	-	-	-
Mn, Diss	Construction	Jul	2	-	-	-	0.635	0.635	0.635	0.472	0.472	0.473	0.474	0.474	0.475	0.245	0.245	0.294	-	-	-
Mn, Diss	Construction	Aug	2	-	-	-	0.618	0.618	0.618	0.471	0.471	0.473	0.474	0.474	0.475	0.242	0.242	0.291	-	-	-
Mn, Diss	Construction	Sep	2	-	-	-	0.595	0.595	0.595	0.471	0.471	0.474	0.474	0.474	0.475	0.238	0.238	0.289	-	-	-
Mn, Diss	Construction	Oct	2	-	-	-	0.560	0.560	0.560	0.471	0.471	0.474	0.474	0.474	0.475	0.247	0.247	0.312	-	-	-
Mn, Diss	Construction	Nov	2	-	-	-	0.268	0.268	0.268	0.471	0.471	0.474	0.474	0.474	0.474	0.296	0.296	0.315	-	-	-
Mn, Diss	Construction	Dec	2	-	-	-	-	-	-	0.471	0.471	0.475	0.474	0.474	0.474	0.359	0.359	0.376	-	-	-
Mn, Diss	Operations	Jan	5	-	-	-	-	-	-	0.460	0.462	0.467	0.454	0.458	0.473	0.232	0.278	0.365	-	-	-
Mn, Diss	Operations	Feb	5	-	-	-	-	-	-	0.460	0.462	0.467	0.453	0.457	0.473	0.298	0.315	0.367	-	-	-
Mn, Diss	Operations	Mar	5	-	-	-	-	-	-	0.460	0.462	0.467	0.453	0.457	0.472	0.398	0.388	0.417	-	-	-
Mn, Diss	Operations	Apr	5	-	-	-	-	-	-	0.460	0.462	0.467	0.452	0.456	0.472	0.415	0.422	0.438	-	-	-
Mn, Diss	Operations	May	5	-	-	-	-	-	-	0.460	0.462	0.467	0.452	0.456	0.471	0.388	0.391	0.407	-	-	-
Mn, Diss	Operations	Jun	5	-	-	-	-	-	-	0.459	0.461	0.466	0.452	0.456	0.470	0.363	0.360	0.372	-	-	-
Mn, Diss	Operations	Jul	5	-	-	-	-	-	-	0.459	0.460	0.466	0.451	0.455	0.469	0.343	0.333	0.347	-	-	-
Mn, Diss	Operations	Aug	5	-	-	-	-	-	-	0.458	0.460	0.465	0.451	0.455	0.468	0.350	0.337	0.352	-	-	-
Mn, Diss	Operations	Sep	5	-	-	-	-	-	-	0.457	0.459	0.465	0.450	0.454	0.468	0.351	0.335	0.353	-	-	-
Mn, Diss	Operations	Oct	5	-	-	-	-	-	-	0.457	0.459	0.465	0.450	0.454	0.467	0.311	0.274	0.317	-	-	-
Mn, Diss	Operations	Nov	5	-	-	-	-	-	-	0.458	0.459	0.465	0.449	0.453	0.466	0.256	0.226	0.264	-	-	-
Mn, Diss	Operations	Dec	5	-	-	-	-	-	-	0.458	0.460	0.465	0.449	0.453	0.465	0.229	0.222	0.236	-	-	-
Mn, Diss	Closure	Jan	6	-	-	-	-	-	-	0.466	0.466	0.473	0.453	0.457	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Feb	6	-	-	-	-	-	-	0.466	0.466	0.473	0.454	0.457	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Mar	6	-	-	-	-	-	-	0.467	0.466	0.473	0.455	0.457	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Apr	6	-	-	-	-	-	-	0.468	0.467	0.473	0.456	0.458	0.470	-	-	-	-	-	-
Mn, Diss	Closure	May	6	-	-	-	-	-	-	0.469	0.467	0.473	0.456	0.458	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Jun	6	-	-	-	-	-	-	0.469	0.467	0.473	0.457	0.458	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Jul	6	-	-	-	-	-	-	0.470	0.467	0.473	0.458	0.459	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Aug	6	-	-	-	-	-	-	0.471	0.467	0.473	0.459	0.459	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Sep	6	-	-	-	-	-	-	0.471	0.467	0.473	0.460	0.459	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Oct	6	-	-	-	-	-	-	0.471	0.467	0.473	0.461	0.459	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Nov	6	-	-	-	-	-	-	0.472	0.467	0.473	0.462	0.460	0.470	-	-	-	-	-	-
Mn, Diss	Closure	Dec	6	-	-	-	-	-	-	0.472	0.467	0.473	0.463	0.460	0.470	-	-	-	-	-	-
Mn, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.291	0.305
Mn, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.291	0.306
Mn, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.291	0.306
Mn, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.292	0.306
Mn, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.292	0.306
Mn, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.291	0.306
Mn, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.291	0.306
Mn, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.291	0.306
Mn, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.305	0.290	0.306
Mn, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.304	0.291	0.305
Mn, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.304	0.291	0.305
Mn, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.473	0.473	0.473	0.473	0.473	0.473	-	-	-	0.304	0.291	0.305
Hg, Diss	Construction	Jan	2	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Diss	Construction	Feb	2	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Diss	Construction	Mar	2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000004	-	-	-
Hg, Diss	Construction	Apr	2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000005	-	-	-
Hg, Diss	Construction	May	2	-	-	-	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000005	-	-	-
Hg, Diss	Construction	Jun	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000005	-	-	-
Hg, Diss	Construction	Jul	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Diss	Construction	Aug	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Diss	Construction	Sep	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Diss	Construction	Oct	2	-	-	-	0.000004	0.000004	0.000004	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Diss	Construction	Nov	2	-	-	-	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Diss	Construction	Dec	2	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000004	-	-	-
Hg, Diss	Operations	Jan	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Diss	Operations	Feb	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Diss	Operations	Mar	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000005	0.000006	-	-	-
Hg, Diss	Operations	Apr	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Hg, Diss	Operations	May	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Hg, Diss	Operations	Jun	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000005	0.000006	-	-	-
Hg, Diss	Operations	Jul	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Diss	Operations	Aug	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Diss	Operations	Sep	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Diss	Operations	Oct	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Diss	Operations	Nov	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000005	0.000004	0.000006	-	-	-
Hg, Diss	Operations	Dec	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000004	0.000004	0.000005	-	-	-
Hg, Diss	Closure	Jan	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Feb	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Mar	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Apr	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	May	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Jun	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Jul	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Aug	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Sep	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Oct	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Nov	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Closure	Dec	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Hg, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Construction	Jan	2	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Tot	Construction	Feb	2	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Tot	Construction	Mar	2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000004	-	-	-
Hg, Tot	Construction	Apr	2	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000005	-	-	-
Hg, Tot	Construction	May	2	-	-	-	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000005	-	-	-
Hg, Tot	Construction	Jun	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000005	-	-	-
Hg, Tot	Construction	Jul	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Tot	Construction	Aug	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Tot	Construction	Sep	2	-	-	-	0.000003	0.000003	0.000003	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Tot	Construction	Oct	2	-	-	-	0.000004	0.000004	0.000004	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000003	0.000003	0.000004	-	-	-
Hg, Tot	Construction	Nov	2	-	-	-	0.000002	0.000002	0.000002	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000004	0.000004	0.000004	-	-	-
Hg, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000005	-	-	-
Hg, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000005	0.000006	-	-	-
Hg, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Hg, Tot	Operations	May	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	-	-	-
Hg, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000006	0.000005	0.000006	-	-	-
Hg, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000005	0.000005	0.000006	-	-	-
Hg, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000005	0.000004	0.000006	-	-	-
Hg, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000006	0.000007	0.000007	0.000005	0.000004	0.000006	-	-	-
Hg, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	May	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	-	-	-
Hg, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Hg, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000007	0.000007	0.000007	0.000007	0.000007	0.000007	-	-	-	0.000006	0.000006	0.000006
Mo, Tot	Construction	Jan	2	0.0010	0.0010	0.0010	0.0014	0.0014	0.0014	0.0071	0.0071	0.0072	0.0072	0.0072	0.0072	0.0060	0.0060	0.0060	-	-	-
Mo, Tot	Construction	Feb	2	0.0013	0.0013	0.0013	0.0016	0.0016	0.0016	0.0071	0.0071	0.0072	0.0072	0.0072	0.0072	0.0059	0.0059	0.0059	-	-	-
Mo, Tot	Construction	Mar	2	0.0019	0.0019	0.0019	0.0018	0.0018	0.0018	0.0071	0.0071	0.0072	0.0072	0.0072	0.0072	0.0050	0.0050	0.0050	-	-	-
Mo, Tot	Construction	Apr	2	0.0026	0.0026	0.0026	0.0020	0.0020	0.0020	0.0071	0.0071	0.0072	0.0071	0.0071	0.0072	0.0040	0.0040	0.0066	-	-	-
Mo, Tot	Construction	May	2	-	-	-	0.0022	0.0022	0.0022	0.0071	0.0071	0.0072	0.0071	0.0071	0.0072	0.0047	0.0047	0.0065	-	-	-
Mo, Tot	Construction	Jun	2	-	-	-	0.0025	0.0025	0.0025	0.0071	0.0071	0.0072	0.0071	0.0071	0.0072	0.0044	0.0044	0.0058	-	-	-
Mo, Tot	Construction	Jul	2	-	-	-	0.0028	0.0028	0.0028	0.0071	0.0071	0.0072	0.0071	0.0071	0.0072	0.0040	0.0040	0.0051	-	-	-
Mo, Tot	Construction	Aug	2	-	-	-	0.0032	0.0032	0.0032	0.0071	0.0071	0.0072	0.0071	0.0071	0.0072	0.0039	0.0039	0.0050	-	-	-
Mo, Tot	Construction	Sep	2	-	-	-	0.0037	0.0037	0.0037	0.0070	0.0070	0.0072	0.0071	0.0071	0.0072	0.0039	0.0039	0.0050	-	-	-
Mo, Tot	Construction	Oct	2	-	-	-	0.0043	0.0043	0.0043	0.0070	0.0070	0.0072	0.0071	0.0071	0.0072	0.0040	0.0040	0.0053	-	-	-
Mo, Tot	Construction	Nov	2	-	-	-	0.0027	0.0027	0.0027	0.0070	0.0070	0.0071	0.0070	0.0070	0.0072	0.0047	0.0047	0.0053	-	-	-
Mo, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0070	0.0070	0.0071	0.0070	0.0070	0.0072	0.0057	0.0057	0.0058	-	-	-
Mo, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0066	0.0067	0.0069	0.0063	0.0064	0.0068	0.0127	0.0147	0.0260	-	-	-
Mo, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0066	0.0067	0.0069	0.0063	0.0064	0.0068	0.0101	0.0112	0.0173	-	-	-
Mo, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0066	0.0067	0.0069	0.0063	0.0064	0.0068	0.0096	0.0091	0.0117	-	-	-
Mo, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0066	0.0067	0.0069	0.0063	0.0064	0.0067	0.0099	0.0096	0.0117	-	-	-
Mo, Tot	Operations	May	5	-	-	-	-	-	-	0.0066	0.0066	0.0069	0.0063	0.0064	0.0067	0.0100	0.0102	0.0130	-	-	-
Mo, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0066	0.0066	0.0069	0.0063	0.0064	0.0067	0.0109	0.0112	0.0156	-	-	-
Mo, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0066	0.0066	0.0069	0.0062	0.0064	0.0067	0.0118	0.0119	0.0171	-	-	-
Mo, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0066	0.0066	0.0068	0.0062	0.0063	0.0067	0.0114	0.0113	0.0158	-	-	-
Mo, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0066	0.0066	0.0068	0.0062	0.0063	0.0066	0.0120	0.0118	0.0163	-	-	-
Mo, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0066	0.0066	0.0068	0.0062	0.0063	0.0066	0.0140	0.0137	0.0198	-	-	-
Mo, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0066	0.0066	0.0068	0.0062	0.0063	0.0066	0.0166	0.0160	0.0241	-	-	-
Mo, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0066	0.0066	0.0068	0.0062	0.0063	0.0066	0.0185	0.0178	0.0271	-	-	-
Mo, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0069	0.0069	0.0072	0.0064	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0069	0.0069	0.0072	0.0065	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0070	0.0069	0.0072	0.0065	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0070	0.0069	0.0072	0.0065	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	May	6	-	-	-	-	-	-	0.0070	0.0069	0.0072	0.0065	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0071	0.0069	0.0072	0.0066	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0071	0.0069	0.0072	0.0066	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0071	0.0069	0.0072	0.0066	0.0066	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0071	0.0070	0.0072	0.0067	0.0067	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0071	0.0070	0.0072	0.0067	0.0067	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0071	0.0070	0.0072	0.0067	0.0067	0.0071	-	-	-	-	-	-
Mo, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0071	0.0070	0.0072	0.0068	0.0067	0.0071	-	-	-	-	-	-
Mo, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0156	0.0160
Mo, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0155	0.0160
Mo, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0155	0.0160
Mo, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0155	0.0160
Mo, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0159	0.0155	0.0160
Mo, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0155	0.0160
Mo, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0156	0.0160
Mo, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0156	0.0160
Mo, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0155	0.0160
Mo, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0156	0.0160
Mo, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0156	0.0160
Mo, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	-	-	-	0.0160	0.0156	0.0160
Ni, Diss	Construction	Jan	2	0.0013	0.0013	0.0013	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0012	0.0012	0.0012	-	-	-
Ni, Diss	Construction	Feb	2	0.0013	0.0013	0.0013	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0011	-	-	-
Ni, Diss	Construction	Mar	2	0.0013	0.0013	0.0013	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0010	0.0010	0.0010	-	-	-
Ni, Diss	Construction	Apr	2	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0012	-	-	-
Ni, Diss	Construction	May	2	-	-	-	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0012	-	-	-
Ni, Diss	Construction	Jun	2	-	-	-	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0011	-	-	-
Ni, Diss	Construction	Jul	2	-	-	-	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0011	-	-	-
Ni, Diss	Construction	Aug	2	-	-	-	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0011	-	-	-
Ni, Diss	Construction	Sep	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0010	0.0010	0.0011	-	-	-
Ni, Diss	Construction	Oct	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0011	-	-	-
Ni, Diss	Construction	Nov	2	-	-	-	0.0006	0.0006	0.0006	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0013	-	-	-
Ni, Diss	Construction	Dec	2	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0012	0.0012	0.0013	-	-	-
Ni, Diss	Operations	Jan	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0008	0.0008	0.0023	0.0026	0.0045	-	-	-
Ni, Diss	Operations	Feb	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0018	0.0020	0.0030	-	-	-
Ni, Diss	Operations	Mar	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0017	0.0016	0.0020	-	-	-
Ni, Diss	Operations	Apr	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0017	0.0017	0.0020	-	-	-
Ni, Diss	Operations	May	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0018	0.0018	0.0022	-	-	-
Ni, Diss	Operations	Jun	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0019	0.0020	0.0027	-	-	-
Ni, Diss	Operations	Jul	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0021	0.0021	0.0029	-	-	-
Ni, Diss	Operations	Aug	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0020	0.0020	0.0027	-	-	-
Ni, Diss	Operations	Sep	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0021	0.0021	0.0028	-	-	-
Ni, Diss	Operations	Oct	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0025	0.0024	0.0034	-	-	-
Ni, Diss	Operations	Nov	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0029	0.0028	0.0041	-	-	-
Ni, Diss	Operations	Dec	5	-	-	-	-	-	-	0.0007	0.0007	0.0008	0.0007	0.0007	0.0008	0.0033	0.0031	0.0046	-	-	-
Ni, Diss	Closure	Jan	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Feb	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Mar	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Apr	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	May	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Jun	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Jul	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Aug	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Sep	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Oct	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Nov	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Closure	Dec	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0019	0.0018	0.0019
Ni, Tot	Construction	Jan	2	0.0014	0.0014	0.0014	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0014	-	-	-
Ni, Tot	Construction	Feb	2	0.0014	0.0014	0.0014	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0013	0.0013	0.0013	-	-	-
Ni, Tot	Construction	Mar	2	0.0013	0.0013	0.0013	0.0010	0.0010	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0012	0.0012	0.0012	-	-	-
Ni, Tot	Construction	Apr	2	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0011	0.0011	0.0013	-	-	-
Ni, Tot	Construction	May	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0016	0.0016	0.0020	-	-	-
Ni, Tot	Construction	Jun	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0015	0.0015	0.0018	-	-	-
Ni, Tot	Construction	Jul	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0016	-	-	-
Ni, Tot	Construction	Aug	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0016	-	-	-
Ni, Tot	Construction	Sep	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0016	-	-	-
Ni, Tot	Construction	Oct	2	-	-	-	0.0011	0.0011	0.0011	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0015	-	-	-
Ni, Tot	Construction	Nov	2	-	-	-	0.0006	0.0006	0.0006	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0017	-	-	-
Ni, Tot	Construction	Dec	2	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0014	0.0014	0.0015	-	-	-
Ni, Tot	Operations	Jan	5	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0026	0.0029	0.0049	-	-	-
Ni, Tot	Operations	Feb	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0020	0.0022	0.0032	-	-	-
Ni, Tot	Operations	Mar	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0018	0.0017	0.0021	-	-	-
Ni, Tot	Operations	Apr	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0019	0.0018	0.0021	-	-	-
Ni, Tot	Operations	May	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0018	0.0019	0.0023	-	-	-
Ni, Tot	Operations	Jun	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0020	0.0021	0.0028	-	-	-
Ni, Tot	Operations	Jul	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0022	0.0022	0.0031	-	-	-
Ni, Tot	Operations	Aug	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0021	0.0021	0.0028	-	-	-
Ni, Tot	Operations	Sep	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0023	0.0023	0.0030	-	-	-
Ni, Tot	Operations	Oct	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0027	0.0027	0.0036	-	-	-
Ni, Tot	Operations	Nov	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0032	0.0031	0.0044	-	-	-
Ni, Tot	Operations	Dec	5	-	-	-	-	-	-	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0036	0.0034	0.0050	-	-	-
Ni, Tot	Closure	Jan	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Feb	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Mar	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Apr	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	May	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Jun	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Jul	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Aug	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Sep	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Oct	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Nov	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Closure	Dec	6	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	-	-	-
Ni, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ni, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Ni, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	-	-	-	0.0021	0.0020	0.0021
Se, Tot	Construction	Jan	2	0.00007	0.00007	0.00007	0.00007	0.00007	0.00007	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	0.00022	0.00022	0.00022	-	-	-
Se, Tot	Construction	Feb	2	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	0.00022	0.00022	0.00022	-	-	-
Se, Tot	Construction	Mar	2	0.00009	0.00009	0.00009	0.00008	0.00008	0.00008	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	0.00019	0.00019	0.00019	-	-	-
Se, Tot	Construction	Apr	2	0.00011	0.00011	0.00011	0.00009	0.00009	0.00009	0.00022	0.00022	0.00023	0.00023	0.00023	0.00023	0.00016	0.00016	0.00023	-	-	-
Se, Tot	Construction	May	2	-	-	-	0.00010	0.00010	0.00010	0.00022	0.00022	0.00023	0.00023	0.00023	0.00023	0.00022	0.00022	0.00024	-	-	-
Se, Tot	Construction	Jun	2	-	-	-	0.00011	0.00011	0.00011	0.00022	0.00022	0.00023	0.00023	0.00023	0.00023	0.00022	0.00022	0.00023	-	-	-
Se, Tot	Construction	Jul	2	-	-	-	0.00011	0.00011	0.00011	0.00022	0.00022	0.00023	0.00022	0.00022	0.00023	0.00021	0.00021	0.00021	-	-	-
Se, Tot	Construction	Aug	2	-	-	-	0.00013	0.00013	0.00013	0.00022	0.00022	0.00023	0.00022	0.00022	0.00023	0.00020	0.00020	0.00020	-	-	-
Se, Tot	Construction	Sep	2	-	-	-	0.00014	0.00014	0.00014	0.00022	0.00022	0.00023	0.00022	0.00022	0.00023	0.00019	0.00019	0.00020	-	-	-
Se, Tot	Construction	Oct	2	-	-	-	0.00016	0.00016	0.00016	0.00022	0.00022	0.00023	0.00022	0.00022	0.00023	0.00019	0.00019	0.00021	-	-	-
Se, Tot	Construction	Nov	2	-	-	-	0.00009	0.00009	0.00009	0.00022	0.00022	0.00023	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-
Se, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00022	0.00022	0.00023	0.00022	0.00022	0.00022	-	-	-
Se, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00021	0.00022	0.00112	0.00126	0.00254	-	-	-
Se, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00021	0.00022	0.00075	0.00084	0.00153	-	-	-
Se, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00021	0.00022	0.00058	0.00053	0.00077	-	-	-
Se, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00021	0.00021	0.00058	0.00054	0.00074	-	-	-
Se, Tot	Operations	May	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00021	0.00021	0.00062	0.00063	0.00090	-	-	-
Se, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00073	0.00077	0.00122	-	-	-
Se, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00086	0.00088	0.00140	-	-	-
Se, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00081	0.00082	0.00126	-	-	-
Se, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00087	0.00087	0.00131	-	-	-
Se, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00113	0.00115	0.00172	-	-	-
Se, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00148	0.00145	0.00225	-	-	-
Se, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00021	0.00021	0.00022	0.00020	0.00020	0.00021	0.00173	0.00165	0.00260	-	-	-
Se, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	May	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00022	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00023	0.00022	0.00023	0.00021	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00023	0.00022	0.00023	0.00022	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00023	0.00022	0.00023	0.00022	0.00021	0.00022	-	-	-	-	-	-
Se, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Se, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Se, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Se, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00076	0.00078
Se, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00076	0.00078
Se, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00076	0.00078
Se, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00076	0.00078
Se, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00076	0.00078
Se, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Se, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Se, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Se, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00023	0.00023	0.00023	0.00023	0.00023	0.00023	-	-	-	0.00078	0.00075	0.00078
Ag, Tot	Construction	Jan	2	0.000006	0.000006	0.000006	0.000005	0.000005	0.000005	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	0.000022	0.000022	0.000022	-	-	-
Ag, Tot	Construction	Feb	2	0.000007	0.000007	0.000007	0.000006	0.000006	0.000006	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	0.000022	0.000022	0.000022	-	-	-
Ag, Tot	Construction	Mar	2	0.000009	0.000009	0.000009	0.000007	0.000007	0.000007	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	0.000018	0.000018	0.000018	-	-	-
Ag, Tot	Construction	Apr	2	0.000011	0.000011	0.000011	0.000008	0.000008	0.000008	0.000035	0.000035	0.000036	0.000036	0.000036	0.000036	0.000014	0.000014	0.000025	-	-	-
Ag, Tot	Construction	May	2	-	-	-	0.000009	0.000009	0.000009	0.000035	0.000035	0.000036	0.000036	0.000036	0.000036	0.000017	0.000017	0.000026	-	-	-
Ag, Tot	Construction	Jun	2	-	-	-	0.000010	0.000010	0.000010	0.000035	0.000035	0.000036	0.000036	0.000036	0.000036	0.000018	0.000018	0.000024	-	-	-
Ag, Tot	Construction	Jul	2	-	-	-	0.000011	0.000011	0.000011	0.000035	0.000035	0.000036	0.000035	0.000035	0.000036	0.000015	0.000015	0.000019	-	-	-
Ag, Tot	Construction	Aug	2	-	-	-	0.000013	0.000013	0.000013	0.000035	0.000035	0.000036	0.000035	0.000035	0.000036	0.000013	0.000013	0.000018	-	-	-
Ag, Tot	Construction	Sep	2	-	-	-	0.000014	0.000014	0.000014	0.000035	0.000035	0.000036	0.000035	0.000035	0.000036	0.000012	0.000012	0.000018	-	-	-
Ag, Tot	Construction	Oct	2	-	-	-	0.000017	0.000017	0.000017	0.000035	0.000035	0.000036	0.000035	0.000035	0.000036	0.000012	0.000012	0.000019	-	-	-
Ag, Tot	Construction	Nov	2	-	-	-	0.000011	0.000011	0.000011	0.000035	0.000035	0.000036	0.000035	0.000035	0.000036	0.000015	0.000015	0.000019	-	-	-
Ag, Tot	Construction	Dec	2	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000035	0.000035	0.000036	0.000020	0.000020	0.000021	-	-	-
Ag, Tot	Operations	Jan	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000032	0.000034	0.000025	0.000028	0.000039	-	-	-
Ag, Tot	Operations	Feb	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000032	0.000034	0.000024	0.000026	0.000032	-	-	-
Ag, Tot	Operations	Mar	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000032	0.000034	0.000029	0.000027	0.000032	-	-	-
Ag, Tot	Operations	Apr	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000032	0.000034	0.000030	0.000030	0.000033	-	-	-
Ag, Tot	Operations	May	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000032	0.000033	0.000030	0.000030	0.000035	-	-	-
Ag, Tot	Operations	Jun	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000031	0.000031	0.000037	-	-	-
Ag, Tot	Operations	Jul	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000030	0.000029	0.000036	-	-	-
Ag, Tot	Operations	Aug	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000029	0.000028	0.000034	-	-	-
Ag, Tot	Operations	Sep	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000030	0.000029	0.000035	-	-	-
Ag, Tot	Operations	Oct	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000030	0.000028	0.000037	-	-	-
Ag, Tot	Operations	Nov	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000030	0.000028	0.000040	-	-	-
Ag, Tot	Operations	Dec	5	-	-	-	-	-	-	0.000033	0.000033	0.000034	0.000031	0.000031	0.000033	0.000031	0.000030	0.000041	-	-	-
Ag, Tot	Closure	Jan	6	-	-	-	-	-	-	0.000035	0.000034	0.000036	0.000032	0.000032	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Feb	6	-	-	-	-	-	-	0.000035	0.000034	0.000036	0.000032	0.000032	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Mar	6	-	-	-	-	-	-	0.000035	0.000034	0.000036	0.000032	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Apr	6	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000032	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	May	6	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000032	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Jun	6	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000033	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Jul	6	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000033	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Aug	6	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000033	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Sep	6	-	-	-	-	-	-	0.000035	0.000035	0.000036	0.000033	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Oct	6	-	-	-	-	-	-	0.000036	0.000035	0.000036	0.000033	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Nov	6	-	-	-	-	-	-	0.000036	0.000035	0.000036	0.000034	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Closure	Dec	6	-	-	-	-	-	-	0.000036	0.000035	0.000036	0.000034	0.000033	0.000035	-	-	-	-	-	-
Ag, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000035	0.000035	0.000036
Ag, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000035	0.000035	0.000036
Ag, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000035	0.000035	0.000036
Ag, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ag, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.000036	0.000036	0.000036	0.000036	0.000036	0.000036	-	-	-	0.000036	0.000035	0.000036
Ta, Tot	Construction	Jan	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Feb	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Mar	2	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Apr	2	0.00004	0.00004	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00003	0.00003	0.00004	-	-	-
Ta, Tot	Construction	May	2	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Jun	2	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Jul	2	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Aug	2	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Sep	2	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Oct	2	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00004	-	-	-
Ta, Tot	Construction	Nov	2	-	-	-	0.00002	0.00002	0.00002	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00005	-	-	-
Ta, Tot	Construction	Dec	2	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.00004	0.00005	-	-	-
Ta, Tot	Operations	Jan	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00015	0.00017	0.00033	-	-	-
Ta, Tot	Operations	Feb	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00010	0.00012	0.00020	-	-	-
Ta, Tot	Operations	Mar	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.00008	0.00011	-	-	-
Ta, Tot	Operations	Apr	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00009	0.00008	0.00011	-	-	-
Ta, Tot	Operations	May	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00009	0.00009	0.00012	-	-	-
Ta, Tot	Operations	Jun	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00010	0.00011	0.00016	-	-	-
Ta, Tot	Operations	Jul	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00012	0.00012	0.00019	-	-	-
Ta, Tot	Operations	Aug	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00011	0.00017	-	-	-
Ta, Tot	Operations	Sep	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00012	0.00012	0.00018	-	-	-
Ta, Tot	Operations	Oct	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00015	0.00016	0.00023	-	-	-
Ta, Tot	Operations	Nov	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00020	0.00019	0.00029	-	-	-
Ta, Tot	Operations	Dec	5	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00023	0.00022	0.00033	-	-	-
Ta, Tot	Closure	Jan	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Feb	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Mar	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Apr	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	May	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Jun	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Jul	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Aug	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Sep	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Oct	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Nov	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Closure	Dec	6	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	-	-	-
Ta, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
Ta, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-	0.00018	0.00018	0.00018
U, Tot	Construction	Jan	2	0.003	0.003	0.003	0.004	0.004	0.004	0.011	0.011	0.011	0.011	0.011	0.011	0.008	0.008	0.008	-	-	-
U, Tot	Construction	Feb	2	0.003	0.003	0.003	0.004	0.004	0.004	0.011	0.011	0.011	0.011	0.011	0.011	0.008	0.008	0.008	-	-	-
U, Tot	Construction	Mar	2	0.004	0.004	0.004	0.004	0.004	0.004	0.011	0.011	0.011	0.011	0.011	0.011	0.006	0.006	0.006	-	-	-
U, Tot	Construction	Apr	2	0.004	0.004	0.004	0.005	0.005	0.005	0.011	0.011	0.011	0.011	0.011	0.011	0.005	0.005	0.009	-	-	-
U, Tot	Construction	May	2	-	-	-	0.005	0.005	0.005	0.011	0.011	0.011	0.011	0.011	0.011	0.005	0.005	0.009	-	-	-
U, Tot	Construction	Jun	2	-	-	-	0.005	0.005	0.005	0.011	0.011	0.011	0.011	0.011	0.011	0.005	0.005	0.007	-	-	-
U, Tot	Construction	Jul	2	-	-	-	0.005	0.005	0.005	0.011	0.011	0.011	0.011	0.011	0.011	0.004	0.004	0.006	-	-	-
U, Tot	Construction	Aug	2	-	-	-	0.006	0.006	0.006	0.011	0.011	0.011	0.011	0.011	0.011	0.004	0.004	0.006	-	-	-
U, Tot	Construction	Sep	2	-	-	-	0.006	0.006	0.006	0.011	0.011	0.011	0.011	0.011	0.011	0.004	0.004	0.006	-	-	-
U, Tot	Construction	Oct	2	-	-	-	0.007	0.007	0.007	0.011	0.011	0.011	0.011	0.011	0.011	0.004	0.004	0.007	-	-	-
U, Tot	Construction	Nov	2	-	-	-	0.004	0.004	0.004	0.011	0.011	0.011	0.011	0.011	0.011	0.005	0.005	0.007	-	-	-
U, Tot	Construction	Dec	2	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	0.007	0.007	0.007	-	-	-
U, Tot	Operations	Jan	5	-	-	-	-	-	-	0.010	0.010	0.011	0.010	0.010	0.011	0.012	0.014	0.023	-	-	-
U, Tot	Operations	Feb	5	-	-	-	-	-	-	0.010	0.010	0.011	0.010	0.010	0.011	0.011	0.012	0.017	-	-	-
U, Tot	Operations	Mar	5	-	-	-	-	-	-	0.010	0.010	0.011	0.010	0.010	0.011	0.011	0.011	0.013	-	-	-
U, Tot	Operations	Apr	5	-	-	-	-	-	-	0.010	0.010	0.011	0.010	0.010	0.010	0.011	0.011	0.013	-	-	-
U, Tot	Operations	May	5	-	-	-	-	-	-	0.010	0.010	0.011	0.010	0.010	0.010	0.011	0.012	0.014	-	-	-
U, Tot	Operations	Jun	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.012	0.012	0.016	-	-	-
U, Tot	Operations	Jul	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.013	0.012	0.017	-	-	-
U, Tot	Operations	Aug	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.012	0.012	0.016	-	-	-
U, Tot	Operations	Sep	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.013	0.012	0.016	-	-	-
U, Tot	Operations	Oct	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.014	0.013	0.019	-	-	-
U, Tot	Operations	Nov	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.016	0.015	0.022	-	-	-
U, Tot	Operations	Dec	5	-	-	-	-	-	-	0.010	0.010	0.010	0.010	0.010	0.010	0.017	0.016	0.024	-	-	-
U, Tot	Closure	Jan	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Feb	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Mar	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Apr	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	May	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Jun	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Jul	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Aug	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Sep	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-

Appendix H-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Wendy Mixed Predicted Project WQ			East Mixed Predicted Project WQ			Gordon Interceptor Wells Predicted Project WQ			Farely Interceptor Wells Predicted Project WQ			Collection Pond Predicted Project WQ			Open Pit Predicted Project WQ		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unit				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
U, Tot	Closure	Oct	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Nov	6	-	-	-	-	-	-	0.011	0.011	0.011	0.010	0.010	0.011	-	-	-	-	-	-
U, Tot	Closure	Dec	6	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.010	0.011	-	-	-	-	-	-
U, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
U, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.011	0.011	0.011	0.011	0.011	0.011	-	-	-	0.010	0.010	0.010
Zn, Diss	Construction	Jan	2	0.002	0.002	0.002	0.002	0.002	0.002	0.018	0.018	0.018	0.018	0.018	0.018	0.015	0.015	0.015	-	-	-
Zn, Diss	Construction	Feb	2	0.003	0.003	0.003	0.002	0.002	0.002	0.018	0.018	0.018	0.018	0.018	0.018	0.014	0.014	0.014	-	-	-
Zn, Diss	Construction	Mar	2	0.004	0.004	0.004	0.003	0.003	0.003	0.018	0.018	0.018	0.018	0.018	0.018	0.012	0.012	0.012	-	-	-
Zn, Diss	Construction	Apr	2	0.006	0.006	0.006	0.004	0.004	0.004	0.018	0.018	0.018	0.018	0.018	0.018	0.009	0.009	0.016	-	-	-
Zn, Diss	Construction	May	2	-	-	-	0.004	0.004	0.004	0.018	0.018	0.018	0.018	0.018	0.018	0.011	0.011	0.016	-	-	-
Zn, Diss	Construction	Jun	2	-	-	-	0.005	0.005	0.005	0.018	0.018	0.018	0.018	0.018	0.018	0.010	0.010	0.014	-	-	-
Zn, Diss	Construction	Jul	2	-	-	-	0.006	0.006	0.006	0.017	0.017	0.018	0.018	0.018	0.018	0.009	0.009	0.012	-	-	-
Zn, Diss	Construction	Aug	2	-	-	-	0.007	0.007	0.007	0.017	0.017	0.018	0.018	0.018	0.018	0.009	0.009	0.011	-	-	-
Zn, Diss	Construction	Sep	2	-	-	-	0.008	0.008	0.008	0.017	0.017	0.018	0.017	0.017	0.018	0.009	0.009	0.011	-	-	-
Zn, Diss	Construction	Oct	2	-	-	-	0.010	0.010	0.010	0.017	0.017	0.018	0.017	0.017	0.018	0.009	0.009	0.012	-	-	-
Zn, Diss	Construction	Nov	2	-	-	-	0.006	0.006	0.006	0.017	0.017	0.018	0.017	0.017	0.018	0.011	0.011	0.012	-	-	-
Zn, Diss	Construction	Dec	2	-	-	-	-	-	-	0.017	0.017	0.018	0.017	0.017	0.018	0.014	0.014	0.014	-	-	-
Zn, Diss	Operations	Jan	5	-	-	-	-	-	-	0.016	0.016	0.017	0.016	0.016	0.017	0.011	0.012	0.014	-	-	-
Zn, Diss	Operations	Feb	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.012	0.013	0.014	-	-	-
Zn, Diss	Operations	Mar	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.016	0.015	0.017	-	-	-
Zn, Diss	Operations	Apr	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.017	0.017	0.018	-	-	-
Zn, Diss	Operations	May	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.016	0.016	0.017	-	-	-
Zn, Diss	Operations	Jun	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.016	0.016	0.015	0.017	-	-	-
Zn, Diss	Operations	Jul	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.015	0.014	0.016	-	-	-
Zn, Diss	Operations	Aug	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.015	0.014	0.016	-	-	-
Zn, Diss	Operations	Sep	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.015	0.014	0.016	-	-	-
Zn, Diss	Operations	Oct	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.014	0.012	0.015	-	-	-
Zn, Diss	Operations	Nov	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.012	0.011	0.013	-	-	-
Zn, Diss	Operations	Dec	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.011	0.010	0.012	-	-	-
Zn, Diss	Closure	Jan	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Feb	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Mar	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Apr	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	May	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Jun	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Jul	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Aug	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Sep	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Oct	6	-	-	-	-	-	-	0.018	0.017	0.018	0.017	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Nov	6	-	-	-	-	-	-	0.018	0.017	0.018	0.017	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Closure	Dec	6	-	-	-	-	-	-	0.018	0.017	0.018	0.017	0.016	0.017	-	-	-	-	-	-
Zn, Diss	Post-Closure	Jan	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Feb	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Mar	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Apr	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	May	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Jun	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Jul	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Aug	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Sep	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.010	0.011
Zn, Diss	Post-Closure	Oct	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Diss	Post-Closure	Nov	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.010	0.011
Zn, Diss	Post-Closure	Dec	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Construction	Jan	2	0.003	0.003	0.003	0.002	0.002	0.002	0.018	0.018	0.018	0.018	0.018	0.018	0.015	0.015	0.015	-	-	-
Zn, Tot	Construction	Feb	2	0.004	0.004	0.004	0.002	0.002	0.002	0.018	0.018	0.018	0.018	0.018	0.018	0.015	0.015	0.015	-	-	-
Zn, Tot	Construction	Mar	2	0.005	0.005	0.005	0.003	0.003	0.003	0.018	0.018	0.018	0.018	0.018	0.018	0.012	0.012	0.012	-	-	-
Zn, Tot	Construction	Apr	2	0.007	0.007	0.007	0.004	0.004	0.004	0.018	0.018	0.018	0.018	0.018	0.018	0.010	0.010	0.016	-	-	-
Zn, Tot	Construction	May	2	-	-	-	0.004	0.004	0.004	0.018	0.018	0.018	0.018	0.018	0.018	0.012	0.012	0.016	-	-	-
Zn, Tot	Construction	Jun	2	-	-	-	0.005	0.005	0.005	0.018	0.018	0.018	0.018	0.018	0.018	0.011	0.011	0.014	-	-	-
Zn, Tot	Construction	Jul	2	-	-	-	0.006	0.006	0.006	0.017	0.017	0.018	0.018	0.018	0.018	0.010	0.010	0.012	-	-	-
Zn, Tot	Construction	Aug	2	-	-	-	0.007	0.007	0.007	0.017	0.017	0.018	0.018	0.018	0.018	0.011	0.011	0.012	-	-	-
Zn, Tot	Construction	Sep	2	-	-	-	0.008	0.008	0.008	0.017	0.017	0.018	0.017	0.017	0.018	0.011	0.011	0.012	-	-	-
Zn, Tot	Construction	Oct	2	-	-	-	0.010	0.010	0.010	0.017	0.017	0.018	0.017	0.017	0.018	0.011	0.011	0.013	-	-	-
Zn, Tot	Construction	Nov	2	-	-	-	0.006	0.006	0.006	0.017	0.017	0.018	0.017	0.017	0.018	0.012	0.012	0.013	-	-	-
Zn, Tot	Construction	Dec	2	-	-	-	-	-	-	0.017	0.017	0.018	0.017	0.017	0.018	0.014	0.014	0.015	-	-	-
Zn, Tot	Operations	Jan	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.012	0.012	0.015	-	-	-
Zn, Tot	Operations	Feb	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.013	0.013	0.015	-	-	-
Zn, Tot	Operations	Mar	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.016	0.016	0.017	-	-	-
Zn, Tot	Operations	Apr	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.017	0.017	0.018	-	-	-
Zn, Tot	Operations	May	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.016	0.017	0.016	0.016	0.017	-	-	-
Zn, Tot	Operations	Jun	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.016	0.015	0.017	-	-	-
Zn, Tot	Operations	Jul	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.016	0.015	0.016	-	-	-
Zn, Tot	Operations	Aug	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.015	0.015	0.016	-	-	-
Zn, Tot	Operations	Sep	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.015	0.015	0.016	-	-	-
Zn, Tot	Operations	Oct	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.014	0.013	0.015	-	-	-
Zn, Tot	Operations	Nov	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.012	0.011	0.014	-	-	-
Zn, Tot	Operations	Dec	5	-	-	-	-	-	-	0.016	0.016	0.017	0.015	0.015	0.016	0.011	0.011	0.013	-	-	-
Zn, Tot	Closure	Jan	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Feb	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Mar	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Apr	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	May	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Jun	6	-	-	-	-	-	-	0.017	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Jul	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Aug	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Sep	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Oct	6	-	-	-	-	-	-	0.018	0.017	0.018	0.016	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Nov	6	-	-	-	-	-	-	0.018	0.017	0.018	0.017	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Closure	Dec	6	-	-	-	-	-	-	0.018	0.017	0.018	0.017	0.016	0.017	-	-	-	-	-	-
Zn, Tot	Post-Closure	Jan	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Feb	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Mar	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Apr	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	May	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Jun	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Jul	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Aug	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Sep	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Oct	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Nov	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011
Zn, Tot	Post-Closure	Dec	117	-	-	-	-	-	-	0.018	0.018	0.018	0.018	0.018	0.018	-	-	-	0.011	0.011	0.011

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Cl	Construction	Jan	2	0.244	0.244	0.251	-5	1.147	1.147	1.311	31	0.684	0.684	0.988	0	0.534	0.534	0.691	41	0.467	0.467	0.534	17	0.285	0.285	0.285	0
Cl	Construction	Feb	2	0.220	0.220	0.228	-23	1.381	1.381	1.919	49	0.848	0.848	0.856	12	0.576	0.576	0.738	44	0.484	0.484	0.558	18	0.298	0.298	0.298	0
Cl	Construction	Mar	2	0.176	0.176	0.180	-28	1.416	1.416	2.126	56	0.857	0.857	1.121	25	0.604	0.604	0.730	51	0.488	0.488	0.566	20	0.285	0.285	0.285	0
Cl	Construction	Apr	2	0.173	0.173	0.175	-27	1.416	1.416	2.178	59	0.872	0.872	1.270	37	0.632	0.632	0.706	58	0.496	0.496	0.573	23	0.285	0.285	0.285	0
Cl	Construction	May	2	0.148	0.148	0.150	2	0.974	0.974	1.478	67	0.544	0.544	0.791	113	0.544	0.544	0.565	58	0.508	0.508	0.569	20	0.245	0.245	0.245	0
Cl	Construction	Jun	2	0.197	0.197	0.199	40	0.921	0.921	1.376	74	0.534	0.534	0.769	64	0.529	0.529	0.543	57	0.487	0.487	0.532	21	0.245	0.245	0.245	0
Cl	Construction	Jul	2	0.231	0.231	0.233	61	0.913	0.913	1.352	85	0.393	0.393	0.553	46	0.507	0.507	0.537	52	0.483	0.483	0.515	23	0.246	0.246	0.246	0
Cl	Construction	Aug	2	0.247	0.247	0.250	71	0.895	0.895	1.312	96	0.375	0.375	0.521	58	0.481	0.481	0.520	46	0.478	0.478	0.499	25	0.246	0.246	0.246	0
Cl	Construction	Sep	2	0.327	0.327	0.331	96	0.879	0.879	1.275	104	0.384	0.384	0.528	68	0.465	0.465	0.512	42	0.471	0.471	0.483	26	0.247	0.247	0.247	0
Cl	Construction	Oct	2	0.415	0.415	0.420	111	0.861	0.861	1.229	110	0.402	0.402	0.543	79	0.455	0.455	0.509	40	0.464	0.464	0.468	27	0.247	0.247	0.247	0
Cl	Construction	Nov	2	0.480	0.480	0.486	71	1.311	1.311	1.694	40	0.997	0.997	1.227	57	0.533	0.533	0.608	43	0.515	0.515	0.519	27	0.286	0.286	0.286	0
Cl	Construction	Dec	2	0.308	0.308	0.312	15	1.028	1.028	1.280	14	1.020	1.020	1.279	44	0.571	0.571	0.662	51	0.516	0.516	0.526	28	0.285	0.285	0.285	0
Cl	Operations	Jan	5	0.223	0.225	0.231	-13	0.639	0.650	0.670	-26	0.647	0.645	0.654	-5	0.425	0.439	0.492	16	0.408	0.426	0.501	7	0.285	0.285	0.285	0
Cl	Operations	Feb	5	0.200	0.202	0.207	-29	0.604	0.615	0.637	-34	0.557	0.570	0.612	-25	0.456	0.471	0.524	18	0.420	0.438	0.514	8	0.298	0.298	0.298	0
Cl	Operations	Mar	5	0.163	0.164	0.168	-33	0.613	0.604	0.621	-33	0.408	0.413	0.475	-40	0.452	0.467	0.521	17	0.420	0.438	0.512	8	0.285	0.285	0.285	0
Cl	Operations	Apr	5	0.161	0.163	0.167	-31	0.608	0.604	0.623	-32	0.439	0.436	0.457	-32	0.447	0.460	0.510	15	0.420	0.437	0.509	9	0.285	0.285	0.285	0
Cl	Operations	May	5	0.140	0.141	0.144	-3	0.444	0.445	0.461	-24	0.280	0.278	0.283	9	0.378	0.388	0.423	13	0.436	0.450	0.508	6	0.245	0.245	0.245	0
Cl	Operations	Jun	5	0.188	0.189	0.193	34	0.455	0.457	0.468	-14	0.285	0.282	0.287	-13	0.360	0.369	0.398	10	0.409	0.421	0.469	5	0.245	0.245	0.245	0
Cl	Operations	Jul	5	0.219	0.221	0.226	55	0.480	0.479	0.488	-3	0.223	0.223	0.227	-17	0.345	0.353	0.378	6	0.396	0.407	0.449	5	0.246	0.246	0.246	0
Cl	Operations	Aug	5	0.235	0.237	0.242	64	0.494	0.492	0.499	7	0.222	0.223	0.228	-6	0.331	0.338	0.359	3	0.384	0.395	0.432	4	0.246	0.246	0.246	0
Cl	Operations	Sep	5	0.312	0.314	0.321	88	0.502	0.500	0.507	16	0.239	0.240	0.245	5	0.324	0.330	0.348	1	0.373	0.383	0.417	3	0.247	0.247	0.247	0
Cl	Operations	Oct	5	0.397	0.399	0.408	103	0.500	0.497	0.503	21	0.270	0.270	0.276	20	0.319	0.325	0.342	0	0.364	0.373	0.404	2	0.247	0.247	0.247	0
Cl	Operations	Nov	5	0.457	0.460	0.470	64	0.926	0.923	0.931	-2	0.783	0.779	0.783	23	0.376	0.382	0.400	3	0.400	0.409	0.442	2	0.286	0.286	0.286	0
Cl	Operations	Dec	5	0.292	0.294	0.300	10	0.759	0.761	0.775	-16	0.775	0.771	0.777	9	0.403	0.408	0.425	9	0.397	0.406	0.437	2	0.285	0.285	0.285	0
Cl	Closure	Jan	6	0.233	0.233	0.245	-10	0.600	0.605	0.638	-31	0.622	0.627	0.661	-8	0.412	0.413	0.420	9	0.390	0.391	0.395	-1	0.285	0.285	0.285	0
Cl	Closure	Feb	6	0.210	0.209	0.220	-27	0.557	0.562	0.587	-39	0.583	0.590	0.619	-22	0.444	0.445	0.453	12	0.402	0.402	0.407	-1	0.298	0.298	0.298	0
Cl	Closure	Mar	6	0.170	0.169	0.177	-30	0.491	0.496	0.513	-45	0.495	0.500	0.517	-27	0.447	0.448	0.456	12	0.402	0.403	0.407	0	0.285	0.285	0.286	0
Cl	Closure	Apr	6	0.169	0.168	0.173	-29	0.447	0.450	0.463	-49	0.450	0.453	0.466	-29	0.446	0.447	0.455	12	0.402	0.403	0.407	1	0.285	0.285	0.285	0
Cl	Closure	May	6	0.144	0.144	0.148	-1	0.324	0.325	0.332	-44	0.252	0.252	0.254	-1	0.377	0.378	0.385	10	0.423	0.424	0.427	1	0.245	0.245	0.245	0
Cl	Closure	Jun	6	0.191	0.192	0.198	36	0.336	0.335	0.341	-37	0.256	0.256	0.259	-21	0.357	0.358	0.365	7	0.400	0.400	0.402	0	0.245	0.245	0.246	0
Cl	Closure	Jul	6	0.224	0.225	0.232	57	0.353	0.353	0.358	-28	0.210	0.210	0.212	-22	0.343	0.344	0.350	4	0.389	0.389	0.392	0	0.246	0.246	0.246	0
Cl	Closure	Aug	6	0.241	0.242	0.250	67	0.368	0.367	0.372	-20	0.207	0.207	0.210	-12	0.329	0.330	0.336	1	0.379	0.379	0.382	0	0.246	0.246	0.246	0
Cl	Closure	Sep	6	0.319	0.319	0.330	91	0.382	0.381	0.386	-12	0.220	0.219	0.222	-4	0.322	0.323	0.328	-1	0.369	0.369	0.373	0	0.247	0.247	0.247	0
Cl	Closure	Oct	6	0.406	0.405	0.419	106	0.403	0.401	0.408	-2	0.237	0.236	0.240	5	0.316	0.317	0.322	-2	0.359	0.360	0.364	-1	0.247	0.247	0.247	0
Cl	Closure	Nov	6	0.480	0.475	0.487	69	0.844	0.842	0.848	-10	0.715	0.713	0.720	12	0.369	0.370	0.375	0	0.395	0.395	0.400	-1	0.286	0.286	0.286	0
Cl	Closure	Dec	6	0.312	0.311	0.336	16	0.704	0.707	0.734	-22	0.728	0.729	0.748	3	0.394	0.394	0.397	5	0.391	0.392	0.397	-1	0.286	0.286	0.286	0
Cl	Post-Closure	Jan	117	0.254	0.255	0.405	-1	1.126	1.095	1.130	25	0.755	0.748	0.757	10	0.401	0.398	0.405	6	0.407	0.405	0.407	3	0.285	0.285	0.285	0
Cl	Post-Closure	Feb	117	0.281	0.282	0.447	-1	1.197	1.162	1.202	26	0.789	0.788	0.827	4	0.424	0.421	0.437	6	0.417	0.415	0.417	3	0.298	0.298	0.298	0
Cl	Post-Closure	Mar	117	0.239	0.240	0.379	-1	1.204	1.165	1.210	28	0.536	0.556	0.755	-19	0.424	0.421	0.442	6	0.415	0.413	0.415	3	0.285	0.285	0.285	0
Cl	Post-Closure	Apr	117	0.232	0.233	0.366	-1	1.213	1.170	1.219	32	0.456	0.481	0.712	-25	0.421	0.419	0.443	5	0.413	0.411	0.413	3	0.285	0.285	0.285	0
Cl	Post-Closure	May	117	0.145	0.145	0.212	0	0.817	0.787	0.821	35	0.229	0.232	0.265	-9	0.360	0.358	0.377	5	0.432	0.430	0.432	2	0.245	0.245	0.245	0
Cl	Post-Closure	Jun	117	0.141	0.142	0.190	1	0.754	0.727	0.757	37	0.373	0.365	0.375	12	0.350	0.348	0.360	4	0.408	0.407	0.408	2	0.245	0.245	0.245	0
Cl	Post-Closure	Jul	117	0.143	0.144	0.209	1	0.711	0.686	0.714	39	0.313	0.307	0.314	14	0.347	0.345	0.347	4	0.397	0.396	0.397	2	0.246	0.246	0.246	0
Cl	Post-Closure	Aug	117	0.145	0.146	0.226	1	0.668	0.645	0.671	41	0.280	0.274	0.281	16	0.342	0.340	0.342	4	0.388	0.387	0.388	2	0.246	0.246	0.246	0
Cl	Post-Closure	Sep	117	0.165	0.167	0.288	0	0.637	0.614	0.640	42	0.272	0.267	0.273	17	0.341	0.339	0.341	4	0.380	0.379	0.380	3	0.247	0.247	0.247	0
Cl	Post-Closure	Oct	117	0.192	0.193	0.328	-2	0.612	0.591	0.616	44	0.270	0.265	0.271	18	0.339	0.337	0.340	4	0.373	0.372	0.373	3	0.247	0.247	0.247	0
Cl	Post-Closure	Nov	117	0.276	0.277	0.445	-1	1.184	1.158	1.188	23	0.751	0.739	0.753	16	0.391	0.389	0.391	5	0.412	0.411	0.412	3	0.286	0.286	0.286	0
Cl	Post-Closure	Dec	117	0.263	0.264	0.422	-1	1.148	1.121	1.152	24	0.816	0.806	0.819	14	0.397	0.395	0.398	5	0.409	0.408	0.409	3	0.286	0.286	0.286	0
F	Construction	Jan	2	0.1178	0.1178	0.1350	70	0.1361	0.1361	0.1612	62	0.0962	0.0962	0.1531	28	0.0955	0.0955	0.1094	16	0.0833	0.0833	0.0883	6	0.0902	0.0902	0.0902	0
F	Construction	Feb	2	0.1374	0.1374	0.1431	76	0.1603	0.1603	0.1633	78	0.1180	0.1180	0.1613	39	0.1003	0.1003	0.1177	16	0.0861	0.0861	0.0918	7	0.0944	0.0944	0.0944	0
F	Construction	Mar	2	0.1258	0.1258	0.1276	86	0.1679	0.1679	0.1785	88	0.1124	0.1124	0.1296	44	0.1009	0.1009	0.1189	18	0.0864	0.0864	0.0928	8	0.0905	0.0905	0.0905	0
F	Construction	Apr	2	0.1288	0.1288	0.1294	93	0.1754	0.1754	0.1900	98	0.1125	0.1125	0.1142	51	0.1012	0.1012	0.1179	19	0.0867	0.0867	0.0938	9	0.0905	0.0905	0.0905	0
F	Construction	May	2	0.0917	0.0917	0.0917	106	0.1290	0.1290	0.1375	111	0.0758	0.0758	0.0790	92	0.0878	0.0878	0.0993	19	0.0752	0.0752	0.0815	10	0.0774	0.0774	0.0774	0
F	Construction	Jun	2	0.1012	0.1012	0.1014	121	0.1286	0.1286	0.1361	117	0.0960	0.0960	0.0978	81	0.0870	0.0870	0.0960	20	0.0746	0.0746	0.0806	11	0.0770	0.0770	0.0770	0
F	Construction	Jul	2	0.1097	0.1097	0.1100	124	0.1330	0.1330	0.1409	125	0.0952	0.0952	0.0959	64	0.0878	0.0878	0.0951	20	0.0765	0.0765	0.0824	12	0.0770	0.0770	0.0770	0
F	Construction	Aug	2	0.1144	0.1144	0.1147	118	0.1366	0.1366	0.1452	127	0.0991	0.0991	0.0997	65	0.0890	0.0890	0.0948	21	0.0790	0.0790	0.0848	13	0.0771	0.0771	0.0771	0
F	Construction	Sep	2	0.1159	0.1159	0.1163	116	0.1389	0.1389	0.1465	129	0.1021	0.1021	0.1024	68	0.0900	0.0900	0.0949	22	0.0807	0.0807	0.0862	14	0.0773	0.0773	0.0773	0
F	Construction	Oct	2	0.1156	0.1156	0.1159	118	0.1391	0.1391	0.1498	131	0.1057	0.1057	0.1060	76	0.0907	0.0907	0.0948	24	0.0815	0.0815	0.0866	15	0.0777	0.0777	0.0777	0
F	Construction	Nov	2	0.1531	0.1531	0.1535	109	0.1765	0.1765	0.1907	104	0.1597	0.1597	0.1629	60	0.1063	0.1063	0.1104	27	0.0917	0.0917	0.0972	16	0.0902	0.0902	0.0902	0
F	Construction	Dec	2	0.1395	0.1395	0.1399	97	0.1638	0.1638	0.1736	93	0.1563	0.1563	0.1654	93	0.1096	0.1096	0.1128	32	0.0925	0.0925	0.0977	17	0.0902	0.0902	0.0902	0
F	Operations	Jan	5	0.1336	0.1337	0.1342	93	0.1500	0.1508	0.1537	79	0.1443	0.1448	0.1521	92	0.1168	0.1175	0.1215	42	0.1017	0.1016	0.1046	29	0.0902	0.0902	0.0902	0
F	Operations	Feb	5	0.1416	0.1417	0.1421	82	0.1574	0.1582	0.1616	74	0.1463	0.1473	0.1516	74	0.1241	0.1248	0.1290	44	0.1050	0.1050	0.1081	30	0.0944	0.0944	0.0944	0
F	Operations	Mar	5	0.1266	0.1268	0.1271	88	0.1659	0.1664	0.1755	87	0.1127	0.1132	0.1238	45	0.1231	0.1238	0.1273	44	0.1054	0.1054	0.1086	32	0.0905	0.0905	0.0905	0
F	Operations	Apr	5	0.1285	0.1286	0.1291	93	0.1708	0.1722	0.1834	95	0.1257	0.1232	0.1289	66	0.1220	0.1223	0.1254	44	0.1058	0.1059	0.1090	33	0.0905	0.0905	0.0905	0
F	Operations	May	5	0.0913	0.0914	0.0917	105	0.1269	0.1276	0.1357	108	0.0743	0.0749	0.0784	89	0.1028	0.1030	0.1055	39	0.0908	0.0909	0.0936	33	0.0774	0.0774	0.0774	0
F	Operations	Jun	5	0.1005	0.1006	0.1010	119	0.1316	0.1300	0.1371	119	0.0967	0.0965	0.1009	82	0.0989	0.0992	0.1016	36	0.0881	0.0882	0.0905	31	0.0770	0.0770	0.0770	0
F	Operations	Jul	5	0.1087	0.1088	0.1092	123	0.1414	0.1378	0.1452	133	0.0976	0.0979	0.1007	68	0.0976	0.0979	0.1001	34	0.0888	0.0889	0.0912	30	0.0770	0.0770	0.0770	0
F	Operations	Aug	5	0.1133	0.1135	0.1139	116	0.1481	0.1436	0.1515	139	0.1048	0.1035	0.1071	72	0.0972	0.0974	0.0995	32	0.0903	0.0905	0.0926	29	0.0771	0.0771	0.0771	0
F	Operations	Sep	5	0.1147	0.1148	0.1153	114	0.1505	0.1457	0.1538	140	0.1111	0.1094	0.1132	80	0.0975	0.0975	0.0996	32	0.0912	0.0913	0.0934	29	0.0773	0.0773	0.0773	0
F	Operations	Oct	5	0.1146	0.1147	0.1152	117	0.1455	0.1410	0.1483	134	0.1208	0.1186	0.1231	98	0.0982	0.0980	0.1001	34	0.0913	0.0913	0.0934	29	0.0777	0.0777	0.0777	0
F	Operations	Nov	5	0.1516	0.1518	0.1525	107	0.1764	0.1726	0.1792	100	0.1834	0.1792	0.1865	79	0.1154	0.1149	0.1176	37	0.1022	0.1022	0.1045	29	0.0902	0.0902	0.0902	0
F	Operations	Dec	5	0.1381	0.1383	0.1389	95	0.1623	0.1600	0.1643	88	0.1623	0.1585	0.1645	96	0.1183	0.1176	0.1206	41	0.1026	0.1026	0.1049	30	0.0902	0.0902	0.0902	0
F	Closure	Jan	6	0.1348	0.1346	0.1353	94	0.1395	0.1417	0.1535	68	0.1392	0.1416	0.1541	88	0.1140	0.1155	0.1223	40	0.1020	0.1027	0.1054	31	0.0902	0.0902	0.0902	0
F	Closure	Feb	6	0.1431	0.1428	0.1436	83	0.1456	0.1471	0.1551	64	0.1533	0.1553	0.1654	83	0.1215	0.1230	0.1302	42	0.1053	0.1060	0.1089	31	0.0944	0.0944	0.0944	0
F	Closure	Mar	6	0.1273	0.1273	0.1280	88	0.1405	0.1413	0.1464	59	0.1402	0.1411	0.1466	80	0.1223	0.1238	0.1308	44	0.1056	0.1063	0.1093	32	0.0905	0.0905	0.0905	0
F	Closure	Apr	6	0.1289	0.1290	0.1298	94	0.1362	0.1366	0.1400	55	0.1344	0.1350	0.1384	82	0.1224	0.1238	0.1305	45	0.1058	0.1065	0.1097	33	0.0905	0.0905	0.0905	0
F	Closure	May	6	0.0914	0.0913	0.0921	105	0.0993	0.0994	0.1009	62	0.0713	0.0708	0.0716	79	0.1033	0.1043	0.1092	41	0.0908	0.0914	0.0941	34	0.0774	0.0774	0.0774	0
F	Closure	Jun	6	0.1008	0.1004	0.1014	119	0.1005	0.1003	0.1015	69	0.0909	0.0904	0.0910	70	0.0988	0.0997	0.1039	37	0.0880	0.0885	0.0911	31	0.0770	0.0770	0.0770	0
F	Closure	Jul	6	0.1091	0.1086	0.1099	122	0.1051	0.1046	0.1056	77	0.0937	0.0932	0.0938	60	0.0970	0.0978	0.1014	34	0.0887	0.0892	0.0917	30	0.0770	0.0770	0.0770	0
F	Closure	Aug	6	0.1138	0.1132	0.1146	115	0.1094	0.1087	0.1096	81	0.0976	0.0969	0.0977	61	0.0960	0.0966	0.0997	31	0.0901	0.0906	0.0931	29	0.0771	0.0771	0.0771	0
F	Closure	Sep	6	0.1155	0.1148	0.1162	114	0.1122	0.1114	0.1123	84	0.1012	0.1003	0.1013	65	0.0955	0.0959	0.0986	29	0.0907	0.0912	0.0936	28	0.0773	0.0773	0.0773	0
F	Closure	Oct	6	0.1150	0.1145	0.1159	116	0.1131	0.1123	0.1132	86	0.1036	0.1027	0.1039	71	0.0951	0.0954	0.0978	30	0.0906	0.0910	0.0934	28	0.0777	0.0777	0.0777	0
F	Closure	Nov	6	0.1525	0.1521	0.1537	108	0.1480	0.1473	0.1482	70	0.1557	0.1552	0.1565	55	0.1104	0.1105	0.1129	32	0.1011	0.1015	0.1041	28	0.0902	0.0902	0.0902	0
F	Closure	Dec	6	0.1393	0.1392	0.1401	97	0.1431	0.1426	0.1433	68	0.1435	0.1429	0.1437	77	0.1124	0.1123	0.1145	35	0.1013	0.1016	0.1041	29	0.0902	0.0902	0.0902	0
F	Post-Closure	Jan	117	0.0690	0.0701	0.1349	1	0.1292	0.1245	0.1376	48	0.0951	0.0938	0.1368	25	0.0893	0.0891	0.1103	8	0.0826	0.0826	0.0999	5	0.0904	0.0904	0.0904	0
F	Post-Closure	Feb	117	0.0775	0.0786	0.1438	1	0.1399	0.1345	0.1446	50	0.1012	0.1006	0.1536	19	0.0936	0.0934	0.1172	8	0.0847	0.0848	0.1029	5	0.0947	0.0947	0.0947	0
F	Post-Closure	Mar	117	0.0670	0.0680	0.1287	1	0.1448	0.1387	0.1449	56	0.0717	0.0736	0.1397	-6	0.0930	0.0928	0.1178	8	0.0844	0.0845	0.1029	5	0.0907	0.0907	0.0907	0
F	Post-Closure	Apr	117	0.0660	0.0670	0.1295	1	0.1499	0.1431	0.1501	62	0.0624	0.0650	0.1344	-12	0.0919	0.0917	0.1179	8	0.0840	0.0841	0.1029	5	0.0907	0.0907	0.0907	0
F	Post-Closure	May	117	0.0443	0.0449	0.0889	1	0.1045	0.0996	0.1045	63	0.0386	0.0391	0.0651	-1	0.0792	0.0791	0.0997	7	0.0718	0.0718	0.0880	5	0.0776	0.0776	0.0776	0
F	Post-Closure	Jun	117	0.0456	0.0461	0.0942	1	0.0995	0.0951	0.0996	61	0.0669	0.0655	0.0857	23	0.0775	0.0774	0.0957	6	0.0706	0.0706	0.0853	5	0.0772	0.0772	0.0772	0
F	Post-Closure	Jul	117	0.0485	0.0491	0.1009	0	0.0978	0.0937	0.0994	58	0.0722	0.0708	0.0876	22	0.0778	0.0777	0.0941	6	0.0716	0.0717	0.0860	4	0.0772	0.0772	0.0772	0
F	Post-Closure	Aug	117	0.0519	0.0525	0.1051	0	0.0968	0.0930	0.1021	55	0.0743	0.0729	0.0898	21	0.0785	0.0784	0.0931	6	0.0733	0.0733	0.0874	4	0.0773	0.0773	0.0773	0
F	Post-Closure	Sep	117	0.0531	0.0536	0.1066	0	0.0963	0.0926	0.1038	53	0.0743	0.0731	0.0921	20	0.0788	0.0786	0.0923	6	0.0743	0.0743	0.0880	4	0.0775	0.0775	0.0775	0
F	Post-Closure	Oct	117	0.0524	0.0529	0.1010	0	0.0958	0.0921	0.1019	53	0.0736	0.0724	0.0928	21	0.0783	0.0781	0.0914	6	0.0745	0.0744	0.0878	4	0.0779	0.0778	0.0779	0
F	Post-Closure	Nov	117	0.0729	0.0735	0.1338	0	0.1303	0.1258	0.1349	45	0.1276	0.1252	0.1519	25	0.0898	0.0895	0.1048	7	0.0831	0.0830	0.0978	5	0.0904	0.0904	0.0904	0
F	Post-Closure	Dec	117	0.0705	0.0710	0.1277	0	0.1292	0.1245	0.1319	46	0.1054	0.1032	0.1244	28	0.0897	0.0893	0.1048	7	0.0828	0.0827	0.0975	5	0.0904	0.0904	0.0904	0
P, Tot	Construction	Jan	2	0.0263	0.0263	0.0289	-8	0.0209	0.0209	0.0223	-2	0.0167	0.0167	0.0206	-35	0.0168	0.0168	0.0186	-11	0.0193	0.0193	0.0221	-13	0.0231	0.0231	0.0232	0
P, Tot	Construction	Feb	2	0.0267	0.0267	0.0283	-16	0.0210	0.0210	0.0241	-6	0.0160	0.0160	0.0193	-43	0.0168	0.0168	0.0183	-15	0.0189	0.0189	0.0217	-15	0.0241	0.0241	0.0242	0
P, Tot	Construction	Mar	2	0.0230	0.0230	0.0236	-16	0.0212	0.0212	0.0252	-3	0.0145	0.0145	0.0150	-44	0.0158	0.0158	0.0169	-19	0.0176	0.0176	0.0201	-20	0.0230	0.0230	0.0231	0
P, Tot	Construction	Apr	2	0.0229	0.0229	0.0232	-14	0.0227	0.0227	0.0266	5	0.0150	0.0150	0.0161	-40	0.0148	0.0148	0.0157	-23	0.0162	0.0162	0.0182	-25	0.0229	0.0229	0.0229	0
P, Tot	Construction	May	2	0.0296	0.0296	0.0297	-21	0.0236	0.0236	0.0256	1	0.0193	0.0193	0.0200	-27	0.0125	0.0125	0.0132	-21	0.0208	0.0208	0.0223	-20	0.0197	0.0197	0.0197	0
P, Tot	Construction	Jun	2	0.0272	0.0272	0.0272	-20	0.0226	0.0226	0.0241	1	0.0233	0.0233	0.0235	-23	0.0139	0.0139	0.0146	-16	0.0195	0.0195	0.0207	-20	0.0199	0.0199	0.0199	0
P, Tot	Construction	Jul	2	0.0196	0.0196	0.0196	-33	0.0218	0.0218	0.0231	1	0.0165	0.0165	0.0167	-18	0.0153	0.0153	0.0159	-13	0.0190	0.0190	0.0200	-20	0.0197	0.0197	0.0197	0
P, Tot	Construction	Aug	2	0.0173	0.0173	0.0173	-32	0.0203	0.0203	0.0216	-1	0.0150	0.0150	0.0151	-7	0.0160	0.0160	0.0165	-12	0.0187	0.0187	0.0196	-19	0.0193	0.0193	0.0193	0
P, Tot	Construction	Sep	2	0.0203	0.0203	0.0203	-17	0.0195	0.0195	0.0208	0	0.0148	0.0148	0.0148	-5	0.0161	0.0161	0.0165	-11	0.0185	0.0185	0.0193	-18	0.0195	0.0195	0.0195	0
P, Tot	Construction	Oct	2	0.0211	0.0211	0.0211	-8	0.0189	0.0189	0.0203	3	0.0148	0.0148	0.0149	-3	0.0155	0.0155	0.0158	-13	0.0182	0.0182	0.0189	-18	0.0200	0.0200	0.0200	0
P, Tot	Construction	Nov	2	0.0278	0.0278	0.0278	-10	0.0225	0.0225	0.0242	2	0.0218	0.0218	0.0224	-21	0.0165	0.0165	0.0167	-16	0.0190	0.0190	0.0196	-20	0.0233	0.0233	0.0233	0
P, Tot	Construction	Dec	2	0.0248	0.0248	0.0248	-16	0.0210	0.0210	0.0222	-3	0.0215	0.0215	0.0225	-14	0.0154	0.0154	0.0155	-20	0.0173	0.0173	0.0178	-24	0.0232	0.0232	0.0232	0
P, Tot	Operations	Jan	5	0.0236	0.0236	0.0236	-18	0.0178	0.0178	0.0180	-16	0.0192	0.0192	0.0197	-26	0.0147	0.0147	0.0147	-22	0.0157	0.0157	0.0157	-29	0.0231	0.0231	0.0231	0
P, Tot	Operations	Feb	5	0.0249	0.0249	0.0249	-22	0.0167	0.0167	0.0169	-25	0.0170	0.0173	0.0182	-39	0.0150	0.0150	0.0151	-24	0.0153	0.0153	0.0153	-31	0.0241	0.0241	0.0241	0
P, Tot	Operations	Mar	5	0.0222	0.0222	0.0222	-18	0.0175	0.0174	0.0180	-21	0.0126	0.0126	0.0143	-52	0.0143	0.0143	0.0143	-27	0.0144	0.0144	0.0144	-34	0.0230	0.0230	0.0230	0
P, Tot	Operations	Apr	5	0.0225	0.0225	0.0225	-15	0.0188	0.0190	0.0198	-12	0.0145	0.0143	0.0146	-43	0.0135	0.0135	0.0136	-30	0.0134	0.0134	0.0135	-37	0.0229	0.0229	0.0229	0
P, Tot	Operations	May	5	0.0297	0.0297	0.0297	-21	0.0214	0.0217	0.0223	-7	0.0186	0.0187	0.0190	-30	0.0115	0.0115	0.0116	-27	0.0188	0.0188	0.0189	-28	0.0197	0.0197	0.0197	0
P, Tot	Operations	Jun	5	0.0272	0.0272	0.0272	-20	0.0213	0.0213	0.0219	-4	0.0226	0.0226	0.0229	-25	0.0130	0.0130	0.0130	-21	0.0179	0.0179	0.0180	-27	0.0199	0.0198	0.0199	0
P, Tot	Operations	Jul	5	0.0195	0.0195	0.0195	-33	0.0211	0.0210	0.0215	-3	0.0160	0.0160	0.0162	-21	0.0145	0.0145	0.0146	-18	0.0176	0.0176	0.0177	-26	0.0197	0.0197	0.0197	0
P, Tot	Operations	Aug	5	0.0172	0.0172	0.0172	-32	0.0200	0.0198	0.0204	-4	0.0147	0.0147	0.0148	-9	0.0153	0.0153	0.0153	-16	0.0175	0.0175	0.0175	-24	0.0193	0.0193	0.0193	0
P, Tot	Operations	Sep	5	0.0202	0.0202	0.0203	-17	0.0193	0.0190	0.0196	-3	0.0148	0.0148	0.0150	-4	0.0155	0.0155	0.0156	-15	0.0174	0.0174	0.0175	-23	0.0195	0.0195	0.0195	0
P, Tot	Operations	Oct	5	0.0211	0.0211	0.0211	-8	0.0183	0.0180	0.0185	-2	0.0157	0.0157	0.0159	3	0.0151	0.0151	0.0151	-15	0.0172	0.0172	0.0173	-22	0.0200	0.0200	0.0200	0
P, Tot	Operations	Nov	5	0.0277	0.0277	0.0277	-10	0.0211	0.0209	0.0213	-6	0.0236	0.0234	0.0238	-15	0.0163	0.0163	0.0163	-17	0.0181	0.0181	0.0182	-24	0.0233	0.0233	0.0233	0
P, Tot	Operations	Dec	5	0.0247	0.0247	0.0247	-16	0.0198	0.0197	0.0199	-9	0.0213	0.0211	0.0215	-16	0.0153	0.0153	0.0154	-20	0.0167	0.0167	0.0168	-26	0.0232	0.0232	0.0232	0
P, Tot	Closure	Jan	6	0.0237	0.0237	0.0238	-17	0.0168	0.0170	0.0178	-20	0.0189	0.0191	0.0200	-26	0.0148	0.0149	0.0151	-21	0.0158	0.0159	0.0162	-28	0.0232	0.0232	0.0232	0
P, Tot	Closure	Feb	6	0.0250	0.0250	0.0251	-21	0.0158	0.0159	0.0165	-29	0.0182	0.0184	0.0192	-35	0.0151	0.0152	0.0154	-23	0.0153	0.0154	0.0157	-30	0.0242	0.0242	0.0242	0
P, Tot	Closure	Mar	6	0.0222	0.0222	0.0223	-18	0.0153	0.0154	0.0157	-30	0.0161	0.0162	0.0165	-38	0.0146	0.0146	0.0148	-25	0.0144	0.0145	0.0148	-33	0.0231	0.0231	0.0231	0
P, Tot	Closure	Apr	6	0.0225	0.0225	0.0226	-15	0.0159	0.0158	0.0160	-27	0.0164	0.0164	0.0166	-34	0.0140	0.0141	0.0142	-28	0.0136	0.0136	0.0139	-36	0.0229	0.0229	0.0230	0
P, Tot	Closure	May	6	0.0294	0.0295	0.0299	-21	0.0192	0.0192	0.0193	-17	0.0198	0.0198	0.0200	-26	0.0120	0.0120	0.0121	-25	0.0192	0.0192	0.0194	-26	0.0198	0.0197	0.0198	0
P, Tot	Closure	Jun	6	0.0271	0.0272	0.0276	-20	0.0187	0.0187	0.0189	-16	0.0241	0.0242	0.0247	-20	0.0134	0.0134	0.0135	-19	0.0183	0.0183	0.0184	-25	0.0199	0.0199	0.0199	0
P, Tot	Closure	Jul	6	0.0196	0.0197	0.0206	-32	0.0181	0.0181	0.0183	-16	0.0174	0.0174	0.0176	-14	0.0150	0.0150	0.0150	-15	0.0180	0.0180	0.0182	-24	0.0197	0.0197	0.0197	0
P, Tot	Closure	Aug	6	0.0173	0.0173	0.0179	-31	0.0168	0.0168	0.0172	-18	0.0153	0.0153	0.0154	-5	0.0158	0.0158	0.0159	-13	0.0179	0.0179	0.0180	-22	0.0193	0.0193	0.0193	0
P, Tot	Closure	Sep	6	0.0203	0.0203	0.0203	-17	0.0161	0.0161	0.0164	-17	0.0150	0.0150	0.0151	-3	0.0160	0.0160	0.0161	-12	0.0178	0.0178	0.0180	-21	0.0195	0.0195	0.0195	0
P, Tot	Closure	Oct	6	0.0210	0.0210	0.0211	-9	0.0157	0.0157	0.0159	-15	0.0148	0.0148	0.0149	-3	0.0155	0.0155	0.0156	-13	0.0176	0.0176	0.0178	-20	0.0200	0.0200	0.0200	0
P, Tot	Closure	Nov	6	0.0277	0.0277	0.0278	-10	0.0189	0.0189	0.0191	-14	0.0217	0.0218	0.0224	-21	0.0167	0.0167	0.0169	-15	0.0185	0.0186	0.0188	-22	0.0233	0.0233	0.0234	0
P, Tot	Closure	Dec	6	0.0248	0.0248	0.0250	-16	0.0185	0.0184	0.0186	-15	0.0200	0.0201	0.0206	-20	0.0156	0.0157	0.0161	-19	0.0170	0.0171	0.0175	-24	0.0233	0.0232	0.0233	0
P, Tot	Post-Closure	Jan	117	0.0307	0.0306	0.0307	7	0.0240	0.0237	0.0240	12	0.0249	0.0251	0.0283	-3	0.0187	0.0187	0.0194	-2	0.0216	0.0215	0.0223	-2	0.0232	0.0232	0.0232	0
P, Tot	Post-Closure	Feb	117	0.0341	0.0339	0.0341	7	0.0253	0.0249	0.0253	12	0.0257	0.0261	0.0314	-7	0.0195	0.0195	0.0203	-2	0.0217	0.0217	0.0225	-2	0.0242	0.0242	0.0242	0
P, Tot	Post-Closure	Mar	117	0.0291	0.0290	0.0291	7	0.0251	0.0246	0.0251	12	0.0190	0.0199	0.0291	-23	0.0193	0.0193	0.0201	-2	0.0213	0.0213	0.0221	-2	0.0231	0.0231	0.0231	0
P, Tot	Post-Closure	Apr	117	0.0283	0.0282	0.0283	7	0.0248	0.0244	0.0248	13	0.0165	0.0176	0.0282	-30	0.0190	0.0190	0.0199	-2	0.0209	0.0208	0.0217	-2	0.0230	0.0230	0.0230	0
P, Tot	Post-Closure	May	117	0.0392	0.0391	0.0392	4	0.0254	0.0251	0.0254	8	0.0238	0.0242	0.0281	-9	0.0156	0.0156	0.0163	-2	0.0256	0.0256	0.0263	-1	0.0198	0.0198	0.0198	0
P, Tot	Post-Closure	Jun	117	0.0358	0.0357	0.0358	5	0.0245	0.0242	0.0245	9	0.0298	0.0299	0.0315	-1	0.0162	0.0162	0.0169	-2	0.0240	0.0240	0.0247	-1	0.0199	0.0199	0.0199	0
P, Tot	Post-Closure	Jul	117	0.0311	0.0310	0.0311	7	0.0238	0.0236	0.0238	9	0.0199	0.0199	0.0211	-1	0.0174	0.0174	0.0180	-2	0.0233	0.0232	0.0239	-1	0.0197	0.0197	0.0197	0
P, Tot	Post-Closure	Aug	117	0.0272	0.0271	0.0272	7	0.0229	0.0227	0.0229	10	0.0159	0.0159	0.0167	-1	0.0179	0.0179	0.0185	-2	0.0227	0.0226	0.0233	-1	0.0193	0.0193	0.0193	0
P, Tot	Post-Closure	Sep	117	0.0261	0.0260	0.0261	7	0.0219	0.0217	0.0219	11	0.0153	0.0153	0.0161	-2	0.0179	0.0180	0.0185	-2	0.0222	0.0222	0.0228	-1	0.0195	0.0195	0.0195	0
P, Tot	Post-Closure	Oct	117	0.0245	0.0245	0.0245	7	0.0209	0.0206	0.0209	12	0.0150	0.0151	0.0161	-1	0.0175	0.0175	0.0181	-1	0.0218	0.0217	0.0224	-1	0.0200	0.0200	0.0200	0
P, Tot	Post-Closure	Nov	117	0.0332	0.0331	0.0332	7	0.0250	0.0247	0.0250	12	0.0276	0.0277	0.0300	1	0.0194	0.0194	0.0201	-2	0.0233	0.0233	0.0240	-1	0.0234	0.0234	0.0234	0
P, Tot	Post-Closure	Dec	117	0.0317	0.0316	0.0317	7	0.0245	0.0242	0.0245	12	0.0251	0.0252	0.0275	1	0.0190	0.0190	0.0197	-2	0.0223	0.0223	0.0230	-1	0.0233	0.0233	0.0233	0
NH3 (as N)	Construction	Jan	2	0.0837	0.0837	0.0843	13	0.0759	0.0759	0.0889	97	0.1237	0.1237	0.1268	-49	0.0102	0.0102	0.0116	16	0.0111	0.0111	0.0113	-2	0.0107	0.0107	0.0107	0
NH3 (as N)	Construction	Feb	2	0.0910	0.0910	0.0929	10	0.0996	0.0996	0.1046	138	0.0909	0.0909	0.1150	-64	0.0111	0.0111	0.0128	16	0.0113	0.0113	0.0115	-2	0.0112	0.0112	0.0113	0
NH3 (as N)	Construction	Mar	2	0.0810	0.0810	0.0819	14	0.1102	0.1102	0.1249	160	0.0871	0.0871	0.0964	-63	0.0114	0.0114	0.0131	17	0.0113	0.0113	0.0113	-2	0.0108	0.0108	0.0109	0
NH3 (as N)	Construction	Apr	2	0.0818	0.0818	0.0823	18	0.1186	0.1186	0.1353	179	0.0892	0.0892	0.0904	-62	0.0117	0.0117	0.0131	18	0.0112	0.0112	0.0113	-2	0.0110	0.0110	0.0110	1
NH3 (as N)	Construction	May	2	0.0568	0.0568	0.0570	44	0.0790	0.0790	0.0879	182	0.0451	0.0451	0.0491	17	0.0091	0.0091	0.0101	18	0.0133	0.0133	0.0135	-3	0.0094	0.0094	0.0094	1
NH3 (as N)	Construction	Jun	2	0.0618	0.0618	0.0620	81	0.0672	0.0672	0.0737	166	0.0510	0.0510	0.0540	99	0.0082	0.0082	0.0089	17	0.0123	0.0123	0.0126	-4	0.0093	0.0093	0.0093	0
NH3 (as N)	Construction	Jul	2	0.0663	0.0663	0.0665	108	0.0582	0.0582	0.0634	152	0.0416	0.0416	0.0433	105	0.0080	0.0080	0.0085	21	0.0117	0.0117	0.0120	-4	0.0091	0.0091	0.0092	0
NH3 (as N)	Construction	Aug	2	0.0683	0.0683	0.0686	127	0.0488	0.0488	0.0530	136	0.0350	0.0350	0.0361	111	0.0081	0.0081	0.0085	28	0.0112	0.0112	0.0115	-4	0.0089	0.0089	0.0089	0
NH3 (as N)	Construction	Sep	2	0.0545	0.0545	0.0547	107	0.0492	0.0492	0.0536	154	0.0444	0.0444	0.0448	21	0.0080	0.0080	0.0083	30	0.0108	0.0108	0.0111	-3	0.0089	0.0089	0.0089	0
NH3 (as N)	Construction	Oct	2	0.0369	0.0369	0.0371	70	0.0530	0.0530	0.0583	182	0.0494	0.0494	0.0494	13	0.0078	0.0078	0.0080	30	0.0104	0.0104	0.0107	-3	0.0090	0.0090	0.0090	0
NH3 (as N)	Construction	Nov	2	0.0859	0.0859	0.0862	8	0.0814	0.0814	0.0893	120	0.1367	0.1367	0.1431	-42	0.0100	0.0100	0.0102	31	0.0113	0.0113	0.0117	-3	0.0105	0.0105	0.0105	0
NH3 (as N)	Construction	Dec	2	0.0832	0.0832	0.0836	9	0.0838	0.0838	0.0893	121	0.1144	0.1144	0.1180	-43	0.0109	0.0109	0.0111	31	0.0112	0.0112	0.0115	-2	0.0106	0.0106	0.0106	0
NH3 (as N)	Operations	Jan	5	0.0814	0.0816	0.0821	10	0.0908	0.0896	0.0932	133	0.1286	0.1248	0.1301	-49	0.0133	0.0129	0.0137	49	0.0124	0.0123	0.0129	10	0.0107	0.0107	0.0107	1
NH3 (as N)	Operations	Feb	5	0.0873	0.0875	0.0880	6	0.1036	0.1023	0.1072	144	0.1170	0.1163	0.1202	-53	0.0145	0.0141	0.0149	49	0.0128	0.0127	0.0133	11	0.0113	0.0113	0.0113	1
NH3 (as N)	Operations	Mar	5	0.0785	0.0787	0.0792	11	0.1224	0.1190	0.1296	181	0.0971	0.0959	0.1012	-59	0.0147	0.0143	0.0149	48	0.0129	0.0127	0.0133	12	0.0109	0.0109	0.0109	1
NH3 (as N)	Operations	Apr	5	0.0799	0.0801	0.0807	15	0.1322	0.1288	0.1396	203	0.1112	0.1076	0.1158	-54	0.0148	0.0144	0.0151	47	0.0129	0.0127	0.0134	14	0.0110	0.0110	0.0110	1
NH3 (as N)	Operations	May	5	0.0557	0.0558	0.0562	42	0.0887	0.0870	0.0923	211	0.0494	0.0489	0.0526	27	0.0115	0.0112	0.0117	45	0.0149	0.0147	0.0152	9	0.0094	0.0094	0.0094	1
NH3 (as N)	Operations	Jun	5	0.0607	0.0608	0.0613	78	0.0771	0.0771	0.0818	205	0.0588	0.0573	0.0602	123	0.0102	0.0099	0.0104	43	0.0138	0.0136	0.0140	7	0.0093	0.0093	0.0093	1
NH3 (as N)	Operations	Jul	5	0.0650	0.0652	0.0656	104	0.0704	0.0700	0.0753	204	0.0501	0.0487	0.0511	140	0.0097	0.0095	0.0099	47	0.0132	0.0130	0.0134	8	0.0092	0.0092	0.0092	1
NH3 (as N)	Operations	Aug	5	0.0671	0.0672	0.0677	123	0.0613	0.0606	0.0657	194	0.0441	0.0427	0.0454	158	0.0097	0.0096	0.0100	53	0.0127	0.0125	0.0128	8	0.0089	0.0089	0.0089	0
NH3 (as N)	Operations	Sep	5	0.0533	0.0534	0.0538	103	0.0622	0.0613	0.0667	216	0.0553	0.0538	0.0565	47	0.0094	0.0094	0.0098	55	0.0123	0.0120	0.0124	10	0.0089	0.0089	0.0089	0
NH3 (as N)	Operations	Oct	5	0.0361	0.0362	0.0365	66	0.0628	0.0623	0.0679	232	0.0639	0.0623	0.0658	42	0.0092	0.0091	0.0095	56	0.0118	0.0116	0.0120	10	0.0090	0.0090	0.0090	0
NH3 (as N)	Operations	Nov	5	0.0850	0.0851	0.0856	7	0.0887	0.0871	0.0921	136	0.1658	0.1641	0.1695	-31	0.0116	0.0116	0.0120	54	0.0129	0.0127	0.0131	11	0.0105	0.0105	0.0105	0
NH3 (as N)	Operations	Dec	5	0.0819	0.0821	0.0827	7	0.0893	0.0881	0.0909	132	0.1279	0.1261	0.1302	-37	0.0126	0.0125	0.0130	52	0.0128	0.0126	0.0130	12	0.0106	0.0106	0.0106	0
NH3 (as N)	Closure	Jan	6	0.0824	0.0822	0.0831	11	0.0747	0.0761	0.0838	98	0.1127	0.1146	0.1247	-53	0.0112	0.0116	0.0130	35	0.0114	0.0117	0.0127	7	0.0106	0.0106	0.0107	0
NH3 (as N)	Closure	Feb	6	0.0885	0.0883	0.0893	7	0.0823	0.0832	0.0886	98	0.1089	0.1105	0.1185	-55	0.0123	0.0127	0.0142	36	0.0117	0.0120	0.0130	8	0.0112	0.0112	0.0113	0
NH3 (as N)	Closure	Mar	6	0.0792	0.0792	0.0800	11	0.0823	0.0828	0.0864	96	0.1015	0.1026	0.1078	-56	0.0126	0.0130	0.0144	36	0.0117	0.0120	0.0130	9	0.0108	0.0108	0.0109	0
NH3 (as N)	Closure	Apr	6	0.0805	0.0806	0.0815	16	0.0817	0.0821	0.0844	93	0.1006	0.1015	0.1054	-57	0.0129	0.0132	0.0145	36	0.0117	0.0120	0.0130	9	0.0109	0.0109	0.0110	0
NH3 (as N)	Closure	May	6	0.0558	0.0560	0.0567	42	0.0541	0.0542	0.0553	94	0.0380	0.0378	0.0383	-2	0.0100	0.0102	0.0112	34	0.0139	0.0141	0.0150	6	0.0094	0.0094	0.0094	0
NH3 (as N)	Closure	Jun	6	0.0609	0.0609	0.0618	78	0.0467	0.0468	0.0476	85	0.0432	0.0431	0.0436	68	0.0087	0.0089	0.0098	31	0.0128	0.0131	0.0139	4	0.0093	0.0093	0.0093	0
NH3 (as N)	Closure	Jul	6	0.0654	0.0652	0.0663	105	0.0408	0.0408	0.0415	77	0.0366	0.0365	0.0368	80	0.0082	0.0084	0.0091	31	0.0122	0.0124	0.0132	4	0.0091	0.0091	0.0092	0
NH3 (as N)	Closure	Aug	6	0.0675	0.0672	0.0685	124	0.0346	0.0346	0.0351	68	0.0306	0.0305	0.0307	84	0.0081	0.0082	0.0088	33	0.0116	0.0118	0.0126	5	0.0089	0.0089	0.0089	0
NH3 (as N)	Closure	Sep	6	0.0540	0.0540	0.0549	105	0.0354	0.0354	0.0358	82	0.0419	0.0420	0.0425	15	0.0078	0.0079	0.0084	33	0.0112	0.0113	0.0121	5	0.0089	0.0089	0.0089	0
NH3 (as N)	Closure	Oct	6	0.0371	0.0371	0.0381	71	0.0383	0.0382	0.0387	103	0.0465	0.0466	0.0472	7	0.0075	0.0076	0.0081	32	0.0107	0.0109	0.0116	5	0.0089	0.0089	0.0090	0
NH3 (as N)	Closure	Nov	6	0.0858	0.0860	0.0883	8	0.0639	0.0638	0.0646	72	0.1393	0.1420	0.1534	-40	0.0096	0.0097	0.0102	31	0.0116	0.0118	0.0125	5	0.0105	0.0105	0.0105	0
NH3 (as N)	Closure	Dec	6	0.0834	0.0831	0.0843	9	0.0702	0.0700	0.0707	84	0.1077	0.1092	0.1169	-46	0.0105	0.0106	0.0110	30	0.0114	0.0116	0.0123	5	0.0106	0.0106	0.0106	0
NH3 (as N)	Post-Closure	Jan	117	0.0786	0.0788	0.0951	6	0.0604	0.0582	0.0720	51	0.2371	0.2380	0.2626	-2	0.0092	0.0092	0.0109	8	0.0112	0.0112	0.0116	4	0.0106	0.0106	0.0106	0
NH3 (as N)	Post-Closure	Feb	117	0.0876	0.0878	0.1056	6	0.0666	0.0640	0.0797	53	0.2312	0.2331	0.2706	-6	0.0101	0.0100	0.0120	8	0.0114	0.0114	0.0119	4	0.0112	0.0112	0.0112	0
NH3 (as N)	Post-Closure	Mar	117	0.0751	0.0753	0.0903	6	0.0702	0.0672	0.0804	59	0.1901	0.1952	0.2559	-16	0.0103	0.0102	0.0123	8	0.0114	0.0113	0.0118	4	0.0108	0.0108	0.0108	0
NH3 (as N)	Post-Closure	Apr	117	0.0733	0.0735	0.0878	6	0.0739	0.0704	0.0804	66	0.1706	0.1785	0.2594	-24	0.0104	0.0104	0.0125	8	0.0113	0.0113	0.0117	4	0.0109	0.0109	0.0109	0
NH3 (as N)	Post-Closure	May	117	0.0422	0.0424	0.0546	8	0.0499	0.0475	0.0535	70	0.0294	0.0308	0.0440	-20	0.0082	0.0081	0.0097	7	0.0136	0.0136	0.0140	3	0.0094	0.0094	0.0094	0
NH3 (as N)	Post-Closure	Jun	117	0.0370	0.0372	0.0570	9	0.0454	0.0432	0.0465	71	0.0314	0.0309	0.0414	20	0.0073	0.0073	0.0086	7	0.0127	0.0127	0.0131	2	0.0093	0.0093	0.0093	0
NH3 (as N)	Post-Closure	Jul	117	0.0345	0.0348	0.0602	9	0.0418	0.0398	0.0419	73	0.0272	0.0265	0.0352	31	0.0069	0.0068	0.0081	8	0.0122	0.0121	0.0125	3	0.0091	0.0091	0.0091	0
NH3 (as N)	Post-Closure	Aug	117	0.0325	0.0328	0.0616	9	0.0378	0.0360	0.0379	74	0.0235	0.0228	0.0297	38	0.0067	0.0066	0.0078	8	0.0116	0.0115	0.0119	3	0.0089	0.0089	0.0089	0
NH3 (as N)	Post-Closure	Sep	117	0.0288	0.0291	0.0522	10	0.0359	0.0342	0.0359	76	0.0436	0.0430	0.0436	17	0.0064	0.0064	0.0075	9	0.0110	0.0110	0.0114	3	0.0089	0.0089	0.0089	0
NH3 (as N)	Post-Closure	Oct	117	0.0244	0.0245	0.0404	13	0.0352	0.0335	0.0353	79	0.0507	0.0502	0.0508	15	0.0063	0.0062	0.0073	9	0.0106	0.0106	0.0110	3	0.0089	0.0089	0.0089	0
NH3 (as N)	Post-Closure	Nov	117	0.0845	0.0846	0.1030	6	0.0575	0.0554	0.0576	50	0.2468	0.2473	0.2620	4	0.0081	0.0080	0.0092	9	0.0115	0.0115	0.0120	4	0.0105	0.0105	0.0105	0
NH3 (as N)	Post-Closure	Dec	117	0.0810	0.0812	0.0983	6	0.0590	0.0568	0.0591	50	0.2054	0.2062	0.2212	2	0.0088	0.0087	0.0099	8	0.0113	0.0113	0.0118	4	0.0105	0.0105	0.0106	0
NO2 (as N)	Construction	Jan	2	0.0066	0.0066	0.0077	-25	0.0234	0.0234	0.0301	-17	0.0024	0.0024	0.0028	-41	0.0068	0.0068	0.0073	-8	0.0059	0.0059	0.0061	-4	0.0105	0.0105	0.0105	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
NO2 (as N)	Construction	Feb	2	0.0056	0.0056	0.0062	-43	0.0239	0.0239	0.0326	-19	0.0030	0.0030	0.0031	-35	0.0068	0.0068	0.0072	-12	0.0060	0.0060	0.0063	-4	0.0109	0.0109	0.0109	0
NO2 (as N)	Construction	Mar	2	0.0043	0.0043	0.0046	-48	0.0222	0.0222	0.0309	-23	0.0029	0.0029	0.0035	-33	0.0064	0.0064	0.0067	-16	0.0060	0.0060	0.0062	-4	0.0104	0.0104	0.0104	0
NO2 (as N)	Construction	Apr	2	0.0042	0.0042	0.0043	-47	0.0210	0.0210	0.0289	-25	0.0030	0.0030	0.0039	-29	0.0060	0.0060	0.0063	-20	0.0059	0.0059	0.0062	-5	0.0103	0.0103	0.0103	0
NO2 (as N)	Construction	May	2	0.0053	0.0053	0.0053	-10	0.0144	0.0144	0.0190	-20	0.0015	0.0015	0.0019	1	0.0048	0.0048	0.0051	-22	0.0050	0.0050	0.0053	-5	0.0089	0.0089	0.0089	0
NO2 (as N)	Construction	Jun	2	0.0079	0.0079	0.0080	24	0.0141	0.0141	0.0178	-11	0.0013	0.0013	0.0016	-16	0.0046	0.0046	0.0048	-24	0.0050	0.0050	0.0052	-6	0.0090	0.0090	0.0091	0
NO2 (as N)	Construction	Jul	2	0.0080	0.0080	0.0081	30	0.0229	0.0229	0.0262	-9	0.0038	0.0038	0.0042	13	0.0045	0.0045	0.0047	-23	0.0051	0.0051	0.0053	-8	0.0090	0.0090	0.0090	0
NO2 (as N)	Construction	Aug	2	0.0074	0.0074	0.0075	33	0.0284	0.0284	0.0314	-14	0.0054	0.0054	0.0057	1	0.0046	0.0046	0.0048	-20	0.0052	0.0052	0.0054	-10	0.0089	0.0089	0.0089	0
NO2 (as N)	Construction	Sep	2	0.0088	0.0088	0.0089	47	0.0236	0.0236	0.0265	-20	0.0077	0.0077	0.0082	0	0.0051	0.0051	0.0053	-16	0.0051	0.0051	0.0052	-11	0.0090	0.0090	0.0090	0
NO2 (as N)	Construction	Oct	2	0.0105	0.0105	0.0106	54	0.0204	0.0204	0.0231	-22	0.0080	0.0080	0.0084	-10	0.0057	0.0057	0.0059	-12	0.0048	0.0048	0.0050	-12	0.0091	0.0091	0.0091	0
NO2 (as N)	Construction	Nov	2	0.0117	0.0117	0.0118	21	0.0218	0.0218	0.0249	-28	0.0062	0.0062	0.0062	-46	0.0066	0.0066	0.0069	-12	0.0054	0.0054	0.0056	-12	0.0106	0.0106	0.0106	0
NO2 (as N)	Construction	Dec	2	0.0073	0.0073	0.0073	-20	0.0181	0.0181	0.0202	-37	0.0024	0.0024	0.0027	-55	0.0064	0.0064	0.0067	-15	0.0054	0.0054	0.0056	-11	0.0105	0.0105	0.0105	0
NO2 (as N)	Operations	Jan	5	0.0052	0.0053	0.0054	-40	0.0167	0.0161	0.0169	-42	0.0028	0.0027	0.0029	-32	0.0064	0.0063	0.0066	-15	0.0053	0.0053	0.0054	-13	0.0105	0.0105	0.0105	0
NO2 (as N)	Operations	Feb	5	0.0047	0.0047	0.0048	-51	0.0164	0.0162	0.0172	-45	0.0030	0.0029	0.0031	-37	0.0065	0.0064	0.0067	-18	0.0054	0.0054	0.0056	-13	0.0109	0.0109	0.0109	0
NO2 (as N)	Operations	Mar	5	0.0039	0.0039	0.0040	-53	0.0176	0.0172	0.0190	-40	0.0024	0.0024	0.0026	-45	0.0062	0.0060	0.0063	-21	0.0054	0.0054	0.0056	-13	0.0104	0.0104	0.0104	0
NO2 (as N)	Operations	Apr	5	0.0039	0.0039	0.0040	-51	0.0179	0.0176	0.0193	-37	0.0030	0.0029	0.0032	-32	0.0059	0.0057	0.0060	-25	0.0054	0.0054	0.0055	-13	0.0103	0.0103	0.0103	0
NO2 (as N)	Operations	May	5	0.0050	0.0051	0.0052	-13	0.0131	0.0130	0.0139	-28	0.0014	0.0014	0.0015	-7	0.0047	0.0046	0.0048	-26	0.0046	0.0046	0.0047	-13	0.0089	0.0089	0.0089	0
NO2 (as N)	Operations	Jun	5	0.0076	0.0077	0.0078	20	0.0141	0.0139	0.0151	-12	0.0014	0.0013	0.0014	-18	0.0045	0.0044	0.0046	-27	0.0047	0.0046	0.0047	-13	0.0090	0.0090	0.0090	0
NO2 (as N)	Operations	Jul	5	0.0077	0.0077	0.0079	26	0.0247	0.0243	0.0258	-4	0.0041	0.0039	0.0041	18	0.0045	0.0044	0.0046	-25	0.0048	0.0048	0.0049	-13	0.0090	0.0090	0.0090	0
NO2 (as N)	Operations	Aug	5	0.0071	0.0071	0.0073	28	0.0314	0.0308	0.0326	-7	0.0059	0.0058	0.0060	9	0.0045	0.0045	0.0046	-22	0.0050	0.0050	0.0051	-14	0.0089	0.0089	0.0089	0
NO2 (as N)	Operations	Sep	5	0.0085	0.0085	0.0086	42	0.0268	0.0262	0.0280	-11	0.0089	0.0087	0.0091	13	0.0051	0.0051	0.0052	-16	0.0049	0.0049	0.0050	-15	0.0090	0.0090	0.0090	0
NO2 (as N)	Operations	Oct	5	0.0101	0.0101	0.0103	49	0.0226	0.0222	0.0237	-16	0.0098	0.0096	0.0101	8	0.0058	0.0058	0.0060	-10	0.0047	0.0047	0.0048	-15	0.0091	0.0091	0.0091	0
NO2 (as N)	Operations	Nov	5	0.0112	0.0113	0.0115	17	0.0234	0.0228	0.0241	-25	0.0079	0.0077	0.0082	-32	0.0069	0.0069	0.0071	-8	0.0053	0.0052	0.0053	-14	0.0106	0.0106	0.0106	0
NO2 (as N)	Operations	Dec	5	0.0070	0.0070	0.0071	-24	0.0193	0.0189	0.0197	-35	0.0028	0.0027	0.0029	-49	0.0068	0.0067	0.0069	-10	0.0053	0.0053	0.0054	-13	0.0105	0.0105	0.0105	0
NO2 (as N)	Closure	Jan	6	0.0054	0.0054	0.0057	-38	0.0127	0.0130	0.0150	-53	0.0022	0.0023	0.0026	-42	0.0057	0.0058	0.0063	-21	0.0051	0.0051	0.0053	-16	0.0105	0.0105	0.0105	0
NO2 (as N)	Closure	Feb	6	0.0049	0.0049	0.0051	-50	0.0121	0.0123	0.0137	-58	0.0025	0.0026	0.0029	-44	0.0058	0.0059	0.0064	-24	0.0052	0.0052	0.0055	-16	0.0109	0.0109	0.0109	0
NO2 (as N)	Closure	Mar	6	0.0040	0.0040	0.0042	-51	0.0108	0.0110	0.0119	-62	0.0023	0.0023	0.0025	-47	0.0055	0.0056	0.0061	-27	0.0052	0.0052	0.0055	-16	0.0104	0.0104	0.0104	0
NO2 (as N)	Closure	Apr	6	0.0041	0.0040	0.0041	-49	0.0099	0.0100	0.0107	-64	0.0023	0.0023	0.0025	-46	0.0053	0.0054	0.0058	-30	0.0051	0.0052	0.0054	-17	0.0104	0.0104	0.0104	0
NO2 (as N)	Closure	May	6	0.0051	0.0051	0.0052	-12	0.0073	0.0074	0.0078	-59	0.0011	0.0011	0.0011	-28	0.0043	0.0043	0.0047	-30	0.0044	0.0044	0.0047	-16	0.0090	0.0090	0.0090	0
NO2 (as N)	Closure	Jun	6	0.0077	0.0077	0.0079	21	0.0079	0.0079	0.0082	-50	0.0010	0.0010	0.0010	-38	0.0042	0.0042	0.0046	-30	0.0044	0.0045	0.0047	-16	0.0091	0.0091	0.0091	0
NO2 (as N)	Closure	Jul	6	0.0078	0.0079	0.0081	28	0.0173	0.0173	0.0176	-32	0.0034	0.0034	0.0034	1	0.0042	0.0042	0.0045	-29	0.0046	0.0046	0.0049	-16	0.0090	0.0090	0.0091	0
NO2 (as N)	Closure	Aug	6	0.0073	0.0073	0.0074	31	0.0232	0.0233	0.0239	-30	0.0052	0.0052	0.0052	-2	0.0042	0.0043	0.0045	-25	0.0048	0.0048	0.0050	-17	0.0089	0.0089	0.0089	0
NO2 (as N)	Closure	Sep	6	0.0086	0.0086	0.0089	44	0.0185	0.0186	0.0195	-36	0.0074	0.0074	0.0074	-4	0.0048	0.0048	0.0050	-20	0.0047	0.0047	0.0049	-17	0.0090	0.0090	0.0090	0
NO2 (as N)	Closure	Oct	6	0.0103	0.0103	0.0105	51	0.0156	0.0157	0.0166	-40	0.0075	0.0075	0.0077	-16	0.0054	0.0054	0.0056	-16	0.0045	0.0045	0.0047	-18	0.0091	0.0091	0.0091	0
NO2 (as N)	Closure	Nov	6	0.0118	0.0116	0.0119	21	0.0168	0.0169	0.0179	-44	0.0059	0.0059	0.0065	-48	0.0063	0.0063	0.0065	-16	0.0050	0.0050	0.0052	-17	0.0106	0.0106	0.0106	0
NO2 (as N)	Closure	Dec	6	0.0074	0.0074	0.0081	-19	0.0146	0.0147	0.0158	-49	0.0021	0.0021	0.0024	-60	0.0060	0.0061	0.0062	-19	0.0050	0.0051	0.0053	-17	0.0105	0.0105	0.0105	0
NO2 (as N)	Post-Closure	Jan	117	0.0087	0.0087	0.0112	-1	0.0336	0.0329	0.0336	17	0.0040	0.0041	0.0046	2	0.0075	0.0074	0.0077	0	0.0061	0.0061	0.0062	-1	0.0105	0.0105	0.0105	0
NO2 (as N)	Post-Closure	Feb	117	0.0096	0.0096	0.0124	-1	0.0354	0.0346	0.0354	18	0.0045	0.0045	0.0054	-2	0.0078	0.0078	0.0080	-1	0.0063	0.0062	0.0064	-1	0.0109	0.0109	0.0109	0
NO2 (as N)	Post-Closure	Mar	117	0.0081	0.0081	0.0105	-1	0.0349	0.0341	0.0349	19	0.0031	0.0033	0.0050	-24	0.0077	0.0077	0.0079	-1	0.0062	0.0062	0.0064	-1	0.0104	0.0104	0.0104	0
NO2 (as N)	Post-Closure	Apr	117	0.0079	0.0078	0.0101	-1	0.0345	0.0335	0.0345	20	0.0028	0.0030	0.0050	-29	0.0076	0.0076	0.0079	-1	0.0062	0.0062	0.0063	-1	0.0104	0.0104	0.0104	0
NO2 (as N)	Post-Closure	May	117	0.0056	0.0056	0.0068	-3	0.0227	0.0221	0.0227	22	0.0013	0.0013	0.0016	-13	0.0062	0.0062	0.0064	-1	0.0053	0.0053	0.0054	0	0.0090	0.0090	0.0090	0
NO2 (as N)	Post-Closure	Jun	117	0.0061	0.0061	0.0071	-4	0.0204	0.0198	0.0204	25	0.0017	0.0017	0.0017	4	0.0060	0.0060	0.0063	-1	0.0053	0.0053	0.0054	0	0.0091	0.0091	0.0091	0
NO2 (as N)	Post-Closure	Jul	117	0.0060	0.0060	0.0074	-3	0.0298	0.0293	0.0298	16	0.0034	0.0034	0.0034	1	0.0059	0.0059	0.0061	-1	0.0056	0.0055	0.0056	0	0.0090	0.0090	0.0091	0
NO2 (as N)	Post-Closure	Aug	117	0.0055	0.0055	0.0070	-1	0.0378	0.0373	0.0378	13	0.0053	0.0053	0.0053	0	0.0057	0.0057	0.0059	-1	0.0058	0.0058	0.0059	0	0.0089	0.0089	0.0089	0
NO2 (as N)	Post-Closure	Sep	117	0.0059	0.0059	0.0081	-1	0.0342	0.0337	0.0342	15	0.0077	0.0077	0.0078	0	0.0061	0.0061	0.0062	-1	0.0057	0.0057	0.0058	0	0.0090	0.0090	0.0090	0
NO2 (as N)	Post-Closure	Oct	117	0.0067	0.0067	0.0090	-2	0.0310	0.0306	0.0311	16	0.0091	0.0090	0.0093	1	0.0065	0.0065	0.0067	-1	0.0055	0.0055	0.0056	0	0.0091	0.0091	0.0091	0
NO2 (as N)	Post-Closure	Nov	117	0.0095	0.0095	0.0124	-2	0.0360	0.0354	0.0360	17	0.0117	0.0117	0.0126	3	0.0076	0.0076	0.0078	0	0.0061	0.0061	0.0062	0	0.0106	0.0106	0.0106	0
NO2 (as N)	Post-Closure	Dec	117	0.0090	0.0090	0.0117	-1	0.0346	0.0340	0.0346	18	0.0055	0.0055	0.0061	3	0.0076	0.0076	0.0077	0	0.0061	0.0061	0.0062	0	0.0105	0.0105	0.0105	0
N_NO3_NO2	Construction	Jan	2	0.0313	0.0313	0.0341	-15	0.0946	0.0946	0.1100	-9	0.0103	0.0103	0.0131	-33	0.0441	0.0441	0.0496	-12	0.0658	0.0658	0.0743	-11	0.0463	0.0463	0.0465	1
N_NO3_NO2	Construction	Feb	2	0.0273	0.0273	0.0292	-33	0.0968	0.0968	0.1186	-11	0.0129	0.0129	0.0145	-27	0.0434	0.0434	0.0483	-17	0.0662	0.0662	0.0749	-12	0.0494	0.0494	0.0496	1
N_NO3_NO2	Construction	Mar	2	0.0218	0.0218	0.0227	-37	0.0923	0.0923	0.1129	-14	0.0124	0.0124	0.0128	-24	0.0403	0.0403	0.0441	-22	0.0642	0.0642	0.0724	-14	0.0481	0.0481	0.0483	1
N_NO3_NO2	Construction	Apr	2	0.0215	0.0215	0.0220	-36	0.0907	0.0907	0.1069	-14	0.0132	0.0132	0.0144	-18	0.0372	0.0372	0.0403	-27	0.0617	0.0617	0.0691	-17	0.0494	0.0494	0.0496	1
N_NO3_NO2	Construction	May	2	0.0256	0.0256	0.0259	10	0.0647	0.0647	0.0724	-5	0.0238	0.0238	0.0257	44	0.0452	0.0452	0.0473	-22	0.0869	0.0869	0.0923	-14	0.0425	0.0425	0.0427	1
N_NO3_NO2	Construction	Jun	2	0.0386	0.0386	0.0390	55	0.0656	0.0656	0.0699	8	0.0248	0.0248	0.0257	2	0.0420	0.0420	0.0438	-23	0.0745	0.0745	0.0786	-16	0.0417	0.0417	0.0418	1
N_NO3_NO2	Construction	Jul	2	0.0451	0.0451	0.0455	74	0.0819	0.0819	0.0833	16	0.0263	0.0263	0.0267	11	0.0396	0.0396	0.0410	-23	0.0679	0.0679	0.0713	-18	0.0408	0.0408	0.0409	1
N_NO3_NO2	Construction	Aug	2	0.0480	0.0480	0.0484	80	0.0913	0.0913	0.0920	19	0.0336	0.0336	0.0352	21	0.0381	0.0381	0.0392	-21	0.0626	0.0626	0.0655	-20	0.0396	0.0396	0.0397	1
N_NO3_NO2	Construction	Sep	2	0.0519	0.0519	0.0524	85	0.1159	0.1159	0.1176	10	0.0428	0.0428	0.0456	25	0.0377	0.0377	0.0384	-19	0.0583	0.0583	0.0608	-21	0.0387	0.0387	0.0388	1
N_NO3_NO2	Construction	Oct	2	0.0554	0.0554	0.0559	89	0.1028	0.1028	0.1040	8	0.0456	0.0456	0.0495	19	0.0379	0.0379	0.0383	-16	0.0550	0.0550	0.0570	-22	0.0381	0.0381	0.0382	1
N_NO3_NO2	Construction	Nov	2	0.0604	0.0604	0.0610	49	0.1113	0.1113	0.1119	1	0.0343	0.0343	0.0386	-28	0.0433	0.0433	0.0435	-16	0.0590	0.0590	0.0610	-23	0.0448	0.0448	0.0449	1
N_NO3_NO2	Construction	Dec	2	0.0376	0.0376	0.0380	-2	0.0943	0.0943	0.0952	-11	0.0126	0.0126	0.0129	-40	0.0412	0.0412	0.0416	-19	0.0573	0.0573	0.0589	-23	0.0458	0.0458	0.0459	1
N_NO3_NO2	Operations	Jan	5	0.0271	0.0273	0.0279	-26	0.1978	0.1836	0.2259	78	0.0341	0.0307	0.0378	101	0.0837	0.0737	0.0943	49	0.0777	0.0752	0.0922	3	0.0466	0.0466	0.0467	1
N_NO3_NO2	Operations	Feb	5	0.0242	0.0244	0.0249	-40	0.2249	0.2071	0.2599	90	0.0369	0.0348	0.0437	98	0.0847	0.0745	0.0950	45	0.0799	0.0769	0.0944	3	0.0496	0.0496	0.0497	1
N_NO3_NO2	Operations	Mar	5	0.0200	0.0202	0.0206	-42	0.2736	0.2604	0.3310	143	0.0340	0.0342	0.0442	109	0.0810	0.0708	0.0900	39	0.0797	0.0763	0.0937	3	0.0482	0.0482	0.0483	1
N_NO3_NO2	Operations	Apr	5	0.0202	0.0203	0.0207	-39	0.2807	0.2794	0.3472	166	0.0463	0.0450	0.0577	179	0.0779	0.0676	0.0856	35	0.0792	0.0754	0.0924	3	0.0495	0.0495	0.0496	2
N_NO3_NO2	Operations	May	5	0.0246	0.0247	0.0251	6	0.2093	0.2023	0.2514	196	0.0644	0.0621	0.0754	277	0.0786	0.0702	0.0839	21	0.1035	0.0999	0.1137	0	0.0426	0.0426	0.0427	1
N_NO3_NO2	Operations	Jun	5	0.0372	0.0374	0.0380	50	0.2336	0.2208	0.2758	263	0.0791	0.0737	0.0894	203	0.0754	0.0678	0.0805	26	0.0918	0.0879	0.0994	0	0.0418	0.0418	0.0418	1
N_NO3_NO2	Operations	Jul	5	0.0433	0.0436	0.0443	68	0.3044	0.2798	0.3463	295	0.0894	0.0812	0.0986	242	0.0709	0.0656	0.0771	30	0.0867	0.0823	0.0931	0	0.0408	0.0408	0.0409	1
N_NO3_NO2	Operations	Aug	5	0.0461	0.0463	0.0472	74	0.3495	0.3150	0.3878	311	0.1213	0.1080	0.1308	290	0.0686	0.0639	0.0765	37	0.0833	0.0784	0.0888	2	0.0396	0.0397	0.0397	1
N_NO3_NO2	Operations	Sep	5	0.0499	0.0502	0.0511	79	0.3749	0.3374	0.4085	219	0.1412	0.1281	0.1533	274	0.0687	0.0686	0.0788	49	0.0808	0.0754	0.0854	4	0.0388	0.0388	0.0388	1
N_NO3_NO2	Operations	Oct	5	0.0534	0.0536	0.0545	83	0.3227	0.2926	0.3566	208	0.1532	0.1392	0.1671	262	0.0737	0.0728	0.0842	63	0.0794	0.0736	0.0833	6	0.0381	0.0382	0.0382	1
N_NO3_NO2	Operations	Nov	5	0.0580	0.0583	0.0593	44	0.3156	0.2882	0.3436	162	0.1183	0.1073	0.1291	126	0.0896	0.0874	0.1015	72	0.0875	0.0818	0.0927	9	0.0448	0.0448	0.0449	1
N_NO3_NO2	Operations	Dec	5	0.0360	0.0362	0.0368	-6	0.2423	0.2285	0.2623	116	0.0365	0.0336	0.0396	60	0.0876	0.0850	0.0990	70	0.0866	0.0817	0.0926	11	0.0458	0.0458	0.0458	1
N_NO3_NO2	Closure	Jan	6	0.0281	0.0281	0.0295	-24	0.0669	0.0798	0.1398	-23	0.0117	0.0140	0.0249	-8	0.0382	0.0455	0.0756	-7	0.0570	0.0627	0.0856	-13	0.0462	0.0463	0.0466	1
N_NO3_NO2	Closure	Feb	6	0.0252	0.0252	0.0264	-38	0.0641	0.0738	0.1185	-32	0.0133	0.0155	0.0255	-12	0.0381	0.0455	0.0759	-10	0.0572	0.0632	0.0871	-14	0.0491	0.0492	0.0495	1
N_NO3_NO2	Closure	Mar	6	0.0209	0.0207	0.0216	-40	0.0578	0.0648	0.0966	-39	0.0121	0.0136	0.0205	-17	0.0361	0.0431	0.0721	-14	0.0557	0.0618	0.0860	-15	0.0477	0.0478	0.0482	1
N_NO3_NO2	Closure	Apr	6	0.0210	0.0208	0.0214	-38	0.0532	0.0586	0.0821	-44	0.0121	0.0133	0.0188	-18	0.0341	0.0408	0.0683	-18	0.0541	0.0602	0.0846	-16	0.0489	0.0490	0.0494	1
N_NO3_NO2	Closure	May	6	0.0248	0.0249	0.0256	7	0.0386	0.0419	0.0549	-39	0.0184	0.0193	0.0233	17	0.0434	0.0483	0.0689	-16	0.0818	0.0870	0.1075	-12	0.0421	0.0422	0.0426	1
N_NO3_NO2	Closure	Jun	6	0.0376	0.0377	0.0387	52	0.0410	0.0435	0.0539	-28	0.0198	0.0207	0.0252	-15	0.0400	0.0442	0.0618	-17	0.0709	0.0755	0.0937	-14	0.0414	0.0414	0.0417	0
N_NO3_NO2	Closure	Jul	6	0.0440	0.0441	0.0453	70	0.0565	0.0587	0.0678	-17	0.0224	0.0232	0.0266	-2	0.0378	0.0413	0.0564	-17	0.0648	0.0691	0.0861	-15	0.0405	0.0405	0.0408	0
N_NO3_NO2	Closure	Aug	6	0.0469	0.0470	0.0482	76	0.0651	0.0672	0.0753	-12	0.0292	0.0299	0.0332	8	0.0363	0.0393	0.0521	-17	0.0598	0.0639	0.0800	-16	0.0393	0.0394	0.0396	0
N_NO3_NO2	Closure	Sep	6	0.0509	0.0510	0.0523	82	0.0900	0.0921	0.0997	-13	0.0393	0.0399	0.0432	16	0.0357	0.0384	0.0496	-15	0.0558	0.0596	0.0747	-17	0.0385	0.0385	0.0388	0
N_NO3_NO2	Closure	Oct	6	0.0544	0.0544	0.0558	85	0.0780	0.0797	0.0868	-16	0.0415	0.0423	0.0457	10	0.0357	0.0382	0.0483	-14	0.0527	0.0562	0.0705	-17	0.0379	0.0379	0.0381	0
N_NO3_NO2	Closure	Nov	6	0.0609	0.0602	0.0614	48	0.0854	0.0870	0.0952	-21	0.0323	0.0329	0.0359	-31	0.0407	0.0433	0.0541	-14	0.0568	0.0605	0.0759	-18	0.0445	0.0446	0.0448	0
N_NO3_NO2	Closure	Dec	6	0.0381	0.0383	0.0419	0	0.0756	0.0767	0.0844	-28	0.0109	0.0111	0.0122	-47	0.0390	0.0413	0.0515	-16	0.0553	0.0588	0.0738	-19	0.0454	0.0454	0.0457	0
N_NO3_NO2	Post-Closure	Jan	117	0.0368	0.0369	0.0575	0	0.1298	0.1260	0.1299	22	0.0161	0.0160	0.0171	5	0.0489	0.0486	0.0495	1	0.0711	0.0708	0.0725	0	0.0460	0.0460	0.0461	0
N_NO3_NO2	Post-Closure	Feb	117	0.0406	0.0407	0.0633	0	0.1375	0.1333	0.1377	22	0.0177	0.0177	0.0196	1	0.0508	0.0506	0.0515	1	0.0724	0.0721	0.0739	0	0.0489	0.0489	0.0489	0
N_NO3_NO2	Post-Closure	Mar	117	0.0345	0.0346	0.0537	0	0.1375	0.1329	0.1377	24	0.0124	0.0129	0.0183	-21	0.0501	0.0499	0.0509	0	0.0717	0.0714	0.0732	0	0.0475	0.0475	0.0476	0
N_NO3_NO2	Post-Closure	Apr	117	0.0333	0.0334	0.0517	0	0.1376	0.1326	0.1378	26	0.0113	0.0119	0.0182	-26	0.0493	0.0491	0.0503	0	0.0710	0.0707	0.0724	0	0.0487	0.0487	0.0488	0
N_NO3_NO2	Post-Closure	May	117	0.0231	0.0232	0.0323	0	0.0918	0.0883	0.0919	29	0.0155	0.0156	0.0175	-5	0.0569	0.0567	0.0580	0	0.0978	0.0976	0.0992	0	0.0420	0.0420	0.0420	0
N_NO3_NO2	Post-Closure	Jun	117	0.0246	0.0248	0.0342	0	0.0833	0.0802	0.0834	32	0.0273	0.0266	0.0273	10	0.0529	0.0528	0.0540	0	0.0868	0.0866	0.0881	0	0.0412	0.0412	0.0412	0
N_NO3_NO2	Post-Closure	Jul	117	0.0257	0.0259	0.0403	0	0.0927	0.0898	0.0929	27	0.0264	0.0259	0.0264	9	0.0500	0.0498	0.0508	0	0.0806	0.0805	0.0820	0	0.0403	0.0403	0.0404	0
N_NO3_NO2	Post-Closure	Aug	117	0.0264	0.0266	0.0434	0	0.0980	0.0953	0.0982	24	0.0304	0.0299	0.0305	8	0.0473	0.0471	0.0479	0	0.0755	0.0754	0.0768	0	0.0392	0.0392	0.0392	0
N_NO3_NO2	Post-Closure	Sep	117	0.0277	0.0279	0.0472	0	0.1273	0.1247	0.1274	18	0.0363	0.0360	0.0365	5	0.0454	0.0453	0.0459	1	0.0710	0.0709	0.0723	0	0.0384	0.0384	0.0384	0
N_NO3_NO2	Post-Closure	Oct	117	0.0290	0.0291	0.0476	-1	0.1171	0.1145	0.1172	21	0.0406	0.0402	0.0406	5	0.0443	0.0441	0.0447	1	0.0675	0.0674	0.0688	0	0.0378	0.0378	0.0378	0
N_NO3_NO2	Post-Closure	Nov	117	0.0402	0.0404	0.0634	0	0.1371	0.1339	0.1372	22	0.0507	0.0504	0.0512	6	0.0504	0.0502	0.0509	1	0.0734	0.0733	0.0748	0	0.0444	0.0444	0.0444	0
N_NO3_NO2	Post-Closure	Dec	117	0.0382	0.0384	0.0600	0	0.1326	0.1294	0.1327	22	0.0224	0.0224	0.0233	7	0.0497	0.0495	0.0502	1	0.0721	0.0719	0.0734	0	0.0453	0.0453	0.0453	0
CN, Tot	Construction	Jan	2	0.00047	0.00047	0.00064	-40	0.00057	0.00057	0.00066	-8	0.00036	0.00036	0.00047	-32	0.00055	0.00055	0.00059	-9	0.00080	0.00080	0.00090	-11	0.00112	0.00112	0.00112	0
CN, Tot	Construction	Feb	2	0.00037	0.00037	0.00046	-56	0.00059	0.00059	0.00073	-10	0.00041	0.00041	0.00046	-30	0.00055	0.00055	0.00059	-13	0.00081	0.00081	0.00090	-11	0.00116	0.00116	0.00116	0
CN, Tot	Construction	Mar	2	0.00029	0.00029	0.00032	-61	0.00055	0.00055	0.00069	-14	0.00036	0.00036	0.00038	-32	0.00052	0.00052	0.00055	-17	0.00079	0.00079	0.00087	-13	0.00111	0.00111	0.00111	0
CN, Tot	Construction	Apr	2	0.00028	0.00028	0.00030	-60	0.00053	0.00053	0.00065	-16	0.00034	0.00034	0.00039	-31	0.00049	0.00049	0.00051	-21	0.00076	0.00076	0.00084	-15	0.00110	0.00110	0.00110	0
CN, Tot	Construction	May	2	0.00030	0.00030	0.00030	-38	0.00041	0.00041	0.00047	-9	0.00035	0.00035	0.00037	-17	0.00040	0.00040	0.00042	-21	0.00098	0.00098	0.00104	-14	0.00090	0.00090	0.00090	0
CN, Tot	Construction	Jun	2	0.00041	0.00041	0.00042	-18	0.00044	0.00044	0.00049	-1	0.00040	0.00040	0.00042	-22	0.00042	0.00042	0.00044	-19	0.00085	0.00085	0.00089	-17	0.00085	0.00085	0.00085	-1
CN, Tot	Construction	Jul	2	0.00048	0.00048	0.00048	-13	0.00050	0.00050	0.00055	8	0.00042	0.00042	0.00043	-20	0.00044	0.00044	0.00046	-18	0.00078	0.00078	0.00082	-18	0.00086	0.00086	0.00087	0
CN, Tot	Construction	Aug	2	0.00050	0.00050	0.00050	-17	0.00057	0.00057	0.00062	14	0.00046	0.00046	0.00047	-11	0.00046	0.00046	0.00047	-16	0.00074	0.00074	0.00077	-19	0.00091	0.00091	0.00091	0
CN, Tot	Construction	Sep	2	0.00048	0.00048	0.00048	-23	0.00058	0.00058	0.00063	12	0.00048	0.00048	0.00048	-8	0.00047	0.00047	0.00048	-15	0.00071	0.00071	0.00073	-20	0.00095	0.00095	0.00095	0
CN, Tot	Construction	Oct	2	0.00044	0.00044	0.00044	-29	0.00055	0.00055	0.00060	5	0.00046	0.00046	0.00047	-8	0.00046	0.00046	0.00047	-15	0.00068	0.00068	0.00070	-20	0.00097	0.00097	0.00097	0
CN, Tot	Construction	Nov	2	0.00048	0.00048	0.00048	-43	0.00061	0.00061	0.00066	-5	0.00065	0.00065	0.00066	-31	0.00052	0.00052	0.00053	-16	0.00073	0.00073	0.00075	-21	0.00113	0.00113	0.00113	0
CN, Tot	Construction	Dec	2	0.00034	0.00034	0.00035	-57	0.00052	0.00052	0.00055	-18	0.00051	0.00051	0.00054	-18	0.00050	0.00050	0.00051	-17	0.00071	0.00071	0.00073	-22	0.00112	0.00112	0.00112	0
CN, Tot	Operations	Jan	5	0.00028	0.00029	0.00029	-63	0.00042	0.00042	0.00043	-32	0.00041	0.00041	0.00042	-22	0.00048	0.00048	0.00048	-21	0.00066	0.00066	0.00067	-26	0.00112	0.00112	0.00112	0
CN, Tot	Operations	Feb	5	0.00028	0.00028	0.00028	-68	0.00041	0.00041	0.00042	-38	0.00039	0.00039	0.00042	-33	0.00049	0.00049	0.00049	-23	0.00067	0.00067	0.00068	-27	0.00116	0.00116	0.00116	0
CN, Tot	Operations	Mar	5	0.00024	0.00025	0.00025	-66	0.00041	0.00041	0.00042	-37	0.00028	0.00028	0.00032	-47	0.00046	0.00046	0.00047	-26	0.00065	0.00065	0.00066	-27	0.00111	0.00111	0.00111	0
CN, Tot	Operations	Apr	5	0.00026	0.00026	0.00026	-63	0.00041	0.00041	0.00043	-35	0.00031	0.00030	0.00031	-39	0.00044	0.00044	0.00044	-29	0.00064	0.00064	0.00065	-29	0.00110	0.00110	0.00110	0
CN, Tot	Operations	May	5	0.00028	0.00029	0.00029	-40	0.00034	0.00034	0.00035	-24	0.00032	0.00032	0.00032	-24	0.00036	0.00036	0.00036	-29	0.00089	0.00089	0.00090	-21	0.00090	0.00090	0.00090	-1
CN, Tot	Operations	Jun	5	0.00040	0.00040	0.00041	-20	0.00039	0.00039	0.00040	-12	0.00037	0.00037	0.00037	-28	0.00038	0.00038	0.00039	-26	0.00078	0.00078	0.00079	-23	0.00085	0.00085	0.00085	-1
CN, Tot	Operations	Jul	5	0.00047	0.00047	0.00048	-15	0.00047	0.00046	0.00047	-1	0.00040	0.00040	0.00040	-24	0.00041	0.00041	0.00041	-23	0.00072	0.00072	0.00073	-24	0.00086	0.00086	0.00086	0
CN, Tot	Operations	Aug	5	0.00049	0.00049	0.00049	-18	0.00054	0.00053	0.00054	7	0.00044	0.00044	0.00045	-15	0.00044	0.00044	0.00044	-21	0.00069	0.00069	0.00069	-24	0.00091	0.00091	0.00091	0
CN, Tot	Operations	Sep	5	0.00046	0.00047	0.00047	-24	0.00055	0.00055	0.00056	5	0.00047	0.00047	0.00047	-10	0.00045	0.00045	0.00045	-19	0.00066	0.00066	0.00067	-24	0.00095	0.00095	0.00095	0
CN, Tot	Operations	Oct	5	0.00043	0.00043	0.00044	-30	0.00052	0.00051	0.00052	-2	0.00048	0.00048	0.00049	-5	0.00044	0.00044	0.00044	-19	0.00064	0.00064	0.00065	-24	0.00097	0.00097	0.00097	0
CN, Tot	Operations	Nov	5	0.00047	0.00047	0.00048	-45	0.00056	0.00055	0.00056	-14	0.00069	0.00069	0.00069	-27	0.00050	0.00050	0.00050	-19	0.00069	0.00069	0.00070	-25	0.00113	0.00113	0.00113	0
CN, Tot	Operations	Dec	5	0.00033	0.00033	0.00034	-58	0.00047	0.00047	0.00047	-25	0.00049	0.00049	0.00049	-22	0.00049	0.00049	0.00049	-20	0.00067	0.00067	0.00068	-25	0.00112	0.00112	0.00112	0
CN, Tot	Closure	Jan	6	0.00029	0.00029	0.00030	-63	0.00039	0.00039	0.00042	-37	0.00040	0.00040	0.00043	-24	0.00048	0.00048	0.00048	-21	0.00067	0.00067	0.00068	-25	0.00112	0.00112	0.00112	0
CN, Tot	Closure	Feb	6	0.00028	0.00028	0.00029	-67	0.00038	0.00038	0.00040	-42	0.00041	0.00041	0.00043	-29	0.00049	0.00049	0.00049	-23	0.00067	0.00067	0.00068	-26	0.00116	0.00116	0.00117	0
CN, Tot	Closure	Mar	6	0.00025	0.00025	0.00026	-66	0.00034	0.00034	0.00036	-46	0.00035	0.00035	0.00036	-34	0.00047	0.00047	0.00047	-25	0.00066	0.00066	0.00067	-26	0.00111	0.00111	0.00111	0
CN, Tot	Closure	Apr	6	0.00026	0.00026	0.00027	-63	0.00032	0.00032	0.00033	-49	0.00033	0.00033	0.00034	-34	0.00045	0.00045	0.00046	-28	0.00064	0.00064	0.00065	-27	0.00110	0.00110	0.00110	0
CN, Tot	Closure	May	6	0.00029	0.00029	0.00029	-40	0.00027	0.00027	0.00027	-40	0.00032	0.00032	0.00032	-24	0.00037	0.00037	0.00037	-27	0.00090	0.00090	0.00091	-20	0.00090	0.00090	0.00090	0
CN, Tot	Closure	Jun	6	0.00040	0.00040	0.00041	-20	0.00031	0.00031	0.00032	-30	0.00037	0.00037	0.00038	-27	0.00039	0.00039	0.00040	-25	0.00079	0.00080	0.00080	-21	0.00086	0.00086	0.00086	0
CN, Tot	Closure	Jul	6	0.00048	0.00047	0.00048	-14	0.00038	0.00038	0.00038	-19	0.00041	0.00041	0.00041	-21	0.00042	0.00042	0.00043	-22	0.00074	0.00074	0.00075	-22	0.00087	0.00087	0.00087	0
CN, Tot	Closure	Aug	6	0.00050	0.00049	0.00050	-17	0.00044	0.00045	0.00045	-11	0.00046	0.00046	0.00046	-13	0.00045	0.00045	0.00045	-19	0.00070	0.00070	0.00071	-22	0.00091	0.00091	0.00091	0
CN, Tot	Closure	Sep	6	0.00048	0.00047	0.00049	-23	0.00046	0.00046	0.00047	-11	0.00047	0.00048	0.00048	-8	0.00046	0.00046	0.00046	-17	0.00067	0.00067	0.00068	-22	0.00095	0.00095	0.00095	0
CN, Tot	Closure	Oct	6	0.00044	0.00044	0.00046	-29	0.00045	0.00045	0.00045	-15	0.00046	0.00046	0.00046	-9	0.00045	0.00045	0.00046	-17	0.00065	0.00065	0.00066	-22	0.00097	0.00097	0.00097	0
CN, Tot	Closure	Nov	6	0.00048	0.00049	0.00052	-43	0.00049	0.00050	0.00051	-23	0.00064	0.00064	0.00068	-31	0.00051	0.00051	0.00052	-18	0.00070	0.00071	0.00072	-23	0.00113	0.00113	0.00113	0
CN, Tot	Closure	Dec	6	0.00035	0.00035	0.00039	-56	0.00043	0.00044	0.00046	-30	0.00045	0.00046	0.00048	-26	0.00050	0.00050	0.00051	-19	0.00068	0.00069	0.00070	-23	0.00113	0.00112	0.00113	0
CN, Tot	Post-Closure	Jan	117	0.00077	0.00076	0.00077	-2	0.00071	0.00070	0.00071	13	0.00053	0.00053	0.00056	-1	0.00061	0.00060	0.00062	-1	0.00087	0.00087	0.00089	-1	0.00112	0.00112	0.00112	0
CN, Tot	Post-Closure	Feb	117	0.00085	0.00084	0.00085	-2	0.00076	0.00074	0.00076	13	0.00055	0.00055	0.00062	-6	0.00063	0.00063	0.00064	-1	0.00089	0.00089	0.00091	-1	0.00117	0.00117	0.00117	0
CN, Tot	Post-Closure	Mar	117	0.00072	0.00072	0.00072	-2	0.00076	0.00074	0.00076	15	0.00038	0.00040	0.00056	-25	0.00062	0.00062	0.00064	-1	0.00088	0.00088	0.00090	-1	0.00111	0.00111	0.00111	0
CN, Tot	Post-Closure	Apr	117	0.00070	0.00069	0.00070	-2	0.00076	0.00074	0.00076	16	0.00033	0.00035	0.00054	-31	0.00061	0.00061	0.00063	-1	0.00087	0.00087	0.00089	-1	0.00110	0.00110	0.00110	0
CN, Tot	Post-Closure	May	117	0.00047	0.00047	0.00047	-1	0.00054	0.00052	0.00054	17	0.00038	0.00038	0.00043	-8	0.00050	0.00050	0.00051	-1	0.00111	0.00111	0.00113	-1	0.00090	0.00090	0.00090	0
CN, Tot	Post-Closure	Jun	117	0.00050	0.00050	0.00050	-1	0.00053	0.00052	0.00053	17	0.00052	0.00052	0.00052	1	0.00051	0.00051	0.00053	-1	0.00100	0.00100	0.00102	-1	0.00086	0.00086	0.00086	0
CN, Tot	Post-Closure	Jul	117	0.00054	0.00054	0.00054	-2	0.00055	0.00054	0.00055	15	0.00054	0.00053	0.00054	2	0.00054	0.00054	0.00055	-1	0.00094	0.00094	0.00096	-1	0.00087	0.00087	0.00087	0
CN, Tot	Post-Closure	Aug	117	0.00058	0.00058	0.00058	-2	0.00058	0.00057	0.00058	14	0.00054	0.00053	0.00054	2	0.00055	0.00055	0.00056	-1	0.00089	0.00089	0.00091	-1	0.00091	0.00091	0.00091	0
CN, Tot	Post-Closure	Sep	117	0.00060	0.00060	0.00060	-2	0.00060	0.00059	0.00060	13	0.00053	0.00052	0.00053	1	0.00055	0.00055	0.00056	-1	0.00086	0.00086	0.00087	-1	0.00095	0.00095	0.00095	0
CN, Tot	Post-Closure	Oct	117	0.00061	0.00061	0.00061	-2	0.00060	0.00059	0.00060	13	0.00051	0.00051	0.00051	0	0.00054	0.00054	0.00055	-1	0.00083	0.00083	0.00085	-1	0.00097	0.00097	0.00097	0
CN, Tot	Post-Closure	Nov	117	0.00083	0.00083	0.00083	-2	0.00074	0.00072	0.00074	13	0.00094	0.00094	0.00097	1	0.00062	0.00062	0.00063	-1	0.00090	0.00090	0.00092	-1	0.00113	0.00113	0.00113	0
CN, Tot	Post-Closure	Dec	117	0.00080	0.00079	0.00080	-2	0.00072	0.00071	0.00072	13	0.00063	0.00063	0.00065	2	0.00061	0.00061	0.00062	-1	0.00089	0.00089	0.00091	-1	0.00113	0.00113	0.00113	0
CN, Free	Construction	Jan	2	0.00038	0.00038	0.00061	-54	0.00038	0.00038	0.00045	-13	0.00025	0.00025	0.00030	-39	0.00062	0.00062	0.00073	-16	0.00071	0.00071	0.00078	-9	0.00112	0.00112	0.00112	0
CN, Free	Construction	Feb	2	0.00024	0.00024	0.00035	-74	0.00037	0.00037	0.00047	-19	0.00026	0.00026	0.00029	-41	0.00061	0.00061	0.00071	-21	0.00072	0.00072	0.00079	-10	0.00116	0.00116	0.00116	0
CN, Free	Construction	Mar	2	0.00014	0.00014	0.00019	-82	0.00034	0.00034	0.00043	-26	0.00022	0.00022	0.00024	-44	0.00056	0.00056	0.00064	-27	0.00071	0.00071	0.00078	-11	0.00111	0.00111	0.00111	0
CN, Free	Construction	Apr	2	0.00012	0.00012	0.00014	-84	0.00031	0.00031	0.00039	-29	0.00021	0.00021	0.00024	-45	0.00051	0.00051	0.00058	-32	0.00069	0.00069	0.00076	-12	0.00110	0.00110	0.00110	0
CN, Free	Construction	May	2	0.00019	0.00019	0.00020	-60	0.00024	0.00024	0.00029	-22	0.00027	0.00027	0.00028	-31	0.00039	0.00039	0.00044	-34	0.00065	0.00065	0.00070	-13	0.00090	0.00090	0.00090	0
CN, Free	Construction	Jun	2	0.00033	0.00033	0.00033	-31	0.00027	0.00027	0.00031	-11	0.00029	0.00029	0.00030	-35	0.00038	0.00038	0.00042	-34	0.00060	0.00060	0.00065	-16	0.00085	0.00085	0.00085	-1
CN, Free	Construction	Jul	2	0.00044	0.00044	0.00045	-18	0.00033	0.00033	0.00036	2	0.00031	0.00031	0.00032	-31	0.00042	0.00042	0.00045	-31	0.00058	0.00058	0.00062	-18	0.00086	0.00086	0.00087	0
CN, Free	Construction	Aug	2	0.00050	0.00050	0.00051	-18	0.00039	0.00039	0.00042	11	0.00035	0.00035	0.00035	-21	0.00047	0.00047	0.00050	-27	0.00057	0.00057	0.00061	-19	0.00091	0.00091	0.00091	0
CN, Free	Construction	Sep	2	0.00050	0.00050	0.00050	-24	0.00041	0.00041	0.00044	11	0.00047	0.00047	0.00047	-25	0.00050	0.00050	0.00052	-25	0.00057	0.00057	0.00061	-19	0.00095	0.00095	0.00095	0
CN, Free	Construction	Oct	2	0.00047	0.00047	0.00047	-31	0.00039	0.00039	0.00042	5	0.00048	0.00048	0.00049	-34	0.00051	0.00051	0.00053	-25	0.00057	0.00057	0.00060	-19	0.00097	0.00097	0.00097	0
CN, Free	Construction	Nov	2	0.00046	0.00046	0.00046	-51	0.00042	0.00042	0.00046	-7	0.00052	0.00052	0.00054	-49	0.00056	0.00056	0.00058	-27	0.00063	0.00063	0.00066	-20	0.00113	0.00113	0.00113	0
CN, Free	Construction	Dec	2	0.00024	0.00024	0.00025	-72	0.00034	0.00034	0.00037	-22	0.00035	0.00035	0.00037	-35	0.00053	0.00053	0.00054	-30	0.00062	0.00062	0.00065	-21	0.00112	0.00112	0.00112	0
CN, Free	Operations	Jan	5	0.00015	0.00015	0.00015	-82	0.00026	0.00026	0.00027	-40	0.00027	0.00027	0.00027	-37	0.00049	0.00049	0.00050	-34	0.00057	0.00057	0.00058	-27	0.00112	0.00112	0.00112	0
CN, Free	Operations	Feb	5	0.00012	0.00012	0.00012	-87	0.00024	0.00024	0.00025	-47	0.00024	0.00024	0.00026	-46	0.00049	0.00049	0.00049	-37	0.00058	0.00058	0.00059	-28	0.00116	0.00116	0.00116	0
CN, Free	Operations	Mar	5	0.00009	0.00009	0.00010	-88	0.00024	0.00023	0.00024	-48	0.00016	0.00017	0.00019	-58	0.00046	0.00046	0.00046	-41	0.00057	0.00057	0.00058	-28	0.00111	0.00111	0.00111	0
CN, Free	Operations	Apr	5	0.00009	0.00009	0.00010	-87	0.00023	0.00023	0.00024	-48	0.00018	0.00017	0.00018	-54	0.00042	0.00042	0.00043	-44	0.00056	0.00056	0.00057	-30	0.00110	0.00110	0.00110	0
CN, Free	Operations	May	5	0.00018	0.00018	0.00018	-62	0.00020	0.00020	0.00020	-36	0.00025	0.00025	0.00025	-36	0.00033	0.00033	0.00034	-45	0.00055	0.00055	0.00055	-27	0.00090	0.00090	0.00090	-1
CN, Free	Operations	Jun	5	0.00031	0.00031	0.00032	-33	0.00024	0.00024	0.00024	-23	0.00027	0.00027	0.00027	-40	0.00034	0.00033	0.00034	-43	0.00052	0.00052	0.00053	-28	0.00085	0.00085	0.00085	-1
CN, Free	Operations	Jul	5	0.00043	0.00043	0.00044	-20	0.00030	0.00030	0.00030	-7	0.00029	0.00030	0.00030	-34	0.00038	0.00038	0.00038	-38	0.00051	0.00051	0.00051	-28	0.00086	0.00086	0.00086	0
CN, Free	Operations	Aug	5	0.00049	0.00049	0.00050	-20	0.00036	0.00036	0.00037	3	0.00033	0.00034	0.00034	-25	0.00044	0.00044	0.00044	-33	0.00051	0.00051	0.00051	-28	0.00091	0.00091	0.00091	0
CN, Free	Operations	Sep	5	0.00049	0.00049	0.00049	-26	0.00038	0.00038	0.00038	3	0.00046	0.00047	0.00048	-25	0.00048	0.00048	0.00048	-30	0.00052	0.00052	0.00052	-27	0.00095	0.00095	0.00095	0
CN, Free	Operations	Oct	5	0.00046	0.00046	0.00046	-32	0.00036	0.00036	0.00036	-4	0.00050	0.00051	0.00051	-31	0.00049	0.00049	0.00050	-28	0.00052	0.00052	0.00052	-27	0.00097	0.00097	0.00097	0
CN, Free	Operations	Nov	5	0.00044	0.00044	0.00045	-52	0.00038	0.00038	0.00038	-16	0.00056	0.00055	0.00056	-46	0.00055	0.00055	0.00055	-30	0.00058	0.00058	0.00058	-27	0.00113	0.00113	0.00113	0
CN, Free	Operations	Dec	5	0.00023	0.00024	0.00024	-73	0.00031	0.00031	0.00031	-30	0.00033	0.00033	0.00033	-38	0.00052	0.00052	0.00052	-32	0.00057	0.00057	0.00057	-27	0.00112	0.00112	0.00112	0
CN, Free	Closure	Jan	6	0.00016	0.00016	0.00017	-81	0.00024	0.00024	0.00026	-44	0.00025	0.00026	0.00027	-39	0.00050	0.00051	0.00051	-34	0.00058	0.00058	0.00058	-27	0.00112	0.00112	0.00112	0
CN, Free	Closure	Feb	6	0.00013	0.00013	0.00013	-86	0.00022	0.00022	0.00023	-52	0.00025	0.00025	0.00026	-44	0.00050	0.00050	0.00051	-37	0.00059	0.00059	0.00059	-27	0.00116	0.00116	0.00117	0
CN, Free	Closure	Mar	6	0.00010	0.00010	0.00010	-87	0.00019	0.00019	0.00020	-57	0.00020	0.00020	0.00021	-49	0.00047	0.00047	0.00048	-40	0.00058	0.00058	0.00058	-28	0.00111	0.00111	0.00111	0
CN, Free	Closure	Apr	6	0.00010	0.00010	0.00010	-87	0.00017	0.00017	0.00018	-61	0.00018	0.00018	0.00019	-51	0.00044	0.00044	0.00045	-43	0.00057	0.00057	0.00057	-29	0.00110	0.00110	0.00110	0
CN, Free	Closure	May	6	0.00018	0.00018	0.00018	-62	0.00015	0.00015	0.00015	-52	0.00025	0.00025	0.00026	-35	0.00035	0.00035	0.00036	-43	0.00056	0.00056	0.00056	-26	0.00090	0.00090	0.00090	0
CN, Free	Closure	Jun	6	0.00032	0.00032	0.00032	-33	0.00019	0.00018	0.00019	-40	0.00027	0.00027	0.00028	-39	0.00035	0.00035	0.00036	-41	0.00053	0.00053	0.00054	-26	0.00086	0.00086	0.00086	0
CN, Free	Closure	Jul	6	0.00043	0.00043	0.00044	-19	0.00024	0.00024	0.00025	-26	0.00031	0.00031	0.00031	-32	0.00039	0.00039	0.00040	-36	0.00052	0.00052	0.00053	-27	0.00087	0.00087	0.00087	0
CN, Free	Closure	Aug	6	0.00050	0.00050	0.00051	-19	0.00030	0.00030	0.00031	-15	0.00035	0.00035	0.00035	-22	0.00046	0.00046	0.00047	-31	0.00052	0.00052	0.00053	-27	0.00091	0.00091	0.00091	0
CN, Free	Closure	Sep	6	0.00050	0.00050	0.00051	-24	0.00032	0.00032	0.00033	-13	0.00049	0.00049	0.00050	-23	0.00050	0.00050	0.00052	-27	0.00053	0.00053	0.00054	-26	0.00095	0.00095	0.00095	0
CN, Free	Closure	Oct	6	0.00047	0.00047	0.00049	-31	0.00031	0.00031	0.00032	-16	0.00050	0.00050	0.00053	-31	0.00052	0.00052	0.00053	-26	0.00054	0.00054	0.00055	-25	0.00097	0.00097	0.00097	0
CN, Free	Closure	Nov	6	0.00046	0.00047	0.00051	-50	0.00034	0.00034	0.00036	-25	0.00052	0.00053	0.00058	-48	0.00057	0.00057	0.00059	-28	0.00060	0.00060	0.00061	-25	0.00113	0.00113	0.00113	0
CN, Free	Closure	Dec	6	0.00025	0.00026	0.00031	-71	0.00028	0.00029	0.00031	-35	0.00031	0.00031	0.00034	-41	0.00054	0.00054	0.00056	-30	0.00059	0.00059	0.00060	-26	0.00113	0.00112	0.00113	0
CN, Free	Post-Closure	Jan	117	0.00083	0.00082	0.00083	-2	0.00049	0.00048	0.00049	10	0.00040	0.00040	0.00045	-3	0.00077	0.00076	0.00079	-1	0.00079	0.00078	0.00081	-1	0.00112	0.00112	0.00112	0
CN, Free	Post-Closure	Feb	117	0.00091	0.00090	0.00091	-1	0.00052	0.00051	0.00052	10	0.00041	0.00041	0.00048	-8	0.00080	0.00079	0.00082	-1	0.00081	0.00080	0.00083	-1	0.00117	0.00117	0.00117	0
CN, Free	Post-Closure	Mar	117	0.00077	0.00076	0.00077	-1	0.00052	0.00050	0.00052	12	0.00028	0.00030	0.00043	-26	0.00078	0.00078	0.00081	-1	0.00080	0.00080	0.00082	-1	0.00111	0.00111	0.00111	0
CN, Free	Post-Closure	Apr	117	0.00074	0.00073	0.00074	-1	0.00052	0.00050	0.00052	13	0.00024	0.00026	0.00041	-31	0.00077	0.00077	0.00080	-2	0.00080	0.00079	0.00082	-1	0.00110	0.00110	0.00110	0
CN, Free	Post-Closure	May	117	0.00047	0.00047	0.00047	0	0.00036	0.00035	0.00036	14	0.00035	0.00036	0.00040	-7	0.00061	0.00061	0.00064	-2	0.00076	0.00075	0.00077	-1	0.00090	0.00090	0.00090	0
CN, Free	Post-Closure	Jun	117	0.00047	0.00047	0.00047	0	0.00036	0.00035	0.00036	14	0.00045	0.00045	0.00046	0	0.00059	0.00059	0.00062	-2	0.00072	0.00072	0.00074	-1	0.00086	0.00086	0.00086	0
CN, Free	Post-Closure	Jul	117	0.00053	0.00053	0.00053	-1	0.00037	0.00037	0.00037	13	0.00046	0.00046	0.00047	1	0.00061	0.00061	0.00064	-1	0.00071	0.00071	0.00073	-1	0.00087	0.00087	0.00087	0
CN, Free	Post-Closure	Aug	117	0.00061	0.00061	0.00061	-2	0.00040	0.00039	0.00040	11	0.00045	0.00045	0.00046	1	0.00066	0.00066	0.00069	-1	0.00071	0.00071	0.00073	-1	0.00091	0.00091	0.00091	0
CN, Free	Post-Closure	Sep	117	0.00065	0.00065	0.00065	-2	0.00041	0.00041	0.00041	11	0.00063	0.00063	0.00065	0	0.00069	0.00069	0.00071	-1	0.00072	0.00071	0.00073	-1	0.00095	0.00095	0.00095	0
CN, Free	Post-Closure	Oct	117	0.00067	0.00066	0.00067	-2	0.00042	0.00041	0.00042	10	0.00073	0.00073	0.00077	0	0.00070	0.00070	0.00072	-1	0.00072	0.00072	0.00073	-1	0.00097	0.00097	0.00097	0
CN, Free	Post-Closure	Nov	117	0.00091	0.00091	0.00091	-1	0.00051	0.00050	0.00051	10	0.00101	0.00101	0.00110	-1	0.00080	0.00080	0.00082	-1	0.00080	0.00080	0.00082	-1	0.00113	0.00113	0.00113	0
CN, Free	Post-Closure	Dec	117	0.00086	0.00086	0.00086	-1	0.00050	0.00049	0.00050	10	0.00053	0.00053	0.00057	-1	0.00078	0.00078	0.00080	-1	0.00079	0.00079	0.00081	-1	0.00113	0.00113	0.00113	0
Al, Tot	Construction	Jan	2	0.011	0.011	0.023	-65	0.005	0.005	0.009	-46	0.003	0.003	0.004	-66	0.027	0.027	0.035	-24	0.042	0.042	0.053	-21	0.033	0.033	0.033	0
Al, Tot	Construction	Feb	2	0.006	0.006	0.011	-84	0.004	0.004	0.007	-58	0.002	0.002	0.003	-75	0.026	0.026	0.033	-29	0.041	0.041	0.052	-23	0.035	0.035	0.035	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Al, Tot	Construction	Mar	2	0.002	0.002	0.004	-93	0.003	0.003	0.005	-67	0.001	0.001	0.002	-77	0.023	0.023	0.030	-35	0.038	0.038	0.048	-27	0.033	0.033	0.033	0
Al, Tot	Construction	Apr	2	0.002	0.002	0.003	-92	0.002	0.002	0.004	-74	0.001	0.001	0.002	-79	0.021	0.021	0.026	-41	0.035	0.035	0.044	-32	0.033	0.033	0.033	-1
Al, Tot	Construction	May	2	0.028	0.028	0.028	-52	0.003	0.003	0.004	-60	0.010	0.010	0.010	-49	0.022	0.022	0.025	-37	0.080	0.080	0.086	-19	0.029	0.029	0.029	0
Al, Tot	Construction	Jun	2	0.030	0.030	0.031	-56	0.005	0.005	0.005	-51	0.009	0.009	0.009	-58	0.022	0.022	0.025	-36	0.070	0.070	0.075	-22	0.031	0.031	0.031	0
Al, Tot	Construction	Jul	2	0.021	0.021	0.021	-66	0.005	0.005	0.005	-51	0.006	0.006	0.006	-61	0.023	0.023	0.025	-36	0.060	0.060	0.064	-25	0.031	0.031	0.031	0
Al, Tot	Construction	Aug	2	0.010	0.010	0.010	-78	0.004	0.004	0.004	-56	0.004	0.004	0.005	-57	0.023	0.023	0.024	-35	0.049	0.049	0.052	-29	0.031	0.031	0.031	0
Al, Tot	Construction	Sep	2	0.005	0.005	0.005	-86	0.004	0.004	0.004	-61	0.006	0.006	0.006	-53	0.022	0.022	0.024	-36	0.041	0.041	0.043	-32	0.030	0.030	0.030	0
Al, Tot	Construction	Oct	2	0.003	0.003	0.003	-91	0.003	0.003	0.003	-66	0.006	0.006	0.006	-60	0.021	0.021	0.022	-38	0.035	0.035	0.037	-35	0.029	0.029	0.029	0
Al, Tot	Construction	Nov	2	0.002	0.002	0.002	-95	0.003	0.003	0.003	-73	0.004	0.004	0.004	-78	0.022	0.022	0.023	-41	0.035	0.035	0.036	-38	0.034	0.034	0.034	0
Al, Tot	Construction	Dec	2	0.001	0.001	0.001	-98	0.002	0.002	0.002	-79	0.002	0.002	0.002	-79	0.020	0.020	0.021	-45	0.032	0.032	0.033	-41	0.033	0.033	0.033	0
Al, Tot	Operations	Jan	5	0.000	0.000	0.000	-99	0.002	0.002	0.002	-83	0.002	0.002	0.002	-80	0.018	0.018	0.018	-49	0.028	0.028	0.029	-45	0.033	0.033	0.033	-1
Al, Tot	Operations	Feb	5	0.000	0.000	0.000	-99	0.001	0.001	0.001	-86	0.001	0.001	0.001	-85	0.018	0.018	0.018	-52	0.028	0.027	0.028	-47	0.034	0.034	0.034	-1
Al, Tot	Operations	Mar	5	0.000	0.000	0.000	-100	0.001	0.001	0.001	-86	0.001	0.001	0.001	-88	0.016	0.016	0.017	-55	0.026	0.026	0.026	-49	0.033	0.033	0.033	-1
Al, Tot	Operations	Apr	5	0.002	0.002	0.002	-94	0.001	0.001	0.001	-86	0.001	0.001	0.001	-86	0.015	0.015	0.015	-58	0.024	0.024	0.024	-52	0.032	0.032	0.032	-1
Al, Tot	Operations	May	5	0.028	0.028	0.028	-52	0.003	0.003	0.003	-65	0.011	0.011	0.011	-48	0.018	0.018	0.018	-49	0.072	0.072	0.072	-26	0.029	0.029	0.029	-1
Al, Tot	Operations	Jun	5	0.031	0.031	0.031	-56	0.005	0.005	0.005	-52	0.009	0.009	0.009	-57	0.019	0.019	0.019	-46	0.064	0.064	0.064	-28	0.031	0.031	0.031	0
Al, Tot	Operations	Jul	5	0.021	0.021	0.021	-66	0.005	0.005	0.005	-51	0.006	0.006	0.006	-60	0.020	0.020	0.021	-43	0.055	0.055	0.056	-30	0.031	0.031	0.031	0
Al, Tot	Operations	Aug	5	0.010	0.010	0.010	-78	0.005	0.004	0.005	-54	0.004	0.005	0.005	-56	0.021	0.021	0.021	-41	0.045	0.045	0.046	-34	0.031	0.030	0.031	0
Al, Tot	Operations	Sep	5	0.005	0.005	0.005	-86	0.004	0.004	0.004	-58	0.007	0.007	0.007	-50	0.021	0.021	0.021	-40	0.038	0.038	0.038	-36	0.030	0.030	0.030	0
Al, Tot	Operations	Oct	5	0.003	0.003	0.003	-91	0.003	0.003	0.003	-63	0.007	0.007	0.007	-54	0.020	0.020	0.020	-40	0.032	0.032	0.033	-39	0.029	0.029	0.029	0
Al, Tot	Operations	Nov	5	0.002	0.002	0.002	-95	0.003	0.003	0.003	-71	0.005	0.005	0.005	-73	0.021	0.021	0.021	-43	0.032	0.032	0.033	-41	0.034	0.034	0.034	0
Al, Tot	Operations	Dec	5	0.001	0.001	0.001	-98	0.002	0.002	0.002	-78	0.002	0.002	0.002	-77	0.020	0.020	0.020	-46	0.030	0.030	0.031	-43	0.033	0.033	0.033	0
Al, Tot	Closure	Jan	6	0.000	0.000	0.000	-99	0.001	0.001	0.002	-87	0.001	0.001	0.002	-83	0.019	0.019	0.020	-47	0.028	0.029	0.030	-43	0.033	0.033	0.033	0
Al, Tot	Closure	Feb	6	0.000	0.000	0.000	-99	0.001	0.001	0.001	-90	0.001	0.001	0.001	-88	0.019	0.019	0.019	-50	0.028	0.028	0.029	-45	0.035	0.035	0.035	0
Al, Tot	Closure	Mar	6	0.000	0.000	0.000	-100	0.001	0.001	0.001	-92	0.001	0.001	0.001	-90	0.017	0.017	0.018	-53	0.026	0.026	0.027	-47	0.033	0.033	0.033	0
Al, Tot	Closure	Apr	6	0.001	0.002	0.002	-95	0.001	0.001	0.001	-93	0.001	0.001	0.001	-89	0.016	0.016	0.016	-56	0.024	0.024	0.026	-50	0.033	0.033	0.033	0
Al, Tot	Closure	May	6	0.028	0.028	0.029	-53	0.002	0.002	0.002	-72	0.011	0.011	0.012	-45	0.018	0.018	0.019	-47	0.073	0.073	0.074	-24	0.029	0.029	0.029	0
Al, Tot	Closure	Jun	6	0.030	0.031	0.033	-56	0.004	0.004	0.004	-59	0.010	0.010	0.011	-52	0.020	0.020	0.021	-43	0.065	0.065	0.066	-25	0.031	0.031	0.031	0
Al, Tot	Closure	Jul	6	0.021	0.022	0.024	-66	0.004	0.004	0.004	-58	0.007	0.007	0.007	-54	0.022	0.022	0.022	-40	0.057	0.057	0.058	-28	0.031	0.031	0.031	0
Al, Tot	Closure	Aug	6	0.010	0.011	0.013	-77	0.004	0.004	0.004	-62	0.005	0.005	0.005	-52	0.022	0.022	0.023	-37	0.046	0.046	0.047	-30	0.031	0.031	0.031	0
Al, Tot	Closure	Sep	6	0.005	0.006	0.007	-85	0.003	0.003	0.003	-67	0.007	0.007	0.008	-47	0.023	0.023	0.023	-36	0.039	0.039	0.040	-33	0.030	0.030	0.030	0
Al, Tot	Closure	Oct	6	0.003	0.003	0.004	-90	0.002	0.003	0.003	-71	0.007	0.007	0.008	-54	0.022	0.022	0.023	-37	0.033	0.033	0.034	-35	0.029	0.029	0.029	0
Al, Tot	Closure	Nov	6	0.002	0.002	0.003	-94	0.002	0.002	0.003	-77	0.004	0.004	0.006	-75	0.022	0.023	0.024	-40	0.033	0.034	0.035	-37	0.034	0.034	0.034	0
Al, Tot	Closure	Dec	6	0.001	0.001	0.002	-97	0.002	0.002	0.002	-83	0.002	0.002	0.002	-81	0.021	0.021	0.022	-43	0.031	0.031	0.032	-39	0.033	0.033	0.033	0
Al, Tot	Post-Closure	Jan	117	0.036	0.036	0.036	10	0.011	0.011	0.011	12	0.008	0.008	0.009	-3	0.036	0.036	0.037	-1	0.049	0.049	0.051	-1	0.033	0.033	0.033	0
Al, Tot	Post-Closure	Feb	117	0.040	0.039	0.040	10	0.012	0.011	0.012	12	0.008	0.007	0.009	-7	0.037	0.037	0.039	-2	0.049	0.049	0.051	-1	0.035	0.035	0.035	0
Al, Tot	Post-Closure	Mar	117	0.034	0.033	0.034	10	0.012	0.011	0.012	14	0.005	0.005	0.007	-26	0.036	0.036	0.038	-2	0.048	0.048	0.050	-1	0.033	0.033	0.033	0
Al, Tot	Post-Closure	Apr	117	0.033	0.032	0.033	10	0.012	0.011	0.012	16	0.004	0.004	0.006	-32	0.036	0.036	0.038	-2	0.047	0.047	0.049	-1	0.033	0.033	0.033	0
Al, Tot	Post-Closure	May	117	0.058	0.057	0.058	-2	0.009	0.009	0.009	12	0.019	0.020	0.022	-4	0.034	0.034	0.036	-2	0.095	0.095	0.097	-1	0.029	0.029	0.029	0
Al, Tot	Post-Closure	Jun	117	0.067	0.067	0.067	-4	0.011	0.010	0.011	8	0.021	0.021	0.022	0	0.035	0.035	0.037	-2	0.086	0.086	0.089	-1	0.031	0.031	0.031	0
Al, Tot	Post-Closure	Jul	117	0.062	0.062	0.062	-3	0.011	0.011	0.011	7	0.015	0.015	0.016	1	0.036	0.035	0.037	-1	0.077	0.077	0.079	-1	0.031	0.031	0.031	0
Al, Tot	Post-Closure	Aug	117	0.048	0.048	0.048	1	0.011	0.010	0.011	8	0.011	0.010	0.011	1	0.035	0.035	0.037	-1	0.066	0.066	0.067	-1	0.031	0.031	0.031	0
Al, Tot	Post-Closure	Sep	117	0.038	0.038	0.038	5	0.010	0.010	0.010	9	0.013	0.013	0.014	0	0.035	0.035	0.036	-1	0.056	0.056	0.058	-1	0.030	0.030	0.030	0
Al, Tot	Post-Closure	Oct	117	0.032	0.032	0.032	8	0.010	0.010	0.010	10	0.015	0.015	0.015	-1	0.034	0.034	0.035	-1	0.050	0.050	0.052	0	0.029	0.029	0.029	0
Al, Tot	Post-Closure	Nov	117	0.040	0.040	0.040	10	0.012	0.012	0.012	11	0.017	0.017	0.019	-1	0.038	0.038	0.039	-1	0.053	0.053	0.054	0	0.034	0.034	0.034	0
Al, Tot	Post-Closure	Dec	117	0.038	0.038	0.038	10	0.011	0.011	0.011	12	0.010	0.010	0.011	0	0.036	0.036	0.038	-1	0.050	0.050	0.052	-1	0.033	0.033	0.033	0
Sb, Diss	Construction	Jan	2	0.00006	0.00006	0.00008	-37	0.00008	0.00008	0.00009	-3	0.00005	0.00005	0.00006	-29	0.00008	0.00008	0.00009	-9	0.00008	0.00008	0.00009	-5	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Feb	2	0.00005	0.00005	0.00006	-53	0.00009	0.00009	0.00011	-1	0.00006	0.00006	0.00006	-23	0.00008	0.00008	0.00009	-12	0.00008	0.00008	0.00009	-6	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Mar	2	0.00004	0.00004	0.00004	-56	0.00008	0.00008	0.00011	-2	0.00005	0.00005	0.00006	-21	0.00008	0.00008	0.00008	-14	0.00008	0.00008	0.00009	-6	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Apr	2	0.00004	0.00004	0.00004	-56	0.00008	0.00008	0.00010	-2	0.00005	0.00005	0.00006	-18	0.00007	0.00007	0.00008	-18	0.00008	0.00008	0.00009	-7	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	May	2	0.00004	0.00004	0.00004	-36	0.00006	0.00006	0.00008	2	0.00005	0.00005	0.00006	-11	0.00006	0.00006	0.00006	-17	0.00007	0.00007	0.00007	-8	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Jun	2	0.00006	0.00006	0.00006	-26	0.00007	0.00007	0.00008	5	0.00006	0.00006	0.00007	-17	0.00007	0.00007	0.00008	-16	0.00007	0.00007	0.00007	-8	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Jul	2	0.00006	0.00006	0.00006	-24	0.00008	0.00008	0.00008	8	0.00007	0.00007	0.00007	-19	0.00007	0.00007	0.00007	-15	0.00007	0.00007	0.00008	-9	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Aug	2	0.00006	0.00006	0.00006	-25	0.00008	0.00008	0.00008	9	0.00007	0.00007	0.00007	-18	0.00007	0.00007	0.00007	-14	0.00007	0.00007	0.00008	-10	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Sep	2	0.00006	0.00006	0.00006	-26	0.00007	0.00007	0.00008	6	0.00007	0.00007	0.00007	-18	0.00007	0.00007	0.00007	-14	0.00007	0.00007	0.00008	-10	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Oct	2	0.00006	0.00006	0.00006	-29	0.00007	0.00007	0.00007	2	0.00006	0.00006	0.00006	-19	0.00007	0.00007	0.00007	-14	0.00007	0.00007	0.00007	-11	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Nov	2	0.00006	0.00006	0.00006	-40	0.00008	0.00008	0.00008	-5	0.00008	0.00008	0.00008	-31	0.00008	0.00008	0.00008	-16	0.00008	0.00008	0.00008	-12	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Dec	2	0.00005	0.00005	0.00005	-53	0.00007	0.00007	0.00007	-15	0.00007	0.00007	0.00007	-13	0.00007	0.00007	0.00008	-16	0.00008	0.00008	0.00008	-12	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Jan	5	0.00004	0.00004	0.00004	-58	0.00012	0.00012	0.00018	48	0.00011	0.00012	0.00019	74	0.00011	0.00011	0.00018	30	0.00009	0.00009	0.00013	8	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Feb	5	0.00004	0.00004	0.00004	-63	0.00013	0.00014	0.00023	61	0.00012	0.00012	0.00019	61	0.00011	0.00012	0.00018	29	0.00009	0.00010	0.00014	9	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Mar	5	0.00003	0.00003	0.00004	-61	0.00017	0.00018	0.00032	116	0.00011	0.00011	0.00019	69	0.00011	0.00012	0.00018	28	0.00009	0.00010	0.00014	10	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Apr	5	0.00004	0.00004	0.00004	-58	0.00020	0.00021	0.00035	145	0.00014	0.00015	0.00024	126	0.00011	0.00012	0.00018	29	0.00009	0.00010	0.00014	11	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	May	5	0.00004	0.00004	0.00004	-37	0.00016	0.00016	0.00027	157	0.00010	0.00010	0.00015	70	0.00009	0.00010	0.00015	30	0.00008	0.00009	0.00012	12	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Jun	5	0.00006	0.00006	0.00006	-26	0.00019	0.00019	0.00031	184	0.00013	0.00014	0.00021	84	0.00009	0.00010	0.00015	31	0.00008	0.00009	0.00012	12	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Jul	5	0.00006	0.00006	0.00006	-25	0.00024	0.00024	0.00039	243	0.00016	0.00016	0.00025	95	0.00010	0.00010	0.00015	32	0.00009	0.00009	0.00013	14	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Aug	5	0.00006	0.00006	0.00006	-26	0.00026	0.00026	0.00043	276	0.00018	0.00018	0.00029	122	0.00010	0.00011	0.00016	36	0.00009	0.00009	0.00013	15	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Sep	5	0.00006	0.00006	0.00006	-27	0.00026	0.00026	0.00042	271	0.00019	0.00019	0.00030	137	0.00010	0.00011	0.00016	41	0.00009	0.00010	0.00013	17	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Oct	5	0.00005	0.00005	0.00006	-29	0.00023	0.00023	0.00036	233	0.00020	0.00020	0.00030	153	0.00011	0.00012	0.00017	48	0.00009	0.00010	0.00013	19	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Nov	5	0.00006	0.00006	0.00006	-41	0.00022	0.00022	0.00035	168	0.00025	0.00025	0.00039	123	0.00014	0.00014	0.00020	55	0.00010	0.00011	0.00015	22	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Dec	5	0.00005	0.00005	0.00005	-54	0.00018	0.00018	0.00026	116	0.00018	0.00018	0.00028	136	0.00014	0.00014	0.00021	59	0.00010	0.00011	0.00015	24	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Jan	6	0.00004	0.00004	0.00004	-58	0.00006	0.00008	0.00020	2	0.00006	0.00009	0.00022	26	0.00008	0.00010	0.00021	17	0.00009	0.00010	0.00015	16	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Feb	6	0.00004	0.00004	0.00004	-62	0.00006	0.00008	0.00016	-12	0.00006	0.00008	0.00018	11	0.00008	0.00011	0.00022	15	0.00009	0.00010	0.00016	16	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Mar	6	0.00004	0.00004	0.00004	-61	0.00006	0.00007	0.00012	-22	0.00006	0.00007	0.00013	0	0.00008	0.00010	0.00021	12	0.00009	0.00010	0.00016	16	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Apr	6	0.00004	0.00004	0.00004	-58	0.00005	0.00006	0.00010	-29	0.00005	0.00006	0.00010	-6	0.00008	0.00010	0.00020	9	0.00009	0.00010	0.00016	15	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	May	6	0.00004	0.00004	0.00004	-38	0.00004	0.00005	0.00007	-23	0.00005	0.00005	0.00006	-13	0.00006	0.00008	0.00016	7	0.00008	0.00009	0.00014	14	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Jun	6	0.00006	0.00006	0.00006	-27	0.00005	0.00005	0.00007	-18	0.00006	0.00006	0.00007	-18	0.00006	0.00008	0.00014	3	0.00008	0.00009	0.00014	10	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Jul	6	0.00006	0.00006	0.00006	-25	0.00006	0.00006	0.00007	-15	0.00007	0.00007	0.00008	-17	0.00007	0.00008	0.00013	1	0.00008	0.00009	0.00013	8	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Aug	6	0.00006	0.00006	0.00006	-25	0.00006	0.00006	0.00007	-14	0.00007	0.00007	0.00008	-16	0.00007	0.00008	0.00012	0	0.00008	0.00009	0.00013	6	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Sep	6	0.00006	0.00006	0.00006	-26	0.00006	0.00006	0.00007	-15	0.00007	0.00007	0.00008	-17	0.00007	0.00008	0.00012	-2	0.00008	0.00009	0.00013	5	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Oct	6	0.00006	0.00006	0.00006	-28	0.00005	0.00006	0.00006	-18	0.00006	0.00006	0.00007	-18	0.00007	0.00008	0.00011	-3	0.00007	0.00008	0.00012	4	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Nov	6	0.00006	0.00006	0.00007	-40	0.00007	0.00007	0.00008	-21	0.00007	0.00008	0.00009	-31	0.00008	0.00009	0.00012	-5	0.00008	0.00009	0.00013	2	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Dec	6	0.00005	0.00005	0.00005	-53	0.00006	0.00006	0.00007	-25	0.00006	0.00006	0.00007	-20	0.00007	0.00008	0.00012	-7	0.00008	0.00009	0.00013	2	0.00010	0.00010	0.00010	0
Sb, Diss	Post-Closure	Jan	117	0.00010	0.00010	0.00010	0	0.00033	0.00029	0.00033	253	0.00021	0.00019	0.00021	178	0.00013	0.00012	0.00013	41	0.00011	0.00011	0.00011	23	0.00010	0.00010	0.00010	5
Sb, Diss	Post-Closure	Feb	117	0.00011	0.00011	0.00011	0	0.00036	0.00032	0.00036	266	0.00023	0.00020	0.00023	168	0.00014	0.00013	0.00014	42	0.00012	0.00011	0.00012	23	0.00011	0.00011	0.00011	6
Sb, Diss	Post-Closure	Mar	117	0.00009	0.00009	0.00009	0	0.00039	0.00034	0.00039	302	0.00016	0.00014	0.00016	107	0.00014	0.00013	0.00014	42	0.00011	0.00011	0.00012	24	0.00010	0.00010	0.00010	6
Sb, Diss	Post-Closure	Apr	117	0.00009	0.00009	0.00009	0	0.00043	0.00037	0.00043	340	0.00014	0.00013	0.00014	96	0.00014	0.00013	0.00014	42	0.00011	0.00011	0.00011	24	0.00010	0.00010	0.00010	6
Sb, Diss	Post-Closure	May	117	0.00007	0.00007	0.00007	-1	0.00030	0.00026	0.00030	319	0.00008	0.00008	0.00008	31	0.00011	0.00010	0.00011	40	0.00010	0.00009	0.00010	23	0.00009	0.00009	0.00009	6
Sb, Diss	Post-Closure	Jun	117	0.00007	0.00007	0.00007	-2	0.00029	0.00025	0.00029	275	0.00017	0.00015	0.00017	104	0.00011	0.00010	0.00011	37	0.00010	0.00010	0.00010	21	0.00009	0.00009	0.00009	5
Sb, Diss	Post-Closure	Jul	117	0.00008	0.00008	0.00008	-2	0.00028	0.00025	0.00028	254	0.00017	0.00016	0.00017	96	0.00011	0.00011	0.00011	35	0.00010	0.00010	0.00010	20	0.00009	0.00009	0.00009	5
Sb, Diss	Post-Closure	Aug	117	0.00008	0.00008	0.00008	-1	0.00027	0.00024	0.00027	238	0.00017	0.00016	0.00017	93	0.00011	0.00011	0.00011	34	0.00010	0.00010	0.00010	21	0.00009	0.00009	0.00009	5
Sb, Diss	Post-Closure	Sep	117	0.00008	0.00008	0.00008	-1	0.00026	0.00023	0.00026	232	0.00017	0.00016	0.00017	92	0.00011	0.00011	0.00011	33	0.00010	0.00010	0.00010	21	0.00009	0.00009	0.00009	5
Sb, Diss	Post-Closure	Oct	117	0.00008	0.00008	0.00008	0	0.00026	0.00023	0.00026	235	0.00017	0.00015	0.00017	100	0.00011	0.00011	0.00011	34	0.00010	0.00010	0.00010	22	0.00009	0.00009	0.00009	5
Sb, Diss	Post-Closure	Nov	117	0.00011	0.00011	0.00011	0	0.00032	0.00028	0.00032	239	0.00029	0.00026	0.00029	135	0.00013	0.00012	0.00013	37	0.00011	0.00011	0.00011	22	0.00010	0.00010	0.00010	5
Sb, Diss	Post-Closure	Dec	117	0.00010	0.00010	0.00010	0	0.00032	0.00028	0.00032	246	0.00024	0.00021	0.00024	176	0.00013	0.00012	0.00013	40	0.00011	0.00011	0.00011	23	0.00010	0.00010	0.00010	5
Sb, Tot	Construction	Jan	2	0.00007	0.00007	0.00009	-37	0.00010	0.00010	0.00012	-10	0.00006	0.00006	0.00008	-32	0.00010	0.00010	0.00011	-8	0.00009	0.00009	0.00009	-5	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Feb	2	0.00005	0.00005	0.00007	-53	0.00010	0.00010	0.00013	-12	0.00007	0.00007	0.00007	-29	0.00010	0.00010	0.00011	-11	0.00009	0.00009	0.00009	-5	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Mar	2	0.00004	0.00004	0.00005	-56	0.00010	0.00010	0.00013	-15	0.00006	0.00006	0.00007	-29	0.00010	0.00010	0.00010	-14	0.00009	0.00009	0.00009	-5	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Apr	2	0.00004	0.00004	0.00004	-56	0.00009	0.00009	0.00012	-16	0.00006	0.00006	0.00007	-27	0.00009	0.00009	0.00010	-17	0.00009	0.00009	0.00009	-6	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	May	2	0.00004	0.00004	0.00004	-38	0.00007	0.00007	0.00008	-12	0.00006	0.00006	0.00006	-11	0.00008	0.00008	0.00009	-17	0.00008	0.00008	0.00008	-6	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Jun	2	0.00006	0.00006	0.00006	-27	0.00007	0.00007	0.00008	-8	0.00007	0.00007	0.00007	-20	0.00008	0.00008	0.00009	-17	0.00008	0.00008	0.00008	-6	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Jul	2	0.00006	0.00006	0.00006	-24	0.00008	0.00008	0.00009	-3	0.00007	0.00007	0.00007	-22	0.00008	0.00008	0.00009	-17	0.00008	0.00008	0.00008	-7	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Aug	2	0.00006	0.00006	0.00006	-24	0.00008	0.00008	0.00009	0	0.00007	0.00007	0.00007	-20	0.00008	0.00008	0.00009	-16	0.00008	0.00008	0.00008	-8	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Sep	2	0.00006	0.00006	0.00006	-25	0.00008	0.00008	0.00009	2	0.00007	0.00007	0.00007	-18	0.00008	0.00008	0.00008	-16	0.00008	0.00008	0.00008	-9	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Oct	2	0.00006	0.00006	0.00006	-27	0.00008	0.00008	0.00009	1	0.00007	0.00007	0.00007	-16	0.00008	0.00008	0.00008	-16	0.00007	0.00007	0.00008	-10	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Nov	2	0.00007	0.00007	0.00007	-39	0.00010	0.00010	0.00011	-9	0.00010	0.00010	0.00010	-28	0.00009	0.00009	0.00009	-17	0.00008	0.00008	0.00008	-11	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Dec	2	0.00005	0.00005	0.00005	-53	0.00009	0.00009	0.00009	-21	0.00009	0.00009	0.00009	-15	0.00009	0.00009	0.00009	-17	0.00008	0.00008	0.00008	-11	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Jan	5	0.00004	0.00004	0.00004	-58	0.00014	0.00014	0.00021	28	0.00013	0.00014	0.00022	56	0.00013	0.00014	0.00021	28	0.00009	0.00010	0.00013	9	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Feb	5	0.00004	0.00004	0.00004	-63	0.00015	0.00016	0.00025	36	0.00013	0.00014	0.00021	40	0.00013	0.00015	0.00022	28	0.00009	0.00010	0.00014	10	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Mar	5	0.00004	0.00004	0.00004	-61	0.00019	0.00020	0.00035	79	0.00013	0.00013	0.00020	44	0.00013	0.00014	0.00022	27	0.00009	0.00010	0.00014	11	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Apr	5	0.00004	0.00004	0.00004	-58	0.00022	0.00023	0.00039	101	0.00016	0.00016	0.00026	92	0.00013	0.00014	0.00022	28	0.00009	0.00010	0.00014	12	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	May	5	0.00004	0.00004	0.00004	-38	0.00017	0.00017	0.00029	114	0.00010	0.00011	0.00016	69	0.00012	0.00012	0.00019	25	0.00008	0.00009	0.00013	14	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Jun	5	0.00006	0.00006	0.00006	-27	0.00020	0.00020	0.00032	142	0.00014	0.00014	0.00022	73	0.00012	0.00012	0.00018	25	0.00009	0.00009	0.00013	15	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Jul	5	0.00006	0.00006	0.00006	-25	0.00025	0.00025	0.00041	201	0.00016	0.00016	0.00025	85	0.00012	0.00012	0.00018	26	0.00009	0.00010	0.00013	15	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Aug	5	0.00006	0.00006	0.00006	-24	0.00028	0.00028	0.00046	241	0.00019	0.00019	0.00030	116	0.00012	0.00013	0.00018	30	0.00009	0.00010	0.00013	17	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Sep	5	0.00006	0.00006	0.00006	-25	0.00029	0.00029	0.00046	247	0.00021	0.00021	0.00032	136	0.00013	0.00013	0.00019	36	0.00009	0.00010	0.00013	18	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Oct	5	0.00006	0.00006	0.00006	-27	0.00026	0.00026	0.00041	220	0.00022	0.00022	0.00034	159	0.00013	0.00014	0.00020	43	0.00009	0.00010	0.00013	20	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Nov	5	0.00007	0.00007	0.00007	-39	0.00027	0.00027	0.00041	137	0.00030	0.00030	0.00045	112	0.00016	0.00017	0.00024	51	0.00011	0.00011	0.00015	22	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Dec	5	0.00005	0.00005	0.00005	-53	0.00021	0.00021	0.00031	89	0.00022	0.00022	0.00033	115	0.00017	0.00017	0.00025	56	0.00011	0.00011	0.00016	24	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Jan	6	0.00004	0.00004	0.00005	-57	0.00007	0.00010	0.00023	-10	0.00008	0.00010	0.00025	15	0.00010	0.00013	0.00025	17	0.00009	0.00011	0.00016	17	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Feb	6	0.00004	0.00004	0.00004	-62	0.00007	0.00009	0.00018	-23	0.00008	0.00010	0.00021	0	0.00010	0.00013	0.00026	15	0.00009	0.00011	0.00016	17	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Mar	6	0.00004	0.00004	0.00004	-61	0.00007	0.00008	0.00014	-33	0.00007	0.00008	0.00015	-11	0.00010	0.00013	0.00025	13	0.00009	0.00011	0.00017	17	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Apr	6	0.00004	0.00004	0.00004	-58	0.00006	0.00007	0.00011	-39	0.00006	0.00007	0.00012	-15	0.00010	0.00012	0.00024	10	0.00009	0.00011	0.00017	17	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	May	6	0.00004	0.00004	0.00004	-39	0.00005	0.00005	0.00008	-34	0.00005	0.00005	0.00007	-14	0.00008	0.00010	0.00019	6	0.00008	0.00009	0.00014	16	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Jun	6	0.00006	0.00006	0.00006	-28	0.00006	0.00006	0.00007	-28	0.00006	0.00006	0.00008	-22	0.00008	0.00010	0.00018	2	0.00008	0.00009	0.00014	13	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Jul	6	0.00006	0.00006	0.00006	-25	0.00006	0.00006	0.00008	-24	0.00007	0.00007	0.00008	-20	0.00008	0.00010	0.00016	0	0.00008	0.00009	0.00014	11	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Aug	6	0.00006	0.00006	0.00007	-24	0.00006	0.00007	0.00008	-20	0.00007	0.00007	0.00008	-19	0.00008	0.00010	0.00015	-2	0.00008	0.00009	0.00014	8	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Sep	6	0.00006	0.00006	0.00007	-25	0.00006	0.00007	0.00008	-18	0.00007	0.00007	0.00008	-17	0.00008	0.00009	0.00014	-3	0.00008	0.00009	0.00013	6	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Oct	6	0.00006	0.00006	0.00006	-27	0.00006	0.00007	0.00008	-18	0.00007	0.00007	0.00008	-16	0.00008	0.00009	0.00013	-5	0.00008	0.00009	0.00013	5	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Nov	6	0.00007	0.00007	0.00007	-38	0.00009	0.00009	0.00010	-21	0.00010	0.00010	0.00011	-28	0.00009	0.00010	0.00015	-6	0.00008	0.00009	0.00014	4	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Dec	6	0.00005	0.00005	0.00006	-52	0.00008	0.00008	0.00009	-28	0.00008	0.00008	0.00009	-20	0.00009	0.00010	0.00014	-7	0.00008	0.00009	0.00014	3	0.00010	0.00010	0.00010	0
Sb, Tot	Post-Closure	Jan	117	0.00011	0.00010	0.00011	0	0.00038	0.00034	0.00038	207	0.00025	0.00022	0.00025	148	0.00016	0.00015	0.00016	39	0.00012	0.00011	0.00012	23	0.00010	0.00010	0.00010	5
Sb, Tot	Post-Closure	Feb	117	0.00012	0.00012	0.00012	0	0.00042	0.00037	0.00042	218	0.00026	0.00024	0.00026	139	0.00017	0.00016	0.00017	40	0.00012	0.00011	0.00012	24	0.00011	0.00011	0.00011	6
Sb, Tot	Post-Closure	Mar	117	0.00010	0.00010	0.00010	0	0.00045	0.00040	0.00045	247	0.00018	0.00016	0.00018	85	0.00017	0.00016	0.00017	41	0.00012	0.00011	0.00012	24	0.00010	0.00010	0.00010	6
Sb, Tot	Post-Closure	Apr	117	0.00010	0.00010	0.00010	0	0.00049	0.00043	0.00049	279	0.00016	0.00015	0.00016	76	0.00017	0.00016	0.00017	41	0.00012	0.00011	0.00012	24	0.00010	0.00010	0.00010	6
Sb, Tot	Post-Closure	May	117	0.00007	0.00007	0.00007	-1	0.00034	0.00030	0.00034	272	0.00009	0.00008	0.00009	31	0.00014	0.00013	0.00014	36	0.00010	0.00010	0.00010	23	0.00009	0.00009	0.00009	6
Sb, Tot	Post-Closure	Jun	117	0.00008	0.00008	0.00008	-2	0.00032	0.00028	0.00032	245	0.00018	0.00017	0.00018	101	0.00014	0.00013	0.00014	34	0.00010	0.00010	0.00010	21	0.00009	0.00009	0.00009	5
Sb, Tot	Post-Closure	Jul	117	0.00008	0.00008	0.00008	-2	0.00031	0.00027	0.00031	231	0.00019	0.00017	0.00019	95	0.00014	0.00013	0.00014	33	0.00010	0.00010	0.00010	21	0.00009	0.00009	0.00009	5
Sb, Tot	Post-Closure	Aug	117	0.00008	0.00008	0.00008	-1	0.00030	0.00026	0.00030	220	0.00019	0.00017	0.00019	92	0.00014	0.00013	0.00014	32	0.00011	0.00010	0.00011	21	0.00009	0.00009	0.00009	5
Sb, Tot	Post-Closure	Sep	117	0.00008	0.00008	0.00008	-1	0.00029	0.00026	0.00029	215	0.00019	0.00017	0.00019	92	0.00013	0.00013	0.00013	32	0.00011	0.00010	0.00011	22	0.00009	0.00009	0.00009	5
Sb, Tot	Post-Closure	Oct	117	0.00008	0.00008	0.00008	-1	0.00029	0.00026	0.00029	219	0.00018	0.00017	0.00019	100	0.00013	0.00013	0.00013	33	0.00010	0.00010	0.00010	22	0.00009	0.00009	0.00009	5
Sb, Tot	Post-Closure	Nov	117	0.00011	0.00011	0.00011	0	0.00038	0.00033	0.00038	195	0.00034	0.00031	0.00034	119	0.00016	0.00015	0.00016	36	0.00012	0.00011	0.00012	23	0.00010	0.00010	0.00010	5
Sb, Tot	Post-Closure	Dec	117	0.00011	0.00011	0.00011	0	0.00038	0.00034	0.00038	201	0.00028	0.00025	0.00028	148	0.00016	0.00015	0.00016	38	0.00012	0.00011	0.00012	23	0.00010	0.00010	0.00010	5
As, Diss	Construction	Jan	2	0.0005	0.0005	0.0005	12	0.0016	0.0016	0.0020	-6	0.0005	0.0005	0.0007	-29	0.0003	0.0003	0.0003	21	0.0003	0.0003	0.0003	12	0.0003	0.0003	0.0003	0
As, Diss	Construction	Feb	2	0.0005	0.0005	0.0005	3	0.0017	0.0017	0.0024	-2	0.0006	0.0006	0.0007	-26	0.0003	0.0003	0.0003	20	0.0003	0.0003	0.0003	13	0.0003	0.0003	0.0003	0
As, Diss	Construction	Mar	2	0.0004	0.0004	0.0004	6	0.0017	0.0017	0.0025	-2	0.0006	0.0006	0.0008	-17	0.0003	0.0003	0.0003	21	0.0003	0.0003	0.0003	13	0.0003	0.0003	0.0003	0
As, Diss	Construction	Apr	2	0.0005	0.0005	0.0005	20	0.0016	0.0016	0.0024	-3	0.0007	0.0007	0.0009	-5	0.0003	0.0003	0.0003	24	0.0003	0.0003	0.0003	14	0.0003	0.0003	0.0003	0
As, Diss	Construction	May	2	0.0004	0.0004	0.0004	37	0.0011	0.0011	0.0015	0	0.0005	0.0005	0.0007	103	0.0002	0.0002	0.0002	29	0.0002	0.0002	0.0003	15	0.0002	0.0002	0.0002	0
As, Diss	Construction	Jun	2	0.0005	0.0005	0.0005	46	0.0010	0.0010	0.0014	5	0.0006	0.0006	0.0008	23	0.0003	0.0003	0.0003	33	0.0002	0.0002	0.0002	15	0.0002	0.0002	0.0002	0
As, Diss	Construction	Jul	2	0.0005	0.0005	0.0005	45	0.0010	0.0010	0.0013	14	0.0005	0.0005	0.0007	14	0.0003	0.0003	0.0003	31	0.0002	0.0002	0.0002	16	0.0002	0.0002	0.0002	0
As, Diss	Construction	Aug	2	0.0005	0.0005	0.0005	39	0.0010	0.0010	0.0013	22	0.0006	0.0006	0.0007	22	0.0003	0.0003	0.0003	30	0.0002	0.0002	0.0003	17	0.0002	0.0002	0.0002	0
As, Diss	Construction	Sep	2	0.0005	0.0005	0.0005	42	0.0009	0.0009	0.0012	27	0.0005	0.0005	0.0006	19	0.0003	0.0003	0.0003	28	0.0003	0.0003	0.0003	18	0.0002	0.0002	0.0002	0
As, Diss	Construction	Oct	2	0.0005	0.0005	0.0005	49	0.0009	0.0009	0.0011	30	0.0005	0.0005	0.0005	26	0.0002	0.0002	0.0003	24	0.0002	0.0002	0.0003	18	0.0002	0.0002	0.0002	0
As, Diss	Construction	Nov	2	0.0006	0.0006	0.0006	36	0.0017	0.0017	0.0019	-4	0.0009	0.0009	0.0010	6	0.0003	0.0003	0.0003	24	0.0003	0.0003	0.0003	18	0.0003	0.0003	0.0003	0
As, Diss	Construction	Dec	2	0.0005	0.0005	0.0005	17	0.0013	0.0013	0.0015	-23	0.0008	0.0008	0.0009	-4	0.0003	0.0003	0.0003	27	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	0
As, Diss	Operations	Jan	5	0.0005	0.0005	0.0005	11	0.0016	0.0016	0.0021	-5	0.0010	0.0010	0.0013	25	0.0004	0.0004	0.0006	79	0.0003	0.0003	0.0005	46	0.0003	0.0003	0.0003	0
As, Diss	Operations	Feb	5	0.0005	0.0005	0.0005	0	0.0017	0.0017	0.0023	-4	0.0009	0.0009	0.0011	2	0.0004	0.0004	0.0006	79	0.0003	0.0003	0.0005	48	0.0003	0.0003	0.0003	0
As, Diss	Operations	Mar	5	0.0004	0.0004	0.0004	3	0.0021	0.0020	0.0028	16	0.0008	0.0008	0.0010	1	0.0004	0.0004	0.0006	77	0.0003	0.0004	0.0005	50	0.0003	0.0003	0.0003	0
As, Diss	Operations	Apr	5	0.0005	0.0005	0.0005	18	0.0023	0.0021	0.0028	25	0.0011	0.0010	0.0013	39	0.0004	0.0004	0.0006	77	0.0003	0.0004	0.0005	52	0.0003	0.0003	0.0003	0
As, Diss	Operations	May	5	0.0004	0.0004	0.0004	36	0.0017	0.0015	0.0020	41	0.0008	0.0007	0.0009	174	0.0003	0.0003	0.0005	81	0.0003	0.0003	0.0004	53	0.0002	0.0002	0.0002	0
As, Diss	Operations	Jun	5	0.0005	0.0005	0.0005	44	0.0020	0.0017	0.0022	77	0.0010	0.0009	0.0012	91	0.0004	0.0004	0.0005	84	0.0003	0.0003	0.0004	50	0.0002	0.0002	0.0002	0
As, Diss	Operations	Jul	5	0.0005	0.0005	0.0005	43	0.0025	0.0020	0.0027	138	0.0011	0.0010	0.0013	113	0.0004	0.0004	0.0005	83	0.0003	0.0003	0.0004	50	0.0002	0.0002	0.0002	0
As, Diss	Operations	Aug	5	0.0005	0.0005	0.0005	37	0.0028	0.0023	0.0031	193	0.0015	0.0012	0.0016	172	0.0004	0.0004	0.0005	88	0.0003	0.0003	0.0004	52	0.0002	0.0002	0.0002	0
As, Diss	Operations	Sep	5	0.0005	0.0005	0.0005	40	0.0029	0.0024	0.0032	222	0.0014	0.0012	0.0016	193	0.0004	0.0004	0.0005	92	0.0003	0.0003	0.0004	55	0.0002	0.0002	0.0002	0
As, Diss	Operations	Oct	5	0.0005	0.0005	0.0005	47	0.0026	0.0022	0.0029	214	0.0014	0.0012	0.0016	233	0.0004	0.0004	0.0005	93	0.0003	0.0003	0.0004	58	0.0002	0.0002	0.0002	0
As, Diss	Operations	Nov	5	0.0006	0.0006	0.0006	34	0.0033	0.0029	0.0036	65	0.0022	0.0019	0.0024	126	0.0005	0.0004	0.0006	101	0.0004	0.0004	0.0005	61	0.0003	0.0003	0.0003	0
As, Diss	Operations	Dec	5	0.0005	0.0005	0.0005	16	0.0025	0.0022	0.0027	31	0.0016	0.0014	0.0017	70	0.0005	0.0005	0.0006	109	0.0004	0.0004	0.0005	64	0.0003	0.0003	0.0003	0
As, Diss	Closure	Jan	6	0.0005	0.0005	0.0005	12	0.0009	0.0011	0.0020	-34	0.0006	0.0007	0.0013	-10	0.0003	0.0003	0.0006	41	0.0003	0.0003	0.0005	38	0.0003	0.0003	0.0003	0
As, Diss	Closure	Feb	6	0.0005	0.0005	0.0005	1	0.0008	0.0010	0.0016	-45	0.0005	0.0006	0.0011	-28	0.0003	0.0003	0.0006	40	0.0003	0.0003	0.0005	38	0.0003	0.0003	0.0003	0
As, Diss	Closure	Mar	6	0.0004	0.0004	0.0004	4	0.0007	0.0008	0.0013	-52	0.0004	0.0005	0.0008	-34	0.0003	0.0003	0.0006	37	0.0003	0.0003	0.0005	38	0.0003	0.0003	0.0003	0
As, Diss	Closure	Apr	6	0.0005	0.0005	0.0005	19	0.0006	0.0007	0.0010	-57	0.0004	0.0005	0.0007	-32	0.0003	0.0003	0.0006	35	0.0003	0.0003	0.0005	38	0.0003	0.0003	0.0003	0
As, Diss	Closure	May	6	0.0004	0.0004	0.0004	36	0.0005	0.0005	0.0007	-53	0.0003	0.0003	0.0004	18	0.0002	0.0003	0.0005	32	0.0002	0.0003	0.0004	36	0.0002	0.0002	0.0002	0
As, Diss	Closure	Jun	6	0.0005	0.0005	0.0005	44	0.0005	0.0005	0.0006	-46	0.0003	0.0004	0.0005	-24	0.0002	0.0002	0.0004	27	0.0002	0.0003	0.0004	31	0.0002	0.0002	0.0002	0
As, Diss	Closure	Jul	6	0.0005	0.0005	0.0005	43	0.0005	0.0005	0.0006	-39	0.0003	0.0004	0.0004	-22	0.0002	0.0002	0.0004	21	0.0002	0.0003	0.0004	27	0.0002	0.0002	0.0002	0
As, Diss	Closure	Aug	6	0.0005	0.0005	0.0005	38	0.0005	0.0005	0.0006	-32	0.0004	0.0004	0.0004	-15	0.0002	0.0002	0.0004	16	0.0002	0.0003	0.0004	24	0.0002	0.0002	0.0002	0
As, Diss	Closure	Sep	6	0.0005	0.0005	0.0005	41	0.0005	0.0005	0.0006	-27	0.0003	0.0004	0.0004	-13	0.0002	0.0002	0.0003	12	0.0002	0.0003	0.0004	21	0.0002	0.0002	0.0002	0
As, Diss	Closure	Oct	6	0.0005	0.0005	0.0005	48	0.0005	0.0005	0.0006	-22	0.0003	0.0003	0.0004	-8	0.0002	0.0002	0.0003	9	0.0002	0.0002	0.0004	20	0.0002	0.0002	0.0002	0
As, Diss	Closure	Nov	6	0.0006	0.0006	0.0006	35	0.0013	0.0014	0.0015	-23	0.0008	0.0008	0.0009	-7	0.0002	0.0002	0.0003	8	0.0002	0.0003	0.0004	18	0.0003	0.0003	0.0003	0
As, Diss	Closure	Dec	6	0.0005	0.0005	0.0005	18	0.0011	0.0011	0.0012	-36	0.0007	0.0007	0.0008	-17	0.0002	0.0002	0.0004	11	0.0002	0.0003	0.0004	17	0.0003	0.0003	0.0003	0
As, Diss	Post-Closure	Jan	117	0.0004	0.0004	0.0006	0	0.0029	0.0027	0.0029	65	0.0012	0.0011	0.0012	43	0.0003	0.0003	0.0003	30	0.0003	0.0003	0.0003	18	0.0003	0.0003	0.0003	16
As, Diss	Post-Closure	Feb	117	0.0005	0.0005	0.0006	0	0.0032	0.0029	0.0032	68	0.0012	0.0011	0.0012	36	0.0003	0.0003	0.0003	30	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	17
As, Diss	Post-Closure	Mar	117	0.0004	0.0004	0.0005	0	0.0033	0.0030	0.0033	78	0.0008	0.0008	0.0008	5	0.0003	0.0003	0.0003	30	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	18
As, Diss	Post-Closure	Apr	117	0.0004	0.0004	0.0005	0	0.0034	0.0031	0.0034	88	0.0007	0.0007	0.0008	0	0.0003	0.0003	0.0003	30	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	18
As, Diss	Post-Closure	May	117	0.0003	0.0003	0.0004	-1	0.0023	0.0021	0.0023	97	0.0003	0.0003	0.0003	15	0.0003	0.0002	0.0003	29	0.0002	0.0002	0.0002	18	0.0003	0.0003	0.0003	17
As, Diss	Post-Closure	Jun	117	0.0003	0.0003	0.0004	-2	0.0021	0.0019	0.0021	103	0.0008	0.0008	0.0008	63	0.0003	0.0002	0.0003	28	0.0002	0.0002	0.0002	17	0.0003	0.0003	0.0003	16
As, Diss	Post-Closure	Jul	117	0.0003	0.0003	0.0005	-2	0.0020	0.0018	0.0020	108	0.0008	0.0007	0.0008	64	0.0003	0.0003	0.0003	27	0.0002	0.0002	0.0002	16	0.0003	0.0003	0.0003	16
As, Diss	Post-Closure	Aug	117	0.0003	0.0003	0.0005	-2	0.0018	0.0017	0.0018	111	0.0008	0.0008	0.0008	67	0.0003	0.0003	0.0003	26	0.0003	0.0002	0.0003	16	0.0003	0.0003	0.0003	15
As, Diss	Post-Closure	Sep	117	0.0003	0.0003	0.0005	-1	0.0018	0.0016	0.0018	115	0.0007	0.0007	0.0007	69	0.0003	0.0003	0.0003	26	0.0003	0.0002	0.0003	17	0.0003	0.0003	0.0003	14
As, Diss	Post-Closure	Oct	117	0.0003	0.0003	0.0004	-1	0.0017	0.0016	0.0017	123	0.0007	0.0006	0.0007	74	0.0003	0.0002	0.0003	27	0.0003	0.0002	0.0003	17	0.0003	0.0003	0.0003	14
As, Diss	Post-Closure	Nov	117	0.0005	0.0005	0.0006	0	0.0030	0.0028	0.0030	60	0.0015	0.0014	0.0015	60	0.0003	0.0003	0.0003	29	0.0003	0.0003	0.0003	18	0.0003	0.0003	0.0003	15
As, Diss	Post-Closure	Dec	117	0.0004	0.0004	0.0006	0	0.0030	0.0028	0.0030	63	0.0013	0.0013	0.0013	49	0.0003	0.0003	0.0003	30	0.0003	0.0003	0.0003	18	0.0003	0.0003	0.0003	15
As, Tot	Construction	Jan	2	0.0005	0.0005	0.0005	4	0.0016	0.0016	0.0020	-4	0.0006	0.0006	0.0007	-29	0.0004	0.0004	0.0004	18	0.0003	0.0003	0.0004	11	0.0003	0.0003	0.0003	0
As, Tot	Construction	Feb	2	0.0005	0.0005	0.0005	-6	0.0018	0.0018	0.0025	1	0.0006	0.0006	0.0007	-25	0.0004	0.0004	0.0004	16	0.0003	0.0003	0.0004	12	0.0003	0.0003	0.0003	0
As, Tot	Construction	Mar	2	0.0004	0.0004	0.0004	-5	0.0017	0.0017	0.0026	1	0.0006	0.0006	0.0008	-15	0.0004	0.0004	0.0004	15	0.0003	0.0003	0.0004	12	0.0003	0.0003	0.0003	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
As, Tot	Construction	Apr	2	0.0005	0.0005	0.0005	8	0.0017	0.0017	0.0025	0	0.0007	0.0007	0.0010	-3	0.0004	0.0004	0.0004	15	0.0003	0.0003	0.0004	12	0.0003	0.0003	0.0003	0
As, Tot	Construction	May	2	0.0004	0.0004	0.0004	27	0.0011	0.0011	0.0016	3	0.0006	0.0006	0.0008	102	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	13	0.0003	0.0003	0.0003	0
As, Tot	Construction	Jun	2	0.0005	0.0005	0.0005	38	0.0010	0.0010	0.0014	8	0.0006	0.0006	0.0008	24	0.0003	0.0003	0.0003	22	0.0003	0.0003	0.0003	12	0.0003	0.0003	0.0003	0
As, Tot	Construction	Jul	2	0.0005	0.0005	0.0005	40	0.0010	0.0010	0.0014	17	0.0006	0.0006	0.0008	19	0.0003	0.0003	0.0003	24	0.0003	0.0003	0.0003	12	0.0003	0.0003	0.0003	0
As, Tot	Construction	Aug	2	0.0005	0.0005	0.0005	37	0.0010	0.0010	0.0013	26	0.0007	0.0007	0.0008	26	0.0004	0.0004	0.0004	28	0.0003	0.0003	0.0003	14	0.0003	0.0003	0.0003	0
As, Tot	Construction	Sep	2	0.0005	0.0005	0.0005	36	0.0010	0.0010	0.0013	32	0.0006	0.0006	0.0007	22	0.0004	0.0004	0.0004	28	0.0003	0.0003	0.0003	15	0.0003	0.0003	0.0003	0
As, Tot	Construction	Oct	2	0.0005	0.0005	0.0005	37	0.0010	0.0010	0.0014	34	0.0006	0.0006	0.0007	29	0.0003	0.0003	0.0004	24	0.0003	0.0003	0.0003	16	0.0003	0.0003	0.0003	0
As, Tot	Construction	Nov	2	0.0006	0.0006	0.0006	23	0.0018	0.0018	0.0020	-2	0.0010	0.0010	0.0010	5	0.0004	0.0004	0.0004	22	0.0004	0.0004	0.0004	17	0.0003	0.0003	0.0003	0
As, Tot	Construction	Dec	2	0.0005	0.0005	0.0005	6	0.0014	0.0014	0.0015	-21	0.0008	0.0008	0.0009	-4	0.0004	0.0004	0.0004	23	0.0004	0.0004	0.0004	17	0.0003	0.0003	0.0003	0
As, Tot	Operations	Jan	5	0.0005	0.0005	0.0005	-1	0.0016	0.0016	0.0021	-4	0.0010	0.0010	0.0013	25	0.0005	0.0005	0.0008	72	0.0004	0.0004	0.0006	43	0.0003	0.0003	0.0003	0
As, Tot	Operations	Feb	5	0.0005	0.0005	0.0005	-10	0.0017	0.0017	0.0023	-4	0.0009	0.0009	0.0012	2	0.0005	0.0005	0.0008	69	0.0004	0.0005	0.0006	45	0.0003	0.0003	0.0003	0
As, Tot	Operations	Mar	5	0.0004	0.0004	0.0004	-7	0.0021	0.0020	0.0028	16	0.0008	0.0008	0.0010	1	0.0005	0.0005	0.0008	66	0.0004	0.0005	0.0006	46	0.0003	0.0003	0.0003	0
As, Tot	Operations	Apr	5	0.0005	0.0005	0.0005	6	0.0023	0.0021	0.0029	25	0.0012	0.0010	0.0013	39	0.0005	0.0005	0.0007	64	0.0004	0.0005	0.0006	48	0.0003	0.0003	0.0003	0
As, Tot	Operations	May	5	0.0004	0.0004	0.0004	25	0.0018	0.0015	0.0021	41	0.0008	0.0007	0.0010	165	0.0004	0.0004	0.0006	66	0.0004	0.0004	0.0005	48	0.0003	0.0003	0.0003	0
As, Tot	Operations	Jun	5	0.0005	0.0005	0.0005	36	0.0020	0.0017	0.0022	77	0.0011	0.0009	0.0012	88	0.0004	0.0004	0.0006	68	0.0003	0.0004	0.0005	46	0.0003	0.0003	0.0003	0
As, Tot	Operations	Jul	5	0.0005	0.0005	0.0005	39	0.0025	0.0021	0.0027	137	0.0013	0.0011	0.0014	118	0.0005	0.0004	0.0006	72	0.0004	0.0004	0.0005	43	0.0003	0.0003	0.0003	0
As, Tot	Operations	Aug	5	0.0005	0.0005	0.0005	35	0.0029	0.0024	0.0031	192	0.0018	0.0015	0.0019	173	0.0006	0.0005	0.0007	86	0.0004	0.0004	0.0005	46	0.0003	0.0003	0.0003	0
As, Tot	Operations	Sep	5	0.0005	0.0005	0.0005	34	0.0029	0.0025	0.0032	221	0.0017	0.0014	0.0018	190	0.0006	0.0005	0.0007	94	0.0004	0.0004	0.0006	51	0.0003	0.0003	0.0003	0
As, Tot	Operations	Oct	5	0.0005	0.0005	0.0005	36	0.0027	0.0022	0.0030	212	0.0017	0.0014	0.0018	228	0.0006	0.0005	0.0007	93	0.0004	0.0004	0.0006	55	0.0003	0.0003	0.0003	0
As, Tot	Operations	Nov	5	0.0006	0.0006	0.0006	21	0.0033	0.0030	0.0036	65	0.0023	0.0020	0.0025	121	0.0007	0.0006	0.0008	98	0.0005	0.0005	0.0006	58	0.0003	0.0003	0.0003	0
As, Tot	Operations	Dec	5	0.0005	0.0005	0.0005	4	0.0025	0.0023	0.0027	31	0.0016	0.0015	0.0018	68	0.0007	0.0006	0.0008	102	0.0005	0.0005	0.0006	61	0.0003	0.0003	0.0003	0
As, Tot	Closure	Jan	6	0.0005	0.0005	0.0005	0	0.0009	0.0011	0.0021	-34	0.0006	0.0007	0.0014	-11	0.0003	0.0004	0.0008	32	0.0003	0.0004	0.0006	33	0.0003	0.0003	0.0003	0
As, Tot	Closure	Feb	6	0.0005	0.0005	0.0005	-9	0.0008	0.0010	0.0017	-45	0.0005	0.0006	0.0011	-28	0.0003	0.0004	0.0008	30	0.0004	0.0004	0.0007	32	0.0003	0.0003	0.0003	0
As, Tot	Closure	Mar	6	0.0004	0.0004	0.0004	-7	0.0007	0.0008	0.0013	-52	0.0004	0.0005	0.0008	-34	0.0003	0.0004	0.0008	27	0.0003	0.0004	0.0007	32	0.0003	0.0003	0.0003	0
As, Tot	Closure	Apr	6	0.0005	0.0005	0.0005	6	0.0007	0.0007	0.0010	-57	0.0004	0.0005	0.0007	-33	0.0003	0.0004	0.0007	24	0.0003	0.0004	0.0007	32	0.0003	0.0003	0.0003	0
As, Tot	Closure	May	6	0.0004	0.0004	0.0004	25	0.0005	0.0005	0.0007	-53	0.0003	0.0003	0.0004	15	0.0002	0.0003	0.0005	21	0.0003	0.0003	0.0006	31	0.0003	0.0003	0.0003	0
As, Tot	Closure	Jun	6	0.0005	0.0005	0.0005	36	0.0005	0.0005	0.0006	-47	0.0004	0.0004	0.0005	-25	0.0002	0.0003	0.0005	17	0.0003	0.0003	0.0005	26	0.0003	0.0003	0.0003	0
As, Tot	Closure	Jul	6	0.0005	0.0005	0.0005	39	0.0005	0.0005	0.0006	-39	0.0004	0.0004	0.0005	-21	0.0002	0.0003	0.0005	13	0.0003	0.0003	0.0005	21	0.0003	0.0003	0.0003	0
As, Tot	Closure	Aug	6	0.0005	0.0005	0.0005	35	0.0005	0.0006	0.0006	-32	0.0005	0.0005	0.0005	-14	0.0003	0.0003	0.0005	11	0.0003	0.0003	0.0005	19	0.0003	0.0003	0.0003	0
As, Tot	Closure	Sep	6	0.0005	0.0005	0.0005	35	0.0005	0.0006	0.0006	-26	0.0004	0.0004	0.0005	-14	0.0003	0.0003	0.0004	8	0.0003	0.0003	0.0005	17	0.0003	0.0003	0.0003	0
As, Tot	Closure	Oct	6	0.0005	0.0005	0.0005	36	0.0005	0.0006	0.0006	-22	0.0004	0.0004	0.0004	-8	0.0003	0.0003	0.0004	5	0.0003	0.0003	0.0005	15	0.0003	0.0003	0.0003	0
As, Tot	Closure	Nov	6	0.0006	0.0006	0.0006	23	0.0008	0.0009	0.0015	-23	0.0008	0.0008	0.0009	-10	0.0003	0.0003	0.0004	4	0.0003	0.0003	0.0005	14	0.0003	0.0003	0.0003	0
As, Tot	Closure	Dec	6	0.0005	0.0005	0.0005	6	0.0011	0.0011	0.0012	-36	0.0007	0.0007	0.0008	-18	0.0003	0.0003	0.0004	5	0.0003	0.0003	0.0005	13	0.0003	0.0003	0.0003	0
As, Tot	Post-Closure	Jan	117	0.0005	0.0005	0.0006	-1	0.0030	0.0028	0.0030	66	0.0012	0.0011	0.0012	44	0.0004	0.0004	0.0004	29	0.0004	0.0004	0.0004	18	0.0003	0.0003	0.0003	15
As, Tot	Post-Closure	Feb	117	0.0005	0.0005	0.0007	-1	0.0032	0.0030	0.0032	70	0.0012	0.0012	0.0012	37	0.0004	0.0004	0.0004	30	0.0004	0.0004	0.0004	19	0.0004	0.0004	0.0004	16
As, Tot	Post-Closure	Mar	117	0.0005	0.0005	0.0006	-1	0.0034	0.0031	0.0034	79	0.0008	0.0008	0.0008	5	0.0004	0.0004	0.0004	30	0.0004	0.0004	0.0004	19	0.0003	0.0003	0.0004	17
As, Tot	Post-Closure	Apr	117	0.0004	0.0004	0.0005	-1	0.0035	0.0032	0.0035	89	0.0007	0.0007	0.0008	1	0.0004	0.0004	0.0004	29	0.0004	0.0004	0.0004	19	0.0004	0.0004	0.0004	17
As, Tot	Post-Closure	May	117	0.0003	0.0003	0.0004	-1	0.0024	0.0022	0.0024	98	0.0003	0.0003	0.0003	15	0.0003	0.0003	0.0003	28	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	16
As, Tot	Post-Closure	Jun	117	0.0003	0.0003	0.0004	-1	0.0021	0.0020	0.0021	105	0.0009	0.0008	0.0009	63	0.0003	0.0003	0.0003	27	0.0003	0.0003	0.0003	17	0.0003	0.0003	0.0003	15
As, Tot	Post-Closure	Jul	117	0.0004	0.0004	0.0005	-2	0.0020	0.0018	0.0020	109	0.0009	0.0008	0.0009	64	0.0003	0.0003	0.0003	27	0.0003	0.0003	0.0003	16	0.0003	0.0003	0.0003	15
As, Tot	Post-Closure	Aug	117	0.0004	0.0004	0.0005	-2	0.0019	0.0017	0.0019	112	0.0010	0.0009	0.0010	67	0.0004	0.0004	0.0004	26	0.0003	0.0003	0.0003	17	0.0003	0.0003	0.0003	14
As, Tot	Post-Closure	Sep	117	0.0004	0.0004	0.0005	-2	0.0018	0.0017	0.0018	116	0.0009	0.0008	0.0009	69	0.0004	0.0004	0.0004	27	0.0003	0.0003	0.0003	17	0.0003	0.0003	0.0003	13
As, Tot	Post-Closure	Oct	117	0.0004	0.0004	0.0005	-2	0.0018	0.0016	0.0018	123	0.0008	0.0008	0.0008	74	0.0004	0.0003	0.0004	27	0.0003	0.0003	0.0003	17	0.0003	0.0003	0.0003	13
As, Tot	Post-Closure	Nov	117	0.0005	0.0005	0.0006	-1	0.0031	0.0029	0.0031	61	0.0016	0.0015	0.0016	61	0.0004	0.0004	0.0004	28	0.0004	0.0004	0.0004	18	0.0003	0.0003	0.0003	14
As, Tot	Post-Closure	Dec	117	0.0005	0.0005	0.0006	-1	0.0030	0.0028	0.0030	64	0.0014	0.0013	0.0014	51	0.0004	0.0004	0.0004	29	0.0004	0.0004	0.0004	18	0.0003	0.0003	0.0003	14
Ba, Tot	Construction	Jan	2	0.0187	0.0187	0.0209	55	0.0296	0.0296	0.0301	16	0.0192	0.0192	0.0279	-7	0.0138	0.0138	0.0167	26	0.0116	0.0116	0.0128	11	0.0089	0.0089	0.0089	0
Ba, Tot	Construction	Feb	2	0.0217	0.0217	0.0223	59	0.0329	0.0329	0.0375	22	0.0231	0.0231	0.0282	0	0.0148	0.0148	0.0181	28	0.0121	0.0121	0.0133	12	0.0094	0.0094	0.0094	0
Ba, Tot	Construction	Mar	2	0.0198	0.0198	0.0200	67	0.0331	0.0331	0.0395	25	0.0217	0.0217	0.0221	2	0.0152	0.0152	0.0182	31	0.0122	0.0122	0.0136	13	0.0090	0.0090	0.0090	0
Ba, Tot	Construction	Apr	2	0.0203	0.0203	0.0203	73	0.0335	0.0335	0.0399	29	0.0213	0.0213	0.0234	8	0.0155	0.0155	0.0181	35	0.0124	0.0124	0.0138	16	0.0090	0.0090	0.0090	0
Ba, Tot	Construction	May	2	0.0150	0.0150	0.0150	78	0.0238	0.0238	0.0275	39	0.0140	0.0140	0.0157	67	0.0127	0.0127	0.0143	37	0.0116	0.0116	0.0128	16	0.0078	0.0078	0.0078	0
Ba, Tot	Construction	Jun	2	0.0168	0.0168	0.0168	81	0.0232	0.0232	0.0262	48	0.0174	0.0174	0.0189	43	0.0126	0.0126	0.0138	37	0.0113	0.0113	0.0124	17	0.0079	0.0079	0.0079	0
Ba, Tot	Construction	Jul	2	0.0173	0.0173	0.0173	79	0.0236	0.0236	0.0264	58	0.0166	0.0166	0.0176	36	0.0126	0.0126	0.0134	36	0.0115	0.0115	0.0125	18	0.0079	0.0079	0.0079	0
Ba, Tot	Construction	Aug	2	0.0168	0.0168	0.0169	74	0.0237	0.0237	0.0264	66	0.0168	0.0168	0.0178	43	0.0125	0.0125	0.0131	35	0.0116	0.0116	0.0125	20	0.0078	0.0078	0.0078	0
Ba, Tot	Construction	Sep	2	0.0163	0.0163	0.0163	72	0.0236	0.0236	0.0263	72	0.0171	0.0171	0.0179	47	0.0125	0.0125	0.0129	35	0.0117	0.0117	0.0125	21	0.0077	0.0077	0.0077	0
Ba, Tot	Construction	Oct	2	0.0159	0.0159	0.0160	75	0.0232	0.0232	0.0259	76	0.0174	0.0174	0.0181	54	0.0126	0.0126	0.0128	36	0.0117	0.0117	0.0124	22	0.0077	0.0077	0.0077	0
Ba, Tot	Construction	Nov	2	0.0219	0.0219	0.0220	74	0.0355	0.0355	0.0388	32	0.0307	0.0307	0.0307	27	0.0150	0.0150	0.0152	40	0.0131	0.0131	0.0138	23	0.0089	0.0089	0.0089	0
Ba, Tot	Construction	Dec	2	0.0210	0.0210	0.0211	71	0.0307	0.0307	0.0329	17	0.0297	0.0297	0.0319	34	0.0160	0.0160	0.0160	47	0.0132	0.0132	0.0139	25	0.0089	0.0089	0.0089	0
Ba, Tot	Operations	Jan	5	0.0206	0.0206	0.0207	71	0.0267	0.0270	0.0281	6	0.0261	0.0262	0.0282	27	0.0167	0.0170	0.0181	56	0.0141	0.0143	0.0149	36	0.0089	0.0089	0.0089	0
Ba, Tot	Operations	Feb	5	0.0220	0.0221	0.0221	62	0.0273	0.0276	0.0291	2	0.0258	0.0259	0.0266	11	0.0179	0.0182	0.0193	58	0.0146	0.0148	0.0154	38	0.0094	0.0094	0.0094	0
Ba, Tot	Operations	Mar	5	0.0198	0.0198	0.0199	67	0.0287	0.0291	0.0322	10	0.0197	0.0197	0.0209	-7	0.0179	0.0182	0.0192	58	0.0148	0.0149	0.0156	39	0.0090	0.0090	0.0090	0
Ba, Tot	Operations	Apr	5	0.0201	0.0202	0.0202	72	0.0295	0.0302	0.0339	16	0.0219	0.0216	0.0232	10	0.0178	0.0180	0.0190	57	0.0149	0.0151	0.0158	41	0.0090	0.0090	0.0090	0
Ba, Tot	Operations	May	5	0.0148	0.0148	0.0148	76	0.0219	0.0223	0.0250	30	0.0129	0.0131	0.0142	56	0.0142	0.0144	0.0153	56	0.0136	0.0138	0.0144	38	0.0078	0.0078	0.0078	0
Ba, Tot	Operations	Jun	5	0.0167	0.0167	0.0168	80	0.0228	0.0229	0.0255	45	0.0165	0.0169	0.0186	39	0.0137	0.0139	0.0147	52	0.0130	0.0132	0.0137	36	0.0079	0.0079	0.0079	0
Ba, Tot	Operations	Jul	5	0.0171	0.0171	0.0172	78	0.0247	0.0245	0.0276	64	0.0166	0.0168	0.0184	38	0.0135	0.0136	0.0144	47	0.0130	0.0131	0.0137	35	0.0079	0.0079	0.0079	0
Ba, Tot	Operations	Aug	5	0.0166	0.0166	0.0167	72	0.0257	0.0254	0.0287	77	0.0177	0.0178	0.0197	51	0.0132	0.0134	0.0142	44	0.0129	0.0131	0.0136	35	0.0078	0.0078	0.0078	0
Ba, Tot	Operations	Sep	5	0.0161	0.0161	0.0162	70	0.0258	0.0254	0.0286	84	0.0187	0.0187	0.0207	61	0.0132	0.0133	0.0141	43	0.0128	0.0130	0.0136	35	0.0077	0.0077	0.0077	0
Ba, Tot	Operations	Oct	5	0.0157	0.0157	0.0158	73	0.0244	0.0240	0.0269	82	0.0201	0.0200	0.0221	77	0.0133	0.0134	0.0142	45	0.0127	0.0129	0.0135	35	0.0077	0.0077	0.0077	0
Ba, Tot	Operations	Nov	5	0.0217	0.0217	0.0218	72	0.0357	0.0354	0.0380	31	0.0353	0.0349	0.0379	44	0.0159	0.0160	0.0171	50	0.0142	0.0144	0.0151	36	0.0089	0.0089	0.0089	0
Ba, Tot	Operations	Dec	5	0.0208	0.0208	0.0209	70	0.0306	0.0305	0.0323	17	0.0311	0.0307	0.0328	38	0.0169	0.0169	0.0181	56	0.0143	0.0144	0.0152	37	0.0089	0.0089	0.0089	0
Ba, Tot	Closure	Jan	6	0.0208	0.0207	0.0209	72	0.0243	0.0250	0.0284	-2	0.0245	0.0253	0.0289	23	0.0159	0.0164	0.0186	51	0.0140	0.0142	0.0153	36	0.0089	0.0089	0.0089	0
Ba, Tot	Closure	Feb	6	0.0223	0.0222	0.0224	63	0.0245	0.0250	0.0274	-7	0.0261	0.0267	0.0296	15	0.0171	0.0176	0.0200	53	0.0145	0.0147	0.0159	37	0.0094	0.0094	0.0094	0
Ba, Tot	Closure	Mar	6	0.0199	0.0199	0.0201	68	0.0232	0.0235	0.0250	-11	0.0232	0.0236	0.0253	11	0.0173	0.0178	0.0201	55	0.0146	0.0148	0.0160	39	0.0090	0.0090	0.0090	0
Ba, Tot	Closure	Apr	6	0.0202	0.0202	0.0204	73	0.0221	0.0223	0.0234	-14	0.0220	0.0222	0.0233	13	0.0174	0.0178	0.0200	56	0.0147	0.0149	0.0162	41	0.0090	0.0090	0.0090	0
Ba, Tot	Closure	May	6	0.0148	0.0149	0.0150	76	0.0160	0.0162	0.0167	-6	0.0117	0.0117	0.0119	39	0.0139	0.0142	0.0158	55	0.0134	0.0136	0.0147	37	0.0078	0.0078	0.0078	0
Ba, Tot	Closure	Jun	6	0.0167	0.0167	0.0168	79	0.0163	0.0163	0.0167	4	0.0149	0.0149	0.0151	22	0.0133	0.0136	0.0149	48	0.0128	0.0130	0.0140	35	0.0079	0.0079	0.0079	0
Ba, Tot	Closure	Jul	6	0.0172	0.0171	0.0173	78	0.0170	0.0170	0.0173	14	0.0150	0.0149	0.0151	22	0.0129	0.0132	0.0143	43	0.0127	0.0129	0.0139	34	0.0079	0.0079	0.0079	0
Ba, Tot	Closure	Aug	6	0.0167	0.0167	0.0169	72	0.0174	0.0174	0.0177	22	0.0153	0.0152	0.0155	29	0.0126	0.0127	0.0137	38	0.0126	0.0128	0.0138	33	0.0078	0.0078	0.0078	0
Ba, Tot	Closure	Sep	6	0.0162	0.0162	0.0163	71	0.0176	0.0175	0.0178	27	0.0157	0.0156	0.0158	35	0.0124	0.0125	0.0134	35	0.0125	0.0127	0.0136	32	0.0077	0.0077	0.0077	0
Ba, Tot	Closure	Oct	6	0.0158	0.0158	0.0160	74	0.0174	0.0174	0.0177	32	0.0159	0.0158	0.0161	39	0.0123	0.0124	0.0132	35	0.0123	0.0125	0.0134	32	0.0077	0.0077	0.0077	0
Ba, Tot	Closure	Nov	6	0.0218	0.0218	0.0220	73	0.0294	0.0295	0.0299	9	0.0290	0.0291	0.0295	20	0.0145	0.0146	0.0154	37	0.0137	0.0139	0.0148	32	0.0089	0.0089	0.0089	0
Ba, Tot	Closure	Dec	6	0.0209	0.0209	0.0211	71	0.0263	0.0264	0.0267	1	0.0268	0.0268	0.0272	21	0.0153	0.0153	0.0160	42	0.0137	0.0139	0.0148	32	0.0089	0.0089	0.0089	0
Ba, Tot	Post-Closure	Jan	117	0.0123	0.0124	0.0207	3	0.0393	0.0375	0.0393	47	0.0268	0.0261	0.0269	27	0.0128	0.0126	0.0151	16	0.0116	0.0115	0.0134	10	0.0091	0.0091	0.0091	2
Ba, Tot	Post-Closure	Feb	117	0.0138	0.0140	0.0223	3	0.0422	0.0402	0.0423	49	0.0285	0.0280	0.0286	20	0.0136	0.0134	0.0162	16	0.0119	0.0118	0.0139	10	0.0095	0.0095	0.0095	2
Ba, Tot	Post-Closure	Mar	117	0.0120	0.0121	0.0201	2	0.0433	0.0411	0.0434	55	0.0197	0.0199	0.0250	-6	0.0136	0.0134	0.0164	17	0.0119	0.0118	0.0139	10	0.0091	0.0091	0.0091	2
Ba, Tot	Post-Closure	Apr	117	0.0119	0.0120	0.0203	2	0.0446	0.0421	0.0446	62	0.0168	0.0173	0.0235	-12	0.0135	0.0133	0.0165	16	0.0118	0.0117	0.0140	11	0.0092	0.0092	0.0092	2
Ba, Tot	Post-Closure	May	117	0.0085	0.0086	0.0145	2	0.0303	0.0286	0.0303	66	0.0083	0.0084	0.0109	0	0.0108	0.0106	0.0132	16	0.0109	0.0108	0.0128	9	0.0080	0.0080	0.0080	2
Ba, Tot	Post-Closure	Jun	117	0.0093	0.0094	0.0158	1	0.0280	0.0264	0.0280	68	0.0165	0.0159	0.0165	31	0.0106	0.0104	0.0127	15	0.0106	0.0105	0.0123	9	0.0080	0.0080	0.0080	2
Ba, Tot	Post-Closure	Jul	117	0.0097	0.0097	0.0163	1	0.0267	0.0252	0.0267	69	0.0166	0.0160	0.0166	31	0.0107	0.0105	0.0124	14	0.0106	0.0105	0.0122	9	0.0080	0.0080	0.0080	1
Ba, Tot	Post-Closure	Aug	117	0.0097	0.0098	0.0160	1	0.0255	0.0241	0.0255	69	0.0162	0.0156	0.0162	33	0.0106	0.0105	0.0120	14	0.0106	0.0105	0.0121	9	0.0079	0.0079	0.0079	1
Ba, Tot	Post-Closure	Sep	117	0.0096	0.0096	0.0155	2	0.0246	0.0233	0.0247	70	0.0159	0.0154	0.0159	33	0.0106	0.0105	0.0118	13	0.0105	0.0104	0.0120	9	0.0078	0.0078	0.0078	1
Ba, Tot	Post-Closure	Oct	117	0.0092	0.0093	0.0145	2	0.0240	0.0227	0.0240	72	0.0158	0.0153	0.0159	35	0.0106	0.0104	0.0116	14	0.0105	0.0104	0.0118	9	0.0078	0.0078	0.0078	1
Ba, Tot	Post-Closure	Nov	117	0.0129	0.0129	0.0194	2	0.0404	0.0388	0.0405	44	0.0331	0.0321	0.0331	32	0.0124	0.0122	0.0135	15	0.0117	0.0115	0.0131	10	0.0090	0.0090	0.0090	1
Ba, Tot	Post-Closure	Dec	117	0.0125	0.0126	0.0186	2	0.0396	0.0380	0.0397	46	0.0298	0.0290	0.0299	31	0.0127	0.0125	0.0136	16	0.0116	0.0115	0.0131	10	0.0091	0.0091	0.0091	1
B, Tot	Construction	Jan	2	0.0089	0.0089	0.0095	34	0.0233	0.0233	0.0287	9	0.0133	0.0133	0.0178	-20	0.0073	0.0073	0.0096	43	0.0072	0.0072	0.0078	9	0.0141	0.0141	0.0141	0
B, Tot	Construction	Feb	2	0.0099	0.0099	0.0101	33	0.0276	0.0276	0.0391	22	0.0175	0.0175	0.0185	-6	0.0082	0.0082	0.0104	49	0.0074	0.0074	0.0081	10	0.0147	0.0147	0.0147	0
B, Tot	Construction	Mar	2	0.0089	0.0089	0.0090	38	0.0281	0.0281	0.0420	27	0.0172	0.0172	0.0225	3	0.0089	0.0089	0.0114	60	0.0075	0.0075	0.0082	11	0.0140	0.0140	0.0140	0
B, Tot	Construction	Apr	2	0.0091	0.0091	0.0091	41	0.0276	0.0276	0.0418	28	0.0171	0.0171	0.0246	11	0.0095	0.0095	0.0103	69	0.0076	0.0076	0.0083	13	0.0139	0.0139	0.0139	0
B, Tot	Construction	May	2	0.0055	0.0055	0.0055	40	0.0181	0.0181	0.0265	29	0.0123	0.0123	0.0165	27	0.0077	0.0077	0.0079	71	0.0084	0.0084	0.0090	11	0.0113	0.0113	0.0113	0
B, Tot	Construction	Jun	2	0.0051	0.0051	0.0052	42	0.0162	0.0162	0.0231	30	0.0135	0.0135	0.0180	8	0.0072	0.0072	0.0073	63	0.0082	0.0082	0.0086	11	0.0106	0.0106	0.0106	0
B, Tot	Construction	Jul	2	0.0054	0.0054	0.0054	48	0.0155	0.0155	0.0215	34	0.0114	0.0114	0.0150	6	0.0067	0.0067	0.0069	55	0.0080	0.0080	0.0083	12	0.0113	0.0113	0.0113	0
B, Tot	Construction	Aug	2	0.0056	0.0056	0.0056	53	0.0148	0.0148	0.0202	39	0.0106	0.0106	0.0137	19	0.0062	0.0062	0.0066	49	0.0077	0.0077	0.0079	13	0.0129	0.0129	0.0129	0
B, Tot	Construction	Sep	2	0.0067	0.0067	0.0067	62	0.0143	0.0143	0.0192	45	0.0103	0.0103	0.0131	25	0.0058	0.0058	0.0063	44	0.0074	0.0074	0.0075	14	0.0131	0.0131	0.0131	0
B, Tot	Construction	Oct	2	0.0077	0.0077	0.0078	66	0.0138	0.0138	0.0183	49	0.0103	0.0103	0.0128	33	0.0056	0.0056	0.0061	41	0.0071	0.0071	0.0072	14	0.0125	0.0125	0.0126	0
B, Tot	Construction	Nov	2	0.0107	0.0107	0.0108	56	0.0247	0.0247	0.0292	7	0.0201	0.0201	0.0225	14	0.0070	0.0070	0.0077	47	0.0077	0.0077	0.0078	14	0.0142	0.0142	0.0143	0
B, Tot	Construction	Dec	2	0.0098	0.0098	0.0098	46	0.0195	0.0195	0.0225	-12	0.0193	0.0193	0.0223	9	0.0079	0.0079	0.0089	59	0.0077	0.0077	0.0077	15	0.0142	0.0142	0.0142	0
B, Tot	Operations	Jan	5	0.0093	0.0093	0.0094	41	0.0168	0.0171	0.0203	-20	0.0167	0.0170	0.0208	2	0.0079	0.0084	0.0103	65	0.0076	0.0075	0.0083	15	0.0141	0.0141	0.0141	0
B, Tot	Operations	Feb	5	0.0099	0.0099	0.0099	33	0.0170	0.0174	0.0216	-23	0.0158	0.0161	0.0192	-13	0.0085	0.0089	0.0113	69	0.0078	0.0077	0.0087	16	0.0147	0.0147	0.0147	0
B, Tot	Operations	Mar	5	0.0088	0.0088	0.0089	36	0.0185	0.0191	0.0257	-13	0.0125	0.0126	0.0155	-25	0.0088	0.0093	0.0115	70	0.0077	0.0078	0.0088	18	0.0140	0.0140	0.0140	0
B, Tot	Operations	Apr	5	0.0089	0.0090	0.0090	39	0.0192	0.0198	0.0272	-8	0.0142	0.0142	0.0186	-8	0.0090	0.0095	0.0117	71	0.0077	0.0079	0.0089	20	0.0139	0.0139	0.0139	0
B, Tot	Operations	May	5	0.0054	0.0054	0.0054	38	0.0142	0.0145	0.0198	4	0.0102	0.0104	0.0128	7	0.0072	0.0075	0.0093	69	0.0084	0.0086	0.0095	15	0.0113	0.0113	0.0113	-1
B, Tot	Operations	Jun	5	0.0051	0.0051	0.0051	40	0.0151	0.0153	0.0210	22	0.0121	0.0125	0.0161	0	0.0066	0.0069	0.0085	59	0.0080	0.0083	0.0093	14	0.0106	0.0106	0.0106	-1
B, Tot	Operations	Jul	5	0.0053	0.0053	0.0053	46	0.0174	0.0174	0.0246	51	0.0119	0.0121	0.0161	12	0.0062	0.0064	0.0079	52	0.0078	0.0081	0.0090	14	0.0113	0.0113	0.0113	0
B, Tot	Operations	Aug	5	0.0055	0.0055	0.0056	51	0.0188	0.0188	0.0268	77	0.0128	0.0129	0.0178	45	0.0058	0.0060	0.0074	47	0.0074	0.0077	0.0087	15	0.0129	0.0129	0.0129	0
B, Tot	Operations	Sep	5	0.0065	0.0066	0.0066	60	0.0190	0.0189	0.0268	92	0.0136	0.0137	0.0188	66	0.0056	0.0058	0.0072	46	0.0071	0.0074	0.0084	15	0.0131	0.0131	0.0131	0
B, Tot	Operations	Oct	5	0.0076	0.0076	0.0077	64	0.0178	0.0176	0.0245	91	0.0146	0.0146	0.0200	88	0.0056	0.0057	0.0071	47	0.0069	0.0071	0.0081	16	0.0125	0.0125	0.0125	0
B, Tot	Operations	Nov	5	0.0106	0.0106	0.0107	54	0.0280	0.0279	0.0342	21	0.0268	0.0266	0.0337	51	0.0073	0.0074	0.0093	58	0.0075	0.0078	0.0090	16	0.0142	0.0142	0.0142	0
B, Tot	Operations	Dec	5	0.0096	0.0096	0.0097	44	0.0221	0.0221	0.0265	0	0.0229	0.0228	0.0277	28	0.0084	0.0085	0.0107	73	0.0075	0.0078	0.0090	18	0.0142	0.0142	0.0142	0
B, Tot	Closure	Jan	6	0.0094	0.0094	0.0095	43	0.0135	0.0148	0.0211	-31	0.0139	0.0153	0.0222	-8	0.0070	0.0078	0.0114	56	0.0071	0.0075	0.0091	17	0.0141	0.0141	0.0141	0
B, Tot	Closure	Feb	6	0.0100	0.0100	0.0101	34	0.0129	0.0138	0.0183	-39	0.0140	0.0150	0.0204	-19	0.0077	0.0086	0.0124	60	0.0073	0.0077	0.0095	18	0.0147	0.0147	0.0148	0
B, Tot	Closure	Mar	6	0.0089	0.0089	0.0090	37	0.0117	0.0123	0.0153	-44	0.0118	0.0125	0.0157	-26	0.0079	0.0087	0.0125	61	0.0073	0.0077	0.0096	19	0.0141	0.0141	0.0141	0
B, Tot	Closure	Apr	6	0.0090	0.0090	0.0091	40	0.0108	0.0112	0.0133	-48	0.0109	0.0113	0.0135	-27	0.0080	0.0088	0.0124	61	0.0073	0.0077	0.0097	20	0.0140	0.0140	0.0140	0
B, Tot	Closure	May	6	0.0055	0.0054	0.0055	40	0.0077	0.0080	0.0090	-43	0.0080	0.0081	0.0088	-16	0.0063	0.0069	0.0096	56	0.0080	0.0084	0.0101	14	0.0113	0.0113	0.0113	0
B, Tot	Closure	Jun	6	0.0051	0.0051	0.0052	41	0.0076	0.0078	0.0086	-38	0.0089	0.0090	0.0097	-28	0.0058	0.0063	0.0086	46	0.0078	0.0082	0.0098	13	0.0106	0.0106	0.0107	0
B, Tot	Closure	Jul	6	0.0053	0.0053	0.0054	47	0.0076	0.0078	0.0084	-33	0.0078	0.0079	0.0085	-26	0.0053	0.0058	0.0077	37	0.0075	0.0078	0.0094	12	0.0113	0.0113	0.0113	0
B, Tot	Closure	Aug	6	0.0056	0.0056	0.0056	51	0.0077	0.0078	0.0084	-27	0.0072	0.0073	0.0078	-18	0.0049	0.0053	0.0069	30	0.0071	0.0074	0.0090	12	0.0129	0.0129	0.0129	0
B, Tot	Closure	Sep	6	0.0066	0.0066	0.0067	60	0.0077	0.0078	0.0084	-21	0.0072	0.0073	0.0077	-11	0.0046	0.0049	0.0063	25	0.0067	0.0070	0.0086	12	0.0131	0.0131	0.0131	0
B, Tot	Closure	Oct	6	0.0076	0.0076	0.0077	64	0.0078	0.0079	0.0085	-14	0.0073	0.0074	0.0078	-5	0.0044	0.0047	0.0059	22	0.0064	0.0067	0.0082	11	0.0126	0.0126	0.0126	0
B, Tot	Closure	Nov	6	0.0106	0.0106	0.0108	55	0.0188	0.0189	0.0197	-18	0.0169	0.0171	0.0178	-4	0.0055	0.0057	0.0071	24	0.0069	0.0072	0.0089	10	0.0143	0.0143	0.0143	0
B, Tot	Closure	Dec	6	0.0098	0.0097	0.0098	46	0.0157	0.0157	0.0164	-29	0.0162	0.0163	0.0169	-8	0.0063	0.0065	0.0077	33	0.0068	0.0071	0.0087	10	0.0142	0.0142	0.0142	0
B, Tot	Post-Closure	Jan	117	0.0065	0.0066	0.0095	0	0.0413	0.0382	0.0414	78	0.0270	0.0254	0.0271	53	0.0073	0.0070	0.0074	41	0.0077	0.0075	0.0077	18	0.0145	0.0145	0.0145	2
B, Tot	Post-Closure	Feb	117	0.0074	0.0074	0.0101	0	0.0445	0.0411	0.0446	82	0.0286	0.0271	0.0287	45	0.0079	0.0075	0.0079	41	0.0079	0.0076	0.0079	18	0.0151	0.0151	0.0151	2
B, Tot	Post-Closure	Mar	117	0.0064	0.0065	0.0091	0	0.0464	0.0426	0.0465	93	0.0195	0.0189	0.0195	13	0.0080	0.0076	0.0080	42	0.0078	0.0076	0.0078	18	0.0144	0.0144	0.0144	2
B, Tot	Post-Closure	Apr	117	0.0064	0.0064	0.0091	0	0.0484	0.0442	0.0485	106	0.0167	0.0163	0.0173	6	0.0080	0.0076	0.0081	41	0.0078	0.0076	0.0078	19	0.0143	0.0143	0.0143	3
B, Tot	Post-Closure	May	117	0.0039	0.0039	0.0055	1	0.0328	0.0299	0.0329	114	0.0105	0.0104	0.0106	7	0.0064	0.0061	0.0064	39	0.0085	0.0083	0.0085	14	0.0116	0.0116	0.0116	3
B, Tot	Post-Closure	Jun	117	0.0037	0.0037	0.0051	2	0.0300	0.0274	0.0301	119	0.0193	0.0182	0.0193	46	0.0061	0.0058	0.0061	37	0.0083	0.0081	0.0083	13	0.0109	0.0109	0.0109	3
B, Tot	Post-Closure	Jul	117	0.0037	0.0037	0.0052	2	0.0282	0.0258	0.0283	124	0.0178	0.0167	0.0178	54	0.0059	0.0056	0.0059	35	0.0080	0.0078	0.0080	13	0.0116	0.0116	0.0116	2
B, Tot	Post-Closure	Aug	117	0.0037	0.0037	0.0054	1	0.0265	0.0242	0.0266	128	0.0158	0.0148	0.0159	66	0.0056	0.0054	0.0056	34	0.0077	0.0075	0.0077	14	0.0131	0.0131	0.0131	2
B, Tot	Post-Closure	Sep	117	0.0041	0.0041	0.0062	0	0.0254	0.0231	0.0255	135	0.0151	0.0140	0.0151	71	0.0054	0.0052	0.0054	34	0.0074	0.0072	0.0074	15	0.0134	0.0134	0.0134	2
B, Tot	Post-Closure	Oct	117	0.0046	0.0046	0.0067	-1	0.0247	0.0225	0.0248	143	0.0149	0.0138	0.0149	78	0.0054	0.0051	0.0054	35	0.0071	0.0070	0.0071	16	0.0128	0.0128	0.0128	2
B, Tot	Post-Closure	Nov	117	0.0068	0.0068	0.0093	-1	0.0422	0.0395	0.0423	71	0.0316	0.0296	0.0317	67	0.0066	0.0063	0.0066	37	0.0078	0.0076	0.0078	17	0.0146	0.0146	0.0146	2
B, Tot	Post-Closure	Dec	117	0.0066	0.0066	0.0090	-1	0.0415	0.0387	0.0416	75	0.0300	0.0282	0.0301	59	0.0071	0.0067	0.0071	40	0.0077	0.0075	0.0077	17	0.0145	0.0145	0.0145	2
Cd, Diss	Construction	Jan	2	0.000002	0.000002	0.000003	-10	0.000004	0.000004	0.000005	49	0.000002	0.000002	0.000003	6	0.000004	0.000004	0.000004	-7	0.000004	0.000004	0.000004	-5	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Feb	2	0.000002	0.000002	0.000002	-25	0.000005	0.000005	0.000005	62	0.000002	0.000002	0.000003	2	0.000004	0.000004	0.000004	-10	0.000004	0.000004	0.000004	-6	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Mar	2	0.000002	0.000002	0.000002	-29	0.000005	0.000005	0.000006	64	0.000002	0.000002	0.000002	3	0.000003	0.000003	0.000003	-14	0.000004	0.000004	0.000004	-7	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Apr	2	0.000002	0.000002	0.000002	-29	0.000005	0.000005	0.000006	68	0.000002	0.000002	0.000002	6	0.000003	0.000003	0.000003	-19	0.000004	0.000004	0.000004	-8	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	May	2	0.000002	0.000002	0.000002	-4	0.000004	0.000004	0.000004	73	0.000003	0.000003	0.000003	4	0.000003	0.000003	0.000003	-18	0.000003	0.000003	0.000003	-9	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Jun	2	0.000002	0.000002	0.000002	25	0.000004	0.000004	0.000005	78	0.000004	0.000004	0.000004	10	0.000003	0.000003	0.000003	-14	0.000003	0.000003	0.000003	-9	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Jul	2	0.000003	0.000003	0.000003	36	0.000004	0.000004	0.000005	83	0.000003	0.000003	0.000003	2	0.000003	0.000003	0.000003	-11	0.000003	0.000003	0.000004	-9	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Aug	2	0.000003	0.000003	0.000003	37	0.000004	0.000004	0.000005	83	0.000003	0.000003	0.000003	4	0.000003	0.000003	0.000003	-10	0.000003	0.000003	0.000004	-10	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Sep	2	0.000003	0.000003	0.000003	39	0.000004	0.000004	0.000005	81	0.000003	0.000003	0.000003	7	0.000003	0.000003	0.000003	-9	0.000003	0.000003	0.000004	-10	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Oct	2	0.000003	0.000003	0.000003	42	0.000004	0.000004	0.000005	79	0.000003	0.000003	0.000003	11	0.000003	0.000003	0.000003	-10	0.000003	0.000003	0.000003	-10	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Nov	2	0.000003	0.000003	0.000003	22	0.000005	0.000005	0.000005	74	0.000003	0.000003	0.000004	-3	0.000003	0.000003	0.000003	-11	0.000004	0.000004	0.000004	-11	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Dec	2	0.000003	0.000003	0.000003	-6	0.000005	0.000005	0.000005	63	0.000003	0.000003	0.000004	45	0.000003	0.000003	0.000003	-12	0.000004	0.000004	0.000004	-11	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Jan	5	0.000002	0.000002	0.000002	-22	0.000004	0.000004	0.000004	47	0.000003	0.000003	0.000003	47	0.000003	0.000003	0.000004	-10	0.000004	0.000004	0.000004	-12	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Feb	5	0.000002	0.000002	0.000002	-34	0.000004	0.000004	0.000004	43	0.000003	0.000003	0.000003	18	0.000003	0.000003	0.000004	-12	0.000004	0.000004	0.000004	-12	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Mar	5	0.000002	0.000002	0.000002	-36	0.000004	0.000005	0.000005	54	0.000002	0.000002	0.000002	-1	0.000003	0.000003	0.000003	-15	0.000004	0.000004	0.000004	-13	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Apr	5	0.000002	0.000002	0.000002	-34	0.000005	0.000005	0.000005	61	0.000002	0.000002	0.000002	14	0.000003	0.000003	0.000003	-19	0.000004	0.000004	0.000004	-14	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	May	5	0.000001	0.000001	0.000002	-9	0.000004	0.000004	0.000004	72	0.000003	0.000003	0.000003	4	0.000003	0.000003	0.000003	-18	0.000003	0.000003	0.000003	-14	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Jun	5	0.000002	0.000002	0.000002	19	0.000004	0.000004	0.000005	85	0.000004	0.000004	0.000004	12	0.000003	0.000003	0.000003	-13	0.000003	0.000003	0.000003	-12	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Jul	5	0.000002	0.000002	0.000003	30	0.000005	0.000005	0.000006	99	0.000003	0.000003	0.000004	7	0.000003	0.000003	0.000003	-10	0.000003	0.000003	0.000003	-12	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Aug	5	0.000003	0.000003	0.000003	31	0.000005	0.000005	0.000006	104	0.000003	0.000003	0.000004	13	0.000003	0.000003	0.000003	-8	0.000003	0.000003	0.000003	-11	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Sep	5	0.000003	0.000003	0.000003	32	0.000005	0.000005	0.000006	101	0.000003	0.000003	0.000004	19	0.000003	0.000003	0.000003	-8	0.000003	0.000003	0.000003	-11	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Oct	5	0.000003	0.000003	0.000003	35	0.000004	0.000004	0.000005	90	0.000004	0.000004	0.000004	29	0.000003	0.000003	0.000003	-7	0.000003	0.000003	0.000003	-11	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Nov	5	0.000003	0.000003	0.000003	16	0.000005	0.000005	0.000005	73	0.000004	0.000004	0.000005	13	0.000004	0.000004	0.000004	-7	0.000004	0.000004	0.000004	-11	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Dec	5	0.000002	0.000002	0.000002	-11	0.000004	0.000004	0.000005	60	0.000004	0.000003	0.000004	48	0.000004	0.000004	0.000004	-8	0.000004	0.000004	0.000004	-11	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Jan	6	0.000002	0.000002	0.000002	-19	0.000004	0.000004	0.000004	32	0.000003	0.000003	0.000003	37	0.000003	0.000003	0.000004	-13	0.000004	0.000004	0.000004	-12	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Feb	6	0.000002	0.000002	0.000002	-31	0.000004	0.000004	0.000004	24	0.000003	0.000003	0.000003	18	0.000003	0.000003	0.000004	-15	0.000004	0.000004	0.000004	-13	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Mar	6	0.000002	0.000002	0.000002	-33	0.000003	0.000003	0.000004	15	0.000002	0.000002	0.000002	11	0.000003	0.000003	0.000004	-17	0.000004	0.000004	0.000004	-13	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Apr	6	0.000002	0.000002	0.000002	-32	0.000003	0.000003	0.000003	9	0.000002	0.000002	0.000002	9	0.000003	0.000003	0.000003	-20	0.000003	0.000004	0.000004	-14	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	May	6	0.000002	0.000002	0.000002	-7	0.000003	0.000003	0.000003	16	0.000003	0.000003	0.000003	-7	0.000003	0.000003	0.000003	-19	0.000003	0.000003	0.000003	-14	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Jun	6	0.000002	0.000002	0.000002	21	0.000003	0.000003	0.000003	24	0.000003	0.000003	0.000003	-2	0.000003	0.000003	0.000003	-16	0.000003	0.000003	0.000003	-13	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Jul	6	0.000003	0.000003	0.000003	33	0.000003	0.000003	0.000003	30	0.000003	0.000003	0.000003	-3	0.000003	0.000003	0.000003	-13	0.000003	0.000003	0.000003	-12	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Aug	6	0.000003	0.000003	0.000003	34	0.000003	0.000003	0.000003	32	0.000003	0.000003	0.000003	-1	0.000003	0.000003	0.000003	-12	0.000003	0.000003	0.000004	-12	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Sep	6	0.000003	0.000003	0.000003	36	0.000003	0.000003	0.000003	33	0.000003	0.000003	0.000003	1	0.000003	0.000003	0.000003	-11	0.000003	0.000003	0.000004	-12	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Oct	6	0.000003	0.000003	0.000003	40	0.000003	0.000003	0.000003	32	0.000003	0.000003	0.000003	3	0.000003	0.000003	0.000003	-11	0.000003	0.000003	0.000003	-12	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Nov	6	0.000003	0.000003	0.000003	21	0.000004	0.000004	0.000004	31	0.000003	0.000003	0.000003	-11	0.000003	0.000003	0.000004	-12	0.000004	0.000004	0.000004	-12	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Dec	6	0.000003	0.000003	0.000003	-5	0.000004	0.000004	0.000004	30	0.000003	0.000003	0.000003	22	0.000003	0.000003	0.000003	-14	0.000004	0.000004	0.000004	-13	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	Jan	117	0.000003	0.000003	0.000003	-1	0.000004	0.000004	0.000004	51	0.000003	0.000003	0.000003	24	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	1	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Feb	117	0.000003	0.000003	0.000004	-1	0.000005	0.000005	0.000005	52	0.000003	0.000003	0.000003	17	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	1	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Mar	117	0.000002	0.000002	0.000003	-1	0.000005	0.000005	0.000005	57	0.000002	0.000002	0.000002	-6	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	2	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Apr	117	0.000002	0.000002	0.000003	-1	0.000005	0.000005	0.000005	63	0.000002	0.000002	0.000002	-14	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	2	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	May	117	0.000002	0.000002	0.000003	-1	0.000004	0.000004	0.000004	58	0.000003	0.000003	0.000003	-2	0.000003	0.000003	0.000003	2	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1
Cd, Diss	Post-Closure	Jun	117	0.000002	0.000002	0.000002	-2	0.000004	0.000004	0.000004	51	0.000004	0.000004	0.000004	13	0.000003	0.000003	0.000003	2	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1
Cd, Diss	Post-Closure	Jul	117	0.000002	0.000002	0.000002	-2	0.000004	0.000004	0.000004	49	0.000004	0.000004	0.000004	13	0.000004	0.000004	0.000004	2	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1
Cd, Diss	Post-Closure	Aug	117	0.000002	0.000002	0.000003	-3	0.000004	0.000004	0.000004	47	0.000003	0.000003	0.000003	13	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1
Cd, Diss	Post-Closure	Sep	117	0.000002	0.000002	0.000003	-2	0.000004	0.000004	0.000004	47	0.000003	0.000003	0.000003	13	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1
Cd, Diss	Post-Closure	Oct	117	0.000002	0.000002	0.000003	-2	0.000004	0.000004	0.000003	49	0.000003	0.000003	0.000003	13	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1
Cd, Diss	Post-Closure	Nov	117	0.000003	0.000003	0.000004	-1	0.000004	0.000004	0.000004	49	0.000004	0.000004	0.000004	18	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	1	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Dec	117	0.000003	0.000003	0.000003	-1	0.000004	0.000004	0.000004	50	0.000003	0.000003	0.000003	26	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	2	0.000005	0.000005	0.000005	1
Cd, Tot	Construction	Jan	2	0.000003	0.000003	0.000004	-30	0.000005	0.000005	0.000005	33	0.000003	0.000003	0.000005	-5	0.000005	0.000005	0.000005	-5	0.000005	0.000005	0.000005	-5	0.000006	0.000006	0.000006	0
Cd, Tot	Construction	Feb	2	0.000003	0.000003	0.000003	-50	0.000005	0.000005	0.000006	39	0.000004	0.000004	0.000005	0	0.000005	0.000005	0.000005	-8	0.000005	0.000005	0.000005	-5	0.000006	0.000006	0.000006	0
Cd, Tot	Construction	Mar	2	0.000002	0.000002	0.000002	-56	0.000005	0.000005	0.000006	38	0.000004	0.000004	0.000004	-1	0.000004	0.000004	0.000004	-11	0.000005	0.000005	0.000005	-6	0.000006	0.000006	0.000006	0
Cd, Tot	Construction	Apr	2	0.000002	0.000002	0.000002	-58	0.000005	0.000005	0.000006	39	0.000003	0.000003	0.000004	-2	0.000004	0.000004	0.000004	-15	0.000004	0.000004	0.000005	-7	0.000006	0.000006	0.000006	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit			Phase	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Cd, Tot	Construction	May	2	0.000003	0.000003	0.000003	-17	0.000004	0.000004	0.000005	48	0.000004	0.000004	0.000004	-9	0.000004	0.000004	0.000004	-14	0.000004	0.000004	0.000004	-8	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Jun	2	0.000005	0.000005	0.000005	17	0.000005	0.000005	0.000005	59	0.000004	0.000004	0.000004	-4	0.000004	0.000004	0.000004	-12	0.000004	0.000004	0.000004	-8	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	16	0.000005	0.000005	0.000005	67	0.000004	0.000004	0.000004	-2	0.000004	0.000004	0.000004	-10	0.000004	0.000004	0.000004	-8	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Aug	2	0.000004	0.000004	0.000004	6	0.000005	0.000005	0.000005	67	0.000005	0.000005	0.000005	2	0.000004	0.000004	0.000004	-8	0.000004	0.000004	0.000004	-7	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Sep	2	0.000004	0.000004	0.000004	16	0.000005	0.000005	0.000005	65	0.000004	0.000004	0.000004	5	0.000004	0.000004	0.000004	-7	0.000004	0.000004	0.000004	-8	0.000006	0.000006	0.000006	0
Cd, Tot	Construction	Oct	2	0.000005	0.000005	0.000005	32	0.000005	0.000005	0.000005	63	0.000004	0.000004	0.000004	10	0.000004	0.000004	0.000004	-8	0.000004	0.000004	0.000004	-8	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Nov	2	0.000006	0.000006	0.000006	8	0.000006	0.000006	0.000006	59	0.000006	0.000006	0.000006	-14	0.000005	0.000005	0.000005	-8	0.000004	0.000004	0.000005	-9	0.000006	0.000006	0.000006	0
Cd, Tot	Construction	Dec	2	0.000003	0.000003	0.000003	-29	0.000005	0.000005	0.000006	47	0.000005	0.000005	0.000005	23	0.000005	0.000005	0.000005	-9	0.000004	0.000004	0.000004	-9	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	Jan	5	0.000002	0.000002	0.000002	-48	0.000005	0.000005	0.000005	32	0.000005	0.000005	0.000005	33	0.000005	0.000005	0.000005	-5	0.000004	0.000004	0.000005	-9	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	Feb	5	0.000002	0.000002	0.000002	-59	0.000005	0.000005	0.000005	25	0.000005	0.000005	0.000005	17	0.000005	0.000005	0.000005	-7	0.000004	0.000004	0.000005	-9	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	Mar	5	0.000002	0.000002	0.000002	-62	0.000005	0.000005	0.000006	33	0.000003	0.000003	0.000004	-3	0.000005	0.000005	0.000005	-9	0.000004	0.000004	0.000005	-9	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	Apr	5	0.000002	0.000002	0.000002	-62	0.000005	0.000005	0.000006	38	0.000004	0.000004	0.000004	8	0.000004	0.000004	0.000005	-12	0.000004	0.000004	0.000004	-10	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	May	5	0.000003	0.000003	0.000003	-21	0.000004	0.000004	0.000005	50	0.000004	0.000004	0.000004	-7	0.000004	0.000004	0.000004	-11	0.000004	0.000004	0.000004	-10	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Jun	5	0.000004	0.000004	0.000004	13	0.000005	0.000005	0.000006	67	0.000004	0.000004	0.000005	-1	0.000004	0.000004	0.000004	-9	0.000004	0.000004	0.000004	-9	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Jul	5	0.000004	0.000004	0.000004	12	0.000006	0.000006	0.000006	83	0.000005	0.000005	0.000005	4	0.000004	0.000004	0.000004	-7	0.000004	0.000004	0.000004	-8	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Aug	5	0.000004	0.000004	0.000004	2	0.000006	0.000006	0.000007	88	0.000005	0.000005	0.000005	12	0.000004	0.000004	0.000004	-5	0.000004	0.000004	0.000004	-7	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Sep	5	0.000004	0.000004	0.000004	12	0.000006	0.000006	0.000006	85	0.000005	0.000005	0.000005	18	0.000004	0.000004	0.000005	-4	0.000004	0.000004	0.000004	-7	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	Oct	5	0.000005	0.000005	0.000005	28	0.000005	0.000005	0.000006	76	0.000005	0.000005	0.000005	30	0.000004	0.000004	0.000004	-4	0.000004	0.000004	0.000004	-7	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Nov	5	0.000005	0.000005	0.000005	4	0.000006	0.000006	0.000006	61	0.000007	0.000007	0.000008	1	0.000005	0.000005	0.000005	-3	0.000005	0.000005	0.000005	-8	0.000006	0.000006	0.000006	0
Cd, Tot	Operations	Dec	5	0.000003	0.000003	0.000003	-33	0.000005	0.000005	0.000006	46	0.000005	0.000005	0.000006	28	0.000005	0.000005	0.000005	-3	0.000004	0.000004	0.000005	-8	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	Jan	6	0.000002	0.000002	0.000003	-47	0.000004	0.000004	0.000005	17	0.000004	0.000004	0.000005	22	0.000004	0.000004	0.000005	-9	0.000004	0.000004	0.000005	-10	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	Feb	6	0.000002	0.000002	0.000002	-58	0.000004	0.000004	0.000005	7	0.000004	0.000004	0.000005	15	0.000004	0.000005	0.000005	-11	0.000004	0.000004	0.000005	-10	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	Mar	6	0.000002	0.000002	0.000002	-61	0.000004	0.000004	0.000004	-3	0.000004	0.000004	0.000004	6	0.000004	0.000004	0.000005	-12	0.000004	0.000004	0.000005	-11	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	Apr	6	0.000002	0.000002	0.000002	-61	0.000003	0.000003	0.000004	-10	0.000004	0.000004	0.000004	-1	0.000004	0.000004	0.000005	-14	0.000004	0.000004	0.000005	-11	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	May	6	0.000003	0.000003	0.000003	-20	0.000003	0.000003	0.000003	-1	0.000003	0.000003	0.000003	-16	0.000003	0.000004	0.000004	-14	0.000004	0.000004	0.000004	-11	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Jun	6	0.000004	0.000004	0.000005	14	0.000003	0.000003	0.000003	12	0.000004	0.000004	0.000004	-12	0.000004	0.000004	0.000004	-13	0.000004	0.000004	0.000004	-10	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Jul	6	0.000004	0.000004	0.000005	14	0.000004	0.000004	0.000004	21	0.000004	0.000004	0.000004	-6	0.000004	0.000004	0.000004	-11	0.000004	0.000004	0.000004	-9	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Aug	6	0.000004	0.000004	0.000004	4	0.000004	0.000004	0.000004	22	0.000004	0.000004	0.000004	-3	0.000004	0.000004	0.000004	-9	0.000004	0.000004	0.000004	-9	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Sep	6	0.000004	0.000004	0.000004	15	0.000004	0.000004	0.000004	21	0.000004	0.000004	0.000004	-1	0.000004	0.000004	0.000004	-8	0.000004	0.000004	0.000004	-9	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	Oct	6	0.000005	0.000005	0.000005	30	0.000004	0.000004	0.000004	21	0.000004	0.000004	0.000004	2	0.000004	0.000004	0.000004	-9	0.000004	0.000004	0.000004	-9	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Nov	6	0.000006	0.000006	0.000006	7	0.000004	0.000004	0.000004	22	0.000006	0.000006	0.000006	-19	0.000005	0.000005	0.000005	-10	0.000004	0.000004	0.000005	-10	0.000006	0.000006	0.000006	0
Cd, Tot	Closure	Dec	6	0.000003	0.000003	0.000004	-28	0.000004	0.000004	0.000004	19	0.000004	0.000004	0.000004	6	0.000004	0.000004	0.000005	-10	0.000004	0.000004	0.000005	-10	0.000006	0.000006	0.000006	0
Cd, Tot	Post-Closure	Jan	117	0.000005	0.000005	0.000005	0	0.000006	0.000005	0.000006	49	0.000004	0.000004	0.000004	23	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cd, Tot	Post-Closure	Feb	117	0.000005	0.000005	0.000006	0	0.000006	0.000006	0.000006	51	0.000005	0.000005	0.000005	17	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	2	0.000007	0.000007	0.000007	1
Cd, Tot	Post-Closure	Mar	117	0.000004	0.000004	0.000005	0	0.000006	0.000006	0.000006	56	0.000003	0.000003	0.000004	-7	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cd, Tot	Post-Closure	Apr	117	0.000004	0.000004	0.000005	0	0.000007	0.000006	0.000007	62	0.000003	0.000003	0.000004	-13	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cd, Tot	Post-Closure	May	117	0.000003	0.000003	0.000004	-1	0.000005	0.000005	0.000005	58	0.000004	0.000004	0.000004	-3	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	2	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Jun	117	0.000004	0.000004	0.000004	-2	0.000005	0.000005	0.000005	51	0.000005	0.000005	0.000005	12	0.000004	0.000004	0.000004	3	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Jul	117	0.000004	0.000004	0.000004	-2	0.000005	0.000005	0.000005	48	0.000005	0.000005	0.000005	13	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Aug	117	0.000004	0.000004	0.000004	-1	0.000005	0.000005	0.000005	47	0.000005	0.000005	0.000005	13	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cd, Tot	Post-Closure	Sep	117	0.000004	0.000004	0.000004	-1	0.000005	0.000004	0.000005	47	0.000005	0.000005	0.000005	13	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cd, Tot	Post-Closure	Oct	117	0.000004	0.000004	0.000004	-1	0.000005	0.000004	0.000005	48	0.000004	0.000004	0.000004	15	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Nov	117	0.000005	0.000005	0.000006	0	0.000006	0.000005	0.000006	48	0.000008	0.000008	0.000008	15	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cd, Tot	Post-Closure	Dec	117	0.000005	0.000005	0.000006	0	0.000006	0.000005	0.000006	49	0.000005	0.000005	0.000005	23	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1
Cr, Diss	Construction	Jan	2	0.00008	0.00008	0.00009	89	0.00005	0.00005	0.00005	18	0.00003	0.00003	0.00003	-21	0.00006	0.00006	0.00007	-19	0.00008	0.00008	0.00009	-11	0.00012	0.00012	0.00012	0
Cr, Diss	Construction	Feb	2	0.00010	0.00010	0.00010	103	0.00005	0.00005	0.00006	26	0.00003	0.00003	0.00003	-28	0.00005	0.00005	0.00006	-24	0.00008	0.00008	0.00009	-12	0.00012	0.00012	0.00012	0
Cr, Diss	Construction	Mar	2	0.00010	0.00010	0.00010	121	0.00005	0.00005	0.00006	31	0.00002	0.00002	0.00003	-27	0.00005	0.00005	0.00006	-31	0.00008	0.00008	0.00009	-14	0.00012	0.00012	0.00012	0
Cr, Diss	Construction	Apr	2	0.00010	0.00010	0.00010	139	0.00006	0.00006	0.00006	38	0.00002	0.00002	0.00003	-24	0.00004	0.00004	0.00005	-37	0.00008	0.00008	0.00008	-17	0.00012	0.00012	0.00012	0
Cr, Diss	Construction	May	2	0.00011	0.00011	0.00011	68	0.00005	0.00005	0.00005	49	0.00005	0.00005	0.00005	-27	0.00004	0.00004	0.00004	-35	0.00008	0.00008	0.00008	-17	0.00010	0.00010	0.00010	-1
Cr, Diss	Construction	Jun	2	0.00010	0.00010	0.00010	27	0.00006	0.00006	0.00006	53	0.00006	0.00006	0.00007	-23	0.00005	0.00005	0.00005	-27	0.00007	0.00007	0.00008	-18	0.00009	0.00009	0.00009	0
Cr, Diss	Construction	Jul	2	0.00006	0.00006	0.00006	-7	0.00006	0.00006	0.00006	50	0.00004	0.00004	0.00005	-26	0.00005	0.00005	0.00006	-23	0.00007	0.00007	0.00008	-18	0.00010	0.00010	0.00010	0
Cr, Diss	Construction	Aug	2	0.00004	0.00004	0.00004	-25	0.00006	0.00006	0.00006	44	0.00004	0.00004	0.00004	-8	0.00006	0.00006	0.00006	-23	0.00007	0.00007	0.00008	-19	0.00010	0.00010	0.00010	0
Cr, Diss	Construction	Sep	2	0.00003	0.00003	0.00003	-34	0.00005	0.00005	0.00005	34	0.00004	0.00004	0.00004	-3	0.00005	0.00005	0.00005	-23	0.00007	0.00007	0.00007	-20	0.00010	0.00010	0.00010	0
Cr, Diss	Construction	Oct	2	0.00002	0.00002	0.00002	-38	0.00004	0.00004	0.00005	23	0.00003	0.00003	0.00003	-7	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-21	0.00010	0.00010	0.00010	0
Cr, Diss	Construction	Nov	2	0.00005	0.00005	0.00005	10	0.00005	0.00005	0.00005	16	0.00003	0.00003	0.00004	-29	0.00005	0.00005	0.00005	-29	0.00007	0.00007	0.00008	-22	0.00012	0.00012	0.00012	0
Cr, Diss	Construction	Dec	2	0.00008	0.00008	0.00008	75	0.00005	0.00005	0.00005	15	0.00003	0.00003	0.00003	-2	0.00005	0.00005	0.00005	-33	0.00007	0.00007	0.00007	-24	0.00012	0.00012	0.00012	0
Cr, Diss	Operations	Jan	5	0.00009	0.00009	0.00009	101	0.00004	0.00004	0.00005	10	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	-36	0.00006	0.00006	0.00007	-28	0.00012	0.00012	0.00012	0
Cr, Diss	Operations	Feb	5	0.00010	0.00010	0.00010	97	0.00005	0.00005	0.00005	13	0.00003	0.00003	0.00003	-17	0.00004	0.00004	0.00004	-39	0.00007	0.00007	0.00007	-29	0.00012	0.00012	0.00012	0
Cr, Diss	Operations	Mar	5	0.00009	0.00009	0.00009	111	0.00005	0.00005	0.00006	26	0.00002	0.00002	0.00003	-29	0.00004	0.00004	0.00004	-43	0.00006	0.00006	0.00006	-31	0.00012	0.00012	0.00012	-1
Cr, Diss	Operations	Apr	5	0.00010	0.00010	0.00010	126	0.00006	0.00006	0.00006	36	0.00003	0.00003	0.00003	-17	0.00004	0.00004	0.00004	-47	0.00006	0.00006	0.00006	-32	0.00012	0.00012	0.00012	-1
Cr, Diss	Operations	May	5	0.00010	0.00010	0.00010	61	0.00005	0.00005	0.00005	49	0.00005	0.00005	0.00006	-25	0.00003	0.00003	0.00003	-44	0.00007	0.00007	0.00007	-28	0.00010	0.00010	0.00010	-1
Cr, Diss	Operations	Jun	5	0.00009	0.00009	0.00009	22	0.00006	0.00006	0.00006	55	0.00007	0.00006	0.00007	-21	0.00004	0.00004	0.00005	-33	0.00007	0.00007	0.00007	-27	0.00009	0.00009	0.00009	-1
Cr, Diss	Operations	Jul	5	0.00005	0.00005	0.00006	-11	0.00007	0.00007	0.00007	55	0.00005	0.00004	0.00005	-24	0.00005	0.00005	0.00005	-27	0.00007	0.00007	0.00007	-26	0.00010	0.00010	0.00010	0
Cr, Diss	Operations	Aug	5	0.00003	0.00003	0.00004	-29	0.00006	0.00006	0.00007	51	0.00004	0.00004	0.00004	-5	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-26	0.00010	0.00010	0.00010	0
Cr, Diss	Operations	Sep	5	0.00002	0.00003	0.00003	-38	0.00006	0.00006	0.00006	41	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-25	0.00010	0.00010	0.00010	0
Cr, Diss	Operations	Oct	5	0.00002	0.00002	0.00002	-41	0.00005	0.00005	0.00005	25	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	-27	0.00006	0.00006	0.00006	-26	0.00010	0.00010	0.00010	0
Cr, Diss	Operations	Nov	5	0.00005	0.00005	0.00005	5	0.00005	0.00005	0.00005	12	0.00004	0.00004	0.00004	-19	0.00005	0.00005	0.00005	-29	0.00007	0.00007	0.00007	-27	0.00012	0.00012	0.00012	0
Cr, Diss	Operations	Dec	5	0.00007	0.00007	0.00008	66	0.00004	0.00004	0.00005	8	0.00003	0.00003	0.00003	-4	0.00005	0.00005	0.00005	-32	0.00007	0.00007	0.00007	-27	0.00012	0.00012	0.00012	0
Cr, Diss	Closure	Jan	6	0.00009	0.00009	0.00009	105	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	-5	0.00004	0.00004	0.00005	-36	0.00007	0.00007	0.00007	-27	0.00012	0.00012	0.00012	0
Cr, Diss	Closure	Feb	6	0.00010	0.00010	0.00011	102	0.00004	0.00004	0.00005	3	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	-39	0.00007	0.00007	0.00007	-29	0.00012	0.00012	0.00012	0
Cr, Diss	Closure	Mar	6	0.00009	0.00009	0.00010	116	0.00004	0.00004	0.00005	4	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	-43	0.00006	0.00006	0.00007	-30	0.00012	0.00012	0.00012	0
Cr, Diss	Closure	Apr	6	0.00010	0.00010	0.00011	132	0.00004	0.00004	0.00004	4	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	-46	0.00006	0.00006	0.00006	-31	0.00012	0.00012	0.00012	0
Cr, Diss	Closure	May	6	0.00010	0.00010	0.00011	63	0.00004	0.00004	0.00004	16	0.00006	0.00006	0.00006	-24	0.00003	0.00003	0.00003	-43	0.00007	0.00007	0.00007	-27	0.00010	0.00010	0.00010	0
Cr, Diss	Closure	Jun	6	0.00010	0.00010	0.00010	25	0.00005	0.00005	0.00005	23	0.00007	0.00007	0.00007	-19	0.00005	0.00005	0.00005	-32	0.00007	0.00007	0.00007	-26	0.00009	0.00009	0.00009	0
Cr, Diss	Closure	Jul	6	0.00006	0.00006	0.00006	-7	0.00005	0.00005	0.00005	21	0.00005	0.00005	0.00005	-20	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-25	0.00010	0.00010	0.00010	0
Cr, Diss	Closure	Aug	6	0.00004	0.00004	0.00004	-25	0.00005	0.00005	0.00005	15	0.00004	0.00004	0.00004	-6	0.00006	0.00006	0.00006	-24	0.00007	0.00007	0.00007	-24	0.00010	0.00010	0.00010	0
Cr, Diss	Closure	Sep	6	0.00003	0.00003	0.00003	-34	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	-2	0.00005	0.00005	0.00005	-24	0.00007	0.00007	0.00007	-24	0.00010	0.00010	0.00010	0
Cr, Diss	Closure	Oct	6	0.00002	0.00002	0.00002	-37	0.00003	0.00003	0.00004	-4	0.00003	0.00003	0.00003	-8	0.00005	0.00005	0.00005	-25	0.00006	0.00006	0.00007	-24	0.00010	0.00010	0.00010	0
Cr, Diss	Closure	Nov	6	0.00005	0.00005	0.00005	8	0.00004	0.00004	0.00004	-9	0.00003	0.00003	0.00004	-31	0.00005	0.00005	0.00005	-28	0.00007	0.00007	0.00007	-25	0.00012	0.00012	0.00012	0
Cr, Diss	Closure	Dec	6	0.00008	0.00008	0.00008	70	0.00004	0.00004	0.00004	-6	0.00003	0.00003	0.00003	-15	0.00005	0.00005	0.00005	-31	0.00007	0.00007	0.00007	-26	0.00012	0.00012	0.00012	0
Cr, Diss	Post-Closure	Jan	117	0.00005	0.00005	0.00009	4	0.00006	0.00006	0.00007	52	0.00004	0.00004	0.00004	21	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr, Diss	Post-Closure	Feb	117	0.00005	0.00005	0.00010	4	0.00007	0.00007	0.00007	54	0.00004	0.00004	0.00004	15	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr, Diss	Post-Closure	Mar	117	0.00004	0.00005	0.00010	3	0.00007	0.00007	0.00007	61	0.00003	0.00003	0.00004	-6	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr, Diss	Post-Closure	Apr	117	0.00004	0.00005	0.00010	3	0.00007	0.00007	0.00008	68	0.00003	0.00003	0.00004	-14	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr, Diss	Post-Closure	May	117	0.00006	0.00006	0.00010	-7	0.00006	0.00005	0.00006	57	0.00007	0.00007	0.00008	-2	0.00006	0.00006	0.00006	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr, Diss	Post-Closure	Jun	117	0.00007	0.00007	0.00010	-7	0.00006	0.00006	0.00006	45	0.00009	0.00009	0.00009	8	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr, Diss	Post-Closure	Jul	117	0.00006	0.00006	0.00006	-4	0.00006	0.00006	0.00006	42	0.00007	0.00007	0.00007	10	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr, Diss	Post-Closure	Aug	117	0.00005	0.00005	0.00005	-1	0.00006	0.00006	0.00006	41	0.00005	0.00005	0.00005	13	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr, Diss	Post-Closure	Sep	117	0.00004	0.00004	0.00004	1	0.00006	0.00006	0.00006	42	0.00004	0.00004	0.00004	13	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00011	0.00011	0.00011	1
Cr, Diss	Post-Closure	Oct	117	0.00004	0.00004	0.00004	3	0.00005	0.00005	0.00006	45	0.00004	0.00004	0.00004	14	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00009	0	0.00010	0.00010	0.00010	1
Cr, Diss	Post-Closure	Nov	117	0.00005	0.00005	0.00005	3	0.00007	0.00006	0.00007	48	0.00006	0.00006	0.00006	18	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr, Diss	Post-Closure	Dec	117	0.00005	0.00005	0.00005	3	0.00006	0.00006	0.00007	50	0.00004	0.00004	0.00004	24	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr (VI), Diss	Construction	Jan	2	0.00008	0.00008	0.00009	89	0.00005	0.00005	0.00005	18	0.00003	0.00003	0.00003	-21	0.00006	0.00006	0.00007	-19	0.00008	0.00008	0.00009	-11	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Construction	Feb	2	0.00010	0.00010	0.00010	103	0.00005	0.00005	0.00006	26	0.00003	0.00003	0.00003	-28	0.00005	0.00005	0.00006	-24	0.00008	0.00008	0.00009	-12	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Construction	Mar	2	0.00010	0.00010	0.00010	121	0.00005	0.00005	0.00006	31	0.00002	0.00002	0.00003	-27	0.00005	0.00005	0.00006	-31	0.00008	0.00008	0.00009	-14	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Construction	Apr	2	0.00010	0.00010	0.00010	139	0.00006	0.00006	0.00006	38	0.00002	0.00002	0.00003	-24	0.00004	0.00004	0.00005	-37	0.00008	0.00008	0.00008	-17	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Construction	May	2	0.00011	0.00011	0.00011	68	0.00005	0.00005	0.00005	49	0.00005	0.00005	0.00005	-27	0.00004	0.00004	0.00004	-35	0.00008	0.00008	0.00008	-17	0.00010	0.00010	0.00010	-1
Cr (VI), Diss	Construction	Jun	2	0.00010	0.00010	0.00010	27	0.00006	0.00006	0.00006	53	0.00006	0.00006	0.00007	-23	0.00005	0.00005	0.00005	-27	0.00007	0.00007	0.00008	-18	0.00009	0.00009	0.00009	0
Cr (VI), Diss	Construction	Jul	2	0.00006	0.00006	0.00006	-7	0.00006	0.00006	0.00006	50	0.00004	0.00004	0.00005	-26	0.00005	0.00005	0.00006	-23	0.00007	0.00007	0.00008	-18	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Construction	Aug	2	0.00004	0.00004	0.00004	-25	0.00006	0.00006	0.00006	44	0.00004	0.00004	0.00004	-8	0.00006	0.00006	0.00006	-23	0.00007	0.00007	0.00008	-19	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Construction	Sep	2	0.00003	0.00003	0.00003	-34	0.00005	0.00005	0.00005	34	0.00004	0.00004	0.00004	-3	0.00005	0.00005	0.00005	-23	0.00007	0.00007	0.00007	-20	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Construction	Oct	2	0.00002	0.00002	0.00002	-38	0.00004	0.00004	0.00005	23	0.00003	0.00003	0.00003	-7	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-21	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Construction	Nov	2	0.00005	0.00005	0.00005	10	0.00005	0.00005	0.00005	16	0.00003	0.00003	0.00004	-29	0.00005	0.00005	0.00005	-29	0.00007	0.00007	0.00008	-22	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Construction	Dec	2	0.00008	0.00008	0.00008	75	0.00005	0.00005	0.00005	15	0.00003	0.00003	0.00003	-2	0.00005	0.00005	0.00005	-33	0.00007	0.00007	0.00007	-24	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Operations	Jan	5	0.00009	0.00009	0.00009	101	0.00004	0.00004	0.00005	10	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	-36	0.00006	0.00006	0.00007	-28	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Operations	Feb	5	0.00010	0.00010	0.00010	97	0.00005	0.00005	0.00005	13	0.00003	0.00003	0.00003	-17	0.00004	0.00004	0.00004	-39	0.00007	0.00007	0.00007	-29	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Operations	Mar	5	0.00009	0.00009	0.00009	111	0.00005	0.00005	0.00006	26	0.00002	0.00002	0.00003	-29	0.00004	0.00004	0.00004	-43	0.00006	0.00006	0.00006	-31	0.00012	0.00012	0.00012	-1
Cr (VI), Diss	Operations	Apr	5	0.00010	0.00010	0.00010	126	0.00006	0.00006	0.00006	36	0.00003	0.00003	0.00003	-17	0.00004	0.00004	0.00004	-47	0.00006	0.00006	0.00006	-32	0.00012	0.00012	0.00012	-1
Cr (VI), Diss	Operations	May	5	0.00010	0.00010	0.00010	61	0.00005	0.00005	0.00005	49	0.00005	0.00005	0.00006	-25	0.00003	0.00003	0.00003	-44	0.00007	0.00007	0.00007	-28	0.00010	0.00010	0.00010	-1
Cr (VI), Diss	Operations	Jun	5	0.00009	0.00009	0.00009	22	0.00006	0.00006	0.00006	55	0.00007	0.00006	0.00007	-21	0.00004	0.00004	0.00005	-33	0.00007	0.00007	0.00007	-27	0.00009	0.00009	0.00009	-1
Cr (VI), Diss	Operations	Jul	5	0.00005	0.00005	0.00006	-11	0.00007	0.00007	0.00007	55	0.00005	0.00004	0.00005	-24	0.00005	0.00005	0.00005	-27	0.00007	0.00007	0.00007	-26	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Operations	Aug	5	0.00003	0.00003	0.00004	-29	0.00006	0.00006	0.00007	51	0.00004	0.00004	0.00004	-5	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-26	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Operations	Sep	5	0.00002	0.00003	0.00003	-38	0.00006	0.00006	0.00006	41	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-25	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Operations	Oct	5	0.00002	0.00002	0.00002	-41	0.00005	0.00005	0.00005	25	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	-27	0.00006	0.00006	0.00006	-26	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Operations	Nov	5	0.00005	0.00005	0.00005	5	0.00005	0.00005	0.00005	12	0.00004	0.00004	0.00004	-19	0.00005	0.00005	0.00005	-29	0.00007	0.00007	0.00007	-27	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Operations	Dec	5	0.00007	0.00007	0.00008	66	0.00004	0.00004	0.00005	8	0.00003	0.00003	0.00003	-4	0.00005	0.00005	0.00005	-32	0.00007	0.00007	0.00007	-27	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Closure	Jan	6	0.00009	0.00009	0.00009	105	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	-5	0.00004	0.00004	0.00005	-36	0.00007	0.00007	0.00007	-27	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Closure	Feb	6	0.00010	0.00010	0.00011	102	0.00004	0.00004	0.00005	3	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	-39	0.00007	0.00007	0.00007	-29	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Closure	Mar	6	0.00009	0.00009	0.00010	116	0.00004	0.00004	0.00005	4	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	-43	0.00006	0.00006	0.00007	-30	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Closure	Apr	6	0.00010	0.00010	0.00011	132	0.00004	0.00004	0.00004	4	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	-46	0.00006	0.00006	0.00006	-31	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Closure	May	6	0.00010	0.00010	0.00011	63	0.00004	0.00004	0.00004	16	0.00006	0.00006	0.00006	-24	0.00003	0.00003	0.00003	-43	0.00007	0.00007	0.00007	-27	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Closure	Jun	6	0.00010	0.00010	0.00010	25	0.00005	0.00005	0.00005	23	0.00007	0.00007	0.00007	-19	0.00005	0.00005	0.00005	-32	0.00007	0.00007	0.00007	-26	0.00009	0.00009	0.00009	0
Cr (VI), Diss	Closure	Jul	6	0.00006	0.00006	0.00006	-7	0.00005	0.00005	0.00005	21	0.00005	0.00005	0.00005	-20	0.00005	0.00005	0.00005	-26	0.00007	0.00007	0.00007	-25	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Closure	Aug	6	0.00004	0.00004	0.00004	-25	0.00005	0.00005	0.00005	15	0.00004	0.00004	0.00004	-6	0.00006	0.00006	0.00006	-24	0.00007	0.00007	0.00007	-24	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Closure	Sep	6	0.00003	0.00003	0.00003	-34	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	-2	0.00005	0.00005	0.00005	-24	0.00007	0.00007	0.00007	-24	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Closure	Oct	6	0.00002	0.00002	0.00002	-37	0.00003	0.00003	0.00004	-4	0.00003	0.00003	0.00003	-8	0.00005	0.00005	0.00005	-25	0.00006	0.00006	0.00007	-24	0.00010	0.00010	0.00010	0
Cr (VI), Diss	Closure	Nov	6	0.00005	0.00005	0.00005	8	0.00004	0.00004	0.00004	-9	0.00003	0.00003	0.00004	-31	0.00005	0.00005	0.00005	-28	0.00007	0.00007	0.00007	-25	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Closure	Dec	6	0.00008	0.00008	0.00008	70	0.00004	0.00004	0.00004	-6	0.00003	0.00003	0.00003	-15	0.00005	0.00005	0.00005	-31	0.00007	0.00007	0.00007	-26	0.00012	0.00012	0.00012	0
Cr (VI), Diss	Post-Closure	Jan	117	0.00005	0.00005	0.00009	4	0.00006	0.00006	0.00007	52	0.00004	0.00004	0.00004	21	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr (VI), Diss	Post-Closure	Feb	117	0.00005	0.00005	0.00010	4	0.00007	0.00007	0.00007	54	0.00004	0.00004	0.00004	15	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr (VI), Diss	Post-Closure	Mar	117	0.00004	0.00005	0.00010	3	0.00007	0.00007	0.00007	61	0.00003	0.00003	0.00004	-6	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr (VI), Diss	Post-Closure	Apr	117	0.00004	0.00005	0.00010	3	0.00007	0.00007	0.00008	68	0.00003	0.00003	0.00004	-14	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr (VI), Diss	Post-Closure	May	117	0.00006	0.00006	0.00010	-7	0.00006	0.00005	0.00006	57	0.00007	0.00007	0.00008	-2	0.00006	0.00006	0.00006	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr (VI), Diss	Post-Closure	Jun	117	0.00007	0.00007	0.00010	-7	0.00006	0.00006	0.00006	45	0.00009	0.00009	0.00009	8	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr (VI), Diss	Post-Closure	Jul	117	0.00006	0.00006	0.00006	-4	0.00006	0.00006	0.00006	42	0.00007	0.00007	0.00007	10	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr (VI), Diss	Post-Closure	Aug	117	0.00005	0.00005	0.00005	-1	0.00006	0.00006	0.00006	41	0.00005	0.00005	0.00005	13	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1
Cr (VI), Diss	Post-Closure	Sep	117	0.00004	0.00004	0.00004	1	0.00006	0.00006	0.00006	42	0.00004	0.00004	0.00004	13	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00011	0.00011	0.00011	1
Cr (VI), Diss	Post-Closure	Oct	117	0.00004	0.00004	0.00004	3	0.00005	0.00005	0.00006	45	0.00004	0.00004	0.00004	14	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00009	0	0.00010	0.00010	0.00010	1
Cr (VI), Diss	Post-Closure	Nov	117	0.00005	0.00005	0.00005	3	0.00007	0.00006	0.00007	48	0.00006	0.00006	0.00006	18	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr (VI), Diss	Post-Closure	Dec	117	0.00005	0.00005	0.00005	3	0.00006	0.00006	0.00007	50	0.00004	0.00004	0.00004	24	0.00007	0.00007	0.00007	1	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00012	1
Cr, Tot	Construction	Jan	2	0.00018	0.00018	0.00023	-34	0.00008	0.00008	0.00009	-5	0.00005	0.00005	0.00007	-32	0.00013	0.00013	0.00016	-20	0.00018	0.00018	0.00021	-12	0.00018	0.00018	0.00018	0
Cr, Tot	Construction	Feb	2	0.00015	0.00015	0.00017	-50	0.00008	0.00008	0.00009	-8	0.00006	0.00006	0.00007	-34	0.00013	0.00013	0.00015	-25	0.00018	0.00018	0.00021	-13	0.00018	0.00018	0.00018	0
Cr, Tot	Construction	Mar	2	0.00011	0.00011	0.00013	-54	0.00008	0.00008	0.00009	-11	0.00005	0.00005	0.00006	-36	0.00011	0.00011	0.00014	-31	0.00018	0.00018	0.00020	-15	0.00017	0.00017	0.00018	0
Cr, Tot	Construction	Apr	2	0.00011	0.00011	0.00012	-53	0.00008	0.00008	0.00008	-11	0.00005	0.00005	0.00005	-36	0.00010	0.00010	0.00012	-38	0.00017	0.00017	0.00020	-17	0.00017	0.00017	0.00017	-1
Cr, Tot	Construction	May	2	0.00012	0.00012	0.00012	-32	0.00007	0.00007	0.00007	-1	0.00008	0.00008	0.00009	-34	0.00010	0.00010	0.00012	-34	0.00020	0.00020	0.00022	-16	0.00015	0.00015	0.00015	-1
Cr, Tot	Construction	Jun	2	0.00016	0.00016	0.00016	-18	0.00008	0.00008	0.00008	7	0.00009	0.00009	0.00009	-35	0.00011	0.00011	0.00012	-32	0.00018	0.00018	0.00020	-18	0.00015	0.00015	0.00015	0
Cr, Tot	Construction	Jul	2	0.00016	0.00016	0.00016	-19	0.00009	0.00009	0.00009	13	0.00008	0.00008	0.00008	-30	0.00011	0.00011	0.00012	-30	0.00017	0.00017	0.00019	-20	0.00015	0.00015	0.00015	0
Cr, Tot	Construction	Aug	2	0.00014	0.00014	0.00014	-24	0.00009	0.00009	0.00009	14	0.00007	0.00007	0.00007	-15	0.00011	0.00011	0.00012	-29	0.00017	0.00017	0.00018	-21	0.00016	0.00016	0.00016	0
Cr, Tot	Construction	Sep	2	0.00016	0.00016	0.00016	-20	0.00008	0.00008	0.00008	8	0.00007	0.00007	0.00008	-15	0.00011	0.00011	0.00012	-28	0.00016	0.00016	0.00017	-22	0.00016	0.00016	0.00016	0
Cr, Tot	Construction	Oct	2	0.00018	0.00018	0.00018	-15	0.00007	0.00007	0.00007	1	0.00007	0.00007	0.00007	-21	0.00011	0.00011	0.00011	-28	0.00015	0.00015	0.00016	-23	0.00016	0.00016	0.00016	0
Cr, Tot	Construction	Nov	2	0.00021	0.00021	0.00021	-29	0.00008	0.00008	0.00008	-5	0.00008	0.00008	0.00009	-36	0.00012	0.00012	0.00012	-31	0.00016	0.00016	0.00017	-25	0.00018	0.00018	0.00018	0
Cr, Tot	Construction	Dec	2	0.00015	0.00015	0.00015	-47	0.00007	0.00007	0.00008	-11	0.00007	0.00007	0.00007	-17	0.00011	0.00011	0.00011	-35	0.00016	0.00016	0.00016	-26	0.00018	0.00018	0.00018	0
Cr, Tot	Operations	Jan	5	0.00012	0.00012	0.00012	-55	0.00007	0.00007	0.00007	-20	0.00007	0.00007	0.00007	-16	0.00010	0.00010	0.00010	-38	0.00014	0.00014	0.00015	-31	0.00018	0.00018	0.00018	-1
Cr, Tot	Operations	Feb	5	0.00012	0.00012	0.00012	-60	0.00007	0.00007	0.00007	-23	0.00006	0.00007	0.00007	-26	0.00010	0.00010	0.00010	-41	0.00014	0.00014	0.00015	-32	0.00018	0.00018	0.00018	-1
Cr, Tot	Operations	Mar	5	0.00010	0.00010	0.00010	-59	0.00007	0.00007	0.00008	-16	0.00005	0.00005	0.00006	-39	0.00009	0.00009	0.00009	-45	0.00014	0.00014	0.00014	-33	0.00017	0.00017	0.00017	-1
Cr, Tot	Operations	Apr	5	0.00011	0.00011	0.00011	-56	0.00007	0.00008	0.00008	-12	0.00006	0.00006	0.00006	-31	0.00008	0.00008	0.00008	-49	0.00014	0.00014	0.00014	-34	0.00017	0.00017	0.00017	-1
Cr, Tot	Operations	May	5	0.00012	0.00012	0.00012	-34	0.00006	0.00007	0.00007	-1	0.00009	0.00009	0.00009	-32	0.00009	0.00009	0.00009	-41	0.00017	0.00017	0.00017	-28	0.00015	0.00015	0.00015	-1
Cr, Tot	Operations	Jun	5	0.00016	0.00016	0.00016	-19	0.00008	0.00008	0.00008	9	0.00009	0.00009	0.00009	-34	0.00010	0.00010	0.00010	-38	0.00016	0.00016	0.00016	-28	0.00015	0.00015	0.00015	-1
Cr, Tot	Operations	Jul	5	0.00016	0.00016	0.00016	-20	0.00009	0.00009	0.00009	17	0.00008	0.00008	0.00008	-28	0.00011	0.00011	0.00011	-34	0.00016	0.00016	0.00016	-28	0.00015	0.00015	0.00015	0
Cr, Tot	Operations	Aug	5	0.00014	0.00014	0.00014	-26	0.00009	0.00009	0.00009	20	0.00007	0.00007	0.00008	-12	0.00011	0.00011	0.00011	-32	0.00015	0.00015	0.00015	-28	0.00016	0.00016	0.00016	0
Cr, Tot	Operations	Sep	5	0.00015	0.00015	0.00015	-21	0.00008	0.00008	0.00009	14	0.00008	0.00008	0.00008	-9	0.00011	0.00011	0.00011	-30	0.00014	0.00014	0.00014	-29	0.00016	0.00016	0.00016	0
Cr, Tot	Operations	Oct	5	0.00017	0.00017	0.00018	-16	0.00007	0.00007	0.00007	4	0.00007	0.00007	0.00008	-11	0.00011	0.00011	0.00011	-29	0.00014	0.00014	0.00014	-29	0.00016	0.00016	0.00016	0
Cr, Tot	Operations	Nov	5	0.00020	0.00020	0.00020	-31	0.00008	0.00008	0.00008	-6	0.00010	0.00009	0.00010	-27	0.00012	0.00012	0.00012	-31	0.00015	0.00015	0.00015	-29	0.00018	0.00018	0.00018	0
Cr, Tot	Operations	Dec	5	0.00014	0.00014	0.00014	-48	0.00007	0.00007	0.00007	-14	0.00007	0.00007	0.00007	-17	0.00011	0.00011	0.00011	-34	0.00015	0.00015	0.00015	-30	0.00018	0.00018	0.00018	0
Cr, Tot	Closure	Jan	6	0.00012	0.00012	0.00013	-54	0.00006	0.00006	0.00006	-29	0.00006	0.00006	0.00007	-23	0.00010	0.00010	0.00010	-38	0.00014	0.00014	0.00015	-30	0.00018	0.00018	0.00018	0
Cr, Tot	Closure	Feb	6	0.00012	0.00012	0.00012	-60	0.00006	0.00006	0.00006	-34	0.00006	0.00006	0.00007	-28	0.00010	0.00010	0.00010	-41	0.00014	0.00015	0.00015	-31	0.00018	0.00018	0.00018	0
Cr, Tot	Closure	Mar	6	0.00010	0.00010	0.00010	-59	0.00005	0.00005	0.00006	-39	0.00006	0.00006	0.00006	-33	0.00009	0.00009	0.00010	-45	0.00014	0.00014	0.00015	-32	0.00018	0.00018	0.00018	0
Cr, Tot	Closure	Apr	6	0.00011	0.00011	0.00011	-56	0.00005	0.00005	0.00005	-42	0.00005	0.00005	0.00006	-35	0.00009	0.00009	0.00009	-48	0.00014	0.00014	0.00014	-34	0.00017	0.00017	0.00017	0
Cr, Tot	Closure	May	6	0.00012	0.00012	0.00012	-34	0.00005	0.00005	0.00005	-31	0.00008	0.00008	0.00009	-33	0.00009	0.00009	0.00010	-41	0.00017	0.00017	0.00017	-27	0.00015	0.00015	0.00015	0
Cr, Tot	Closure	Jun	6	0.00016	0.00016	0.00016	-19	0.00006	0.00006	0.00006	-21	0.00009	0.00009	0.00009	-35	0.00010	0.00010	0.00010	-37	0.00016	0.00016	0.00016	-27	0.00015	0.00015	0.00015	0
Cr, Tot	Closure	Jul	6	0.00016	0.00016	0.00016	-20	0.00006	0.00006	0.00007	-16	0.00008	0.00008	0.00008	-30	0.00011	0.00011	0.00011	-33	0.00016	0.00016	0.00016	-27	0.00015	0.00015	0.00015	0
Cr, Tot	Closure	Aug	6	0.00014	0.00014	0.00014	-25	0.00006	0.00006	0.00007	-15	0.00007	0.00007	0.00007	-18	0.00011	0.00011	0.00011	-31	0.00015	0.00015	0.00015	-27	0.00016	0.00016	0.00016	0
Cr, Tot	Closure	Sep	6	0.00016	0.00016	0.00016	-20	0.00006	0.00006	0.00006	-19	0.00007	0.00007	0.00007	-17	0.00011	0.00011	0.00011	-29	0.00015	0.00015	0.00015	-27	0.00016	0.00016	0.00016	0
Cr, Tot	Closure	Oct	6	0.00018	0.00018	0.00018	-16	0.00005	0.00005	0.00005	-24	0.00006	0.00006	0.00007	-24	0.00011	0.00011	0.00011	-29	0.00014	0.00014	0.00014	-27	0.00016	0.00016	0.00016	0
Cr, Tot	Closure	Nov	6	0.00021	0.00021	0.00021	-29	0.00006	0.00006	0.00006	-25	0.00008	0.00008	0.00009	-39	0.00012	0.00012	0.00012	-31	0.00015	0.00015	0.00016	-28	0.00018	0.00018	0.00018	0
Cr, Tot	Closure	Dec	6	0.00015	0.00015	0.00016	-46	0.00006	0.00006	0.00006	-27	0.00006	0.00006	0.00007	-28	0.00011	0.00011	0.00011	-34	0.00015	0.00015	0.00015	-29	0.00018	0.00018	0.00018	0
Cr, Tot	Post-Closure	Jan	117	0.00025	0.00025	0.00025	-6	0.00013	0.00012	0.00013	48	0.00010	0.00010	0.00010	22	0.00017	0.00017	0.00017	1	0.00021	0.00021	0.00021	0	0.00018	0.00018	0.00018	0
Cr, Tot	Post-Closure	Feb	117	0.00028	0.00028	0.00028	-6	0.00014	0.00013	0.00015	50	0.00011	0.00010	0.00011	16	0.00017	0.00017	0.00018	1	0.00021	0.00021	0.00022	0	0.00019	0.00019	0.00019	0
Cr, Tot	Post-Closure	Mar	117	0.00024	0.00024	0.00024	-5	0.00014	0.00014	0.00015	56	0.00008	0.00008	0.00009	-7	0.00017	0.00017	0.00017	1	0.00021	0.00021	0.00021	0	0.00018	0.00018	0.00018	0
Cr, Tot	Post-Closure	Apr	117	0.00023	0.00023	0.00023	-5	0.00015	0.00014	0.00016	62	0.00007	0.00007	0.00009	-14	0.00017	0.00017	0.00017	0	0.00021	0.00021	0.00021	0	0.00017	0.00017	0.00017	1
Cr, Tot	Post-Closure	May	117	0.00017	0.00017	0.00017	-6	0.00011	0.00010	0.00012	57	0.00012	0.00012	0.00013	-2	0.00016	0.00016	0.00016	0	0.00023	0.00023	0.00024	0	0.00015	0.00015	0.00015	1
Cr, Tot	Post-Closure	Jun	117	0.00019	0.00019	0.00019	-5	0.00011	0.00011	0.00012	49	0.00015	0.00015	0.00016	9	0.00016	0.00016	0.00016	0	0.00022	0.00022	0.00022	0	0.00015	0.00015	0.00015	0
Cr, Tot	Post-Closure	Jul	117	0.00019	0.00019	0.00019	-5	0.00012	0.00011	0.00012	46	0.00013	0.00012	0.00013	12	0.00016	0.00016	0.00016	1	0.00022	0.00022	0.00022	0	0.00016	0.00015	0.00016	0
Cr, Tot	Post-Closure	Aug	117	0.00018	0.00018	0.00018	-5	0.00011	0.00011	0.00012	44	0.00010	0.00010	0.00010	15	0.00016	0.00016	0.00016	1	0.00021	0.00021	0.00021	0	0.00016	0.00016	0.00016	0
Cr, Tot	Post-Closure	Sep	117	0.00019	0.00018	0.00019	-5	0.00011	0.00010	0.00011	44	0.00010	0.00010	0.00010	14	0.00016	0.00016	0.00016	1	0.00020	0.00020	0.00020	0	0.00016	0.00016	0.00016	0
Cr, Tot	Post-Closure	Oct	117	0.00020	0.00020	0.00020	-6	0.00010	0.00010	0.00011	46	0.00010	0.00010	0.00010	14	0.00016	0.00016	0.00016	1	0.00019	0.00019	0.00020	0	0.00016	0.00016	0.00016	0
Cr, Tot	Post-Closure	Nov	117	0.00028	0.00028	0.00028	-6	0.00013	0.00012	0.00013	46	0.00016	0.00015	0.00016	18	0.00018	0.00018	0.00018	2	0.00021	0.00021	0.00022	0	0.00018	0.00018	0.00018	0
Cr, Tot	Post-Closure	Dec	117	0.00026	0.00026	0.00026	-5	0.00013	0.00012	0.00013	47	0.00011	0.00011	0.00012	25	0.00017	0.00017	0.00017	1	0.00021	0.00021	0.00021	0	0.00018	0.00018	0.00018	0
Cu, Diss	Construction	Jan	2	0.00010	0.00010	0.00011	-11	0.00052	0.00052	0.00061	-1	0.00006	0.00006	0.00008	-26	0.00034	0.00034	0.00040	-16	0.00038	0.00038	0.00042	-8	0.00043	0.00043	0.00043	0
Cu, Diss	Construction	Feb	2	0.00010	0.00010	0.00010	-24	0.00056	0.00056	0.00073	0	0.00006	0.00006	0.00006	-28	0.00033	0.00033	0.00039	-21	0.00039	0.00039	0.00042	-10	0.00045	0.00045	0.00045	0
Cu, Diss	Construction	Mar	2	0.00008	0.00008	0.00008	-28	0.00055	0.00055	0.00074	-1	0.00005	0.00005	0.00006	-25	0.00030	0.00030	0.00035	-26	0.00037	0.00037	0.00041	-11	0.00043	0.00043	0.00043	0
Cu, Diss	Construction	Apr	2	0.00008	0.00008	0.00008	-28	0.00054	0.00054	0.00072	-1	0.00005	0.00005	0.00006	-18	0.00028	0.00028	0.00031	-32	0.00036	0.00036	0.00039	-14	0.00043	0.00043	0.00043	0
Cu, Diss	Construction	May	2	0.00008	0.00008	0.00008	-4	0.00039	0.00039	0.00050	4	0.00018	0.00018	0.00021	29	0.00028	0.00028	0.00031	-29	0.00031	0.00031	0.00033	-15	0.00037	0.00037	0.00037	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Cu, Diss	Construction	Jun	2	0.00011	0.00011	0.00011	18	0.00038	0.00038	0.00047	10	0.00022	0.00022	0.00026	0	0.00029	0.00029	0.00031	-27	0.00031	0.00031	0.00034	-14	0.00037	0.00037	0.00037	0
Cu, Diss	Construction	Jul	2	0.00014	0.00014	0.00014	30	0.00039	0.00039	0.00047	19	0.00017	0.00017	0.00017	-3	0.00029	0.00029	0.00032	-25	0.00032	0.00032	0.00034	-15	0.00037	0.00037	0.00037	0
Cu, Diss	Construction	Aug	2	0.00016	0.00016	0.00016	33	0.00039	0.00039	0.00047	28	0.00017	0.00017	0.00019	16	0.00030	0.00030	0.00032	-24	0.00033	0.00033	0.00035	-15	0.00038	0.00038	0.00038	0
Cu, Diss	Construction	Sep	2	0.00013	0.00013	0.00013	15	0.00039	0.00039	0.00047	34	0.00012	0.00012	0.00014	6	0.00030	0.00030	0.00032	-23	0.00033	0.00033	0.00035	-16	0.00037	0.00037	0.00037	0
Cu, Diss	Construction	Oct	2	0.00009	0.00009	0.00009	-11	0.00037	0.00037	0.00045	36	0.00010	0.00010	0.00011	10	0.00028	0.00028	0.00030	-25	0.00032	0.00032	0.00034	-16	0.00037	0.00037	0.00037	0
Cu, Diss	Construction	Nov	2	0.00010	0.00010	0.00010	-20	0.00058	0.00058	0.00067	5	0.00011	0.00011	0.00012	-14	0.00030	0.00030	0.00032	-28	0.00035	0.00035	0.00037	-18	0.00043	0.00043	0.00043	0
Cu, Diss	Construction	Dec	2	0.00009	0.00009	0.00009	-22	0.00046	0.00046	0.00052	-13	0.00008	0.00008	0.00009	-7	0.00028	0.00028	0.00030	-31	0.00034	0.00034	0.00036	-20	0.00043	0.00043	0.00043	0
Cu, Diss	Operations	Jan	5	0.00008	0.00008	0.00009	-26	0.00040	0.00041	0.00049	-21	0.00007	0.00007	0.00009	-6	0.00027	0.00028	0.00031	-32	0.00031	0.00031	0.00033	-25	0.00043	0.00043	0.00043	0
Cu, Diss	Operations	Feb	5	0.00008	0.00008	0.00009	-35	0.00041	0.00042	0.00052	-24	0.00006	0.00006	0.00007	-24	0.00027	0.00027	0.00031	-35	0.00031	0.00032	0.00033	-26	0.00045	0.00045	0.00045	0
Cu, Diss	Operations	Mar	5	0.00007	0.00007	0.00007	-36	0.00047	0.00049	0.00065	-12	0.00005	0.00005	0.00006	-31	0.00025	0.00026	0.00029	-38	0.00031	0.00031	0.00033	-27	0.00043	0.00043	0.00043	0
Cu, Diss	Operations	Apr	5	0.00007	0.00007	0.00007	-34	0.00050	0.00052	0.00071	-4	0.00006	0.00006	0.00007	-10	0.00023	0.00024	0.00026	-42	0.00030	0.00030	0.00032	-29	0.00043	0.00043	0.00043	0
Cu, Diss	Operations	May	5	0.00007	0.00007	0.00009	-9	0.00039	0.00040	0.00054	8	0.00018	0.00018	0.00022	31	0.00026	0.00026	0.00028	-36	0.00026	0.00026	0.00027	-28	0.00037	0.00037	0.00037	0
Cu, Diss	Operations	Jun	5	0.00010	0.00010	0.00011	13	0.00043	0.00043	0.00058	26	0.00023	0.00024	0.00030	9	0.00026	0.00027	0.00029	-32	0.00027	0.00027	0.00029	-25	0.00037	0.00037	0.00037	0
Cu, Diss	Operations	Jul	5	0.00013	0.00013	0.00014	24	0.00050	0.00050	0.00068	55	0.00020	0.00020	0.00026	17	0.00028	0.00028	0.00031	-28	0.00028	0.00029	0.00030	-24	0.00037	0.00037	0.00037	0
Cu, Diss	Operations	Aug	5	0.00015	0.00015	0.00016	27	0.00055	0.00055	0.00075	78	0.00023	0.00023	0.00030	55	0.00030	0.00030	0.00033	-25	0.00030	0.00030	0.00031	-23	0.00038	0.00038	0.00038	0
Cu, Diss	Operations	Sep	5	0.00012	0.00013	0.00013	9	0.00056	0.00055	0.00075	90	0.00017	0.00017	0.00023	49	0.00030	0.00030	0.00033	-23	0.00030	0.00031	0.00032	-22	0.00037	0.00037	0.00037	0
Cu, Diss	Operations	Oct	5	0.00008	0.00008	0.00008	-16	0.00051	0.00050	0.00067	83	0.00015	0.00014	0.00019	63	0.00029	0.00029	0.00032	-25	0.00030	0.00031	0.00032	-22	0.00037	0.00037	0.00037	0
Cu, Diss	Operations	Nov	5	0.00009	0.00009	0.00010	-25	0.00069	0.00068	0.00084	23	0.00016	0.00016	0.00020	23	0.00032	0.00032	0.00036	-24	0.00033	0.00033	0.00036	-22	0.00043	0.00043	0.00043	0
Cu, Diss	Operations	Dec	5	0.00009	0.00009	0.00009	-26	0.00054	0.00054	0.00064	0	0.00010	0.00010	0.00012	12	0.00030	0.00031	0.00034	-26	0.00032	0.00033	0.00035	-23	0.00043	0.00043	0.00043	0
Cu, Diss	Closure	Jan	6	0.00009	0.00009	0.00009	-24	0.00031	0.00034	0.00051	-35	0.00006	0.00006	0.00010	-19	0.00026	0.00027	0.00032	-34	0.00031	0.00031	0.00034	-25	0.00043	0.00043	0.00043	0
Cu, Diss	Closure	Feb	6	0.00009	0.00009	0.00009	-32	0.00029	0.00032	0.00043	-43	0.00005	0.00006	0.00008	-33	0.00025	0.00027	0.00032	-37	0.00031	0.00032	0.00035	-26	0.00045	0.00045	0.00045	0
Cu, Diss	Closure	Mar	6	0.00007	0.00007	0.00008	-33	0.00027	0.00028	0.00036	-49	0.00004	0.00004	0.00006	-38	0.00024	0.00025	0.00031	-40	0.00030	0.00031	0.00034	-28	0.00043	0.00043	0.00043	0
Cu, Diss	Closure	Apr	6	0.00007	0.00007	0.00007	-32	0.00025	0.00026	0.00031	-53	0.00004	0.00004	0.00005	-37	0.00022	0.00023	0.00029	-43	0.00029	0.00030	0.00033	-29	0.00043	0.00043	0.00043	0
Cu, Diss	Closure	May	6	0.00007	0.00007	0.00008	-7	0.00019	0.00020	0.00022	-47	0.00013	0.00013	0.00014	-6	0.00025	0.00026	0.00030	-37	0.00025	0.00026	0.00029	-28	0.00037	0.00037	0.00037	0
Cu, Diss	Closure	Jun	6	0.00011	0.00011	0.00011	15	0.00020	0.00021	0.00022	-40	0.00016	0.00016	0.00017	-28	0.00025	0.00026	0.00029	-35	0.00027	0.00027	0.00030	-26	0.00037	0.00037	0.00037	0
Cu, Diss	Closure	Jul	6	0.00014	0.00014	0.00014	27	0.00022	0.00022	0.00023	-32	0.00013	0.00013	0.00013	-27	0.00026	0.00027	0.00030	-32	0.00028	0.00029	0.00031	-25	0.00037	0.00037	0.00037	0
Cu, Diss	Closure	Aug	6	0.00016	0.00016	0.00016	30	0.00023	0.00023	0.00024	-24	0.00013	0.00013	0.00013	-13	0.00028	0.00028	0.00031	-29	0.00029	0.00030	0.00032	-24	0.00038	0.00038	0.00038	0
Cu, Diss	Closure	Sep	6	0.00013	0.00013	0.00013	13	0.00024	0.00024	0.00024	-19	0.00010	0.00010	0.00010	-16	0.00028	0.00029	0.00031	-28	0.00030	0.00030	0.00032	-24	0.00037	0.00037	0.00037	0
Cu, Diss	Closure	Oct	6	0.00009	0.00009	0.00009	-11	0.00023	0.00023	0.00023	-17	0.00008	0.00008	0.00008	-14	0.00027	0.00027	0.00029	-29	0.00029	0.00030	0.00032	-24	0.00037	0.00037	0.00037	0
Cu, Diss	Closure	Nov	6	0.00010	0.00010	0.00011	-20	0.00043	0.00043	0.00044	-22	0.00009	0.00009	0.00009	-27	0.00029	0.00029	0.00032	-31	0.00032	0.00033	0.00035	-24	0.00043	0.00043	0.00043	0
Cu, Diss	Closure	Dec	6	0.00009	0.00009	0.00010	-22	0.00035	0.00036	0.00038	-33	0.00007	0.00007	0.00007	-25	0.00027	0.00028	0.00030	-34	0.00031	0.00032	0.00034	-25	0.00043	0.00043	0.00043	0
Cu, Diss	Post-Closure	Jan	117	0.00012	0.00012	0.00012	4	0.00079	0.00074	0.00079	41	0.00010	0.00010	0.00010	22	0.00042	0.00042	0.00042	2	0.00043	0.00043	0.00043	1	0.00044	0.00044	0.00044	2
Cu, Diss	Post-Closure	Feb	117	0.00013	0.00013	0.00014	4	0.00085	0.00079	0.00085	42	0.00010	0.00009	0.00010	15	0.00044	0.00044	0.00044	2	0.00044	0.00043	0.00044	1	0.00046	0.00046	0.00046	2
Cu, Diss	Post-Closure	Mar	117	0.00011	0.00011	0.00012	3	0.00087	0.00081	0.00087	47	0.00006	0.00006	0.00007	-10	0.00043	0.00043	0.00043	2	0.00044	0.00043	0.00044	1	0.00044	0.00044	0.00044	3
Cu, Diss	Post-Closure	Apr	117	0.00011	0.00011	0.00011	3	0.00090	0.00083	0.00090	53	0.00005	0.00005	0.00006	-17	0.00043	0.00042	0.00043	2	0.00043	0.00043	0.00043	1	0.00044	0.00044	0.00044	3
Cu, Diss	Post-Closure	May	117	0.00008	0.00008	0.00008	1	0.00062	0.00057	0.00062	55	0.00014	0.00014	0.00014	0	0.00041	0.00041	0.00041	1	0.00037	0.00037	0.00037	1	0.00038	0.00038	0.00038	2
Cu, Diss	Post-Closure	Jun	117	0.00009	0.00009	0.00010	0	0.00058	0.00054	0.00058	57	0.00028	0.00026	0.00028	21	0.00040	0.00040	0.00040	1	0.00038	0.00037	0.00038	1	0.00038	0.00038	0.00038	2
Cu, Diss	Post-Closure	Jul	117	0.00011	0.00011	0.00013	-1	0.00055	0.00051	0.00055	58	0.00023	0.00022	0.00023	25	0.00041	0.00040	0.00041	2	0.00039	0.00038	0.00039	1	0.00038	0.00038	0.00038	2
Cu, Diss	Post-Closure	Aug	117	0.00012	0.00012	0.00015	-1	0.00053	0.00049	0.00053	60	0.00020	0.00019	0.00020	29	0.00041	0.00041	0.00041	2	0.00040	0.00039	0.00040	1	0.00038	0.00038	0.00038	2
Cu, Diss	Post-Closure	Sep	117	0.00011	0.00011	0.00013	0	0.00051	0.00047	0.00051	62	0.00016	0.00015	0.00016	29	0.00041	0.00041	0.00041	2	0.00040	0.00040	0.00040	1	0.00038	0.00038	0.00038	2
Cu, Diss	Post-Closure	Oct	117	0.00010	0.00010	0.00010	2	0.00049	0.00045	0.00049	66	0.00012	0.00012	0.00012	30	0.00040	0.00039	0.00040	2	0.00040	0.00040	0.00040	1	0.00038	0.00038	0.00038	2
Cu, Diss	Post-Closure	Nov	117	0.00013	0.00013	0.00013	4	0.00082	0.00077	0.00082	40	0.00017	0.00016	0.00017	30	0.00044	0.00044	0.00044	3	0.00044	0.00044	0.00044	1	0.00044	0.00044	0.00044	2
Cu, Diss	Post-Closure	Dec	117	0.00012	0.00012	0.00013	4	0.00080	0.00075	0.00080	40	0.00012	0.00011	0.00012	27	0.00043	0.00043	0.00043	3	0.00043	0.00043	0.00043	1	0.00044	0.00044	0.00044	2
Cu, Tot	Construction	Jan	2	0.00018	0.00018	0.00020	-14	0.00061	0.00061	0.00073	-5	0.00014	0.00014	0.00017	-29	0.00048	0.00048	0.00055	-14	0.00044	0.00044	0.00047	-8	0.00044	0.00044	0.00044	0
Cu, Tot	Construction	Feb	2	0.00016	0.00016	0.00018	-29	0.00065	0.00065	0.00084	-5	0.00013	0.00013	0.00014	-32	0.00048	0.00048	0.00054	-18	0.00044	0.00044	0.00048	-9	0.00047	0.00047	0.00047	0
Cu, Tot	Construction	Mar	2	0.00013	0.00013	0.00014	-34	0.00062	0.00062	0.00083	-8	0.00012	0.00012	0.00014	-28	0.00044	0.00044	0.00049	-23	0.00043	0.00043	0.00047	-10	0.00045	0.00045	0.00045	0
Cu, Tot	Construction	Apr	2	0.00012	0.00012	0.00013	-35	0.00061	0.00061	0.00080	-9	0.00012	0.00012	0.00015	-21	0.00040	0.00040	0.00045	-29	0.00042	0.00042	0.00045	-12	0.00045	0.00045	0.00045	0
Cu, Tot	Construction	May	2	0.00010	0.00010	0.00010	-20	0.00043	0.00043	0.00055	-4	0.00024	0.00024	0.00029	25	0.00046	0.00046	0.00049	-25	0.00036	0.00036	0.00039	-12	0.00039	0.00039	0.00039	0
Cu, Tot	Construction	Jun	2	0.00012	0.00012	0.00012	-4	0.00042	0.00042	0.00052	1	0.00030	0.00030	0.00035	-4	0.00044	0.00044	0.00047	-24	0.00038	0.00038	0.00040	-11	0.00039	0.00039	0.00039	0
Cu, Tot	Construction	Jul	2	0.00015	0.00015	0.00015	8	0.00042	0.00042	0.00051	9	0.00020	0.00020	0.00023	-14	0.00043	0.00043	0.00046	-24	0.00039	0.00039	0.00042	-12	0.00039	0.00039	0.00039	0
Cu, Tot	Construction	Aug	2	0.00017	0.00017	0.00017	14	0.00042	0.00042	0.00051	17	0.00018	0.00018	0.00021	4	0.00041	0.00041	0.00044	-24	0.00040	0.00040	0.00042	-13	0.00039	0.00039	0.00039	0
Cu, Tot	Construction	Sep	2	0.00019	0.00019	0.00019	20	0.00042	0.00042	0.00050	23	0.00025	0.00025	0.00028	15	0.00040	0.00040	0.00042	-24	0.00039	0.00039	0.00041	-14	0.00039	0.00039	0.00039	0
Cu, Tot	Construction	Oct	2	0.00020	0.00020	0.00021	25	0.00041	0.00041	0.00049	27	0.00028	0.00028	0.00031	11	0.00039	0.00039	0.00041	-24	0.00037	0.00037	0.00039	-16	0.00038	0.00038	0.00038	0
Cu, Tot	Construction	Nov	2	0.00025	0.00025	0.00025	9	0.00068	0.00068	0.00078	1	0.00027	0.00027	0.00028	-22	0.00043	0.00043	0.00045	-25	0.00040	0.00040	0.00042	-17	0.00044	0.00044	0.00044	0
Cu, Tot	Construction	Dec	2	0.00019	0.00019	0.00019	-13	0.00055	0.00055	0.00061	-16	0.00020	0.00020	0.00022	-13	0.00041	0.00041	0.00043	-27	0.00039	0.00039	0.00041	-19	0.00044	0.00044	0.00044	0
Cu, Tot	Operations	Jan	5	0.00015	0.00015	0.00016	-27	0.00048	0.00049	0.00056	-24	0.00017	0.00017	0.00020	-10	0.00040	0.00040	0.00045	-27	0.00036	0.00036	0.00038	-23	0.00044	0.00044	0.00044	0
Cu, Tot	Operations	Feb	5	0.00014	0.00014	0.00014	-38	0.00048	0.00049	0.00059	-28	0.00014	0.00014	0.00016	-27	0.00040	0.00041	0.00046	-30	0.00036	0.00037	0.00038	-24	0.00047	0.00047	0.00047	0
Cu, Tot	Operations	Mar	5	0.00012	0.00012	0.00012	-40	0.00053	0.00055	0.00072	-18	0.00011	0.00011	0.00013	-34	0.00037	0.00038	0.00043	-33	0.00035	0.00036	0.00038	-25	0.00045	0.00045	0.00045	0
Cu, Tot	Operations	Apr	5	0.00011	0.00012	0.00012	-39	0.00056	0.00058	0.00077	-12	0.00013	0.00013	0.00016	-14	0.00035	0.00036	0.00040	-37	0.00035	0.00035	0.00037	-26	0.00045	0.00045	0.00045	0
Cu, Tot	Operations	May	5	0.00009	0.00009	0.00010	-24	0.00043	0.00044	0.00058	-2	0.00024	0.00025	0.00030	26	0.00042	0.00043	0.00046	-29	0.00030	0.00031	0.00033	-25	0.00039	0.00039	0.00039	0
Cu, Tot	Operations	Jun	5	0.00012	0.00012	0.00012	-7	0.00046	0.00047	0.00061	14	0.00031	0.00032	0.00041	4	0.00041	0.00042	0.00045	-28	0.00033	0.00034	0.00035	-21	0.00039	0.00039	0.00039	0
Cu, Tot	Operations	Jul	5	0.00014	0.00014	0.00015	4	0.00053	0.00053	0.00072	38	0.00024	0.00024	0.00031	2	0.00041	0.00041	0.00045	-26	0.00035	0.00035	0.00037	-20	0.00039	0.00039	0.00039	0
Cu, Tot	Operations	Aug	5	0.00016	0.00016	0.00017	10	0.00058	0.00058	0.00078	60	0.00024	0.00024	0.00032	37	0.00040	0.00041	0.00044	-25	0.00037	0.00037	0.00039	-19	0.00039	0.00039	0.00039	0
Cu, Tot	Operations	Sep	5	0.00018	0.00018	0.00018	15	0.00059	0.00058	0.00078	70	0.00035	0.00035	0.00045	57	0.00040	0.00041	0.00044	-23	0.00036	0.00037	0.00039	-20	0.00039	0.00039	0.00039	0
Cu, Tot	Operations	Oct	5	0.00020	0.00020	0.00020	20	0.00055	0.00054	0.00072	66	0.00040	0.00040	0.00051	58	0.00040	0.00040	0.00045	-21	0.00035	0.00035	0.00037	-20	0.00038	0.00038	0.00038	0
Cu, Tot	Operations	Nov	5	0.00024	0.00024	0.00024	4	0.00079	0.00078	0.00094	16	0.00038	0.00038	0.00047	9	0.00046	0.00046	0.00051	-20	0.00038	0.00038	0.00041	-21	0.00044	0.00044	0.00044	0
Cu, Tot	Operations	Dec	5	0.00018	0.00018	0.00018	-17	0.00062	0.00062	0.00073	-5	0.00024	0.00023	0.00028	3	0.00044	0.00044	0.00050	-21	0.00037	0.00037	0.00040	-21	0.00044	0.00044	0.00044	0
Cu, Tot	Closure	Jan	6	0.00016	0.00016	0.00016	-24	0.00037	0.00041	0.00058	-36	0.00014	0.00015	0.00022	-21	0.00036	0.00039	0.00048	-30	0.00035	0.00036	0.00039	-23	0.00044	0.00044	0.00044	0
Cu, Tot	Closure	Feb	6	0.00015	0.00015	0.00016	-36	0.00035	0.00038	0.00050	-45	0.00012	0.00013	0.00017	-35	0.00036	0.00039	0.00048	-33	0.00035	0.00036	0.00040	-24	0.00046	0.00046	0.00047	0
Cu, Tot	Closure	Mar	6	0.00012	0.00012	0.00013	-38	0.00032	0.00033	0.00041	-51	0.00010	0.00010	0.00013	-38	0.00034	0.00037	0.00046	-36	0.00034	0.00035	0.00039	-25	0.00045	0.00045	0.00045	0
Cu, Tot	Closure	Apr	6	0.00012	0.00012	0.00012	-38	0.00029	0.00030	0.00035	-55	0.00009	0.00009	0.00011	-38	0.00032	0.00034	0.00043	-38	0.00033	0.00035	0.00039	-27	0.00045	0.00045	0.00045	0
Cu, Tot	Closure	May	6	0.00010	0.00010	0.00010	-22	0.00022	0.00022	0.00025	-50	0.00018	0.00018	0.00019	-8	0.00040	0.00042	0.00049	-31	0.00030	0.00031	0.00034	-25	0.00039	0.00039	0.00039	0
Cu, Tot	Closure	Jun	6	0.00012	0.00012	0.00012	-6	0.00022	0.00023	0.00025	-45	0.00022	0.00022	0.00024	-30	0.00039	0.00040	0.00046	-30	0.00032	0.00033	0.00037	-22	0.00039	0.00039	0.00039	0
Cu, Tot	Closure	Jul	6	0.00015	0.00015	0.00015	6	0.00023	0.00024	0.00025	-38	0.00015	0.00016	0.00017	-34	0.00038	0.00039	0.00044	-29	0.00034	0.00035	0.00038	-21	0.00039	0.00039	0.00039	0
Cu, Tot	Closure	Aug	6	0.00017	0.00017	0.00017	12	0.00024	0.00025	0.00026	-32	0.00014	0.00014	0.00014	-22	0.00038	0.00039	0.00043	-28	0.00035	0.00036	0.00040	-21	0.00039	0.00039	0.00039	0
Cu, Tot	Closure	Sep	6	0.00019	0.00018	0.00019	18	0.00025	0.00025	0.00026	-26	0.00020	0.00020	0.00020	-11	0.00037	0.00038	0.00042	-28	0.00035	0.00036	0.00039	-21	0.00039	0.00039	0.00039	0
Cu, Tot	Closure	Oct	6	0.00020	0.00020	0.00021	23	0.00026	0.00026	0.00027	-21	0.00022	0.00022	0.00023	-13	0.00036	0.00037	0.00040	-28	0.00033	0.00034	0.00037	-22	0.00038	0.00038	0.00038	0
Cu, Tot	Closure	Nov	6	0.00025	0.00025	0.00025	8	0.00052	0.00052	0.00054	-22	0.00023	0.00023	0.00024	-32	0.00040	0.00040	0.00044	-29	0.00036	0.00037	0.00040	-23	0.00044	0.00044	0.00044	0
Cu, Tot	Closure	Dec	6	0.00019	0.00019	0.00020	-13	0.00043	0.00044	0.00046	-33	0.00016	0.00016	0.00017	-27	0.00038	0.00039	0.00042	-31	0.00035	0.00036	0.00039	-24	0.00044	0.00044	0.00044	0
Cu, Tot	Post-Closure	Jan	117	0.00021	0.00021	0.00024	0	0.00093	0.00088	0.00093	36	0.00024	0.00023	0.00024	19	0.00058	0.00057	0.00058	3	0.00048	0.00047	0.00048	1	0.00045	0.00045	0.00045	2
Cu, Tot	Post-Closure	Feb	117	0.00023	0.00023	0.00026	0	0.00100	0.00094	0.00100	38	0.00023	0.00022	0.00023	12	0.00060	0.00059	0.00060	3	0.00049	0.00048	0.00049	1	0.00048	0.00048	0.00048	2
Cu, Tot	Post-Closure	Mar	117	0.00020	0.00020	0.00022	0	0.00102	0.00096	0.00102	42	0.00014	0.00014	0.00017	-12	0.00059	0.00058	0.00059	3	0.00049	0.00048	0.00049	1	0.00046	0.00046	0.00046	2
Cu, Tot	Post-Closure	Apr	117	0.00019	0.00019	0.00021	1	0.00105	0.00098	0.00105	47	0.00012	0.00012	0.00016	-19	0.00058	0.00057	0.00058	3	0.00048	0.00048	0.00048	1	0.00046	0.00046	0.00046	3
Cu, Tot	Post-Closure	May	117	0.00013	0.00013	0.00014	1	0.00072	0.00067	0.00072	50	0.00019	0.00019	0.00019	-2	0.00062	0.00061	0.00062	2	0.00042	0.00041	0.00042	1	0.00040	0.00040	0.00040	2
Cu, Tot	Post-Closure	Jun	117	0.00013	0.00013	0.00014	1	0.00067	0.00062	0.00067	52	0.00039	0.00037	0.00039	20	0.00059	0.00058	0.00059	2	0.00043	0.00043	0.00043	1	0.00040	0.00040	0.00040	2
Cu, Tot	Post-Closure	Jul	117	0.00014	0.00014	0.00014	1	0.00064	0.00059	0.00064	54	0.00030	0.00029	0.00030	23	0.00057	0.00057	0.00057	2	0.00045	0.00045	0.00045	1	0.00040	0.00040	0.00040	2
Cu, Tot	Post-Closure	Aug	117	0.00015	0.00015	0.00016	0	0.00060	0.00056	0.00060	56	0.00024	0.00022	0.00024	27	0.00056	0.00055	0.00056	2	0.00047	0.00046	0.00047	1	0.00040	0.00040	0.00040	2
Cu, Tot	Post-Closure	Sep	117	0.00016	0.00016	0.00018	0	0.00058	0.00054	0.00058	58	0.00029	0.00028	0.00029	25	0.00054	0.00054	0.00054	3	0.00046	0.00046	0.00046	1	0.00039	0.00039	0.00039	2
Cu, Tot	Post-Closure	Oct	117	0.00016	0.00016	0.00019	0	0.00056	0.00052	0.00056	60	0.00033	0.00031	0.00033	25	0.00053	0.00052	0.00053	3	0.00045	0.00044	0.00045	1	0.00039	0.00039	0.00039	2
Cu, Tot	Post-Closure	Nov	117	0.00023	0.00023	0.00026	0	0.00096	0.00092	0.00096	35	0.00045	0.00043	0.00045	25	0.00059	0.00059	0.00059	3	0.00049	0.00049	0.00049	2	0.00045	0.00045	0.00045	2
Cu, Tot	Post-Closure	Dec	117	0.00022	0.00022	0.00024	1	0.00094	0.00089	0.00094	36	0.00029	0.00028	0.00029	23	0.00058	0.00058	0.00058	4	0.00048	0.00048	0.00048	2	0.00045	0.00045	0.00045	2
Fe, Tot	Construction	Jan	2	*0.382*	*0.382*	*0.590*	-50	0.078	0.078	0.126	-42	0.129	0.129	0.187	-65	0.062	0.062	0.076	-20	0.146	0.146	0.183	-20	0.225	0.225	0.226	0
Fe, Tot	Construction	Feb	2	0.283	0.283	*0.385*	-67	0.069	0.069	0.112	-51	0.083	0.083	0.092	-82	0.060	0.060	0.074	-25	0.145	0.145	0.182	-21	0.234	0.234	0.235	0
Fe, Tot	Construction	Mar	2	0.198	0.198	0.237	-72	0.057	0.057	0.089	-59	0.053	0.053	0.063	-86	0.055	0.055	0.066	-31	0.138	0.138	0.172	-24	0.223	0.223	0.223	-1
Fe, Tot	Construction	Apr	2	0.177	0.177	0.192	-74	0.050	0.050	0.072	-63	0.047	0.047	0.057	-86	0.050	0.050	0.060	-37	0.130	0.130	0.161	-28	0.220	0.220	0.220	-1
Fe, Tot	Construction	May	2	*0.637*	*0.637*	*0.639*	-47	0.135	0.135	0.145	-41	0.093	0.093	0.097	-32	0.046	0.046	0.053	-33	0.291	0.291	*0.313*	-17	0.205	0.205	0.206	0
Fe, Tot	Construction	Jun	2	*0.501*	*0.501*	*0.502*	-54	0.099	0.099	0.106	-50	0.102	0.102	0.104	-43	0.060	0.060	0.066	-24	0.245	0.245	0.261	-21	0.225	0.225	0.226	0
Fe, Tot	Construction	Jul	2	*0.359*	*0.359*	*0.361*	-62	0.077	0.077	0.083	-56	0.075	0.075	0.076	-52	0.063	0.063	0.068	-23	0.209	0.209	0.222	-24	0.225	0.225	0.226	0
Fe, Tot	Construction	Aug	2	0.235	0.235	0.237	-69	0.061	0.061	0.066	-60	0.058	0.058	0.058	-55	0.057	0.057	0.061	-26	0.170	0.170	0.180	-28	0.213	0.213	0.213	0
Fe, Tot	Construction	Sep	2	0.170	0.170	0.171	-73	0.050	0.050	0.054	-64	0.054	0.054	0.054	-57	0.052	0.052	0.056	-29	0.141	0.141	0.149	-31	0.205	0.205	0.205	0
Fe, Tot	Construction	Oct	2	0.130	0.130	0.132	-76	0.041	0.041	0.045	-67	0.047	0.047	0.048	-61	0.049	0.049	0.052	-31	0.121	0.121	0.127	-35	0.200	0.200	0.200	0
Fe, Tot	Construction	Nov	2	0.241	0.241	0.243	-71	0.042	0.042	0.046	-71	0.141	0.141	0.152	-68	0.052	0.052	0.054	-35	0.121	0.121	0.126	-37	0.228	0.228	0.229	0
Fe, Tot	Construction	Dec	2	0.196	0.196	0.198	-75	0.034	0.034	0.037	-76	0.107	0.107	0.107	-75	0.048	0.048	0.050	-38	0.112	0.112	0.116	-40	0.226	0.226	0.227	-1
Fe, Tot	Operations	Jan	5	0.183	0.181	0.183	-76	0.025	0.025	0.026	-81	0.070	0.070	0.071	-81	0.043	0.043	0.043	-44	0.101	0.100	0.101	-44	0.225	0.225	0.225	-1
Fe, Tot	Operations	Feb	5	0.188	0.187	0.189	-78	0.024	0.024	0.025	-83	0.072	0.071	0.072	-85	0.043	0.043	0.043	-47	0.100	0.099	0.100	-45	0.234	0.233	0.234	-1
Fe, Tot	Operations	Mar	5	0.166	0.165	0.167	-77	0.025	0.025	0.025	-82	0.036	0.036	0.041	-90	0.039	0.039	0.040	-50	0.096	0.095	0.096	-46	0.222	0.222	0.222	-1
Fe, Tot	Operations	Apr	5	0.169	0.167	0.169	-76	0.024	0.025	0.025	-82	0.036	0.036	0.037	-89	0.037	0.037	0.037	-53	0.091	0.091	0.092	-48	0.220	0.219	0.220	-1
Fe, Tot	Operations	May	5	*0.642*	*0.642*	*0.643*	-47	0.124	0.123	0.124	-46	0.087	0.087	0.088	-36	0.036	0.036	0.036	-47	0.263	0.262	0.264	-24	0.205	0.205	0.205	-1
Fe, Tot	Operations	Jun	5	*0.507*	*0.506*	*0.507*	-53	0.091	0.091	0.091	-53	0.098	0.098	0.100	-45	0.051	0.051	0.051	-35	0.224	0.224	0.225	-27	0.225	0.225	0.225	-1
Fe, Tot	Operations	Jul	5	*0.362*	*0.362*	*0.363*	-61	0.072	0.072	0.072	-59	0.071	0.072	0.074	-54	0.055	0.055	0.055	-32	0.192	0.191	0.193	-29	0.225	0.225	0.225	0
Fe, Tot	Operations	Aug	5	0.237	0.237	0.238	-69	0.057	0.057	0.057	-63	0.056	0.056	0.057	-57	0.051	0.051	0.051	-34	0.156	0.155	0.157	-33	0.213	0.213	0.213	0
Fe, Tot	Operations	Sep	5	0.172	0.171	0.172	-73	0.047	0.046	0.047	-66	0.053	0.053	0.054	-58	0.047	0.047	0.048	-35	0.129	0.129	0.131	-36	0.205	0.205	0.205	0
Fe, Tot	Operations	Oct	5	0.132	0.132	0.133	-76	0.038	0.038	0.038	-70	0.049	0.050	0.050	-60	0.045	0.045	0.045	-37	0.111	0.111	0.113	-38	0.200	0.200	0.200	0
Fe, Tot	Operations	Nov	5	0.246	0.245	0.246	-71	0.037	0.037	0.037	-75	0.159	0.159	0.159	-64	0.048	0.048	0.049	-39	0.112	0.112	0.114	-40	0.228	0.228	0.228	-1
Fe, Tot	Operations	Dec	5	0.202	0.201	0.202	-75	0.030	0.030	0.030	-79	0.114	0.114	0.114	-74	0.045	0.045	0.046	-41	0.105	0.105	0.107	-42	0.226	0.226	0.226	-1
Fe, Tot	Closure	Jan	6	0.179	0.179	0.185	-77	0.022	0.022	0.025	-84	0.067	0.067	0.072	-82	0.044	0.044	0.045	-42	0.101	0.101	0.106	-41	0.226	0.225	0.226	0
Fe, Tot	Closure	Feb	6	0.183	0.184	0.191	-78	0.020	0.021	0.022	-85	0.069	0.070	0.075	-85	0.043	0.043	0.044	-45	0.099	0.100	0.105	-43	0.235	0.234	0.235	0
Fe, Tot	Closure	Mar	6	0.160	0.161	0.167	-78	0.018	0.018	0.019	-87	0.041	0.042	0.044	-89	0.040	0.040	0.041	-49	0.095	0.096	0.101	-44	0.223	0.223	0.224	0
Fe, Tot	Closure	Apr	6	0.161	0.162	0.169	-77	0.017	0.017	0.017	-88	0.040	0.041	0.043	-88	0.038	0.038	0.039	-51	0.091	0.092	0.096	-46	0.221	0.221	0.221	0
Fe, Tot	Closure	May	6	*0.631*	*0.635*	*0.655*	-48	0.119	0.120	0.123	-47	0.094	0.094	0.094	-31	0.036	0.036	0.037	-45	0.266	0.266	0.269	-22	0.206	0.206	0.206	0
Fe, Tot	Closure	Jun	6	*0.501*	*0.506*	*0.536*	-53	0.085	0.086	0.091	-56	0.109	0.111	0.115	-38	0.052	0.053	0.053	-32	0.228	0.229	0.231	-24	0.226	0.226	0.226	0
Fe, Tot	Closure	Jul	6	*0.361*	*0.366*	*0.399*	-61	0.064	0.066	0.072	-62	0.082	0.083	0.089	-47	0.057	0.057	0.058	-29	0.196	0.196	0.199	-26	0.226	0.226	0.226	0
Fe, Tot	Closure	Aug	6	0.237	0.242	0.272	-68	0.049	0.050	0.056	-67	0.061	0.062	0.068	-52	0.053	0.053	0.054	-30	0.160	0.160	0.163	-29	0.213	0.213	0.214	0
Fe, Tot	Closure	Sep	6	0.171	0.176	0.200	-72	0.038	0.040	0.045	-71	0.055	0.057	0.063	-55	0.049	0.050	0.050	-31	0.133	0.133	0.136	-32	0.205	0.205	0.206	0
Fe, Tot	Closure	Oct	6	0.132	0.135	0.154	-75	0.031	0.032	0.037	-75	0.048	0.049	0.056	-60	0.046	0.047	0.048	-33	0.114	0.115	0.118	-34	0.201	0.201	0.201	0
Fe, Tot	Closure	Nov	6	0.244	0.247	0.270	-71	0.031	0.032	0.038	-78	0.152	0.157	0.184	-65	0.050	0.050	0.052	-35	0.115	0.116	0.120	-36	0.229	0.229	0.230	0
Fe, Tot	Closure	Dec	6	0.198	0.200	0.216	-75	0.026	0.027	0.032	-81	0.106	0.111	0.136	-74	0.047	0.047	0.049	-38	0.107	0.109	0.113	-38	0.227	0.227	0.228	0
Fe, Tot	Post-Closure	Jan	117	*0.862*	*0.852*	*0.862*	11	0.165	0.161	0.165	19	*0.358*	*0.360*	*0.415*	-4	0.073	0.073	0.076	-2	0.167	0.166	0.173	-1	0.226	0.226	0.226	0
Fe, Tot	Post-Closure	Feb	117	*0.953*	*0.941*	*0.953*	11	0.173	0.169	0.173	19	*0.423*	*0.427*	*0.514*	-8	0.076	0.076	0.080	-2	0.169	0.168	0.176	-1	0.235	0.235	0.235	0
Fe, Tot	Post-Closure	Mar	117	*0.810*	*0.800*	*0.810*	11	0.170	0.166	0.170	20	0.283	0.292	*0.413*	-20	0.075	0.075	0.079	-2	0.167	0.166	0.173	-1	0.224	0.224	0.224	0
Fe, Tot	Post-Closure	Apr	117	*0.783*	*0.773*	*0.783*	11	0.167	0.163	0.167	21	0.227	0.239	*0.375*	-28	0.075	0.074	0.078	-3	0.164	0.164	0.171	-1	0.221	0.221	0.221	0
Fe, Tot	Post-Closure	May	117	*1.287*	*1.280*	*1.287*	6	0.248	0.246	0.248	8	0.117	0.119	0.146	-13	0.064	0.064	0.067	-3	*0.336*	*0.336*	*0.343*	-1	0.206	0.206	0.206	0
Fe, Tot	Post-Closure	Jun	117	*1.155*	*1.149*	*1.155*	6	0.220	0.217	0.220	11	0.176	0.176	0.185	-2	0.075	0.075	0.078	-3	0.298	0.297	*0.305*	-1	0.226	0.226	0.226	0
Fe, Tot	Post-Closure	Jul	117	*1.016*	*1.010*	*1.017*	8	0.200	0.197	0.200	13	0.156	0.156	0.165	-1	0.078	0.078	0.081	-2	0.263	0.263	0.270	-1	0.226	0.226	0.226	0
Fe, Tot	Post-Closure	Aug	117	*0.838*	*0.833*	*0.838*	10	0.180	0.178	0.180	15	0.131	0.131	0.138	1	0.073	0.073	0.076	-2	0.222	0.222	0.229	-1	0.214	0.214	0.214	0
Fe, Tot	Post-Closure	Sep	117	*0.713*	*0.709*	*0.713*	12	0.164	0.162	0.164	17	0.128	0.128	0.137	2	0.070	0.070	0.072	-2	0.191	0.191	0.197	-1	0.206	0.206	0.206	0
Fe, Tot	Post-Closure	Oct	117	*0.618*	*0.614*	*0.618*	13	0.150	0.149	0.151	19	0.125	0.125	0.135	2	0.067	0.067	0.070	-2	0.170	0.170	0.176	-1	0.201	0.201	0.201	0
Fe, Tot	Post-Closure	Nov	117	*0.941*	*0.936*	*0.941*	12	0.176	0.173	0.176	20	*0.451*	*0.454*	*0.495*	1	0.076	0.076	0.079	-2	0.178	0.178	0.184	-1	0.230	0.230	0.230	0
Fe, Tot	Post-Closure	Dec	117	*0.896*	*0.891*	*0.896*	12	0.169	0.167	0.169	20	*0.430*	*0.433*	*0.478*	0	0.074	0.074	0.077	-2	0.171	0.171	0.178	-1	0.228	0.228	0.228	0
Pb, Diss	Construction	Jan	2	0.000011	0.000011	0.000013	-18	0.000021	0.000021	0.000022	16	0.000007	0.000007	0.000010	-23	0.000026	0.000026	0.000031	-15	0.000031	0.000031	0.000034	-9	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Feb	2	0.000010	0.000010	0.000011	-36	0.000023	0.000023	0.000026	18	0.000006	0.000006	0.000008	-32	0.000026	0.000026	0.000030	-20	0.000032	0.000032	0.000035	-10	0.000047	0.000047	0.000047	0
Pb, Diss	Construction	Mar	2	0.000007	0.000007	0.000008	-43	0.000022	0.000022	0.000027	16	0.000005	0.000005	0.000006	-31	0.000023	0.000023	0.000027	-26	0.000031	0.000031	0.000034	-12	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Apr	2	0.000007	0.000007	0.000007	-46	0.000022	0.000022	0.000026	16	0.000005	0.000005	0.000006	-31	0.000021	0.000021	0.000024	-32	0.000030	0.000030	0.000033	-14	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	May	2	0.000006	0.000006	0.000006	-26	0.000020	0.000020	0.000022	29	0.000017	0.000017	0.000018	-22	0.000018	0.000018	0.000020	-32	0.000026	0.000026	0.000028	-15	0.000039	0.000039	0.000039	0
Pb, Diss	Construction	Jun	2	0.000009	0.000009	0.000009	-1	0.000024	0.000024	0.000027	45	0.000023	0.000023	0.000024	-16	0.000020	0.000020	0.000022	-27	0.000027	0.000027	0.000029	-15	0.000039	0.000039	0.000039	0
Pb, Diss	Construction	Jul	2	0.000011	0.000011	0.000011	11	0.000027	0.000027	0.000030	54	0.000026	0.000026	0.000026	-14	0.000022	0.000022	0.000023	-24	0.000027	0.000027	0.000029	-16	0.000039	0.000039	0.000039	0
Pb, Diss	Construction	Aug	2	0.000012	0.000012	0.000012	14	0.000028	0.000028	0.000031	57	0.000027	0.000027	0.000027	-12	0.000023	0.000023	0.000024	-21	0.000027	0.000027	0.000029	-16	0.000039	0.000039	0.000039	0
Pb, Diss	Construction	Sep	2	0.000013	0.000013	0.000013	15	0.000026	0.000026	0.000029	51	0.000019	0.000019	0.000019	-21	0.000024	0.000024	0.000024	-21	0.000027	0.000027	0.000028	-17	0.000039	0.000039	0.000039	0
Pb, Diss	Construction	Oct	2	0.000013	0.000013	0.000013	16	0.000023	0.000023	0.000026	41	0.000014	0.000014	0.000014	-22	0.000023	0.000023	0.000023	-22	0.000026	0.000026	0.000028	-18	0.000039	0.000039	0.000039	0
Pb, Diss	Construction	Nov	2	0.000015	0.000015	0.000015	1	0.000025	0.000025	0.000028	28	0.000013	0.000013	0.000013	-37	0.000024	0.000024	0.000025	-25	0.000028	0.000028	0.000030	-19	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Dec	2	0.000012	0.000012	0.000012	-19	0.000022	0.000022	0.000024	15	0.000010	0.000010	0.000011	-8	0.000023	0.000023	0.000023	-28	0.000028	0.000028	0.000029	-20	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Jan	5	0.000009	0.000009	0.000009	-34	0.000018	0.000019	0.000020	2	0.000009	0.000009	0.000010	-4	0.000022	0.000022	0.000023	-30	0.000026	0.000026	0.000026	-24	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Feb	5	0.000008	0.000008	0.000009	-46	0.000018	0.000019	0.000021	-3	0.000007	0.000007	0.000008	-24	0.000022	0.000022	0.000023	-33	0.000026	0.000026	0.000027	-25	0.000047	0.000047	0.000047	0
Pb, Diss	Operations	Mar	5	0.000006	0.000007	0.000007	-50	0.000019	0.000020	0.000023	4	0.000005	0.000005	0.000005	-37	0.000020	0.000020	0.000021	-37	0.000026	0.000026	0.000026	-26	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Apr	5	0.000006	0.000006	0.000006	-51	0.000020	0.000021	0.000024	9	0.000005	0.000005	0.000006	-27	0.000019	0.000019	0.000020	-41	0.000025	0.000025	0.000026	-27	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	May	5	0.000006	0.000006	0.000006	-31	0.000019	0.000019	0.000023	29	0.000017	0.000018	0.000019	-21	0.000016	0.000016	0.000017	-39	0.000022	0.000022	0.000022	-27	0.000039	0.000039	0.000039	0
Pb, Diss	Operations	Jun	5	0.000008	0.000008	0.000008	-6	0.000026	0.000026	0.000030	54	0.000023	0.000024	0.000026	-12	0.000019	0.000019	0.000020	-32	0.000024	0.000024	0.000024	-24	0.000039	0.000039	0.000039	0
Pb, Diss	Operations	Jul	5	0.000010	0.000010	0.000010	5	0.000031	0.000031	0.000036	74	0.000027	0.000028	0.000030	-8	0.000021	0.000021	0.000022	-27	0.000025	0.000025	0.000025	-23	0.000039	0.000039	0.000039	0
Pb, Diss	Operations	Aug	5	0.000011	0.000012	0.000012	8	0.000033	0.000033	0.000039	83	0.000030	0.000030	0.000033	-2	0.000023	0.000023	0.000024	-23	0.000025	0.000025	0.000026	-23	0.000039	0.000039	0.000039	0
Pb, Diss	Operations	Sep	5	0.000012	0.000012	0.000012	9	0.000031	0.000031	0.000037	76	0.000022	0.000022	0.000025	-9	0.000023	0.000023	0.000025	-21	0.000025	0.000025	0.000026	-22	0.000039	0.000039	0.000039	0
Pb, Diss	Operations	Oct	5	0.000012	0.000012	0.000012	10	0.000026	0.000026	0.000031	58	0.000017	0.000017	0.000019	-4	0.000023	0.000023	0.000024	-22	0.000025	0.000025	0.000025	-22	0.000039	0.000039	0.000039	0
Pb, Diss	Operations	Nov	5	0.000014	0.000014	0.000015	-5	0.000027	0.000026	0.000030	36	0.000017	0.000016	0.000019	-21	0.000025	0.000025	0.000026	-23	0.000027	0.000027	0.000028	-23	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Dec	5	0.000011	0.000011	0.000011	-24	0.000022	0.000022	0.000025	18	0.000011	0.000011	0.000013	-1	0.000024	0.000024	0.000025	-26	0.000027	0.000027	0.000027	-23	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Jan	6	0.000009	0.000009	0.000010	-32	0.000015	0.000016	0.000021	-12	0.000008	0.000008	0.000010	-14	0.000021	0.000022	0.000024	-31	0.000026	0.000026	0.000027	-24	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Feb	6	0.000009	0.000009	0.000009	-43	0.000015	0.000016	0.000019	-19	0.000007	0.000007	0.000008	-27	0.000021	0.000022	0.000024	-34	0.000026	0.000026	0.000027	-25	0.000047	0.000047	0.000047	0
Pb, Diss	Closure	Mar	6	0.000007	0.000007	0.000007	-47	0.000014	0.000014	0.000016	-26	0.000005	0.000005	0.000006	-31	0.000020	0.000020	0.000022	-37	0.000026	0.000026	0.000027	-26	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Apr	6	0.000006	0.000006	0.000007	-49	0.000013	0.000013	0.000014	-30	0.000005	0.000005	0.000005	-33	0.000018	0.000019	0.000021	-41	0.000025	0.000025	0.000026	-27	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	May	6	0.000006	0.000006	0.000006	-29	0.000013	0.000013	0.000013	-16	0.000017	0.000017	0.000017	-26	0.000016	0.000016	0.000018	-39	0.000022	0.000022	0.000023	-27	0.000039	0.000039	0.000039	0
Pb, Diss	Closure	Jun	6	0.000008	0.000008	0.000009	-3	0.000017	0.000017	0.000017	-1	0.000021	0.000021	0.000022	-22	0.000019	0.000019	0.000020	-33	0.000024	0.000024	0.000025	-24	0.000039	0.000039	0.000039	0
Pb, Diss	Closure	Jul	6	0.000011	0.000011	0.000011	8	0.000019	0.000019	0.000020	8	0.000025	0.000025	0.000025	-17	0.000021	0.000021	0.000022	-28	0.000025	0.000025	0.000026	-23	0.000039	0.000039	0.000039	0
Pb, Diss	Closure	Aug	6	0.000012	0.000012	0.000012	11	0.000020	0.000020	0.000021	11	0.000026	0.000026	0.000026	-15	0.000023	0.000023	0.000024	-25	0.000025	0.000025	0.000026	-22	0.000039	0.000039	0.000039	0
Pb, Diss	Closure	Sep	6	0.000013	0.000012	0.000013	13	0.000019	0.000019	0.000020	8	0.000019	0.000019	0.000020	-22	0.000023	0.000023	0.000024	-23	0.000025	0.000025	0.000026	-22	0.000039	0.000039	0.000039	0
Pb, Diss	Closure	Oct	6	0.000013	0.000013	0.000013	14	0.000017	0.000017	0.000017	1	0.000014	0.000014	0.000014	-25	0.000022	0.000022	0.000023	-24	0.000025	0.000025	0.000026	-22	0.000039	0.000039	0.000039	0
Pb, Diss	Closure	Nov	6	0.000015	0.000015	0.000016	0	0.000018	0.000018	0.000019	-6	0.000012	0.000012	0.000013	-41	0.000024	0.000024	0.000025	-26	0.000027	0.000027	0.000028	-23	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Dec	6	0.000012	0.000012	0.000012	-19	0.000017	0.000017	0.000018	-11	0.000009	0.000009	0.000009	-24	0.000022	0.000023	0.000024	-29	0.000026	0.000027	0.000028	-23	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	Jan	117	0.000014	0.000014	0.000015	-1	0.000035	0.000032	0.000035	76	0.000013	0.000013	0.000013	37	0.000033	0.000032	0.000033	3	0.000035	0.000035	0.000035	1	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Feb	117	0.000015	0.000015	0.000017	-1	0.000037	0.000035	0.000037	79	0.000013	0.000012	0.000013	30	0.000034	0.000034	0.000034	3	0.000036	0.000036	0.000036	1	0.000047	0.000047	0.000047	1
Pb, Diss	Post-Closure	Mar	117	0.000013	0.000013	0.000014	-1	0.000039	0.000036	0.000039	87	0.000008	0.000008	0.000009	4	0.000034	0.000033	0.000034	3	0.000036	0.000035	0.000036	1	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Apr	117	0.000012	0.000012	0.000014	-1	0.000040	0.000037	0.000040	95	0.000007	0.000007	0.000008	-5	0.000033	0.000033	0.000033	3	0.000035	0.000035	0.000035	1	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	May	117	0.000008	0.000008	0.000009	-1	0.000030	0.000028	0.000030	83	0.000022	0.000022	0.000023	-1	0.000027	0.000027	0.000027	2	0.000031	0.000031	0.000031	1	0.000039	0.000039	0.000039	1
Pb, Diss	Post-Closure	Jun	117	0.000009	0.000009	0.000009	-1	0.000031	0.000029	0.000031	72	0.000032	0.000032	0.000032	17	0.000029	0.000029	0.000029	2	0.000032	0.000032	0.000032	1	0.000039	0.000039	0.000039	1
Pb, Diss	Post-Closure	Jul	117	0.000009	0.000009	0.000010	-2	0.000032	0.000030	0.000032	68	0.000035	0.000035	0.000035	16	0.000030	0.000030	0.000030	2	0.000033	0.000033	0.000033	1	0.000039	0.000039	0.000039	1
Pb, Diss	Post-Closure	Aug	117	0.000010	0.000010	0.000012	-3	0.000032	0.000030	0.000032	66	0.000036	0.000036	0.000036	17	0.000031	0.000031	0.000031	3	0.000033	0.000033	0.000033	1	0.000039	0.000039	0.000039	1
Pb, Diss	Post-Closure	Sep	117	0.000011	0.000011	0.000012	-3	0.000031	0.000029	0.000031	66	0.000029	0.000028	0.000029	17	0.000031	0.000031	0.000031	3	0.000033	0.000033	0.000033	1	0.000039	0.000039	0.000039	1
Pb, Diss	Post-Closure	Oct	117	0.000011	0.000011	0.000012	-2	0.000030	0.000028	0.000030	69	0.000022	0.000021	0.000022	18	0.000030	0.000030	0.000030	3	0.000032	0.000032	0.000032	1	0.000039	0.000039	0.000039	1
Pb, Diss	Post-Closure	Nov	117	0.000015	0.000015	0.000016	-1	0.000036	0.000033	0.000036	71	0.000026	0.000026	0.000026	24	0.000034	0.000034	0.000034	3	0.000036	0.000036	0.000036	1	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Dec	117	0.000014	0.000014	0.000016	-1	0.000035	0.000033	0.000035	74	0.000016	0.000016	0.000016	37	0.000033	0.000033	0.000033	3	0.000035	0.000035	0.000035	2	0.000045	0.000045	0.000045	1
Pb, Tot	Construction	Jan	2	0.000044	0.000044	0.000060	-39	0.000037	0.000037	0.000044	-11	0.000012	0.000012	0.000015	-36	0.000049	0.000049	0.000059	-18	0.000054	0.000054	0.000062	-13	0.000142	0.000142	0.000143	0
Pb, Tot	Construction	Feb	2	0.000035	0.000035	0.000043	-56	0.000037	0.000037	0.000046	-17	0.000010	0.000010	0.000012	-45	0.000048	0.000048	0.000057	-23	0.000054	0.000054	0.000062	-14	0.000148	0.000148	0.000148	0
Pb, Tot	Construction	Mar	2	0.000025	0.000025	0.000029	-62	0.000034	0.000034	0.000042	-23	0.000008	0.000008	0.000008	-46	0.000043	0.000043	0.000051	-29	0.000052	0.000052	0.000060	-16	0.000141	0.000141	0.000141	-1
Pb, Tot	Construction	Apr	2	0.000023	0.000023	0.000025	-64	0.000032	0.000032	0.000038	-27	0.000007	0.000007	0.000008	-47	0.000039	0.000039	0.000045	-35	0.000050	0.000050	0.000057	-19	0.000139	0.000139	0.000139	-1
Pb, Tot	Construction	May	2	0.000018	0.000018	0.000019	-54	0.000029	0.000029	0.000033	-11	0.000030	0.000030	0.000031	-30	0.000037	0.000037	0.000041	-33	0.000047	0.000047	0.000053	-19	0.000132	0.000132	0.000132	-1
Pb, Tot	Construction	Jun	2	0.000021	0.000021	0.000022	-44	0.000036	0.000036	0.000040	6	0.000037	0.000037	0.000038	-30	0.000045	0.000045	0.000049	-28	0.000061	0.000061	0.000066	-15	0.000147	0.000147	0.000147	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality Median				West Farley Lake Predicted Project Water Quality Median				East Farley Lake Predicted Project Water Quality Median				Swede Lake Predicted Project Water Quality Median				Ellystan Lake Predicted Project Water Quality Median				Susan Lake last one Predicted Project Water Quality Median			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Pb, Tot	Construction	Jul	2	0.000036	0.000036	0.000036	-25	0.000043	0.000043	0.000047	19	0.000038	0.000038	0.000039	-24	0.000047	0.000047	0.000050	-26	0.000061	0.000061	0.000065	-17	0.000148	0.000148	0.000149	0
Pb, Tot	Construction	Aug	2	0.000052	0.000052	0.000052	-18	0.000050	0.000050	0.000054	29	0.000041	0.000041	0.000042	-11	0.000045	0.000045	0.000047	-26	0.000055	0.000055	0.000058	-19	0.000142	0.000142	0.000142	0
Pb, Tot	Construction	Sep	2	0.000049	0.000049	0.000049	-25	0.000048	0.000048	0.000052	24	0.000030	0.000030	0.000031	-15	0.000043	0.000043	0.000045	-26	0.000050	0.000050	0.000053	-21	0.000135	0.000135	0.000135	0
Pb, Tot	Construction	Oct	2	0.000039	0.000039	0.000039	-34	0.000040	0.000040	0.000043	10	0.000022	0.000022	0.000022	-17	0.000040	0.000040	0.000042	-28	0.000045	0.000045	0.000048	-23	0.000128	0.000128	0.000128	0
Pb, Tot	Construction	Nov	2	0.000043	0.000043	0.000043	-46	0.000041	0.000041	0.000045	-6	0.000022	0.000022	0.000022	-39	0.000043	0.000043	0.000044	-31	0.000047	0.000047	0.000050	-25	0.000144	0.000144	0.000144	-1
Pb, Tot	Construction	Dec	2	0.000033	0.000033	0.000033	-56	0.000034	0.000034	0.000037	-20	0.000017	0.000017	0.000018	-23	0.000040	0.000040	0.000041	-34	0.000045	0.000045	0.000049	-27	0.000143	0.000143	0.000143	-1
Pb, Tot	Operations	Jan	5	0.000027	0.000027	0.000028	-62	0.000028	0.000029	0.000031	-31	0.000014	0.000014	0.000015	-25	0.000038	0.000038	0.000039	-36	0.000041	0.000041	0.000042	-32	0.000142	0.000142	0.000142	-1
Pb, Tot	Operations	Feb	5	0.000026	0.000026	0.000026	-67	0.000028	0.000028	0.000030	-37	0.000011	0.000011	0.000011	-42	0.000038	0.000038	0.000039	-39	0.000041	0.000042	0.000042	-33	0.000147	0.000147	0.000147	-1
Pb, Tot	Operations	Mar	5	0.000021	0.000021	0.000022	-68	0.000028	0.000029	0.000032	-35	0.000007	0.000007	0.000007	-53	0.000035	0.000035	0.000036	-42	0.000040	0.000040	0.000041	-34	0.000140	0.000140	0.000140	-1
Pb, Tot	Operations	Apr	5	0.000021	0.000021	0.000021	-68	0.000028	0.000029	0.000033	-34	0.000008	0.000008	0.000008	-46	0.000032	0.000032	0.000033	-46	0.000039	0.000039	0.000039	-36	0.000138	0.000138	0.000139	-1
Pb, Tot	Operations	May	5	0.000018	0.000018	0.000018	-56	0.000027	0.000027	0.000031	-15	0.000030	0.000030	0.000031	-30	0.000032	0.000032	0.000032	-41	0.000039	0.000039	0.000039	-32	0.000131	0.000131	0.000131	-1
Pb, Tot	Operations	Jun	5	0.000021	0.000021	0.000021	-46	0.000037	0.000037	0.000042	8	0.000036	0.000037	0.000040	-29	0.000038	0.000038	0.000039	-33	0.000041	0.000041	0.000042	-24	0.000146	0.000146	0.000147	-1
Pb, Tot	Operations	Jul	5	0.000035	0.000035	0.000036	-27	0.000047	0.000046	0.000053	28	0.000039	0.000040	0.000043	-20	0.000044	0.000044	0.000045	-30	0.000055	0.000055	0.000055	-24	0.000148	0.000148	0.000148	0
Pb, Tot	Operations	Aug	5	0.000051	0.000051	0.000052	-19	0.000056	0.000055	0.000063	42	0.000044	0.000044	0.000049	-4	0.000043	0.000043	0.000044	-29	0.000050	0.000050	0.000050	-29	0.000142	0.000142	0.000142	0
Pb, Tot	Operations	Sep	5	0.000048	0.000048	0.000048	-27	0.000053	0.000053	0.000060	36	0.000034	0.000034	0.000037	-6	0.000041	0.000042	0.000042	-28	0.000045	0.000045	0.000046	-27	0.000135	0.000135	0.000135	-1
Pb, Tot	Operations	Oct	5	0.000038	0.000038	0.000039	-36	0.000043	0.000043	0.000049	18	0.000026	0.000026	0.000029	-2	0.000039	0.000039	0.000040	-29	0.000042	0.000042	0.000042	-29	0.000128	0.000128	0.000128	0
Pb, Tot	Operations	Nov	5	0.000042	0.000042	0.000042	-47	0.000043	0.000043	0.000048	-2	0.000026	0.000026	0.000029	-25	0.000042	0.000043	0.000043	-30	0.000044	0.000044	0.000044	-30	0.000144	0.000144	0.000144	-1
Pb, Tot	Operations	Dec	5	0.000032	0.000032	0.000032	-58	0.000035	0.000035	0.000038	-18	0.000018	0.000018	0.000020	-18	0.000040	0.000040	0.000042	-32	0.000043	0.000043	0.000043	-31	0.000143	0.000143	0.000143	-1
Pb, Tot	Closure	Jan	6	0.000028	0.000028	0.000029	-61	0.000024	0.000025	0.000031	-41	0.000012	0.000012	0.000016	-32	0.000036	0.000037	0.000040	-36	0.000041	0.000041	0.000043	-31	0.000142	0.000142	0.000143	0
Pb, Tot	Closure	Feb	6	0.000027	0.000027	0.000027	-67	0.000022	0.000023	0.000028	-48	0.000010	0.000010	0.000012	-45	0.000036	0.000037	0.000039	-39	0.000041	0.000041	0.000043	-32	0.000148	0.000148	0.000148	0
Pb, Tot	Closure	Mar	6	0.000022	0.000022	0.000023	-68	0.000020	0.000020	0.000023	-54	0.000008	0.000008	0.000009	-49	0.000034	0.000034	0.000037	-42	0.000040	0.000040	0.000042	-33	0.000141	0.000141	0.000141	0
Pb, Tot	Closure	Apr	6	0.000022	0.000022	0.000022	-67	0.000018	0.000018	0.000020	-58	0.000007	0.000007	0.000008	-50	0.000031	0.000032	0.000035	-45	0.000039	0.000039	0.000040	-35	0.000139	0.000139	0.000140	0
Pb, Tot	Closure	May	6	0.000018	0.000018	0.000018	-56	0.000018	0.000018	0.000019	-44	0.000028	0.000029	0.000029	-32	0.000032	0.000032	0.000034	-40	0.000039	0.000039	0.000040	-31	0.000132	0.000132	0.000132	0
Pb, Tot	Closure	Jun	6	0.000021	0.000021	0.000021	-45	0.000024	0.000024	0.000025	-29	0.000034	0.000034	0.000035	-34	0.000041	0.000042	0.000044	-33	0.000055	0.000055	0.000056	-23	0.000147	0.000147	0.000147	0
Pb, Tot	Closure	Jul	6	0.000035	0.000035	0.000036	-26	0.000029	0.000029	0.000030	-18	0.000036	0.000036	0.000036	-28	0.000043	0.000044	0.000045	-30	0.000055	0.000055	0.000056	-23	0.000149	0.000148	0.000149	0
Pb, Tot	Closure	Aug	6	0.000052	0.000052	0.000052	-19	0.000036	0.000036	0.000036	-8	0.000038	0.000038	0.000039	-17	0.000042	0.000042	0.000044	-29	0.000050	0.000050	0.000051	-24	0.000142	0.000142	0.000142	0
Pb, Tot	Closure	Sep	6	0.000049	0.000048	0.000050	-26	0.000035	0.000035	0.000036	-9	0.000029	0.000029	0.000030	-18	0.000041	0.000041	0.000042	-28	0.000046	0.000046	0.000047	-25	0.000135	0.000135	0.000135	0
Pb, Tot	Closure	Oct	6	0.000039	0.000039	0.000041	-34	0.000030	0.000030	0.000030	-18	0.000021	0.000021	0.000022	-21	0.000038	0.000039	0.000040	-29	0.000042	0.000042	0.000043	-27	0.000128	0.000128	0.000128	0
Pb, Tot	Closure	Nov	6	0.000043	0.000043	0.000047	-45	0.000031	0.000032	0.000033	-28	0.000020	0.000021	0.000022	-42	0.000041	0.000042	0.000043	-31	0.000044	0.000044	0.000046	-28	0.000145	0.000145	0.000145	0
Pb, Tot	Closure	Dec	6	0.000033	0.000033	0.000036	-56	0.000027	0.000027	0.000029	-36	0.000014	0.000014	0.000015	-35	0.000039	0.000039	0.000041	-34	0.000042	0.000043	0.000044	-29	0.000144	0.000144	0.000144	0
Pb, Tot	Post-Closure	Jan	117	0.000071	0.000071	0.000071	-2	0.000065	0.000062	0.000066	47	0.000023	0.000022	0.000023	23	0.000059	0.000058	0.000059	2	0.000059	0.000059	0.000060	0	0.000143	0.000143	0.000143	0
Pb, Tot	Post-Closure	Feb	117	0.000079	0.000078	0.000079	-2	0.000070	0.000066	0.000071	48	0.000022	0.000022	0.000022	16	0.000061	0.000061	0.000061	2	0.000060	0.000060	0.000061	0	0.000149	0.000149	0.000149	0
Pb, Tot	Post-Closure	Mar	117	0.000067	0.000066	0.000067	-2	0.000072	0.000067	0.000072	53	0.000014	0.000014	0.000016	-7	0.000060	0.000060	0.000061	2	0.000060	0.000059	0.000060	0	0.000142	0.000142	0.000142	0
Pb, Tot	Post-Closure	Apr	117	0.000065	0.000064	0.000065	-1	0.000073	0.000068	0.000074	58	0.000012	0.000012	0.000015	-15	0.000059	0.000059	0.000060	1	0.000059	0.000059	0.000060	0	0.000140	0.000140	0.000140	0
Pb, Tot	Post-Closure	May	117	0.000040	0.000040	0.000040	-1	0.000053	0.000050	0.000054	56	0.000041	0.000041	0.000044	-2	0.000054	0.000053	0.000054	1	0.000056	0.000056	0.000057	0	0.000133	0.000133	0.000133	0
Pb, Tot	Post-Closure	Jun	117	0.000038	0.000038	0.000038	-1	0.000055	0.000052	0.000055	51	0.000059	0.000058	0.000059	11	0.000062	0.000062	0.000063	1	0.000071	0.000071	0.000072	0	0.000148	0.000148	0.000148	0
Pb, Tot	Post-Closure	Jul	117	0.000047	0.000047	0.000047	-3	0.000056	0.000053	0.000057	49	0.000057	0.000056	0.000058	13	0.000063	0.000063	0.000063	1	0.000071	0.000071	0.000072	0	0.000149	0.000149	0.000149	0
Pb, Tot	Post-Closure	Aug	117	0.000060	0.000060	0.000060	-5	0.000059	0.000056	0.000059	44	0.000054	0.000052	0.000054	14	0.000060	0.000060	0.000060	1	0.000066	0.000066	0.000067	0	0.000143	0.000143	0.000143	0
Pb, Tot	Post-Closure	Sep	117	0.000063	0.000062	0.000063	-4	0.000058	0.000055	0.000058	43	0.000042	0.000041	0.000042	14	0.000057	0.000057	0.000057	2	0.000061	0.000061	0.000062	0	0.000136	0.000136	0.000136	0
Pb, Tot	Post-Closure	Oct	117	0.000058	0.000058	0.000058	-3	0.000055	0.000053	0.000055	45	0.000031	0.000031	0.000031	15	0.000055	0.000055	0.000055	2	0.000057	0.000057	0.000057	1	0.000129	0.000129	0.000129	0
Pb, Tot	Post-Closure	Nov	117	0.000078	0.000078	0.000078	-2	0.000067	0.000064	0.000067	46	0.000043	0.000042	0.000043	18	0.000061	0.000061	0.000061	2	0.000061	0.000061	0.000062	1	0.000145	0.000145	0.000145	0
Pb, Tot	Post-Closure	Dec	117	0.000074	0.000074	0.000074	-1	0.000066	0.000063	0.000066	46	0.000028	0.000027	0.000028	25	0.000060	0.000060	0.000060	2	0.000060	0.000060	0.000061	1	0.000144	0.000144	0.000144	0
Mn, Diss	Construction	Jan	2	0.061	0.061	0.068	-7	0.268	0.268	0.370	-13	0.144	0.144	0.168	-38	0.012	0.012	0.015	28	0.025	0.025	0.026	-3	0.019	0.019	0.019	0
Mn, Diss	Construction	Feb	2	0.066	0.066	0.070	-14	0.296	0.296	0.454	-8	0.181	0.181	0.218	-30	0.012	0.012	0.015	23	0.025	0.025	0.026	-4	0.020	0.020	0.020	0
Mn, Diss	Construction	Mar	2	0.058	0.058	0.060	-15	0.287	0.287	0.461	-8	0.173	0.173	0.249	-25	0.012	0.012	0.014	18	0.024	0.024	0.025	-7	0.019	0.019	0.019	0
Mn, Diss	Construction	Apr	2	0.059	0.059	0.059	-16	0.271	0.271	0.441	-11	0.167	0.167	0.260	-19	0.011	0.011	0.013	12	0.023	0.023	0.023	-10	0.019	0.019	0.019	0
Mn, Diss	Construction	May	2	0.057	0.057	0.057	-12	0.170	0.170	0.270	-11	0.093	0.093	0.144	67	0.012	0.012	0.013	40	0.039	0.039	0.040	-10	0.018	0.018	0.018	0
Mn, Diss	Construction	Jun	2	0.073	0.073	0.073	-15	0.150	0.150	0.231	-9	0.108	0.108	0.163	10	0.018	0.018	0.023	67	0.034	0.034	0.034	-12	0.020	0.020	0.020	0
Mn, Diss	Construction	Jul	2	0.059	0.059	0.059	-28	0.141	0.141	0.213	-5	0.092	0.092	0.136	2	0.019	0.019	0.025	62	0.031	0.031	0.031	-11	0.019	0.019	0.019	0
Mn, Diss	Construction	Aug	2	0.038	0.038	0.038	-42	0.130	0.130	0.193	-2	0.085	0.085	0.123	8	0.016	0.016	0.021	54	0.028	0.028	0.029	-10	0.018	0.018	0.018	0
Mn, Diss	Construction	Sep	2	0.025	0.025	0.025	-52	0.119	0.119	0.176	0	0.080	0.080	0.115	8	0.014	0.014	0.018	46	0.025	0.025	0.027	-10	0.017	0.017	0.017	0
Mn, Diss	Construction	Oct	2	0.017	0.017	0.017	-60	0.107	0.107	0.159	-1	0.076	0.076	0.108	8	0.012	0.012	0.016	39	0.023	0.023	0.025	-10	0.016	0.016	0.016	0
Mn, Diss	Construction	Nov	2	0.037	0.037	0.037	-42	0.267	0.267	0.317	-20	0.204	0.204	0.234	-8	0.013	0.013	0.016	32	0.024	0.024	0.026	-11	0.019	0.019	0.019	0
Mn, Diss	Construction	Dec	2	0.049	0.049	0.049	-24	0.192	0.192	0.225	-39	0.195	0.195	0.228	-20	0.012	0.012	0.016	28	0.023	0.023	0.025	-13	0.019	0.019	0.019	0
Mn, Diss	Operations	Jan	5	0.054	0.054	0.054	-18	0.125	0.126	0.128	-59	0.128	0.128	0.131	-45	0.007	0.007	0.009	-22	0.017	0.017	0.020	-32	0.019	0.019	0.019	0
Mn, Diss	Operations	Feb	5	0.060	0.060	0.061	-21	0.112	0.112	0.114	-65	0.109	0.110	0.115	-57	0.007	0.007	0.009	-25	0.017	0.017	0.020	-33	0.020	0.020	0.020	0
Mn, Diss	Operations	Mar	5	0.055	0.055	0.056	-19	0.104	0.103	0.105	-67	0.072	0.072	0.083	-68	0.007	0.007	0.008	-28	0.016	0.017	0.019	-35	0.019	0.019	0.019	0
Mn, Diss	Operations	Apr	5	0.057	0.057	0.057	-18	0.098	0.098	0.101	-68	0.072	0.071	0.074	-66	0.006	0.007	0.008	-32	0.015	0.016	0.018	-37	0.019	0.019	0.019	0
Mn, Diss	Operations	May	5	0.056	0.057	0.057	-12	0.068	0.068	0.070	-64	0.040	0.040	0.041	-28	0.006	0.007	0.007	-22	0.034	0.034	0.036	-21	0.018	0.018	0.018	0
Mn, Diss	Operations	Jun	5	0.072	0.072	0.073	-15	0.069	0.069	0.070	-58	0.051	0.051	0.052	-48	0.010	0.010	0.010	-11	0.028	0.029	0.030	-24	0.020	0.020	0.020	0
Mn, Diss	Operations	Jul	5	0.058	0.058	0.058	-29	0.071	0.071	0.072	-52	0.047	0.046	0.047	-48	0.010	0.010	0.011	-12	0.025	0.025	0.027	-25	0.019	0.019	0.019	0
Mn, Diss	Operations	Aug	5	0.037	0.037	0.037	-43	0.069	0.069	0.070	-48	0.046	0.046	0.046	-42	0.009	0.009	0.009	-16	0.022	0.022	0.024	-27	0.018	0.018	0.018	0
Mn, Diss	Operations	Sep	5	0.025	0.025	0.025	-53	0.065	0.065	0.066	-45	0.046	0.046	0.047	-38	0.007	0.007	0.008	-20	0.019	0.020	0.021	-28	0.017	0.017	0.017	0
Mn, Diss	Operations	Oct	5	0.017	0.017	0.017	-61	0.059	0.058	0.059	-46	0.048	0.048	0.048	-33	0.006	0.007	0.007	-23	0.017	0.018	0.019	-30	0.016	0.016	0.016	0
Mn, Diss	Operations	Nov	5	0.036	0.037	0.037	-43	0.220	0.220	0.221	-34	0.180	0.180	0.181	-19	0.007	0.007	0.008	-25	0.018	0.018	0.020	-32	0.019	0.019	0.019	0
Mn, Diss	Operations	Dec	5	0.048	0.049	0.049	-25	0.162	0.161	0.163	-49	0.170	0.169	0.170	-31	0.007	0.007	0.008	-25	0.017	0.017	0.019	-33	0.019	0.019	0.019	0
Mn, Diss	Closure	Jan	6	0.054	0.054	0.055	-18	0.117	0.118	0.125	-61	0.125	0.126	0.133	-45	0.007	0.007	0.007	-28	0.016	0.016	0.017	-34	0.019	0.019	0.019	0
Mn, Diss	Closure	Feb	6	0.061	0.061	0.061	-20	0.103	0.104	0.109	-68	0.114	0.115	0.121	-55	0.007	0.007	0.007	-30	0.016	0.016	0.017	-36	0.020	0.020	0.020	0
Mn, Diss	Closure	Mar	6	0.055	0.055	0.056	-18	0.087	0.088	0.091	-72	0.090	0.090	0.094	-61	0.006	0.006	0.007	-33	0.015	0.015	0.016	-38	0.019	0.019	0.019	0
Mn, Diss	Closure	Apr	6	0.057	0.057	0.058	-18	0.077	0.077	0.080	-75	0.078	0.078	0.081	-62	0.006	0.006	0.006	-35	0.015	0.015	0.015	-39	0.019	0.019	0.019	0
Mn, Diss	Closure	May	6	0.057	0.056	0.057	-13	0.053	0.053	0.055	-72	0.038	0.038	0.039	-32	0.006	0.006	0.006	-26	0.033	0.033	0.034	-22	0.018	0.018	0.018	0
Mn, Diss	Closure	Jun	6	0.072	0.072	0.074	-15	0.054	0.054	0.056	-67	0.048	0.048	0.049	-51	0.009	0.009	0.009	-17	0.028	0.028	0.029	-24	0.020	0.020	0.020	0
Mn, Diss	Closure	Jul	6	0.058	0.059	0.061	-28	0.056	0.056	0.057	-62	0.046	0.045	0.047	-49	0.010	0.009	0.010	-18	0.025	0.025	0.025	-25	0.019	0.019	0.019	0
Mn, Diss	Closure	Aug	6	0.038	0.038	0.041	-41	0.054	0.055	0.055	-59	0.044	0.044	0.045	-45	0.008	0.008	0.008	-21	0.022	0.022	0.022	-26	0.018	0.018	0.018	0
Mn, Diss	Closure	Sep	6	0.025	0.026	0.029	-51	0.051	0.051	0.052	-57	0.043	0.043	0.044	-42	0.007	0.007	0.007	-24	0.019	0.019	0.020	-28	0.017	0.017	0.017	0
Mn, Diss	Closure	Oct	6	0.017	0.017	0.020	-59	0.047	0.046	0.048	-57	0.041	0.041	0.042	-42	0.006	0.006	0.006	-26	0.017	0.017	0.018	-29	0.016	0.016	0.016	0
Mn, Diss	Closure	Nov	6	0.037	0.037	0.038	-42	0.207	0.209	0.219	-37	0.170	0.171	0.174	-23	0.007	0.007	0.007	-27	0.018	0.018	0.019	-31	0.019	0.019	0.019	0
Mn, Diss	Closure	Dec	6	0.049	0.049	0.049	-25	0.151	0.154	0.169	-51	0.162	0.164	0.177	-33	0.007	0.007	0.007	-28	0.017	0.017	0.018	-32	0.019	0.019	0.019	0
Mn, Diss	Post-Closure	Jan	117	0.071	0.070	0.071	7	0.347	0.341	0.347	11	0.227	0.228	0.255	-1	0.009	0.009	0.009	-2	0.024	0.024	0.025	-1	0.019	0.019	0.019	0
Mn, Diss	Post-Closure	Feb	117	0.082	0.081	0.082	7	0.364	0.358	0.364	11	0.237	0.240	0.289	-7	0.009	0.009	0.009	-2	0.024	0.024	0.025	-2	0.020	0.020	0.020	0
Mn, Diss	Post-Closure	Mar	117	0.073	0.072	0.073	6	0.358	0.351	0.358	12	0.157	0.166	0.261	-28	0.009	0.009	0.009	-2	0.024	0.024	0.025	-2	0.019	0.019	0.019	0
Mn, Diss	Post-Closure	Apr	117	0.074	0.074	0.074	6	0.352	0.344	0.352	13	0.127	0.137	0.239	-34	0.009	0.009	0.009	-3	0.024	0.024	0.024	-2	0.019	0.019	0.019	0
Mn, Diss	Post-Closure	May	117	0.067	0.067	0.067	4	0.227	0.222	0.227	16	0.043	0.044	0.059	-21	0.008	0.008	0.008	-3	0.042	0.042	0.043	-1	0.018	0.018	0.018	0
Mn, Diss	Post-Closure	Jun	117	0.086	0.086	0.086	0	0.200	0.196	0.200	19	0.101	0.100	0.101	2	0.010	0.010	0.010	-4	0.037	0.036	0.037	-1	0.020	0.020	0.020	0
Mn, Diss	Post-Closure	Jul	117	0.083	0.083	0.083	1	0.183	0.179	0.183	21	0.094	0.093	0.094	4	0.011	0.011	0.011	-3	0.033	0.033	0.034	-1	0.019	0.019	0.019	0
Mn, Diss	Post-Closure	Aug	117	0.068	0.068	0.068	4	0.166	0.162	0.166	23	0.085	0.084	0.085	6	0.010	0.010	0.010	-3	0.029	0.029	0.030	-1	0.018	0.018	0.018	0
Mn, Diss	Post-Closure	Sep	117	0.057	0.056	0.057	7	0.153	0.149	0.153	25	0.081	0.080	0.081	8	0.009	0.009	0.009	-2	0.026	0.026	0.027	-1	0.017	0.017	0.017	0
Mn, Diss	Post-Closure	Oct	117	0.047	0.047	0.047	9	0.141	0.137	0.141	27	0.079	0.078	0.079	10	0.008	0.008	0.008	-2	0.024	0.024	0.024	-1	0.016	0.016	0.016	0
Mn, Diss	Post-Closure	Nov	117	0.069	0.069	0.069	8	0.373	0.369	0.373	11	0.235	0.234	0.241	6	0.009	0.009	0.009	-2	0.026	0.025	0.026	-1	0.019	0.019	0.019	0
Mn, Diss	Post-Closure	Dec	117	0.070	0.070	0.070	8	0.358	0.354	0.358	11	0.251	0.251	0.266	3	0.009	0.009	0.009	-2	0.025	0.025	0.025	-1	0.019	0.019	0.019	0
Hg, Diss	Construction	Jan	2	0.0000008	0.0000008	0.0000010	-30	0.0000008	0.0000008	0.0000010	-18	0.0000005	0.0000005	0.0000006	-43	0.0000008	0.0000008	0.0000009	-13	0.0000008	0.0000008	0.0000009	-10	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	Feb	2	0.0000007	0.0000007	0.0000008	-44	0.0000008	0.0000008	0.0000010	-23	0.0000005	0.0000006	0.0000006	-46	0.0000008	0.0000008	0.0000009	-17	0.0000008	0.0000008	0.0000009	-11	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Construction	Mar	2	0.0000006	0.0000006	0.0000006	-46	0.0000007	0.0000007	0.0000009	-28	0.0000005	0.0000005	0.0000005	-51	0.0000007	0.0000007	0.0000007	-22	0.0000008	0.0000008	0.0000009	-13	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	Apr	2	0.0000006	0.0000006	0.0000006	-45	0.0000007	0.0000007	0.0000008	-29	0.0000005	0.0000005	0.0000005	-48	0.0000007	0.0000007	0.0000007	-27	0.0000008	0.0000008	0.0000009	-16	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	May	2	0.0000008	0.0000008	0.0000008	-27	0.0000007	0.0000007	0.0000008	-14	0.0000006	0.0000006	0.0000006	-23	0.0000006	0.0000006	0.0000006	-27	0.0000007	0.0000007	0.0000007	-17	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Construction	Jun	2	0.0000010	0.0000010	0.0000010	-24	0.0000009	0.0000009	0.0000010	-2	0.0000008	0.0000008	0.0000008	-21	0.0000006	0.0000006	0.0000006	-19	0.0000008	0.0000008	0.0000008	-15	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Construction	Jul	2	0.0000010	0.0000010	0.0000010	-27	0.0000010	0.0000010	0.0000011	-1	0.0000009	0.0000009	0.0000009	-20	0.0000007	0.0000007	0.0000007	-19	0.0000008	0.0000008	0.0000008	-15	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Construction	Aug	2	0.0000009	0.0000009	0.0000009	-28	0.0000010	0.0000010	0.0000010	-4	0.0000008	0.0000008	0.0000008	-19	0.0000007	0.0000007	0.0000007	-17	0.0000008	0.0000008	0.0000008	-15	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Construction	Sep	2	0.0000007	0.0000007	0.0000007	-35	0.0000009	0.0000009	0.0000009	-11	0.0000008	0.0000008	0.0000008	-21	0.0000007	0.0000007	0.0000007	-17	0.0000008	0.0000008	0.0000008	-16	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Construction	Oct	2	0.0000005	0.0000005	0.0000005	-44	0.0000007	0.0000007	0.0000008	-19	0.0000006	0.0000006	0.0000007	-25	0.0000007	0.0000007	0.0000007	-18	0.0000008	0.0000008	0.0000008	-17	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Construction	Nov	2	0.0000006	0.0000006	0.0000006	-49	0.0000008	0.0000008	0.0000008	-27	0.0000008	0.0000008	0.0000008	-43	0.0000007	0.0000007	0.0000007	-21	0.0000008	0.0000008	0.0000008	-18	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Construction	Dec	2	0.0000006	0.0000006	0.0000006	-51	0.0000007	0.0000007	0.0000007	-36	0.0000007	0.0000007	0.0000007	-39	0.0000007	0.0000007	0.0000007	-24	0.0000008	0.0000008	0.0000008	-20	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Jan	5	0.0000006	0.0000006	0.0000006	-52	0.0000006	0.0000006	0.0000006	-43	0.0000006	0.0000006	0.0000006	-39	0.0000007	0.0000007	0.0000007	-26	0.0000007	0.0000007	0.0000007	-25	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Feb	5	0.0000006	0.0000006	0.0000006	-55	0.0000006	0.0000006	0.0000006	-46	0.0000006	0.0000006	0.0000006	-48	0.0000007	0.0000007	0.0000007	-29	0.0000007	0.0000007	0.0000007	-26	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Operations	Mar	5	0.0000005	0.0000005	0.0000005	-53	0.0000006	0.0000006	0.0000006	-43	0.0000004	0.0000004	0.0000005	-59	0.0000006	0.0000006	0.0000006	-32	0.0000007	0.0000007	0.0000007	-27	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Apr	5	0.0000005	0.0000005	0.0000006	-49	0.0000006	0.0000006	0.0000006	-39	0.0000005	0.0000005	0.0000005	-50	0.0000006	0.0000006	0.0000006	-35	0.0000007	0.0000007	0.0000007	-29	0.0000014	0.0000014	0.0000014	-1
Hg, Diss	Operations	May	5	0.0000007	0.0000007	0.0000007	-29	0.0000007	0.0000007	0.0000007	-19	0.0000006	0.0000006	0.0000006	-25	0.0000005	0.0000005	0.0000005	-34	0.0000006	0.0000006	0.0000006	-28	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Operations	Jun	5	0.0000010	0.0000010	0.0000010	-26	0.0000009	0.0000009	0.0000010	-3	0.0000008	0.0000008	0.0000008	-22	0.0000006	0.0000006	0.0000006	-27	0.0000007	0.0000007	0.0000007	-23	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Operations	Jul	5	0.0000009	0.0000009	0.0000010	-29	0.0000010	0.0000010	0.0000011	1	0.0000008	0.0000008	0.0000009	-19	0.0000007	0.0000007	0.0000007	-23	0.0000007	0.0000007	0.0000007	-22	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Operations	Aug	5	0.0000009	0.0000009	0.0000009	-30	0.0000010	0.0000010	0.0000011	-1	0.0000008	0.0000009	0.0000009	-17	0.0000007	0.0000007	0.0000007	-21	0.0000007	0.0000007	0.0000008	-21	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Operations	Sep	5	0.0000007	0.0000007	0.0000007	-37	0.0000009	0.0000009	0.0000010	-8	0.0000008	0.0000008	0.0000008	-17	0.0000007	0.0000007	0.0000007	-20	0.0000007	0.0000007	0.0000007	-21	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Operations	Oct	5	0.0000005	0.0000005	0.0000005	-46	0.0000007	0.0000007	0.0000008	-17	0.0000007	0.0000007	0.0000007	-16	0.0000007	0.0000007	0.0000007	-20	0.0000007	0.0000007	0.0000007	-21	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Operations	Nov	5	0.0000006	0.0000006	0.0000006	-51	0.0000007	0.0000007	0.0000008	-29	0.0000009	0.0000009	0.0000010	-35	0.0000007	0.0000007	0.0000007	-21	0.0000008	0.0000008	0.0000008	-22	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Operations	Dec	5	0.0000006	0.0000006	0.0000006	-53	0.0000006	0.0000006	0.0000007	-38	0.0000007	0.0000007	0.0000008	-38	0.0000007	0.0000007	0.0000007	-23	0.0000007	0.0000007	0.0000007	-23	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Jan	6	0.0000006	0.0000006	0.0000006	-51	0.0000005	0.0000005	0.0000006	-48	0.0000005	0.0000005	0.0000006	-42	0.0000007	0.0000007	0.0000007	-26	0.0000007	0.0000007	0.0000007	-24	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Feb	6	0.0000006	0.0000006	0.0000006	-54	0.0000005	0.0000005	0.0000005	-52	0.0000006	0.0000006	0.0000006	-47	0.0000007	0.0000007	0.0000007	-29	0.0000007	0.0000007	0.0000007	-26	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Closure	Mar	6	0.0000005	0.0000005	0.0000005	-52	0.0000005	0.0000005	0.0000005	-54	0.0000005	0.0000005	0.0000005	-51	0.0000006	0.0000006	0.0000007	-32	0.0000007	0.0000007	0.0000007	-27	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Apr	6	0.0000006	0.0000006	0.0000006	-48	0.0000005	0.0000004	0.0000005	-55	0.0000005	0.0000005	0.0000005	-48	0.0000006	0.0000006	0.0000006	-34	0.0000007	0.0000007	0.0000007	-29	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	May	6	0.0000007	0.0000007	0.0000007	-29	0.0000005	0.0000005	0.0000005	-37	0.0000006	0.0000006	0.0000006	-26	0.0000005	0.0000006	0.0000006	-33	0.0000006	0.0000006	0.0000006	-27	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Closure	Jun	6	0.0000010	0.0000010	0.0000010	-25	0.0000007	0.0000007	0.0000008	-23	0.0000008	0.0000008	0.0000008	-22	0.0000006	0.0000006	0.0000006	-27	0.0000007	0.0000007	0.0000007	-23	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Closure	Jul	6	0.0000010	0.0000010	0.0000010	-28	0.0000008	0.0000008	0.0000008	-21	0.0000009	0.0000009	0.0000009	-18	0.0000007	0.0000007	0.0000007	-23	0.0000007	0.0000007	0.0000008	-21	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Closure	Aug	6	0.0000009	0.0000009	0.0000009	-28	0.0000008	0.0000008	0.0000008	-23	0.0000008	0.0000009	0.0000009	-17	0.0000007	0.0000007	0.0000007	-20	0.0000007	0.0000007	0.0000008	-20	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Closure	Sep	6	0.0000007	0.0000007	0.0000008	-35	0.0000007	0.0000007	0.0000007	-28	0.0000008	0.0000008	0.0000008	-19	0.0000007	0.0000007	0.0000007	-19	0.0000007	0.0000007	0.0000008	-20	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Closure	Oct	6	0.0000005	0.0000005	0.0000006	-44	0.0000006	0.0000006	0.0000006	-34	0.0000006	0.0000007	0.0000007	-25	0.0000007	0.0000007	0.0000007	-20	0.0000007	0.0000007	0.0000007	-20	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Closure	Nov	6	0.0000006	0.0000006	0.0000007	-49	0.0000006	0.0000006	0.0000007	-41	0.0000008	0.0000008	0.0000009	-44	0.0000007	0.0000007	0.0000007	-22	0.0000007	0.0000008	0.0000008	-21	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Closure	Dec	6	0.0000006	0.0000006	0.0000006	-51	0.0000005	0.0000005	0.0000006	-46	0.0000006	0.0000006	0.0000008	-45	0.0000007	0.0000007	0.0000007	-24	0.0000007	0.0000007	0.0000008	-23	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Jan	117	0.0000012	0.0000012	0.0000012	1	0.0000013	0.0000012	0.0000013	24	0.0000010	0.0000010	0.0000010	6	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Feb	117	0.0000013	0.0000013	0.0000013	1	0.0000014	0.0000013	0.0000014	25	0.0000011	0.0000011	0.0000012	1	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000009	0.0000010	0	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Post-Closure	Mar	117	0.0000011	0.0000011	0.0000011	1	0.0000014	0.0000013	0.0000014	28	0.0000008	0.0000008	0.0000011	-19	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Apr	117	0.0000011	0.0000011	0.0000011	1	0.0000014	0.0000013	0.0000014	31	0.0000006	0.0000007	0.0000010	-26	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	-1	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	May	117	0.0000010	0.0000010	0.0000010	-5	0.0000011	0.0000010	0.0000011	26	0.0000008	0.0000008	0.0000008	-6	0.0000008	0.0000007	0.0000008	-1	0.0000008	0.0000008	0.0000008	-1	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Post-Closure	Jun	117	0.0000012	0.0000012	0.0000012	-6	0.0000012	0.0000012	0.0000012	20	0.0000011	0.0000011	0.0000011	3	0.0000008	0.0000008	0.0000008	0	0.0000009	0.0000009	0.0000009	0	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Post-Closure	Jul	117	0.0000013	0.0000013	0.0000013	-5	0.0000012	0.0000012	0.0000012	19	0.0000011	0.0000011	0.0000011	3	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000010	0	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Post-Closure	Aug	117	0.0000012	0.0000012	0.0000012	-4	0.0000012	0.0000012	0.0000012	19	0.0000011	0.0000011	0.0000011	4	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000010	0	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Post-Closure	Sep	117	0.0000011	0.0000011	0.0000011	-2	0.0000012	0.0000012	0.0000012	20	0.0000010	0.0000010	0.0000010	3	0.0000008	0.0000008	0.0000008	0	0.0000009	0.0000009	0.0000009	0	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Post-Closure	Oct	117	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000011	0.0000011	22	0.0000009	0.0000009	0.0000009	4	0.0000008	0.0000008	0.0000008	0	0.0000009	0.0000009	0.0000009	0	0.0000013	0.0000013	0.0000013	0
Hg, Diss	Post-Closure	Nov	117	0.0000013	0.0000013	0.0000013	1	0.0000013	0.0000013	0.0000013	23	0.0000015	0.0000015	0.0000015	7	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	0	0.0000015	0.0000015	0.0000015	0
Hg, Diss	Post-Closure	Dec	117	0.0000012	0.0000012	0.0000012	1	0.0000013	0.0000012	0.0000013	24	0.0000012	0.0000012	0.0000012	8	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000010	0	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Construction	Jan	2	0.0000013	0.0000013	0.0000015	-14	0.0000010	0.0000010	0.0000012	-20	0.0000009	0.0000009	0.0000010	-53	0.0000009	0.0000009	0.0000010	-12	0.0000012	0.0000012	0.0000013	-8	0.0000015	0.0000015	0.0000016	0
Hg, Tot	Construction	Feb	2	0.0000013	0.0000013	0.0000014	-23	0.0000010	0.0000010	0.0000012	-24	0.0000007	0.0000007	0.0000008	-61	0.0000009	0.0000009	0.0000010	-16	0.0000012	0.0000012	0.0000013	-9	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Construction	Mar	2	0.0000011	0.0000011	0.0000011	-23	0.0000009	0.0000009	0.0000011	-28	0.0000007	0.0000007	0.0000007	-61	0.0000009	0.0000009	0.0000009	-20	0.0000011	0.0000011	0.0000013	-11	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Construction	Apr	2	0.0000011	0.0000011	0.0000011	-19	0.0000009	0.0000009	0.0000010	-30	0.0000006	0.0000006	0.0000007	-61	0.0000008	0.0000008	0.0000009	-24	0.0000011	0.0000011	0.0000012	-12	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Construction	May	2	0.0000011	0.0000011	0.0000011	-17	0.0000009	0.0000009	0.0000010	-15	0.0000008	0.0000008	0.0000008	-32	0.0000007	0.0000007	0.0000007	-24	0.0000011	0.0000011	0.0000012	-13	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Construction	Jun	2	0.0000014	0.0000014	0.0000014	-20	0.0000012	0.0000012	0.0000012	-6	0.0000010	0.0000010	0.0000010	-23	0.0000007	0.0000007	0.0000008	-20	0.0000011	0.0000011	0.0000012	-13	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Construction	Jul	2	0.0000013	0.0000013	0.0000013	-27	0.0000012	0.0000012	0.0000013	-6	0.0000010	0.0000010	0.0000010	-21	0.0000008	0.0000008	0.0000008	-17	0.0000011	0.0000011	0.0000012	-14	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Construction	Aug	2	0.0000011	0.0000011	0.0000011	-33	0.0000011	0.0000011	0.0000012	-11	0.0000010	0.0000010	0.0000010	-21	0.0000008	0.0000008	0.0000008	-16	0.0000011	0.0000011	0.0000011	-15	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Construction	Sep	2	0.0000008	0.0000008	0.0000008	-41	0.0000010	0.0000010	0.0000010	-18	0.0000009	0.0000009	0.0000009	-24	0.0000008	0.0000008	0.0000008	-16	0.0000010	0.0000010	0.0000011	-16	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Construction	Oct	2	0.0000006	0.0000006	0.0000006	-49	0.0000008	0.0000008	0.0000009	-26	0.0000007	0.0000007	0.0000007	-29	0.0000008	0.0000008	0.0000008	-18	0.0000010	0.0000010	0.0000010	-16	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Construction	Nov	2	0.0000009	0.0000009	0.0000009	-44	0.0000009	0.0000009	0.0000009	-34	0.0000010	0.0000010	0.0000010	-49	0.0000008	0.0000008	0.0000008	-20	0.0000011	0.0000011	0.0000011	-17	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Construction	Dec	2	0.0000010	0.0000010	0.0000010	-34	0.0000008	0.0000008	0.0000008	-40	0.0000009	0.0000009	0.0000009	-50	0.0000008	0.0000008	0.0000008	-22	0.0000010	0.0000010	0.0000011	-18	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Operations	Jan	5	0.0000011	0.0000011	0.0000011	-28	0.0000007	0.0000007	0.0000007	-45	0.0000008	0.0000008	0.0000009	-56	0.0000008	0.0000008	0.0000008	-24	0.0000010	0.0000010	0.0000010	-22	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Operations	Feb	5	0.0000011	0.0000011	0.0000011	-31	0.0000007	0.0000007	0.0000007	-46	0.0000007	0.0000007	0.0000008	-61	0.0000008	0.0000008	0.0000008	-26	0.0000010	0.0000010	0.0000010	-23	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Operations	Mar	5	0.0000010	0.0000010	0.0000010	-27	0.0000007	0.0000007	0.0000008	-42	0.0000006	0.0000006	0.0000006	-67	0.0000008	0.0000008	0.0000008	-29	0.0000010	0.0000010	0.0000010	-24	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Operations	Apr	5	0.0000011	0.0000011	0.0000011	-22	0.0000008	0.0000008	0.0000008	-38	0.0000006	0.0000006	0.0000006	-62	0.0000007	0.0000007	0.0000007	-32	0.0000009	0.0000010	0.0000010	-25	0.0000015	0.0000015	0.0000015	-1
Hg, Tot	Operations	May	5	0.0000011	0.0000011	0.0000011	-18	0.0000008	0.0000009	0.0000009	-20	0.0000008	0.0000008	0.0000008	-33	0.0000006	0.0000006	0.0000006	-30	0.0000010	0.0000010	0.0000010	-22	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Operations	Jun	5	0.0000014	0.0000014	0.0000014	-20	0.0000012	0.0000012	0.0000012	-7	0.0000010	0.0000010	0.0000011	-23	0.0000007	0.0000007	0.0000007	-25	0.0000010	0.0000010	0.0000010	-21	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Operations	Jul	5	0.0000013	0.0000013	0.0000013	-28	0.0000012	0.0000012	0.0000013	-5	0.0000010	0.0000010	0.0000011	-20	0.0000008	0.0000008	0.0000008	-21	0.0000010	0.0000010	0.0000010	-20	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Operations	Aug	5	0.0000011	0.0000011	0.0000011	-34	0.0000012	0.0000012	0.0000012	-9	0.0000010	0.0000010	0.0000010	-19	0.0000008	0.0000008	0.0000008	-19	0.0000010	0.0000010	0.0000010	-20	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Operations	Sep	5	0.0000008	0.0000008	0.0000008	-41	0.0000010	0.0000010	0.0000011	-15	0.0000009	0.0000009	0.0000009	-20	0.0000008	0.0000008	0.0000008	-18	0.0000010	0.0000010	0.0000010	-20	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Operations	Oct	5	0.0000006	0.0000006	0.0000006	-49	0.0000008	0.0000008	0.0000009	-25	0.0000008	0.0000008	0.0000009	-21	0.0000007	0.0000007	0.0000008	-19	0.0000009	0.0000009	0.0000009	-21	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Operations	Nov	5	0.0000009	0.0000009	0.0000009	-44	0.0000009	0.0000008	0.0000009	-35	0.0000011	0.0000011	0.0000012	-42	0.0000008	0.0000008	0.0000008	-20	0.0000010	0.0000010	0.0000010	-21	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Operations	Dec	5	0.0000010	0.0000010	0.0000010	-34	0.0000007	0.0000007	0.0000008	-42	0.0000009	0.0000009	0.0000010	-48	0.0000008	0.0000008	0.0000008	-22	0.0000010	0.0000010	0.0000010	-22	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Closure	Jan	6	0.0000011	0.0000011	0.0000011	-28	0.0000006	0.0000006	0.0000007	-49	0.0000008	0.0000008	0.0000009	-58	0.0000008	0.0000008	0.0000008	-24	0.0000010	0.0000010	0.0000010	-21	0.0000015	0.0000015	0.0000016	0
Hg, Tot	Closure	Feb	6	0.0000011	0.0000011	0.0000011	-31	0.0000006	0.0000006	0.0000007	-51	0.0000008	0.0000008	0.0000008	-60	0.0000008	0.0000008	0.0000008	-26	0.0000010	0.0000010	0.0000010	-22	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Closure	Mar	6	0.0000010	0.0000010	0.0000010	-27	0.0000006	0.0000006	0.0000006	-52	0.0000007	0.0000007	0.0000007	-60	0.0000008	0.0000008	0.0000008	-28	0.0000010	0.0000010	0.0000010	-23	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Closure	Apr	6	0.0000011	0.0000011	0.0000011	-21	0.0000006	0.0000006	0.0000006	-53	0.0000007	0.0000007	0.0000007	-59	0.0000007	0.0000007	0.0000008	-30	0.0000010	0.0000010	0.0000010	-24	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Closure	May	6	0.0000011	0.0000011	0.0000011	-18	0.0000007	0.0000007	0.0000007	-35	0.0000008	0.0000008	0.0000008	-32	0.0000006	0.0000006	0.0000006	-29	0.0000010	0.0000010	0.0000010	-21	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Closure	Jun	6	0.0000014	0.0000014	0.0000014	-20	0.0000010	0.0000010	0.0000010	-23	0.0000010	0.0000010	0.0000010	-22	0.0000007	0.0000007	0.0000007	-24	0.0000010	0.0000010	0.0000011	-19	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Closure	Jul	6	0.0000013	0.0000013	0.0000013	-27	0.0000010	0.0000010	0.0000010	-22	0.0000011	0.0000011	0.0000011	-17	0.0000008	0.0000008	0.0000008	-20	0.0000010	0.0000010	0.0000011	-19	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Closure	Aug	6	0.0000011	0.0000011	0.0000011	-33	0.0000009	0.0000009	0.0000010	-26	0.0000010	0.0000010	0.0000010	-18	0.0000008	0.0000008	0.0000008	-18	0.0000010	0.0000010	0.0000010	-19	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Closure	Sep	6	0.0000008	0.0000008	0.0000009	-40	0.0000008	0.0000008	0.0000008	-32	0.0000009	0.0000009	0.0000009	-21	0.0000008	0.0000008	0.0000008	-17	0.0000010	0.0000010	0.0000010	-19	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Closure	Oct	6	0.0000006	0.0000006	0.0000007	-48	0.0000007	0.0000007	0.0000007	-39	0.0000007	0.0000007	0.0000008	-27	0.0000007	0.0000007	0.0000008	-18	0.0000009	0.0000009	0.0000010	-19	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Closure	Nov	6	0.0000009	0.0000009	0.0000009	-43	0.0000007	0.0000007	0.0000008	-46	0.0000010	0.0000010	0.0000011	-48	0.0000008	0.0000008	0.0000008	-20	0.0000010	0.0000010	0.0000010	-20	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Closure	Dec	6	0.0000010	0.0000010	0.0000010	-34	0.0000006	0.0000006	0.0000007	-49	0.0000008	0.0000008	0.0000009	-53	0.0000008	0.0000008	0.0000008	-22	0.0000010	0.0000010	0.0000010	-20	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Post-Closure	Jan	117	0.0000015	0.0000015	0.0000015	1	0.0000015	0.0000015	0.0000015	21	0.0000019	0.0000019	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000012	0.0000012	0.0000013	-1	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Post-Closure	Feb	117	0.0000017	0.0000017	0.0000017	1	0.0000016	0.0000016	0.0000016	22	0.0000018	0.0000018	0.0000021	-5	0.0000011	0.0000011	0.0000011	0	0.0000013	0.0000013	0.0000013	-1	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Post-Closure	Mar	117	0.0000014	0.0000014	0.0000014	1	0.0000017	0.0000016	0.0000017	24	0.0000013	0.0000014	0.0000018	-20	0.0000011	0.0000011	0.0000011	0	0.0000013	0.0000013	0.0000013	-1	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Post-Closure	Apr	117	0.0000014	0.0000014	0.0000014	1	0.0000017	0.0000016	0.0000017	27	0.0000011	0.0000012	0.0000017	-27	0.0000011	0.0000010	0.0000011	-1	0.0000012	0.0000012	0.0000013	-1	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Post-Closure	May	117	0.0000013	0.0000013	0.0000013	-4	0.0000013	0.0000013	0.0000013	22	0.0000010	0.0000011	0.0000012	-9	0.0000009	0.0000009	0.0000009	-1	0.0000012	0.0000012	0.0000013	-1	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Post-Closure	Jun	117	0.0000016	0.0000016	0.0000016	-6	0.0000015	0.0000015	0.0000015	16	0.0000014	0.0000013	0.0000014	1	0.0000009	0.0000009	0.0000009	-1	0.0000013	0.0000013	0.0000013	0	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Post-Closure	Jul	117	0.0000017	0.0000017	0.0000017	-5	0.0000015	0.0000015	0.0000015	15	0.0000013	0.0000013	0.0000013	2	0.0000010	0.0000010	0.0000010	-1	0.0000013	0.0000013	0.0000013	0	0.0000015	0.0000015	0.0000015	0
Hg, Tot	Post-Closure	Aug	117	0.0000015	0.0000015	0.0000015	-3	0.0000015	0.0000015	0.0000015	16	0.0000013	0.0000012	0.0000013	2	0.0000010	0.0000010	0.0000010	0	0.0000012	0.0000012	0.0000012	0	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Post-Closure	Sep	117	0.0000014	0.0000014	0.0000014	-2	0.0000014	0.0000014	0.0000014	17	0.0000012	0.0000012	0.0000012	2	0.0000009	0.0000009	0.0000009	0	0.0000012	0.0000012	0.0000012	0	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Post-Closure	Oct	117	0.0000012	0.0000012	0.0000012	0	0.0000014	0.0000013	0.0000014	19	0.0000011	0.0000011	0.0000011	2	0.0000009	0.0000009	0.0000009	0	0.0000012	0.0000012	0.0000012	0	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Post-Closure	Nov	117	0.0000016	0.0000016	0.0000016	1	0.0000016	0.0000016	0.0000016	20	0.0000020	0.0000020	0.0000020	4	0.0000010	0.0000010	0.0000010	0	0.0000013	0.0000013	0.0000013	0	0.0000016	0.0000016	0.0000016	0
Hg, Tot	Post-Closure	Dec	117	0.0000015	0.0000015	0.0000015	1	0.0000016	0.0000015	0.0000016	21	0.0000019	0.0000019	0.0000019	4	0.0000010	0.0000010	0.0000010	0	0.0000013	0.0000012	0.0000013	0	0.0000016	0.0000016	0.0000016	0
Mo, Tot	Construction	Jan	2	0.00066	0.00066	0.00090	445	0.00130	0.00130	0.00184	218	0.00043	0.00043	0.00074	107	0.00083	0.00083	0.00083	-1	0.00057	0.00057	0.00057	0	0.0015	0.0015	0.0015	0
Mo, Tot	Construction	Feb	2	0.00076	0.00076	0.00086	438	0.00160	0.00160	0.00189	261	0.00044	0.00044	0.00067	94	0.00084	0.00084	0.00086	-5	0.00059	0.00059	0.00059	0	0.0016	0.0016	0.0016	0
Mo, Tot	Construction	Mar	2	0.00066	0.00066	0.00070	427	0.00173	0.00173	0.00184	285	0.00038	0.00038	0.00049	92	0.00079	0.00079	0.00083	-9	0.00058	0.00058	0.00059	0	0.0015	0.0015	0.0015	0
Mo, Tot	Construction	Apr	2	0.00066	0.00066	0.00067	416	0.00188	0.00188	0.00194	314	0.00039	0.00039	0.00044	107	0.00074	0.00074	0.00079	-13	0.00058	0.00058	0.00058	-1	0.0015	0.0015	0.0015	0
Mo, Tot	Construction	May	2	0.00044	0.00044	0.00044	467	0.00140	0.00140	0.00145	342	0.00069	0.00069	0.00072	127	0.00078	0.00078	0.00082	-12	0.00048	0.00048	0.00049	-1	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Jun	2	0.00051	0.00051	0.00051	604	0.00140	0.00140	0.00143	364	0.00095	0.00095	0.00101	155	0.00079	0.00079	0.00083	-7	0.00044	0.00044	0.00045	-1	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Jul	2	0.00052	0.00052	0.00053	645	0.00145	0.00145	0.00146	391	0.00070	0.00070	0.00074	104	0.00080	0.00080	0.00084	-3	0.00046	0.00046	0.00047	0	0.0013	0.0013	0.0013	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Mo, Tot	Construction	Aug	2	0.00049	0.00049	0.00049	625	0.00147	0.00147	0.00149	406	0.00060	0.00060	0.00063	102	0.00080	0.00080	0.00083	-2	0.00050	0.00050	0.00051	2	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Sep	2	0.00059	0.00059	0.00060	739	0.00149	0.00149	0.00154	422	0.00066	0.00066	0.00069	128	0.00079	0.00079	0.00082	-2	0.00052	0.00052	0.00053	2	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Oct	2	0.00074	0.00074	0.00075	864	0.00152	0.00152	0.00160	444	0.00075	0.00075	0.00077	160	0.00078	0.00078	0.00082	0	0.00053	0.00053	0.00054	3	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Nov	2	0.00105	0.00105	0.00107	827	0.00192	0.00192	0.00206	367	0.00081	0.00081	0.00084	123	0.00089	0.00089	0.00093	1	0.00059	0.00059	0.00061	3	0.0015	0.0015	0.0015	0
Mo, Tot	Construction	Dec	2	0.00096	0.00096	0.00097	722	0.00183	0.00183	0.00194	349	0.00074	0.00074	0.00078	230	0.00087	0.00087	0.00090	2	0.00059	0.00059	0.00061	3	0.0015	0.0015	0.0015	0
Mo, Tot	Operations	Jan	5	0.00083	0.00084	0.00087	601	0.00184	0.00189	0.00215	362	0.00076	0.00078	0.00091	276	0.00098	0.00101	0.00117	19	0.00065	0.00067	0.00075	17	0.0015	0.0015	0.0015	0
Mo, Tot	Operations	Feb	5	0.00079	0.00080	0.00083	471	0.00200	0.00206	0.00240	363	0.00066	0.00068	0.00076	198	0.00101	0.00103	0.00120	18	0.00067	0.00069	0.00077	17	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	Mar	5	0.00065	0.00066	0.00068	421	0.00231	0.00238	0.00298	430	0.00050	0.00051	0.00058	154	0.00097	0.00099	0.00115	15	0.00067	0.00068	0.00077	17	0.0015	0.0015	0.0015	0
Mo, Tot	Operations	Apr	5	0.00063	0.00064	0.00065	395	0.00248	0.00257	0.00327	466	0.00058	0.00058	0.00071	211	0.00092	0.00094	0.00110	11	0.00067	0.00068	0.00077	17	0.0015	0.0015	0.0015	0
Mo, Tot	Operations	May	5	0.00041	0.00041	0.00043	437	0.00183	0.00189	0.00240	496	0.00085	0.00088	0.00107	188	0.00093	0.00094	0.00106	7	0.00056	0.00057	0.00064	17	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Jun	5	0.00047	0.00048	0.00049	565	0.00194	0.00196	0.00249	549	0.00122	0.00127	0.00158	241	0.00094	0.00096	0.00108	13	0.00051	0.00052	0.00059	16	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Jul	5	0.00049	0.00049	0.00051	601	0.00219	0.00218	0.00285	639	0.00095	0.00097	0.00121	184	0.00095	0.00097	0.00110	16	0.00053	0.00054	0.00061	17	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Aug	5	0.00045	0.00046	0.00047	581	0.00233	0.00231	0.00306	694	0.00087	0.00088	0.00112	196	0.00094	0.00096	0.00109	17	0.00058	0.00059	0.00066	19	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Sep	5	0.00055	0.00055	0.00057	690	0.00235	0.00232	0.00305	712	0.00101	0.00101	0.00129	248	0.00094	0.00095	0.00109	19	0.00060	0.00061	0.00069	20	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Oct	5	0.00069	0.00070	0.00072	810	0.00221	0.00217	0.00281	679	0.00118	0.00117	0.00149	307	0.00095	0.00096	0.00111	23	0.00061	0.00062	0.00070	20	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Nov	5	0.00098	0.00099	0.00102	775	0.00245	0.00243	0.00300	491	0.00124	0.00122	0.00154	238	0.00111	0.00112	0.00129	28	0.00069	0.00070	0.00079	21	0.0015	0.0015	0.0015	0
Mo, Tot	Operations	Dec	5	0.00089	0.00090	0.00093	676	0.00216	0.00216	0.00256	431	0.00093	0.00092	0.00112	313	0.00109	0.00110	0.00128	29	0.00069	0.00070	0.00080	22	0.0015	0.0015	0.0015	0
Mo, Tot	Closure	Jan	6	0.00087	0.00087	0.00091	622	0.00152	0.00162	0.00222	296	0.00064	0.00069	0.00097	234	0.00086	0.00094	0.00126	12	0.00063	0.00067	0.00080	16	0.0015	0.0015	0.0015	0
Mo, Tot	Closure	Feb	6	0.00084	0.00083	0.00087	492	0.00160	0.00166	0.00208	274	0.00060	0.00063	0.00082	179	0.00088	0.00096	0.00129	10	0.00065	0.00068	0.00082	16	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	Mar	6	0.00069	0.00068	0.00071	439	0.00154	0.00158	0.00185	252	0.00050	0.00051	0.00061	158	0.00085	0.00093	0.00125	8	0.00064	0.00068	0.00082	16	0.0015	0.0015	0.0015	0
Mo, Tot	Closure	Apr	6	0.00067	0.00066	0.00069	413	0.00149	0.00151	0.00168	233	0.00047	0.00048	0.00054	156	0.00082	0.00089	0.00120	5	0.00063	0.00067	0.00082	15	0.0015	0.0015	0.0015	0
Mo, Tot	Closure	May	6	0.00043	0.00043	0.00044	456	0.00106	0.00107	0.00115	237	0.00063	0.00063	0.00065	105	0.00084	0.00090	0.00112	2	0.00053	0.00056	0.00069	15	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Jun	6	0.00049	0.00049	0.00051	584	0.00104	0.00105	0.00110	247	0.00086	0.00087	0.00091	133	0.00083	0.00088	0.00107	4	0.00048	0.00051	0.00062	13	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Jul	6	0.00051	0.00051	0.00053	623	0.00107	0.00107	0.00111	264	0.00066	0.00067	0.00069	95	0.00083	0.00087	0.00103	5	0.00050	0.00052	0.00063	13	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Aug	6	0.00047	0.00047	0.00049	605	0.00108	0.00108	0.00111	273	0.00056	0.00056	0.00057	88	0.00082	0.00085	0.00098	5	0.00053	0.00056	0.00066	12	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Sep	6	0.00057	0.00057	0.00060	712	0.00110	0.00110	0.00112	284	0.00061	0.00061	0.00062	108	0.00080	0.00083	0.00095	4	0.00055	0.00057	0.00067	11	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Oct	6	0.00071	0.00071	0.00075	833	0.00113	0.00113	0.00115	303	0.00067	0.00067	0.00068	133	0.00079	0.00083	0.00092	5	0.00055	0.00057	0.00067	11	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Nov	6	0.00102	0.00102	0.00107	803	0.00148	0.00147	0.00150	259	0.00074	0.00074	0.00075	104	0.00090	0.00092	0.00103	5	0.00061	0.00064	0.00074	11	0.0015	0.0015	0.0015	0
Mo, Tot	Closure	Dec	6	0.00095	0.00094	0.00098	710	0.00149	0.00149	0.00152	265	0.00063	0.00063	0.00064	182	0.00087	0.00089	0.00100	5	0.00061	0.00064	0.00074	11	0.0015	0.0015	0.0015	0
Mo, Tot	Post-Closure	Jan	117	0.00012	0.00013	0.00090	7	0.00248	0.00219	0.00249	435	0.00075	0.00067	0.00075	226	0.00107	0.00104	0.00108	24	0.00069	0.00067	0.00069	17	0.0015	0.0015	0.0015	2
Mo, Tot	Post-Closure	Feb	117	0.00014	0.00015	0.00088	5	0.00275	0.00243	0.00277	447	0.00075	0.00068	0.00075	198	0.00112	0.00109	0.00112	25	0.00071	0.00069	0.00071	17	0.0016	0.0016	0.0016	2
Mo, Tot	Post-Closure	Mar	117	0.00012	0.00013	0.00073	4	0.00302	0.00266	0.00304	493	0.00049	0.00045	0.00050	126	0.00111	0.00107	0.00111	25	0.00071	0.00069	0.00071	17	0.0015	0.0015	0.0015	2
Mo, Tot	Post-Closure	Apr	117	0.00012	0.00013	0.00070	4	0.00330	0.00291	0.00332	540	0.00041	0.00038	0.00047	103	0.00109	0.00106	0.00109	25	0.00070	0.00069	0.00070	17	0.0015	0.0015	0.0015	2
Mo, Tot	Post-Closure	May	117	0.00008	0.00008	0.00043	5	0.00229	0.00202	0.00230	537	0.00042	0.00041	0.00056	34	0.00107	0.00104	0.00107	18	0.00059	0.00057	0.00059	17	0.0013	0.0013	0.0013	2
Mo, Tot	Post-Closure	Jun	117	0.00007	0.00008	0.00046	6	0.00212	0.00186	0.00212	519	0.00108	0.00098	0.00108	164	0.00103	0.00100	0.00103	19	0.00054	0.00053	0.00054	16	0.0013	0.0013	0.0013	2
Mo, Tot	Post-Closure	Jul	117	0.00007	0.00007	0.00047	6	0.00202	0.00178	0.00203	504	0.00092	0.00085	0.00093	147	0.00101	0.00099	0.00102	20	0.00055	0.00054	0.00055	16	0.0013	0.0013	0.0013	2
Mo, Tot	Post-Closure	Aug	117	0.00007	0.00007	0.00044	6	0.00193	0.00170	0.00194	486	0.00075	0.00069	0.00075	132	0.00099	0.00097	0.00099	20	0.00059	0.00058	0.00059	16	0.0013	0.0013	0.0013	2
Mo, Tot	Post-Closure	Sep	117	0.00007	0.00007	0.00051	6	0.00188	0.00166	0.00189	482	0.00074	0.00068	0.00074	134	0.00098	0.00095	0.00098	20	0.00061	0.00060	0.00061	16	0.0013	0.0013	0.0013	2
Mo, Tot	Post-Closure	Oct	117	0.00008	0.00008	0.00053	5	0.00187	0.00166	0.00188	493	0.00079	0.00072	0.00079	151	0.00096	0.00094	0.00096	21	0.00062	0.00060	0.00062	16	0.0013	0.0013	0.0013	2
Mo, Tot	Post-Closure	Nov	117	0.00011	0.00012	0.00068	4	0.00240	0.00213	0.00241	419	0.00115	0.00105	0.00116	190	0.00110	0.00107	0.00110	22	0.00069	0.00068	0.00069	16	0.0015	0.0015	0.0015	2
Mo, Tot	Post-Closure	Dec	117	0.00011	0.00012	0.00065	3	0.00242	0.00215	0.00243	428	0.00084	0.00076	0.00084	238	0.00109	0.00105	0.00109	24	0.00069	0.00067	0.00069	16	0.0015	0.0015	0.0015	2
Ni, Diss	Construction	Jan	2	0.00014	0.00014	0.00016	-20	0.00045	0.00045	0.00054	2	0.00013	0.00013	0.00018	-24	0.00021	0.00021	0.00021	0	0.00021	0.00021	0.00021	-1	0.00027	0.00027	0.00027	0
Ni, Diss	Construction	Feb	2	0.00013	0.00013	0.00014	-33	0.00050	0.00050	0.00068	7	0.00015	0.00015	0.00015	-21	0.00021	0.00021	0.00021	-4	0.00021	0.00021	0.00021	-1	0.00028	0.00028	0.00028	0
Ni, Diss	Construction	Mar	2	0.00011	0.00011	0.00011	-34	0.00050	0.00050	0.00070	7	0.00015	0.00015	0.00018	-12	0.00020	0.00020	0.00021	-8	0.00021	0.00021	0.00021	-2	0.00027	0.00027	0.00027	0
Ni, Diss	Construction	Apr	2	0.00011	0.00011	0.00011	-31	0.00050	0.00050	0.00069	8	0.00016	0.00016	0.00021	-3	0.00019	0.00019	0.00019	-11	0.00021	0.00021	0.00021	-3	0.00026	0.00026	0.00026	0
Ni, Diss	Construction	May	2	0.00008	0.00008	0.00008	-20	0.00035	0.00035	0.00046	11	0.00018	0.00018	0.00023	38	0.00016	0.00016	0.00016	-11	0.00018	0.00018	0.00018	-4	0.00022	0.00022	0.00022	0
Ni, Diss	Construction	Jun	2	0.00009	0.00009	0.00009	-10	0.00034	0.00034	0.00043	12	0.00019	0.00019	0.00024	5	0.00016	0.00016	0.00017	-7	0.00018	0.00018	0.00018	-4	0.00022	0.00022	0.00022	0
Ni, Diss	Construction	Jul	2	0.00011	0.00011	0.00011	-3	0.00034	0.00034	0.00042	17	0.00019	0.00019	0.00022	0	0.00017	0.00017	0.00018	-6	0.00018	0.00018	0.00018	-4	0.00023	0.00023	0.00023	0
Ni, Diss	Construction	Aug	2	0.00013	0.00013	0.00013	-3	0.00033	0.00033	0.00041	22	0.00020	0.00020	0.00023	3	0.00018	0.00018	0.00019	-4	0.00018	0.00018	0.00019	-4	0.00023	0.00023	0.00023	0
Ni, Diss	Construction	Sep	2	0.00013	0.00013	0.00013	-5	0.00033	0.00033	0.00041	26	0.00020	0.00020	0.00023	5	0.00018	0.00018	0.00020	-3	0.00019	0.00019	0.00019	-4	0.00023	0.00023	0.00023	0
Ni, Diss	Construction	Oct	2	0.00013	0.00013	0.00013	-5	0.00032	0.00032	0.00039	26	0.00020	0.00020	0.00023	9	0.00019	0.00019	0.00019	-2	0.00019	0.00019	0.00019	-4	0.00023	0.00023	0.00023	0
Ni, Diss	Construction	Nov	2	0.00015	0.00015	0.00016	-16	0.00048	0.00048	0.00056	3	0.00022	0.00022	0.00024	-18	0.00021	0.00021	0.00023	-3	0.00021	0.00021	0.00021	-4	0.00027	0.00027	0.00027	0
Ni, Diss	Construction	Dec	2	0.00012	0.00012	0.00012	-30	0.00039	0.00039	0.00044	-14	0.00018	0.00018	0.00021	-6	0.00020	0.00020	0.00022	-5	0.00020	0.00020	0.00021	-4	0.00027	0.00027	0.00027	0
Ni, Diss	Operations	Jan	5	0.00011	0.00011	0.00011	-37	0.00032	0.00033	0.00037	-26	0.00016	0.00016	0.00019	-8	0.00019	0.00020	0.00023	-7	0.00019	0.00019	0.00021	-8	0.00027	0.00027	0.00027	0
Ni, Diss	Operations	Feb	5	0.00011	0.00011	0.00011	-43	0.00033	0.00033	0.00039	-29	0.00014	0.00014	0.00016	-25	0.00019	0.00020	0.00023	-9	0.00020	0.00020	0.00021	-9	0.00028	0.00028	0.00028	0
Ni, Diss	Operations	Mar	5	0.00009	0.00010	0.00010	-41	0.00036	0.00037	0.00048	-20	0.00012	0.00012	0.00013	-31	0.00019	0.00019	0.00022	-13	0.00019	0.00020	0.00021	-9	0.00027	0.00026	0.00027	0
Ni, Diss	Operations	Apr	5	0.00010	0.00010	0.00010	-36	0.00038	0.00040	0.00051	-14	0.00013	0.00014	0.00018	-11	0.00016	0.00018	0.00021	-16	0.00019	0.00019	0.00021	-10	0.00026	0.00026	0.00026	0
Ni, Diss	Operations	May	5	0.00008	0.00008	0.00008	-24	0.00030	0.00030	0.00039	-3	0.00016	0.00016	0.00019	24	0.00014	0.00015	0.00017	-15	0.00016	0.00017	0.00018	-10	0.00022	0.00022	0.00022	0
Ni, Diss	Operations	Jun	5	0.00008	0.00009	0.00009	-14	0.00033	0.00033	0.00042	11	0.00018	0.00019	0.00023	1	0.00015	0.00016	0.00018	-12	0.00017	0.00017	0.00018	-9	0.00022	0.00022	0.00022	0
Ni, Diss	Operations	Jul	5	0.00010	0.00011	0.00011	-6	0.00037	0.00037	0.00048	30	0.00019	0.00020	0.00024	6	0.00016	0.00016	0.00018	-10	0.00017	0.00017	0.00019	-9	0.00023	0.00023	0.00023	0
Ni, Diss	Operations	Aug	5	0.00012	0.00012	0.00013	-6	0.00040	0.00040	0.00052	46	0.00023	0.00023	0.00028	18	0.00017	0.00018	0.00020	-6	0.00017	0.00018	0.00019	-9	0.00023	0.00023	0.00023	0
Ni, Diss	Operations	Sep	5	0.00013	0.00013	0.00013	-8	0.00041	0.00040	0.00052	53	0.00024	0.00024	0.00030	28	0.00018	0.00019	0.00021	-3	0.00018	0.00018	0.00019	-8	0.00023	0.00023	0.00023	0
Ni, Diss	Operations	Oct	5	0.00012	0.00012	0.00013	-8	0.00038	0.00037	0.00048	47	0.00026	0.00026	0.00032	40	0.00019	0.00019	0.00022	0	0.00018	0.00018	0.00020	-7	0.00023	0.00023	0.00023	0
Ni, Diss	Operations	Nov	5	0.00015	0.00015	0.00015	-20	0.00052	0.00051	0.00061	10	0.00029	0.00028	0.00034	5	0.00022	0.00022	0.00025	2	0.00020	0.00020	0.00022	-6	0.00027	0.00027	0.00027	0
Ni, Diss	Operations	Dec	5	0.00012	0.00012	0.00012	-34	0.00041	0.00041	0.00048	-9	0.00020	0.00020	0.00023	4	0.00021	0.00022	0.00025	1	0.00020	0.00020	0.00022	-6	0.00027	0.00027	0.00027	0
Ni, Diss	Closure	Jan	6	0.00011	0.00011	0.00011	-35	0.00026	0.00028	0.00038	-37	0.00013	0.00014	0.00020	-18	0.00017	0.00018	0.00024	-14	0.00018	0.00019	0.00022	-10	0.00027	0.00027	0.00027	0
Ni, Diss	Closure	Feb	6	0.00011	0.00011	0.00011	-41	0.00025	0.00026	0.00034	-44	0.00012	0.00013	0.00017	-31	0.00017	0.00019	0.00025	-16	0.00018	0.00019	0.00022	-11	0.00028	0.00028	0.00028	0
Ni, Diss	Closure	Mar	6	0.00010	0.00010	0.00010	-39	0.00023	0.00024	0.00029	-49	0.00011	0.00011	0.00014	-33	0.00017	0.00018	0.00024	-19	0.00018	0.00019	0.00022	-12	0.00027	0.00027	0.00027	0
Ni, Diss	Closure	Apr	6	0.00010	0.00010	0.00010	-34	0.00021	0.00022	0.00025	-53	0.00011	0.00011	0.00013	-32	0.00016	0.00017	0.00023	-22	0.00018	0.00019	0.00022	-12	0.00026	0.00026	0.00026	0
Ni, Diss	Closure	May	6	0.00008	0.00008	0.00008	-22	0.00016	0.00017	0.00018	-47	0.00012	0.00012	0.00013	-7	0.00013	0.00014	0.00018	-22	0.00015	0.00016	0.00019	-13	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Jun	6	0.00009	0.00009	0.00009	-12	0.00017	0.00018	0.00019	-40	0.00013	0.00013	0.00014	-27	0.00013	0.00014	0.00018	-20	0.00016	0.00016	0.00019	-12	0.00022	0.00022	0.00022	0
Ni, Diss	Closure	Jul	6	0.00011	0.00011	0.00011	-5	0.00018	0.00019	0.00020	-35	0.00014	0.00014	0.00015	-24	0.00014	0.00015	0.00018	-18	0.00016	0.00017	0.00019	-12	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Aug	6	0.00013	0.00013	0.00013	-4	0.00019	0.00019	0.00020	-29	0.00015	0.00015	0.00016	-21	0.00015	0.00016	0.00018	-16	0.00016	0.00017	0.00019	-13	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Sep	6	0.00013	0.00013	0.00013	-6	0.00020	0.00020	0.00020	-25	0.00015	0.00016	0.00016	-18	0.00016	0.00016	0.00018	-15	0.00016	0.00017	0.00019	-12	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Oct	6	0.00013	0.00013	0.00013	-6	0.00020	0.00020	0.00020	-23	0.00016	0.00016	0.00016	-15	0.00016	0.00016	0.00018	-15	0.00016	0.00017	0.00019	-12	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Nov	6	0.00016	0.00015	0.00016	-17	0.00035	0.00035	0.00036	-24	0.00018	0.00019	0.00019	-31	0.00018	0.00018	0.00021	-13	0.00018	0.00018	0.00021	-13	0.00027	0.00027	0.00027	0
Ni, Diss	Closure	Dec	6	0.00012	0.00013	0.00013	-30	0.00030	0.00030	0.00031	-34	0.00014	0.00015	0.00015	-25	0.00017	0.00018	0.00020	-16	0.00018	0.00018	0.00021	-13	0.00027	0.00027	0.00027	0
Ni, Diss	Post-Closure	Jan	117	0.00016	0.00016	0.00016	-5	0.00065	0.00061	0.00065	38	0.00022	0.00021	0.00022	20	0.00023	0.00023	0.00023	7	0.00022	0.00022	0.00022	4	0.00027	0.00027	0.00027	2
Ni, Diss	Post-Closure	Feb	117	0.00018	0.00018	0.00018	-5	0.00070	0.00065	0.00070	39	0.00022	0.00022	0.00022	13	0.00024	0.00024	0.00024	7	0.00023	0.00022	0.00023	4	0.00028	0.00028	0.00028	2
Ni, Diss	Post-Closure	Mar	117	0.00015	0.00015	0.00015	-5	0.00072	0.00067	0.00072	44	0.00015	0.00015	0.00017	-12	0.00024	0.00024	0.00024	6	0.00023	0.00022	0.00023	4	0.00027	0.00027	0.00027	2
Ni, Diss	Post-Closure	Apr	117	0.00015	0.00015	0.00015	-5	0.00074	0.00069	0.00074	49	0.00013	0.00013	0.00017	-18	0.00024	0.00023	0.00024	6	0.00023	0.00022	0.00023	4	0.00027	0.00027	0.00027	2
Ni, Diss	Post-Closure	May	117	0.00012	0.00012	0.00013	-4	0.00051	0.00047	0.00051	51	0.00016	0.00016	0.00016	-2	0.00020	0.00020	0.00020	5	0.00020	0.00019	0.00020	3	0.00023	0.00023	0.00023	2
Ni, Diss	Post-Closure	Jun	117	0.00010	0.00010	0.00010	-3	0.00048	0.00045	0.00048	51	0.00023	0.00022	0.00023	20	0.00019	0.00019	0.00019	5	0.00020	0.00019	0.00020	3	0.00023	0.00023	0.00023	2
Ni, Diss	Post-Closure	Jul	117	0.00011	0.00011	0.00011	-5	0.00047	0.00044	0.00047	52	0.00023	0.00022	0.00023	20	0.00020	0.00019	0.00020	5	0.00020	0.00020	0.00020	3	0.00023	0.00023	0.00023	2
Ni, Diss	Post-Closure	Aug	117	0.00012	0.00012	0.00013	-7	0.00045	0.00042	0.00045	53	0.00024	0.00023	0.00024	21	0.00020	0.00020	0.00020	5	0.00020	0.00020	0.00020	3	0.00023	0.00023	0.00023	2
Ni, Diss	Post-Closure	Sep	117	0.00013	0.00013	0.00013	-7	0.00043	0.00040	0.00043	54	0.00024	0.00023	0.00024	21	0.00021	0.00020	0.00021	5	0.00020	0.00020	0.00020	3	0.00024	0.00024	0.00024	2
Ni, Diss	Post-Closure	Oct	117	0.00012	0.00012	0.00013	-6	0.00042	0.00039	0.00042	55	0.00024	0.00023	0.00024	23	0.00021	0.00020	0.00021	6	0.00020	0.00020	0.00020	3	0.00023	0.00023	0.00023	2
Ni, Diss	Post-Closure	Nov	117	0.00017	0.00017	0.00017	-5	0.00067	0.00064	0.00067	37	0.00035	0.00033	0.00035	24	0.00024	0.00023	0.00024	6	0.00023	0.00022	0.00023	4	0.00027	0.00027	0.00027	2
Ni, Diss	Post-Closure	Dec	117	0.00017	0.00017	0.00017	-5	0.00066	0.00062	0.00066	38	0.00025	0.00024	0.00025	24	0.00024	0.00023	0.00024	7	0.00022	0.00022	0.00022	4	0.00027	0.00027	0.00027	2
Ni, Tot	Construction	Jan	2	0.00023	0.00023	0.00032	-44	0.00060	0.00060	0.00075	-11	0.00018	0.00018	0.00023	-33	0.00026	0.00026	0.00026	-1	0.00028	0.00028	0.00029	-2	0.00034	0.00034	0.00034	0
Ni, Tot	Construction	Feb	2	0.00017	0.00017	0.00022	-62	0.00063	0.00063	0.00086	-12	0.00020	0.00020	0.00020	-33	0.00027	0.00027	0.00027	-5	0.00029	0.00029	0.00029	-3	0.00035	0.00035	0.00035	0
Ni, Tot	Construction	Mar	2	0.00012	0.00012	0.00014	-67	0.00060	0.00060	0.00084	-15	0.00019	0.00019	0.00023	-29	0.00025	0.00025	0.00026	-9	0.00028	0.00028	0.00028	-3	0.00033	0.00033	0.00033	0
Ni, Tot	Construction	Apr	2	0.00012	0.00012	0.00012	-68	0.00057	0.00057	0.00080	-18	0.00020	0.00020	0.00026	-22	0.00024	0.00024	0.00024	-12	0.00028	0.00028	0.00028	-4	0.00033	0.00033	0.00033	0
Ni, Tot	Construction	May	2	0.00009	0.00009	0.00009	-58	0.00039	0.00039	0.00053	-15	0.00020	0.00020	0.00026	32	0.00019	0.00019	0.00020	-12	0.00027	0.00027	0.00027	-5	0.00028	0.00028	0.00028	0
Ni, Tot	Construction	Jun	2	0.00010	0.00010	0.00010	-48	0.00037	0.00037	0.00048	-13	0.00021	0.00021	0.00026	-9	0.00020	0.00020	0.00021	-9	0.00026	0.00026	0.00026	-7	0.00027	0.00027	0.00027	0
Ni, Tot	Construction	Jul	2	0.00018	0.00018	0.00018	-25	0.00038	0.00038	0.00047	-7	0.00022	0.00022	0.00026	-12	0.00020	0.00020	0.00021	-9	0.00025	0.00025	0.00026	-8	0.00028	0.00028	0.00028	0
Ni, Tot	Construction	Aug	2	0.00026	0.00026	0.00026	-16	0.00039	0.00039	0.00047	0	0.00023	0.00023	0.00028	-9	0.00022	0.00022	0.00023	-7	0.00025	0.00025	0.00025	-8	0.00029	0.00029	0.00029	0
Ni, Tot	Construction	Sep	2	0.00027	0.00027	0.00027	-21	0.00040	0.00040	0.00048	6	0.00026	0.00026	0.00029	-5	0.00022	0.00022	0.00024	-6	0.00025	0.00025	0.00025	-8	0.00029	0.00029	0.00029	0
Ni, Tot	Construction	Oct	2	0.00024	0.00024	0.00024	-29	0.00039	0.00039	0.00046	7	0.00027	0.00027	0.00030	1	0.00023	0.00023	0.00024	-4	0.00024	0.00024	0.00025	-8	0.00029	0.00029	0.00029	0
Ni, Tot	Construction	Nov	2	0.00025	0.00025	0.00025	-45	0.00063	0.00063	0.00071	-10	0.00031	0.00031	0.00032	-23	0.00026	0.00026	0.00028	-5	0.00027	0.00027	0.00028	-8	0.00034	0.00034	0.00034	0
Ni, Tot	Construction	Dec	2	0.00016	0.00016	0.00016	-61	0.00050	0.00050	0.00056	-27	0.00025	0.00025	0.00028	-17	0.00025	0.00025	0.00027	-6	0.00027	0.00027	0.00028	-8	0.00034	0.00034	0.00034	0
Ni, Tot	Operations	Jan	5	0.00013	0.00013	0.00013	-69	0.00040	0.00041	0.00045	-39	0.00021	0.00022	0.00025	-22	0.00024	0.00025	0.00028	-8	0.00025	0.00025	0.00027	-12	0.00034	0.00034	0.00034	0
Ni, Tot	Operations	Feb	5	0.00012	0.00012	0.00013	-74	0.00039	0.00040	0.00046	-44	0.00018	0.00019	0.00021	-38	0.00024	0.00025	0.00028	-11	0.00026	0.00026	0.00027	-12	0.00035	0.00035	0.00035	0
Ni, Tot	Operations	Mar	5	0.00010	0.00010	0.00010	-74	0.00042	0.00043	0.00054	-38	0.00014	0.00015	0.00016	-45	0.00023	0.00024	0.00027	-14	0.00026	0.00026	0.00027	-12	0.00033	0.00033	0.00033	0
Ni, Tot	Operations	Apr	5	0.00010	0.00010	0.00011	-72	0.00044	0.00045	0.00057	-35	0.00018	0.00018	0.00021	-30	0.00022	0.00023	0.00026	-18	0.00025	0.00025	0.00027	-13	0.00033	0.00033	0.00033	0
Ni, Tot	Operations	May	5	0.00008	0.00008	0.00009	-61	0.00033	0.00034	0.00043	-27	0.00018	0.00018	0.00021	16	0.00018	0.00018	0.00020	-18	0.00025	0.00025	0.00027	-12	0.00028	0.00028	0.00028	0
Ni, Tot	Operations	Jun	5	0.00010	0.00010	0.00010	-49	0.00036	0.00036	0.00046	-16	0.00020	0.00020	0.00024	-14	0.00018	0.00018	0.00021	-15	0.00024	0.00024	0.00026	-12	0.00027	0.00027	0.00027	0
Ni, Tot	Operations	Jul	5	0.00017	0.00017	0.00017	-27	0.00041	0.00041	0.00052	1	0.00023	0.00023	0.00028	-8	0.00019	0.00019	0.00022	-13	0.00023	0.00024	0.00025	-13	0.00028	0.00028	0.00028	0
Ni, Tot	Operations	Aug	5	0.00026	0.00026	0.00026	-18	0.00046	0.00045	0.00058	16	0.00028	0.00028	0.00034	3	0.00021	0.00021	0.00023	-10	0.00023	0.00024	0.00025	-13	0.00029	0.00029	0.00029	0
Ni, Tot	Operations	Sep	5	0.00026	0.00026	0.00026	-23	0.00048	0.00047	0.00059	24	0.00031	0.00031	0.00037	13	0.00022	0.00022	0.00025	-7	0.00023	0.00024	0.00025	-12	0.00029	0.00029	0.00029	0
Ni, Tot	Operations	Oct	5	0.00023	0.00023	0.00023	-30	0.00045	0.00044	0.00055	21	0.00034	0.00034	0.00041	26	0.00023	0.00023	0.00026	-3	0.00023	0.00024	0.00025	-11	0.00029	0.00029	0.00029	0
Ni, Tot	Operations	Nov	5	0.00024	0.00024	0.00024	-46	0.00067	0.00067	0.00076	-5	0.00039	0.00039	0.00046	-4	0.00027	0.00027	0.00031	-1	0.00026	0.00026	0.00028	-11	0.00034	0.00034	0.00034	0
Ni, Tot	Operations	Dec	5	0.00016	0.00016	0.00016	-63	0.00053	0.00052	0.00059	-23	0.00028	0.00028	0.00032	-9	0.00026	0.00027	0.00030	-2	0.00026	0.00026	0.00028	-10	0.00034	0.00034	0.00034	0
Ni, Tot	Closure	Jan	6	0.00013	0.00013	0.00013	-68	0.00033	0.00035	0.00046	-48	0.00018	0.00019	0.00026	-30	0.00021	0.00023	0.00029	-16	0.00024	0.00025	0.00028	-14	0.00034	0.00034	0.00034	0
Ni, Tot	Closure	Feb	6	0.00012	0.00012	0.00013	-73	0.00030	0.00032	0.00040	-56	0.00016	0.00017	0.00022	-43	0.00022	0.00023	0.00030	-18	0.00024	0.00025	0.00029	-15	0.00035	0.00035	0.00035	0
Ni, Tot	Closure	Mar	6	0.00010	0.00010	0.00011	-73	0.00026	0.00027	0.00033	-61	0.00014	0.00014	0.00017	-47	0.00021	0.00022	0.00029	-21	0.00024	0.00025	0.00029	-15	0.00034	0.00034	0.00034	0
Ni, Tot	Closure	Apr	6	0.00011	0.00011	0.00011	-71	0.00024	0.00024	0.00028	-65	0.00013	0.00013	0.00015	-47	0.00020	0.00021	0.00028	-24	0.00023	0.00025	0.00029	-16	0.00033	0.00033	0.00033	0
Ni, Tot	Closure	May	6	0.00009	0.00009	0.00009	-60	0.00018	0.00018	0.00020	-61	0.00013	0.00013	0.00014	-15	0.00016	0.00017	0.00022	-24	0.00024	0.00025	0.00028	-14	0.00028	0.00028	0.00028	0
Ni, Tot	Closure	Jun	6	0.00010	0.00010	0.00010	-49	0.00019	0.00019	0.00020	-56	0.00014	0.00014	0.00015	-40	0.00016	0.00017	0.00021	-23	0.00023	0.00024	0.00027	-15	0.00027	0.00027	0.00027	0
Ni, Tot	Closure	Jul	6	0.00017	0.00017	0.00018	-26	0.00020	0.00020	0.00021	-50	0.00016	0.00016	0.00017	-36	0.00017	0.00017	0.00021	-22	0.00022	0.00023	0.00026	-15	0.00028	0.00028	0.00028	0
Ni, Tot	Closure	Aug	6	0.00026	0.00026	0.00026	-18	0.00022	0.00022	0.00023	-42	0.00019	0.00019	0.00019	-31	0.00018	0.00019	0.00022	-20	0.00022	0.00023	0.00026	-16	0.00029	0.00029	0.00029	0
Ni, Tot	Closure	Sep	6	0.00027	0.00026	0.00027	-22	0.00024	0.00024	0.00025	-36	0.00020	0.00020	0.00021	-25	0.00019	0.00020	0.00022	-19	0.00022	0.00022	0.00025	-16	0.00029	0.00029	0.00029	0
Ni, Tot	Closure	Oct	6	0.00024	0.00024	0.00024	-29	0.00025	0.00025	0.00025	-33	0.00021	0.00021	0.00022	-21	0.00019	0.00020	0.00022	-18	0.00021	0.00022	0.00025	-16	0.00029	0.00029	0.00029	0
Ni, Tot	Closure	Nov	6	0.00025	0.00025	0.00027	-44	0.00049	0.00049	0.00050	-31	0.00027	0.00027	0.00028	-33	0.00022	0.00023	0.00025	-18	0.00024	0.00024	0.00027	-17	0.00034	0.00034	0.00034	0
Ni, Tot	Closure	Dec	6	0.00016	0.00017	0.00019	-61	0.00039	0.00040	0.00042	-42	0.00021	0.00021	0.00022	-30	0.00022	0.00022	0.00024	-19	0.00023	0.00024	0.00027	-17	0.00034	0.00034	0.00034	0
Ni, Tot	Post-Closure	Jan	117	0.00038	0.00038	0.00038	-7	0.00091	0.00087	0.00091	29	0.00032	0.00031	0.00032	13	0.00029	0.00029	0.00029	6	0.00030	0.00030	0.00030	3	0.00034	0.00034	0.00034	1
Ni, Tot	Post-Closure	Feb	117	0.00042	0.00042	0.00042	-7	0.00098	0.00093	0.00098	30	0.00033	0.00032	0.00033	7	0.00031	0.00030	0.00031	6	0.00031	0.00030	0.00031	3	0.00036	0.00036	0.00036	1
Ni, Tot	Post-Closure	Mar	117	0.00036	0.00035	0.00036	-7	0.00100	0.00094	0.00100	34	0.00022	0.00022	0.00028	-17	0.00030	0.00030	0.00030	6	0.00031	0.00030	0.00031	3	0.00034	0.00034	0.00034	2
Ni, Tot	Post-Closure	Apr	117	0.00034	0.00034	0.00034	-7	0.00102	0.00096	0.00102	38	0.00019	0.00019	0.00026	-22	0.00030	0.00029	0.00030	5	0.00030	0.00030	0.00030	3	0.00034	0.00034	0.00034	2
Ni, Tot	Post-Closure	May	117	0.00020	0.00020	0.00020	-5	0.00070	0.00065	0.00070	41	0.00015	0.00015	0.00015	-5	0.00024	0.00023	0.00024	5	0.00030	0.00029	0.00030	3	0.00028	0.00028	0.00028	2
Ni, Tot	Post-Closure	Jun	117	0.00018	0.00018	0.00018	-4	0.00065	0.00061	0.00065	43	0.00028	0.00027	0.00029	17	0.00023	0.00023	0.00023	5	0.00029	0.00028	0.00029	2	0.00028	0.00028	0.00028	1
Ni, Tot	Post-Closure	Jul	117	0.00022	0.00022	0.00022	-6	0.00062	0.00058	0.00062	44	0.00030	0.00029	0.00030	16	0.00024	0.00024	0.00024	5	0.00028	0.00028	0.00028	2	0.00028	0.00028	0.00028	1
Ni, Tot	Post-Closure	Aug	117	0.00029	0.00029	0.00029	-9	0.00059	0.00056	0.00059	44	0.00033	0.00032	0.00033	18	0.00025	0.00025	0.00025	5	0.00028	0.00028	0.00028	3	0.00029	0.00029	0.00029	1
Ni, Tot	Post-Closure	Sep	117	0.00031	0.00031	0.00031	-8	0.00058	0.00054	0.00058	44	0.00033	0.00032	0.00033	18	0.00026	0.00025	0.00026	5	0.00028	0.00028	0.00028	3	0.00030	0.00030	0.00030	1
Ni, Tot	Post-Closure	Oct	117	0.00031	0.00031	0.00031	-8	0.00056	0.00053	0.00056	45	0.00033	0.00032	0.00033	19	0.00026	0.00026	0.00026	5	0.00028	0.00027	0.00028	3	0.00030	0.00030	0.00030	1
Ni, Tot	Post-Closure	Nov	117	0.00042	0.00042	0.00042	-7	0.00094	0.00090	0.00094	29	0.00050	0.00049	0.00050	19	0.00030	0.00029	0.00030	6	0.00030	0.00030	0.00030	3	0.00034	0.00034	0.00034	1
Ni, Tot	Post-Closure	Dec	117	0.00040	0.00039	0.00040	-7	0.00092	0.00088	0.00092	29	0.00037	0.00036	0.00037	17	0.00030	0.00029	0.00030	6	0.00030	0.00030	0.00030	3	0.00034	0.00034	0.00034	1
Se, Tot	Construction	Jan	2	0.00003	0.00003	0.00004	-34	0.00005	0.00005	0.00006	8	0.00003	0.00003	0.00005	-22	0.00004	0.00004	0.00005	-5	0.00006	0.00006	0.00007	-9	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Feb	2	0.00003	0.00003	0.00003	-49	0.00006	0.00006	0.00007	13	0.00004	0.00004	0.00005	-16	0.00004	0.00004	0.00005	-7	0.00006	0.00006	0.00007	-10	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Mar	2	0.00002	0.00002	0.00002	-52	0.00006	0.00006	0.00007	15	0.00004	0.00004	0.00004	-14	0.00004	0.00004	0.00004	-10	0.00006	0.00006	0.00007	-12	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Apr	2	0.00002	0.00002	0.00002	-50	0.00006	0.00006	0.00007	15	0.00004	0.00004	0.00004	-12	0.00004	0.00004	0.00004	-12	0.00006	0.00006	0.00007	-14	0.00006	0.00006	0.00006	0
Se, Tot	Construction	May	2	0.00004	0.00004	0.00004	-20	0.00005	0.00005	0.00005	23	0.00005	0.00005	0.00005	-23	0.00003	0.00003	0.00004	-11	0.00007	0.00007	0.00007	-13	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Jun	2	0.00007	0.00007	0.00007	-11	0.00005	0.00005	0.00006	32	0.00005	0.00005	0.00005	-23	0.00004	0.00004	0.00004	-9	0.00007	0.00007	0.00007	-14	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Jul	2	0.00005	0.00005	0.00006	-23	0.00006	0.00006	0.00006	32	0.00005	0.00005	0.00005	-18	0.00004	0.00004	0.00004	-8	0.00006	0.00006	0.00007	-15	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Aug	2	0.00003	0.00003	0.00003	-39	0.00005	0.00005	0.00005	22	0.00004	0.00004	0.00005	-10	0.00004	0.00004	0.00004	-9	0.00006	0.00006	0.00006	-15	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Sep	2	0.00003	0.00003	0.00003	-45	0.00005	0.00005	0.00005	16	0.00004	0.00004	0.00004	-10	0.00004	0.00004	0.00004	-9	0.00006	0.00006	0.00006	-16	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Oct	2	0.00002	0.00002	0.00002	-44	0.00005	0.00005	0.00005	15	0.00004	0.00004	0.00004	-8	0.00004	0.00004	0.00004	-9	0.00006	0.00006	0.00006	-17	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Nov	2	0.00003	0.00003	0.00003	-48	0.00006	0.00006	0.00006	11	0.00006	0.00006	0.00006	-25	0.00004	0.00004	0.00004	-9	0.00006	0.00006	0.00006	-18	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Dec	2	0.00002	0.00002	0.00002	-54	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	-3	0.00004	0.00004	0.00004	-9	0.00006	0.00006	0.00006	-19	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Jan	5	0.00002	0.00002	0.00002	-57	0.00006	0.00006	0.00008	30	0.00006	0.00006	0.00009	41	0.00005	0.00005	0.00007	18	0.00006	0.00006	0.00007	-11	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Feb	5	0.00002	0.00002	0.00002	-61	0.00007	0.00007	0.00010	40	0.00006	0.00006	0.00009	31	0.00005	0.00006	0.00008	17	0.00006	0.00006	0.00007	-11	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Mar	5	0.00002	0.00002	0.00002	-59	0.00009	0.00009	0.00014	79	0.00006	0.00006	0.00008	30	0.00005	0.00006	0.00007	16	0.00006	0.00006	0.00007	-11	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Apr	5	0.00002	0.00002	0.00002	-55	0.00009	0.00010	0.00015	96	0.00007	0.00007	0.00010	64	0.00005	0.00006	0.00007	17	0.00006	0.00006	0.00007	-11	0.00006	0.00006	0.00006	0
Se, Tot	Operations	May	5	0.00004	0.00004	0.00004	-22	0.00008	0.00008	0.00012	109	0.00006	0.00006	0.00008	3	0.00004	0.00005	0.00006	18	0.00007	0.00007	0.00008	-10	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Jun	5	0.00006	0.00006	0.00007	-13	0.00009	0.00010	0.00014	133	0.00008	0.00008	0.00011	14	0.00005	0.00005	0.00006	18	0.00007	0.00007	0.00008	-9	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Jul	5	0.00005	0.00005	0.00005	-25	0.00011	0.00011	0.00016	155	0.00008	0.00008	0.00011	33	0.00005	0.00005	0.00006	19	0.00007	0.00007	0.00008	-8	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Aug	5	0.00003	0.00003	0.00003	-41	0.00011	0.00011	0.00016	153	0.00008	0.00008	0.00011	61	0.00005	0.00005	0.00006	20	0.00007	0.00007	0.00008	-7	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Sep	5	0.00002	0.00002	0.00002	-47	0.00010	0.00010	0.00015	147	0.00008	0.00008	0.00011	72	0.00005	0.00005	0.00006	23	0.00006	0.00007	0.00008	-6	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Oct	5	0.00002	0.00002	0.00002	-46	0.00010	0.00010	0.00014	133	0.00008	0.00008	0.00012	89	0.00005	0.00005	0.00007	27	0.00006	0.00006	0.00007	-6	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Nov	5	0.00003	0.00003	0.00003	-50	0.00010	0.00010	0.00014	98	0.00012	0.00012	0.00016	50	0.00006	0.00006	0.00008	31	0.00007	0.00007	0.00008	-5	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Dec	5	0.00002	0.00002	0.00002	-56	0.00008	0.00008	0.00011	68	0.00009	0.00009	0.00012	68	0.00006	0.00006	0.00008	34	0.00007	0.00007	0.00008	-4	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Jan	6	0.00002	0.00002	0.00002	-56	0.00004	0.00005	0.00009	-1	0.00004	0.00005	0.00009	12	0.00004	0.00005	0.00008	9	0.00006	0.00006	0.00008	-7	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Feb	6	0.00002	0.00002	0.00002	-60	0.00004	0.00005	0.00008	-9	0.00004	0.00005	0.00009	4	0.00004	0.00005	0.00008	7	0.00006	0.00006	0.00008	-8	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Mar	6	0.00002	0.00002	0.00002	-58	0.00004	0.00004	0.00006	-15	0.00004	0.00004	0.00006	-2	0.00004	0.00005	0.00008	6	0.00006	0.00006	0.00008	-9	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Apr	6	0.00002	0.00002	0.00002	-54	0.00004	0.00004	0.00005	-21	0.00004	0.00004	0.00005	-6	0.00004	0.00005	0.00008	4	0.00006	0.00006	0.00008	-9	0.00006	0.00006	0.00006	0
Se, Tot	Closure	May	6	0.00004	0.00004	0.00004	-22	0.00003	0.00003	0.00004	-12	0.00005	0.00005	0.00005	-24	0.00003	0.00004	0.00006	3	0.00007	0.00007	0.00009	-8	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Jun	6	0.00007	0.00006	0.00007	-13	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00006	-24	0.00004	0.00004	0.00006	1	0.00007	0.00007	0.00008	-9	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Jul	6	0.00005	0.00005	0.00006	-24	0.00004	0.00004	0.00005	2	0.00005	0.00005	0.00005	-17	0.00004	0.00004	0.00006	0	0.00006	0.00007	0.00008	-9	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Aug	6	0.00003	0.00003	0.00004	-39	0.00004	0.00004	0.00004	-5	0.00004	0.00004	0.00005	-10	0.00004	0.00004	0.00005	-1	0.00006	0.00006	0.00008	-10	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Sep	6	0.00003	0.00003	0.00003	-44	0.00004	0.00004	0.00004	-10	0.00004	0.00004	0.00004	-11	0.00004	0.00004	0.00005	-2	0.00006	0.00006	0.00008	-10	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Oct	6	0.00002	0.00002	0.00002	-44	0.00004	0.00004	0.00004	-11	0.00004	0.00004	0.00004	-11	0.00004	0.00004	0.00005	-3	0.00006	0.00006	0.00007	-10	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Nov	6	0.00003	0.00003	0.00003	-48	0.00004	0.00004	0.00005	-13	0.00005	0.00006	0.00006	-28	0.00004	0.00004	0.00006	-4	0.00006	0.00006	0.00008	-11	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Dec	6	0.00002	0.00002	0.00002	-54	0.00004	0.00004	0.00004	-16	0.00004	0.00004	0.00005	-16	0.00004	0.00004	0.00005	-5	0.00006	0.00006	0.00008	-12	0.00006	0.00006	0.00006	0
Se, Tot	Post-Closure	Jan	117	0.00005	0.00005	0.00005	4	0.00013	0.00012	0.00013	141	0.00009	0.00008	0.00009	87	0.00006	0.00006	0.00006	22	0.00008	0.00007	0.00008	8	0.00006	0.00006	0.00006	5
Se, Tot	Post-Closure	Feb	117	0.00005	0.00005	0.00005	4	0.00014	0.00013	0.00014	149	0.00010	0.00009	0.00010	79	0.00006	0.00006	0.00006	23	0.00008	0.00008	0.00008	9	0.00006	0.00006	0.00006	5
Se, Tot	Post-Closure	Mar	117	0.00005	0.00005	0.00005	4	0.00015	0.00014	0.00015	169	0.00007	0.00006	0.00007	40	0.00006	0.00006	0.00006	23	0.00008	0.00007	0.00008	9	0.00006	0.00006	0.00006	5
Se, Tot	Post-Closure	Apr	117	0.00004	0.00004	0.00004	5	0.00017	0.00015	0.00017	190	0.00006	0.00006	0.00006	31	0.00006	0.00006	0.00006	23	0.00008	0.00007	0.00008	9	0.00006	0.00006	0.00006	5
Se, Tot	Post-Closure	May	117	0.00005	0.00005	0.00005	-4	0.00012	0.00010	0.00012	177	0.00007	0.00007	0.00007	6	0.00005	0.00005	0.00005	21	0.00008	0.00008	0.00008	6	0.00005	0.00005	0.00005	5
Se, Tot	Post-Closure	Jun	117	0.00007	0.00007	0.00007	-6	0.00011	0.00010	0.00011	151	0.00010	0.00010	0.00010	36	0.00005	0.00005	0.00005	19	0.00008	0.00008	0.00008	6	0.00005	0.00005	0.00005	5
Se, Tot	Post-Closure	Jul	117	0.00007	0.00007	0.00007	-4	0.00011	0.00010	0.00011	136	0.00009	0.00009	0.00009	42	0.00005	0.00005	0.00005	19	0.00008	0.00008	0.00008	6	0.00005	0.00005	0.00005	4
Se, Tot	Post-Closure	Aug	117	0.00006	0.00006	0.00006	-1	0.00011	0.00010	0.00011	127	0.00008	0.00007	0.00008	49	0.00005	0.00005	0.00005	18	0.00008	0.00008	0.00008	7	0.00005	0.00005	0.00005	4
Se, Tot	Post-Closure	Sep	117	0.00005	0.00005	0.00005	2	0.00010	0.00009	0.00010	124	0.00007	0.00007	0.00007	50	0.00005	0.00005	0.00005	18	0.00007	0.00007	0.00007	7	0.00005	0.00005	0.00005	4
Se, Tot	Post-Closure	Oct	117	0.00004	0.00004	0.00004	4	0.00010	0.00009	0.00010	127	0.00007	0.00007	0.00007	54	0.00005	0.00005	0.00005	19	0.00007	0.00007	0.00007	8	0.00005	0.00005	0.00005	4
Se, Tot	Post-Closure	Nov	117	0.00005	0.00005	0.00005	5	0.00013	0.00012	0.00013	131	0.00013	0.00012	0.00013	62	0.00006	0.00006	0.00006	20	0.00008	0.00008	0.00008	8	0.00006	0.00006	0.00006	4
Se, Tot	Post-Closure	Dec	117	0.00005	0.00005	0.00005	5	0.00013	0.00012	0.00013	136	0.00010	0.00009	0.00010	86	0.00006	0.00006	0.00006	22	0.00008	0.00007	0.00008	8	0.00006	0.00006	0.00006	4
Ag, Tot	Construction	Jan	2	0.000003	0.000003	0.000004	-37	0.000006	0.000006	0.000006	0	0.000004	0.000004	0.000005	-27	0.000005	0.000005	0.000006	-11	0.000007	0.000007	0.000008	-9	0.000009	0.000009	0.000009	0
Ag, Tot	Construction	Feb	2	0.000002	0.000002	0.000003	-53	0.000006	0.000006	0.000007	-1	0.000004	0.000004	0.000005	-25	0.000005	0.000005	0.000006	-15	0.000007	0.000007	0.000008	-10	0.000009	0.000009	0.000009	0
Ag, Tot	Construction	Mar	2	0.000002	0.000002	0.000002	-57	0.000006	0.000006	0.000007	-3	0.000004	0.000004	0.000004	-26	0.000005	0.000005	0.000006	-19	0.000007	0.000007	0.000008	-12	0.000009	0.000009	0.000009	0
Ag, Tot	Construction	Apr	2	0.000002	0.000002	0.000002	-57	0.000006	0.000006	0.000007	-3	0.000004	0.000004	0.000004	-25	0.000005	0.000005	0.000005	-23	0.000007	0.000007	0.000008	-14	0.000009	0.000009	0.000009	0
Ag, Tot	Construction	May	2	0.000004	0.000004	0.000004	-20	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	-25	0.000004	0.000004	0.000004	-22	0.000007	0.000007	0.000008	-14	0.000007	0.000007	0.000007	0
Ag, Tot	Construction	Jun	2	0.000007	0.000007	0.000007	-9	0.000006	0.000006	0.000006	12	0.000006	0.000006	0.000006	-25	0.000005	0.000005	0.000005	-18	0.000007	0.000007	0.000008	-15	0.000007	0.000007	0.000007	0
Ag, Tot	Construction	Jul	2	0.000006	0.000006	0.000006	-20	0.000006	0.000006	0.000007	15	0.000005	0.000005	0.000005	-20	0.000005	0.000005	0.000005	-17	0.000007	0.000007	0.000007	-15	0.000007	0.000007	0.000007	0
Ag, Tot	Construction	Aug	2	0.000004	0.000004	0.000004	-37	0.000006	0.000006	0.000006	14	0.000005	0.000005	0.000005	-11	0.000005	0.000005	0.000005	-17	0.000007	0.000007	0.000007	-15	0.000008	0.000008	0.000008	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Ag, Tot	Construction	Sep	2	0.000003	0.000003	0.000003	-43	0.000006	0.000006	0.000006	11	0.000005	0.000005	0.000005	-10	0.000005	0.000005	0.000005	-18	0.000007	0.000007	0.000007	-16	0.000008	0.000008	0.000008	0
Ag, Tot	Construction	Oct	2	0.000002	0.000002	0.000002	-42	0.000005	0.000005	0.000006	10	0.000005	0.000005	0.000005	-9	0.000005	0.000005	0.000005	-18	0.000006	0.000006	0.000007	-17	0.000008	0.000008	0.000008	0
Ag, Tot	Construction	Nov	2	0.000003	0.000003	0.000003	-48	0.000006	0.000006	0.000007	3	0.000006	0.000006	0.000006	-27	0.000005	0.000005	0.000005	-20	0.000007	0.000007	0.000007	-18	0.000009	0.000009	0.000009	0
Ag, Tot	Construction	Dec	2	0.000002	0.000002	0.000002	-56	0.000005	0.000005	0.000005	-9	0.000005	0.000005	0.000005	-11	0.000005	0.000005	0.000005	-21	0.000007	0.000007	0.000007	-20	0.000009	0.000009	0.000009	0
Ag, Tot	Operations	Jan	5	0.000002	0.000002	0.000002	-61	0.000005	0.000005	0.000005	-18	0.000004	0.000005	0.000005	-10	0.000005	0.000005	0.000005	-22	0.000006	0.000006	0.000006	-22	0.000009	0.000009	0.000009	0
Ag, Tot	Operations	Feb	5	0.000002	0.000002	0.000002	-65	0.000005	0.000005	0.000005	-22	0.000004	0.000004	0.000005	-20	0.000005	0.000005	0.000005	-23	0.000006	0.000006	0.000006	-23	0.000009	0.000009	0.000009	0
Ag, Tot	Operations	Mar	5	0.000002	0.000002	0.000002	-64	0.000005	0.000005	0.000006	-15	0.000003	0.000003	0.000004	-33	0.000005	0.000005	0.000005	-26	0.000006	0.000006	0.000006	-24	0.000009	0.000009	0.000009	0
Ag, Tot	Operations	Apr	5	0.000002	0.000002	0.000002	-61	0.000005	0.000005	0.000006	-10	0.000004	0.000004	0.000004	-22	0.000004	0.000004	0.000005	-29	0.000006	0.000006	0.000006	-25	0.000009	0.000009	0.000009	0
Ag, Tot	Operations	May	5	0.000004	0.000004	0.000004	-23	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	-24	0.000004	0.000004	0.000004	-27	0.000007	0.000007	0.000007	-22	0.000007	0.000007	0.000007	0
Ag, Tot	Operations	Jun	5	0.000007	0.000007	0.000007	-11	0.000006	0.000006	0.000007	15	0.000006	0.000006	0.000006	-23	0.000005	0.000005	0.000005	-21	0.000007	0.000007	0.000007	-21	0.000007	0.000007	0.000007	0
Ag, Tot	Operations	Jul	5	0.000005	0.000005	0.000006	-23	0.000007	0.000007	0.000008	23	0.000006	0.000006	0.000006	-17	0.000005	0.000005	0.000005	-19	0.000007	0.000007	0.000007	-20	0.000007	0.000007	0.000007	0
Ag, Tot	Operations	Aug	5	0.000003	0.000003	0.000003	-39	0.000007	0.000007	0.000007	24	0.000006	0.000006	0.000006	-5	0.000005	0.000005	0.000005	-18	0.000007	0.000007	0.000007	-20	0.000008	0.000008	0.000008	0
Ag, Tot	Operations	Sep	5	0.000003	0.000003	0.000003	-46	0.000006	0.000006	0.000007	23	0.000005	0.000005	0.000006	0	0.000005	0.000005	0.000005	-18	0.000006	0.000006	0.000006	-20	0.000008	0.000008	0.000008	0
Ag, Tot	Operations	Oct	5	0.000002	0.000002	0.000002	-44	0.000006	0.000006	0.000006	17	0.000005	0.000005	0.000006	7	0.000005	0.000005	0.000005	-18	0.000006	0.000006	0.000006	-20	0.000008	0.000008	0.000008	0
Ag, Tot	Operations	Nov	5	0.000003	0.000003	0.000003	-50	0.000006	0.000006	0.000007	4	0.000007	0.000007	0.000008	-14	0.000005	0.000005	0.000005	-18	0.000007	0.000007	0.000007	-21	0.000009	0.000009	0.000009	0
Ag, Tot	Operations	Dec	5	0.000002	0.000002	0.000002	-58	0.000005	0.000005	0.000006	-9	0.000005	0.000005	0.000006	-7	0.000005	0.000005	0.000005	-19	0.000006	0.000006	0.000007	-21	0.000009	0.000009	0.000009	0
Ag, Tot	Closure	Jan	6	0.000002	0.000002	0.000002	-62	0.000004	0.000005	0.000005	-27	0.000004	0.000004	0.000005	-16	0.000005	0.000005	0.000005	-22	0.000006	0.000006	0.000006	-22	0.000009	0.000009	0.000009	0
Ag, Tot	Closure	Feb	6	0.000002	0.000002	0.000002	-64	0.000004	0.000004	0.000005	-32	0.000004	0.000004	0.000005	-21	0.000005	0.000005	0.000005	-24	0.000006	0.000006	0.000007	-22	0.000009	0.000009	0.000009	0
Ag, Tot	Closure	Mar	6	0.000002	0.000002	0.000002	-63	0.000004	0.000004	0.000004	-36	0.000004	0.000004	0.000004	-25	0.000005	0.000005	0.000005	-26	0.000006	0.000006	0.000007	-23	0.000009	0.000009	0.000009	0
Ag, Tot	Closure	Apr	6	0.000002	0.000002	0.000002	-60	0.000003	0.000004	0.000004	-39	0.000004	0.000004	0.000004	-25	0.000004	0.000004	0.000005	-29	0.000006	0.000006	0.000006	-24	0.000009	0.000009	0.000009	0
Ag, Tot	Closure	May	6	0.000004	0.000004	0.000004	-22	0.000003	0.000003	0.000003	-25	0.000005	0.000005	0.000005	-27	0.000004	0.000004	0.000004	-27	0.000007	0.000007	0.000007	-21	0.000007	0.000007	0.000007	0
Ag, Tot	Closure	Jun	6	0.000007	0.000007	0.000007	-10	0.000005	0.000005	0.000005	-13	0.000006	0.000006	0.000006	-25	0.000005	0.000005	0.000005	-21	0.000007	0.000007	0.000007	-20	0.000007	0.000007	0.000007	0
Ag, Tot	Closure	Jul	6	0.000006	0.000006	0.000006	-21	0.000005	0.000005	0.000005	-9	0.000006	0.000006	0.000006	-18	0.000005	0.000005	0.000005	-19	0.000007	0.000007	0.000007	-19	0.000007	0.000007	0.000007	0
Ag, Tot	Closure	Aug	6	0.000004	0.000004	0.000004	-37	0.000005	0.000005	0.000005	-10	0.000005	0.000005	0.000005	-11	0.000005	0.000005	0.000005	-18	0.000007	0.000007	0.000007	-19	0.000008	0.000008	0.000008	0
Ag, Tot	Closure	Sep	6	0.000003	0.000003	0.000003	-43	0.000005	0.000005	0.000005	-12	0.000005	0.000005	0.000005	-10	0.000005	0.000005	0.000005	-18	0.000006	0.000006	0.000007	-19	0.000008	0.000008	0.000008	0
Ag, Tot	Closure	Oct	6	0.000002	0.000002	0.000002	-42	0.000004	0.000004	0.000004	-14	0.000004	0.000004	0.000005	-11	0.000005	0.000005	0.000005	-18	0.000006	0.000006	0.000006	-19	0.000008	0.000008	0.000008	0
Ag, Tot	Closure	Nov	6	0.000003	0.000003	0.000003	-47	0.000005	0.000005	0.000005	-19	0.000006	0.000006	0.000006	-30	0.000005	0.000005	0.000005	-20	0.000007	0.000007	0.000007	-20	0.000009	0.000009	0.000009	0
Ag, Tot	Closure	Dec	6	0.000002	0.000002	0.000002	-56	0.000004	0.000004	0.000004	-25	0.000004	0.000004	0.000005	-23	0.000005	0.000005	0.000005	-21	0.000006	0.000006	0.000007	-21	0.000009	0.000009	0.000009	0
Ag, Tot	Post-Closure	Jan	117	0.000005	0.000005	0.000005	5	0.000009	0.000008	0.000009	48	0.000006	0.000006	0.000006	24	0.000006	0.000006	0.000006	4	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1
Ag, Tot	Post-Closure	Feb	117	0.000005	0.000005	0.000005	5	0.000009	0.000009	0.000009	50	0.000007	0.000007	0.000007	18	0.000007	0.000007	0.000007	4	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1
Ag, Tot	Post-Closure	Mar	117	0.000005	0.000005	0.000005	5	0.000010	0.000009	0.000010	56	0.000005	0.000005	0.000006	-6	0.000007	0.000006	0.000007	4	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1
Ag, Tot	Post-Closure	Apr	117	0.000004	0.000004	0.000004	5	0.000010	0.000009	0.000010	62	0.000004	0.000004	0.000005	-13	0.000006	0.000006	0.000006	3	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1
Ag, Tot	Post-Closure	May	117	0.000005	0.000005	0.000005	-4	0.000007	0.000007	0.000007	55	0.000006	0.000006	0.000007	-2	0.000005	0.000005	0.000005	3	0.000009	0.000009	0.000009	1	0.000007	0.000007	0.000007	1
Ag, Tot	Post-Closure	Jun	117	0.000007	0.000007	0.000007	-6	0.000008	0.000008	0.000008	43	0.000009	0.000008	0.000009	10	0.000006	0.000006	0.000006	2	0.000008	0.000008	0.000008	1	0.000007	0.000007	0.000007	1
Ag, Tot	Post-Closure	Jul	117	0.000007	0.000007	0.000007	-4	0.000008	0.000008	0.000008	40	0.000008	0.000008	0.000008	11	0.000007	0.000006	0.000007	2	0.000008	0.000008	0.000008	1	0.000007	0.000007	0.000007	1
Ag, Tot	Post-Closure	Aug	117	0.000006	0.000006	0.000006	-1	0.000008	0.000008	0.000008	40	0.000007	0.000006	0.000007	13	0.000006	0.000006	0.000006	3	0.000008	0.000008	0.000008	1	0.000008	0.000008	0.000008	0
Ag, Tot	Post-Closure	Sep	117	0.000005	0.000005	0.000005	2	0.000008	0.000007	0.000008	41	0.000006	0.000006	0.000006	13	0.000006	0.000006	0.000006	3	0.000008	0.000008	0.000008	1	0.000008	0.000008	0.000008	0
Ag, Tot	Post-Closure	Oct	117	0.000004	0.000004	0.000004	4	0.000007	0.000007	0.000007	43	0.000006	0.000006	0.000006	15	0.000006	0.000006	0.000006	3	0.000008	0.000008	0.000008	1	0.000008	0.000008	0.000008	0
Ag, Tot	Post-Closure	Nov	117	0.000005	0.000005	0.000005	5	0.000009	0.000009	0.000009	45	0.000010	0.000010	0.000010	19	0.000006	0.000006	0.000006	3	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	0
Ag, Tot	Post-Closure	Dec	117	0.000005	0.000005	0.000005	5	0.000009	0.000008	0.000009	47	0.000007	0.000007	0.000007	26	0.000006	0.000006	0.000006	4	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1
Ta, Tot	Construction	Jan	2	0.00003	0.00003	0.00004	-25	0.00003	0.00003	0.00004	5	0.00002	0.00002	0.00003	-23	0.00003	0.00003	0.00004	-9	0.00004	0.00004	0.00004	-5	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Feb	2	0.00003	0.00003	0.00004	-37	0.00004	0.00004	0.00005	12	0.00003	0.00003	0.00003	-13	0.00004	0.00004	0.00004	-11	0.00004	0.00004	0.00004	-6	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Mar	2	0.00003	0.00003	0.00003	-40	0.00004	0.00004	0.00005	14	0.00003	0.00003	0.00003	-8	0.00003	0.00003	0.00004	-14	0.00004	0.00004	0.00004	-6	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Apr	2	0.00003	0.00003	0.00003	-39	0.00004	0.00004	0.00005	15	0.00003	0.00003	0.00003	-5	0.00003	0.00003	0.00003	-16	0.00004	0.00004	0.00004	-7	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	May	2	0.00002	0.00002	0.00002	-27	0.00003	0.00003	0.00004	17	0.00003	0.00003	0.00003	-8	0.00003	0.00003	0.00003	-15	0.00003	0.00003	0.00003	-7	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Jun	2	0.00003	0.00003	0.00003	-22	0.00003	0.00003	0.00004	14	0.00003	0.00003	0.00003	-14	0.00003	0.00003	0.00003	-15	0.00003	0.00003	0.00003	-7	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Jul	2	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00004	12	0.00003	0.00003	0.00003	-18	0.00003	0.00003	0.00003	-13	0.00003	0.00003	0.00003	-8	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Aug	2	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00003	7	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00003	-13	0.00003	0.00003	0.00003	-9	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Sep	2	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00003	1	0.00003	0.00003	0.00003	-23	0.00003	0.00003	0.00003	-14	0.00003	0.00003	0.00003	-10	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Oct	2	0.00003	0.00003	0.00003	-22	0.00003	0.00003	0.00003	-6	0.00002	0.00002	0.00002	-27	0.00003	0.00003	0.00003	-15	0.00003	0.00003	0.00003	-11	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Nov	2	0.00004	0.00004	0.00004	-30	0.00003	0.00003	0.00003	-8	0.00003	0.00003	0.00003	-38	0.00003	0.00003	0.00003	-17	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Construction	Dec	2	0.00003	0.00003	0.00003	-38	0.00003	0.00003	0.00003	-8	0.00003	0.00003	0.00003	-12	0.00003	0.00003	0.00003	-18	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Jan	5	0.00003	0.00003	0.00003	-41	0.00003	0.00003	0.00003	-6	0.00003	0.00003	0.00003	5	0.00003	0.00003	0.00004	-15	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Feb	5	0.00003	0.00003	0.00003	-45	0.00003	0.00003	0.00004	-4	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00004	-15	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Mar	5	0.00003	0.00003	0.00003	-43	0.00004	0.00004	0.00004	8	0.00002	0.00002	0.00003	-11	0.00003	0.00003	0.00004	-17	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Apr	5	0.00003	0.00003	0.00003	-41	0.00004	0.00004	0.00005	15	0.00003	0.00003	0.00003	6	0.00003	0.00003	0.00003	-18	0.00003	0.00003	0.00003	-14	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	May	5	0.00002	0.00002	0.00002	-27	0.00003	0.00003	0.00004	22	0.00003	0.00003	0.00003	-5	0.00003	0.00003	0.00003	-17	0.00003	0.00003	0.00003	-13	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Jun	5	0.00003	0.00003	0.00003	-21	0.00004	0.00004	0.00004	26	0.00003	0.00003	0.00004	-7	0.00003	0.00003	0.00003	-14	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Jul	5	0.00003	0.00003	0.00003	-20	0.00004	0.00004	0.00005	31	0.00003	0.00003	0.00004	-9	0.00003	0.00003	0.00003	-12	0.00003	0.00003	0.00003	-11	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Aug	5	0.00003	0.00003	0.00003	-20	0.00004	0.00004	0.00005	32	0.00003	0.00003	0.00004	-8	0.00003	0.00003	0.00003	-11	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Sep	5	0.00003	0.00003	0.00003	-20	0.00004	0.00004	0.00004	26	0.00003	0.00003	0.00004	-8	0.00003	0.00003	0.00003	-11	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Oct	5	0.00003	0.00003	0.00003	-21	0.00003	0.00003	0.00004	14	0.00003	0.00003	0.00004	-7	0.00003	0.00003	0.00003	-11	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Nov	5	0.00004	0.00004	0.00004	-29	0.00003	0.00003	0.00004	4	0.00004	0.00004	0.00004	-19	0.00003	0.00003	0.00004	-11	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Operations	Dec	5	0.00003	0.00003	0.00003	-38	0.00003	0.00003	0.00004	1	0.00003	0.00003	0.00004	1	0.00003	0.00003	0.00004	-11	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Jan	6	0.00003	0.00003	0.00003	-41	0.00003	0.00003	0.00003	-15	0.00003	0.00003	0.00003	-1	0.00003	0.00003	0.00004	-15	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Feb	6	0.00003	0.00003	0.00003	-45	0.00003	0.00003	0.00003	-17	0.00003	0.00003	0.00004	0	0.00003	0.00003	0.00004	-16	0.00003	0.00003	0.00004	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Mar	6	0.00003	0.00003	0.00003	-43	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00003	-1	0.00003	0.00003	0.00004	-17	0.00003	0.00003	0.00004	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Apr	6	0.00003	0.00003	0.00003	-41	0.00003	0.00003	0.00003	-22	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00004	-18	0.00003	0.00003	0.00004	-13	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	May	6	0.00002	0.00002	0.00002	-28	0.00002	0.00002	0.00002	-16	0.00002	0.00002	0.00002	-13	0.00003	0.00003	0.00003	-17	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Jun	6	0.00003	0.00003	0.00003	-22	0.00003	0.00003	0.00003	-13	0.00003	0.00003	0.00003	-16	0.00003	0.00003	0.00003	-15	0.00003	0.00003	0.00003	-11	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Jul	6	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00003	-13	0.00003	0.00003	0.00003	-17	0.00003	0.00003	0.00003	-14	0.00003	0.00003	0.00003	-11	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Aug	6	0.00003	0.00003	0.00003	-20	0.00002	0.00002	0.00003	-15	0.00003	0.00003	0.00003	-19	0.00003	0.00003	0.00003	-13	0.00003	0.00003	0.00003	-11	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Sep	6	0.00003	0.00003	0.00003	-20	0.00002	0.00002	0.00002	-19	0.00003	0.00003	0.00003	-21	0.00003	0.00003	0.00003	-13	0.00003	0.00003	0.00003	-11	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Oct	6	0.00003	0.00003	0.00003	-21	0.00002	0.00002	0.00002	-24	0.00003	0.00003	0.00003	-25	0.00003	0.00003	0.00003	-14	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Nov	6	0.00004	0.00004	0.00004	-29	0.00002	0.00002	0.00003	-23	0.00003	0.00003	0.00003	-38	0.00003	0.00003	0.00003	-15	0.00003	0.00003	0.00003	-12	0.00004	0.00004	0.00004	0
Ta, Tot	Closure	Dec	6	0.00003	0.00003	0.00003	-38	0.00003	0.00003	0.00003	-20	0.00003	0.00003	0.00003	-19	0.00003	0.00003	0.00003	-17	0.00003	0.00003	0.00003	-13	0.00004	0.00004	0.00004	0
Ta, Tot	Post-Closure	Jan	117	0.00005	0.00005	0.00005	1	0.00006	0.00005	0.00006	62	0.00004	0.00004	0.00004	35	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Feb	117	0.00005	0.00005	0.00005	1	0.00006	0.00006	0.00006	65	0.00004	0.00004	0.00004	30	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Mar	117	0.00004	0.00004	0.00004	1	0.00006	0.00006	0.00007	75	0.00003	0.00003	0.00003	2	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Apr	117	0.00004	0.00004	0.00004	1	0.00007	0.00006	0.00007	85	0.00003	0.00003	0.00003	-4	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	May	117	0.00003	0.00003	0.00003	-1	0.00005	0.00005	0.00005	78	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00003	6	0.00003	0.00003	0.00003	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Jun	117	0.00004	0.00004	0.00004	-2	0.00005	0.00005	0.00005	65	0.00004	0.00004	0.00004	20	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Jul	117	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	60	0.00005	0.00004	0.00005	18	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Aug	117	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	58	0.00005	0.00004	0.00005	18	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Sep	117	0.00004	0.00004	0.00004	0	0.00005	0.00004	0.00005	57	0.00004	0.00004	0.00004	18	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Oct	117	0.00004	0.00004	0.00004	0	0.00005	0.00004	0.00005	59	0.00004	0.00004	0.00004	19	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Nov	117	0.00005	0.00005	0.00005	1	0.00006	0.00005	0.00006	59	0.00006	0.00006	0.00006	27	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
Ta, Tot	Post-Closure	Dec	117	0.00005	0.00005	0.00005	1	0.00006	0.00005	0.00006	61	0.00005	0.00004	0.00005	36	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	1
U, Tot	Construction	Jan	2	0.00039	0.00039	0.00052	1293	0.0010	0.0010	0.0012	175	0.00025	0.00025	0.00042	92	0.00009	0.00009	0.00015	143	0.00007	0.00007	0.00009	58	0.00009	0.00009	0.00009	0
U, Tot	Construction	Feb	2	0.00054	0.00054	0.00059	1344	0.0014	0.0014	0.0016	246	0.00028	0.00028	0.00035	101	0.00010	0.00010	0.00016	149	0.00007	0.00007	0.00009	61	0.00009	0.00009	0.00009	0
U, Tot	Construction	Mar	2	0.00053	0.00053	0.00054	1293	0.0015	0.0015	0.0020	285	0.00027	0.00027	0.00029	125	0.00010	0.00010	0.00016	158	0.00007	0.00007	0.00010	65	0.00009	0.00009	0.00009	0
U, Tot	Construction	Apr	2	0.00038	0.00038	0.00039	867	0.0016	0.0016	0.0021	308	0.00030	0.00030	0.00037	165	0.00011	0.00011	0.00015	169	0.00007	0.00007	0.00010	70	0.00008	0.00008	0.00008	0
U, Tot	Construction	May	2	0.00014	0.00014	0.00014	571	0.0011	0.0011	0.0015	333	0.00031	0.00031	0.00039	563	0.00009	0.00009	0.00012	189	0.00006	0.00006	0.00009	74	0.00007	0.00007	0.00007	0
U, Tot	Construction	Jun	2	0.00010	0.00010	0.00010	551	0.0011	0.0011	0.0014	350	0.00038	0.00038	0.00048	368	0.00011	0.00011	0.00012	220	0.00007	0.00007	0.00009	77	0.00007	0.00007	0.00007	0
U, Tot	Construction	Jul	2	0.00010	0.00010	0.00010	620	0.0011	0.0011	0.0014	382	0.00028	0.00028	0.00034	299	0.00011	0.00011	0.00012	224	0.00007	0.00007	0.00009	88	0.00007	0.00007	0.00007	0
U, Tot	Construction	Aug	2	0.00010	0.00010	0.00010	730	0.0010	0.0010	0.0013	418	0.00026	0.00026	0.00032	337	0.00011	0.00011	0.00011	218	0.00008	0.00008	0.00009	98	0.00008	0.00008	0.00008	0
U, Tot	Construction	Sep	2	0.00010	0.00010	0.00011	832	0.0010	0.0010	0.0013	447	0.00021	0.00021	0.00026	327	0.00011	0.00011	0.00011	216	0.00008	0.00008	0.00009	106	0.00008	0.00008	0.00008	0
U, Tot	Construction	Oct	2	0.00011	0.00011	0.00011	928	0.0010	0.0010	0.0013	464	0.00019	0.00019	0.00023	357	0.00010	0.00010	0.00011	215	0.00008	0.00008	0.00009	112	0.00007	0.00007	0.00007	0
U, Tot	Construction	Nov	2	0.00029	0.00029	0.00029	1533	0.0013	0.0013	0.0016	231	0.00042	0.00042	0.00050	257	0.00012	0.00012	0.00013	224	0.00009	0.00009	0.00010	119	0.00009	0.00009	0.00009	0
U, Tot	Construction	Dec	2	0.00044	0.00044	0.00045	1857	0.0011	0.0011	0.0013	199	0.00043	0.00043	0.00052	219	0.00013	0.00013	0.00014	242	0.00009	0.00009	0.00010	125	0.00009	0.00009	0.00009	0
U, Tot	Operations	Jan	5	0.00048	0.00048	0.00050	1648	0.0011	0.0011	0.0013	193	0.00038	0.00039	0.00049	196	0.00014	0.00015	0.00019	284	0.00010	0.00011	0.00013	166	0.00009	0.00009	0.00009	0
U, Tot	Operations	Feb	5	0.00054	0.00055	0.00057	1374	0.0012	0.0012	0.0015	207	0.00033	0.00034	0.00040	138	0.00015	0.00016	0.00021	286	0.00011	0.00011	0.00014	170	0.00009	0.00009	0.00009	0
U, Tot	Operations	Mar	5	0.00050	0.00051	0.00052	1243	0.0014	0.0015	0.0020	268	0.00027	0.00027	0.00033	121	0.00014	0.00015	0.00020	281	0.00011	0.00011	0.00014	174	0.00009	0.00009	0.00009	0
U, Tot	Operations	Apr	5	0.00036	0.00036	0.00037	815	0.0015	0.0016	0.0022	299	0.00034	0.00034	0.00044	193	0.00014	0.00015	0.00020	279	0.00011	0.00012	0.00014	178	0.00008	0.00008	0.00008	0
U, Tot	Operations	May	5	0.00013	0.00013	0.00013	530	0.0011	0.0012	0.0016	337	0.00029	0.00030	0.00040	556	0.00012	0.00013	0.00016	284	0.00009	0.00010	0.00012	175	0.00007	0.00007	0.00007	0
U, Tot	Operations	Jun	5	0.00009	0.00010	0.00010	508	0.0012	0.0012	0.0016	399	0.00040	0.00041	0.00055	401	0.00012	0.00013	0.00017	295	0.00009	0.00010	0.00012	159	0.00007	0.00007	0.00007	0
U, Tot	Operations	Jul	5	0.00009	0.00009	0.00010	571	0.0013	0.0014	0.0019	513	0.00033	0.00033	0.00046	379	0.00012	0.00013	0.00017	288	0.00009	0.00010	0.00012	161	0.00007	0.00007	0.00007	0
U, Tot	Operations	Aug	5	0.00009	0.00009	0.00010	673	0.0015	0.0014	0.0021	622	0.00035	0.00035	0.00050	493	0.00012	0.00013	0.00017	281	0.00010	0.00010	0.00013	165	0.00008	0.00008	0.00008	0
U, Tot	Operations	Sep	5	0.00010	0.00010	0.00010	768	0.0015	0.0014	0.0021	678	0.00031	0.00031	0.00043	519	0.00013	0.00013	0.00017	283	0.00010	0.00010	0.00013	169	0.00008	0.00008	0.00008	0
U, Tot	Operations	Oct	5	0.00010	0.00010	0.00011	860	0.0013	0.0013	0.0019	656	0.00029	0.00029	0.00040	592	0.00013	0.00013	0.00017	289	0.00010	0.00011	0.00013	173	0.00007	0.00007	0.00007	0
U, Tot	Operations	Nov	5	0.00027	0.00027	0.00028	1432	0.0015	0.0015	0.0020	296	0.00060	0.00059	0.00079	400	0.00015	0.00015	0.00020	306	0.00011	0.00012	0.00015	180	0.00009	0.00009	0.00009	0
U, Tot	Operations	Dec	5	0.00041	0.00041	0.00043	1739	0.0013	0.0013	0.0016	247	0.00053	0.00052	0.00067	288	0.00016	0.00016	0.00022	325	0.00011	0.00012	0.00015	186	0.00009	0.00009	0.00009	0
U, Tot	Closure	Jan	6	0.00050	0.00050	0.00052	1698	0.0008	0.0009	0.0014	139	0.00029	0.00033	0.00053	151	0.00010	0.00013	0.00022	227	0.00009	0.00010	0.00015	155	0.00009	0.00009	0.00009	0
U, Tot	Closure	Feb	6	0.00057	0.00057	0.00060	1423	0.0009	0.0009	0.0013	132	0.00028	0.00030	0.00042	111	0.00011	0.00013	0.00023	230	0.00009	0.00011	0.00016	157	0.00009	0.00009	0.00009	0
U, Tot	Closure	Mar	6	0.00053	0.00052	0.00055	1287	0.0009	0.0009	0.0011	125	0.00024	0.00025	0.00032	107	0.00011	0.00013	0.00023	228	0.00009	0.00011	0.00016	158	0.00009	0.00009	0.00009	0
U, Tot	Closure	Apr	6	0.00038	0.00038	0.00041	858	0.0008	0.0009	0.0010	116	0.00025	0.00025	0.00030	122	0.00011	0.00013	0.00022	226	0.00009	0.00011	0.00016	160	0.00008	0.00008	0.00008	0
U, Tot	Closure	May	6	0.00014	0.00014	0.00015	572	0.0006	0.0006	0.0007	123	0.00019	0.00019	0.00020	300	0.00009	0.00010	0.00017	222	0.00008	0.00009	0.00014	155	0.00007	0.00007	0.00007	0
U, Tot	Closure	Jun	6	0.00010	0.00010	0.00011	546	0.0005	0.0006	0.0006	132	0.00024	0.00024	0.00026	193	0.00009	0.00010	0.00016	212	0.00008	0.00009	0.00013	135	0.00007	0.00007	0.00007	0
U, Tot	Closure	Jul	6	0.00010	0.00010	0.00010	607	0.0005	0.0005	0.0006	148	0.00018	0.00018	0.00019	161	0.00009	0.00010	0.00014	193	0.00008	0.00009	0.00013	131	0.00007	0.00007	0.00007	0
U, Tot	Closure	Aug	6	0.00010	0.00010	0.00010	708	0.0005	0.0005	0.0006	168	0.00017	0.00017	0.00017	179	0.00008	0.00009	0.00013	174	0.00008	0.00009	0.00013	128	0.00008	0.00008	0.00008	0
U, Tot	Closure	Sep	6	0.00010	0.00010	0.00011	805	0.0005	0.0005	0.0006	187	0.00014	0.00014	0.00014	179	0.00008	0.00009	0.00012	162	0.00008	0.00009	0.00013	125	0.00008	0.00008	0.00008	0
U, Tot	Closure	Oct	6	0.00011	0.00011	0.00011	897	0.0005	0.0005	0.0006	203	0.00013	0.00012	0.00013	198	0.00008	0.00008	0.00011	155	0.00008	0.00009	0.00012	123	0.00007	0.00007	0.00007	0
U, Tot	Closure	Nov	6	0.00028	0.00028	0.00029	1469	0.0008	0.0008	0.0008	105	0.00030	0.00030	0.00031	151	0.00009	0.00010	0.00013	157	0.00008	0.00009	0.00013	123	0.00009	0.00009	0.00009	0
U, Tot	Closure	Dec	6	0.00042	0.00042	0.00045	1792	0.0008	0.0008	0.0008	107	0.00031	0.00031	0.00032	127	0.00009	0.00010	0.00013	165	0.00008	0.00009	0.00013	124	0.00009	0.00009	0.00009	0
U, Tot	Post-Closure	Jan	117	0.00003	0.00003	0.00048	14	0.0013	0.0012	0.0013	219	0.00035	0.00032	0.00035	141	0.00008	0.00007	0.00009	90	0.00006	0.00006	0.00008	50	0.00011	0.00011	0.00011	27
U, Tot	Post-Closure	Feb	117	0.00004	0.00004	0.00056	10	0.0015	0.0013	0.0015	227	0.00034	0.00031	0.00034	121	0.00008	0.00008	0.00010	91	0.00007	0.00006	0.00008	51	0.00012	0.00011	0.00012	28
U, Tot	Post-Closure	Mar	117	0.00004	0.00004	0.00053	8	0.0016	0.0014	0.0016	252	0.00022	0.00021	0.00024	70	0.00008	0.00008	0.00010	91	0.00007	0.00006	0.00008	51	0.00011	0.00011	0.00011	30
U, Tot	Post-Closure	Apr	117	0.00004	0.00004	0.00042	4	0.0017	0.0015	0.0017	278	0.00019	0.00018	0.00024	56	0.00008	0.00008	0.00010	91	0.00007	0.00006	0.00008	52	0.00011	0.00011	0.00011	31
U, Tot	Post-Closure	May	117	0.00002	0.00002	0.00017	6	0.0012	0.0010	0.0012	294	0.00008	0.00008	0.00016	68	0.00007	0.00006	0.00008	87	0.00006	0.00005	0.00007	49	0.00009	0.00009	0.00010	29
U, Tot	Post-Closure	Jun	117	0.00002	0.00002	0.00012	9	0.0011	0.0010	0.0011	300	0.00027	0.00024	0.00027	189	0.00006	0.00006	0.00008	83	0.00006	0.00005	0.00007	44	0.00009	0.00009	0.00009	27
U, Tot	Post-Closure	Jul	117	0.00001	0.00002	0.00011	11	0.0010	0.0009	0.0010	311	0.00023	0.00020	0.00023	190	0.00007	0.00006	0.00008	82	0.00006	0.00005	0.00007	43	0.00009	0.00009	0.00009	26
U, Tot	Post-Closure	Aug	117	0.00001	0.00001	0.00010	12	0.0010	0.0009	0.0010	327	0.00020	0.00018	0.00020	198	0.00007	0.00006	0.00008	79	0.00006	0.00006	0.00007	44	0.00009	0.00009	0.00009	24
U, Tot	Post-Closure	Sep	117	0.00001	0.00001	0.00010	13	0.0009	0.0008	0.0009	344	0.00017	0.00015	0.00017	204	0.00006	0.00006	0.00007	78	0.00006	0.00006	0.00007	45	0.00009	0.00009	0.00009	24
U, Tot	Post-Closure	Oct	117	0.00001	0.00001	0.00009	13	0.0009	0.0008	0.0009	364	0.00015	0.00013	0.00015	216	0.00006	0.00006	0.00007	79	0.00006	0.00006	0.00007	46	0.00009	0.00009	0.00009	24
U, Tot	Post-Closure	Nov	117	0.00002	0.00002	0.00012	9	0.0013	0.0012	0.0013	208	0.00038	0.00034	0.00038	184	0.00007	0.00007	0.00008	83	0.00007	0.00006	0.00008	48	0.00011	0.00011	0.00011	24
U, Tot	Post-Closure	Dec	117	0.00002	0.00002	0.00012	4	0.0013	0.0012	0.0013	214	0.00039	0.00035	0.00039	160	0.00008	0.00007	0.00008	87	0.00006	0.00006	0.00008	49	0.00011	0.00011	0.00011	26
Zn, Diss	Construction	Jan	2	0.0007	0.0007	0.0008	28	0.0009	0.0009	0.0010	61	0.0003	0.0003	0.0004	0	0.0009	0.0009	0.0010	-12	0.0009	0.0009	0.0010	-6	0.0010	0.0010	0.0010	0
Zn, Diss	Construction	Feb	2	0.0007	0.0007	0.0007	19	0.0010	0.0010	0.0011	76	0.0003	0.0003	0.0004	-9	0.0009	0.0009	0.0009	-16	0.0010	0.0010	0.0010	-7	0.0011	0.0011	0.0011	0
Zn, Diss	Construction	Mar	2	0.0006	0.0006	0.0006	18	0.0011	0.0011	0.0011	81	0.0002	0.0002	0.0003	-9	0.0008	0.0008	0.0009	-21	0.0009	0.0009	0.0010	-8	0.0010	0.0010	0.0010	0
Zn, Diss	Construction	Apr	2	0.0006	0.0006	0.0006	21	0.0011	0.0011	0.0011	90	0.0002	0.0002	0.0002	-10	0.0007	0.0007	0.0008	-27	0.0009	0.0009	0.0010	-9	0.0010	0.0010	0.0010	0
Zn, Diss	Construction	May	2	0.0004	0.0004	0.0004	34	0.0008	0.0008	0.0009	100	0.0004	0.0004	0.0004	-8	0.0008	0.0008	0.0008	-24	0.0008	0.0008	0.0008	-10	0.0009	0.0009	0.0009	0
Zn, Diss	Construction	Jun	2	0.0005	0.0005	0.0005	61	0.0009	0.0009	0.0009	110	0.0004	0.0004	0.0004	-1	0.0007	0.0007	0.0008	-25	0.0008	0.0008	0.0008	-10	0.0009	0.0009	0.0009	0
Zn, Diss	Construction	Jul	2	0.0008	0.0008	0.0008	97	0.0010	0.0010	0.0010	120	0.0006	0.0006	0.0006	22	0.0007	0.0007	0.0007	-24	0.0008	0.0008	0.0008	-11	0.0009	0.0009	0.0009	0
Zn, Diss	Construction	Aug	2	0.0010	0.0010	0.0010	104	0.0011	0.0011	0.0011	121	0.0008	0.0008	0.0008	33	0.0008	0.0008	0.0008	-20	0.0008	0.0008	0.0008	-12	0.0009	0.0009	0.0009	0
Zn, Diss	Construction	Sep	2	0.0009	0.0009	0.0009	86	0.0011	0.0011	0.0011	110	0.0007	0.0007	0.0007	21	0.0008	0.0008	0.0008	-17	0.0008	0.0008	0.0008	-13	0.0009	0.0009	0.0009	0
Zn, Diss	Construction	Oct	2	0.0008	0.0008	0.0008	68	0.0009	0.0009	0.0010	93	0.0006	0.0006	0.0006	12	0.0008	0.0008	0.0008	-17	0.0008	0.0008	0.0008	-13	0.0009	0.0009	0.0009	0
Zn, Diss	Construction	Nov	2	0.0009	0.0009	0.0009	52	0.0010	0.0010	0.0011	86	0.0005	0.0005	0.0005	-16	0.0008	0.0008	0.0008	-18	0.0009	0.0009	0.0009	-13	0.0010	0.0010	0.0010	0
Zn, Diss	Construction	Dec	2	0.0008	0.0008	0.0008	39	0.0010	0.0010	0.0011	82	0.0004	0.0004	0.0005	29	0.0008	0.0008	0.0008	-20	0.0009	0.0009	0.0009	-14	0.0010	0.0010	0.0010	0
Zn, Diss	Operations	Jan	5	0.0007	0.0007	0.0007	27	0.0009	0.0009	0.0009	68	0.0004	0.0004	0.0004	34	0.0008	0.0008	0.0008	-20	0.0008	0.0009	0.0009	-16	0.0010	0.0010	0.0010	0
Zn, Diss	Operations	Feb	5	0.0007	0.0007	0.0007	12	0.0010	0.0010	0.0010	66	0.0003	0.0003	0.0004	10	0.0008	0.0008	0.0008	-22	0.0009	0.0009	0.0009	-16	0.0011	0.0011	0.0011	0
Zn, Diss	Operations	Mar	5	0.0006	0.0006	0.0006	11	0.0011	0.0011	0.0011	81	0.0002	0.0002	0.0003	-9	0.0007	0.0008	0.0008	-26	0.0009	0.0009	0.0009	-17	0.0010	0.0010	0.0010	0
Zn, Diss	Operations	Apr	5	0.0006	0.0006	0.0006	13	0.0011	0.0011	0.0012	93	0.0003	0.0003	0.0003	1	0.0007	0.0007	0.0007	-30	0.0008	0.0008	0.0009	-18	0.0010	0.0010	0.0010	0
Zn, Diss	Operations	May	5	0.0004	0.0004	0.0004	26	0.0008	0.0009	0.0009	104	0.0004	0.0004	0.0004	-6	0.0008	0.0008	0.0008	-26	0.0007	0.0007	0.0007	-17	0.0009	0.0009	0.0009	0
Zn, Diss	Operations	Jun	5	0.0005	0.0005	0.0005	52	0.0009	0.0009	0.0010	119	0.0004	0.0004	0.0004	2	0.0007	0.0007	0.0007	-26	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Operations	Jul	5	0.0007	0.0007	0.0007	87	0.0011	0.0011	0.0012	135	0.0006	0.0007	0.0007	27	0.0007	0.0007	0.0007	-24	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Operations	Aug	5	0.0010	0.0010	0.0010	93	0.0012	0.0012	0.0013	137	0.0009	0.0009	0.0009	41	0.0008	0.0008	0.0008	-19	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Operations	Sep	5	0.0009	0.0009	0.0009	76	0.0011	0.0011	0.0012	124	0.0008	0.0008	0.0008	31	0.0008	0.0008	0.0008	-16	0.0008	0.0008	0.0008	-15	0.0009	0.0009	0.0009	0
Zn, Diss	Operations	Oct	5	0.0007	0.0007	0.0007	58	0.0010	0.0009	0.0010	99	0.0006	0.0006	0.0007	28	0.0008	0.0008	0.0008	-15	0.0008	0.0008	0.0008	-15	0.0009	0.0009	0.0009	0
Zn, Diss	Operations	Nov	5	0.0009	0.0009	0.0009	44	0.0010	0.0010	0.0011	79	0.0006	0.0006	0.0006	-3	0.0009	0.0009	0.0009	-16	0.0009	0.0009	0.0009	-15	0.0010	0.0010	0.0010	0
Zn, Diss	Operations	Dec	5	0.0007	0.0008	0.0008	31	0.0009	0.0009	0.0010	72	0.0004	0.0004	0.0004	27	0.0008	0.0008	0.0009	-17	0.0009	0.0009	0.0009	-15	0.0010	0.0010	0.0010	0
Zn, Diss	Closure	Jan	6	0.0007	0.0007	0.0008	31	0.0008	0.0008	0.0009	52	0.0004	0.0004	0.0004	27	0.0008	0.0008	0.0008	-22	0.0008	0.0008	0.0009	-16	0.0010	0.0010	0.0010	0
Zn, Diss	Closure	Feb	6	0.0007	0.0007	0.0008	17	0.0009	0.0009	0.0009	47	0.0003	0.0003	0.0004	11	0.0008	0.0008	0.0008	-25	0.0009	0.0009	0.0009	-17	0.0011	0.0011	0.0011	0
Zn, Diss	Closure	Mar	6	0.0006	0.0006	0.0006	15	0.0008	0.0008	0.0009	41	0.0003	0.0003	0.0003	6	0.0007	0.0007	0.0008	-27	0.0009	0.0009	0.0009	-17	0.0010	0.0010	0.0010	0
Zn, Diss	Closure	Apr	6	0.0006	0.0006	0.0006	17	0.0008	0.0008	0.0008	35	0.0003	0.0002	0.0003	0	0.0007	0.0007	0.0008	-30	0.0008	0.0008	0.0009	-18	0.0010	0.0010	0.0010	0
Zn, Diss	Closure	May	6	0.0004	0.0004	0.0004	31	0.0006	0.0006	0.0006	41	0.0004	0.0003	0.0004	-12	0.0008	0.0008	0.0008	-26	0.0007	0.0007	0.0008	-17	0.0009	0.0009	0.0009	0
Zn, Diss	Closure	Jun	6	0.0005	0.0005	0.0005	56	0.0006	0.0006	0.0007	50	0.0004	0.0004	0.0004	-7	0.0007	0.0007	0.0008	-26	0.0007	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Closure	Jul	6	0.0007	0.0007	0.0008	91	0.0007	0.0007	0.0008	60	0.0006	0.0006	0.0006	14	0.0007	0.0007	0.0008	-24	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Closure	Aug	6	0.0010	0.0010	0.0010	98	0.0008	0.0008	0.0009	64	0.0008	0.0008	0.0008	25	0.0008	0.0008	0.0008	-20	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Closure	Sep	6	0.0009	0.0009	0.0009	82	0.0008	0.0008	0.0008	58	0.0007	0.0007	0.0007	17	0.0008	0.0008	0.0008	-17	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Closure	Oct	6	0.0008	0.0007	0.0008	65	0.0007	0.0007	0.0007	46	0.0005	0.0005	0.0006	8	0.0008	0.0008	0.0008	-17	0.0008	0.0008	0.0008	-16	0.0009	0.0009	0.0009	0
Zn, Diss	Closure	Nov	6	0.0009	0.0009	0.0009	51	0.0008	0.0008	0.0008	42	0.0005	0.0005	0.0005	-20	0.0008	0.0008	0.0009	-18	0.0009	0.0009	0.0009	-16	0.0010	0.0010	0.0010	0
Zn, Diss	Closure	Dec	6	0.0008	0.0008	0.0008	38	0.0008	0.0008	0.0008	46	0.0004	0.0004	0.0004	10	0.0008	0.0008	0.0008	-20	0.0009	0.0009	0.0009	-16	0.0010	0.0010	0.0010	0
Zn, Diss	Post-Closure	Jan	117	0.0006	0.0006	0.0009	0	0.0008	0.0008	0.0008	44	0.0003	0.0003	0.0004	15	0.0010	0.0010	0.0010	1	0.0010	0.0010	0.0010	1	0.0010	0.0010	0.0010	1
Zn, Diss	Post-Closure	Feb	117	0.0006	0.0006	0.0010	0	0.0009	0.0009	0.0009	45	0.0003	0.0003	0.0004	9	0.0011	0.0010	0.0011	1	0.0011	0.0010	0.0011	1	0.0011	0.0011	0.0011	1
Zn, Diss	Post-Closure	Mar	117	0.0005	0.0005	0.0008	0	0.0009	0.0009	0.0009	51	0.0002	0.0002	0.0003	-10	0.0010	0.0010	0.0011	1	0.0010	0.0010	0.0011	1	0.0010	0.0010	0.0010	1
Zn, Diss	Post-Closure	Apr	117	0.0005	0.0005	0.0008	0	0.0010	0.0009	0.0010	56	0.0002	0.0002	0.0003	-18	0.0010	0.0010	0.0010	1	0.0010	0.0010	0.0011	1	0.0010	0.0010	0.0010	1
Zn, Diss	Post-Closure	May	117	0.0003	0.0003	0.0005	1	0.0007	0.0007	0.0007	54	0.0004	0.0004	0.0004	-3	0.0010	0.0010	0.0011	0	0.0009	0.0009	0.0009	1	0.0009	0.0009	0.0009	1
Zn, Diss	Post-Closure	Jun	117	0.0003	0.0003	0.0005	1	0.0007	0.0006	0.0007	51	0.0005	0.0005	0.0005	9	0.0010	0.0010	0.0010	0	0.0009	0.0009	0.0009	1	0.0009	0.0009	0.0009	1
Zn, Diss	Post-Closure	Jul	117	0.0004	0.0004	0.0007	-2	0.0007	0.0007	0.0007	46	0.0006	0.0006	0.0006	11	0.0010	0.0010	0.0010	1	0.0009	0.0009	0.0009	0	0.0009	0.0009	0.0009	1
Zn, Diss	Post-Closure	Aug	117	0.0005	0.0005	0.0009	-4	0.0007	0.0007	0.0008	40	0.0007	0.0007	0.0007	11	0.0010	0.0010	0.0010	1	0.0009	0.0009	0.0009	0	0.0009	0.0009	0.0009	0
Zn, Diss	Post-Closure	Sep	117	0.0005	0.0005	0.0009	-3	0.0007	0.0007	0.0008	39	0.0007	0.0006	0.0007	11	0.0010	0.0010	0.0010	1	0.0009	0.0009	0.0009	1	0.0009	0.0009	0.0009	0
Zn, Diss	Post-Closure	Oct	117	0.0004	0.0004	0.0007	-1	0.0007	0.0007	0.0007	40	0.0006	0.0006	0.0006	10	0.0009	0.0009	0.0009	1	0.0009	0.0009	0.0009	1	0.0009	0.0009	0.0009	0
Zn, Diss	Post-Closure	Nov	117	0.0006	0.0006	0.0010	-1	0.0008	0.0008	0.0008	41	0.0007	0.0007	0.0007	12	0.0011	0.0010	0.0011	2	0.0010	0.0010	0.0010	1	0.0010	0.0010	0.0010	0
Zn, Diss	Post-Closure	Dec	117	0.0006	0.0006	0.0009	-1	0.0008	0.0008	0.0008	42	0.0004	0.0004	0.0004	17	0.0010	0.0010	0.0010	2	0.0010	0.0010	0.0010	1	0.0010	0.0010	0.0010	0
Zn, Tot	Construction	Jan	2	0.0009	0.0009	0.0010	-14	0.0012	0.0012	0.0012	23	0.0007	0.0007	0.0009	-14	0.0028	0.0028	0.0033	-18	0.0015	0.0015	0.0015	-3	0.0012	0.0012	0.0012	0
Zn, Tot	Construction	Feb	2	0.0008	0.0008	0.0009	-28	0.0013	0.0013	0.0013	26	0.0006	0.0006	0.0008	-23	0.0027	0.0027	0.0032	-23	0.0016	0.0016	0.0016	-2	0.0013	0.0013	0.0013	0
Zn, Tot	Construction	Mar	2	0.0007	0.0007	0.0007	-32	0.0012	0.0012	0.0014	25	0.0005	0.0005	0.0006	-25	0.0025	0.0025	0.0029	-28	0.0016	0.0016	0.0017	1	0.0012	0.0012	0.0012	0
Zn, Tot	Construction	Apr	2	0.0006	0.0006	0.0007	-32	0.0012	0.0012	0.0014	27	0.0005	0.0005	0.0005	-25	0.0023	0.0023	0.0026	-34	0.0017	0.0017	0.0018	3	0.0012	0.0012	0.0012	0
Zn, Tot	Construction	May	2	0.0004	0.0004	0.0004	-18	0.0009	0.0009	0.0010	37	0.0006	0.0006	0.0006	-29	0.0029	0.0029	0.0032	-28	0.0014	0.0014	0.0015	3	0.0010	0.0010	0.0010	0
Zn, Tot	Construction	Jun	2	0.0005	0.0005	0.0005	9	0.0010	0.0010	0.0010	48	0.0006	0.0006	0.0006	-32	0.0025	0.0025	0.0027	-31	0.0013	0.0013	0.0014	-1	0.0010	0.0010	0.0010	0
Zn, Tot	Construction	Jul	2	0.0009	0.0009	0.0009	36	0.0011	0.0011	0.0011	59	0.0009	0.0009	0.0009	-13	0.0022	0.0022	0.0024	-33	0.0012	0.0012	0.0013	-5	0.0010	0.0010	0.0010	0
Zn, Tot	Construction	Aug	2	0.0013	0.0013	0.0013	30	0.0013	0.0013	0.0013	61	0.0011	0.0011	0.0011	-3	0.0020	0.0020	0.0021	-34	0.0011	0.0011	0.0012	-9	0.0010	0.0010	0.0010	0
Zn, Tot	Construction	Sep	2	0.0011	0.0011	0.0011	14	0.0013	0.0013	0.0014	59	0.0011	0.0011	0.0012	-1	0.0021	0.0021	0.0022	-32	0.0011	0.0011	0.0011	-12	0.0010	0.0010	0.0010	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - expected case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change*	Median	Mean	Max	Change *	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Zn, Tot	Construction	Oct	2	0.0009	0.0009	0.0009	1	0.0012	0.0012	0.0013	54	0.0011	0.0011	0.0011	2	0.0022	0.0022	0.0022	-31	0.0010	0.0010	0.0011	-14	0.0011	0.0011	0.0011	0
Zn, Tot	Construction	Nov	2	0.0010	0.0010	0.0010	-11	0.0014	0.0014	0.0015	43	0.0011	0.0011	0.0012	-19	0.0024	0.0024	0.0024	-32	0.0012	0.0012	0.0013	-14	0.0012	0.0012	0.0012	0
Zn, Tot	Construction	Dec	2	0.0008	0.0008	0.0009	-22	0.0012	0.0012	0.0013	30	0.0010	0.0010	0.0011	13	0.0022	0.0022	0.0023	-35	0.0013	0.0013	0.0014	-13	0.0012	0.0012	0.0012	0
Zn, Tot	Operations	Jan	5	0.0007	0.0007	0.0007	-29	0.0011	0.0011	0.0011	14	0.0008	0.0009	0.0009	10	0.0021	0.0021	0.0022	-36	0.0012	0.0012	0.0013	-18	0.0012	0.0012	0.0012	0
Zn, Tot	Operations	Feb	5	0.0007	0.0007	0.0007	-38	0.0011	0.0011	0.0011	9	0.0007	0.0007	0.0007	-13	0.0022	0.0021	0.0022	-38	0.0013	0.0013	0.0014	-17	0.0013	0.0013	0.0013	0
Zn, Tot	Operations	Mar	5	0.0006	0.0006	0.0006	-39	0.0011	0.0012	0.0012	16	0.0005	0.0005	0.0005	-29	0.0020	0.0020	0.0020	-41	0.0014	0.0014	0.0014	-16	0.0012	0.0012	0.0012	0
Zn, Tot	Operations	Apr	5	0.0006	0.0006	0.0006	-37	0.0012	0.0012	0.0013	22	0.0005	0.0005	0.0005	-20	0.0019	0.0019	0.0019	-45	0.0014	0.0014	0.0014	-14	0.0012	0.0012	0.0012	0
Zn, Tot	Operations	May	5	0.0004	0.0004	0.0004	-23	0.0009	0.0009	0.0010	34	0.0006	0.0006	0.0006	-28	0.0027	0.0027	0.0027	-34	0.0012	0.0012	0.0012	-14	0.0010	0.0010	0.0010	0
Zn, Tot	Operations	Jun	5	0.0005	0.0005	0.0005	3	0.0010	0.0010	0.0011	50	0.0006	0.0006	0.0006	-31	0.0023	0.0023	0.0023	-36	0.0011	0.0011	0.0011	-16	0.0010	0.0010	0.0010	0
Zn, Tot	Operations	Jul	5	0.0009	0.0009	0.0009	30	0.0012	0.0011	0.0012	66	0.0009	0.0009	0.0009	-10	0.0021	0.0021	0.0021	-37	0.0010	0.0010	0.0010	-18	0.0010	0.0010	0.0010	0
Zn, Tot	Operations	Aug	5	0.0012	0.0012	0.0012	25	0.0013	0.0013	0.0014	70	0.0011	0.0011	0.0012	1	0.0019	0.0019	0.0019	-37	0.0010	0.0010	0.0010	-21	0.0010	0.0010	0.0010	0
Zn, Tot	Operations	Sep	5	0.0011	0.0011	0.0011	9	0.0014	0.0014	0.0015	67	0.0012	0.0012	0.0013	6	0.0020	0.0020	0.0020	-34	0.0009	0.0009	0.0009	-22	0.0010	0.0010	0.0010	0
Zn, Tot	Operations	Oct	5	0.0008	0.0008	0.0008	-4	0.0013	0.0012	0.0013	54	0.0012	0.0012	0.0013	14	0.0021	0.0021	0.0022	-31	0.0009	0.0009	0.0009	-23	0.0011	0.0011	0.0011	0
Zn, Tot	Operations	Nov	5	0.0009	0.0010	0.0010	-15	0.0014	0.0013	0.0014	36	0.0013	0.0013	0.0013	-9	0.0024	0.0024	0.0024	-32	0.0011	0.0011	0.0011	-22	0.0012	0.0012	0.0012	0
Zn, Tot	Operations	Dec	5	0.0008	0.0008	0.0008	-26	0.0012	0.0012	0.0012	22	0.0010	0.0010	0.0010	12	0.0022	0.0023	0.0023	-34	0.0012	0.0012	0.0012	-20	0.0012	0.0012	0.0012	0
Zn, Tot	Closure	Jan	6	0.0008	0.0008	0.0008	-27	0.0010	0.0010	0.0011	2	0.0008	0.0008	0.0009	4	0.0021	0.0022	0.0022	-36	0.0013	0.0013	0.0013	-17	0.0012	0.0012	0.0012	0
Zn, Tot	Closure	Feb	6	0.0007	0.0007	0.0008	-36	0.0010	0.0010	0.0010	-4	0.0007	0.0007	0.0008	-12	0.0021	0.0022	0.0022	-38	0.0013	0.0013	0.0013	-16	0.0013	0.0013	0.0013	0
Zn, Tot	Closure	Mar	6	0.0006	0.0006	0.0006	-37	0.0009	0.0009	0.0009	-11	0.0006	0.0006	0.0006	-18	0.0020	0.0020	0.0021	-41	0.0014	0.0014	0.0014	-15	0.0012	0.0012	0.0012	0
Zn, Tot	Closure	Apr	6	0.0006	0.0006	0.0006	-35	0.0008	0.0008	0.0009	-15	0.0005	0.0005	0.0005	-22	0.0019	0.0019	0.0020	-43	0.0014	0.0014	0.0014	-14	0.0012	0.0012	0.0012	0
Zn, Tot	Closure	May	6	0.0004	0.0004	0.0004	-20	0.0006	0.0006	0.0006	-8	0.0006	0.0006	0.0006	-30	0.0027	0.0028	0.0028	-32	0.0012	0.0012	0.0012	-13	0.0010	0.0010	0.0010	0
Zn, Tot	Closure	Jun	6	0.0005	0.0005	0.0005	6	0.0007	0.0007	0.0007	2	0.0006	0.0006	0.0006	-34	0.0024	0.0024	0.0024	-34	0.0011	0.0011	0.0011	-15	0.0010	0.0010	0.0010	0
Zn, Tot	Closure	Jul	6	0.0009	0.0009	0.0009	32	0.0008	0.0008	0.0008	13	0.0008	0.0008	0.0009	-16	0.0021	0.0021	0.0022	-35	0.0010	0.0010	0.0010	-17	0.0010	0.0010	0.0010	0
Zn, Tot	Closure	Aug	6	0.0012	0.0012	0.0013	27	0.0009	0.0009	0.0010	20	0.0011	0.0011	0.0011	-7	0.0019	0.0020	0.0020	-34	0.0010	0.0010	0.0010	-19	0.0010	0.0010	0.0010	0
Zn, Tot	Closure	Sep	6	0.0011	0.0011	0.0011	12	0.0010	0.0010	0.0010	20	0.0011	0.0011	0.0011	-3	0.0021	0.0021	0.0022	-31	0.0010	0.0010	0.0010	-21	0.0010	0.0010	0.0010	0
Zn, Tot	Closure	Oct	6	0.0009	0.0009	0.0009	1	0.0009	0.0009	0.0010	17	0.0010	0.0010	0.0011	-2	0.0022	0.0022	0.0023	-29	0.0009	0.0009	0.0009	-22	0.0011	0.0011	0.0011	0
Zn, Tot	Closure	Nov	6	0.0010	0.0010	0.0011	-11	0.0011	0.0011	0.0011	10	0.0011	0.0011	0.0011	-23	0.0024	0.0024	0.0025	-31	0.0011	0.0011	0.0011	-21	0.0012	0.0012	0.0012	0
Zn, Tot	Closure	Dec	6	0.0009	0.0008	0.0009	-22	0.0010	0.0010	0.0010	4	0.0008	0.0008	0.0009	-3	0.0023	0.0023	0.0024	-33	0.0012	0.0012	0.0012	-19	0.0012	0.0012	0.0012	0
Zn, Tot	Post-Closure	Jan	117	0.0010	0.0010	0.0011	-6	0.0013	0.0012	0.0013	30	0.0009	0.0008	0.0009	10	0.0034	0.0034	0.0035	0	0.0015	0.0015	0.0016	0	0.0012	0.0012	0.0012	0
Zn, Tot	Post-Closure	Feb	117	0.0011	0.0011	0.0012	-6	0.0014	0.0013	0.0014	32	0.0009	0.0008	0.0009	4	0.0035	0.0035	0.0036	0	0.0016	0.0016	0.0016	0	0.0013	0.0013	0.0013	0
Zn, Tot	Post-Closure	Mar	117	0.0009	0.0009	0.0010	-6	0.0014	0.0013	0.0014	35	0.0006	0.0006	0.0008	-15	0.0035	0.0035	0.0036	0	0.0016	0.0016	0.0017	0	0.0012	0.0012	0.0012	0
Zn, Tot	Post-Closure	Apr	117	0.0009	0.0009	0.0010	-5	0.0014	0.0014	0.0014	39	0.0005	0.0005	0.0007	-22	0.0034	0.0034	0.0035	-1	0.0017	0.0016	0.0017	0	0.0012	0.0012	0.0012	0
Zn, Tot	Post-Closure	May	117	0.0005	0.0005	0.0006	-3	0.0010	0.0010	0.0010	40	0.0008	0.0008	0.0009	-4	0.0040	0.0040	0.0042	-1	0.0014	0.0014	0.0014	0	0.0011	0.0011	0.0011	0
Zn, Tot	Post-Closure	Jun	117	0.0005	0.0005	0.0005	0	0.0010	0.0009	0.0010	40	0.0009	0.0009	0.0009	5	0.0036	0.0036	0.0038	-1	0.0013	0.0013	0.0013	0	0.0010	0.0010	0.0010	0
Zn, Tot	Post-Closure	Jul	117	0.0006	0.0006	0.0008	-6	0.0010	0.0009	0.0010	37	0.0011	0.0011	0.0011	7	0.0033	0.0033	0.0034	-1	0.0013	0.0013	0.0013	0	0.0010	0.0010	0.0010	0
Zn, Tot	Post-Closure	Aug	117	0.0009	0.0009	0.0012	-10	0.0011	0.0010	0.0011	31	0.0012	0.0012	0.0012	8	0.0030	0.0030	0.0031	0	0.0012	0.0012	0.0013	0	0.0010	0.0010	0.0010	0
Zn, Tot	Post-Closure	Sep	117	0.0009	0.0009	0.0011	-9	0.0011	0.0010	0.0011	29	0.0012	0.0012	0.0012	7	0.0031	0.0031	0.0032	0	0.0012	0.0012	0.0012	0	0.0010	0.0010	0.0010	0
Zn, Tot	Post-Closure	Oct	117	0.0008	0.0008	0.0009	-7	0.0011	0.0010	0.0011	29	0.0012	0.0011	0.0012	7	0.0032	0.0032	0.0033	0	0.0012	0.0012	0.0012	0	0.0011	0.0011	0.0011	0
Zn, Tot	Post-Closure	Nov	117	0.0011	0.0011	0.0012	-6	0.0013	0.0013	0.0013	29	0.0015	0.0015	0.0015	8	0.0035	0.0035	0.0036	0	0.0014	0.0014	0.0014	0	0.0012	0.0012	0.0012	0
Zn, Tot	Post-Closure	Dec	117	0.0010	0.0010	0.0012	-6	0.0013	0.0012	0.0013	30	0.0010	0.0010	0.0010	12	0.0034	0.0034	0.0036	0	0.0015	0.0015	0.0015	0	0.0012	0.0012	0.0012	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality Median	Mean	Max	Change	West Farley Lake Predicted Project Water Quality Median	Mean	Max	Change *	East Farley Lake Predicted Project Water Quality Median	Mean	Max	Change	Swede Lake Predicted Project Water Quality Median	Mean	Max	Change*	Ellystan Lake Predicted Project Water Quality Median	Mean	Max	Change*	Susan Lake last one Predicted Project Water Quality Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Cl	Construction	Jan	2	1.040	1.040	1.353	144	2.119	2.119	2.848	289	1.844	1.844	2.673	219	0.821	0.821	1.260	121	0.687	0.687	0.867	35	0.285	0.285	0.285	0
Cl	Construction	Feb	2	1.103	1.103	1.230	130	2.631	2.631	2.844	338	2.201	2.201	2.520	218	0.958	0.958	1.413	145	0.717	0.717	0.916	38	0.298	0.298	0.298	0
Cl	Construction	Mar	2	0.962	0.962	1.004	131	2.698	2.698	2.753	339	2.301	2.301	2.317	237	1.073	1.073	1.470	174	0.732	0.732	0.943	43	0.285	0.285	0.285	0
Cl	Construction	Apr	2	0.984	0.984	0.996	140	2.726	2.726	2.895	334	2.362	2.362	2.503	233	1.200	1.200	1.524	207	0.759	0.759	0.975	49	0.285	0.285	0.285	0
Cl	Construction	May	2	0.777	0.774	0.777	230	2.037	2.037	2.195	363	1.126	1.126	1.225	345	1.020	1.020	1.232	219	0.679	0.679	0.859	57	0.245	0.245	0.245	0
Cl	Construction	Jun	2	1.007	1.007	1.018	381	2.102	2.102	2.304	385	1.299	1.299	1.420	359	0.993	0.993	1.150	217	0.686	0.686	0.844	66	0.245	0.245	0.245	0
Cl	Construction	Jul	2	1.182	1.182	1.198	485	2.208	2.208	2.451	415	0.876	0.876	0.965	301	0.962	0.962	1.080	203	0.713	0.713	0.858	77	0.246	0.246	0.246	0
Cl	Construction	Aug	2	1.266	1.266	1.285	546	2.259	2.259	2.529	438	0.722	0.722	0.808	338	0.903	0.903	0.992	179	0.731	0.731	0.863	87	0.246	0.246	0.246	0
Cl	Construction	Sep	2	1.690	1.690	1.716	603	2.322	2.322	2.604	459	0.743	0.743	0.838	380	0.863	0.863	0.929	163	0.739	0.739	0.858	93	0.247	0.247	0.247	0
Cl	Construction	Oct	2	2.186	2.186	2.220	617	2.793	2.793	2.706	484	0.840	0.840	0.893	417	0.840	0.840	0.888	157	0.742	0.742	0.850	96	0.247	0.247	0.247	0
Cl	Construction	Nov	2	2.588	2.588	2.627	475	3.025	3.025	3.312	478	2.522	2.522	2.804	472	1.013	1.013	1.037	173	0.939	0.939	1.050	79	0.286	0.286	0.286	0
Cl	Construction	Dec	2	1.709	1.709	1.733	293	2.875	2.875	3.056	440	2.759	2.759	2.961	417	1.144	1.144	1.150	208	0.946	0.946	1.047	84	0.285	0.285	0.285	0
Cl	Operations	Jan	5	1.264	1.278	1.312	199	2.493	2.525	2.600	363	2.324	2.350	2.416	307	1.157	1.172	1.224	214	1.048	1.045	1.058	106	0.285	0.285	0.285	0
Cl	Operations	Feb	5	1.150	1.162	1.192	142	2.544	2.579	2.666	329	2.244	2.273	2.352	228	1.284	1.301	1.358	230	1.082	1.080	1.094	108	0.298	0.298	0.298	0
Cl	Operations	Mar	5	0.944	0.954	0.979	130	2.512	2.519	2.563	310	2.143	2.156	2.197	216	1.338	1.356	1.406	244	1.091	1.090	1.104	112	0.285	0.285	0.285	0
Cl	Operations	Apr	5	0.940	0.950	0.975	132	2.512	2.498	2.518	298	2.183	2.169	2.190	206	1.400	1.417	1.456	260	1.104	1.105	1.119	117	0.285	0.285	0.285	0
Cl	Operations	May	5	0.733	0.740	0.759	215	1.830	1.829	1.850	315	0.983	0.987	1.009	290	1.142	1.150	1.177	257	0.947	0.949	0.961	120	0.245	0.245	0.245	0
Cl	Operations	Jun	5	0.951	0.959	0.985	358	1.857	1.865	1.890	331	1.141	1.149	1.164	306	1.071	1.077	1.101	242	0.898	0.902	0.913	118	0.245	0.245	0.245	0
Cl	Operations	Jul	5	1.112	1.122	1.152	455	1.956	1.949	1.970	355	0.777	0.776	0.785	255	1.008	1.014	1.038	218	0.890	0.895	0.907	122	0.246	0.246	0.246	0
Cl	Operations	Aug	5	1.192	1.202	1.234	513	1.998	1.989	2.005	373	0.638	0.635	0.640	285	0.928	0.935	0.957	187	0.879	0.885	0.897	126	0.246	0.246	0.246	0
Cl	Operations	Sep	5	1.595	1.608	1.650	569	2.053	2.045	2.060	392	0.654	0.652	0.658	321	0.873	0.880	0.900	166	0.863	0.869	0.882	127	0.247	0.247	0.247	0
Cl	Operations	Oct	5	2.071	2.087	2.141	584	2.120	2.116	2.132	409	0.688	0.686	0.692	347	0.839	0.845	0.864	156	0.848	0.853	0.867	126	0.247	0.247	0.247	0
Cl	Operations	Nov	5	2.445	2.463	2.527	448	2.662	2.667	2.701	410	2.175	2.176	2.200	394	0.983	0.989	1.009	164	1.043	1.050	1.065	100	0.286	0.286	0.286	0
Cl	Operations	Dec	5	1.608	1.620	1.662	273	2.595	2.606	2.648	389	2.468	2.476	2.512	364	1.073	1.079	1.100	188	1.036	1.042	1.058	102	0.285	0.285	0.285	0
Cl	Closure	Jan	6	1.321	1.321	1.390	209	2.493	2.496	2.578	358	2.322	2.322	2.396	302	1.114	1.112	1.150	194	0.985	0.989	1.035	94	0.285	0.285	0.285	0
Cl	Closure	Feb	6	1.209	1.205	1.269	151	2.544	2.548	2.642	324	2.251	2.254	2.347	225	1.250	1.245	1.275	212	1.019	1.023	1.070	97	0.298	0.298	0.298	0
Cl	Closure	Mar	6	0.992	0.986	1.032	137	2.405	2.407	2.503	292	2.079	2.082	2.162	205	1.302	1.295	1.325	225	1.030	1.033	1.077	100	0.285	0.285	0.286	0
Cl	Closure	Apr	6	0.991	0.981	1.015	140	2.300	2.300	2.391	266	2.007	2.009	2.086	183	1.345	1.338	1.373	236	1.042	1.044	1.085	104	0.285	0.285	0.285	0
Cl	Closure	May	6	0.759	0.758	0.786	223	1.632	1.629	1.681	270	0.836	0.844	0.882	234	1.083	1.078	1.108	231	0.893	0.894	0.925	107	0.245	0.245	0.245	0
Cl	Closure	Jun	6	0.971	0.979	1.020	367	1.631	1.630	1.687	276	0.986	0.994	1.032	251	1.004	1.001	1.029	215	0.847	0.849	0.872	105	0.245	0.245	0.245	0
Cl	Closure	Jul	6	1.139	1.147	1.196	467	1.692	1.705	1.771	298	0.674	0.680	0.705	211	0.940	0.936	0.962	191	0.839	0.841	0.859	108	0.246	0.246	0.246	0
Cl	Closure	Aug	6	1.223	1.229	1.282	527	1.744	1.764	1.835	320	0.544	0.551	0.574	234	0.866	0.862	0.883	161	0.829	0.829	0.844	112	0.246	0.246	0.246	0
Cl	Closure	Sep	6	1.639	1.637	1.711	581	1.823	1.840	1.913	343	0.566	0.570	0.595	269	0.815	0.811	0.829	142	0.813	0.813	0.826	112	0.247	0.247	0.247	0
Cl	Closure	Oct	6	2.128	2.118	2.214	595	1.956	1.968	2.044	374	0.619	0.622	0.648	305	0.784	0.779	0.797	133	0.798	0.798	0.810	111	0.247	0.247	0.247	0
Cl	Closure	Nov	6	2.551	2.543	2.631	465	2.556	2.569	2.671	391	2.070	2.073	2.167	370	0.913	0.915	0.938	141	0.989	0.987	1.001	88	0.286	0.286	0.286	0
Cl	Closure	Dec	6	1.736	1.715	1.808	294	2.546	2.567	2.658	382	2.409	2.425	2.517	354	1.005	1.010	1.039	167	0.981	0.980	0.994	90	0.286	0.286	0.286	0
Cl	Post-Closure	Jan	117	0.421	0.443	1.810	4	1.235	1.193	2.488	119	1.085	1.058	2.294	83	0.492	0.493	1.047	29	0.581	0.586	0.980	14	0.285	0.285	0.285	0
Cl	Post-Closure	Feb	117	0.472	0.495	1.995	3	1.365	1.316	2.602	119	1.248	1.216	2.325	75	0.523	0.525	1.162	30	0.594	0.599	1.009	15	0.298	0.298	0.298	0
Cl	Post-Closure	Mar	117	0.408	0.427	1.692	3	1.452	1.394	2.505	127	1.247	1.211	2.149	77	0.528	0.529	1.205	31	0.590	0.595	1.012	15	0.285	0.285	0.286	0
Cl	Post-Closure	Apr	117	0.402	0.419	1.631	2	1.537	1.469	2.414	134	1.293	1.254	2.096	77	0.532	0.533	1.244	33	0.586	0.590	1.016	15	0.285	0.285	0.285	0
Cl	Post-Closure	May	117	0.235	0.246	0.854	5	1.076	1.028	1.674	134	0.388	0.381	0.786	51	0.434	0.434	1.003	32	0.495	0.499	0.864	15	0.245	0.245	0.245	0
Cl	Post-Closure	Jun	117	0.213	0.223	0.889	7	1.022	0.979	1.615	126	0.511	0.494	0.955	75	0.420	0.420	0.934	31	0.473	0.476	0.815	14	0.245	0.245	0.246	0
Cl	Post-Closure	Jul	117	0.207	0.217	1.021	7	0.997	0.955	1.635	123	0.390	0.378	0.655	73	0.420	0.419	0.879	29	0.463	0.466	0.803	15	0.246	0.246	0.246	0
Cl	Post-Closure	Aug	117	0.201	0.211	1.089	8	0.967	0.927	1.648	121	0.290	0.282	0.502	71	0.420	0.419	0.815	26	0.452	0.455	0.790	16	0.246	0.246	0.246	0
Cl	Post-Closure	Sep	117	0.241	0.253	1.395	5	0.953	0.914	1.680	120	0.273	0.265	0.501	71	0.421	0.419	0.770	24	0.445	0.447	0.775	16	0.247	0.247	0.247	0
Cl	Post-Closure	Oct	117	0.301	0.313	1.528	3	0.954	0.915	1.652	120	0.277	0.269	0.511	75	0.418	0.416	0.741	23	0.440	0.441	0.761	16	0.247	0.247	0.247	0
Cl	Post-Closure	Nov	117	0.444	0.459	1.991	2	1.194	1.144	1.973	119	0.864	0.833	1.413	89	0.479	0.476	0.843	25	0.595	0.596	0.949	13	0.286	0.286	0.286	0
Cl	Post-Closure	Dec	117	0.429	0.444	1.885	2	1.208	1.157	1.939	117	1.049	1.010	1.607	89	0.486	0.483	0.852	27	0.587	0.588	0.939	14	0.286	0.286	0.286	0
F	Construction	Jan	2	0.1963	0.1963	0.2406	136	0.1705	0.1705	0.2313	111	0.1611	0.1611	0.2260	123	0.1042	0.1042	0.1293	32	0.0855	0.0855	0.0963	14	0.0949	0.0949	0.0949	0
F	Construction	Feb	2	0.2390	0.2390	0.2557	153	0.2006	0.2006	0.2467	131	0.2047	0.2047	0.2579	124	0.1142	0.1142	0.1420	38	0.0885	0.0885	0.1004	16	0.0994	0.0994	0.0994	0
F	Construction	Mar	2	0.2227	0.2227	0.2284	169	0.2057	0.2057	0.2391	137	0.1708	0.1708	0.2010	103	0.1186	0.1186	0.1460	45	0.0892	0.0892	0.1018	17	0.0953	0.0953	0.0953	0
F	Construction	Apr	2	0.2296	0.2296	0.2316	179	0.2074	0.2074	0.2322	139	0.1635	0.1635	0.1834	110	0.1212	0.1212	0.1473	49	0.0903	0.0903	0.1035	19	0.0953	0.0953	0.0953	0
F	Construction	May	2	0.1597	0.1597	0.1599	192	0.1594	0.1594	0.1734	153	0.1091	0.1091	0.1165	146	0.1007	0.1007	0.1200	52	0.0794	0.0794	0.0909	22	0.0816	0.0816	0.0816	0
F	Construction	Jun	2	0.1739	0.1739	0.1742	213	0.1660	0.1660	0.1761	164	0.1473	0.1473	0.1559	149	0.1031	0.1031	0.1196	54	0.0809	0.0809	0.0918	23	0.0812	0.0812	0.0812	0
F	Construction	Jul	2	0.1873	0.1873	0.1879	222	0.1743	0.1743	0.1815	173	0.1512	0.1512	0.1570	136	0.1071	0.1071	0.1212	55	0.0841	0.0841	0.0949	26	0.0811	0.0811	0.0811	0
F	Construction	Aug	2	0.1938	0.1938	0.1945	217	0.1800	0.1800	0.1848	176	0.1568	0.1568	0.1602	138	0.1110	0.1110	0.1228	57	0.0877	0.0877	0.0982	29	0.0812	0.0812	0.0812	0
F	Construction	Sep	2	0.1974	0.1974	0.1982	218	0.1844	0.1844	0.1875	179	0.1625	0.1625	0.1643	143	0.1140	0.1140	0.1239	59	0.0901	0.0901	0.1002	32	0.0814	0.0814	0.0814	0
F	Construction	Oct	2	0.1989	0.1989	0.1997	222	0.1871	0.1871	0.1889	184	0.1683	0.1683	0.1690	153	0.1163	0.1163	0.1247	64	0.0915	0.0915	0.1010	34	0.0817	0.0817	0.0817	0
F	Construction	Nov	2	0.2670	0.2670	0.2680	210	0.2313	0.2313	0.2338	185	0.1259	0.1259	0.1308	64	0.1344	0.1344	0.1431	66	0.1037	0.1037	0.1139	37	0.0949	0.0949	0.0949	0
F	Construction	Dec	2	0.2468	0.2468	0.2476	193	0.2313	0.2313	0.2336	186	0.1852	0.1852	0.1869	208	0.1327	0.1327	0.1409	67	0.1049	0.1049	0.1147	40	0.0949	0.0949	0.0949	0
F	Operations	Jan	5	0.2375	0.2379	0.2389	186	0.2359	0.2353	0.2373	192	0.2309	0.2305	0.2325	219	0.1496	0.1493	0.1525	89	0.1246	0.1232	0.1276	65	0.0949	0.0949	0.0949	0
F	Operations	Feb	5	0.2526	0.2529	0.2537	167	0.2495	0.2488	0.2505	186	0.2616	0.2608	0.2626	185	0.1617	0.1614	0.1646	95	0.1287	0.1274	0.1317	66	0.0994	0.0994	0.0994	0
F	Operations	Mar	5	0.2262	0.2265	0.2273	174	0.2435	0.2422	0.2442	179	0.2035	0.2026	0.2037	140	0.1643	0.1640	0.1671	99	0.1293	0.1281	0.1323	68	0.0953	0.0953	0.0953	0
F	Operations	Apr	5	0.2296	0.2300	0.2309	179	0.2391	0.2374	0.2401	174	0.1888	0.1876	0.1898	141	0.1643	0.1640	0.1670	101	0.1301	0.1289	0.1331	70	0.0953	0.0953	0.0953	0
F	Operations	May	5	0.1588	0.1590	0.1597	191	0.1775	0.1765	0.1788	180	0.1170	0.1168	0.1195	163	0.1322	0.1320	0.1345	98	0.1120	0.1112	0.1146	70	0.0816	0.0816	0.0816	0
F	Operations	Jun	5	0.1725	0.1727	0.1734	211	0.1819	0.1807	0.1832	187	0.1596	0.1588	0.1612	168	0.1297	0.1294	0.1317	92	0.1091	0.1084	0.1113	64	0.0812	0.0812	0.0812	0
F	Operations	Jul	5	0.1852	0.1855	0.1863	219	0.1910	0.1889	0.1919	196	0.1637	0.1622	0.1647	153	0.1300	0.1295	0.1315	87	0.1101	0.1095	0.1122	63	0.0811	0.0811	0.0811	0
F	Operations	Aug	5	0.1916	0.1919	0.1928	214	0.1972	0.1945	0.1978	198	0.1700	0.1677	0.1707	155	0.1307	0.1300	0.1318	83	0.1119	0.1113	0.1138	63	0.0812	0.0812	0.0812	0
F	Operations	Sep	5	0.1949	0.1952	0.1962	214	0.2008	0.1979	0.2013	200	0.1756	0.1730	0.1761	159	0.1315	0.1306	0.1323	82	0.1126	0.1119	0.1143	63	0.0814	0.0814	0.0814	0
F	Operations	Oct	5	0.1967	0.1970	0.1981	219	0.2005	0.1978	0.2009	201	0.1792	0.1765	0.1795	165	0.1322	0.1311	0.1328	84	0.1124	0.1117	0.1139	64	0.0817	0.0817	0.0817	0
F	Operations	Nov	5	0.2639	0.2643	0.2658	207	0.2438	0.2414	0.2441	197	0.1396	0.1379	0.1398	80	0.1516	0.1502	0.1523	85	0.1259	0.1251	0.1275	65	0.0949	0.0949	0.0949	0
F	Operations	Dec	5	0.2439	0.2442	0.2456	190	0.2402	0.2386	0.2404	195	0.1913	0.1900	0.1915	216	0.1492	0.1479	0.1498	85	0.1263	0.1255	0.1278	67	0.0949	0.0949	0.0949	0
F	Closure	Jan	6	0.2399	0.2395	0.2413	188	0.2366	0.2359	0.2381	192	0.2316	0.2308	0.2331	220	0.1456	0.1466	0.1528	84	0.1226	0.1235	0.1280	64	0.0949	0.0949	0.0949	0
F	Closure	Feb	6	0.2554	0.2550	0.2568	170	0.2500	0.2498	0.2523	188	0.2626	0.2621	0.2650	187	0.1581	0.1591	0.1648	91	0.1267	0.1275	0.1322	66	0.0994	0.0994	0.0994	0
F	Closure	Mar	6	0.2276	0.2276	0.2291	175	0.2434	0.2436	0.2460	180	0.2052	0.2054	0.2077	144	0.1610	0.1618	0.1668	96	0.1273	0.1281	0.1326	67	0.0953	0.0953	0.0953	0
F	Closure	Apr	6	0.2308	0.2310	0.2327	180	0.2376	0.2378	0.2403	174	0.1872	0.1874	0.1895	141	0.1610	0.1617	0.1662	97	0.1279	0.1286	0.1330	69	0.0953	0.0953	0.0953	0
F	Closure	May	6	0.1591	0.1592	0.1607	191	0.1726	0.1729	0.1751	175	0.1099	0.1091	0.1118	146	0.1294	0.1300	0.1330	95	0.1099	0.1105	0.1140	68	0.0816	0.0816	0.0816	0
F	Closure	Jun	6	0.1729	0.1724	0.1746	210	0.1719	0.1727	0.1752	174	0.1502	0.1501	0.1528	153	0.1262	0.1267	0.1289	88	0.1069	0.1074	0.1103	62	0.0812	0.0812	0.0812	0
F	Closure	Jul	6	0.1861	0.1852	0.1879	218	0.1779	0.1784	0.1813	179	0.1514	0.1511	0.1540	136	0.1255	0.1258	0.1274	81	0.1078	0.1082	0.1107	61	0.0811	0.0811	0.0811	0
F	Closure	Aug	6	0.1927	0.1915	0.1945	214	0.1832	0.1832	0.1864	181	0.1559	0.1551	0.1583	136	0.1250	0.1250	0.1263	75	0.1092	0.1096	0.1117	60	0.0812	0.0812	0.0812	0
F	Closure	Sep	6	0.1964	0.1950	0.1982	214	0.1872	0.1869	0.1901	183	0.1616	0.1605	0.1637	140	0.1248	0.1246	0.1256	73	0.1095	0.1098	0.1117	59	0.0814	0.0814	0.0814	0
F	Closure	Oct	6	0.1976	0.1965	0.1997	218	0.1893	0.1888	0.1920	187	0.1674	0.1661	0.1697	150	0.1251	0.1246	0.1258	74	0.1090	0.1092	0.1109	59	0.0817	0.0817	0.0817	0
F	Closure	Nov	6	0.2657	0.2647	0.2683	207	0.2349	0.2343	0.2383	188	0.1331	0.1329	0.1346	73	0.1434	0.1429	0.1444	76	0.1219	0.1220	0.1237	60	0.0948	0.0948	0.0949	0
F	Closure	Dec	6	0.2461	0.2458	0.2481	192	0.2352	0.2348	0.2387	191	0.1878	0.1862	0.1905	210	0.1413	0.1409	0.1423	75	0.1220	0.1220	0.1236	62	0.0949	0.0949	0.0949	0
F	Post-Closure	Jan	117	0.0833	0.0858	0.2391	3	0.1246	0.1224	0.2299	52	0.1051	0.1037	0.2223	44	0.0891	0.0894	0.1401	12	0.0809	0.0815	0.1202	8	0.0952	0.0951	0.0952	0
F	Post-Closure	Feb	117	0.0944	0.0971	0.2561	3	0.1354	0.1328	0.2461	53	0.1321	0.1302	0.2592	42	0.0936	0.0939	0.1510	13	0.0830	0.0836	0.1238	8	0.0997	0.0997	0.0997	0
F	Post-Closure	Mar	117	0.0823	0.0847	0.2299	2	0.1398	0.1367	0.2425	57	0.1233	0.1211	0.2052	44	0.0933	0.0936	0.1531	13	0.0826	0.0832	0.1239	8	0.0955	0.0955	0.0955	0
F	Post-Closure	Apr	117	0.0818	0.0841	0.2316	2	0.1439	0.1403	0.2383	62	0.1140	0.1119	0.1868	44	0.0927	0.0930	0.1532	13	0.0822	0.0827	0.1240	9	0.0956	0.0956	0.0956	0
F	Post-Closure	May	117	0.0544	0.0558	0.1544	2	0.1033	0.1006	0.1709	60	0.0531	0.0528	0.0982	19	0.0753	0.0755	0.1230	13	0.0707	0.0711	0.1062	8	0.0818	0.0818	0.0818	0
F	Post-Closure	Jun	117	0.0553	0.0566	0.1605	2	0.1004	0.0980	0.1673	56	0.0786	0.0774	0.1407	31	0.0755	0.0756	0.1199	12	0.0708	0.0712	0.1031	7	0.0814	0.0814	0.0814	0
F	Post-Closure	Jul	117	0.0579	0.0591	0.1698	2	0.1000	0.0977	0.1693	53	0.0833	0.0822	0.1399	28	0.0772	0.0774	0.1189	11	0.0719	0.0722	0.1037	7	0.0813	0.0813	0.0813	0
F	Post-Closure	Aug	117	0.0606	0.0619	0.1745	1	0.0999	0.0977	0.1712	50	0.0848	0.0837	0.1408	27	0.0790	0.0791	0.1177	10	0.0732	0.0735	0.1048	7	0.0814	0.0814	0.0814	0
F	Post-Closure	Sep	117	0.0619	0.0631	0.1775	2	0.1001	0.0979	0.1728	48	0.0861	0.0850	0.1439	27	0.0796	0.0797	0.1166	10	0.0737	0.0740	0.1047	7	0.0816	0.0816	0.0816	0
F	Post-Closure	Oct	117	0.0617	0.0627	0.1673	2	0.1001	0.0979	0.1684	49	0.0871	0.0859	0.1448	29	0.0792	0.0791	0.1157	10	0.0734	0.0737	0.1039	7	0.0818	0.0818	0.0818	0
F	Post-Closure	Nov	117	0.0864	0.0878	0.2193	2	0.1240	0.1211	0.2019	49	0.1021	0.1008	0.1605	31	0.0906	0.0905	0.1326	11	0.0816	0.0819	0.1156	8	0.0951	0.0951	0.0951	0
F	Post-Closure	Dec	117	0.0843	0.0856	0.2093	2	0.1238	0.1209	0.1982	50	0.0860	0.0843	0.1301	40	0.0897	0.0895	0.1315	11	0.0813	0.0815	0.1153	8	0.0951	0.0951	0.0951	0
P, Tot	Construction	Jan	2	0.1188	0.1188	0.1524	232	0.0235	0.0235	0.0310	16	0.0318	0.0318	0.0380	-13	0.0247	0.0247	0.0305	29	0.0155	0.0155	0.0173	-11	0.0326	0.0326	0.0326	0
P, Tot	Construction	Feb	2	0.1495	0.1495	0.1624	265	0.0162	0.0162	0.0225	-22	0.0220	0.0220	0.0298	-53	0.0245	0.0245	0.0304	23	0.0152	0.0152	0.0171	-13	0.0339	0.0339	0.0340	0
P, Tot	Construction	Mar	2	0.1409	0.1409	0.1450	289	0.0108	0.0108	0.0153	-47	0.0141	0.0141	0.0195	-71	0.0227	0.0227	0.0286	15	0.0142	0.0142	0.0158	-17	0.0323	0.0323	0.0324	0
P, Tot	Construction	Apr	2	0.1459	0.1459	0.1469	301	0.0075	0.0075	0.0103	-62	0.0103	0.0103	0.0137	-79	0.0207	0.0207	0.0263	5	0.0132	0.0132	0.0144	-22	0.0321	0.0321	0.0321	0
P, Tot	Construction	May	2	0.1440	0.1440	0.1446	216	0.0508	0.0508	0.0550	117	0.0291	0.0291	0.0309	21	0.0164	0.0164	0.0206	3	0.0162	0.0162	0.0168	-17	0.0274	0.0274	0.0274	0
P, Tot	Construction	Jun	2	0.1883	0.1883	0.1900	329	0.0860	0.0860	0.0918	249	0.0721	0.0721	0.0762	157	0.0196	0.0196	0.0231	20	0.0191	0.0191	0.0191	-12	0.0273	0.0273	0.0274	0
P, Tot	Construction	Jul	2	0.1519	0.1519	0.1534	295	0.0810	0.0810	0.0865	249	0.0718	0.0718	0.0759	187	0.0236	0.0236	0.0267	39	0.0199	0.0199	0.0204	-8	0.0270	0.0270	0.0270	0
P, Tot	Construction	Aug	2	0.1147	0.1147	0.1159	256	0.0681	0.0681	0.0728	223	0.0616	0.0616	0.0652	191	0.0265	0.0265	0.0292	53	0.0210	0.0210	0.0219	-2	0.0263	0.0263	0.0263	0
P, Tot	Construction	Sep	2	0.1182	0.1182	0.1196	300	0.0726	0.0726	0.0761	263	0.0612	0.0612	0.0640	183	0.0283	0.0283	0.0307	61	0.0198	0.0198	0.0207	-1	0.0268	0.0268	0.0269	0
P, Tot	Construction	Oct	2	0.1201	0.1201	0.1217	346	0.0812	0.0812	0.0836	322	0.0709	0.0709	0.0726	215	0.0303	0.0303	0.0324	73	0.0170	0.0170	0.0179	-5	0.0281	0.0281	0.0281	0
P, Tot	Construction	Nov	2	0.1637	0.1637	0.1659	351	0.0791	0.0791	0.0830	253	0.0942	0.0942	0.0986	147	0.0354	0.0354	0.0376	79	0.0169	0.0169	0.0179	-9	0.0329	0.0329	0.0329	0
P, Tot	Construction	Dec	2	0.1537	0.1537	0.1557	330	0.0502	0.0502	0.0534	138	0.0601	0.0601	0.0636	78	0.0341	0.0341	0.0363	76	0.0156	0.0156	0.0165	-13	0.0327	0.0327	0.0327	0
P, Tot	Operations	Jan	5	0.1435	0.1448	0.1480	305	0.0345	0.0345	0.0349	71	0.0422	0.0422	0.0426	16	0.0344	0.0345	0.0350	79	0.0166	0.0164	0.0167	-5	0.0325	0.0325	0.0325	0
P, Tot	Operations	Feb	5	0.1530	0.1544	0.1578	276	0.0246	0.0248	0.0253	18	0.0327	0.0328	0.0333	-30	0.0345	0.0345	0.0349	72	0.0163	0.0160	0.0163	-7	0.0339	0.0339	0.0339	0
P, Tot	Operations	Mar	5	0.1371	0.1384	0.1416	282	0.0157	0.0158	0.0170	-22	0.0199	0.0200	0.0215	-58	0.0321	0.0322	0.0326	62	0.0154	0.0152	0.0155	-11	0.0323	0.0323	0.0323	0
P, Tot	Operations	Apr	5	0.1392	0.1405	0.1439	286	0.0105	0.0105	0.0113	-46	0.0140	0.0139	0.0149	-72	0.0295	0.0296	0.0302	51	0.0144	0.0143	0.0146	-14	0.0321	0.0321	0.0321	0
P, Tot	Operations	May	5	0.1375	0.1386	0.1415	204	0.0519	0.0520	0.0539	122	0.0293	0.0295	0.0304	23	0.0229	0.0230	0.0234	43	0.0176	0.0175	0.0177	-10	0.0274	0.0274	0.0274	0
P, Tot	Operations	Jun	5	0.1789	0.1803	0.1843	311	0.0865	0.0868	0.0896	253	0.0721	0.0723	0.0745	158	0.0247	0.0247	0.0253	51	0.0209	0.0208	0.0210	-4	0.0273	0.0273	0.0273	0
P, Tot	Operations	Jul	5	0.1435	0.1447	0.1480	276	0.0816	0.0819	0.0845	253	0.0721	0.0721	0.0741	188	0.0277	0.0277	0.0283	63	0.0220	0.0220	0.0221	2	0.0270	0.0270	0.0270	0
P, Tot	Operations	Aug	5	0.1082	0.1090	0.1116	238	0.0686	0.0689	0.0711	227	0.0618	0.0620	0.0637	193	0.0297	0.0297	0.0303	71	0.0232	0.0233	0.0234	9	0.0263	0.0263	0.0263	0
P, Tot	Operations	Sep	5	0.1116	0.1124	0.1151	281	0.0723	0.0725	0.0744	263	0.0609	0.0611	0.0626	183	0.0308	0.0308	0.0315	76	0.0219	0.0218	0.0219	10	0.0269	0.0268	0.0269	0
P, Tot	Operations	Oct	5	0.1138	0.1146	0.1174	326	0.0790	0.0792	0.0813	312	0.0686	0.0689	0.0703	206	0.0321	0.0322	0.0328	83	0.0189	0.0188	0.0190	6	0.0281	0.0281	0.0281	0
P, Tot	Operations	Nov	5	0.1551	0.1562	0.1600	330	0.0787	0.0790	0.0811	252	0.0939	0.0942	0.0966	147	0.0370	0.0371	0.0378	87	0.0190	0.0190	0.0191	3	0.0329	0.0329	0.0329	0
P, Tot	Operations	Dec	5	0.1457	0.1466	0.1501	310	0.0516	0.0518	0.0529	145	0.0616	0.0618	0.0631	83	0.0357	0.0359	0.0366	84	0.0176	0.0176	0.0177	0	0.0327	0.0327	0.0327	0
P, Tot	Closure	Jan	6	0.1485	0.1482	0.1533	314	0.0342	0.0347	0.0381	72	0.0420	0.0428	0.0468	18	0.0328	0.0329	0.0342	71	0.0160	0.0161	0.0166	-5	0.0326	0.0326	0.0326	0
P, Tot	Closure	Feb	6	0.1592	0.1585	0.1638	287	0.0250	0.0254	0.0285	21	0.0335	0.0341	0.0382	-27	0.0327	0.0329	0.0343	64	0.0156	0.0157	0.0162	-8	0.0340	0.0340	0.0340	0
P, Tot	Closure	Mar	6	0.1427	0.1419	0.1464	292	0.0173	0.0177	0.0203	-12	0.0225	0.0231	0.0263	-52	0.0308	0.0310	0.0325	56	0.0148	0.0149	0.0154	-11	0.0324	0.0324	0.0324	0
P, Tot	Closure	Apr	6	0.1451	0.1442	0.1488	296	0.0124	0.0126	0.0148	-35	0.0169	0.0175	0.0202	-65	0.0287	0.0290	0.0305	47	0.0141	0.0141	0.0146	-14	0.0322	0.0322	0.0322	0
P, Tot	Closure	May	6	0.1399	0.1406	0.1451	208	0.0466	0.0474	0.0502	102	0.0270	0.0272	0.0285	13	0.0224	0.0227	0.0238	41	0.0173	0.0173	0.0178	-10	0.0275	0.0274	0.0275	0
P, Tot	Closure	Jun	6	0.1814	0.1828	0.1896	316	0.0780	0.0797	0.0851	224	0.0641	0.0649	0.0692	132	0.0239	0.0239	0.0245	45	0.0206	0.0206	0.0211	-4	0.0274	0.0274	0.0274	0
P, Tot	Closure	Jul	6	0.1484	0.1484	0.1536	286	0.0775	0.0788	0.0839	239	0.0659	0.0669	0.0715	167	0.0262	0.0261	0.0268	54	0.0216	0.0216	0.0220	1	0.0270	0.0270	0.0270	0
P, Tot	Closure	Aug	6	0.1133	0.1126	0.1162	249	0.0682	0.0688	0.0731	226	0.0590	0.0600	0.0639	183	0.0276	0.0278	0.0287	59	0.0227	0.0227	0.0230	7	0.0264	0.0264	0.0264	0
P, Tot	Closure	Sep	6	0.1157	0.1157	0.1197	292	0.0714	0.0721	0.0765	260	0.0591	0.0599	0.0636	178	0.0285	0.0289	0.0299	64	0.0213	0.0213	0.0215	8	0.0269	0.0269	0.0269	0
P, Tot	Closure	Oct	6	0.1174	0.1175	0.1217	337	0.0782	0.0791	0.0838	311	0.0668	0.0679	0.0720	202	0.0299	0.0302	0.0315	72	0.0184	0.0184	0.0187	5	0.0281	0.0281	0.0281	0
P, Tot	Closure	Nov	6	0.1613	0.1608	0.1662	343	0.0801	0.0799	0.0844	256	0.0951	0.0951	0.1002	149	0.0347	0.0351	0.0366	77	0.0185	0.0185	0.0189	2	0.0329	0.0329	0.0329	0
P, Tot	Closure	Dec	6	0.1536	0.1520	0.1563	325	0.0526	0.0532	0.0586	152	0.0632	0.0638	0.0696	89	0.0336	0.0340	0.0355	74	0.0171	0.0172	0.0176	-2	0.0328	0.0327	0.0328	0
P, Tot	Post-Closure	Jan	117	0.0379	0.0397	0.1511	11	0.0220	0.0227	0.0695	12	0.0382	0.0389	0.0773	7	0.0195	0.0198	0.0324	3	0.0167	0.0168	0.0192	0	0.0326	0.0326	0.0326	0
P, Tot	Post-Closure	Feb	117	0.0432	0.0451	0.1627	10	0.0225	0.0231	0.0722	11	0.0476	0.0484	0.0923	3	0.0203	0.0206	0.0330	3	0.0169	0.0170	0.0194	0	0.0340	0.0340	0.0340	0
P, Tot	Post-Closure	Mar	117	0.0379	0.0396	0.1465	9	0.0210	0.0216	0.0698	7	0.0461	0.0471	0.0890	-2	0.0201	0.0204	0.0320	3	0.0165	0.0166	0.0191	0	0.0325	0.0325	0.0325	0
P, Tot	Post-Closure	Apr	117	0.0378	0.0395	0.1478	9	0.0194	0.0202	0.0675	4	0.0440	0.0454	0.0877	-9	0.0198	0.0202	0.0317	2	0.0162	0.0163	0.0187	0	0.0322	0.0322	0.0322	0
P, Tot	Post-Closure	May	117	0.0469	0.0480	0.1338	5	0.0237	0.0243	0.0541	4	0.0228	0.0232	0.0320	-3	0.0161	0.0164	0.0253	2	0.0191	0.0191	0.0212	0	0.0275	0.0275	0.0275	0
P, Tot	Post-Closure	Jun	117	0.0452	0.0464	0.1642	6	0.0254	0.0260	0.0692	6	0.0284	0.0288	0.0554	3	0.0165	0.0167	0.0248	2	0.0214	0.0214	0.0235	0	0.0274	0.0274	0.0274	0
P, Tot	Post-Closure	Jul	117	0.0402	0.0413	0.1411	7	0.0242	0.0248	0.0700	7	0.0258	0.0262	0.0570	5	0.0171	0.0173	0.0253	2	0.0212	0.0213	0.0235	0	0.0271	0.0271	0.0271	0
P, Tot	Post-Closure	Aug	117	0.0342	0.0350	0.1110	9	0.0223	0.0229	0.0637	9	0.0221	0.0224	0.0527	6	0.0175	0.0177	0.0262	2	0.0210	0.0211	0.0236	0	0.0264	0.0264	0.0264	0
P, Tot	Post-Closure	Sep	117	0.0314	0.0322	0.1098	9	0.0216	0.0221	0.0661	11	0.0227	0.0230	0.0534	7	0.0177	0.0179	0.0268	2	0.0195	0.0196	0.0221	0	0.0269	0.0269	0.0269	0
P, Tot	Post-Closure	Oct	117	0.0288	0.0295	0.1011	10	0.0212	0.0217	0.0669	13	0.0239	0.0242	0.0573	8	0.0177	0.0179	0.0274	2	0.0173	0.0174	0.0198	1	0.0281	0.0281	0.0281	0
P, Tot	Post-Closure	Nov	117	0.0389	0.0398	0.1302	10	0.0249	0.0254	0.0768	13	0.0408	0.0414	0.0941	9	0.0201	0.0203	0.0315	2	0.0181	0.0182	0.0207	1	0.0330	0.0329	0.0330	0
P, Tot	Post-Closure	Dec	117	0.0381	0.0390	0.1240	9	0.0232	0.0237	0.0724	12	0.0362	0.0368	0.0797	9	0.0197	0.0199	0.0312	2	0.0173	0.0174	0.0198	0	0.0328	0.0328	0.0328	0
NH3 (as N)	Construction	Jan	2	0.2911	0.2911	0.3548	158	0.1968	0.1968	0.2863	332	0.2546	0.2546	0.3094	-7	0.0271	0.0271	0.0369	60	0.0328	0.0328	0.0342	5	0.0211	0.0211	0.0211	0
NH3 (as N)	Construction	Feb	2	0.3691	0.3691	0.3925	187	0.2680	0.2680	0.3346	418	0.2773	0.2773	0.3541	17	0.0308	0.0308	0.0415	69	0.0335	0.0335	0.0354	5	0.0223	0.0223	0.0223	0
NH3 (as N)	Construction	Mar	2	0.3490	0.3490	0.3567	209	0.2947	0.2947	0.3444	444	0.2876	0.2876	0.3386	94	0.0338	0.0338	0.0440	84	0.0332	0.0332	0.0356	5	0.0215	0.0215	0.0216	1
NH3 (as N)	Construction	Apr	2	0.3620	0.3620	0.3645	221	0.3096	0.3096	0.3491	449	0.3025	0.3025	0.3415	166	0.0372	0.0372	0.0468	104	0.0331	0.0331	0.0361	6	0.0218	0.0218	0.0219	1
NH3 (as N)	Construction	May	2	0.2481	0.2481	0.2482	253	0.2154	0.2154	0.2385	455	0.1502	0.1502	0.1633	323	0.0296	0.0296	0.0367	110	0.0265	0.0265	0.0292	4	0.0186	0.0186	0.0187	1
NH3 (as N)	Construction	Jun	2	0.2685	0.2685	0.2693	294	0.1964	0.1964	0.2133	424	0.1747	0.1747	0.1892	367	0.0252	0.0252	0.0311	103	0.0209	0.0209	0.0232	-1	0.0182	0.0182	0.0183	1
NH3 (as N)	Construction	Jul	2	0.2873	0.2873	0.2886	328	0.1675	0.1675	0.1804	374	0.1505	0.1505	0.1612	352	0.0289	0.0289	0.0341	131	0.0177	0.0177	0.0198	-4	0.0177	0.0177	0.0177	1
NH3 (as N)	Construction	Aug	2	0.2952	0.2952	0.2968	350	0.1317	0.1317	0.1414	313	0.1192	0.1192	0.1271	320	0.0339	0.0339	0.0385	158	0.0155	0.0155	0.0173	-4	0.0169	0.0169	0.0170	0
NH3 (as N)	Construction	Sep	2	0.2362	0.2362	0.2375	305	0.1250	0.1250	0.1316	313	0.1292	0.1292	0.1357	86	0.0328	0.0328	0.0369	157	0.0159	0.0159	0.0178	6	0.0170	0.0170	0.0170	0
NH3 (as N)	Construction	Oct	2	0.1612	0.1612	0.1621	234	0.1274	0.1274	0.1311	332	0.1354	0.1354	0.1400	60	0.0304	0.0304	0.0340	147	0.0177	0.0177	0.0197	20	0.0175	0.0175	0.0175	0
NH3 (as N)	Construction	Nov	2	0.2820	0.2820	0.2836	144	0.1906	0.1906	0.1906	387	0.2752	0.2752	0.2856	-16	0.0358	0.0358	0.0395	133	0.0370	0.0370	0.0394	13	0.0207	0.0207	0.0207	0
NH3 (as N)	Construction	Dec	2	0.3293	0.3293	0.3313	191	0.2438	0.2438	0.2441	471	0.2650	0.2650	0.2661	11	0.0379	0.0379	0.0412	130	0.0368	0.0368	0.0392	15	0.0209	0.0209	0.0210	1
NH3 (as N)	Operations	Jan	5	0.3460	0.3472	0.3500	208	0.2886	0.2897	0.2961	536	0.3164	0.3157	0.3210	16	0.0472	0.0462	0.0479	173	0.0428	0.0421	0.0436	35	0.0211	0.0211	0.0212	1
NH3 (as N)	Operations	Feb	5	0.3826	0.3838	0.3866	199	0.3456	0.3424	0.3499	562	0.3626	0.3611	0.3683	52	0.0516	0.0505	0.0521	178	0.0442	0.0435	0.0450	37	0.0223	0.0223	0.0223	1
NH3 (as N)	Operations	Mar	5	0.3486	0.3499	0.3529	210	0.3694	0.3655	0.3761	575	0.3605	0.3568	0.3665	141	0.0538	0.0527	0.0544	188	0.0445	0.0437	0.0452	40	0.0216	0.0216	0.0216	1
NH3 (as N)	Operations	Apr	5	0.3566	0.3580	0.3612	217	0.3807	0.3757	0.3867	566	0.3721	0.3676	0.3782	224	0.0564	0.0552	0.0571	203	0.0450	0.0442	0.0457	43	0.0219	0.0219	0.0219	1
NH3 (as N)	Operations	May	5	0.2434	0.2443	0.2465	248	0.2589	0.2551	0.2621	557	0.1729	0.1717	0.1754	383	0.0437	0.0429	0.0443	205	0.0364	0.0357	0.0370	42	0.0186	0.0186	0.0187	1
NH3 (as N)	Operations	Jun	5	0.2630	0.2639	0.2662	288	0.2346	0.2310	0.2381	516	0.2050	0.2026	0.2087	442	0.0368	0.0362	0.0374	193	0.0288	0.0283	0.0292	35	0.0182	0.0182	0.0183	1
NH3 (as N)	Operations	Jul	5	0.2807	0.2816	0.2843	319	0.2016	0.1984	0.2052	462	0.1786	0.1759	0.1821	428	0.0392	0.0389	0.0400	212	0.0243	0.0239	0.0247	32	0.0177	0.0177	0.0177	1
NH3 (as N)	Operations	Aug	5	0.2883	0.2892	0.2920	341	0.1590	0.1567	0.1621	392	0.1425	0.1403	0.1453	394	0.0432	0.0432	0.0444	229	0.0211	0.0208	0.0214	31	0.0170	0.0170	0.0170	1
NH3 (as N)	Operations	Sep	5	0.2298	0.2305	0.2329	296	0.1488	0.1467	0.1519	385	0.1497	0.1480	0.1522	113	0.0412	0.0411	0.0423	223	0.0214	0.0210	0.0216	42	0.0170	0.0170	0.0170	1
NH3 (as N)	Operations	Oct	5	0.1566	0.1571	0.1589	226	0.1467	0.1446	0.1499	391	0.1543	0.1526	0.1570	81	0.0381	0.0379	0.0389	210	0.0233	0.0229	0.0236	58	0.0175	0.0175	0.0175	1
NH3 (as N)	Operations	Nov	5	0.2759	0.2767	0.2795	140	0.2029	0.2018	0.2066	416	0.3068	0.3054	0.3106	-7	0.0441	0.0438	0.0450	186	0.0433	0.0430	0.0438	32	0.0207	0.0207	0.0207	1
NH3 (as N)	Operations	Dec	5	0.3222	0.3231	0.3266	185	0.2518	0.2499	0.2552	485	0.2764	0.2765	0.2816	16	0.0456	0.0453	0.0464	176	0.0431	0.0429	0.0436	36	0.0209	0.0209	0.0209	1
NH3 (as N)	Closure	Jan	6	0.3497	0.3499	0.3554	211	0.2788	0.2785	0.2857	511	0.3052	0.3047	0.3097	11	0.0429	0.0434	0.0461	156	0.0408	0.0412	0.0430	33	0.0210	0.0210	0.0211	0
NH3 (as N)	Closure	Feb	6	0.3876	0.3878	0.3939	202	0.3250	0.3254	0.3343	529	0.3460	0.3460	0.3532	46	0.0473	0.0476	0.0501	161	0.0421	0.0424	0.0443	35	0.0222	0.0222	0.0223	0
NH3 (as N)	Closure	Mar	6	0.3523	0.3527	0.3579	212	0.3372	0.3379	0.3472	524	0.3312	0.3320	0.3412	124	0.0491	0.0494	0.0515	170	0.0423	0.0426	0.0445	37	0.0214	0.0214	0.0216	0
NH3 (as N)	Closure	Apr	6	0.3604	0.3608	0.3663	220	0.3434	0.3443	0.3535	510	0.3347	0.3356	0.3449	196	0.0509	0.0512	0.0528	180	0.0425	0.0428	0.0446	40	0.0217	0.0217	0.0219	0
NH3 (as N)	Closure	May	6	0.2442	0.2455	0.2497	249	0.2326	0.2331	0.2394	500	0.1484	0.1483	0.1545	318	0.0395	0.0397	0.0408	181	0.0344	0.0346	0.0361	38	0.0185	0.0185	0.0186	0
NH3 (as N)	Closure	Jun	6	0.2640	0.2645	0.2697	288	0.2074	0.2080	0.2134	455	0.1785	0.1799	0.1856	381	0.0335	0.0336	0.0347	172	0.0274	0.0276	0.0289	33	0.0181	0.0181	0.0182	0
NH3 (as N)	Closure	Jul	6	0.2826	0.2824	0.2885	320	0.1793	0.1796	0.1839	408	0.1540	0.1552	0.1599	366	0.0350	0.0352	0.0358	182	0.0232	0.0234	0.0246	30	0.0176	0.0176	0.0177	0
NH3 (as N)	Closure	Aug	6	0.2907	0.2899	0.2965	342	0.1445	0.1449	0.1488	355	0.1256	0.1260	0.1295	344	0.0382	0.0382	0.0390	190	0.0201	0.0203	0.0213	30	0.0169	0.0169	0.0170	0
NH3 (as N)	Closure	Sep	6	0.2333	0.2336	0.2382	301	0.1339	0.1341	0.1370	343	0.1381	0.1383	0.1408	99	0.0362	0.0363	0.0370	184	0.0200	0.0202	0.0210	38	0.0169	0.0169	0.0170	0
NH3 (as N)	Closure	Oct	6	0.1622	0.1613	0.1647	234	0.1309	0.1310	0.1339	344	0.1416	0.1418	0.1443	68	0.0335	0.0336	0.0342	174	0.0215	0.0216	0.0223	51	0.0174	0.0174	0.0175	0
NH3 (as N)	Closure	Nov	6	0.2801	0.2798	0.2837	142	0.1861	0.1872	0.1918	378	0.2908	0.2919	0.3087	-11	0.0391	0.0392	0.0400	156	0.0411	0.0413	0.0420	28	0.0206	0.0206	0.0207	0
NH3 (as N)	Closure	Dec	6	0.3252	0.3251	0.3314	187	0.2369	0.2368	0.2447	454	0.2636	0.2639	0.2678	11	0.0407	0.0409	0.0416	149	0.0408	0.0409	0.0416	30	0.0208	0.0208	0.0209	0
NH3 (as N)	Post-Closure	Jan	117	0.1187	0.1219	0.3420	8	0.0861	0.0847	0.2607	86	0.2886	0.2896	0.3598	6	0.0199	0.0201	0.0416	19	0.0319	0.0321	0.0406	4	0.0210	0.0210	0.0210	0
NH3 (as N)	Post-Closure	Feb	117	0.1348	0.1384	0.3836	8	0.0983	0.0966	0.3062	87	0.2519	0.2534	0.3387	7	0.0214	0.0216	0.0452	19	0.0325	0.0326	0.0417	4	0.0221	0.0221	0.0221	0
NH3 (as N)	Post-Closure	Mar	117	0.1179	0.1211	0.3533	7	0.1079	0.1054	0.3223	95	0.1673	0.1684	0.3146	14	0.0215	0.0217	0.0464	19	0.0321	0.0323	0.0416	5	0.0214	0.0214	0.0214	0
NH3 (as N)	Post-Closure	Apr	117	0.1173	0.1206	0.3607	7	0.1171	0.1138	0.3324	102	0.1391	0.1396	0.3210	23	0.0215	0.0217	0.0476	19	0.0318	0.0319	0.0417	5	0.0217	0.0217	0.0217	0
NH3 (as N)	Post-Closure	May	117	0.0736	0.0756	0.2377	8	0.0814	0.0790	0.2267	103	0.0435	0.0438	0.1286	23	0.0166	0.0168	0.0369	19	0.0259	0.0261	0.0338	4	0.0185	0.0185	0.0185	0
NH3 (as N)	Post-Closure	Jun	117	0.0711	0.0730	0.2454	7	0.0760	0.0738	0.2031	97	0.0574	0.0566	0.1671	51	0.0146	0.0148	0.0316	19	0.0215	0.0216	0.0274	4	0.0181	0.0181	0.0181	0
NH3 (as N)	Post-Closure	Jul	117	0.0703	0.0722	0.2574	8	0.0706	0.0685	0.1787	94	0.0529	0.0520	0.1456	56	0.0148	0.0149	0.0325	20	0.0186	0.0187	0.0239	5	0.0176	0.0176	0.0176	0
NH3 (as N)	Post-Closure	Aug	117	0.0688	0.0707	0.2616	8	0.0633	0.0614	0.1486	93	0.0465	0.0455	0.1213	60	0.0157	0.0158	0.0347	20	0.0162	0.0163	0.0210	5	0.0169	0.0169	0.0169	0
NH3 (as N)	Post-Closure	Sep	117	0.0622	0.0637	0.2220	9	0.0596	0.0578	0.1360	91	0.0871	0.0863	0.1400	24	0.0152	0.0153	0.0330	20	0.0152	0.0153	0.0199	6	0.0169	0.0169	0.0169	0
NH3 (as N)	Post-Closure	Oct	117	0.0527	0.0539	0.1718	12	0.0581	0.0563	0.1272	91	0.1023	0.1016	0.1457	20	0.0146	0.0146	0.0309	20	0.0151	0.0151	0.0209	7	0.0174	0.0174	0.0174	0
NH3 (as N)	Post-Closure	Nov	117	0.1227	0.1242	0.2714	8	0.0751	0.0727	0.1539	86	0.3569	0.3574	0.4201	9	0.0181	0.0182	0.0364	18	0.0332	0.0333	0.0403	4	0.0206	0.0206	0.0206	0
NH3 (as N)	Post-Closure	Dec	117	0.1199	0.1213	0.2597	7	0.0808	0.0781	0.1555	83	0.2605	0.2607	0.3268	10	0.0193	0.0193	0.0374	18	0.0324	0.0325	0.0399	4	0.0208	0.0208	0.0208	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
NO2 (as N)	Construction	Jan	2	0.0247	0.0247	0.0269	21	0.0212	0.0212	0.0247	-35	0.0063	0.0063	0.0074	-27	0.0110	0.0110	0.0110	6	0.0062	0.0062	0.0064	3	0.0311	0.0311	0.0312	0
NO2 (as N)	Construction	Feb	2	0.0239	0.0239	0.0245	6	0.0126	0.0126	0.0132	-63	0.0035	0.0035	0.0037	-60	0.0109	0.0109	0.0116	0	0.0066	0.0066	0.0068	5	0.0323	0.0323	0.0324	0
NO2 (as N)	Construction	Mar	2	0.0203	0.0203	0.0204	5	0.0070	0.0070	0.0074	-79	0.0020	0.0020	0.0021	-75	0.0100	0.0100	0.0108	-7	0.0066	0.0066	0.0068	6	0.0308	0.0308	0.0308	0
NO2 (as N)	Construction	Apr	2	0.0206	0.0206	0.0207	10	0.0037	0.0037	0.0042	-88	0.0012	0.0012	0.0013	-85	0.0091	0.0091	0.0100	-15	0.0066	0.0066	0.0069	6	0.0304	0.0304	0.0305	-1
NO2 (as N)	Construction	May	2	0.0240	0.0240	0.0242	65	0.0047	0.0047	0.0047	-76	0.0013	0.0013	0.0013	-59	0.0070	0.0070	0.0076	-20	0.0055	0.0055	0.0058	5	0.0263	0.0263	0.0264	-1
NO2 (as N)	Construction	Jun	2	0.0363	0.0363	0.0367	115	0.0084	0.0084	0.0088	-50	0.0017	0.0017	0.0017	-42	0.0067	0.0067	0.0073	-23	0.0051	0.0051	0.0053	1	0.0269	0.0269	0.0269	0
NO2 (as N)	Construction	Jul	2	0.0370	0.0370	0.0374	129	0.0297	0.0297	0.0308	-2	0.0097	0.0097	0.0101	28	0.0063	0.0063	0.0068	-25	0.0050	0.0050	0.0053	-3	0.0267	0.0267	0.0268	0
NO2 (as N)	Construction	Aug	2	0.0340	0.0340	0.0344	145	0.0373	0.0373	0.0392	30	0.0163	0.0163	0.0172	46	0.0055	0.0055	0.0059	-26	0.0049	0.0049	0.0052	-6	0.0262	0.0262	0.0263	0
NO2 (as N)	Construction	Sep	2	0.0398	0.0398	0.0403	179	0.0468	0.0468	0.0490	37	0.0235	0.0235	0.0249	72	0.0069	0.0069	0.0071	-14	0.0047	0.0047	0.0050	-9	0.0265	0.0265	0.0265	0
NO2 (as N)	Construction	Oct	2	0.0474	0.0474	0.0479	201	0.0479	0.0479	0.0502	51	0.0277	0.0277	0.0293	81	0.0095	0.0095	0.0096	6	0.0046	0.0046	0.0048	-8	0.0272	0.0272	0.0272	0
NO2 (as N)	Construction	Nov	2	0.0539	0.0539	0.0546	143	0.0458	0.0458	0.0467	26	0.0214	0.0214	0.0216	9	0.0123	0.0123	0.0126	16	0.0056	0.0056	0.0057	-3	0.0315	0.0315	0.0316	0
NO2 (as N)	Construction	Dec	2	0.0346	0.0346	0.0350	64	0.0283	0.0283	0.0284	-17	0.0086	0.0086	0.0086	-20	0.0121	0.0121	0.0123	14	0.0061	0.0061	0.0062	3	0.0313	0.0313	0.0313	0
NO2 (as N)	Operations	Jan	5	0.0254	0.0257	0.0263	26	0.0212	0.0205	0.0219	-37	0.0061	0.0059	0.0063	-31	0.0123	0.0121	0.0126	15	0.0067	0.0067	0.0069	11	0.0310	0.0310	0.0311	0
NO2 (as N)	Operations	Feb	5	0.0231	0.0233	0.0239	3	0.0145	0.0139	0.0149	-59	0.0040	0.0039	0.0042	-56	0.0123	0.0121	0.0126	10	0.0071	0.0071	0.0073	14	0.0323	0.0323	0.0323	-1
NO2 (as N)	Operations	Mar	5	0.0194	0.0195	0.0200	1	0.0081	0.0081	0.0085	-75	0.0023	0.0023	0.0024	-71	0.0114	0.0112	0.0117	3	0.0072	0.0072	0.0074	15	0.0307	0.0307	0.0307	-1
NO2 (as N)	Operations	Apr	5	0.0196	0.0197	0.0202	5	0.0045	0.0046	0.0049	-85	0.0014	0.0014	0.0015	-81	0.0105	0.0103	0.0107	-4	0.0072	0.0072	0.0074	15	0.0304	0.0304	0.0304	-1
NO2 (as N)	Operations	May	5	0.0230	0.0232	0.0236	59	0.0052	0.0052	0.0055	-73	0.0014	0.0014	0.0014	-56	0.0080	0.0079	0.0082	-10	0.0060	0.0060	0.0062	14	0.0263	0.0263	0.0263	-1
NO2 (as N)	Operations	Jun	5	0.0348	0.0350	0.0357	107	0.0094	0.0093	0.0099	-45	0.0018	0.0018	0.0019	-45	0.0077	0.0076	0.0078	-14	0.0056	0.0055	0.0057	9	0.0269	0.0268	0.0269	-1
NO2 (as N)	Operations	Jul	5	0.0352	0.0355	0.0362	120	0.0333	0.0327	0.0342	7	0.0105	0.0104	0.0108	37	0.0071	0.0070	0.0072	-17	0.0055	0.0054	0.0056	5	0.0267	0.0267	0.0267	0
NO2 (as N)	Operations	Aug	5	0.0323	0.0325	0.0332	135	0.0431	0.0422	0.0447	47	0.0184	0.0180	0.0190	61	0.0062	0.0061	0.0063	-18	0.0054	0.0053	0.0055	1	0.0262	0.0262	0.0262	0
NO2 (as N)	Operations	Sep	5	0.0380	0.0382	0.0390	168	0.0530	0.0521	0.0548	52	0.0264	0.0259	0.0273	90	0.0075	0.0075	0.0077	-7	0.0051	0.0051	0.0052	-2	0.0265	0.0265	0.0265	0
NO2 (as N)	Operations	Oct	5	0.0453	0.0456	0.0465	189	0.0528	0.0520	0.0545	64	0.0304	0.0298	0.0313	94	0.0101	0.0101	0.0104	11	0.0050	0.0050	0.0051	-1	0.0271	0.0271	0.0271	0
NO2 (as N)	Operations	Nov	5	0.0514	0.0517	0.0528	133	0.0514	0.0509	0.0530	39	0.0246	0.0243	0.0254	23	0.0130	0.0130	0.0134	21	0.0060	0.0059	0.0061	3	0.0315	0.0315	0.0315	0
NO2 (as N)	Operations	Dec	5	0.0328	0.0330	0.0338	56	0.0330	0.0326	0.0340	-5	0.0100	0.0099	0.0103	-8	0.0128	0.0127	0.0132	20	0.0065	0.0064	0.0066	8	0.0313	0.0313	0.0313	0
NO2 (as N)	Closure	Jan	6	0.0265	0.0265	0.0278	30	0.0179	0.0182	0.0197	-44	0.0052	0.0053	0.0057	-38	0.0110	0.0111	0.0119	5	0.0064	0.0065	0.0068	7	0.0311	0.0311	0.0312	0
NO2 (as N)	Closure	Feb	6	0.0242	0.0241	0.0253	7	0.0123	0.0126	0.0138	-63	0.0035	0.0036	0.0039	-60	0.0110	0.0110	0.0119	0	0.0067	0.0068	0.0071	9	0.0324	0.0324	0.0324	0
NO2 (as N)	Closure	Mar	6	0.0202	0.0201	0.0209	4	0.0078	0.0082	0.0092	-75	0.0022	0.0023	0.0026	-71	0.0102	0.0103	0.0112	-5	0.0068	0.0069	0.0072	10	0.0309	0.0308	0.0309	0
NO2 (as N)	Closure	Apr	6	0.0205	0.0203	0.0209	8	0.0050	0.0052	0.0062	-83	0.0016	0.0016	0.0019	-79	0.0095	0.0097	0.0106	-11	0.0068	0.0069	0.0072	10	0.0305	0.0305	0.0306	0
NO2 (as N)	Closure	May	6	0.0233	0.0234	0.0242	61	0.0046	0.0046	0.0050	-76	0.0014	0.0014	0.0015	-54	0.0074	0.0075	0.0082	-15	0.0057	0.0058	0.0061	9	0.0265	0.0264	0.0265	0
NO2 (as N)	Closure	Jun	6	0.0352	0.0354	0.0365	110	0.0072	0.0072	0.0075	-57	0.0017	0.0017	0.0017	-50	0.0072	0.0073	0.0079	-17	0.0053	0.0053	0.0056	5	0.0270	0.0269	0.0270	0
NO2 (as N)	Closure	Jul	6	0.0359	0.0361	0.0373	124	0.0267	0.0270	0.0278	-11	0.0084	0.0084	0.0087	11	0.0068	0.0069	0.0074	-19	0.0052	0.0053	0.0055	1	0.0268	0.0268	0.0269	0
NO2 (as N)	Closure	Aug	6	0.0331	0.0332	0.0343	140	0.0325	0.0329	0.0342	14	0.0140	0.0141	0.0147	26	0.0058	0.0059	0.0064	-20	0.0051	0.0052	0.0055	-2	0.0263	0.0263	0.0263	0
NO2 (as N)	Closure	Sep	6	0.0388	0.0389	0.0402	173	0.0418	0.0423	0.0439	24	0.0202	0.0203	0.0212	49	0.0070	0.0071	0.0074	-12	0.0049	0.0050	0.0052	-4	0.0265	0.0265	0.0266	0
NO2 (as N)	Closure	Oct	6	0.0463	0.0462	0.0479	194	0.0431	0.0436	0.0453	37	0.0243	0.0244	0.0254	59	0.0092	0.0092	0.0094	1	0.0048	0.0048	0.0051	-5	0.0272	0.0272	0.0272	0
NO2 (as N)	Closure	Nov	6	0.0538	0.0533	0.0547	141	0.0439	0.0437	0.0454	20	0.0208	0.0207	0.0215	5	0.0116	0.0116	0.0118	8	0.0057	0.0057	0.0059	-2	0.0316	0.0316	0.0316	0
NO2 (as N)	Closure	Dec	6	0.0351	0.0350	0.0350	65	0.0280	0.0285	0.0314	-17	0.0085	0.0087	0.0096	-20	0.0114	0.0114	0.0116	6	0.0061	0.0061	0.0063	3	0.0314	0.0313	0.0314	0
NO2 (as N)	Post-Closure	Jan	117	0.0204	0.0207	0.0443	1	0.0337	0.0339	0.0404	4	0.0089	0.0089	0.0103	4	0.0108	0.0108	0.0110	1	0.0061	0.0061	0.0063	1	0.0312	0.0312	0.0312	0
NO2 (as N)	Post-Closure	Feb	117	0.0226	0.0229	0.0488	1	0.0343	0.0345	0.0420	2	0.0090	0.0090	0.0105	3	0.0113	0.0113	0.0115	1	0.0063	0.0063	0.0066	1	0.0324	0.0324	0.0325	0
NO2 (as N)	Post-Closure	Mar	117	0.0193	0.0195	0.0414	1	0.0319	0.0322	0.0406	-1	0.0081	0.0081	0.0093	4	0.0111	0.0111	0.0114	1	0.0063	0.0063	0.0066	1	0.0309	0.0309	0.0309	0
NO2 (as N)	Post-Closure	Apr	117	0.0187	0.0189	0.0399	1	0.0295	0.0299	0.0392	-4	0.0077	0.0077	0.0089	1	0.0110	0.0110	0.0113	0	0.0063	0.0063	0.0066	1	0.0306	0.0306	0.0306	0
NO2 (as N)	Post-Closure	May	117	0.0142	0.0144	0.0249	-1	0.0187	0.0189	0.0249	-3	0.0031	0.0031	0.0035	0	0.0089	0.0089	0.0091	0	0.0054	0.0054	0.0056	1	0.0265	0.0265	0.0265	0
NO2 (as N)	Post-Closure	Jun	117	0.0163	0.0165	0.0318	-2	0.0164	0.0166	0.0219	-1	0.0033	0.0033	0.0037	-1	0.0089	0.0089	0.0092	0	0.0051	0.0051	0.0052	1	0.0270	0.0270	0.0270	0
NO2 (as N)	Post-Closure	Jul	117	0.0158	0.0160	0.0331	-1	0.0306	0.0308	0.0357	1	0.0075	0.0075	0.0081	-1	0.0086	0.0086	0.0088	0	0.0052	0.0052	0.0053	1	0.0269	0.0269	0.0269	0
NO2 (as N)	Post-Closure	Aug	117	0.0139	0.0141	0.0309	2	0.0295	0.0297	0.0340	3	0.0112	0.0112	0.0126	0	0.0075	0.0075	0.0077	0	0.0053	0.0053	0.0054	1	0.0263	0.0263	0.0263	0
NO2 (as N)	Post-Closure	Sep	117	0.0143	0.0145	0.0350	2	0.0355	0.0357	0.0395	4	0.0139	0.0139	0.0177	2	0.0082	0.0082	0.0084	0	0.0052	0.0052	0.0053	1	0.0266	0.0266	0.0266	0
NO2 (as N)	Post-Closure	Oct	117	0.0156	0.0158	0.0369	1	0.0333	0.0335	0.0386	6	0.0159	0.0159	0.0206	4	0.0094	0.0094	0.0095	0	0.0051	0.0051	0.0052	0	0.0272	0.0272	0.0272	0
NO2 (as N)	Post-Closure	Nov	117	0.0221	0.0223	0.0488	1	0.0384	0.0386	0.0448	6	0.0204	0.0205	0.0246	4	0.0110	0.0110	0.0112	1	0.0058	0.0058	0.0059	1	0.0316	0.0316	0.0316	0
NO2 (as N)	Post-Closure	Dec	117	0.0211	0.0213	0.0462	1	0.0357	0.0359	0.0422	5	0.0112	0.0113	0.0132	4	0.0109	0.0109	0.0111	1	0.0060	0.0060	0.0061	1	0.0314	0.0314	0.0314	0
N_NO3_NO2	Construction	Jan	2	0.0777	0.0777	0.0862	26	0.1461	0.1461	0.1806	60	0.0351	0.0351	0.0442	55	0.0592	0.0592	0.0639	8	0.1029	0.1029	0.1085	-5	0.0670	0.0670	0.0673	0
N_NO3_NO2	Construction	Feb	2	0.0752	0.0752	0.0778	10	0.1619	0.1619	0.1879	65	0.0365	0.0365	0.0433	50	0.0600	0.0600	0.0654	5	0.1031	0.1031	0.1087	-6	0.0712	0.0712	0.0715	1
N_NO3_NO2	Construction	Mar	2	0.0639	0.0639	0.0645	10	0.1675	0.1675	0.1956	71	0.0384	0.0384	0.0444	70	0.0575	0.0575	0.0633	2	0.0995	0.0995	0.1040	-9	0.0693	0.0693	0.0695	1
N_NO3_NO2	Construction	Apr	2	0.0650	0.0650	0.0651	15	0.1751	0.1751	0.2080	79	0.0412	0.0412	0.0486	82	0.0554	0.0554	0.0616	-1	0.0954	0.0954	0.0984	-11	0.0709	0.0709	0.0711	1
N_NO3_NO2	Construction	May	2	0.0726	0.0726	0.0732	87	0.1273	0.1273	0.1517	95	0.0550	0.0550	0.0630	130	0.0591	0.0591	0.0642	-2	0.0781	0.0781	0.0796	-13	0.0611	0.0611	0.0613	1
N_NO3_NO2	Construction	Jun	2	0.1093	0.1093	0.1104	165	0.1306	0.1306	0.1564	119	0.0733	0.0733	0.0860	108	0.0587	0.0587	0.0641	3	0.0713	0.0713	0.0717	-13	0.0601	0.0601	0.0602	1
N_NO3_NO2	Construction	Jul	2	0.1281	0.1281	0.1295	202	0.1450	0.1450	0.1770	149	0.0742	0.0742	0.0884	127	0.0592	0.0592	0.0649	7	0.0689	0.0689	0.0695	-12	0.0589	0.0589	0.0590	1
N_NO3_NO2	Construction	Aug	2	0.1360	0.1360	0.1375	219	0.1566	0.1566	0.1932	170	0.0834	0.0834	0.1008	164	0.0601	0.0601	0.0664	13	0.0674	0.0674	0.0688	-10	0.0574	0.0574	0.0575	1
N_NO3_NO2	Construction	Sep	2	0.1483	0.1483	0.1500	229	0.1723	0.1723	0.2120	202	0.0930	0.0930	0.1127	196	0.0619	0.0619	0.0688	20	0.0660	0.0660	0.0681	-9	0.0563	0.0563	0.0564	1
N_NO3_NO2	Construction	Oct	2	0.1599	0.1599	0.1617	233	0.1868	0.1868	0.2258	237	0.1061	0.1061	0.1275	239	0.0644	0.0644	0.0722	29	0.0649	0.0649	0.0676	-7	0.0554	0.0554	0.0556	1
N_NO3_NO2	Construction	Nov	2	0.1768	0.1768	0.1787	164	0.2459	0.2459	0.2859	165	0.0944	0.0944	0.1134	124	0.0768	0.0768	0.0867	36	0.1081	0.1081	0.1119	-5	0.0651	0.0651	0.0652	1
N_NO3_NO2	Construction	Dec	2	0.1120	0.1120	0.1132	76	0.2266	0.2266	0.2615	147	0.0586	0.0586	0.0679	123	0.0757	0.0757	0.0857	37	0.1047	0.1047	0.1092	-5	0.0663	0.0663	0.0664	1
N_NO3_NO2	Operations	Jan	5	0.0816	0.0823	0.0842	34	0.7901	0.7010	0.9165	667	0.1880	0.1721	0.2234	662	0.3355	0.2787	0.3948	412	0.2497	0.2341	0.3345	117	0.0673	0.0674	0.0675	1
N_NO3_NO2	Operations	Feb	5	0.0738	0.0743	0.0760	9	0.9168	0.8489	1.1200	764	0.1931	0.1812	0.2393	643	0.3436	0.2844	0.4004	402	0.2606	0.2422	0.3449	121	0.0715	0.0715	0.0716	1
N_NO3_NO2	Operations	Mar	5	0.0614	0.0619	0.0633	6	1.0690	1.0544	1.3810	974	0.2421	0.2335	0.3058	933	0.3359	0.2766	0.3873	393	0.2640	0.2433	0.3449	125	0.0694	0.0694	0.0696	1
N_NO3_NO2	Operations	Apr	5	0.0620	0.0625	0.0639	11	1.1290	1.0876	1.4160	1010	0.2622	0.2556	0.3325	1028	0.3325	0.2720	0.3775	391	0.2673	0.2441	0.3440	129	0.0710	0.0710	0.0711	1
N_NO3_NO2	Operations	May	5	0.0696	0.0700	0.0714	80	0.7986	0.7442	0.9653	1040	0.2887	0.2726	0.3500	1039	0.2814	0.2319	0.3114	287	0.2278	0.2062	0.2873	132	0.0611	0.0612	0.0612	1
N_NO3_NO2	Operations	Jun	5	0.1046	0.1053	0.1074	155	0.8529	0.7756	0.9939	1198	0.4285	0.3958	0.5090	1025	0.2720	0.2311	0.3024	307	0.2137	0.1907	0.2581	135	0.0601	0.0602	0.0602	1
N_NO3_NO2	Operations	Jul	5	0.1223	0.1231	0.1256	190	1.0570	0.9290	1.1750	1496	0.4831	0.4335	0.5517	1223	0.2602	0.2333	0.2986	325	0.2158	0.1896	0.2535	145	0.0590	0.0590	0.0590	1
N_NO3_NO2	Operations	Aug	5	0.1299	0.1307	0.1333	206	1.1540	1.0151	1.2730	1647	0.5880	0.5133	0.6473	1527	0.2534	0.2416	0.3022	356	0.2218	0.1920	0.2534	158	0.0574	0.0575	0.0575	1
N_NO3_NO2	Operations	Sep	5	0.1416	0.1425	0.1453	216	1.1690	1.0437	1.3000	1728	0.6260	0.5548	0.6938	1668	0.2541	0.2567	0.3188	400	0.2282	0.1951	0.2542	173	0.0563	0.0563	0.0564	1
N_NO3_NO2	Operations	Oct	5	0.1532	0.1541	0.1571	221	1.1000	0.9830	1.2290	1671	0.6380	0.5677	0.7107	1715	0.2799	0.2753	0.3425	453	0.2345	0.1993	0.2567	189	0.0555	0.0555	0.0556	1
N_NO3_NO2	Operations	Nov	5	0.1689	0.1699	0.1732	154	1.1200	1.0292	1.2450	1009	0.5042	0.4555	0.5618	981	0.3456	0.3332	0.4147	495	0.2992	0.2664	0.3300	137	0.0651	0.0651	0.0652	1
N_NO3_NO2	Operations	Dec	5	0.1066	0.1072	0.1093	68	0.8783	0.8408	1.0080	817	0.2422	0.2274	0.2718	765	0.3440	0.3287	0.4085	496	0.2976	0.2698	0.3330	146	0.0663	0.0663	0.0664	1
N_NO3_NO2	Closure	Jan	6	0.0848	0.0848	0.0890	38	0.1823	0.2335	0.4714	156	0.0448	0.0583	0.1218	158	0.0753	0.1151	0.2839	113	0.1253	0.1592	0.2956	49	0.0669	0.0669	0.0673	0
N_NO3_NO2	Closure	Feb	6	0.0771	0.0768	0.0806	13	0.1814	0.2211	0.3994	125	0.0428	0.0528	0.0988	117	0.0765	0.1164	0.2858	107	0.1253	0.1604	0.3020	48	0.0709	0.0710	0.0715	0
N_NO3_NO2	Closure	Mar	6	0.0641	0.0637	0.0663	10	0.1685	0.1979	0.3256	102	0.0396	0.0468	0.0783	107	0.0734	0.1112	0.2716	100	0.1216	0.1569	0.2993	46	0.0688	0.0689	0.0694	0
N_NO3_NO2	Closure	Apr	6	0.0648	0.0642	0.0659	14	0.1587	0.1815	0.2766	85	0.0380	0.0436	0.0673	92	0.0704	0.1059	0.2568	92	0.1178	0.1530	0.2957	44	0.0703	0.0704	0.0710	0
N_NO3_NO2	Closure	May	6	0.0704	0.0708	0.0730	82	0.1086	0.1219	0.1743	87	0.0452	0.0490	0.0651	105	0.0697	0.0960	0.2075	61	0.0967	0.1258	0.2442	43	0.0606	0.0607	0.0611	0
N_NO3_NO2	Closure	Jun	6	0.1062	0.1063	0.1099	158	0.1058	0.1161	0.1565	94	0.0607	0.0662	0.0878	88	0.0660	0.0881	0.1823	56	0.0868	0.1120	0.2147	39	0.0597	0.0597	0.0601	0
N_NO3_NO2	Closure	Jul	6	0.1245	0.1247	0.1290	194	0.1112	0.1198	0.1540	106	0.0582	0.0623	0.0793	90	0.0637	0.0826	0.1628	51	0.0823	0.1055	0.2005	37	0.0585	0.0586	0.0589	0
N_NO3_NO2	Closure	Aug	6	0.1325	0.1326	0.1371	211	0.1168	0.1240	0.1538	113	0.0624	0.0658	0.0806	108	0.0617	0.0776	0.1454	47	0.0786	0.1001	0.1885	36	0.0571	0.0571	0.0574	0
N_NO3_NO2	Closure	Sep	6	0.1448	0.1448	0.1496	221	0.1265	0.1329	0.1611	133	0.0681	0.0711	0.0853	127	0.0607	0.0745	0.1334	46	0.0753	0.0952	0.1773	35	0.0560	0.0560	0.0563	0
N_NO3_NO2	Closure	Oct	6	0.1566	0.1564	0.1615	225	0.1386	0.1443	0.1724	160	0.0774	0.0801	0.0949	156	0.0606	0.0729	0.1258	47	0.0726	0.0912	0.1681	34	0.0552	0.0553	0.0555	0
N_NO3_NO2	Closure	Nov	6	0.1771	0.1753	0.1797	162	0.1976	0.2046	0.2385	120	0.0743	0.0778	0.0917	84	0.0702	0.0832	0.1392	49	0.1155	0.1355	0.2181	21	0.0647	0.0648	0.0651	0
N_NO3_NO2	Closure	Dec	6	0.1136	0.1135	0.1225	78	0.1871	0.1953	0.2288	113	0.0482	0.0503	0.0587	91	0.0687	0.0809	0.1335	48	0.1112	0.1307	0.2109	20	0.0658	0.0659	0.0663	0
N_NO3_NO2	Post-Closure	Jan	117	0.0612	0.0624	0.1526	1	0.1454	0.1391	0.1729	52	0.0340	0.0327	0.0423	45	0.0604	0.0597	0.0623	11	0.1103	0.1098	0.1103	3	0.0666	0.0666	0.0667	0
N_NO3_NO2	Post-Closure	Feb	117	0.0678	0.0690	0.1679	1	0.1580	0.1508	0.1764	54	0.0364	0.0350	0.0420	44	0.0630	0.0623	0.0646	11	0.1121	0.1116	0.1121	3	0.0706	0.0706	0.0707	0
N_NO3_NO2	Post-Closure	Mar	117	0.0579	0.0588	0.1423	1	0.1638	0.1556	0.1667	59	0.0356	0.0340	0.0389	50	0.0623	0.0616	0.0640	11	0.1107	0.1102	0.1107	3	0.0685	0.0685	0.0686	0
N_NO3_NO2	Post-Closure	Apr	117	0.0562	0.0571	0.1370	1	0.1693	0.1601	0.1695	63	0.0365	0.0348	0.0378	54	0.0616	0.0608	0.0633	11	0.1093	0.1088	0.1093	3	0.0700	0.0700	0.0701	0
N_NO3_NO2	Post-Closure	May	117	0.0387	0.0393	0.0793	1	0.1153	0.1088	0.1154	67	0.0289	0.0283	0.0401	18	0.0646	0.0640	0.0661	8	0.0910	0.0906	0.0910	3	0.0604	0.0604	0.0604	0
N_NO3_NO2	Post-Closure	Jun	117	0.0411	0.0418	0.0943	1	0.1058	0.1001	0.1059	67	0.0500	0.0480	0.0571	37	0.0613	0.0607	0.0625	8	0.0832	0.0828	0.0832	3	0.0595	0.0595	0.0595	0
N_NO3_NO2	Post-Closure	Jul	117	0.0423	0.0431	0.1108	2	0.1018	0.0964	0.1026	66	0.0472	0.0454	0.0529	38	0.0594	0.0588	0.0603	8	0.0796	0.0792	0.0796	3	0.0583	0.0583	0.0584	0
N_NO3_NO2	Post-Closure	Aug	117	0.0425	0.0433	0.1186	2	0.0990	0.0940	0.1054	62	0.0457	0.0440	0.0544	39	0.0574	0.0569	0.0581	8	0.0765	0.0762	0.0766	4	0.0569	0.0569	0.0569	0
N_NO3_NO2	Post-Closure	Sep	117	0.0448	0.0457	0.1294	1	0.0977	0.0928	0.1109	63	0.0460	0.0443	0.0576	41	0.0559	0.0553	0.0563	9	0.0736	0.0732	0.0736	4	0.0558	0.0558	0.0559	0
N_NO3_NO2	Post-Closure	Oct	117	0.0475	0.0483	0.1285	1	0.0974	0.0924	0.1126	67	0.0476	0.0457	0.0610	46	0.0545	0.0539	0.0552	9	0.0710	0.0707	0.0710	4	0.0551	0.0551	0.0551	0
N_NO3_NO2	Post-Closure	Nov	117	0.0664	0.0674	0.1682	1	0.1455	0.1392	0.1609	50	0.0643	0.0618	0.0757	47	0.0619	0.0612	0.0632	10	0.1151	0.1147	0.1151	3	0.0646	0.0646	0.0646	0
N_NO3_NO2	Post-Closure	Dec	117	0.0633	0.0643	0.1591	1	0.1447	0.1383	0.1583	51	0.0398	0.0382	0.0446	46	0.0601	0.0605	0.0626	11	0.1122	0.1118	0.1122	3	0.0657	0.0657	0.0657	0
CN, Tot	Construction	Jan	2	0.00074	0.00074	0.00106	-44	0.00057	0.00057	0.00069	-25	0.00058	0.00058	0.00072	-16	0.00060	0.00060	0.00070	-15	0.00272	0.00272	0.00310	-12	0.00194	0.00194	0.00194	0
CN, Tot	Construction	Feb	2	0.00057	0.00057	0.00073	-61	0.00052	0.00052	0.00059	-35	0.00056	0.00056	0.00065	-28	0.00060	0.00060	0.00070	-19	0.00268	0.00268	0.00307	-14	0.00201	0.00201	0.00202	0
CN, Tot	Construction	Mar	2	0.00042	0.00042	0.00048	-66	0.00044	0.00044	0.00048	-43	0.00046	0.00046	0.00050	-36	0.00056	0.00056	0.00064	-23	0.00252	0.00252	0.00287	-18	0.00191	0.00191	0.00192	0
CN, Tot	Construction	Apr	2	0.00040	0.00040	0.00043	-66	0.00041	0.00041	0.00042	-47	0.00042	0.00042	0.00044	-41	0.00052	0.00052	0.00059	-28	0.00234	0.00234	0.00264	-23	0.00189	0.00189	0.00189	-1
CN, Tot	Construction	May	2	0.00043	0.00043	0.00044	-46	0.00029	0.00029	0.00030	-43	0.00039	0.00039	0.00039	-31	0.00043	0.00043	0.00048	-28	0.00182	0.00182	0.00204	-27	0.00151	0.00151	0.00151	-1
CN, Tot	Construction	Jun	2	0.00060	0.00060	0.00060	-26	0.00030	0.00030	0.00030	-37	0.00040	0.00040	0.00040	-38	0.00048	0.00048	0.00052	-25	0.00150	0.00150	0.00166	-30	0.00140	0.00140	0.00140	-1
CN, Tot	Construction	Jul	2	0.00072	0.00072	0.00072	-22	0.00041	0.00041	0.00041	-21	0.00043	0.00043	0.00043	-30	0.00052	0.00052	0.00055	-23	0.00134	0.00134	0.00147	-31	0.00142	0.00142	0.00143	-1
CN, Tot	Construction	Aug	2	0.00076	0.00076	0.00077	-26	0.00054	0.00054	0.00055	-9	0.00053	0.00053	0.00053	-13	0.00055	0.00055	0.00057	-22	0.00122	0.00122	0.00133	-32	0.00154	0.00154	0.00154	0
CN, Tot	Construction	Sep	2	0.00073	0.00073	0.00073	-32	0.00054	0.00054	0.00054	-15	0.00055	0.00055	0.00055	-9	0.00054	0.00054	0.00056	-21	0.00114	0.00114	0.00123	-32	0.00163	0.00163	0.00163	0
CN, Tot	Construction	Oct	2	0.00066	0.00066	0.00066	-38	0.00047	0.00047	0.00048	-26	0.00049	0.00049	0.00050	-16	0.00050	0.00050	0.00052	-23	0.00107	0.00107	0.00114	-33	0.00169	0.00169	0.00169	0
CN, Tot	Construction	Nov	2	0.00071	0.00071	0.00072	-51	0.00053	0.00053	0.00054	-33	0.00067	0.00067	0.00069	-41	0.00054	0.00054	0.00056	-25	0.00265	0.00265	0.00272	-20	0.00197	0.00197	0.00197	0
CN, Tot	Construction	Dec	2	0.00050	0.00050	0.00050	-64	0.00048	0.00048	0.00049	-38	0.00050	0.00050	0.00051	-37	0.00052	0.00052	0.00053	-28	0.00246	0.00246	0.00250	-23	0.00195	0.00195	0.00195	0
CN, Tot	Operations	Jan	5	0.00041	0.00041	0.00042	-69	0.00044	0.00044	0.00045	-42	0.00045	0.00046	0.00046	-34	0.00049	0.00049	0.00049	-32	0.00228	0.00228	0.00229	-26	0.00193	0.00193	0.00194	0
CN, Tot	Operations	Feb	5	0.00039	0.00039	0.00040	-73	0.00043	0.00043	0.00044	-46	0.00047	0.00047	0.00048	-39	0.00049	0.00049	0.00050	-34	0.00224	0.00223	0.00224	-28	0.00201	0.00201	0.00201	-1
CN, Tot	Operations	Mar	5	0.00035	0.00035	0.00035	-72	0.00040	0.00040	0.00040	-49	0.00040	0.00041	0.00041	-43	0.00047	0.00047	0.00047	-37	0.00212	0.00212	0.00213	-31	0.00191	0.00191	0.00191	-1
CN, Tot	Operations	Apr	5	0.00036	0.00037	0.00037	-70	0.00038	0.00038	0.00039	-50	0.00039	0.00039	0.00039	-44	0.00044	0.00044	0.00044	-40	0.00199	0.00199	0.00200	-34	0.00189	0.00189	0.00189	-1
CN, Tot	Operations	May	5	0.00041	0.00041	0.00042	-48	0.00029	0.00029	0.00029	-44	0.00039	0.00039	0.00039	-32	0.00037	0.00037	0.00038	-38	0.00157	0.00157	0.00158	-37	0.00151	0.00151	0.00151	-1
CN, Tot	Operations	Jun	5	0.00058	0.00058	0.00059	-28	0.00029	0.00029	0.00030	-39	0.00039	0.00040	0.00040	-38	0.00044	0.00044	0.00044	-33	0.00132	0.00131	0.00132	-38	0.00140	0.00140	0.00140	-1
CN, Tot	Operations	Jul	5	0.00070	0.00070	0.00071	-23	0.00040	0.00040	0.00041	-23	0.00043	0.00043	0.00043	-31	0.00049	0.00049	0.00050	-29	0.00119	0.00118	0.00119	-39	0.00143	0.00142	0.00143	-1
CN, Tot	Operations	Aug	5	0.00075	0.00075	0.00076	-27	0.00053	0.00053	0.00054	-11	0.00053	0.00053	0.00053	-14	0.00052	0.00052	0.00052	-26	0.00110	0.00109	0.00110	-39	0.00154	0.00154	0.00154	0
CN, Tot	Operations	Sep	5	0.00071	0.00072	0.00072	-33	0.00053	0.00053	0.00054	-16	0.00055	0.00055	0.00055	-9	0.00052	0.00052	0.00052	-25	0.00103	0.00103	0.00103	-38	0.00163	0.00163	0.00163	0
CN, Tot	Operations	Oct	5	0.00065	0.00065	0.00066	-39	0.00047	0.00047	0.00048	-25	0.00050	0.00050	0.00050	-15	0.00049	0.00049	0.00049	-26	0.00098	0.00097	0.00098	-38	0.00169	0.00169	0.00169	0
CN, Tot	Operations	Nov	5	0.00070	0.00070	0.00071	-52	0.00054	0.00054	0.00055	-32	0.00070	0.00070	0.00071	-39	0.00054	0.00054	0.00054	-28	0.00258	0.00258	0.00259	-21	0.00197	0.00197	0.00197	0
CN, Tot	Operations	Dec	5	0.00049	0.00049	0.00049	-65	0.00048	0.00048	0.00049	-37	0.00050	0.00051	0.00051	-36	0.00051	0.00051	0.00051	-29	0.00241	0.00241	0.00242	-24	0.00195	0.00195	0.00195	0
CN, Tot	Closure	Jan	6	0.00042	0.00042	0.00043	-69	0.00044	0.00045	0.00046	-41	0.00046	0.00046	0.00048	-34	0.00050	0.00050	0.00051	-31	0.00228	0.00229	0.00234	-25	0.00194	0.00194	0.00194	0
CN, Tot	Closure	Feb	6	0.00040	0.00040	0.00041	-72	0.00043	0.00044	0.00045	-45	0.00048	0.00048	0.00050	-39	0.00050	0.00050	0.00051	-33	0.00223	0.00224	0.00229	-28	0.00202	0.00202	0.00202	0
CN, Tot	Closure	Mar	6	0.00035	0.00035	0.00036	-72	0.00040	0.00040	0.00042	-49	0.00041	0.00041	0.00043	-43	0.00047	0.00048	0.00048	-36	0.00212	0.00212	0.00217	-30	0.00192	0.00192	0.00192	0
CN, Tot	Closure	Apr	6	0.00037	0.00037	0.00038	-69	0.00038	0.00038	0.00039	-51	0.00039	0.00039	0.00041	-44	0.00045	0.00045	0.00046	-38	0.00201	0.00201	0.00205	-33	0.00190	0.00189	0.00190	0
CN, Tot	Closure	May	6	0.00041	0.00041	0.00042	-48	0.00028	0.00028	0.00029	-46	0.00039	0.00039	0.00040	-31	0.00038	0.00038	0.00039	-37	0.00160	0.00160	0.00163	-35	0.00152	0.00151	0.00152	0
CN, Tot	Closure	Jun	6	0.00059	0.00059	0.00059	-28	0.00029	0.00029	0.00029	-40	0.00041	0.00041	0.00042	-37	0.00045	0.00045	0.00046	-32	0.00135	0.00135	0.00137	-36	0.00141	0.00140	0.00141	0
CN, Tot	Closure	Jul	6	0.00071	0.00071	0.00072	-22	0.00039	0.00039	0.00040	-25	0.00043	0.00043	0.00044	-30	0.00051	0.00051	0.00052	-28	0.00122	0.00121	0.00123	-37	0.00143	0.00143	0.00143	0
CN, Tot	Closure	Aug	6	0.00076	0.00076	0.00077	-26	0.00052	0.00052	0.00054	-13	0.00052	0.00052	0.00053	-15	0.00054	0.00054	0.00055	-25	0.00112	0.00112	0.00114	-36	0.00155	0.00155	0.00155	0
CN, Tot	Closure	Sep	6	0.00073	0.00073	0.00075	-32	0.00054	0.00054	0.00055	-15	0.00055	0.00055	0.00055	-10	0.00053	0.00053	0.00054	-23	0.00106	0.00106	0.00108	-35	0.00163	0.00163	0.00163	0
CN, Tot	Closure	Oct	6	0.00066	0.00067	0.00070	-37	0.00048	0.00048	0.00050	-23	0.00050	0.00050	0.00051	-14	0.00050	0.00050	0.00052	-24	0.00100	0.00100	0.00102	-35	0.00169	0.00169	0.00169	0
CN, Tot	Closure	Nov	6	0.00072	0.00072	0.00079	-50	0.00055	0.00056	0.00058	-30	0.00071	0.00072	0.00077	-37	0.00055	0.00055	0.00057	-26	0.00260	0.00261	0.00265	-20	0.00197	0.00197	0.00197	0
CN, Tot	Closure	Dec	6	0.00050	0.00051	0.00057	-63	0.00049	0.00050	0.00054	-35	0.00052	0.00052	0.00056	-34	0.00053	0.00053	0.00055	-28	0.00243	0.00244	0.00249	-22	0.00196	0.00195	0.00196	0
CN, Tot	Post-Closure	Jan	117	0.00129	0.00128	0.00129	-4	0.00072	0.00073	0.00078	-4	0.00068	0.00068	0.00072	-2	0.00072	0.00071	0.00074	-1	0.00303	0.00302	0.00310	-1	0.00194	0.00194	0.00194	0
CN, Tot	Post-Closure	Feb	117	0.00142	0.00141	0.00142	-4	0.00076	0.00076	0.00083	-5	0.00076	0.00076	0.00080	-2	0.00075	0.00074	0.00077	-1	0.00306	0.00305	0.00313	-1	0.00202	0.00202	0.00202	0
CN, Tot	Post-Closure	Mar	117	0.00121	0.00120	0.00121	-3	0.00074	0.00074	0.00081	-6	0.00073	0.00072	0.00075	1	0.00074	0.00073	0.00076	-1	0.00301	0.00300	0.00308	-1	0.00192	0.00192	0.00192	0
CN, Tot	Post-Closure	Apr	117	0.00117	0.00116	0.00117	-3	0.00071	0.00071	0.00080	-7	0.00071	0.00070	0.00072	0	0.00073	0.00072	0.00075	-2	0.00295	0.00295	0.00303	-1	0.00190	0.00190	0.00190	0
CN, Tot	Post-Closure	May	117	0.00078	0.00077	0.00078	-3	0.00048	0.00048	0.00054	-5	0.00056	0.00056	0.00059	-2	0.00060	0.00060	0.00062	-2	0.00242	0.00242	0.00249	-1	0.00152	0.00152	0.00152	0
CN, Tot	Post-Closure	Jun	117	0.00080	0.00080	0.00080	-2	0.00046	0.00046	0.00051	-4	0.00063	0.00063	0.00067	-1	0.00065	0.00065	0.00067	-1	0.00208	0.00208	0.00215	-1	0.00141	0.00141	0.00141	0
CN, Tot	Post-Closure	Jul	117	0.00089	0.00089	0.00089	-3	0.00050	0.00050	0.00054	-3	0.00061	0.00062	0.00065	-1	0.00070	0.00069	0.00072	-1	0.00188	0.00188	0.00195	-1	0.00143	0.00143	0.00143	0
CN, Tot	Post-Closure	Aug	117	0.00099	0.00098	0.00099	-4	0.00058	0.00058	0.00062	-2	0.00060	0.00061	0.00063	-1	0.00071	0.00071	0.00073	-1	0.00173	0.00173	0.00179	-1	0.00155	0.00155	0.00155	0
CN, Tot	Post-Closure	Sep	117	0.00102	0.00102	0.00102	-4	0.00062	0.00062	0.00065	-3	0.00060	0.00060	0.00062	-1	0.00069	0.00069	0.00071	-1	0.00161	0.00161	0.00167	-1	0.00163	0.00163	0.00163	0
CN, Tot	Post-Closure	Oct	117	0.00102	0.00102	0.00102	-4	0.00061	0.00061	0.00065	-3	0.00058	0.00058	0.00059	-2	0.00066	0.00066	0.00068	-1	0.00152	0.00152	0.00158	-1	0.00169	0.00169	0.00169	0
CN, Tot	Post-Closure	Nov	117	0.00140	0.00140	0.00140	-4	0.00076	0.00076	0.00082	-3	0.00111	0.00111	0.00118	-2	0.00074	0.00074	0.00076	-1	0.00323	0.00323	0.00329	0	0.00197	0.00197	0.00197	0
CN, Tot	Post-Closure	Dec	117	0.00134	0.00133	0.00134	-3	0.00074	0.00074	0.00080	-3	0.00077	0.00077	0.00081	-2	0.00073	0.00073	0.00075	-1	0.00311	0.00311	0.00317	0	0.00196	0.00196	0.00196	0
CN, Free	Construction	Jan	2	0.00073	0.00073	0.00119	-56	0.00028	0.00028	0.00035	-34	0.00032	0.00032	0.00042	-31	0.00114	0.00114	0.00139	-19	0.00116	0.00116	0.00126	-9	0.00194	0.00194	0.00194	0
CN, Free	Construction	Feb	2	0.00044	0.00044	0.00066	-76	0.00022	0.00022	0.00026	-50	0.00025	0.00025	0.00030	-49	0.00112	0.00112	0.00136	-23	0.00118	0.00118	0.00130	-9	0.00201	0.00201	0.00202	0
CN, Free	Construction	Mar	2	0.00025	0.00025	0.00034	-84	0.00017	0.00017	0.00019	-60	0.00018	0.00018	0.00020	-59	0.00103	0.00103	0.00123	-29	0.00117	0.00117	0.00129	-10	0.00191	0.00191	0.00192	0
CN, Free	Construction	Apr	2	0.00020	0.00020	0.00023	-87	0.00015	0.00015	0.00015	-65	0.00016	0.00016	0.00016	-64	0.00093	0.00093	0.00110	-34	0.00115	0.00115	0.00127	-11	0.00189	0.00189	0.00189	-1
CN, Free	Construction	May	2	0.00030	0.00030	0.00031	-66	0.00012	0.00012	0.00012	-56	0.00027	0.00027	0.00028	-45	0.00070	0.00070	0.00082	-37	0.00096	0.00096	0.00106	-12	0.00151	0.00151	0.00151	-1
CN, Free	Construction	Jun	2	0.00051	0.00051	0.00052	-38	0.00015	0.00015	0.00015	-44	0.00027	0.00027	0.00027	-50	0.00066	0.00066	0.00075	-38	0.00088	0.00088	0.00097	-15	0.00140	0.00140	0.00140	-1
CN, Free	Construction	Jul	2	0.00075	0.00075	0.00076	-24	0.00023	0.00023	0.00023	-21	0.00030	0.00030	0.00030	-41	0.00071	0.00071	0.00078	-36	0.00087	0.00087	0.00095	-17	0.00142	0.00142	0.00143	-1
CN, Free	Construction	Aug	2	0.00090	0.00090	0.00091	-26	0.00033	0.00033	0.00033	-4	0.00037	0.00037	0.00037	-24	0.00082	0.00082	0.00087	-32	0.00088	0.00088	0.00095	-19	0.00154	0.00154	0.00154	0
CN, Free	Construction	Sep	2	0.00090	0.00090	0.00090	-32	0.00033	0.00033	0.00033	-9	0.00055	0.00055	0.00056	-27	0.00089	0.00089	0.00093	-30	0.00090	0.00090	0.00096	-19	0.00163	0.00163	0.00163	0
CN, Free	Construction	Oct	2	0.00083	0.00083	0.00083	-38	0.00029	0.00029	0.00030	-20	0.00054	0.00054	0.00056	-41	0.00091	0.00091	0.00094	-29	0.00091	0.00091	0.00097	-19	0.00169	0.00169	0.00169	0
CN, Free	Construction	Nov	2	0.00079	0.00079	0.00080	-56	0.00030	0.00030	0.00031	-32	0.00048	0.00048	0.00051	-59	0.00099	0.00099	0.00102	-32	0.00102	0.00102	0.00108	-20	0.00197	0.00197	0.00197	0
CN, Free	Construction	Dec	2	0.00042	0.00042	0.00042	-76	0.00024	0.00024	0.00025	-44	0.00027	0.00027	0.00028	-54	0.00094	0.00094	0.00095	-35	0.00101	0.00101	0.00107	-21	0.00195	0.00195	0.00195	0
CN, Free	Operations	Jan	5	0.00025	0.00025	0.00026	-85	0.00020	0.00020	0.00020	-52	0.00022	0.00022	0.00022	-52	0.00088	0.00088	0.00089	-38	0.00092	0.00092	0.00094	-28	0.00193	0.00193	0.00194	0
CN, Free	Operations	Feb	5	0.00020	0.00020	0.00020	-89	0.00018	0.00018	0.00018	-60	0.00021	0.00021	0.00021	-58	0.00088	0.00087	0.00088	-41	0.00094	0.00094	0.00095	-29	0.00201	0.00201	0.00201	-1
CN, Free	Operations	Mar	5	0.00015	0.00015	0.00016	-90	0.00015	0.00015	0.00015	-65	0.00016	0.00016	0.00017	-64	0.00082	0.00082	0.00082	-44	0.00093	0.00093	0.00094	-29	0.00191	0.00191	0.00191	-1
CN, Free	Operations	Apr	5	0.00015	0.00015	0.00015	-90	0.00014	0.00014	0.00014	-67	0.00015	0.00015	0.00015	-66	0.00075	0.00075	0.00076	-48	0.00091	0.00091	0.00093	-30	0.00189	0.00189	0.00189	-1
CN, Free	Operations	May	5	0.00028	0.00028	0.00029	-68	0.00012	0.00012	0.00012	-58	0.00028	0.00028	0.00028	-44	0.00058	0.00058	0.00059	-49	0.00077	0.00077	0.00078	-30	0.00151	0.00151	0.00151	-1
CN, Free	Operations	Jun	5	0.00049	0.00050	0.00050	-40	0.00014	0.00014	0.00015	-45	0.00027	0.00027	0.00027	-49	0.00056	0.00056	0.00057	-48	0.00073	0.00073	0.00074	-31	0.00140	0.00140	0.00140	-1
CN, Free	Operations	Jul	5	0.00073	0.00073	0.00074	-26	0.00022	0.00022	0.00023	-23	0.00030	0.00030	0.00030	-41	0.00064	0.00064	0.00064	-43	0.00073	0.00073	0.00074	-31	0.00143	0.00142	0.00143	-1
CN, Free	Operations	Aug	5	0.00088	0.00088	0.00089	-27	0.00032	0.00032	0.00032	-7	0.00036	0.00036	0.00037	-25	0.00077	0.00077	0.00078	-37	0.00076	0.00076	0.00076	-30	0.00154	0.00154	0.00154	0
CN, Free	Operations	Sep	5	0.00087	0.00088	0.00089	-33	0.00032	0.00032	0.00033	-11	0.00055	0.00055	0.00056	-27	0.00085	0.00085	0.00086	-33	0.00079	0.00079	0.00080	-29	0.00163	0.00163	0.00163	0
CN, Free	Operations	Oct	5	0.00081	0.00081	0.00082	-40	0.00029	0.00029	0.00030	-20	0.00056	0.00056	0.00057	-38	0.00088	0.00088	0.00089	-32	0.00082	0.00082	0.00082	-28	0.00169	0.00169	0.00169	0
CN, Free	Operations	Nov	5	0.00077	0.00077	0.00078	-58	0.00030	0.00031	0.00031	-31	0.00051	0.00051	0.00052	-56	0.00098	0.00098	0.00099	-34	0.00093	0.00092	0.00093	-28	0.00197	0.00197	0.00197	0
CN, Free	Operations	Dec	5	0.00040	0.00040	0.00041	-77	0.00024	0.00024	0.00025	-43	0.00027	0.00028	0.00028	-53	0.00093	0.00093	0.00094	-36	0.00092	0.00092	0.00092	-28	0.00195	0.00195	0.00195	0
CN, Free	Closure	Jan	6	0.00026	0.00026	0.00028	-84	0.00020	0.00020	0.00021	-52	0.00022	0.00022	0.00024	-51	0.00092	0.00092	0.00093	-37	0.00095	0.00095	0.00096	-28	0.00194	0.00194	0.00194	0
CN, Free	Closure	Feb	6	0.00021	0.00021	0.00022	-89	0.00018	0.00018	0.00019	-59	0.00021	0.00021	0.00023	-58	0.00091	0.00091	0.00093	-40	0.00097	0.00097	0.00098	-28	0.00202	0.00202	0.00202	0
CN, Free	Closure	Mar	6	0.00016	0.00016	0.00017	-90	0.00015	0.00015	0.00016	-65	0.00016	0.00017	0.00018	-63	0.00085	0.00085	0.00088	-43	0.00096	0.00096	0.00097	-28	0.00192	0.00192	0.00192	0
CN, Free	Closure	Apr	6	0.00016	0.00016	0.00016	-89	0.00013	0.00013	0.00014	-68	0.00015	0.00015	0.00016	-66	0.00079	0.00080	0.00082	-46	0.00095	0.00095	0.00096	-29	0.00190	0.00189	0.00190	0
CN, Free	Closure	May	6	0.00028	0.00028	0.00029	-67	0.00011	0.00011	0.00011	-61	0.00028	0.00029	0.00030	-43	0.00061	0.00062	0.00064	-47	0.00080	0.00080	0.00081	-29	0.00152	0.00151	0.00152	0
CN, Free	Closure	Jun	6	0.00050	0.00050	0.00051	-40	0.00013	0.00013	0.00014	-50	0.00028	0.00028	0.00029	-47	0.00059	0.00060	0.00062	-46	0.00076	0.00076	0.00077	-29	0.00141	0.00140	0.00141	0
CN, Free	Closure	Jul	6	0.00074	0.00074	0.00075	-26	0.00020	0.00021	0.00021	-28	0.00030	0.00030	0.00032	-40	0.00068	0.00068	0.00070	-41	0.00076	0.00076	0.00077	-30	0.00143	0.00143	0.00143	0
CN, Free	Closure	Aug	6	0.00090	0.00089	0.00091	-26	0.00030	0.00030	0.00031	-11	0.00036	0.00036	0.00037	-25	0.00082	0.00082	0.00085	-34	0.00079	0.00079	0.00080	-29	0.00155	0.00155	0.00155	0
CN, Free	Closure	Sep	6	0.00090	0.00089	0.00093	-32	0.00032	0.00032	0.00033	-12	0.00056	0.00057	0.00058	-25	0.00091	0.00091	0.00095	-31	0.00082	0.00083	0.00084	-28	0.00163	0.00163	0.00163	0
CN, Free	Closure	Oct	6	0.00083	0.00083	0.00088	-38	0.00030	0.00029	0.00030	-19	0.00058	0.00058	0.00063	-36	0.00094	0.00094	0.00098	-30	0.00085	0.00085	0.00087	-27	0.00169	0.00169	0.00169	0
CN, Free	Closure	Nov	6	0.00080	0.00081	0.00091	-56	0.00031	0.00031	0.00033	-29	0.00052	0.00053	0.00060	-54	0.00104	0.00104	0.00109	-31	0.00096	0.00097	0.00099	-27	0.00197	0.00197	0.00197	0
CN, Free	Closure	Dec	6	0.00042	0.00044	0.00054	-74	0.00025	0.00025	0.00028	-41	0.00028	0.00029	0.00032	-51	0.00098	0.00099	0.00104	-34	0.00096	0.00096	0.00099	-27	0.00196	0.00195	0.00196	0
CN, Free	Post-Closure	Jan	117	0.00162	0.00160	0.00162	-2	0.00039	0.00039	0.00043	-6	0.00044	0.00044	0.00049	-4	0.00148	0.00147	0.00154	-1	0.00132	0.00132	0.00136	-1	0.00194	0.00194	0.00194	0
CN, Free	Post-Closure	Feb	117	0.00178	0.00176	0.00178	-2	0.00041	0.00041	0.00046	-7	0.00047	0.00047	0.00052	-4	0.00153	0.00153	0.00160	-1	0.00136	0.00135	0.00140	-1	0.00202	0.00202	0.00202	0
CN, Free	Post-Closure	Mar	117	0.00150	0.00149	0.00150	-2	0.00039	0.00039	0.00045	-8	0.00044	0.00044	0.00047	-3	0.00151	0.00151	0.00158	-1	0.00136	0.00135	0.00139	-1	0.00192	0.00192	0.00192	0
CN, Free	Post-Closure	Apr	117	0.00144	0.00143	0.00144	-2	0.00037	0.00037	0.00043	-10	0.00041	0.00041	0.00045	-5	0.00149	0.00148	0.00156	-2	0.00135	0.00134	0.00139	-1	0.00190	0.00190	0.00190	0
CN, Free	Post-Closure	May	117	0.00087	0.00087	0.00087	0	0.00025	0.00025	0.00029	-9	0.00048	0.00049	0.00052	-3	0.00117	0.00117	0.00123	-2	0.00114	0.00114	0.00117	-1	0.00152	0.00152	0.00152	0
CN, Free	Post-Closure	Jun	117	0.00083	0.00083	0.00083	0	0.00024	0.00025	0.00028	-7	0.00052	0.00052	0.00056	-1	0.00110	0.00110	0.00116	-2	0.00108	0.00108	0.00111	-1	0.00141	0.00141	0.00141	0
CN, Free	Post-Closure	Jul	117	0.00098	0.00098	0.00098	-1	0.00027	0.00027	0.00030	-5	0.00050	0.00050	0.00054	0	0.00115	0.00115	0.00120	-1	0.00109	0.00108	0.00112	-1	0.00143	0.00143	0.00143	0
CN, Free	Post-Closure	Aug	117	0.00118	0.00118	0.00118	-3	0.00033	0.00033	0.00035	-4	0.00048	0.00048	0.00051	0	0.00126	0.00125	0.00130	-1	0.00112	0.00112	0.00115	-1	0.00155	0.00155	0.00155	0
CN, Free	Post-Closure	Sep	117	0.00128	0.00127	0.00128	-3	0.00035	0.00035	0.00037	-4	0.00075	0.00075	0.00079	0	0.00133	0.00133	0.00137	-1	0.00115	0.00115	0.00118	-1	0.00163	0.00163	0.00163	0
CN, Free	Post-Closure	Oct	117	0.00131	0.00130	0.00131	-3	0.00035	0.00035	0.00037	-4	0.00090	0.00090	0.00096	-1	0.00135	0.00135	0.00140	-1	0.00118	0.00117	0.00121	-1	0.00169	0.00169	0.00169	0
CN, Free	Post-Closure	Nov	117	0.00179	0.00178	0.00179	-2	0.00042	0.00042	0.00046	-4	0.00113	0.00114	0.00126	-2	0.00153	0.00153	0.00158	-1	0.00133	0.00132	0.00136	-1	0.00197	0.00197	0.00197	0
CN, Free	Post-Closure	Dec	117	0.00169	0.00169	0.00169	-2	0.00041	0.00041	0.00044	-5	0.00056	0.00057	0.00063	-4	0.00150	0.00150	0.00156	-1	0.00133	0.00132	0.00136	-1	0.00196	0.00196	0.00196	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Al, Tot	Construction	Jan	2	0.018	0.018	0.034	-62	0.006	0.006	0.010	-52	0.008	0.008	0.012	-48	0.033	0.033	0.041	-22	0.052	0.052	0.063	-17	0.044	0.044	0.044	0
Al, Tot	Construction	Feb	2	0.010	0.010	0.018	-80	0.004	0.004	0.006	-70	0.005	0.005	0.007	-70	0.032	0.032	0.040	-27	0.051	0.051	0.062	-19	0.046	0.046	0.046	0
Al, Tot	Construction	Mar	2	0.005	0.005	0.008	-88	0.003	0.003	0.003	-79	0.003	0.003	0.004	-79	0.029	0.029	0.035	-33	0.048	0.048	0.058	-23	0.043	0.043	0.043	0
Al, Tot	Construction	Apr	2	0.018	0.018	0.020	-57	0.002	0.002	0.002	-83	0.003	0.003	0.003	-83	0.026	0.026	0.031	-39	0.045	0.045	0.054	-27	0.043	0.043	0.043	-1
Al, Tot	Construction	May	2	0.045	0.045	0.046	-25	0.010	0.010	0.010	-30	0.018	0.018	0.018	-45	0.021	0.021	0.025	-40	0.038	0.038	0.045	-28	0.039	0.039	0.039	0
Al, Tot	Construction	Jun	2	0.065	0.065	0.066	-27	0.015	0.015	0.016	-15	0.022	0.022	0.023	-37	0.024	0.024	0.026	-35	0.040	0.040	0.045	-26	0.041	0.041	0.041	0
Al, Tot	Construction	Jul	2	0.050	0.050	0.050	-41	0.012	0.012	0.013	-30	0.018	0.018	0.018	-38	0.026	0.026	0.028	-32	0.071	0.071	0.076	-18	0.041	0.041	0.041	0
Al, Tot	Construction	Aug	2	0.026	0.026	0.026	-60	0.008	0.008	0.009	-47	0.012	0.012	0.013	-43	0.027	0.027	0.029	-31	0.063	0.063	0.067	-21	0.040	0.040	0.040	0
Al, Tot	Construction	Sep	2	0.015	0.015	0.015	-72	0.006	0.006	0.006	-59	0.015	0.015	0.016	-49	0.027	0.027	0.029	-31	0.054	0.054	0.057	-24	0.040	0.040	0.040	0
Al, Tot	Construction	Oct	2	0.009	0.009	0.009	-79	0.004	0.004	0.004	-66	0.010	0.010	0.011	-60	0.027	0.027	0.028	-32	0.047	0.047	0.049	-27	0.039	0.039	0.039	0
Al, Tot	Construction	Nov	2	0.007	0.007	0.007	-87	0.004	0.004	0.004	-73	0.007	0.007	0.008	-76	0.028	0.028	0.029	-36	0.047	0.047	0.049	-31	0.044	0.044	0.044	0
Al, Tot	Construction	Dec	2	0.003	0.003	0.003	-94	0.003	0.003	0.003	-78	0.004	0.004	0.004	-79	0.026	0.026	0.026	-40	0.043	0.043	0.045	-34	0.044	0.044	0.044	0
Al, Tot	Operations	Jan	5	0.002	0.002	0.002	-95	0.002	0.002	0.003	-80	0.003	0.003	0.003	-78	0.024	0.024	0.024	-43	0.038	0.038	0.039	-38	0.044	0.044	0.044	-1
Al, Tot	Operations	Feb	5	0.002	0.002	0.002	-95	0.002	0.002	0.002	-83	0.003	0.003	0.003	-82	0.024	0.024	0.024	-46	0.037	0.037	0.038	-40	0.046	0.045	0.046	-1
Al, Tot	Operations	Mar	5	0.002	0.002	0.002	-95	0.002	0.002	0.002	-84	0.002	0.002	0.003	-84	0.022	0.022	0.022	-50	0.035	0.035	0.035	-43	0.043	0.043	0.043	-1
Al, Tot	Operations	Apr	5	0.016	0.016	0.017	-62	0.002	0.002	0.002	-85	0.002	0.002	0.002	-84	0.020	0.020	0.020	-54	0.034	0.033	0.034	-45	0.043	0.043	0.043	-1
Al, Tot	Operations	May	5	0.044	0.044	0.045	-27	0.010	0.010	0.010	-29	0.019	0.019	0.019	-43	0.017	0.017	0.017	-52	0.029	0.029	0.029	-44	0.039	0.039	0.039	-1
Al, Tot	Operations	Jun	5	0.064	0.064	0.065	-29	0.016	0.016	0.016	-14	0.022	0.023	0.023	-35	0.021	0.021	0.021	-44	0.033	0.033	0.033	-39	0.041	0.041	0.041	-1
Al, Tot	Operations	Jul	5	0.048	0.049	0.049	-43	0.012	0.013	0.013	-28	0.018	0.018	0.018	-36	0.024	0.024	0.024	-39	0.065	0.065	0.065	-24	0.041	0.041	0.041	0
Al, Tot	Operations	Aug	5	0.025	0.025	0.025	-61	0.008	0.008	0.009	-45	0.012	0.013	0.013	-41	0.025	0.025	0.025	-36	0.058	0.058	0.058	-26	0.040	0.040	0.040	0
Al, Tot	Operations	Sep	5	0.014	0.014	0.014	-73	0.006	0.006	0.006	-56	0.016	0.016	0.016	-46	0.026	0.026	0.026	-34	0.050	0.050	0.050	-29	0.040	0.040	0.040	0
Al, Tot	Operations	Oct	5	0.008	0.008	0.008	-80	0.004	0.004	0.004	-64	0.011	0.011	0.011	-56	0.026	0.026	0.026	-35	0.043	0.043	0.044	-32	0.039	0.039	0.039	0
Al, Tot	Operations	Nov	5	0.006	0.006	0.007	-88	0.004	0.004	0.004	-70	0.008	0.008	0.008	-73	0.028	0.028	0.028	-37	0.044	0.044	0.044	-34	0.044	0.044	0.044	0
Al, Tot	Operations	Dec	5	0.003	0.003	0.003	-94	0.003	0.003	0.003	-76	0.004	0.004	0.004	-77	0.026	0.026	0.026	-40	0.040	0.040	0.041	-36	0.044	0.044	0.044	0
Al, Tot	Closure	Jan	6	0.002	0.002	0.002	-95	0.002	0.002	0.003	-80	0.003	0.003	0.004	-77	0.025	0.025	0.026	-42	0.038	0.038	0.040	-37	0.044	0.044	0.044	0
Al, Tot	Closure	Feb	6	0.002	0.002	0.002	-95	0.002	0.002	0.002	-83	0.003	0.003	0.003	-81	0.024	0.024	0.025	-45	0.037	0.037	0.039	-39	0.046	0.046	0.046	0
Al, Tot	Closure	Mar	6	0.002	0.002	0.002	-95	0.002	0.002	0.002	-85	0.003	0.003	0.003	-83	0.022	0.023	0.023	-48	0.035	0.035	0.037	-41	0.044	0.043	0.044	0
Al, Tot	Closure	Apr	6	0.016	0.016	0.017	-62	0.002	0.002	0.002	-86	0.003	0.003	0.003	-84	0.021	0.021	0.021	-51	0.034	0.034	0.035	-43	0.043	0.043	0.043	0
Al, Tot	Closure	May	6	0.044	0.044	0.045	-27	0.009	0.009	0.009	-35	0.019	0.019	0.020	-41	0.018	0.018	0.018	-49	0.030	0.030	0.031	-42	0.039	0.039	0.039	0
Al, Tot	Closure	Jun	6	0.064	0.064	0.066	-28	0.015	0.015	0.015	-18	0.023	0.023	0.023	-34	0.021	0.022	0.022	-42	0.033	0.033	0.034	-37	0.041	0.041	0.041	0
Al, Tot	Closure	Jul	6	0.050	0.050	0.053	-41	0.013	0.013	0.013	-27	0.019	0.019	0.020	-34	0.025	0.025	0.025	-37	0.066	0.066	0.067	-23	0.041	0.041	0.041	0
Al, Tot	Closure	Aug	6	0.026	0.026	0.030	-59	0.009	0.009	0.010	-41	0.014	0.014	0.014	-36	0.027	0.027	0.027	-33	0.059	0.059	0.059	-24	0.040	0.040	0.040	0
Al, Tot	Closure	Sep	6	0.015	0.015	0.018	-71	0.006	0.007	0.007	-51	0.018	0.018	0.019	-41	0.028	0.028	0.028	-31	0.051	0.051	0.051	-27	0.040	0.040	0.040	0
Al, Tot	Closure	Oct	6	0.009	0.009	0.012	-78	0.005	0.005	0.006	-59	0.012	0.012	0.013	-52	0.027	0.027	0.028	-32	0.044	0.044	0.045	-29	0.039	0.039	0.039	0
Al, Tot	Closure	Nov	6	0.007	0.007	0.010	-86	0.004	0.004	0.005	-67	0.009	0.009	0.011	-70	0.029	0.029	0.031	-34	0.045	0.045	0.046	-31	0.045	0.044	0.045	0
Al, Tot	Closure	Dec	6	0.003	0.004	0.005	-93	0.003	0.003	0.004	-74	0.004	0.004	0.006	-74	0.027	0.027	0.029	-38	0.041	0.041	0.043	-33	0.044	0.044	0.044	0
Al, Tot	Post-Closure	Jan	117	0.051	0.050	0.051	5	0.011	0.011	0.013	-7	0.014	0.014	0.016	-5	0.042	0.042	0.044	-2	0.059	0.059	0.061	-1	0.044	0.044	0.044	0
Al, Tot	Post-Closure	Feb	117	0.056	0.055	0.056	5	0.012	0.012	0.014	-8	0.016	0.016	0.018	-5	0.044	0.044	0.046	-2	0.060	0.060	0.062	-1	0.046	0.046	0.046	0
Al, Tot	Post-Closure	Mar	117	0.047	0.046	0.047	6	0.011	0.011	0.014	-10	0.015	0.015	0.017	-6	0.043	0.043	0.045	-2	0.059	0.059	0.061	-1	0.044	0.044	0.044	0
Al, Tot	Post-Closure	Apr	117	0.045	0.045	0.045	5	0.010	0.011	0.013	-12	0.014	0.014	0.017	-9	0.042	0.042	0.045	-2	0.058	0.058	0.060	-1	0.043	0.043	0.043	0
Al, Tot	Post-Closure	May	117	0.057	0.057	0.057	-6	0.012	0.012	0.014	-10	0.031	0.032	0.035	-3	0.035	0.035	0.037	-2	0.050	0.050	0.052	-1	0.039	0.039	0.039	0
Al, Tot	Post-Closure	Jun	117	0.083	0.083	0.083	-7	0.016	0.017	0.018	-9	0.034	0.034	0.036	-2	0.037	0.037	0.039	-2	0.052	0.051	0.053	-1	0.041	0.041	0.041	0
Al, Tot	Post-Closure	Jul	117	0.081	0.081	0.081	-5	0.016	0.016	0.017	-8	0.028	0.028	0.030	-1	0.039	0.039	0.040	-2	0.084	0.084	0.086	-1	0.041	0.041	0.041	0
Al, Tot	Post-Closure	Aug	117	0.064	0.063	0.064	-2	0.014	0.014	0.015	-7	0.021	0.021	0.022	-2	0.039	0.039	0.041	-1	0.077	0.077	0.078	-1	0.041	0.041	0.041	0
Al, Tot	Post-Closure	Sep	117	0.052	0.052	0.052	2	0.012	0.012	0.014	-6	0.030	0.030	0.031	-1	0.040	0.040	0.041	-1	0.068	0.068	0.070	0	0.040	0.040	0.040	0
Al, Tot	Post-Closure	Oct	117	0.044	0.044	0.044	4	0.011	0.011	0.012	-6	0.024	0.024	0.026	-1	0.040	0.040	0.041	-1	0.061	0.061	0.063	0	0.039	0.039	0.039	0
Al, Tot	Post-Closure	Nov	117	0.056	0.056	0.056	6	0.013	0.013	0.014	-6	0.028	0.029	0.032	-3	0.044	0.044	0.046	-1	0.064	0.064	0.066	0	0.045	0.045	0.045	0
Al, Tot	Post-Closure	Dec	117	0.053	0.053	0.053	6	0.012	0.012	0.014	-6	0.016	0.017	0.019	-4	0.043	0.043	0.045	-1	0.061	0.061	0.063	0	0.044	0.044	0.044	0
Sb, Diss	Construction	Jan	2	0.00008	0.00008	0.00010	-32	0.00008	0.00008	0.00009	-17	0.00006	0.00006	0.00007	-4	0.00008	0.00008	0.00009	-9	0.00006	0.00006	0.00006	-6	0.00011	0.00011	0.00011	0
Sb, Diss	Construction	Feb	2	0.00007	0.00007	0.00008	-47	0.00007	0.00007	0.00008	-25	0.00006	0.00006	0.00007	-17	0.00008	0.00008	0.00009	-12	0.00006	0.00006	0.00006	-7	0.00012	0.00012	0.00012	0
Sb, Diss	Construction	Mar	2	0.00005	0.00005	0.00006	-50	0.00007	0.00007	0.00007	-32	0.00006	0.00006	0.00006	-17	0.00008	0.00008	0.00008	-15	0.00006	0.00006	0.00006	-8	0.00011	0.00011	0.00011	0
Sb, Diss	Construction	Apr	2	0.00005	0.00005	0.00006	-48	0.00006	0.00006	0.00006	-35	0.00005	0.00005	0.00006	-20	0.00008	0.00008	0.00008	-19	0.00006	0.00006	0.00006	-9	0.00011	0.00011	0.00011	0
Sb, Diss	Construction	May	2	0.00005	0.00005	0.00006	-28	0.00005	0.00005	0.00006	-22	0.00005	0.00005	0.00005	-14	0.00006	0.00006	0.00007	-19	0.00005	0.00005	0.00005	-10	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Jun	2	0.00007	0.00007	0.00007	-16	0.00007	0.00007	0.00007	-11	0.00005	0.00005	0.00005	-18	0.00006	0.00006	0.00007	-18	0.00005	0.00005	0.00005	-10	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Jul	2	0.00008	0.00008	0.00008	-14	0.00008	0.00008	0.00008	-5	0.00006	0.00006	0.00006	-12	0.00007	0.00007	0.00007	-17	0.00005	0.00005	0.00005	-11	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Aug	2	0.00008	0.00008	0.00008	-15	0.00008	0.00008	0.00008	-2	0.00007	0.00007	0.00007	-6	0.00007	0.00007	0.00007	-16	0.00005	0.00005	0.00005	-11	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Sep	2	0.00008	0.00008	0.00008	-17	0.00008	0.00008	0.00008	-3	0.00007	0.00007	0.00007	-6	0.00007	0.00007	0.00007	-15	0.00005	0.00005	0.00005	-12	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Oct	2	0.00007	0.00007	0.00007	-19	0.00008	0.00008	0.00008	-5	0.00007	0.00007	0.00007	-7	0.00007	0.00007	0.00007	-14	0.00005	0.00005	0.00005	-12	0.00010	0.00010	0.00010	0
Sb, Diss	Construction	Nov	2	0.00008	0.00008	0.00008	-32	0.00008	0.00008	0.00009	-13	0.00008	0.00008	0.00008	-30	0.00008	0.00008	0.00008	-15	0.00006	0.00006	0.00006	-13	0.00011	0.00011	0.00011	0
Sb, Diss	Construction	Dec	2	0.00006	0.00006	0.00006	-46	0.00007	0.00007	0.00008	-22	0.00006	0.00006	0.00006	-21	0.00008	0.00008	0.00008	-17	0.00006	0.00006	0.00006	-14	0.00011	0.00011	0.00011	0
Sb, Diss	Operations	Jan	5	0.00006	0.00006	0.00006	-51	0.00014	0.00014	0.00023	55	0.00011	0.00012	0.00019	81	0.00011	0.00012	0.00019	35	0.00006	0.00007	0.00010	10	0.00011	0.00011	0.00011	0
Sb, Diss	Operations	Feb	5	0.00005	0.00005	0.00006	-56	0.00016	0.00016	0.00027	65	0.00012	0.00012	0.00020	71	0.00012	0.00013	0.00020	33	0.00006	0.00007	0.00010	10	0.00012	0.00012	0.00012	0
Sb, Diss	Operations	Mar	5	0.00005	0.00005	0.00005	-54	0.00019	0.00019	0.00033	102	0.00015	0.00016	0.00027	132	0.00011	0.00013	0.00020	33	0.00006	0.00007	0.00010	11	0.00011	0.00011	0.00011	0
Sb, Diss	Operations	Apr	5	0.00005	0.00005	0.00005	-50	0.00020	0.00020	0.00034	114	0.00017	0.00017	0.00029	155	0.00012	0.00013	0.00020	34	0.00006	0.00007	0.00010	11	0.00011	0.00011	0.00011	0
Sb, Diss	Operations	May	5	0.00005	0.00005	0.00005	-30	0.00017	0.00017	0.00028	139	0.00011	0.00011	0.00017	92	0.00010	0.00010	0.00016	36	0.00006	0.00006	0.00009	12	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Jun	5	0.00007	0.00007	0.00007	-17	0.00022	0.00022	0.00035	184	0.00014	0.00014	0.00021	111	0.00010	0.00011	0.00016	36	0.00006	0.00006	0.00009	13	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Jul	5	0.00008	0.00008	0.00008	-15	0.00029	0.00029	0.00047	257	0.00016	0.00016	0.00026	153	0.00010	0.00011	0.00016	37	0.00006	0.00007	0.00009	14	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Aug	5	0.00008	0.00008	0.00008	-16	0.00032	0.00032	0.00053	297	0.00021	0.00022	0.00034	203	0.00011	0.00012	0.00017	42	0.00006	0.00007	0.00009	17	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Sep	5	0.00008	0.00008	0.00008	-18	0.00032	0.00032	0.00052	291	0.00024	0.00024	0.00038	217	0.00012	0.00012	0.00018	51	0.00007	0.00007	0.00010	20	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Oct	5	0.00007	0.00007	0.00007	-20	0.00029	0.00029	0.00046	258	0.00024	0.00024	0.00038	211	0.00013	0.00013	0.00019	61	0.00007	0.00007	0.00010	23	0.00010	0.00010	0.00010	0
Sb, Diss	Operations	Nov	5	0.00008	0.00008	0.00008	-32	0.00028	0.00028	0.00044	192	0.00026	0.00026	0.00044	137	0.00015	0.00016	0.00023	68	0.00008	0.00008	0.00011	26	0.00011	0.00011	0.00011	0
Sb, Diss	Operations	Dec	5	0.00006	0.00006	0.00006	-47	0.00022	0.00022	0.00033	132	0.00018	0.00018	0.00027	143	0.00015	0.00016	0.00023	70	0.00008	0.00008	0.00011	28	0.00011	0.00011	0.00011	0
Sb, Diss	Closure	Jan	6	0.00006	0.00006	0.00006	-51	0.00007	0.00010	0.00025	7	0.00006	0.00008	0.00021	27	0.00008	0.00011	0.00023	19	0.00006	0.00007	0.00012	16	0.00011	0.00011	0.00011	0
Sb, Diss	Closure	Feb	6	0.00006	0.00006	0.00006	-56	0.00007	0.00009	0.00019	-9	0.00006	0.00007	0.00017	4	0.00008	0.00011	0.00024	16	0.00006	0.00007	0.00012	16	0.00012	0.00012	0.00012	0
Sb, Diss	Closure	Mar	6	0.00005	0.00005	0.00005	-54	0.00006	0.00008	0.00014	-21	0.00005	0.00007	0.00013	-3	0.00008	0.00011	0.00023	12	0.00006	0.00007	0.00012	15	0.00011	0.00011	0.00011	0
Sb, Diss	Closure	Apr	6	0.00006	0.00006	0.00006	-50	0.00006	0.00007	0.00011	-28	0.00005	0.00006	0.00010	-12	0.00008	0.00010	0.00022	9	0.00006	0.00007	0.00012	14	0.00011	0.00011	0.00011	0
Sb, Diss	Closure	May	6	0.00005	0.00005	0.00005	-30	0.00005	0.00006	0.00008	-21	0.00005	0.00005	0.00006	-12	0.00006	0.00008	0.00017	6	0.00005	0.00006	0.00010	12	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Jun	6	0.00007	0.00007	0.00007	-17	0.00006	0.00007	0.00008	-13	0.00005	0.00005	0.00006	-17	0.00006	0.00008	0.00015	2	0.00005	0.00006	0.00010	9	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Jul	6	0.00008	0.00008	0.00008	-14	0.00007	0.00007	0.00009	-9	0.00005	0.00006	0.00006	-13	0.00007	0.00008	0.00014	0	0.00005	0.00006	0.00010	7	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Aug	6	0.00008	0.00008	0.00008	-15	0.00007	0.00008	0.00009	-6	0.00006	0.00006	0.00007	-9	0.00007	0.00008	0.00013	-2	0.00005	0.00006	0.00010	5	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Sep	6	0.00008	0.00008	0.00008	-17	0.00007	0.00007	0.00009	-6	0.00007	0.00007	0.00008	-8	0.00007	0.00008	0.00012	-2	0.00005	0.00006	0.00009	4	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Oct	6	0.00007	0.00007	0.00007	-19	0.00007	0.00007	0.00008	-7	0.00007	0.00007	0.00008	-8	0.00007	0.00008	0.00012	-3	0.00005	0.00006	0.00009	3	0.00010	0.00010	0.00010	0
Sb, Diss	Closure	Nov	6	0.00008	0.00009	0.00009	-31	0.00008	0.00008	0.00010	-12	0.00008	0.00008	0.00009	-28	0.00008	0.00009	0.00013	-5	0.00006	0.00007	0.00010	2	0.00011	0.00011	0.00011	0
Sb, Diss	Closure	Dec	6	0.00006	0.00006	0.00007	-45	0.00007	0.00008	0.00009	-20	0.00006	0.00006	0.00007	-18	0.00008	0.00009	0.00012	-7	0.00006	0.00006	0.00010	1	0.00011	0.00011	0.00011	0
Sb, Diss	Post-Closure	Jan	117	0.00011	0.00011	0.00011	-1	0.00038	0.00034	0.00038	263	0.00024	0.00021	0.00024	232	0.00014	0.00013	0.00014	46	0.00008	0.00008	0.00008	26	0.00012	0.00012	0.00012	8
Sb, Diss	Post-Closure	Feb	117	0.00013	0.00012	0.00013	0	0.00042	0.00037	0.00042	275	0.00028	0.00024	0.00028	242	0.00015	0.00014	0.00015	47	0.00009	0.00008	0.00009	27	0.00013	0.00013	0.00013	9
Sb, Diss	Post-Closure	Mar	117	0.00011	0.00011	0.00011	0	0.00044	0.00039	0.00044	304	0.00029	0.00026	0.00029	283	0.00015	0.00014	0.00015	49	0.00009	0.00008	0.00009	27	0.00012	0.00012	0.00013	9
Sb, Diss	Post-Closure	Apr	117	0.00010	0.00010	0.00010	0	0.00047	0.00041	0.00047	336	0.00032	0.00028	0.00032	309	0.00015	0.00014	0.00015	50	0.00009	0.00008	0.00009	27	0.00013	0.00012	0.00013	10
Sb, Diss	Post-Closure	May	117	0.00008	0.00007	0.00008	-1	0.00033	0.00029	0.00033	316	0.00012	0.00011	0.00012	87	0.00012	0.00011	0.00012	49	0.00007	0.00007	0.00007	26	0.00011	0.00011	0.00011	9
Sb, Diss	Post-Closure	Jun	117	0.00008	0.00008	0.00008	-2	0.00032	0.00028	0.00032	269	0.00016	0.00015	0.00016	128	0.00012	0.00011	0.00012	45	0.00007	0.00007	0.00007	24	0.00011	0.00011	0.00011	9
Sb, Diss	Post-Closure	Jul	117	0.00009	0.00009	0.00009	-2	0.00032	0.00028	0.00032	250	0.00016	0.00014	0.00016	118	0.00012	0.00011	0.00012	42	0.00007	0.00007	0.00007	24	0.00011	0.00011	0.00011	8
Sb, Diss	Post-Closure	Aug	117	0.00009	0.00009	0.00009	-2	0.00031	0.00028	0.00031	237	0.00017	0.00015	0.00017	114	0.00012	0.00012	0.00012	39	0.00008	0.00007	0.00008	24	0.00011	0.00011	0.00011	8
Sb, Diss	Post-Closure	Sep	117	0.00009	0.00009	0.00009	-1	0.00031	0.00027	0.00031	234	0.00018	0.00017	0.00018	117	0.00012	0.00012	0.00012	38	0.00008	0.00007	0.00008	25	0.00011	0.00011	0.00011	7
Sb, Diss	Post-Closure	Oct	117	0.00009	0.00009	0.00009	-1	0.00031	0.00027	0.00031	241	0.00020	0.00018	0.00020	131	0.00012	0.00012	0.00012	40	0.00008	0.00007	0.00008	25	0.00011	0.00011	0.00011	7
Sb, Diss	Post-Closure	Nov	117	0.00012	0.00012	0.00012	0	0.00038	0.00034	0.00038	248	0.00032	0.00029	0.00032	165	0.00014	0.00013	0.00014	43	0.00009	0.00008	0.00009	26	0.00012	0.00012	0.00012	8
Sb, Diss	Post-Closure	Dec	117	0.00012	0.00012	0.00012	0	0.00038	0.00034	0.00038	256	0.00025	0.00023	0.00025	214	0.00014	0.00014	0.00014	45	0.00008	0.00008	0.00008	26	0.00012	0.00012	0.00012	8
Sb, Tot	Construction	Jan	2	0.00008	0.00008	0.00011	-32	0.00010	0.00010	0.00011	-14	0.00010	0.00010	0.00011	-2	0.00013	0.00013	0.00014	-8	0.00008	0.00008	0.00009	-4	0.00011	0.00011	0.00011	0
Sb, Tot	Construction	Feb	2	0.00007	0.00007	0.00008	-47	0.00010	0.00010	0.00011	-20	0.00010	0.00010	0.00011	-9	0.00013	0.00013	0.00014	-9	0.00008	0.00008	0.00009	-4	0.00012	0.00012	0.00012	0
Sb, Tot	Construction	Mar	2	0.00006	0.00006	0.00006	-50	0.00009	0.00009	0.00010	-25	0.00009	0.00009	0.00010	-13	0.00013	0.00013	0.00014	-11	0.00008	0.00008	0.00009	-5	0.00011	0.00011	0.00011	0
Sb, Tot	Construction	Apr	2	0.00006	0.00006	0.00006	-48	0.00008	0.00008	0.00009	-28	0.00008	0.00008	0.00009	-14	0.00012	0.00012	0.00013	-14	0.00008	0.00008	0.00009	-6	0.00011	0.00011	0.00011	0
Sb, Tot	Construction	May	2	0.00006	0.00006	0.00006	-30	0.00007	0.00007	0.00007	-20	0.00006	0.00006	0.00007	-5	0.00012	0.00012	0.00013	-14	0.00007	0.00007	0.00007	-5	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Jun	2	0.00007	0.00007	0.00007	-17	0.00008	0.00008	0.00008	-13	0.00008	0.00008	0.00008	-10	0.00011	0.00011	0.00012	-15	0.00007	0.00007	0.00007	-5	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Jul	2	0.00008	0.00008	0.00008	-14	0.00009	0.00009	0.00009	-7	0.00009	0.00009	0.00009	-9	0.00011	0.00011	0.00011	-15	0.00007	0.00007	0.00008	-5	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Aug	2	0.00008	0.00008	0.00008	-13	0.00009	0.00009	0.00009	-4	0.00009	0.00009	0.00009	-7	0.00011	0.00011	0.00011	-15	0.00007	0.00007	0.00008	-6	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Sep	2	0.00008	0.00008	0.00008	-15	0.00009	0.00009	0.00009	-3	0.00009	0.00009	0.00009	-5	0.00011	0.00011	0.00011	-14	0.00007	0.00007	0.00008	-7	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Oct	2	0.00008	0.00008	0.00008	-17	0.00009	0.00009	0.00009	-3	0.00009	0.00009	0.00009	-4	0.00011	0.00011	0.00011	-14	0.00007	0.00007	0.00007	-8	0.00010	0.00010	0.00010	0
Sb, Tot	Construction	Nov	2	0.00009	0.00009	0.00009	-30	0.00011	0.00011	0.00011	-10	0.00013	0.00013	0.00013	-25	0.00012	0.00012	0.00012	-15	0.00008	0.00008	0.00008	-8	0.00011	0.00011	0.00011	0
Sb, Tot	Construction	Dec	2	0.00007	0.00007	0.00007	-45	0.00010	0.00010	0.00010	-18	0.00010	0.00010	0.00010	-15	0.00012	0.00012	0.00012	-15	0.00008	0.00008	0.00008	-9	0.00011	0.00011	0.00011	0
Sb, Tot	Operations	Jan	5	0.00006	0.00006	0.00006	-51	0.00018	0.00018	0.00028	57	0.00018	0.00018	0.00029	82	0.00017	0.00019	0.00030	40	0.00009	0.00010	0.00014	18	0.00011	0.00011	0.00011	0
Sb, Tot	Operations	Feb	5	0.00006	0.00006	0.00006	-56	0.00020	0.00021	0.00034	72	0.00020	0.00021	0.00033	84	0.00018	0.00020	0.00031	40	0.00009	0.00010	0.00015	19	0.00012	0.00012	0.00012	0
Sb, Tot	Operations	Mar	5	0.00005	0.00005	0.00005	-54	0.00025	0.00026	0.00044	115	0.00023	0.00024	0.00041	136	0.00018	0.00020	0.00032	42	0.00009	0.00010	0.00015	20	0.00011	0.00011	0.00011	0
Sb, Tot	Operations	Apr	5	0.00006	0.00006	0.00006	-50	0.00026	0.00027	0.00045	129	0.00026	0.00026	0.00044	169	0.00019	0.00020	0.00033	46	0.00009	0.00010	0.00015	21	0.00011	0.00011	0.00011	0
Sb, Tot	Operations	May	5	0.00006	0.00006	0.00006	-31	0.00020	0.00021	0.00034	141	0.00015	0.00015	0.00023	118	0.00018	0.00019	0.00029	37	0.00008	0.00009	0.00013	23	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Jun	5	0.00007	0.00007	0.00007	-18	0.00024	0.00024	0.00040	172	0.00021	0.00021	0.00032	132	0.00017	0.00018	0.00027	37	0.00009	0.00009	0.00013	25	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Jul	5	0.00008	0.00008	0.00008	-14	0.00031	0.00031	0.00051	239	0.00025	0.00025	0.00040	160	0.00017	0.00018	0.00027	40	0.00009	0.00010	0.00014	27	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Aug	5	0.00008	0.00008	0.00008	-14	0.00035	0.00035	0.00058	279	0.00029	0.00029	0.00047	199	0.00018	0.00018	0.00027	46	0.00009	0.00010	0.00014	29	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Sep	5	0.00008	0.00008	0.00008	-15	0.00035	0.00035	0.00057	280	0.00031	0.00031	0.00049	215	0.00019	0.00019	0.00028	54	0.00010	0.00010	0.00015	31	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Oct	5	0.00008	0.00008	0.00008	-18	0.00033	0.00032	0.00052	252	0.00030	0.00030	0.00047	214	0.00019	0.00020	0.00029	62	0.00010	0.00010	0.00015	34	0.00010	0.00010	0.00010	0
Sb, Tot	Operations	Nov	5	0.00009	0.00009	0.00009	-31	0.00033	0.00033	0.00051	182	0.00039	0.00039	0.00059	130	0.00023	0.00024	0.00035	70	0.00011	0.00012	0.00017	37	0.00011	0.00011	0.00011	0
Sb, Tot	Operations	Dec	5	0.00007	0.00007	0.00007	-46	0.00026	0.00026	0.00039	128	0.00028	0.00028	0.00042	143	0.00024	0.00024	0.00036	75	0.00011	0.00012	0.00017	39	0.00011	0.00011	0.00011	0
Sb, Tot	Closure	Jan	6	0.00006	0.00006	0.00006	-50	0.00010	0.00013	0.00030	12	0.00010	0.00013	0.00032	32	0.00013	0.00017	0.00036	25	0.00009	0.00011	0.00017	27	0.00011	0.00011	0.00011	0
Sb, Tot	Closure	Feb	6	0.00006	0.00006	0.00006	-56	0.00010	0.00012	0.00024	-3	0.00010	0.00013	0.00027	15	0.00013	0.00017	0.00037	24	0.00009	0.00011	0.00018	26	0.00012	0.00012	0.00012	0
Sb, Tot	Closure	Mar	6	0.00005	0.00005	0.00005	-54	0.00009	0.00010	0.00018	-14	0.00009	0.00010	0.00019	2	0.00013	0.00017	0.00036	21	0.00009	0.00011	0.00018	26	0.00011	0.00011	0.00011	0
Sb, Tot	Closure	Apr	6	0.00006	0.00006	0.00006	-50	0.00008	0.00009	0.00015	-21	0.00008	0.00009	0.00015	-4	0.00012	0.00016	0.00034	18	0.00009	0.00011	0.00018	25	0.00011	0.00011	0.00011	0
Sb, Tot	Closure	May	6	0.00006	0.00006	0.00006	-31	0.00007	0.00007	0.00010	-16	0.00006	0.00007	0.00008	-4	0.00012	0.00015	0.00028	11	0.00008	0.00009	0.00015	24	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Jun	6	0.00007	0.00007	0.00007	-18	0.00007	0.00008	0.00010	-13	0.00008	0.00008	0.00010	-9	0.00011	0.00014	0.00025	7	0.00008	0.00009	0.00015	21	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Jul	6	0.00008	0.00008	0.00008	-14	0.00008	0.00008	0.00010	-9	0.00008	0.00009	0.00010	-9	0.00011	0.00013	0.00023	4	0.00008	0.00009	0.00015	18	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Aug	6	0.00008	0.00008	0.00008	-14	0.00008	0.00009	0.00010	-6	0.00009	0.00009	0.00010	-8	0.00011	0.00013	0.00021	2	0.00008	0.00009	0.00014	15	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Sep	6	0.00008	0.00008	0.00009	-15	0.00009	0.00009	0.00010	-5	0.00009	0.00009	0.00010	-6	0.00011	0.00012	0.00019	0	0.00008	0.00009	0.00014	13	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Oct	6	0.00008	0.00008	0.00008	-17	0.00008	0.00009	0.00010	-4	0.00009	0.00009	0.00010	-5	0.00011	0.00012	0.00018	-1	0.00008	0.00009	0.00014	11	0.00010	0.00010	0.00010	0
Sb, Tot	Closure	Nov	6	0.00009	0.00009	0.00010	-30	0.00010	0.00011	0.00013	-8	0.00013	0.00013	0.00015	-23	0.00012	0.00013	0.00020	-2	0.00008	0.00009	0.00015	10	0.00011	0.00011	0.00011	0
Sb, Tot	Closure	Dec	6	0.00007	0.00007	0.00008	-44	0.00010	0.00010	0.00012	-13	0.00010	0.00010	0.00012	-11	0.00012	0.00013	0.00019	-3	0.00008	0.00009	0.00014	8	0.00011	0.00011	0.00011	0
Sb, Tot	Post-Closure	Jan	117	0.00012	0.00012	0.00012	-1	0.00046	0.00040	0.00046	253	0.00037	0.00033	0.00037	225	0.00022	0.00020	0.00022	52	0.00012	0.00011	0.00012	33	0.00012	0.00012	0.00012	8
Sb, Tot	Post-Closure	Feb	117	0.00014	0.00014	0.00014	-1	0.00050	0.00044	0.00050	265	0.00043	0.00038	0.00043	238	0.00023	0.00022	0.00023	54	0.00012	0.00012	0.00012	33	0.00013	0.00013	0.00013	9
Sb, Tot	Post-Closure	Mar	117	0.00012	0.00012	0.00012	-1	0.00054	0.00047	0.00054	298	0.00044	0.00038	0.00044	275	0.00023	0.00022	0.00023	55	0.00012	0.00012	0.00012	34	0.00012	0.00012	0.00013	9
Sb, Tot	Post-Closure	Apr	117	0.00011	0.00011	0.00011	-1	0.00058	0.00051	0.00058	331	0.00045	0.00040	0.00045	306	0.00023	0.00022	0.00023	57	0.00012	0.00011	0.00012	34	0.00013	0.00012	0.00013	10
Sb, Tot	Post-Closure	May	117	0.00008	0.00008	0.00008	-1	0.00041	0.00036	0.00041	318	0.00015	0.00014	0.00015	102	0.00021	0.00020	0.00021	46	0.00010	0.00010	0.00010	33	0.00011	0.00011	0.00011	9
Sb, Tot	Post-Closure	Jun	117	0.00009	0.00009	0.00009	-2	0.00038	0.00034	0.00038	276	0.00024	0.00022	0.00024	145	0.00020	0.00019	0.00020	45	0.00010	0.00010	0.00010	30	0.00011	0.00011	0.00011	9
Sb, Tot	Post-Closure	Jul	117	0.00009	0.00009	0.00009	-2	0.00037	0.00033	0.00037	258	0.00025	0.00022	0.00025	131	0.00020	0.00018	0.00020	44	0.00010	0.00010	0.00010	30	0.00011	0.00011	0.00011	8
Sb, Tot	Post-Closure	Aug	117	0.00010	0.00010	0.00010	-2	0.00036	0.00032	0.00036	243	0.00024	0.00022	0.00024	125	0.00019	0.00018	0.00019	43	0.00011	0.00010	0.00011	31	0.00011	0.00011	0.00011	8
Sb, Tot	Post-Closure	Sep	117	0.00010	0.00010	0.00010	-1	0.00035	0.00032	0.00036	238	0.00024	0.00022	0.00024	127	0.00019	0.00018	0.00019	43	0.00011	0.00010	0.00011	31	0.00011	0.00011	0.00011	7
Sb, Tot	Post-Closure	Oct	117	0.00010	0.00010	0.00010	-1	0.00036	0.00032	0.00036	244	0.00025	0.00023	0.00025	140	0.00018	0.00017	0.00018	45	0.00011	0.00010	0.00011	31	0.00011	0.00011	0.00011	7
Sb, Tot	Post-Closure	Nov	117	0.00013	0.00013	0.00013	-1	0.00045	0.00040	0.00045	239	0.00047	0.00043	0.00047	154	0.00021	0.00020	0.00021	48	0.00012	0.00011	0.00012	32	0.00012	0.00012	0.00012	8
Sb, Tot	Post-Closure	Dec	117	0.00013	0.00013	0.00013	-1	0.00045	0.00040	0.00045	246	0.00040	0.00035	0.00040	206	0.00022	0.00020	0.00022	51	0.00012	0.00011	0.00012	33	0.00012	0.00012	0.00012	8
As, Diss	Construction	Jan	2	0.0011	0.0011	0.0013	99	0.0020	0.0020	0.0021	28	0.0014	0.0014	0.0014	37	0.0005	0.0005	0.0006	61	0.0003	0.0003	0.0004	30	0.0003	0.0003	0.0003	0
As, Diss	Construction	Feb	2	0.0012	0.0012	0.0013	101	0.0023	0.0023	0.0027	40	0.0015	0.0015	0.0017	42	0.0005	0.0005	0.0007	64	0.0003	0.0003	0.0004	32	0.0003	0.0003	0.0003	0
As, Diss	Construction	Mar	2	0.0011	0.0011	0.0012	113	0.0022	0.0022	0.0028	40	0.0015	0.0015	0.0019	59	0.0005	0.0005	0.0007	70	0.0004	0.0004	0.0004	35	0.0003	0.0003	0.0003	0
As, Diss	Construction	Apr	2	0.0013	0.0013	0.0013	144	0.0021	0.0021	0.0027	37	0.0016	0.0016	0.0020	67	0.0005	0.0005	0.0006	76	0.0004	0.0004	0.0004	38	0.0003	0.0003	0.0003	0
As, Diss	Construction	May	2	0.0010	0.0010	0.0010	163	0.0015	0.0015	0.0018	48	0.0009	0.0009	0.0011	188	0.0005	0.0005	0.0005	83	0.0003	0.0003	0.0004	42	0.0003	0.0003	0.0003	0
As, Diss	Construction	Jun	2	0.0011	0.0011	0.0011	173	0.0015	0.0015	0.0018	65	0.0011	0.0011	0.0013	118	0.0005	0.0005	0.0005	88	0.0003	0.0003	0.0004	43	0.0003	0.0003	0.0003	0
As, Diss	Construction	Jul	2	0.0012	0.0012	0.0012	173	0.0015	0.0015	0.0018	82	0.0012	0.0012	0.0014	122	0.0005	0.0005	0.0005	89	0.0004	0.0004	0.0004	46	0.0003	0.0003	0.0003	0
As, Diss	Construction	Aug	2	0.0012	0.0012	0.0012	164	0.0016	0.0016	0.0018	94	0.0013	0.0013	0.0015	132	0.0005	0.0005	0.0005	89	0.0004	0.0004	0.0004	50	0.0003	0.0003	0.0003	0
As, Diss	Construction	Sep	2	0.0012	0.0012	0.0012	176	0.0016	0.0016	0.0018	103	0.0011	0.0011	0.0012	122	0.0005	0.0005	0.0005	93	0.0004	0.0004	0.0004	52	0.0003	0.0003	0.0003	0
As, Diss	Construction	Oct	2	0.0012	0.0012	0.0012	198	0.0015	0.0015	0.0017	110	0.0010	0.0010	0.0011	131	0.0005	0.0005	0.0005	97	0.0004	0.0004	0.0004	54	0.0003	0.0003	0.0003	0
As, Diss	Construction	Nov	2	0.0016	0.0016	0.0016	178	0.0023	0.0023	0.0025	43	0.0019	0.0019	0.0021	82	0.0006	0.0006	0.0006	101	0.0004	0.0004	0.0004	57	0.0003	0.0003	0.0003	0
As, Diss	Construction	Dec	2	0.0014	0.0014	0.0014	145	0.0020	0.0020	0.0021	28	0.0016	0.0016	0.0017	49	0.0006	0.0006	0.0006	105	0.0004	0.0004	0.0004	61	0.0003	0.0003	0.0003	0
As, Diss	Operations	Jan	5	0.0013	0.0013	0.0013	132	0.0026	0.0024	0.0027	58	0.0020	0.0018	0.0021	81	0.0008	0.0008	0.0010	172	0.0005	0.0005	0.0007	110	0.0003	0.0003	0.0003	0
As, Diss	Operations	Feb	5	0.0013	0.0013	0.0013	109	0.0028	0.0026	0.0030	60	0.0019	0.0017	0.0020	64	0.0009	0.0008	0.0011	169	0.0005	0.0006	0.0007	114	0.0003	0.0003	0.0003	0
As, Diss	Operations	Mar	5	0.0011	0.0011	0.0011	114	0.0030	0.0027	0.0032	72	0.0021	0.0018	0.0022	92	0.0008	0.0008	0.0010	167	0.0005	0.0006	0.0007	117	0.0003	0.0003	0.0003	0
As, Diss	Operations	Apr	5	0.0013	0.0013	0.0013	142	0.0030	0.0027	0.0031	73	0.0022	0.0019	0.0023	109	0.0009	0.0008	0.0010	167	0.0006	0.0006	0.0007	121	0.0003	0.0003	0.0003	0
As, Diss	Operations	May	5	0.0010	0.0010	0.0010	159	0.0022	0.0020	0.0022	95	0.0012	0.0011	0.0013	256	0.0007	0.0007	0.0008	167	0.0005	0.0005	0.0006	121	0.0003	0.0003	0.0003	0
As, Diss	Operations	Jun	5	0.0011	0.0011	0.0011	169	0.0024	0.0022	0.0024	138	0.0017	0.0015	0.0017	196	0.0007	0.0006	0.0008	165	0.0005	0.0005	0.0006	111	0.0003	0.0003	0.0003	0
As, Diss	Operations	Jul	5	0.0012	0.0012	0.0012	168	0.0029	0.0026	0.0029	203	0.0020	0.0018	0.0020	241	0.0007	0.0006	0.0008	162	0.0005	0.0005	0.0006	110	0.0003	0.0003	0.0003	0
As, Diss	Operations	Aug	5	0.0011	0.0011	0.0011	160	0.0033	0.0029	0.0033	255	0.0025	0.0022	0.0025	301	0.0007	0.0007	0.0008	166	0.0005	0.0005	0.0006	112	0.0003	0.0003	0.0003	0
As, Diss	Operations	Sep	5	0.0012	0.0012	0.0012	171	0.0033	0.0029	0.0034	280	0.0022	0.0019	0.0022	302	0.0008	0.0007	0.0008	177	0.0005	0.0005	0.0006	114	0.0003	0.0003	0.0003	0
As, Diss	Operations	Oct	5	0.0012	0.0012	0.0012	193	0.0031	0.0028	0.0032	278	0.0020	0.0017	0.0020	312	0.0008	0.0007	0.0009	190	0.0005	0.0005	0.0006	116	0.0003	0.0003	0.0003	0
As, Diss	Operations	Nov	5	0.0015	0.0016	0.0016	172	0.0039	0.0036	0.0039	118	0.0034	0.0031	0.0034	186	0.0010	0.0009	0.0010	199	0.0006	0.0006	0.0007	121	0.0003	0.0003	0.0003	0
As, Diss	Operations	Dec	5	0.0013	0.0013	0.0013	140	0.0032	0.0030	0.0032	89	0.0026	0.0024	0.0027	123	0.0010	0.0009	0.0010	204	0.0006	0.0006	0.0007	128	0.0003	0.0003	0.0003	0
As, Diss	Closure	Jan	6	0.0013	0.0013	0.0013	135	0.0017	0.0019	0.0027	23	0.0013	0.0014	0.0020	42	0.0005	0.0006	0.0010	111	0.0004	0.0005	0.0007	89	0.0003	0.0003	0.0003	0
As, Diss	Closure	Feb	6	0.0013	0.0013	0.0013	112	0.0017	0.0018	0.0024	14	0.0012	0.0013	0.0017	22	0.0005	0.0006	0.0011	109	0.0004	0.0005	0.0007	91	0.0003	0.0003	0.0003	0
As, Diss	Closure	Mar	6	0.0011	0.0011	0.0012	116	0.0016	0.0017	0.0021	6	0.0011	0.0012	0.0015	22	0.0005	0.0006	0.0010	106	0.0004	0.0005	0.0007	92	0.0003	0.0003	0.0003	0
As, Diss	Closure	Apr	6	0.0013	0.0013	0.0013	144	0.0015	0.0016	0.0018	2	0.0011	0.0011	0.0013	23	0.0005	0.0006	0.0010	103	0.0004	0.0005	0.0007	93	0.0003	0.0003	0.0003	0
As, Diss	Closure	May	6	0.0010	0.0010	0.0010	160	0.0011	0.0011	0.0013	12	0.0006	0.0006	0.0007	99	0.0004	0.0005	0.0008	99	0.0004	0.0004	0.0006	90	0.0003	0.0003	0.0003	0
As, Diss	Closure	Jun	6	0.0011	0.0011	0.0011	169	0.0011	0.0011	0.0012	26	0.0008	0.0008	0.0009	62	0.0004	0.0005	0.0007	92	0.0004	0.0004	0.0006	79	0.0003	0.0003	0.0003	0
As, Diss	Closure	Jul	6	0.0012	0.0012	0.0012	169	0.0012	0.0012	0.0013	40	0.0009	0.0009	0.0009	65	0.0004	0.0004	0.0006	84	0.0004	0.0004	0.0006	74	0.0003	0.0003	0.0003	0
As, Diss	Closure	Aug	6	0.0011	0.0011	0.0012	161	0.0012	0.0012	0.0013	51	0.0009	0.0009	0.0010	74	0.0004	0.0004	0.0006	77	0.0004	0.0004	0.0006	70	0.0003	0.0003	0.0003	0
As, Diss	Closure	Sep	6	0.0012	0.0012	0.0012	172	0.0012	0.0012	0.0013	60	0.0008	0.0008	0.0009	72	0.0004	0.0004	0.0006	74	0.0004	0.0004	0.0006	68	0.0003	0.0003	0.0003	0
As, Diss	Closure	Oct	6	0.0012	0.0012	0.0012	194	0.0012	0.0012	0.0013	69	0.0008	0.0008	0.0008	82	0.0004	0.0004	0.0006	73	0.0003	0.0004	0.0005	66	0.0003	0.0003	0.0003	0
As, Diss	Closure	Nov	6	0.0016	0.0016	0.0016	175	0.0021	0.0021	0.0022	29	0.0017	0.0017	0.0018	57	0.0005	0.0005	0.0006	75	0.0004	0.0004	0.0006	65	0.0003	0.0003	0.0003	0
As, Diss	Closure	Dec	6	0.0014	0.0014	0.0014	145	0.0019	0.0019	0.0020	20	0.0015	0.0015	0.0016	38	0.0005	0.0005	0.0006	79	0.0004	0.0004	0.0006	66	0.0003	0.0003	0.0003	0
As, Diss	Post-Closure	Jan	117	0.0005	0.0006	0.0013	2	0.0025	0.0023	0.0025	52	0.0016	0.0015	0.0016	51	0.0004	0.0004	0.0005	33	0.0003	0.0003	0.0004	21	0.0004	0.0004	0.0004	15
As, Diss	Post-Closure	Feb	117	0.0006	0.0006	0.0014	2	0.0026	0.0025	0.0026	55	0.0017	0.0016	0.0017	50	0.0004	0.0004	0.0005	34	0.0003	0.0003	0.0004	22	0.0004	0.0004	0.0004	15
As, Diss	Post-Closure	Mar	117	0.0005	0.0005	0.0012	1	0.0027	0.0025	0.0027	60	0.0016	0.0015	0.0016	60	0.0004	0.0004	0.0005	34	0.0003	0.0003	0.0004	22	0.0004	0.0004	0.0004	16
As, Diss	Post-Closure	Apr	117	0.0005	0.0005	0.0013	1	0.0028	0.0026	0.0028	66	0.0017	0.0016	0.0017	69	0.0004	0.0004	0.0005	35	0.0003	0.0003	0.0004	22	0.0004	0.0004	0.0004	17
As, Diss	Post-Closure	May	117	0.0004	0.0004	0.0009	1	0.0019	0.0017	0.0019	72	0.0005	0.0005	0.0005	53	0.0003	0.0003	0.0004	34	0.0003	0.0003	0.0003	21	0.0003	0.0003	0.0003	16
As, Diss	Post-Closure	Jun	117	0.0004	0.0004	0.0010	0	0.0017	0.0016	0.0017	76	0.0009	0.0008	0.0009	60	0.0003	0.0003	0.0004	33	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	15
As, Diss	Post-Closure	Jul	117	0.0004	0.0004	0.0011	0	0.0016	0.0015	0.0016	79	0.0009	0.0008	0.0009	58	0.0003	0.0003	0.0004	32	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	14
As, Diss	Post-Closure	Aug	117	0.0004	0.0004	0.0011	0	0.0016	0.0015	0.0016	80	0.0009	0.0009	0.0009	59	0.0003	0.0003	0.0004	30	0.0003	0.0003	0.0003	19	0.0003	0.0003	0.0003	13
As, Diss	Post-Closure	Sep	117	0.0004	0.0004	0.0011	0	0.0015	0.0014	0.0015	83	0.0008	0.0008	0.0008	62	0.0003	0.0003	0.0004	30	0.0003	0.0003	0.0003	20	0.0003	0.0003	0.0003	13
As, Diss	Post-Closure	Oct	117	0.0004	0.0004	0.0010	0	0.0015	0.0014	0.0015	88	0.0007	0.0007	0.0007	67	0.0003	0.0003	0.0004	30	0.0003	0.0003	0.0003	20	0.0003	0.0003	0.0003	13
As, Diss	Post-Closure	Nov	117	0.0006	0.0006	0.0013	1	0.0026	0.0024	0.0026	49	0.0018	0.0017	0.0018	56	0.0004	0.0004	0.0004	32	0.0003	0.0003	0.0003	20	0.0004	0.0004	0.0004	13
As, Diss	Post-Closure	Dec	117	0.0005	0.0006	0.0013	1	0.0025	0.0024	0.0025	51	0.0017	0.0017	0.0017	51	0.0004	0.0004	0.0004	33	0.0003	0.0003	0.0003	21	0.0004	0.0004	0.0004	14

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake				West Farley Lake				East Farley Lake				Swede Lake				Ellystan Lake				Susan Lake last one			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
As, Tot	Construction	Jan	2	0.0011	0.0011	0.0013	75	0.0020	0.0020	0.0021	27	0.0015	0.0015	0.0015	36	0.0005	0.0005	0.0006	63	0.0004	0.0004	0.0004	27	0.0004	0.0004	0.0004	0
As, Tot	Construction	Feb	2	0.0013	0.0013	0.0013	74	0.0023	0.0023	0.0027	37	0.0016	0.0016	0.0019	39	0.0005	0.0005	0.0007	69	0.0004	0.0004	0.0005	29	0.0004	0.0004	0.0004	0
As, Tot	Construction	Mar	2	0.0012	0.0012	0.0012	84	0.0022	0.0022	0.0028	38	0.0016	0.0016	0.0021	58	0.0005	0.0005	0.0006	77	0.0004	0.0004	0.0005	32	0.0004	0.0004	0.0004	0
As, Tot	Construction	Apr	2	0.0013	0.0013	0.0013	111	0.0021	0.0021	0.0027	35	0.0017	0.0017	0.0021	64	0.0005	0.0005	0.0006	86	0.0004	0.0004	0.0005	36	0.0004	0.0004	0.0004	0
As, Tot	Construction	May	2	0.0010	0.0010	0.0010	135	0.0015	0.0015	0.0018	46	0.0009	0.0009	0.0011	179	0.0004	0.0004	0.0005	92	0.0004	0.0004	0.0004	39	0.0003	0.0003	0.0003	0
As, Tot	Construction	Jun	2	0.0011	0.0011	0.0011	152	0.0015	0.0015	0.0018	62	0.0011	0.0011	0.0014	113	0.0004	0.0004	0.0005	94	0.0004	0.0004	0.0004	40	0.0003	0.0003	0.0003	0
As, Tot	Construction	Jul	2	0.0012	0.0012	0.0012	158	0.0016	0.0016	0.0018	79	0.0012	0.0012	0.0015	119	0.0004	0.0004	0.0005	93	0.0004	0.0004	0.0004	43	0.0003	0.0003	0.0003	0
As, Tot	Construction	Aug	2	0.0013	0.0013	0.0013	150	0.0016	0.0016	0.0018	92	0.0013	0.0013	0.0015	128	0.0005	0.0005	0.0005	95	0.0004	0.0004	0.0004	46	0.0003	0.0003	0.0003	0
As, Tot	Construction	Sep	2	0.0013	0.0013	0.0013	152	0.0016	0.0016	0.0018	102	0.0011	0.0011	0.0013	119	0.0005	0.0005	0.0005	97	0.0004	0.0004	0.0004	48	0.0003	0.0003	0.0003	0
As, Tot	Construction	Oct	2	0.0013	0.0013	0.0013	161	0.0016	0.0016	0.0018	108	0.0010	0.0010	0.0012	128	0.0005	0.0005	0.0005	98	0.0004	0.0004	0.0004	49	0.0003	0.0003	0.0003	0
As, Tot	Construction	Nov	2	0.0016	0.0016	0.0016	139	0.0024	0.0024	0.0025	43	0.0021	0.0021	0.0023	80	0.0005	0.0005	0.0006	103	0.0004	0.0004	0.0005	49	0.0004	0.0004	0.0004	0
As, Tot	Construction	Dec	2	0.0014	0.0014	0.0014	110	0.0020	0.0020	0.0021	27	0.0018	0.0018	0.0018	49	0.0006	0.0006	0.0006	109	0.0004	0.0004	0.0005	53	0.0004	0.0004	0.0004	0
As, Tot	Operations	Jan	5	0.0013	0.0013	0.0013	99	0.0027	0.0025	0.0028	56	0.0021	0.0019	0.0022	80	0.0008	0.0008	0.0010	178	0.0005	0.0006	0.0007	99	0.0004	0.0004	0.0004	0
As, Tot	Operations	Feb	5	0.0013	0.0013	0.0013	79	0.0029	0.0026	0.0031	58	0.0021	0.0019	0.0022	62	0.0008	0.0008	0.0010	177	0.0006	0.0006	0.0007	103	0.0004	0.0004	0.0004	0
As, Tot	Operations	Mar	5	0.0012	0.0012	0.0012	85	0.0031	0.0028	0.0033	70	0.0022	0.0020	0.0024	91	0.0008	0.0008	0.0010	177	0.0006	0.0006	0.0008	107	0.0004	0.0004	0.0004	0
As, Tot	Operations	Apr	5	0.0013	0.0013	0.0013	109	0.0031	0.0027	0.0032	71	0.0024	0.0021	0.0024	106	0.0008	0.0008	0.0010	180	0.0006	0.0006	0.0008	112	0.0004	0.0004	0.0004	0
As, Tot	Operations	May	5	0.0010	0.0010	0.0010	132	0.0022	0.0020	0.0023	92	0.0013	0.0011	0.0013	245	0.0007	0.0006	0.0008	179	0.0005	0.0005	0.0007	113	0.0003	0.0003	0.0003	0
As, Tot	Operations	Jun	5	0.0011	0.0011	0.0011	149	0.0025	0.0022	0.0025	134	0.0017	0.0015	0.0018	191	0.0007	0.0006	0.0008	174	0.0005	0.0005	0.0006	104	0.0003	0.0003	0.0003	0
As, Tot	Operations	Jul	5	0.0012	0.0012	0.0012	153	0.0029	0.0026	0.0030	197	0.0022	0.0019	0.0022	238	0.0007	0.0006	0.0007	170	0.0005	0.0005	0.0006	103	0.0003	0.0003	0.0003	0
As, Tot	Operations	Aug	5	0.0012	0.0012	0.0013	146	0.0033	0.0029	0.0034	249	0.0026	0.0023	0.0027	293	0.0007	0.0006	0.0008	175	0.0005	0.0005	0.0006	106	0.0003	0.0003	0.0003	0
As, Tot	Operations	Sep	5	0.0013	0.0013	0.0013	148	0.0034	0.0030	0.0034	274	0.0023	0.0020	0.0023	294	0.0007	0.0007	0.0008	183	0.0005	0.0005	0.0006	107	0.0003	0.0003	0.0003	0
As, Tot	Operations	Oct	5	0.0013	0.0013	0.0013	157	0.0032	0.0028	0.0032	271	0.0021	0.0018	0.0021	302	0.0007	0.0007	0.0008	190	0.0005	0.0005	0.0006	108	0.0003	0.0003	0.0003	0
As, Tot	Operations	Nov	5	0.0016	0.0016	0.0016	135	0.0039	0.0036	0.0040	117	0.0036	0.0033	0.0037	182	0.0009	0.0008	0.0009	200	0.0006	0.0006	0.0007	106	0.0004	0.0004	0.0004	0
As, Tot	Operations	Dec	5	0.0014	0.0014	0.0014	106	0.0032	0.0030	0.0033	88	0.0028	0.0026	0.0029	122	0.0009	0.0008	0.0010	208	0.0006	0.0006	0.0007	113	0.0004	0.0004	0.0004	0
As, Tot	Closure	Jan	6	0.0013	0.0013	0.0013	101	0.0017	0.0019	0.0027	22	0.0014	0.0015	0.0022	41	0.0005	0.0006	0.0010	117	0.0005	0.0005	0.0007	80	0.0004	0.0004	0.0004	0
As, Tot	Closure	Feb	6	0.0013	0.0013	0.0013	82	0.0017	0.0019	0.0024	12	0.0013	0.0014	0.0019	20	0.0005	0.0006	0.0010	116	0.0005	0.0005	0.0008	82	0.0004	0.0004	0.0004	0
As, Tot	Closure	Mar	6	0.0012	0.0012	0.0012	86	0.0016	0.0017	0.0021	5	0.0012	0.0013	0.0016	21	0.0005	0.0006	0.0010	114	0.0005	0.0005	0.0008	84	0.0004	0.0004	0.0004	0
As, Tot	Closure	Apr	6	0.0013	0.0013	0.0013	110	0.0015	0.0016	0.0019	0	0.0012	0.0012	0.0014	21	0.0005	0.0006	0.0010	112	0.0005	0.0005	0.0008	86	0.0004	0.0004	0.0004	0
As, Tot	Closure	May	6	0.0010	0.0010	0.0010	133	0.0011	0.0011	0.0013	10	0.0006	0.0006	0.0007	93	0.0004	0.0005	0.0007	108	0.0004	0.0005	0.0007	84	0.0003	0.0003	0.0003	0
As, Tot	Closure	Jun	6	0.0011	0.0011	0.0011	149	0.0011	0.0011	0.0013	23	0.0008	0.0008	0.0009	58	0.0004	0.0004	0.0007	99	0.0004	0.0004	0.0006	74	0.0003	0.0003	0.0003	0
As, Tot	Closure	Jul	6	0.0012	0.0012	0.0012	154	0.0012	0.0012	0.0013	37	0.0009	0.0009	0.0010	62	0.0004	0.0004	0.0006	89	0.0004	0.0004	0.0006	69	0.0003	0.0003	0.0003	0
As, Tot	Closure	Aug	6	0.0013	0.0013	0.0013	147	0.0012	0.0012	0.0013	49	0.0010	0.0010	0.0011	71	0.0004	0.0004	0.0006	81	0.0004	0.0004	0.0006	67	0.0003	0.0003	0.0003	0
As, Tot	Closure	Sep	6	0.0013	0.0013	0.0013	149	0.0013	0.0013	0.0013	59	0.0009	0.0009	0.0009	69	0.0004	0.0004	0.0006	77	0.0004	0.0004	0.0006	64	0.0003	0.0003	0.0003	0
As, Tot	Closure	Oct	6	0.0013	0.0013	0.0013	157	0.0013	0.0013	0.0013	67	0.0008	0.0008	0.0009	79	0.0004	0.0004	0.0005	75	0.0004	0.0004	0.0005	62	0.0003	0.0003	0.0003	0
As, Tot	Closure	Nov	6	0.0016	0.0016	0.0016	137	0.0021	0.0021	0.0022	28	0.0018	0.0018	0.0019	56	0.0005	0.0005	0.0006	77	0.0004	0.0005	0.0006	58	0.0004	0.0004	0.0004	0
As, Tot	Closure	Dec	6	0.0014	0.0014	0.0014	110	0.0019	0.0019	0.0020	19	0.0016	0.0016	0.0017	38	0.0005	0.0005	0.0006	82	0.0004	0.0005	0.0006	59	0.0004	0.0004	0.0004	0
As, Tot	Post-Closure	Jan	117	0.0006	0.0006	0.0013	0	0.0025	0.0024	0.0025	52	0.0017	0.0016	0.0017	51	0.0004	0.0004	0.0005	34	0.0003	0.0003	0.0004	19	0.0004	0.0004	0.0004	12
As, Tot	Post-Closure	Feb	117	0.0007	0.0007	0.0015	-1	0.0027	0.0026	0.0027	55	0.0018	0.0017	0.0018	50	0.0004	0.0004	0.0005	35	0.0004	0.0003	0.0004	20	0.0004	0.0004	0.0004	13
As, Tot	Post-Closure	Mar	117	0.0006	0.0006	0.0013	-1	0.0028	0.0026	0.0028	60	0.0018	0.0017	0.0018	61	0.0004	0.0004	0.0005	35	0.0004	0.0003	0.0004	20	0.0004	0.0004	0.0004	14
As, Tot	Post-Closure	Apr	117	0.0006	0.0006	0.0013	-1	0.0028	0.0026	0.0028	66	0.0018	0.0017	0.0018	69	0.0004	0.0004	0.0005	36	0.0004	0.0003	0.0004	20	0.0004	0.0004	0.0004	14
As, Tot	Post-Closure	May	117	0.0004	0.0004	0.0009	0	0.0019	0.0018	0.0019	72	0.0005	0.0005	0.0006	53	0.0003	0.0003	0.0004	36	0.0003	0.0003	0.0004	20	0.0004	0.0004	0.0004	13
As, Tot	Post-Closure	Jun	117	0.0004	0.0004	0.0010	0	0.0018	0.0016	0.0018	76	0.0009	0.0008	0.0009	59	0.0003	0.0003	0.0004	35	0.0003	0.0003	0.0003	18	0.0004	0.0004	0.0004	12
As, Tot	Post-Closure	Jul	117	0.0005	0.0005	0.0011	-1	0.0017	0.0016	0.0017	78	0.0010	0.0009	0.0010	58	0.0003	0.0003	0.0004	33	0.0003	0.0003	0.0003	18	0.0004	0.0004	0.0004	12
As, Tot	Post-Closure	Aug	117	0.0005	0.0005	0.0012	-2	0.0016	0.0015	0.0016	80	0.0010	0.0009	0.0010	59	0.0003	0.0003	0.0004	31	0.0003	0.0003	0.0004	18	0.0004	0.0004	0.0004	11
As, Tot	Post-Closure	Sep	117	0.0005	0.0005	0.0012	-2	0.0016	0.0015	0.0016	82	0.0009	0.0008	0.0009	61	0.0003	0.0003	0.0003	31	0.0003	0.0003	0.0003	19	0.0004	0.0004	0.0004	11
As, Tot	Post-Closure	Oct	117	0.0005	0.0005	0.0011	-2	0.0015	0.0014	0.0015	87	0.0008	0.0008	0.0008	66	0.0003	0.0003	0.0003	31	0.0003	0.0003	0.0003	19	0.0004	0.0004	0.0004	11
As, Tot	Post-Closure	Nov	117	0.0007	0.0007	0.0014	-1	0.0026	0.0025	0.0026	49	0.0019	0.0018	0.0019	56	0.0004	0.0004	0.0004	32	0.0003	0.0003	0.0004	18	0.0004	0.0004	0.0004	11
As, Tot	Post-Closure	Dec	117	0.0006	0.0007	0.0014	-1	0.0026	0.0024	0.0026	51	0.0019	0.0018	0.0019	51	0.0004	0.0004	0.0004	34	0.0003	0.0003	0.0004	19	0.0004	0.0004	0.0004	12
Ba, Tot	Construction	Jan	2	0.0394	0.0394	0.0482	139	0.0353	0.0353	0.0471	120	0.0337	0.0337	0.0464	110	0.0146	0.0146	0.0204	70	0.0132	0.0132	0.0154	21	0.0097	0.0097	0.0097	0
Ba, Tot	Construction	Feb	2	0.0486	0.0486	0.0518	158	0.0424	0.0424	0.0504	145	0.0431	0.0431	0.0527	124	0.0163	0.0163	0.0225	80	0.0136	0.0136	0.0162	22	0.0101	0.0101	0.0101	0
Ba, Tot	Construction	Mar	2	0.0454	0.0454	0.0465	175	0.0439	0.0439	0.0492	153	0.0433	0.0433	0.0489	133	0.0175	0.0175	0.0233	94	0.0138	0.0138	0.0165	24	0.0097	0.0097	0.0097	0
Ba, Tot	Construction	Apr	2	0.0469	0.0469	0.0473	183	0.0446	0.0446	0.0484	157	0.0439	0.0439	0.0477	134	0.0188	0.0188	0.0240	109	0.0140	0.0140	0.0169	28	0.0097	0.0097	0.0097	0
Ba, Tot	Construction	May	2	0.0331	0.0331	0.0331	183	0.0339	0.0339	0.0361	175	0.0240	0.0240	0.0251	173	0.0158	0.0158	0.0195	117	0.0124	0.0124	0.0149	32	0.0085	0.0085	0.0085	0
Ba, Tot	Construction	Jun	2	0.0364	0.0364	0.0365	186	0.0352	0.0352	0.0368	186	0.0309	0.0309	0.0322	178	0.0158	0.0158	0.0189	116	0.0126	0.0126	0.0150	34	0.0086	0.0086	0.0086	0
Ba, Tot	Construction	Jul	2	0.0374	0.0374	0.0375	185	0.0369	0.0369	0.0378	194	0.0313	0.0313	0.0320	174	0.0159	0.0159	0.0185	114	0.0131	0.0131	0.0153	40	0.0086	0.0086	0.0086	0
Ba, Tot	Construction	Aug	2	0.0363	0.0363	0.0364	178	0.0376	0.0376	0.0381	194	0.0320	0.0320	0.0323	182	0.0157	0.0157	0.0179	113	0.0134	0.0134	0.0156	45	0.0085	0.0085	0.0085	0
Ba, Tot	Construction	Sep	2	0.0353	0.0353	0.0355	179	0.0380	0.0380	0.0381	195	0.0329	0.0329	0.0330	184	0.0159	0.0159	0.0177	114	0.0136	0.0136	0.0157	50	0.0084	0.0084	0.0084	0
Ba, Tot	Construction	Oct	2	0.0349	0.0349	0.0351	189	0.0380	0.0380	0.0382	197	0.0338	0.0338	0.0341	189	0.0163	0.0163	0.0178	120	0.0138	0.0138	0.0157	54	0.0083	0.0083	0.0083	0
Ba, Tot	Construction	Nov	2	0.0491	0.0491	0.0493	192	0.0467	0.0467	0.0468	192	0.0492	0.0492	0.0492	146	0.0197	0.0197	0.0210	130	0.0170	0.0170	0.0190	51	0.0097	0.0097	0.0097	0
Ba, Tot	Construction	Dec	2	0.0481	0.0481	0.0483	190	0.0466	0.0466	0.0466	192	0.0462	0.0462	0.0463	179	0.0207	0.0207	0.0219	141	0.0171	0.0171	0.0191	56	0.0097	0.0097	0.0097	0
Ba, Tot	Operations	Jan	5	0.0474	0.0475	0.0477	188	0.0476	0.0478	0.0493	199	0.0469	0.0472	0.0489	194	0.0232	0.0235	0.0248	175	0.0208	0.0207	0.0219	90	0.0097	0.0097	0.0097	0
Ba, Tot	Operations	Feb	5	0.0510	0.0511	0.0513	172	0.0509	0.0513	0.0531	197	0.0532	0.0535	0.0553	178	0.0251	0.0254	0.0268	182	0.0215	0.0214	0.0226	93	0.0101	0.0101	0.0101	0
Ba, Tot	Operations	Mar	5	0.0459	0.0460	0.0462	178	0.0510	0.0513	0.0541	196	0.0503	0.0507	0.0532	172	0.0258	0.0261	0.0275	190	0.0216	0.0216	0.0228	96	0.0097	0.0097	0.0097	0
Ba, Tot	Operations	Apr	5	0.0467	0.0468	0.0471	183	0.0509	0.0512	0.0543	194	0.0501	0.0504	0.0535	169	0.0265	0.0268	0.0283	199	0.0218	0.0218	0.0230	99	0.0097	0.0097	0.0097	0
Ba, Tot	Operations	May	5	0.0328	0.0328	0.0330	181	0.0378	0.0380	0.0403	208	0.0257	0.0260	0.0277	196	0.0213	0.0216	0.0229	198	0.0188	0.0188	0.0198	100	0.0085	0.0085	0.0085	0
Ba, Tot	Operations	Jun	5	0.0360	0.0360	0.0362	183	0.0393	0.0393	0.0419	219	0.0339	0.0339	0.0361	206	0.0205	0.0207	0.0219	184	0.0181	0.0181	0.0191	93	0.0086	0.0086	0.0086	0
Ba, Tot	Operations	Jul	5	0.0368	0.0369	0.0371	181	0.0417	0.0415	0.0449	231	0.0348	0.0346	0.0372	204	0.0199	0.0200	0.0211	171	0.0181	0.0181	0.0191	94	0.0086	0.0086	0.0086	0
Ba, Tot	Operations	Aug	5	0.0357	0.0358	0.0360	174	0.0428	0.0426	0.0463	233	0.0360	0.0358	0.0388	215	0.0192	0.0193	0.0203	161	0.0180	0.0181	0.0190	97	0.0085	0.0085	0.0085	0
Ba, Tot	Operations	Sep	5	0.0347	0.0348	0.0350	175	0.0430	0.0427	0.0463	231	0.0369	0.0366	0.0397	216	0.0190	0.0190	0.0201	157	0.0179	0.0179	0.0189	98	0.0084	0.0084	0.0084	0
Ba, Tot	Operations	Oct	5	0.0344	0.0345	0.0347	185	0.0421	0.0418	0.0449	226	0.0372	0.0369	0.0398	215	0.0191	0.0192	0.0203	159	0.0178	0.0178	0.0187	100	0.0083	0.0083	0.0083	0
Ba, Tot	Operations	Nov	5	0.0483	0.0484	0.0488	188	0.0501	0.0499	0.0528	212	0.0536	0.0533	0.0567	167	0.0227	0.0227	0.0240	166	0.0212	0.0213	0.0223	91	0.0097	0.0097	0.0097	0
Ba, Tot	Operations	Dec	5	0.0473	0.0474	0.0478	186	0.0490	0.0489	0.0509	206	0.0489	0.0487	0.0510	194	0.0235	0.0235	0.0249	174	0.0212	0.0213	0.0223	94	0.0097	0.0097	0.0097	0
Ba, Tot	Closure	Jan	6	0.0478	0.0478	0.0483	190	0.0469	0.0473	0.0497	196	0.0462	0.0467	0.0494	190	0.0222	0.0228	0.0255	166	0.0201	0.0206	0.0224	91	0.0097	0.0097	0.0097	0
Ba, Tot	Closure	Feb	6	0.0516	0.0515	0.0520	174	0.0502	0.0504	0.0519	192	0.0525	0.0528	0.0549	175	0.0242	0.0247	0.0274	174	0.0208	0.0213	0.0232	93	0.0101	0.0101	0.0101	0
Ba, Tot	Closure	Mar	6	0.0462	0.0462	0.0467	180	0.0494	0.0494	0.0502	185	0.0490	0.0491	0.0500	164	0.0248	0.0253	0.0278	182	0.0209	0.0214	0.0233	96	0.0097	0.0097	0.0097	0
Ba, Tot	Closure	Apr	6	0.0470	0.0470	0.0475	184	0.0485	0.0485	0.0489	179	0.0477	0.0477	0.0482	155	0.0253	0.0257	0.0280	188	0.0211	0.0215	0.0234	98	0.0097	0.0097	0.0097	0
Ba, Tot	Closure	May	6	0.0328	0.0329	0.0333	181	0.0351	0.0351	0.0354	185	0.0233	0.0231	0.0236	163	0.0204	0.0206	0.0223	185	0.0181	0.0185	0.0200	98	0.0085	0.0085	0.0085	0
Ba, Tot	Closure	Jun	6	0.0360	0.0360	0.0365	183	0.0352	0.0352	0.0356	186	0.0303	0.0302	0.0307	172	0.0194	0.0196	0.0209	169	0.0174	0.0177	0.0191	90	0.0086	0.0086	0.0086	0
Ba, Tot	Closure	Jul	6	0.0370	0.0369	0.0375	182	0.0364	0.0364	0.0369	190	0.0302	0.0300	0.0305	164	0.0186	0.0188	0.0199	154	0.0174	0.0176	0.0189	90	0.0086	0.0086	0.0086	0
Ba, Tot	Closure	Aug	6	0.0360	0.0358	0.0364	174	0.0370	0.0370	0.0375	189	0.0307	0.0305	0.0311	168	0.0177	0.0178	0.0187	142	0.0172	0.0175	0.0186	91	0.0085	0.0085	0.0085	0
Ba, Tot	Closure	Sep	6	0.0351	0.0349	0.0355	176	0.0373	0.0372	0.0377	189	0.0316	0.0313	0.0319	171	0.0173	0.0173	0.0181	135	0.0170	0.0172	0.0183	92	0.0084	0.0084	0.0084	0
Ba, Tot	Closure	Oct	6	0.0347	0.0345	0.0351	185	0.0372	0.0371	0.0376	190	0.0325	0.0322	0.0328	175	0.0173	0.0173	0.0180	135	0.0168	0.0170	0.0180	92	0.0083	0.0083	0.0083	0
Ba, Tot	Closure	Nov	6	0.0487	0.0486	0.0493	189	0.0460	0.0458	0.0464	187	0.0484	0.0483	0.0488	142	0.0205	0.0205	0.0211	140	0.0200	0.0202	0.0213	82	0.0097	0.0097	0.0097	0
Ba, Tot	Closure	Dec	6	0.0478	0.0477	0.0483	188	0.0463	0.0462	0.0468	189	0.0458	0.0456	0.0463	176	0.0214	0.0213	0.0218	149	0.0200	0.0202	0.0212	85	0.0097	0.0097	0.0097	0
Ba, Tot	Post-Closure	Jan	117	0.0167	0.0172	0.0474	4	0.0334	0.0316	0.0455	98	0.0299	0.0286	0.0446	78	0.0117	0.0115	0.0208	35	0.0127	0.0127	0.0195	18	0.0099	0.0099	0.0099	3
Ba, Tot	Post-Closure	Feb	117	0.0190	0.0195	0.0515	4	0.0366	0.0346	0.0490	100	0.0354	0.0339	0.0516	76	0.0124	0.0122	0.0225	36	0.0130	0.0130	0.0201	18	0.0104	0.0104	0.0104	3
Ba, Tot	Post-Closure	Mar	117	0.0167	0.0171	0.0466	3	0.0385	0.0363	0.0486	109	0.0357	0.0340	0.0480	83	0.0124	0.0122	0.0230	36	0.0129	0.0129	0.0201	18	0.0100	0.0100	0.0100	3
Ba, Tot	Post-Closure	Apr	117	0.0166	0.0171	0.0472	3	0.0404	0.0379	0.0481	118	0.0364	0.0346	0.0470	85	0.0125	0.0123	0.0233	37	0.0129	0.0128	0.0201	18	0.0100	0.0100	0.0100	3
Ba, Tot	Post-Closure	May	117	0.0118	0.0120	0.0320	3	0.0284	0.0267	0.0343	116	0.0129	0.0125	0.0206	43	0.0101	0.0099	0.0187	37	0.0110	0.0110	0.0172	18	0.0087	0.0087	0.0087	3
Ba, Tot	Post-Closure	Jun	117	0.0127	0.0130	0.0337	2	0.0271	0.0256	0.0338	107	0.0188	0.0180	0.0280	62	0.0099	0.0098	0.0178	34	0.0109	0.0108	0.0165	16	0.0088	0.0088	0.0088	3
Ba, Tot	Post-Closure	Jul	117	0.0131	0.0134	0.0344	2	0.0267	0.0253	0.0343	101	0.0190	0.0182	0.0274	60	0.0099	0.0097	0.0171	32	0.0109	0.0108	0.0164	17	0.0088	0.0088	0.0088	2
Ba, Tot	Post-Closure	Aug	117	0.0131	0.0133	0.0334	2	0.0264	0.0250	0.0345	95	0.0187	0.0180	0.0273	58	0.0097	0.0096	0.0162	30	0.0107	0.0107	0.0162	17	0.0087	0.0087	0.0087	2
Ba, Tot	Post-Closure	Sep	117	0.0128	0.0130	0.0325	2	0.0262	0.0249	0.0345	93	0.0190	0.0183	0.0278	58	0.0097	0.0095	0.0157	29	0.0106	0.0105	0.0160	18	0.0086	0.0086	0.0086	2
Ba, Tot	Post-Closure	Oct	117	0.0123	0.0124	0.0301	3	0.0263	0.0249	0.0333	94	0.0197	0.0189	0.0278	62	0.0097	0.0095	0.0155	29	0.0105	0.0104	0.0157	18	0.0085	0.0085	0.0085	2
Ba, Tot	Post-Closure	Nov	117	0.0171	0.0174	0.0395	3	0.0328	0.0311	0.0398	94	0.0355	0.0339	0.0449	70	0.0114	0.0112	0.0180	31	0.0130	0.0129	0.0188	16	0.0099	0.0099	0.0099	2
Ba, Tot	Post-Closure	Dec	117	0.0168	0.0170	0.0378	3	0.0329	0.0312	0.0391	95	0.0310	0.0295	0.0368	78	0.0116	0.0113	0.0181	33	0.0128	0.0127	0.0186	17	0.0099	0.0099	0.0099	2
B, Tot	Construction	Jan	2	0.0277	0.0277	0.0342	150	0.0287	0.0287	0.0346	203	0.0262	0.0262	0.0344	162	0.0058	0.0058	0.0090	134	0.0137	0.0137	0.0140	-2	0.0433	0.0433	0.0434	0
B, Tot	Construction	Feb	2	0.0341	0.0341	0.0366	167	0.0380	0.0380	0.0398	269	0.0380	0.0380	0.0382	214	0.0071	0.0071	0.0103	171	0.0137	0.0137	0.0138	-3	0.0451	0.0451	0.0452	0
B, Tot	Construction	Mar	2	0.0319	0.0319	0.0327	181	0.0401	0.0401	0.0454	283	0.0394	0.0394	0.0441	232	0.0085	0.0085	0.0109	222	0.0132	0.0132	0.0133	-5	0.0429	0.0429	0.0430	0
B, Tot	Construction	Apr	2	0.0329	0.0329	0.0332	187	0.0399	0.0399	0.0462	276	0.0396	0.0396	0.0459	217	0.0100	0.0100	0.0116	263	0.0128	0.0128	0.0131	-6	0.0425	0.0425	0.0426	0
B, Tot	Construction	May	2	0.0188	0.0188	0.0189	191	0.0282	0.0282	0.0321	275	0.0247	0.0247	0.0275	58	0.0083	0.0083	0.0092	259	0.0109	0.0109	0.0113	-6	0.0335	0.0335	0.0335	-1
B, Tot	Construction	Jun	2	0.0169	0.0169	0.0169	209	0.0274	0.0274	0.0309	263	0.0277	0.0277	0.0307	73	0.0073	0.0073	0.0080	228	0.0109	0.0109	0.0113	-3	0.0304	0.0304	0.0304	-1
B, Tot	Construction	Jul	2	0.0175	0.0175	0.0175	241	0.0273	0.0273	0.0307	262	0.0246	0.0246	0.0275	107	0.0066	0.0066	0.0071	207	0.0104	0.0104	0.0108	-1	0.0333	0.0333	0.0333	0
B, Tot	Construction	Aug	2	0.0180	0.0180	0.0181	270	0.0270	0.0270	0.0304	263	0.0232	0.0232	0.0261	189	0.0059	0.0059	0.0063	191	0.0096	0.0096	0.0100	2	0.0404	0.0404	0.0405	0
B, Tot	Construction	Sep	2	0.0216	0.0216	0.0218	273	0.0271	0.0271	0.0303	268	0.0234	0.0234	0.0263	225	0.0054	0.0054	0.0057	181	0.0089	0.0089	0.0093	4	0.0416	0.0416	0.0416	0
B, Tot	Construction	Oct	2	0.0256	0.0256	0.0258	256	0.0276	0.0276	0.0306	277	0.0243	0.0243	0.0271	248	0.0051	0.0051	0.0053	176	0.0083	0.0083	0.0087	5	0.0389	0.0389	0.0390	0
B, Tot	Construction	Nov	2	0.0367	0.0367	0.0369	231	0.0341	0.0341	0.0369	271	0.0359	0.0359	0.0391	192	0.0067	0.0067	0.0067	189	0.0151	0.0151	0.0155	2	0.0438	0.0438	0.0439	0
B, Tot	Construction	Dec	2	0.0347	0.0347	0.0349	214	0.0337	0.0337	0.0353	261	0.0335	0.0335	0.0354	231	0.0079	0.0079	0.0081	225	0.0144	0.0144	0.0148	1	0.0435	0.0435	0.0435	0
B, Tot	Operations	Jan	5	0.0334	0.0335	0.0338	202	0.0359	0.0361	0.0403	282	0.0354	0.0357	0.0402	259	0.0089	0.0092	0.0107	281	0.0146	0.0148	0.0156	7	0.0432	0.0432	0.0433	-1
B, Tot	Operations	Feb	5	0.0357	0.0358	0.0360	180	0.0391	0.0396	0.0451	283	0.0405	0.0409	0.0461	238	0.0102	0.0105	0.0122	308	0.0147	0.0148	0.0157	7	0.0450	0.0450	0.0450	-1
B, Tot	Operations	Mar	5	0.0320	0.0321	0.0324	184	0.0404	0.0410	0.0487	292	0.0396	0.0402	0.0474	238	0.0110	0.0114	0.0132	337	0.0144	0.0145	0.0155	7	0.0429	0.0429	0.0429	-1
B, Tot	Operations	Apr	5	0.0325	0.0327	0.0329	185	0.0407	0.0410	0.0490	287	0.0401	0.0405	0.0484	225	0.0120	0.0124	0.0144	357	0.0141	0.0143	0.0153	6	0.0425	0.0425	0.0425	-1
B, Tot	Operations	May	5	0.0185	0.0186	0.0188	187	0.0299	0.0300	0.0358	300	0.0250	0.0252	0.0290	61	0.0096	0.0099	0.0116	336	0.0121	0.0122	0.0131	7	0.0335	0.0334	0.0335	-1
B, Tot	Operations	Jun	5	0.0166	0.0166	0.0168	203	0.0310	0.0310	0.0377	312	0.0300	0.0301	0.0353	88	0.0084	0.0087	0.0101	294	0.0119	0.0121	0.0129	8	0.0304	0.0303	0.0304	-1
B, Tot	Operations	Jul	5	0.0171	0.0171	0.0173	234	0.0338	0.0339	0.0428	350	0.0289	0.0289	0.0354	142	0.0075	0.0077	0.0090	266	0.0113	0.0115	0.0124	12	0.0333	0.0333	0.0333	-1
B, Tot	Operations	Aug	5	0.0176	0.0177	0.0178	263	0.0355	0.0354	0.0454	375	0.0294	0.0294	0.0372	265	0.0067	0.0069	0.0080	246	0.0105	0.0107	0.0116	15	0.0404	0.0404	0.0404	0
B, Tot	Operations	Sep	5	0.0212	0.0212	0.0214	266	0.0358	0.0357	0.0454	384	0.0303	0.0302	0.0383	318	0.0062	0.0063	0.0074	236	0.0098	0.0099	0.0108	18	0.0415	0.0415	0.0415	0
B, Tot	Operations	Oct	5	0.0251	0.0252	0.0254	250	0.0351	0.0349	0.0434	378	0.0307	0.0305	0.0381	337	0.0059	0.0060	0.0071	232	0.0092	0.0093	0.0102	20	0.0389	0.0389	0.0389	0
B, Tot	Operations	Nov	5	0.0359	0.0360	0.0364	225	0.0410	0.0410	0.0488	345	0.0442	0.0440	0.0531	258	0.0077	0.0078	0.0092	242	0.0161	0.0163	0.0172	11	0.0438	0.0438	0.0438	0
B, Tot	Operations	Dec	5	0.0339	0.0340	0.0344	208	0.0390	0.0391	0.0446	319	0.0392	0.0392	0.0453	288	0.0089	0.0090	0.0106	278	0.0154	0.0156	0.0166	11	0.0435	0.0435	0.0435	0
B, Tot	Closure	Jan	6	0.0339	0.0338	0.0343	205	0.0328	0.0342	0.0413	261	0.0322	0.0338	0.0417	239	0.0083	0.0089	0.0116	273	0.0144	0.0148	0.0162	10	0.0434	0.0434	0.0434	0
B, Tot	Closure	Feb	6	0.0363	0.0362	0.0367	183	0.0352	0.0362	0.0410	251	0.0368	0.0380	0.0440	214	0.0095	0.0101	0.0129	299	0.0144	0.0149	0.0163	9	0.0452	0.0452	0.0452	0
B, Tot	Closure	Mar	6	0.0324	0.0324	0.0328	186	0.0346	0.0353	0.0383	237	0.0344	0.0351	0.0385	195	0.0102	0.0107	0.0135	321	0.0141	0.0145	0.0161	8	0.0431	0.0430	0.0431	0
B, Tot	Closure	Apr	6	0.0329	0.0329	0.0334	188	0.0340	0.0344	0.0364	225	0.0336	0.0341	0.0362	173	0.0108	0.0113	0.0139	327	0.0138	0.0142	0.0159	8	0.0427	0.0426	0.0427	0
B, Tot	Closure	May	6	0.0188	0.0188	0.0190	190	0.0243	0.0245	0.0254	226	0.0214	0.0214	0.0218	37	0.0086	0.0090	0.0109	303	0.0118	0.0122	0.0136	8	0.0336	0.0336	0.0337	0
B, Tot	Closure	Jun	6	0.0167	0.0168	0.0170	206	0.0234	0.0235	0.0242	212	0.0245	0.0246	0.0251	54	0.0076	0.0079	0.0095	264	0.0116	0.0119	0.0132	9	0.0305	0.0305	0.0306	0
B, Tot	Closure	Jul	6	0.0172	0.0172	0.0176	237	0.0233	0.0233	0.0239	210	0.0212	0.0213	0.0217	78	0.0067	0.0070	0.0083	236	0.0110	0.0113	0.0126	11	0.0334	0.0334	0.0335	0
B, Tot	Closure	Aug	6	0.0178	0.0178	0.0181	265	0.0232	0.0232	0.0237	211	0.0196	0.0195	0.0198	142	0.0059	0.0061	0.0073	214	0.0101	0.0104	0.0117	15	0.0405	0.0404	0.0405	0
B, Tot	Closure	Sep	6	0.0214	0.0212	0.0217	266	0.0235	0.0234	0.0239	217	0.0198	0.0197	0.0200	173	0.0053	0.0055	0.0065	199	0.0093	0.0096	0.0108	17	0.0416	0.0416	0.0416	0
B, Tot	Closure	Oct	6	0.0253	0.0251	0.0257	250	0.0242	0.0241	0.0246	230	0.0208	0.0206	0.0210	195	0.0049	0.0051	0.0061	191	0.0087	0.0090	0.0101	19	0.0390	0.0390	0.0390	0
B, Tot	Closure	Nov	6	0.0362	0.0361	0.0369	226	0.0312	0.0309	0.0315	236	0.0325	0.0323	0.0330	163	0.0063	0.0065	0.0074	191	0.0155	0.0158	0.0171	10	0.0439	0.0439	0.0440	0
B, Tot	Closure	Dec	6	0.0344	0.0344	0.0349	211	0.0321	0.0319	0.0324	242	0.0316	0.0313	0.0319	210	0.0073	0.0074	0.0082	218	0.0148	0.0151	0.0163	9	0.0437	0.0436	0.0437	0
B, Tot	Post-Closure	Jan	117	0.0110	0.0113	0.0338	2	0.0361	0.0325	0.0362	244	0.0310	0.0282	0.0311	183	0.0047	0.0045	0.0074	90	0.0147	0.0146	0.0150	9	0.0440	0.0440	0.0440	1
B, Tot	Post-Closure	Feb	117	0.0127	0.0130	0.0364	2	0.0399	0.0359	0.0401	248	0.0366	0.0334	0.0368	176	0.0051	0.0048	0.0083	94	0.0149	0.0147	0.0152	9	0.0459	0.0459	0.0459	1
B, Tot	Post-Closure	Mar	117	0.0112	0.0115	0.0329	2	0.0431	0.0387	0.0433	270	0.0375	0.0341	0.0376	186	0.0053	0.0050	0.0088	97	0.0147	0.0145	0.0149	9	0.0438	0.0438	0.0438	1
B, Tot	Post-Closure	Apr	117	0.0113	0.0116	0.0332	1	0.0462	0.0414	0.0464	290	0.0393	0.0357	0.0394	186	0.0055	0.0052	0.0093	98	0.0145	0.0143	0.0147	9	0.0434	0.0434	0.0434	2
B, Tot	Post-Closure	May	117	0.0065	0.0067	0.0190	4	0.0323	0.0289	0.0324	285	0.0216	0.0209	0.0216	33	0.0045	0.0043	0.0075	92	0.0123	0.0122	0.0125	9	0.0342	0.0342	0.0342	2
B, Tot	Post-Closure	Jun	117	0.0056	0.0058	0.0165	6	0.0303	0.0272	0.0304	261	0.0279	0.0264	0.0280	65	0.0042	0.0040	0.0067	85	0.0120	0.0118	0.0121	9	0.0311	0.0311	0.0311	2
B, Tot	Post-Closure	Jul	117	0.0053	0.0054	0.0164	6	0.0294	0.0264	0.0295	251	0.0237	0.0222	0.0238	86	0.0039	0.0037	0.0060	81	0.0112	0.0111	0.0114	10	0.0339	0.0339	0.0339	1
B, Tot	Post-Closure	Aug	117	0.0051	0.0052	0.0164	6	0.0283	0.0255	0.0284	242	0.0195	0.0180	0.0195	123	0.0036	0.0034	0.0053	78	0.0101	0.0100	0.0103	11	0.0410	0.0409	0.0410	1
B, Tot	Post-Closure	Sep	117	0.0059	0.0060	0.0190	4	0.0279	0.0251	0.0280	241	0.0187	0.0172	0.0188	139	0.0034	0.0032	0.0048	76	0.0093	0.0091	0.0095	13	0.0421	0.0421	0.0421	1
B, Tot	Post-Closure	Oct	117	0.0072	0.0073	0.0201	2	0.0279	0.0252	0.0280	245	0.0193	0.0176	0.0193	153	0.0033	0.0031	0.0045	77	0.0086	0.0085	0.0088	14	0.0395	0.0395	0.0395	1
B, Tot	Post-Closure	Nov	117	0.0110	0.0112	0.0272	1	0.0350	0.0315	0.0351	243	0.0361	0.0330	0.0362	168	0.0042	0.0039	0.0055	78	0.0156	0.0155	0.0159	8	0.0445	0.0445	0.0445	1
B, Tot	Post-Closure	Dec	117	0.0110	0.0111	0.0262	1	0.0354	0.0319	0.0355	242	0.0320	0.0291	0.0321	188	0.0045	0.0043	0.0057	85	0.0151	0.0149	0.0153	9	0.0442	0.0442	0.0442	1
Cd, Diss	Construction	Jan	2	0.000027	0.000027	0.000037	391	0.000019	0.000019	0.000028	250	0.000006	0.000006	0.000009	55	0.000007	0.000007	0.000009	53	0.000006	0.000006	0.000007	23	0.000006	0.000006	0.000006	0
Cd, Diss	Construction	Feb	2	0.000031	0.000031	0.000035	390	0.000021	0.000021	0.000029	256	0.000006	0.000006	0.000008	21	0.000007	0.000007	0.000009	49	0.000006	0.000006	0.000007	24	0.000006	0.000006	0.000006	0
Cd, Diss	Construction	Mar	2	0.000028	0.000028	0.000029	394	0.000020	0.000020	0.000026	241	0.000005	0.000005	0.000007	15	0.000007	0.000007	0.000009	44	0.000006	0.000006	0.000007	24	0.000006	0.000006	0.000006	0
Cd, Diss	Construction	Apr	2	0.000028	0.000028	0.000029	397	0.000020	0.000020	0.000024	229	0.000005	0.000005	0.000006	4	0.000006	0.000006	0.000008	38	0.000006	0.000006	0.000007	23	0.000006	0.000006	0.000006	0
Cd, Diss	Construction	May	2	0.000023	0.000023	0.000023	553	0.000025	0.000025	0.000028	436	0.000013	0.000013	0.000015	202	0.000005	0.000005	0.000007	43	0.000005	0.000005	0.000006	23	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Jun	2	0.000031	0.000031	0.000031	825	0.000040	0.000040	0.000043	655	0.000031	0.000031	0.000034	392	0.000007	0.000007	0.000008	81	0.000005	0.000005	0.000006	24	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Jul	2	0.000037	0.000037	0.000037	961	0.000040	0.000040	0.000044	662	0.000023	0.000023	0.000025	345	0.000009	0.000009	0.000010	115	0.000005	0.000005	0.000007	32	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Aug	2	0.000040	0.000040	0.000041	988	0.000034	0.000034	0.000036	587	0.000016	0.000016	0.000017	306	0.000009	0.000009	0.000010	123	0.000006	0.000006	0.000007	42	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Sep	2	0.000042	0.000042	0.000043	1023	0.000030	0.000030	0.000032	555	0.000014	0.000014	0.000015	290	0.000009	0.000009	0.000010	125	0.000006	0.000006	0.000007	50	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Oct	2	0.000044	0.000044	0.000045	1070	0.000028	0.000028	0.000030	553	0.000013	0.000013	0.000014	283	0.000009	0.000009	0.000010	128	0.000007	0.000007	0.000007	56	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Nov	2	0.000053	0.000053	0.000054	908	0.000033	0.000033	0.000034	522	0.000015	0.000015	0.000015	191	0.000010	0.000010	0.000011	131	0.000007	0.000007	0.000008	62	0.000006	0.000006	0.000006	0
Cd, Diss	Construction	Dec	2	0.000041	0.000041	0.000042	677	0.000030	0.000030	0.000031	476	0.000011	0.000011	0.000011	179	0.000010	0.000010	0.000011	131	0.000008	0.000008	0.000009	65	0.000006	0.000006	0.000006	0
Cd, Diss	Operations	Jan	5	0.000034	0.000034	0.000035	529	0.000028	0.000028	0.000029	423	0.000009	0.000009	0.000009	126	0.000011	0.000011	0.000011	150	0.000009	0.000009	0.000009	102	0.000006	0.000006	0.000006	0
Cd, Diss	Operations	Feb	5	0.000032	0.000033	0.000034	417	0.000027	0.000027	0.000029	370	0.000008	0.000008	0.000008	66	0.000011	0.000011	0.000011	143	0.000010	0.000009	0.000010	103	0.000006	0.000006	0.000006	0
Cd, Diss	Operations	Mar	5	0.000027	0.000027	0.000028	387	0.000025	0.000025	0.000026	323	0.000007	0.000007	0.000007	43	0.000011	0.000011	0.000011	134	0.000009	0.000009	0.000010	104	0.000006	0.000006	0.000006	0
Cd, Diss	Operations	Apr	5	0.000027	0.000027	0.000028	375	0.000023	0.000024	0.000024	292	0.000006	0.000006	0.000006	25	0.000010	0.000010	0.000010	123	0.000009	0.000009	0.000009	103	0.000006	0.000006	0.000006	0
Cd, Diss	Operations	May	5	0.000021	0.000021	0.000022	516	0.000027	0.000027	0.000028	480	0.000014	0.000014	0.000014	217	0.000008	0.000008	0.000008	117	0.000008	0.000008	0.000008	99	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Jun	5	0.000028	0.000029	0.000030	770	0.000042	0.000042	0.000043	692	0.000032	0.000032	0.000033	412	0.000009	0.000009	0.000009	140	0.000008	0.000008	0.000008	87	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Jul	5	0.000034	0.000035	0.000036	894	0.000042	0.000042	0.000043	698	0.000025	0.000024	0.000025	364	0.000010	0.000010	0.000011	162	0.000008	0.000008	0.000008	88	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Aug	5	0.000037	0.000037	0.000039	920	0.000035	0.000035	0.000036	617	0.000016	0.000016	0.000017	322	0.000011	0.000010	0.000011	160	0.000008	0.000008	0.000008	93	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Sep	5	0.000039	0.000039	0.000041	952	0.000031	0.000031	0.000032	578	0.000014	0.000014	0.000015	302	0.000010	0.000010	0.000010	156	0.000008	0.000008	0.000008	96	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Oct	5	0.000041	0.000041	0.000042	1000	0.000029	0.000029	0.000029	563	0.000013	0.000014	0.000014	288	0.000010	0.000010	0.000010	156	0.000008	0.000008	0.000008	99	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Nov	5	0.000050	0.000050	0.000052	846	0.000032	0.000033	0.000033	521	0.000015	0.000015	0.000015	198	0.000012	0.000012	0.000012	157	0.000009	0.000009	0.000009	102	0.000006	0.000006	0.000006	0
Cd, Diss	Operations	Dec	5	0.000038	0.000039	0.000040	628	0.000030	0.000030	0.000031	465	0.000011	0.000011	0.000011	177	0.000011	0.000011	0.000011	155	0.000009	0.000009	0.000009	105	0.000006	0.000006	0.000006	0
Cd, Diss	Closure	Jan	6	0.000035	0.000035	0.000037	552	0.000028	0.000028	0.000030	423	0.000009	0.000009	0.000010	127	0.000010	0.000010	0.000011	132	0.000009	0.000009	0.000009	92	0.000006	0.000006	0.000006	0
Cd, Diss	Closure	Feb	6	0.000034	0.000034	0.000036	438	0.000027	0.000028	0.000030	371	0.000008	0.000008	0.000009	68	0.000010	0.000010	0.000011	126	0.000009	0.000009	0.000010	92	0.000006	0.000006	0.000006	0
Cd, Diss	Closure	Mar	6	0.000029	0.000028	0.000030	405	0.000025	0.000025	0.000027	324	0.000007	0.000007	0.000007	46	0.000010	0.000010	0.000011	119	0.000009	0.000009	0.000010	93	0.000006	0.000006	0.000006	0
Cd, Diss	Closure	Apr	6	0.000028	0.000028	0.000029	393	0.000023	0.000023	0.000025	288	0.000006	0.000006	0.000006	26	0.000009	0.000009	0.000010	111	0.000009	0.000009	0.000009	92	0.000006	0.000006	0.000006	0
Cd, Diss	Closure	May	6	0.000022	0.000022	0.000023	535	0.000024	0.000024	0.000026	419	0.000012	0.000012	0.000013	172	0.000008	0.000008	0.000008	106	0.000007	0.000007	0.000008	88	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Jun	6	0.000029	0.000030	0.000031	793	0.000035	0.000036	0.000039	584	0.000027	0.000027	0.000029	335	0.000008	0.000008	0.000009	119	0.000007	0.000007	0.000008	77	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Jul	6	0.000035	0.000036	0.000037	922	0.000037	0.000038	0.000041	612	0.000021	0.000021	0.000023	307	0.000009	0.000009	0.000010	132	0.000007	0.000007	0.000008	77	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Aug	6	0.000038	0.000039	0.000041	950	0.000033	0.000033	0.000035	571	0.000015	0.000015	0.000016	286	0.000009	0.000009	0.000010	129	0.000008	0.000008	0.000008	80	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Sep	6	0.000040	0.000041	0.000043	986	0.000030	0.000030	0.000032	553	0.000013	0.000014	0.000015	279	0.000009	0.000009	0.000010	126	0.000008	0.000008	0.000008	82	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Oct	6	0.000042	0.000042	0.000045	1036	0.000028	0.000028	0.000030	551	0.000013	0.000013	0.000014	276	0.000009	0.000009	0.000009	128	0.000008	0.000008	0.000008	84	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Nov	6	0.000053	0.000052	0.000055	888	0.000033	0.000033	0.000035	521	0.000015	0.000015	0.000016	197	0.000010	0.000010	0.000011	131	0.000009	0.000009	0.000009	86	0.000006	0.000006	0.000006	0
Cd, Diss	Closure	Dec	6	0.000042	0.000041	0.000043	673	0.000030	0.000030	0.000032	474	0.000011	0.000011	0.000012	182	0.000010	0.000010	0.000011	131	0.000009	0.000009	0.000009	88	0.000006	0.000006	0.000006	0
Cd, Diss	Post-Closure	Jan	117	0.000005	0.000006	0.000039	10	0.000010	0.000010	0.000030	81	0.000005	0.000005	0.000010	30	0.000005	0.000005	0.000010	13	0.000005	0.000005	0.000009	8	0.000006	0.000006	0.000006	2
Cd, Diss	Post-Closure	Feb	117	0.000006	0.000007	0.000043	8	0.000011	0.000010	0.000030	79	0.000006	0.000006	0.000011	22	0.000005	0.000005	0.000010	13	0.000005	0.000005	0.000009	8	0.000006	0.000006	0.000006	2
Cd, Diss	Post-Closure	Mar	117	0.000005	0.000006	0.000037	7	0.000011	0.000011	0.000029	79	0.000005	0.000005	0.000010	15	0.000005	0.000005	0.000010	13	0.000005	0.000005	0.000009	9	0.000006	0.000006	0.000006	2
Cd, Diss	Post-Closure	Apr	117	0.000006	0.000006	0.000036	6	0.000011	0.000011	0.000028	78	0.000005	0.000005	0.000009	7	0.000005	0.000005	0.000010	13	0.000005	0.000005	0.000009	9	0.000006	0.000006	0.000006	2
Cd, Diss	Post-Closure	May	117	0.000003	0.000004	0.000021	7	0.000009	0.000008	0.000024	78	0.000005	0.000005	0.000010	8	0.000004	0.000004	0.000008	12	0.000004	0.000004	0.000007	8	0.000005	0.000005	0.000005	2
Cd, Diss	Post-Closure	Jun	117	0.000003	0.000004	0.000027	9	0.000009	0.000009	0.000032	75	0.000008	0.000008	0.000024	32	0.000004	0.000004	0.000008	12	0.000004	0.000004	0.000007	7	0.000005	0.000005	0.000005	2
Cd, Diss	Post-Closure	Jul	117	0.000003	0.000004	0.000031	8	0.000010	0.000009	0.000034	76	0.000007	0.000007	0.000019	33	0.000004	0.000004	0.000009	12	0.000004	0.000004	0.000007	7	0.000005	0.000005	0.000005	2
Cd, Diss	Post-Closure	Aug	117	0.000004	0.000004	0.000034	7	0.000009	0.000009	0.000031	77	0.000005	0.000005	0.000014	33	0.000004	0.000004	0.000009	11	0.000004	0.000005	0.000007	7	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Sep	117	0.000004	0.000004	0.000036	7	0.000008	0.000008	0.000028	79	0.000005	0.000005	0.000012	33	0.000004	0.000004	0.000008	11	0.000004	0.000005	0.000007	7	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Oct	117	0.000004	0.000004	0.000034	7	0.000008	0.000008	0.000026	82	0.000005	0.000005	0.000012	35	0.000004	0.000004	0.000008	11	0.000004	0.000004	0.000007	7	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Nov	117	0.000005	0.000006	0.000043	6	0.000010	0.000010	0.000030	82	0.000007	0.000007	0.000016	37	0.000005	0.000005	0.000009	12	0.000005	0.000005	0.000008	7	0.000006	0.000006	0.000006	1
Cd, Diss	Post-Closure	Dec	117	0.000005	0.000006	0.000041	5	0.000010	0.000009	0.000029	80	0.000005	0.000005	0.000012	36	0.000005	0.000005	0.000009	12	0.000005	0.000005	0.000008	8	0.000006	0.000006	0.000006	2

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake: Predicted Project Water Quality				West Farley Lake: Predicted Project Water Quality				East Farley Lake: Predicted Project Water Quality				Swede Lake: Predicted Project Water Quality				Ellystan Lake: Predicted Project Water Quality				Susan Lake last one: Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Cd, Tot	Construction	Jan	2	0.000031	0.000031	0.000043	197	0.000017	0.000017	0.000026	241	0.000019	0.000019	0.000028	49	0.000007	0.000007	0.000009	36	0.000007	0.000007	0.000007	8	0.000011	0.000011	0.000011	0
Cd, Tot	Construction	Feb	2	0.000033	0.000033	0.000038	178	0.000019	0.000019	0.000026	243	0.000021	0.000021	0.000029	25	0.000007	0.000007	0.000009	37	0.000007	0.000007	0.000007	9	0.000012	0.000012	0.000012	0
Cd, Tot	Construction	Mar	2	0.000029	0.000029	0.000030	177	0.000018	0.000018	0.000024	226	0.000019	0.000019	0.000025	10	0.000007	0.000007	0.000009	38	0.000007	0.000007	0.000008	9	0.000011	0.000011	0.000011	0
Cd, Tot	Construction	Apr	2	0.000029	0.000029	0.000029	182	0.000018	0.000018	0.000022	213	0.000018	0.000018	0.000023	-1	0.000007	0.000007	0.000009	38	0.000007	0.000007	0.000008	10	0.000011	0.000011	0.000011	0
Cd, Tot	Construction	May	2	0.000035	0.000035	0.000035	389	0.000015	0.000015	0.000017	275	0.000012	0.000012	0.000014	21	0.000006	0.000006	0.000008	41	0.000006	0.000006	0.000007	10	0.000009	0.000009	0.000009	-1
Cd, Tot	Construction	Jun	2	0.000060	0.000060	0.000060	628	0.000018	0.000018	0.000020	369	0.000017	0.000017	0.000019	79	0.000007	0.000007	0.000008	46	0.000006	0.000006	0.000007	11	0.000008	0.000008	0.000008	-1
Cd, Tot	Construction	Jul	2	0.000062	0.000062	0.000062	654	0.000021	0.000021	0.000022	448	0.000018	0.000018	0.000020	116	0.000007	0.000007	0.000009	51	0.000007	0.000007	0.000008	13	0.000009	0.000009	0.000009	0
Cd, Tot	Construction	Aug	2	0.000053	0.000053	0.000053	612	0.000022	0.000022	0.000023	499	0.000020	0.000020	0.000021	163	0.000007	0.000007	0.000009	56	0.000007	0.000007	0.000008	17	0.000010	0.000010	0.000010	0
Cd, Tot	Construction	Sep	2	0.000060	0.000060	0.000061	711	0.000023	0.000023	0.000024	535	0.000020	0.000020	0.000021	199	0.000008	0.000008	0.000008	62	0.000007	0.000007	0.000008	20	0.000010	0.000010	0.000010	0
Cd, Tot	Construction	Oct	2	0.000073	0.000073	0.000074	834	0.000024	0.000024	0.000025	581	0.000022	0.000022	0.000022	239	0.000008	0.000008	0.000008	69	0.000007	0.000007	0.000008	23	0.000010	0.000010	0.000010	0
Cd, Tot	Construction	Nov	2	0.000085	0.000085	0.000086	671	0.000030	0.000030	0.000031	505	0.000035	0.000035	0.000037	84	0.000009	0.000009	0.000010	77	0.000008	0.000008	0.000009	25	0.000011	0.000011	0.000011	0
Cd, Tot	Construction	Dec	2	0.000055	0.000055	0.000056	415	0.000028	0.000028	0.000029	467	0.000030	0.000030	0.000030	139	0.000009	0.000009	0.000010	83	0.000008	0.000008	0.000009	28	0.000011	0.000011	0.000011	0
Cd, Tot	Operations	Jan	5	0.000040	0.000040	0.000041	280	0.000026	0.000026	0.000027	409	0.000027	0.000027	0.000028	114	0.000010	0.000010	0.000010	102	0.000010	0.000009	0.000010	52	0.000011	0.000011	0.000011	0
Cd, Tot	Operations	Feb	5	0.000035	0.000036	0.000037	199	0.000025	0.000025	0.000026	354	0.000028	0.000028	0.000030	70	0.000011	0.000011	0.000011	103	0.000010	0.000010	0.000010	54	0.000012	0.000011	0.000012	-1
Cd, Tot	Operations	Mar	5	0.000028	0.000029	0.000029	177	0.000023	0.000023	0.000024	307	0.000024	0.000024	0.000025	37	0.000011	0.000011	0.000011	102	0.000010	0.000010	0.000010	55	0.000011	0.000011	0.000011	-1
Cd, Tot	Operations	Apr	5	0.000028	0.000028	0.000029	172	0.000021	0.000021	0.000022	275	0.000022	0.000022	0.000023	19	0.000010	0.000010	0.000011	99	0.000010	0.000010	0.000010	56	0.000011	0.000011	0.000011	-1
Cd, Tot	Operations	May	5	0.000033	0.000034	0.000035	367	0.000017	0.000017	0.000017	320	0.000014	0.000014	0.000014	32	0.000009	0.000009	0.000009	95	0.000008	0.000008	0.000009	55	0.000009	0.000009	0.000009	-1
Cd, Tot	Operations	Jun	5	0.000056	0.000057	0.000058	593	0.000019	0.000019	0.000020	402	0.000018	0.000018	0.000018	91	0.000009	0.000009	0.000009	88	0.000009	0.000008	0.000009	47	0.000008	0.000008	0.000008	-1
Cd, Tot	Operations	Jul	5	0.000058	0.000058	0.000060	615	0.000022	0.000022	0.000022	474	0.000019	0.000019	0.000019	126	0.000009	0.000009	0.000009	86	0.000009	0.000009	0.000009	47	0.000009	0.000009	0.000009	0
Cd, Tot	Operations	Aug	5	0.000049	0.000050	0.000051	574	0.000023	0.000023	0.000023	519	0.000020	0.000020	0.000020	171	0.000009	0.000009	0.000009	85	0.000009	0.000009	0.000009	48	0.000010	0.000010	0.000010	0
Cd, Tot	Operations	Sep	5	0.000056	0.000057	0.000058	668	0.000023	0.000023	0.000024	550	0.000021	0.000021	0.000021	205	0.000009	0.000009	0.000009	87	0.000009	0.000009	0.000009	49	0.000010	0.000010	0.000010	0
Cd, Tot	Operations	Oct	5	0.000069	0.000069	0.000071	789	0.000024	0.000024	0.000024	581	0.000021	0.000021	0.000022	238	0.000009	0.000009	0.000009	92	0.000008	0.000008	0.000009	51	0.000010	0.000010	0.000010	0
Cd, Tot	Operations	Nov	5	0.000080	0.000081	0.000083	631	0.000030	0.000030	0.000030	498	0.000036	0.000036	0.000036	86	0.000010	0.000010	0.000010	96	0.000010	0.000010	0.000010	51	0.000011	0.000011	0.000011	0
Cd, Tot	Operations	Dec	5	0.000052	0.000052	0.000053	387	0.000027	0.000028	0.000028	453	0.000029	0.000029	0.000030	135	0.000010	0.000010	0.000010	99	0.000010	0.000010	0.000010	53	0.000011	0.000011	0.000011	0
Cd, Tot	Closure	Jan	6	0.000041	0.000041	0.000044	293	0.000026	0.000026	0.000028	412	0.000027	0.000028	0.000029	116	0.000010	0.000010	0.000010	98	0.000009	0.000009	0.000010	51	0.000011	0.000011	0.000011	0
Cd, Tot	Closure	Feb	6	0.000037	0.000037	0.000039	211	0.000025	0.000025	0.000027	358	0.000028	0.000029	0.000031	73	0.000011	0.000010	0.000011	99	0.000010	0.000010	0.000010	52	0.000012	0.000012	0.000012	0
Cd, Tot	Closure	Mar	6	0.000030	0.000030	0.000031	187	0.000023	0.000023	0.000025	309	0.000024	0.000025	0.000027	41	0.000010	0.000010	0.000011	99	0.000010	0.000010	0.000010	54	0.000011	0.000011	0.000011	0
Cd, Tot	Closure	Apr	6	0.000029	0.000029	0.000030	182	0.000021	0.000021	0.000023	272	0.000022	0.000023	0.000024	21	0.000010	0.000010	0.000011	98	0.000010	0.000010	0.000010	55	0.000011	0.000011	0.000011	0
Cd, Tot	Closure	May	6	0.000034	0.000034	0.000036	375	0.000016	0.000016	0.000017	301	0.000013	0.000013	0.000014	26	0.000008	0.000008	0.000009	93	0.000008	0.000008	0.000008	53	0.000009	0.000009	0.000009	0
Cd, Tot	Closure	Jun	6	0.000057	0.000058	0.000060	603	0.000018	0.000018	0.000019	368	0.000017	0.000017	0.000018	81	0.000009	0.000009	0.000009	84	0.000008	0.000008	0.000009	46	0.000008	0.000008	0.000009	0
Cd, Tot	Closure	Jul	6	0.000059	0.000060	0.000062	631	0.000020	0.000020	0.000022	441	0.000018	0.000018	0.000019	112	0.000009	0.000009	0.000009	80	0.000008	0.000008	0.000009	45	0.000009	0.000009	0.000009	0
Cd, Tot	Closure	Aug	6	0.000051	0.000051	0.000053	594	0.000021	0.000022	0.000023	490	0.000019	0.000019	0.000020	156	0.000008	0.000008	0.000009	78	0.000008	0.000008	0.000009	46	0.000010	0.000010	0.000010	0
Cd, Tot	Closure	Sep	6	0.000058	0.000058	0.000061	688	0.000022	0.000023	0.000024	526	0.000019	0.000020	0.000021	191	0.000008	0.000008	0.000008	79	0.000008	0.000008	0.000009	47	0.000010	0.000010	0.000010	0
Cd, Tot	Closure	Oct	6	0.000071	0.000071	0.000074	807	0.000023	0.000024	0.000025	569	0.000021	0.000021	0.000022	229	0.000008	0.000008	0.000008	83	0.000008	0.000008	0.000008	48	0.000010	0.000010	0.000010	0
Cd, Tot	Closure	Nov	6	0.000084	0.000083	0.000086	658	0.000030	0.000030	0.000031	500	0.000036	0.000036	0.000038	87	0.000009	0.000009	0.000010	88	0.000009	0.000009	0.000010	48	0.000011	0.000011	0.000011	0
Cd, Tot	Closure	Dec	6	0.000056	0.000055	0.000059	417	0.000028	0.000028	0.000030	463	0.000030	0.000030	0.000031	140	0.000010	0.000010	0.000010	93	0.000009	0.000009	0.000009	50	0.000011	0.000011	0.000011	0
Cd, Tot	Post-Closure	Jan	117	0.000011	0.000011	0.000061	8	0.000008	0.000008	0.000027	64	0.000015	0.000015	0.000029	21	0.000005	0.000005	0.000010	10	0.000006	0.000006	0.000009	6	0.000011	0.000011	0.000011	1
Cd, Tot	Post-Closure	Feb	117	0.000012	0.000013	0.000067	7	0.000009	0.000009	0.000027	63	0.000019	0.000019	0.000033	16	0.000006	0.000006	0.000010	10	0.000007	0.000007	0.000010	6	0.000012	0.000012	0.000012	1
Cd, Tot	Post-Closure	Mar	117	0.000010	0.000011	0.000057	7	0.000009	0.000009	0.000025	64	0.000019	0.000019	0.000033	10	0.000006	0.000006	0.000010	10	0.000006	0.000007	0.000010	6	0.000011	0.000011	0.000011	1
Cd, Tot	Post-Closure	Apr	117	0.000010	0.000011	0.000055	6	0.000010	0.000009	0.000024	64	0.000019	0.000019	0.000033	2	0.000006	0.000006	0.000010	10	0.000006	0.000006	0.000010	6	0.000011	0.000011	0.000011	1
Cd, Tot	Post-Closure	May	117	0.000007	0.000008	0.000031	6	0.000007	0.000007	0.000017	66	0.000010	0.000010	0.000013	2	0.000005	0.000005	0.000008	10	0.000006	0.000006	0.000008	5	0.000009	0.000009	0.000009	1
Cd, Tot	Post-Closure	Jun	117	0.000008	0.000009	0.000049	6	0.000006	0.000006	0.000018	65	0.000011	0.000011	0.000017	15	0.000005	0.000005	0.000009	9	0.000006	0.000006	0.000008	5	0.000009	0.000009	0.000009	1
Cd, Tot	Post-Closure	Jul	117	0.000008	0.000009	0.000053	7	0.000006	0.000006	0.000019	65	0.000010	0.000010	0.000017	18	0.000005	0.000005	0.000009	8	0.000006	0.000006	0.000008	5	0.000009	0.000009	0.000009	1
Cd, Tot	Post-Closure	Aug	117	0.000007	0.000008	0.000047	7	0.000006	0.000006	0.000020	66	0.000009	0.000009	0.000017	21	0.000005	0.000005	0.000008	8	0.000006	0.000006	0.000008	5	0.000010	0.000010	0.000010	1
Cd, Tot	Post-Closure	Sep	117	0.000007	0.000008	0.000051	7	0.000006	0.000006	0.000020	68	0.000008	0.000008	0.000018	23	0.000005	0.000005	0.000008	8	0.000006	0.000006	0.000008	5	0.000010	0.000010	0.000010	1
Cd, Tot	Post-Closure	Oct	117	0.000008	0.000008	0.000053	7	0.000006	0.000006	0.000020	71	0.000008	0.000008	0.000018	26	0.000005	0.000005	0.000008	8	0.000006	0.000006	0.000008	5	0.000010	0.000010	0.000010	1
Cd, Tot	Post-Closure	Nov	117	0.000011	0.000012	0.000068	6	0.000008	0.000008	0.000024	63	0.000022	0.000022	0.000038	16	0.000005	0.000005	0.000009	9	0.000007	0.000007	0.000009	5	0.000011	0.000011	0.000011	1
Cd, Tot	Post-Closure	Dec	117	0.000011	0.000011	0.000064	6	0.000008	0.000008	0.000023	62	0.000015	0.000015	0.000028	22	0.000005	0.000005	0.000009	9	0.000006	0.000006	0.000009	5	0.000011	0.000011	0.000011	1
Cr, Diss	Construction	Jan	2	0.00023	0.00023	0.00027	137	0.00010	0.00010	0.00013	47	0.00007	0.00007	0.00009	2	0.00010	0.00010	0.00012	-17	0.00011	0.00011	0.00013	-10	0.00025	0.00025	0.00025	0
Cr, Diss	Construction	Feb	2	0.00028	0.00028	0.00029	158	0.00010	0.00010	0.00013	38	0.00006	0.00006	0.00008	-28	0.00010	0.00010	0.00012	-22	0.00012	0.00012	0.00013	-10	0.00026	0.00026	0.00026	0
Cr, Diss	Construction	Mar	2	0.00027	0.00027	0.00027	180	0.00009	0.00009	0.00012	30	0.00005	0.00005	0.00007	-36	0.00009	0.00009	0.00011	-27	0.00011	0.00011	0.00013	-11	0.00024	0.00024	0.00024	-1
Cr, Diss	Construction	Apr	2	0.00037	0.00037	0.00037	283	0.00009	0.00009	0.00011	29	0.00005	0.00005	0.00006	-41	0.00008	0.00008	0.00009	-33	0.00011	0.00011	0.00012	-13	0.00024	0.00024	0.00024	-1
Cr, Diss	Construction	May	2	0.00043	0.00043	0.00043	188	0.00010	0.00010	0.00012	83	0.00013	0.00013	0.00014	-28	0.00007	0.00007	0.00008	-30	0.00010	0.00010	0.00011	-14	0.00020	0.00020	0.00020	-1
Cr, Diss	Construction	Jun	2	0.00040	0.00040	0.00040	118	0.00015	0.00015	0.00016	116	0.00018	0.00018	0.00019	-9	0.00010	0.00010	0.00011	-20	0.00011	0.00011	0.00011	-13	0.00019	0.00019	0.00019	-1
Cr, Diss	Construction	Jul	2	0.00024	0.00024	0.00024	63	0.00014	0.00014	0.00016	107	0.00009	0.00009	0.00010	-21	0.00012	0.00012	0.00012	-16	0.00012	0.00012	0.00012	-12	0.00020	0.00020	0.00020	-1
Cr, Diss	Construction	Aug	2	0.00015	0.00015	0.00015	36	0.00012	0.00012	0.00013	89	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	-18	0.00012	0.00012	0.00013	-12	0.00022	0.00022	0.00022	0
Cr, Diss	Construction	Sep	2	0.00011	0.00011	0.00011	24	0.00013	0.00013	0.00014	117	0.00005	0.00005	0.00005	48	0.00010	0.00010	0.00010	-21	0.00011	0.00011	0.00012	-14	0.00023	0.00023	0.00023	0
Cr, Diss	Construction	Oct	2	0.00009	0.00009	0.00010	23	0.00016	0.00016	0.00017	168	0.00007	0.00007	0.00007	100	0.00009	0.00009	0.00009	-24	0.00010	0.00010	0.00010	-18	0.00022	0.00022	0.00022	0
Cr, Diss	Construction	Nov	2	0.00017	0.00017	0.00018	74	0.00019	0.00019	0.00019	154	0.00013	0.00013	0.00013	88	0.00009	0.00009	0.00010	-27	0.00010	0.00010	0.00011	-20	0.00025	0.00025	0.00025	0
Cr, Diss	Construction	Dec	2	0.00023	0.00023	0.00024	139	0.00015	0.00015	0.00015	114	0.00010	0.00010	0.00011	60	0.00009	0.00009	0.00009	-29	0.00010	0.00010	0.00010	-21	0.00025	0.00025	0.00025	-1
Cr, Diss	Operations	Jan	5	0.00025	0.00025	0.00026	162	0.00013	0.00013	0.00013	87	0.00008	0.00009	0.00009	23	0.00009	0.00009	0.00009	-31	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	-1
Cr, Diss	Operations	Feb	5	0.00027	0.00027	0.00028	152	0.00012	0.00012	0.00013	70	0.00007	0.00008	0.00008	-10	0.00009	0.00009	0.00009	-33	0.00010	0.00010	0.00010	-24	0.00025	0.00025	0.00025	-1
Cr, Diss	Operations	Mar	5	0.00025	0.00025	0.00026	165	0.00011	0.00011	0.00011	57	0.00006	0.00006	0.00007	-23	0.00008	0.00008	0.00008	-37	0.00010	0.00010	0.00010	-25	0.00024	0.00024	0.00024	-1
Cr, Diss	Operations	Apr	5	0.00034	0.00035	0.00036	260	0.00010	0.00011	0.00011	52	0.00006	0.00006	0.00006	-30	0.00008	0.00008	0.00008	-41	0.00010	0.00010	0.00010	-26	0.00024	0.00024	0.00024	-1
Cr, Diss	Operations	May	5	0.00040	0.00041	0.00042	173	0.00011	0.00011	0.00011	98	0.00014	0.00014	0.00014	-24	0.00007	0.00007	0.00007	-36	0.00008	0.00008	0.00008	-25	0.00020	0.00020	0.00020	-1
Cr, Diss	Operations	Jun	5	0.00037	0.00038	0.00039	106	0.00016	0.00016	0.00016	127	0.00018	0.00018	0.00019	-5	0.00010	0.00010	0.00010	-24	0.00010	0.00010	0.00010	-21	0.00019	0.00019	0.00019	-1
Cr, Diss	Operations	Jul	5	0.00022	0.00022	0.00023	53	0.00015	0.00015	0.00015	117	0.00009	0.00009	0.00010	-18	0.00012	0.00012	0.00012	-18	0.00011	0.00011	0.00011	-18	0.00020	0.00020	0.00020	-1
Cr, Diss	Operations	Aug	5	0.00014	0.00014	0.00015	27	0.00013	0.00013	0.00013	99	0.00005	0.00005	0.00005	5	0.00011	0.00011	0.00011	-19	0.00012	0.00012	0.00012	-17	0.00022	0.00022	0.00022	0
Cr, Diss	Operations	Sep	5	0.00010	0.00011	0.00011	16	0.00014	0.00014	0.00014	124	0.00005	0.00005	0.00005	53	0.00010	0.00010	0.00010	-21	0.00011	0.00011	0.00011	-18	0.00023	0.00023	0.00023	0
Cr, Diss	Operations	Oct	5	0.00009	0.00009	0.00009	15	0.00016	0.00016	0.00016	164	0.00007	0.00007	0.00007	97	0.00009	0.00009	0.00009	-24	0.00009	0.00009	0.00009	-21	0.00022	0.00022	0.00022	0
Cr, Diss	Operations	Nov	5	0.00016	0.00016	0.00017	63	0.00018	0.00018	0.00018	147	0.00012	0.00012	0.00012	85	0.00010	0.00010	0.00010	-26	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	0
Cr, Diss	Operations	Dec	5	0.00022	0.00022	0.00022	125	0.00015	0.00015	0.00015	109	0.00010	0.00010	0.00010	58	0.00009	0.00009	0.00009	-28	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	-1
Cr, Diss	Closure	Jan	6	0.00026	0.00026	0.00027	169	0.00013	0.00013	0.00013	83	0.00008	0.00008	0.00009	21	0.00009	0.00009	0.00009	-30	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	0
Cr, Diss	Closure	Feb	6	0.00028	0.00028	0.00030	161	0.00012	0.00012	0.00013	67	0.00007	0.00008	0.00008	-10	0.00009	0.00009	0.00009	-33	0.00010	0.00010	0.00010	-23	0.00026	0.00026	0.00026	0
Cr, Diss	Closure	Mar	6	0.00026	0.00026	0.00027	174	0.00011	0.00011	0.00012	55	0.00006	0.00006	0.00007	-21	0.00008	0.00008	0.00008	-36	0.00010	0.00010	0.00010	-24	0.00024	0.00024	0.00024	0
Cr, Diss	Closure	Apr	6	0.00036	0.00036	0.00037	270	0.00010	0.00010	0.00011	49	0.00006	0.00006	0.00006	-29	0.00008	0.00008	0.00008	-39	0.00010	0.00010	0.00010	-25	0.00024	0.00024	0.00024	0
Cr, Diss	Closure	May	6	0.00041	0.00041	0.00043	178	0.00010	0.00010	0.00011	85	0.00014	0.00014	0.00014	-24	0.00007	0.00007	0.00007	-35	0.00008	0.00008	0.00009	-24	0.00020	0.00020	0.00020	0
Cr, Diss	Closure	Jun	6	0.00039	0.00039	0.00040	112	0.00014	0.00015	0.00015	110	0.00018	0.00018	0.00019	-7	0.00010	0.00010	0.00010	-24	0.00010	0.00010	0.00010	-20	0.00019	0.00019	0.00019	0
Cr, Diss	Closure	Jul	6	0.00024	0.00023	0.00025	60	0.00014	0.00014	0.00015	105	0.00010	0.00010	0.00010	-16	0.00012	0.00012	0.00012	-18	0.00011	0.00011	0.00011	-18	0.00020	0.00020	0.00020	0
Cr, Diss	Closure	Aug	6	0.00015	0.00015	0.00016	35	0.00012	0.00012	0.00013	92	0.00005	0.00005	0.00005	4	0.00011	0.00011	0.00012	-19	0.00012	0.00012	0.00012	-16	0.00022	0.00022	0.00022	0
Cr, Diss	Closure	Sep	6	0.00011	0.00011	0.00012	24	0.00013	0.00013	0.00014	111	0.00005	0.00005	0.00005	46	0.00010	0.00010	0.00011	-20	0.00011	0.00011	0.00011	-18	0.00023	0.00023	0.00023	0
Cr, Diss	Closure	Oct	6	0.00009	0.00009	0.00010	22	0.00015	0.00015	0.00016	148	0.00006	0.00006	0.00007	85	0.00009	0.00009	0.00010	-23	0.00009	0.00009	0.00010	-20	0.00022	0.00022	0.00022	0
Cr, Diss	Closure	Nov	6	0.00017	0.00017	0.00018	70	0.00017	0.00017	0.00018	137	0.00012	0.00012	0.00012	78	0.00010	0.00010	0.00010	-25	0.00010	0.00010	0.00010	-22	0.00025	0.00025	0.00025	0
Cr, Diss	Closure	Dec	6	0.00023	0.00023	0.00024	133	0.00014	0.00014	0.00015	105	0.00010	0.00010	0.00011	55	0.00009	0.00009	0.00010	-27	0.00010	0.00010	0.00010	-22	0.00025	0.00025	0.00025	0
Cr, Diss	Post-Closure	Jan	117	0.00010	0.00010	0.00025	8	0.00011	0.00011	0.00014	54	0.00009	0.00009	0.00011	27	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr, Diss	Post-Closure	Feb	117	0.00012	0.00012	0.00029	8	0.00011	0.00011	0.00014	54	0.00010	0.00010	0.00012	22	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00026	0.00026	0.00026	1
Cr, Diss	Post-Closure	Mar	117	0.00010	0.00010	0.00027	8	0.00011	0.00011	0.00014	55	0.00010	0.00010	0.00012	17	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr, Diss	Post-Closure	Apr	117	0.00010	0.00010	0.00034	7	0.00011	0.00011	0.00014	56	0.00009	0.00009	0.00012	10	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00024	0.00024	0.00024	1
Cr, Diss	Post-Closure	May	117	0.00014	0.00014	0.00038	-4	0.00009	0.00008	0.00010	49	0.00018	0.00018	0.00020	0	0.00011	0.00011	0.00011	1	0.00011	0.00011	0.00011	1	0.00020	0.00020	0.00020	1
Cr, Diss	Post-Closure	Jun	117	0.00017	0.00018	0.00038	-4	0.00010	0.00010	0.00014	38	0.00021	0.00021	0.00023	8	0.00013	0.00013	0.00013	1	0.00012	0.00012	0.00012	0	0.00019	0.00019	0.00019	1
Cr, Diss	Post-Closure	Jul	117	0.00014	0.00014	0.00025	-1	0.00010	0.00010	0.00014	37	0.00013	0.00013	0.00014	11	0.00015	0.00015	0.00015	1	0.00013	0.00013	0.00014	0	0.00020	0.00020	0.00020	1
Cr, Diss	Post-Closure	Aug	117	0.00011	0.00011	0.00017	2	0.00009	0.00009	0.00012	38	0.00005	0.00005	0.00006	16	0.00014	0.00014	0.00014	1	0.00014	0.00014	0.00014	0	0.00022	0.00022	0.00022	1
Cr, Diss	Post-Closure	Sep	117	0.00010	0.00010	0.00013	5	0.00009	0.00009	0.00013	42	0.00004	0.00004	0.00005	20	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00023	0.00023	0.00023	1
Cr, Diss	Post-Closure	Oct	117	0.00008	0.00008	0.00011	7	0.00009	0.00009	0.00013	49	0.00004	0.00004	0.00006	24	0.00012	0.00012	0.00012	1	0.00012	0.00012	0.00012	1	0.00022	0.00022	0.00022	1
Cr, Diss	Post-Closure	Nov	117	0.00011	0.00011	0.00014	8	0.00011	0.00011	0.00015	53	0.00009	0.00009	0.00011	31	0.00013	0.00013	0.00014	2	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr, Diss	Post-Closure	Dec	117	0.00010	0.00010	0.00014	8	0.00011	0.00011	0.00014	53	0.00009	0.00009	0.00010	32	0.00013	0.00013	0.00013	2	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr (VI), Diss	Construction	Jan	2	0.00023	0.00023	0.00027	137	0.00010	0.00010	0.00013	47	0.00007	0.00007	0.00009	2	0.00010	0.00010	0.00012	-17	0.00011	0.00011	0.00013	-10	0.00025	0.00025	0.00025	0
Cr (VI), Diss	Construction	Feb	2	0.00028	0.00028	0.00029	158	0.00010	0.00010	0.00013	38	0.00006	0.00006	0.00008	-28	0.00010	0.00010	0.00012	-22	0.00012	0.00012	0.00013	-10	0.00026	0.00026	0.00026	0
Cr (VI), Diss	Construction	Mar	2	0.00027	0.00027	0.00027	180	0.00009	0.00009	0.00012	30	0.00005	0.00005	0.00007	-36	0.00009	0.00009	0.00011	-27	0.00011	0.00011	0.00013	-11	0.00024	0.00024	0.00024	-1
Cr (VI), Diss	Construction	Apr	2	0.00037	0.00037	0.00037	283	0.00009	0.00009	0.00011	29	0.00005	0.00005	0.00006	-41	0.00008	0.00008	0.00009	-33	0.00011	0.00011	0.00012	-13	0.00024	0.00024	0.00024	-1
Cr (VI), Diss	Construction	May	2	0.00043	0.00043	0.00043	188	0.00010	0.00010	0.00012	83	0.00013	0.00013	0.00014	-28	0.00007	0.00007	0.00008	-30	0.00010	0.00010	0.00011	-14	0.00020	0.00020	0.00020	-1
Cr (VI), Diss	Construction	Jun	2	0.00040	0.00040	0.00040	118	0.00015	0.00015	0.00016	116	0.00018	0.00018	0.00019	-9	0.00010	0.00010	0.00011	-20	0.00011	0.00011	0.00011	-13	0.00019	0.00019	0.00019	-1
Cr (VI), Diss	Construction	Jul	2	0.00024	0.00024	0.00024	63	0.00014	0.00014	0.00016	107	0.00009	0.00009	0.00010	-21	0.00012	0.00012	0.00012	-16	0.00012	0.00012	0.00012	-12	0.00020	0.00020	0.00020	-1
Cr (VI), Diss	Construction	Aug	2	0.00015	0.00015	0.00015	36	0.00012	0.00012	0.00013	89	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	-18	0.00012	0.00012	0.00013	-12	0.00022	0.00022	0.00022	0
Cr (VI), Diss	Construction	Sep	2	0.00011	0.00011	0.00011	24	0.00013	0.00013	0.00014	117	0.00005	0.00005	0.00005	48	0.00010	0.00010	0.00010	-21	0.00011	0.00011	0.00012	-14	0.00023	0.00023	0.00023	0
Cr (VI), Diss	Construction	Oct	2	0.00009	0.00009	0.00010	23	0.00016	0.00016	0.00017	168	0.00007	0.00007	0.00007	100	0.00009	0.00009	0.00009	-24	0.00010	0.00010	0.00010	-18	0.00022	0.00022	0.00022	0
Cr (VI), Diss	Construction	Nov	2	0.00017	0.00017	0.00018	74	0.00019	0.00019	0.00019	154	0.00013	0.00013	0.00013	88	0.00009	0.00009	0.00010	-27	0.00010	0.00010	0.00011	-20	0.00025	0.00025	0.00025	0
Cr (VI), Diss	Construction	Dec	2	0.00023	0.00023	0.00024	139	0.00015	0.00015	0.00015	114	0.00010	0.00010	0.00011	60	0.00009	0.00009	0.00009	-29	0.00010	0.00010	0.00010	-21	0.00025	0.00025	0.00025	-1
Cr (VI), Diss	Operations	Jan	5	0.00025	0.00025	0.00026	162	0.00013	0.00013	0.00013	87	0.00008	0.00009	0.00009	23	0.00009	0.00009	0.00009	-31	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	-1
Cr (VI), Diss	Operations	Feb	5	0.00027	0.00027	0.00028	152	0.00012	0.00012	0.00013	70	0.00007	0.00008	0.00008	-10	0.00009	0.00009	0.00009	-33	0.00010	0.00010	0.00010	-24	0.00025	0.00025	0.00025	-1
Cr (VI), Diss	Operations	Mar	5	0.00025	0.00025	0.00026	165	0.00011	0.00011	0.00011	57	0.00006	0.00006	0.00007	-23	0.00008	0.00008	0.00008	-37	0.00010	0.00010	0.00010	-25	0.00024	0.00024	0.00024	-1
Cr (VI), Diss	Operations	Apr	5	0.00034	0.00035	0.00036	260	0.00010	0.00011	0.00011	52	0.00006	0.00006	0.00006	-30	0.00008	0.00008	0.00008	-41	0.00010	0.00010	0.00010	-26	0.00024	0.00024	0.00024	-1
Cr (VI), Diss	Operations	May	5	0.00040	0.00041	0.00042	173	0.00011	0.00011	0.00011	98	0.00014	0.00014	0.00014	-24	0.00007	0.00007	0.00007	-36	0.00008	0.00008	0.00008	-25	0.00020	0.00020	0.00020	-1
Cr (VI), Diss	Operations	Jun	5	0.00037	0.00038	0.00039	106	0.00016	0.00016	0.00016	127	0.00018	0.00018	0.00019	-5	0.00010	0.00010	0.00010	-24	0.00010	0.00010	0.00010	-21	0.00019	0.00019	0.00019	-1
Cr (VI), Diss	Operations	Jul	5	0.00022	0.00022	0.00023	53	0.00015	0.00015	0.00015	117	0.00009	0.00009	0.00010	-18	0.00012	0.00012	0.00012	-18	0.00011	0.00011	0.00011	-18	0.00020	0.00020	0.00020	-1
Cr (VI), Diss	Operations	Aug	5	0.00014	0.00014	0.00015	27	0.00013	0.00013	0.00013	99	0.00005	0.00005	0.00005	5	0.00011	0.00011	0.00011	-19	0.00012	0.00012	0.00012	-17	0.00022	0.00022	0.00022	0
Cr (VI), Diss	Operations	Sep	5	0.00010	0.00011	0.00011	16	0.00014	0.00014	0.00014	124	0.00005	0.00005	0.00005	53	0.00010	0.00010	0.00010	-21	0.00011	0.00011	0.00011	-18	0.00023	0.00023	0.00023	0
Cr (VI), Diss	Operations	Oct	5	0.00009	0.00009	0.00009	15	0.00016	0.00016	0.00016	164	0.00007	0.00007	0.00007	97	0.00009	0.00009	0.00009	-24	0.00009	0.00009	0.00009	-21	0.00022	0.00022	0.00022	0
Cr (VI), Diss	Operations	Nov	5	0.00016	0.00016	0.00017	63	0.00018	0.00018	0.00018	147	0.00012	0.00012	0.00012	85	0.00010	0.00010	0.00010	-26	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	0
Cr (VI), Diss	Operations	Dec	5	0.00022	0.00022	0.00022	125	0.00015	0.00015	0.00015	109	0.00010	0.00010	0.00010	58	0.00009	0.00009	0.00009	-28	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	-1
Cr (VI), Diss	Closure	Jan	6	0.00026	0.00026	0.00027	169	0.00013	0.00013	0.00013	83	0.00008	0.00008	0.00009	21	0.00009	0.00009	0.00009	-30	0.00010	0.00010	0.00010	-23	0.00025	0.00025	0.00025	0
Cr (VI), Diss	Closure	Feb	6	0.00028	0.00028	0.00030	161	0.00012	0.00012	0.00013	67	0.00007	0.00008	0.00008	-10	0.00009	0.00009	0.00009	-33	0.00010	0.00010	0.00010	-23	0.00026	0.00026	0.00026	0
Cr (VI), Diss	Closure	Mar	6	0.00026	0.00026	0.00027	174	0.00011	0.00011	0.00012	55	0.00006	0.00006	0.00007	-21	0.00008	0.00008	0.00008	-36	0.00010	0.00010	0.00010	-24	0.00024	0.00024	0.00024	0
Cr (VI), Diss	Closure	Apr	6	0.00036	0.00036	0.00037	270	0.00010	0.00010	0.00011	49	0.00006	0.00006	0.00006	-29	0.00008	0.00008	0.00008	-39	0.00010	0.00010	0.00010	-25	0.00024	0.00024	0.00024	0
Cr (VI), Diss	Closure	May	6	0.00041	0.00041	0.00043	178	0.00010	0.00010	0.00011	85	0.00014	0.00014	0.00014	-24	0.00007	0.00007	0.00007	-35	0.00008	0.00008	0.00009	-24	0.00020	0.00020	0.00020	0
Cr (VI), Diss	Closure	Jun	6	0.00039	0.00039	0.00040	112	0.00014	0.00015	0.00015	110	0.00018	0.00018	0.00019	-7	0.00010	0.00010	0.00010	-24	0.00010	0.00010	0.00010	-20	0.00019	0.00019	0.00019	0
Cr (VI), Diss	Closure	Jul	6	0.00024	0.00023	0.00025	60	0.00014	0.00014	0.00015	105	0.00010	0.00010	0.00010	-16	0.00012	0.00012	0.00012	-18	0.00011	0.00011	0.00011	-18	0.00020	0.00020	0.00020	0
Cr (VI), Diss	Closure	Aug	6	0.00015	0.00015	0.00016	35	0.00012	0.00012	0.00013	92	0.00005	0.00005	0.00005	4	0.00011	0.00011	0.00012	-19	0.00012	0.00012	0.00012	-16	0.00022	0.00022	0.00022	0
Cr (VI), Diss	Closure	Sep	6	0.00011	0.00011	0.00012	24	0.00013	0.00013	0.00014	111	0.00005	0.00005	0.00005	46	0.00010	0.00010	0.00011	-20	0.00011	0.00011	0.00011	-18	0.00023	0.00023	0.00023	0
Cr (VI), Diss	Closure	Oct	6	0.00009	0.00009	0.00010	22	0.00015	0.00015	0.00016	148	0.00006	0.00006	0.00007	85	0.00009	0.00009	0.00010	-23	0.00009	0.00009	0.00010	-20	0.00022	0.00022	0.00022	0
Cr (VI), Diss	Closure	Nov	6	0.00017	0.00017	0.00018	70	0.00017	0.00017	0.00018	137	0.00012	0.00012	0.00012	78	0.00010	0.00010	0.00010	-25	0.00010	0.00010	0.00010	-22	0.00025	0.00025	0.00025	0
Cr (VI), Diss	Closure	Dec	6	0.00023	0.00023	0.00024	133	0.00014	0.00014	0.00015	105	0.00010	0.00010	0.00011	55	0.00009	0.00009	0.00010	-27	0.00010	0.00010	0.00010	-22	0.00025	0.00025	0.00025	0
Cr (VI), Diss	Post-Closure	Jan	117	0.00010	0.00010	0.00025	8	0.00011	0.00011	0.00014	54	0.00009	0.00009	0.00011	27	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr (VI), Diss	Post-Closure	Feb	117	0.00012	0.00012	0.00029	8	0.00011	0.00011	0.00014	54	0.00010	0.00010	0.00012	22	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00026	0.00026	0.00026	1
Cr (VI), Diss	Post-Closure	Mar	117	0.00010	0.00010	0.00027	8	0.00011	0.00011	0.00014	55	0.00010	0.00010	0.00012	17	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr (VI), Diss	Post-Closure	Apr	117	0.00010	0.00010	0.00034	7	0.00011	0.00011	0.00014	56	0.00009	0.00009	0.00012	10	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00024	0.00024	0.00024	1
Cr (VI), Diss	Post-Closure	May	117	0.00014	0.00014	0.00038	-4	0.00009	0.00008	0.00010	49	0.00018	0.00018	0.00020	0	0.00011	0.00011	0.00011	1	0.00011	0.00011	0.00011	1	0.00020	0.00020	0.00020	1
Cr (VI), Diss	Post-Closure	Jun	117	0.00017	0.00018	0.00038	-4	0.00010	0.00010	0.00014	38	0.00021	0.00021	0.00023	8	0.00013	0.00013	0.00013	1	0.00012	0.00012	0.00012	0	0.00019	0.00019	0.00019	1
Cr (VI), Diss	Post-Closure	Jul	117	0.00014	0.00014	0.00025	-1	0.00010	0.00010	0.00014	37	0.00013	0.00013	0.00014	11	0.00015	0.00015	0.00015	1	0.00013	0.00013	0.00014	0	0.00020	0.00020	0.00020	1
Cr (VI), Diss	Post-Closure	Aug	117	0.00011	0.00011	0.00017	2	0.00009	0.00009	0.00012	38	0.00005	0.00005	0.00006	16	0.00014	0.00014	0.00014	1	0.00014	0.00014	0.00014	0	0.00022	0.00022	0.00022	1
Cr (VI), Diss	Post-Closure	Sep	117	0.00010	0.00010	0.00013	5	0.00009	0.00009	0.00013	42	0.00004	0.00004	0.00005	20	0.00013	0.00013	0.00013	1	0.00013	0.00013	0.00013	1	0.00023	0.00023	0.00023	1
Cr (VI), Diss	Post-Closure	Oct	117	0.00008	0.00008	0.00011	7	0.00009	0.00009	0.00013	49	0.00004	0.00004	0.00006	24	0.00012	0.00012	0.00012	1	0.00012	0.00012	0.00012	1	0.00022	0.00022	0.00022	1
Cr (VI), Diss	Post-Closure	Nov	117	0.00011	0.00011	0.00014	8	0.00011	0.00011	0.00015	53	0.00009	0.00009	0.00011	31	0.00013	0.00013	0.00014	2	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr (VI), Diss	Post-Closure	Dec	117	0.00010	0.00010	0.00014	8	0.00011	0.00011	0.00014	53	0.00009	0.00009	0.00010	32	0.00013	0.00013	0.00013	2	0.00013	0.00013	0.00013	1	0.00025	0.00025	0.00025	1
Cr, Tot	Construction	Jan	2	0.00060	0.00060	0.00060	7	0.00020	0.00020	0.00024	45	0.00021	0.00021	0.00024	19	0.00029	0.00029	0.00031	-7	0.00027	0.00027	0.00029	-7	0.00034	0.00034	0.00034	0
Cr, Tot	Construction	Feb	2	0.00060	0.00060	0.00061	-4	0.00022	0.00022	0.00026	49	0.00024	0.00024	0.00028	10	0.00030	0.00030	0.00031	-9	0.00027	0.00027	0.00029	-6	0.00035	0.00035	0.00035	0
Cr, Tot	Construction	Mar	2	0.00052	0.00052	0.00053	-2	0.00022	0.00022	0.00026	47	0.00022	0.00022	0.00026	4	0.00029	0.00029	0.00030	-11	0.00027	0.00027	0.00029	-6	0.00034	0.00034	0.00034	0
Cr, Tot	Construction	Apr	2	0.00054	0.00054	0.00055	5	0.00022	0.00022	0.00025	46	0.00022	0.00022	0.00026	0	0.00028	0.00028	0.00028	-13	0.00027	0.00027	0.00029	-6	0.00033	0.00033	0.00033	-1
Cr, Tot	Construction	May	2	0.00049	0.00049	0.00049	34	0.00019	0.00019	0.00021	66	0.00024	0.00024	0.00026	-21	0.00024	0.00024	0.00024	-12	0.00031	0.00031	0.00032	-6	0.00028	0.00028	0.00028	-1
Cr, Tot	Construction	Jun	2	0.00063	0.00063	0.00064	63	0.00023	0.00023	0.00025	79	0.00028	0.00028	0.00029	-12	0.00025	0.00025	0.00026	-11	0.00029	0.00029	0.00030	-7	0.00028	0.00028	0.00028	-1
Cr, Tot	Construction	Jul	2	0.00063	0.00063	0.00063	64	0.00025	0.00025	0.00027	88	0.00024	0.00024	0.00026	8	0.00027	0.00027	0.00027	-10	0.00029	0.00029	0.00030	-7	0.00029	0.00029	0.00029	0
Cr, Tot	Construction	Aug	2	0.00055	0.00055	0.00056	57	0.00025	0.00025	0.00027	90	0.00023	0.00023	0.00024	55	0.00027	0.00027	0.00027	-8	0.00029	0.00029	0.00030	-8	0.00031	0.00031	0.00031	0
Cr, Tot	Construction	Sep	2	0.00063	0.00063	0.00063	65	0.00021	0.00021	0.00022	70	0.00022	0.00022	0.00023	48	0.00027	0.00027	0.00028	-7	0.00027	0.00027	0.00027	-10	0.00031	0.00031	0.00031	0
Cr, Tot	Construction	Oct	2	0.00073	0.00073	0.00074	72	0.00016	0.00016	0.00017	42	0.00018	0.00018	0.00019	17	0.00027	0.00027	0.00027	-7	0.00023	0.00023	0.00023	-14	0.00030	0.00030	0.00030	0
Cr, Tot	Construction	Nov	2	0.00089	0.00089	0.00090	47	0.00020	0.00020	0.00021	49	0.00022	0.00022	0.00024	-4	0.00029	0.00029	0.00030	-9	0.00024	0.00024	0.00024	-15	0.00034	0.00034	0.00034	0
Cr, Tot	Construction	Dec	2	0.00067	0.00067	0.00068	16	0.00023	0.00023	0.00024	69	0.00023	0.00023	0.00024	31	0.00029	0.00029	0.00029	-10	0.00025	0.00025	0.00025	-14	0.00034	0.00034	0.00034	0
Cr, Tot	Operations	Jan	5	0.00057	0.00057	0.00058	3	0.00024	0.00024	0.00025	74	0.00024	0.00024	0.00025	39	0.00029	0.00029	0.00029	-8	0.00025	0.00025	0.00025	-12	0.00034	0.00034	0.00034	-1
Cr, Tot	Operations	Feb	5	0.00056	0.00057	0.00057	-9	0.00025	0.00026	0.00026	73	0.00027	0.00028	0.00029	29	0.00030	0.00030	0.00031	-8	0.00026	0.00026	0.00026	-11	0.00035	0.00035	0.00035	-1
Cr, Tot	Operations	Mar	5	0.00050	0.00050	0.00051	-6	0.00025	0.00025	0.00026	69	0.00025	0.00025	0.00026	20	0.00030	0.00030	0.00030	-9	0.00026	0.00026	0.00026	-11	0.00034	0.00034	0.00034	-1
Cr, Tot	Operations	Apr	5	0.00052	0.00052	0.00053	1	0.00024	0.00024	0.00025	66	0.00025	0.00025	0.00025	13	0.00029	0.00029	0.00029	-10	0.00026	0.00026	0.00026	-10	0.00033	0.00033	0.00033	-1
Cr, Tot	Operations	May	5	0.00047	0.00047	0.00048	30	0.00020	0.00020	0.00020	80	0.00025	0.00025	0.00025	-17	0.00025	0.00025	0.00026	-9	0.00030	0.00030	0.00030	-8	0.00028	0.00028	0.00028	-1
Cr, Tot	Operations	Jun	5	0.00061	0.00062	0.00062	59	0.00024	0.00024	0.00024	88	0.00029	0.00029	0.00029	-9	0.00027	0.00027	0.00027	-8	0.00029	0.00029	0.00029	-8	0.00028	0.00028	0.00028	-1
Cr, Tot	Operations	Jul	5	0.00061	0.00061	0.00062	60	0.00026	0.00026	0.00026	95	0.00025	0.00025	0.00026	12	0.00028	0.00028	0.00028	-7	0.00029	0.00029	0.00029	-8	0.00029	0.00028	0.00029	-1
Cr, Tot	Operations	Aug	5	0.00053	0.00054	0.00054	52	0.00026	0.00026	0.00026	96	0.00023	0.00023	0.00023	59	0.00028	0.00028	0.00028	-6	0.00029	0.00029	0.00029	-7	0.00031	0.00030	0.00031	0
Cr, Tot	Operations	Sep	5	0.00061	0.00061	0.00062	61	0.00022	0.00022	0.00022	76	0.00023	0.00023	0.00023	52	0.00028	0.00028	0.00028	-5	0.00027	0.00027	0.00027	-9	0.00031	0.00031	0.00031	0
Cr, Tot	Operations	Oct	5	0.00071	0.00072	0.00073	68	0.00017	0.00017	0.00017	50	0.00019	0.00019	0.00019	24	0.00028	0.00028	0.00028	-5	0.00023	0.00023	0.00023	-12	0.00030	0.00030	0.00030	0
Cr, Tot	Operations	Nov	5	0.00087	0.00087	0.00088	43	0.00021	0.00021	0.00021	52	0.00024	0.00024	0.00024	2	0.00031	0.00031	0.00031	-6	0.00025	0.00025	0.00025	-13	0.00034	0.00034	0.00034	0
Cr, Tot	Operations	Dec	5	0.00065	0.00065	0.00066	13	0.00023	0.00023	0.00023	66	0.00023	0.00023	0.00023	30	0.00030	0.00030	0.00030	-7	0.00025	0.00025	0.00025	-12	0.00034	0.00034	0.00034	0
Cr, Tot	Closure	Jan	6	0.00059	0.00059	0.00060	5	0.00024	0.00024	0.00025	75	0.00024	0.00024	0.00026	41	0.00029	0.00029	0.00030	-8	0.00025	0.00025	0.00026	-11	0.00034	0.00034	0.00034	0
Cr, Tot	Closure	Feb	6	0.00058	0.00058	0.00059	-7	0.00025	0.00026	0.00027	73	0.00028	0.00028	0.00029	30	0.00030	0.00030	0.00031	-9	0.00026	0.00026	0.00027	-10	0.00035	0.00035	0.00035	0
Cr, Tot	Closure	Mar	6	0.00051	0.00051	0.00052	-4	0.00024	0.00025	0.00026	66	0.00025	0.00025	0.00027	20	0.00030	0.00030	0.00031	-9	0.00026	0.00026	0.00027	-10	0.00034	0.00034	0.00034	0
Cr, Tot	Closure	Apr	6	0.00053	0.00053	0.00054	3	0.00024	0.00024	0.00025	61	0.00024	0.00025	0.00026	12	0.00029	0.00029	0.00030	-10	0.00026	0.00026	0.00027	-9	0.00033	0.00033	0.00033	0
Cr, Tot	Closure	May	6	0.00047	0.00048	0.00049	31	0.00019	0.00019	0.00020	70	0.00025	0.00025	0.00026	-18	0.00025	0.00026	0.00026	-9	0.00030	0.00030	0.00031	-7	0.00028	0.00028	0.00028	0
Cr, Tot	Closure	Jun	6	0.00062	0.00062	0.00063	60	0.00022	0.00023	0.00024	77	0.00029	0.00029	0.00029	-9	0.00027	0.00027	0.00027	-9	0.00029	0.00029	0.00030	-7	0.00028	0.00028	0.00028	0
Cr, Tot	Closure	Jul	6	0.00061	0.00062	0.00063	62	0.00024	0.00025	0.00026	84	0.00025	0.00025	0.00025	9	0.00028	0.00028	0.00028	-7	0.00029	0.00029	0.00030	-7	0.00029	0.00029	0.00029	0
Cr, Tot	Closure	Aug	6	0.00055	0.00055	0.00056	55	0.00025	0.00025	0.00026	87	0.00022	0.00022	0.00023	50	0.00028	0.00028	0.00028	-6	0.00029	0.00029	0.00030	-7	0.00031	0.00031	0.00031	0
Cr, Tot	Closure	Sep	6	0.00062	0.00062	0.00063	62	0.00022	0.00022	0.00023	73	0.00022	0.00022	0.00023	48	0.00028	0.00028	0.00029	-5	0.00027	0.00027	0.00027	-8	0.00031	0.00031	0.00031	0
Cr, Tot	Closure	Oct	6	0.00072	0.00072	0.00074	69	0.00017	0.00017	0.00018	51	0.00019	0.00019	0.00020	24	0.00028	0.00028	0.00029	-5	0.00023	0.00023	0.00024	-11	0.00030	0.00030	0.00030	0
Cr, Tot	Closure	Nov	6	0.00089	0.00089	0.00090	46	0.00021	0.00021	0.00022	55	0.00024	0.00024	0.00026	4	0.00031	0.00031	0.00032	-6	0.00025	0.00025	0.00026	-12	0.00035	0.00035	0.00035	0
Cr, Tot	Closure	Dec	6	0.00068	0.00068	0.00070	17	0.00023	0.00023	0.00024	70	0.00024	0.00023	0.00024	34	0.00030	0.00030	0.00031	-7	0.00025	0.00025	0.00026	-11	0.00034	0.00034	0.00034	0
Cr, Tot	Post-Closure	Jan	117	0.00053	0.00053	0.00078	-5	0.00019	0.00018	0.00025	32	0.00021	0.00021	0.00025	21	0.00033	0.00033	0.00033	3	0.00029	0.00029	0.00029	2	0.00034	0.00034	0.00034	0
Cr, Tot	Post-Closure	Feb	117	0.00059	0.00059	0.00086	-5	0.00020	0.00020	0.00027	34	0.00026	0.00025	0.00029	19	0.00035	0.00035	0.00035	4	0.00030	0.00030	0.00030	2	0.00036	0.00036	0.00036	0
Cr, Tot	Post-Closure	Mar	117	0.00050	0.00051	0.00073	-5	0.00021	0.00020	0.00026	37	0.00026	0.00025	0.00028	19	0.00035	0.00035	0.00035	4	0.00030	0.00030	0.00030	2	0.00034	0.00034	0.00034	0
Cr, Tot	Post-Closure	Apr	117	0.00049	0.00049	0.00071	-5	0.00021	0.00021	0.00025	41	0.00026	0.00026	0.00028	16	0.00034	0.00034	0.00034	4	0.00030	0.00029	0.00030	2	0.00034	0.00034	0.00034	0
Cr, Tot	Post-Closure	May	117	0.00035	0.00035	0.00046	-4	0.00016	0.00016	0.00020	39	0.00031	0.00031	0.00033	1	0.00029	0.00029	0.00029	3	0.00033	0.00033	0.00033	1	0.00028	0.00028	0.00028	0
Cr, Tot	Post-Closure	Jun	117	0.00037	0.00037	0.00058	-3	0.00017	0.00017	0.00022	32	0.00034	0.00034	0.00036	8	0.00030	0.00030	0.00030	3	0.00032	0.00032	0.00032	1	0.00028	0.00028	0.00028	0
Cr, Tot	Post-Closure	Jul	117	0.00037	0.00037	0.00058	-3	0.00018	0.00017	0.00024	31	0.00025	0.00025	0.00026	11	0.00031	0.00031	0.00031	3	0.00032	0.00032	0.00032	1	0.00029	0.00029	0.00029	0
Cr, Tot	Post-Closure	Aug	117	0.00034	0.00034	0.00053	-2	0.00018	0.00017	0.00024	30	0.00017	0.00017	0.00021	16	0.00031	0.00031	0.00031	3	0.00032	0.00032	0.00032	2	0.00031	0.00031	0.00031	0
Cr, Tot	Post-Closure	Sep	117	0.00036	0.00036	0.00058	-4	0.00017	0.00016	0.00021	31	0.00018	0.00017	0.00021	16	0.00031	0.00031	0.00031	3	0.00030	0.00030	0.00030	2	0.00031	0.00031	0.00031	0
Cr, Tot	Post-Closure	Oct	117	0.00040	0.00040	0.00062	-5	0.00015	0.00015	0.00018	31	0.00018	0.00018	0.00021	15	0.00031	0.00031	0.00031	3	0.00027	0.00027	0.00027	2	0.00030	0.00030	0.00030	0
Cr, Tot	Post-Closure	Nov	117	0.00057	0.00057	0.00085	-5	0.00018	0.00018	0.00022	30	0.00028	0.00027	0.00031	17	0.00034	0.00034	0.00034	3	0.00029	0.00029	0.00029	2	0.00035	0.00035	0.00035	0
Cr, Tot	Post-Closure	Dec	117	0.00055	0.00055	0.00081	-5	0.00018	0.00018	0.00021	31	0.00022	0.00021	0.00024	21	0.00034	0.00034	0.00034	3	0.00029	0.00029	0.00029	2	0.00034	0.00034	0.00034	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Cu, Diss	Construction	Jan	2	0.00082	0.00082	0.00107	265	0.00106	0.00106	0.00150	239	0.00015	0.00015	0.00022	87	0.00040	0.00040	0.00042	5	0.00028	0.00028	0.00028	1	0.00057	0.00057	0.00057	0
Cu, Diss	Construction	Feb	2	0.00097	0.00097	0.00106	274	0.00128	0.00128	0.00160	269	0.00017	0.00017	0.00021	75	0.00040	0.00040	0.00043	1	0.00028	0.00028	0.00029	0	0.00060	0.00060	0.00060	0
Cu, Diss	Construction	Mar	2	0.00087	0.00087	0.00090	279	0.00129	0.00129	0.00152	261	0.00016	0.00016	0.00019	72	0.00037	0.00037	0.00041	-4	0.00028	0.00028	0.00028	-1	0.00057	0.00057	0.00057	0
Cu, Diss	Construction	Apr	2	0.00088	0.00088	0.00089	285	0.00130	0.00130	0.00150	255	0.00015	0.00015	0.00017	63	0.00035	0.00035	0.00038	-9	0.00027	0.00027	0.00028	-2	0.00057	0.00057	0.00057	0
Cu, Diss	Construction	May	2	0.00073	0.00073	0.00074	373	0.00111	0.00111	0.00124	315	0.00047	0.00047	0.00050	119	0.00030	0.00030	0.00033	-7	0.00024	0.00024	0.00024	-3	0.00049	0.00049	0.00049	0
Cu, Diss	Construction	Jun	2	0.00102	0.00102	0.00102	511	0.00134	0.00134	0.00135	395	0.00083	0.00083	0.00088	187	0.00035	0.00035	0.00038	7	0.00025	0.00025	0.00026	-3	0.00049	0.00049	0.00049	0
Cu, Diss	Construction	Jul	2	0.00131	0.00131	0.00133	590	0.00144	0.00144	0.00151	431	0.00063	0.00063	0.00066	196	0.00041	0.00041	0.00044	19	0.00026	0.00026	0.00027	-1	0.00050	0.00050	0.00050	0
Cu, Diss	Construction	Aug	2	0.00152	0.00152	0.00155	603	0.00143	0.00143	0.00148	437	0.00054	0.00054	0.00056	288	0.00044	0.00044	0.00047	23	0.00027	0.00027	0.00028	1	0.00051	0.00051	0.00051	0
Cu, Diss	Construction	Sep	2	0.00126	0.00126	0.00129	518	0.00131	0.00131	0.00134	411	0.00039	0.00039	0.00040	248	0.00046	0.00046	0.00048	25	0.00027	0.00027	0.00028	3	0.00050	0.00050	0.00050	0
Cu, Diss	Construction	Oct	2	0.00085	0.00085	0.00087	396	0.00111	0.00111	0.00113	366	0.00027	0.00027	0.00028	204	0.00044	0.00044	0.00046	24	0.00027	0.00027	0.00028	4	0.00049	0.00049	0.00049	0
Cu, Diss	Construction	Nov	2	0.00106	0.00106	0.00108	367	0.00134	0.00134	0.00135	361	0.00028	0.00028	0.00029	134	0.00048	0.00048	0.00050	21	0.00029	0.00029	0.00031	4	0.00057	0.00057	0.00057	0
Cu, Diss	Construction	Dec	2	0.00106	0.00106	0.00108	373	0.00142	0.00142	0.00143	374	0.00023	0.00023	0.00023	174	0.00046	0.00046	0.00048	18	0.00029	0.00029	0.00030	5	0.00057	0.00057	0.00057	0
Cu, Diss	Operations	Jan	5	0.00098	0.00100	0.00103	340	0.00143	0.00143	0.00146	360	0.00021	0.00021	0.00021	156	0.00048	0.00048	0.00050	25	0.00032	0.00032	0.00033	14	0.00057	0.00057	0.00057	0
Cu, Diss	Operations	Feb	5	0.00098	0.00099	0.00102	282	0.00154	0.00153	0.00155	341	0.00021	0.00021	0.00021	116	0.00048	0.00048	0.00050	21	0.00032	0.00032	0.00033	14	0.00060	0.00060	0.00060	0
Cu, Diss	Operations	Mar	5	0.00083	0.00084	0.00087	267	0.00153	0.00155	0.00162	334	0.00018	0.00019	0.00019	105	0.00046	0.00046	0.00048	16	0.00032	0.00032	0.00033	13	0.00057	0.00057	0.00057	0
Cu, Diss	Operations	Apr	5	0.00082	0.00083	0.00086	264	0.00152	0.00155	0.00165	322	0.00017	0.00017	0.00018	94	0.00043	0.00043	0.00045	11	0.00031	0.00031	0.00033	12	0.00057	0.00057	0.00057	0
Cu, Diss	Operations	May	5	0.00068	0.00069	0.00071	344	0.00124	0.00126	0.00135	371	0.00050	0.00051	0.00054	137	0.00036	0.00036	0.00037	11	0.00027	0.00027	0.00028	11	0.00049	0.00049	0.00049	0
Cu, Diss	Operations	Jun	5	0.00094	0.00095	0.00098	473	0.00149	0.00150	0.00161	454	0.00091	0.00091	0.00097	216	0.00041	0.00041	0.00043	21	0.00028	0.00028	0.00029	10	0.00049	0.00049	0.00049	0
Cu, Diss	Operations	Jul	5	0.00121	0.00123	0.00127	546	0.00163	0.00162	0.00176	500	0.00070	0.00070	0.00075	229	0.00046	0.00046	0.00048	32	0.00029	0.00029	0.00030	11	0.00050	0.00050	0.00050	0
Cu, Diss	Operations	Aug	5	0.00141	0.00142	0.00147	558	0.00163	0.00162	0.00176	506	0.00061	0.00061	0.00066	334	0.00049	0.00049	0.00051	35	0.00030	0.00030	0.00031	12	0.00051	0.00051	0.00051	0
Cu, Diss	Operations	Sep	5	0.00117	0.00118	0.00122	477	0.00147	0.00146	0.00159	473	0.00043	0.00043	0.00047	289	0.00050	0.00050	0.00053	36	0.00030	0.00030	0.00031	13	0.00050	0.00050	0.00050	0
Cu, Diss	Operations	Oct	5	0.00079	0.00079	0.00082	362	0.00123	0.00122	0.00132	413	0.00030	0.00030	0.00033	235	0.00049	0.00049	0.00051	35	0.00029	0.00029	0.00030	14	0.00049	0.00049	0.00049	0
Cu, Diss	Operations	Nov	5	0.00097	0.00099	0.00102	336	0.00139	0.00139	0.00147	378	0.00031	0.00031	0.00032	155	0.00054	0.00054	0.00056	33	0.00033	0.00033	0.00034	15	0.00057	0.00057	0.00057	0
Cu, Diss	Operations	Dec	5	0.00098	0.00099	0.00103	343	0.00140	0.00141	0.00146	370	0.00023	0.00023	0.00024	176	0.00051	0.00051	0.00054	30	0.00032	0.00032	0.00034	16	0.00057	0.00057	0.00057	0
Cu, Diss	Closure	Jan	6	0.00103	0.00103	0.00108	355	0.00138	0.00137	0.00144	339	0.00020	0.00020	0.00021	146	0.00044	0.00045	0.00051	14	0.00030	0.00031	0.00033	9	0.00057	0.00057	0.00057	0
Cu, Diss	Closure	Feb	6	0.00103	0.00103	0.00108	297	0.00146	0.00144	0.00152	316	0.00020	0.00020	0.00021	107	0.00044	0.00045	0.00052	11	0.00030	0.00031	0.00034	9	0.00060	0.00060	0.00060	0
Cu, Diss	Closure	Mar	6	0.00088	0.00087	0.00091	281	0.00138	0.00138	0.00145	286	0.00017	0.00017	0.00018	87	0.00042	0.00043	0.00049	7	0.00030	0.00031	0.00034	8	0.00057	0.00057	0.00057	0
Cu, Diss	Closure	Apr	6	0.00088	0.00087	0.00090	279	0.00132	0.00132	0.00140	259	0.00015	0.00015	0.00016	68	0.00040	0.00041	0.00047	3	0.00030	0.00030	0.00033	7	0.00057	0.00057	0.00057	0
Cu, Diss	Closure	May	6	0.00071	0.00071	0.00075	358	0.00102	0.00102	0.00108	281	0.00040	0.00041	0.00043	91	0.00033	0.00034	0.00038	3	0.00026	0.00026	0.00029	7	0.00049	0.00049	0.00049	0
Cu, Diss	Closure	Jun	6	0.00097	0.00098	0.00103	488	0.00115	0.00116	0.00124	330	0.00071	0.00072	0.00076	150	0.00037	0.00037	0.00041	11	0.00027	0.00027	0.00030	5	0.00049	0.00049	0.00049	0
Cu, Diss	Closure	Jul	6	0.00125	0.00126	0.00133	564	0.00123	0.00125	0.00133	362	0.00054	0.00055	0.00058	158	0.00041	0.00042	0.00044	17	0.00028	0.00028	0.00030	5	0.00050	0.00050	0.00050	0
Cu, Diss	Closure	Aug	6	0.00145	0.00146	0.00154	577	0.00125	0.00127	0.00135	375	0.00046	0.00047	0.00050	234	0.00044	0.00044	0.00046	18	0.00028	0.00028	0.00030	6	0.00051	0.00051	0.00051	0
Cu, Diss	Closure	Sep	6	0.00123	0.00123	0.00129	501	0.00117	0.00118	0.00126	363	0.00034	0.00035	0.00037	213	0.00045	0.00045	0.00046	19	0.00028	0.00028	0.00030	7	0.00050	0.00050	0.00050	0
Cu, Diss	Closure	Oct	6	0.00086	0.00084	0.00088	389	0.00102	0.00103	0.00109	330	0.00025	0.00025	0.00027	180	0.00043	0.00043	0.00045	18	0.00028	0.00028	0.00029	7	0.00049	0.00049	0.00049	0
Cu, Diss	Closure	Nov	6	0.00107	0.00104	0.00108	361	0.00123	0.00123	0.00130	322	0.00027	0.00027	0.00028	122	0.00048	0.00048	0.00049	17	0.00030	0.00031	0.00032	7	0.00057	0.00057	0.00057	0
Cu, Diss	Closure	Dec	6	0.00107	0.00105	0.00109	368	0.00131	0.00130	0.00137	335	0.00022	0.00021	0.00023	154	0.00046	0.00046	0.00047	14	0.00030	0.00030	0.00032	7	0.00057	0.00057	0.00057	0
Cu, Diss	Post-Closure	Jan	117	0.00023	0.00025	0.00107	8	0.00064	0.00061	0.00138	95	0.00012	0.00012	0.00020	46	0.00042	0.00042	0.00047	7	0.00029	0.00029	0.00030	4	0.00059	0.00059	0.00059	3
Cu, Diss	Post-Closure	Feb	117	0.00026	0.00028	0.00115	7	0.00071	0.00067	0.00148	94	0.00014	0.00013	0.00021	39	0.00044	0.00044	0.00049	6	0.00030	0.00030	0.00031	4	0.00062	0.00062	0.00062	3
Cu, Diss	Post-Closure	Mar	117	0.00023	0.00024	0.00098	7	0.00076	0.00071	0.00144	99	0.00013	0.00012	0.00018	34	0.00043	0.00043	0.00048	6	0.00030	0.00030	0.00031	4	0.00059	0.00059	0.00059	3
Cu, Diss	Post-Closure	Apr	117	0.00023	0.00024	0.00095	6	0.00080	0.00074	0.00139	103	0.00012	0.00011	0.00016	28	0.00043	0.00042	0.00047	6	0.00029	0.00029	0.00031	4	0.00059	0.00059	0.00059	4
Cu, Diss	Post-Closure	May	117	0.00016	0.00016	0.00069	6	0.00058	0.00054	0.00104	101	0.00023	0.00023	0.00037	8	0.00035	0.00035	0.00039	6	0.00026	0.00026	0.00027	4	0.00051	0.00051	0.00051	3
Cu, Diss	Post-Closure	Jun	117	0.00017	0.00018	0.00088	5	0.00057	0.00054	0.00112	98	0.00039	0.00038	0.00068	33	0.00036	0.00036	0.00039	6	0.00027	0.00027	0.00028	3	0.00051	0.00051	0.00051	3
Cu, Diss	Post-Closure	Jul	117	0.00019	0.00020	0.00111	4	0.00057	0.00053	0.00117	97	0.00030	0.00030	0.00052	40	0.00038	0.00038	0.00041	6	0.00028	0.00027	0.00029	3	0.00051	0.00051	0.00051	3
Cu, Diss	Post-Closure	Aug	117	0.00021	0.00022	0.00128	3	0.00056	0.00052	0.00118	96	0.00022	0.00021	0.00042	49	0.00040	0.00040	0.00043	6	0.00028	0.00028	0.00029	3	0.00052	0.00052	0.00052	3
Cu, Diss	Post-Closure	Sep	117	0.00020	0.00021	0.00114	4	0.00053	0.00050	0.00111	96	0.00017	0.00016	0.00032	48	0.00040	0.00040	0.00044	6	0.00028	0.00027	0.00029	3	0.00052	0.00052	0.00052	3
Cu, Diss	Post-Closure	Oct	117	0.00017	0.00018	0.00089	6	0.00050	0.00047	0.00098	98	0.00014	0.00013	0.00024	47	0.00039	0.00039	0.00043	6	0.00027	0.00027	0.00028	3	0.00051	0.00051	0.00051	3
Cu, Diss	Post-Closure	Nov	117	0.00023	0.00024	0.00114	7	0.00061	0.00057	0.00113	98	0.00019	0.00018	0.00031	51	0.00044	0.00044	0.00048	6	0.00030	0.00030	0.00031	4	0.00059	0.00059	0.00059	3
Cu, Diss	Post-Closure	Dec	117	0.00023	0.00024	0.00108	6	0.00063	0.00059	0.00110	95	0.00013	0.00013	0.00021	52	0.00043	0.00043	0.00047	6	0.00029	0.00029	0.00031	4	0.00059	0.00059	0.00059	3
Cu, Tot	Construction	Jan	2	0.00142	0.00142	0.00188	249	0.00188	0.00188	0.00271	302	0.00053	0.00053	0.00078	143	0.00080	0.00080	0.00088	10	0.00051	0.00051	0.00052	3	0.00067	0.00067	0.00067	0
Cu, Tot	Construction	Feb	2	0.00161	0.00161	0.00180	247	0.00243	0.00243	0.00305	356	0.00060	0.00060	0.00078	152	0.00082	0.00082	0.00091	8	0.00052	0.00052	0.00053	3	0.00071	0.00071	0.00071	0
Cu, Tot	Construction	Mar	2	0.00143	0.00143	0.00149	250	0.00259	0.00259	0.00306	361	0.00061	0.00061	0.00072	176	0.00079	0.00079	0.00089	6	0.00051	0.00051	0.00053	3	0.00068	0.00068	0.00068	0
Cu, Tot	Construction	Apr	2	0.00144	0.00144	0.00146	254	0.00272	0.00272	0.00312	359	0.00062	0.00062	0.00071	181	0.00077	0.00077	0.00087	5	0.00051	0.00051	0.00053	2	0.00069	0.00069	0.00069	0
Cu, Tot	Construction	May	2	0.00099	0.00099	0.00099	292	0.00204	0.00204	0.00228	374	0.00085	0.00085	0.00093	228	0.00083	0.00083	0.00091	3	0.00045	0.00045	0.00048	4	0.00060	0.00060	0.00060	0
Cu, Tot	Construction	Jun	2	0.00114	0.00114	0.00115	370	0.00205	0.00205	0.00223	385	0.00129	0.00129	0.00140	260	0.00085	0.00085	0.00093	10	0.00050	0.00050	0.00052	5	0.00061	0.00061	0.00061	0
Cu, Tot	Construction	Jul	2	0.00138	0.00138	0.00140	442	0.00192	0.00192	0.00206	373	0.00088	0.00088	0.00094	233	0.00087	0.00087	0.00094	16	0.00051	0.00051	0.00054	7	0.00061	0.00061	0.00061	0
Cu, Tot	Construction	Aug	2	0.00156	0.00156	0.00158	479	0.00171	0.00171	0.00181	348	0.00067	0.00067	0.00070	284	0.00083	0.00083	0.00090	17	0.00051	0.00051	0.00054	8	0.00060	0.00060	0.00060	0
Cu, Tot	Construction	Sep	2	0.00178	0.00178	0.00180	531	0.00147	0.00147	0.00154	313	0.00107	0.00107	0.00110	264	0.00082	0.00082	0.00088	20	0.00050	0.00050	0.00053	8	0.00059	0.00059	0.00059	0
Cu, Tot	Construction	Oct	2	0.00200	0.00200	0.00203	588	0.00122	0.00122	0.00127	273	0.00110	0.00110	0.00114	186	0.00084	0.00084	0.00090	27	0.00049	0.00049	0.00052	9	0.00058	0.00058	0.00058	0
Cu, Tot	Construction	Nov	2	0.00257	0.00257	0.00261	524	0.00184	0.00184	0.00184	350	0.00090	0.00090	0.00094	91	0.00097	0.00097	0.00103	30	0.00055	0.00055	0.00058	10	0.00067	0.00067	0.00067	0
Cu, Tot	Construction	Dec	2	0.00209	0.00209	0.00212	413	0.00236	0.00236	0.00239	441	0.00073	0.00073	0.00074	191	0.00095	0.00095	0.00100	29	0.00055	0.00055	0.00058	11	0.00067	0.00067	0.00067	0
Cu, Tot	Operations	Jan	5	0.00176	0.00178	0.00182	336	0.00256	0.00258	0.00264	453	0.00074	0.00074	0.00076	242	0.00100	0.00101	0.00105	40	0.00061	0.00061	0.00063	24	0.00067	0.00067	0.00067	0
Cu, Tot	Operations	Feb	5	0.00168	0.00170	0.00174	265	0.00295	0.00293	0.00297	451	0.00075	0.00075	0.00076	214	0.00103	0.00104	0.00108	39	0.00063	0.00062	0.00065	25	0.00071	0.00071	0.00071	0
Cu, Tot	Operations	Mar	5	0.00140	0.00141	0.00145	246	0.00309	0.00313	0.00328	457	0.00072	0.00073	0.00076	231	0.00100	0.00101	0.00104	36	0.00062	0.00062	0.00064	25	0.00068	0.00068	0.00068	0
Cu, Tot	Operations	Apr	5	0.00137	0.00139	0.00143	240	0.00319	0.00324	0.00344	447	0.00073	0.00074	0.00078	236	0.00097	0.00098	0.00101	34	0.00062	0.00062	0.00064	25	0.00069	0.00069	0.00069	0
Cu, Tot	Operations	May	5	0.00093	0.00094	0.00097	274	0.00231	0.00235	0.00249	446	0.00092	0.00094	0.00100	261	0.00098	0.00099	0.00102	23	0.00055	0.00055	0.00056	25	0.00060	0.00060	0.00060	0
Cu, Tot	Operations	Jun	5	0.00107	0.00108	0.00111	347	0.00232	0.00233	0.00249	453	0.00144	0.00145	0.00155	303	0.00099	0.00099	0.00103	29	0.00058	0.00058	0.00060	24	0.00061	0.00061	0.00061	0
Cu, Tot	Operations	Jul	5	0.00129	0.00130	0.00134	414	0.00220	0.00220	0.00238	442	0.00099	0.00100	0.00107	277	0.00099	0.00100	0.00103	34	0.00059	0.00059	0.00061	24	0.00061	0.00061	0.00061	0
Cu, Tot	Operations	Aug	5	0.00146	0.00148	0.00152	449	0.00196	0.00196	0.00213	413	0.00076	0.00076	0.00082	336	0.00094	0.00095	0.00098	34	0.00059	0.00059	0.00061	24	0.00060	0.00060	0.00060	0
Cu, Tot	Operations	Sep	5	0.00167	0.00168	0.00173	498	0.00167	0.00167	0.00181	370	0.00120	0.00120	0.00130	308	0.00092	0.00093	0.00096	36	0.00058	0.00058	0.00059	24	0.00059	0.00059	0.00059	0
Cu, Tot	Operations	Oct	5	0.00188	0.00190	0.00195	554	0.00137	0.00137	0.00146	320	0.00123	0.00123	0.00131	219	0.00094	0.00094	0.00098	43	0.00056	0.00056	0.00058	24	0.00058	0.00058	0.00058	0
Cu, Tot	Operations	Nov	5	0.00241	0.00243	0.00250	491	0.00187	0.00188	0.00195	359	0.00100	0.00100	0.00106	113	0.00108	0.00108	0.00113	46	0.00062	0.00062	0.00064	25	0.00067	0.00067	0.00067	0
Cu, Tot	Operations	Dec	5	0.00196	0.00198	0.00203	386	0.00230	0.00231	0.00236	429	0.00072	0.00073	0.00075	188	0.00105	0.00106	0.00110	44	0.00062	0.00062	0.00064	26	0.00067	0.00067	0.00067	0
Cu, Tot	Closure	Jan	6	0.00183	0.00183	0.00191	349	0.00255	0.00252	0.00262	441	0.00074	0.00073	0.00075	235	0.00094	0.00095	0.00107	34	0.00058	0.00059	0.00064	22	0.00067	0.00067	0.00067	0
Cu, Tot	Closure	Feb	6	0.00176	0.00176	0.00183	277	0.00283	0.00282	0.00294	430	0.00073	0.00073	0.00076	206	0.00097	0.00098	0.00110	32	0.00059	0.00061	0.00066	22	0.00071	0.00071	0.00071	0
Cu, Tot	Closure	Mar	6	0.00147	0.00146	0.00152	258	0.00283	0.00282	0.00295	403	0.00067	0.00067	0.00070	204	0.00094	0.00096	0.00107	30	0.00059	0.00060	0.00066	22	0.00068	0.00068	0.00068	0
Cu, Tot	Closure	Apr	6	0.00145	0.00143	0.00149	252	0.00280	0.00280	0.00293	373	0.00064	0.00064	0.00067	193	0.00092	0.00093	0.00103	28	0.00059	0.00060	0.00065	22	0.00069	0.00069	0.00069	0
Cu, Tot	Closure	May	6	0.00097	0.00097	0.00100	285	0.00198	0.00198	0.00207	361	0.00075	0.00076	0.00080	192	0.00094	0.00095	0.00102	18	0.00052	0.00053	0.00057	22	0.00060	0.00060	0.00060	0
Cu, Tot	Closure	Jun	6	0.00111	0.00111	0.00116	358	0.00191	0.00191	0.00200	354	0.00118	0.00119	0.00125	231	0.00093	0.00093	0.00099	22	0.00055	0.00056	0.00060	20	0.00061	0.00061	0.00061	0
Cu, Tot	Closure	Jul	6	0.00133	0.00134	0.00139	426	0.00180	0.00180	0.00189	343	0.00082	0.00082	0.00086	210	0.00091	0.00092	0.00097	25	0.00056	0.00057	0.00061	20	0.00061	0.00061	0.00061	0
Cu, Tot	Closure	Aug	6	0.00150	0.00151	0.00158	461	0.00162	0.00162	0.00170	325	0.00061	0.00062	0.00065	254	0.00087	0.00087	0.00091	24	0.00056	0.00056	0.00060	19	0.00060	0.00060	0.00060	0
Cu, Tot	Closure	Sep	6	0.00172	0.00172	0.00180	512	0.00142	0.00142	0.00148	299	0.00097	0.00099	0.00103	235	0.00084	0.00084	0.00088	25	0.00054	0.00055	0.00058	19	0.00059	0.00059	0.00059	0
Cu, Tot	Closure	Oct	6	0.00194	0.00194	0.00203	569	0.00120	0.00120	0.00125	268	0.00106	0.00106	0.00111	177	0.00085	0.00085	0.00088	30	0.00053	0.00053	0.00056	19	0.00058	0.00058	0.00058	0
Cu, Tot	Closure	Nov	6	0.00252	0.00252	0.00261	511	0.00173	0.00174	0.00181	326	0.00090	0.00091	0.00096	93	0.00098	0.00098	0.00100	32	0.00058	0.00059	0.00062	19	0.00067	0.00067	0.00067	0
Cu, Tot	Closure	Dec	6	0.00211	0.00207	0.00214	410	0.00220	0.00222	0.00233	408	0.00069	0.00069	0.00072	175	0.00096	0.00095	0.00098	32	0.00058	0.00058	0.00061	20	0.00067	0.00067	0.00067	0
Cu, Tot	Post-Closure	Jan	117	0.00041	0.00043	0.00193	6	0.00094	0.00089	0.00243	90	0.00034	0.00033	0.00070	50	0.00078	0.00077	0.00094	9	0.00051	0.00051	0.00058	5	0.00069	0.00069	0.00069	3
Cu, Tot	Post-Closure	Feb	117	0.00046	0.00049	0.00196	5	0.00107	0.00101	0.00276	89	0.00036	0.00035	0.00077	45	0.00081	0.00081	0.00098	9	0.00052	0.00052	0.00059	5	0.00073	0.00073	0.00073	3
Cu, Tot	Post-Closure	Mar	117	0.00040	0.00043	0.00167	4	0.00118	0.00111	0.00282	98	0.00033	0.00032	0.00066	45	0.00080	0.00080	0.00097	9	0.00052	0.00052	0.00059	5	0.00070	0.00070	0.00070	3
Cu, Tot	Post-Closure	Apr	117	0.00040	0.00042	0.00161	4	0.00130	0.00121	0.00284	104	0.00033	0.00032	0.00065	43	0.00079	0.00078	0.00096	9	0.00051	0.00051	0.00059	5	0.00071	0.00071	0.00071	3
Cu, Tot	Post-Closure	May	117	0.00025	0.00026	0.00097	5	0.00093	0.00087	0.00200	103	0.00030	0.00030	0.00067	16	0.00085	0.00085	0.00098	6	0.00045	0.00045	0.00052	5	0.00062	0.00062	0.00062	3
Cu, Tot	Post-Closure	Jun	117	0.00025	0.00026	0.00105	6	0.00090	0.00084	0.00189	99	0.00053	0.00051	0.00113	42	0.00081	0.00081	0.00093	6	0.00049	0.00048	0.00055	4	0.00062	0.00062	0.00062	3
Cu, Tot	Post-Closure	Jul	117	0.00026	0.00027	0.00121	5	0.00086	0.00080	0.00178	97	0.00041	0.00039	0.00080	48	0.00079	0.00078	0.00091	6	0.00050	0.00049	0.00056	4	0.00062	0.00062	0.00062	2
Cu, Tot	Post-Closure	Aug	117	0.00027	0.00028	0.00135	4	0.00080	0.00075	0.00161	96	0.00029	0.00027	0.00059	57	0.00075	0.00074	0.00086	7	0.00049	0.00049	0.00055	4	0.00062	0.00062	0.00062	2
Cu, Tot	Post-Closure	Sep	117	0.00028	0.00029	0.00151	4	0.00074	0.00070	0.00143	96	0.00045	0.00043	0.00091	48	0.00072	0.00072	0.00083	7	0.00048	0.00048	0.00054	5	0.00061	0.00061	0.00061	2
Cu, Tot	Post-Closure	Oct	117	0.00029	0.00030	0.00150	4	0.00068	0.00064	0.00123	96	0.00058	0.00056	0.00104	46	0.00071	0.00070	0.00083	7	0.00047	0.00047	0.00052	5	0.00059	0.00059	0.00059	2
Cu, Tot	Post-Closure	Nov	117	0.00041	0.00043	0.00193	4	0.00084	0.00079	0.00145	92	0.00073	0.00070	0.00119	49	0.00080	0.00080	0.00096	8	0.00051	0.00051	0.00058	5	0.00068	0.00068	0.00068	2
Cu, Tot	Post-Closure	Dec	117	0.00041	0.00042	0.00184	4	0.00088	0.00083	0.00145	89	0.00040	0.00038	0.00063	53	0.00079	0.00078	0.00095	9	0.00051	0.00051	0.00058	5	0.00069	0.00069	0.00069	3
Fe, Tot	Construction	Jan	2	4.285	4.285	4.951	90	0.180	0.180	0.216	26	0.268	0.268	0.275	-39	0.094	0.094	0.098	3	0.198	0.198	0.212	-6	0.330	0.330	0.331	0
Fe, Tot	Construction	Feb	2	5.216	5.216	5.436	105	0.195	0.195	0.238	29	0.249	0.249	0.302	-59	0.094	0.094	0.099	-1	0.198	0.198	0.211	-8	0.343	0.343	0.344	0
Fe, Tot	Construction	Mar	2	4.858	4.858	4.925	120	0.191	0.191	0.232	28	0.230	0.230	0.279	-65	0.089	0.089	0.095	-6	0.189	0.189	0.201	-11	0.326	0.326	0.327	-1
Fe, Tot	Construction	Apr	2	5.007	5.007	5.025	129	0.183	0.183	0.215	25	0.220	0.220	0.258	-69	0.083	0.083	0.090	-12	0.180	0.180	0.188	-14	0.322	0.322	0.323	-1
Fe, Tot	Construction	May	2	3.510	3.510	3.513	150	0.500	0.500	0.518	177	0.306	0.306	0.315	13	0.078	0.078	0.083	-4	0.187	0.187	0.192	-15	0.298	0.298	0.298	-1
Fe, Tot	Construction	Jun	2	3.856	3.856	3.869	170	0.624	0.624	0.644	212	0.604	0.604	0.618	120	0.123	0.123	0.127	31	0.181	0.181	0.184	-15	0.324	0.324	0.325	0
Fe, Tot	Construction	Jul	2	3.352	3.352	3.366	156	0.430	0.430	0.452	143	0.319	0.319	0.333	62	0.140	0.140	0.144	43	0.179	0.179	0.180	-12	0.324	0.324	0.324	0
Fe, Tot	Construction	Aug	2	2.536	2.536	2.548	133	0.308	0.308	0.328	99	0.169	0.169	0.179	39	0.127	0.127	0.131	39	0.171	0.171	0.172	-10	0.307	0.307	0.308	0
Fe, Tot	Construction	Sep	2	2.164	2.164	2.177	131	0.239	0.239	0.256	71	0.134	0.134	0.142	21	0.116	0.116	0.120	33	0.164	0.164	0.164	-9	0.297	0.297	0.298	0
Fe, Tot	Construction	Oct	2	1.997	1.997	2.010	143	0.197	0.197	0.213	54	0.115	0.115	0.123	4	0.107	0.107	0.111	28	0.156	0.156	0.157	-9	0.293	0.293	0.293	0
Fe, Tot	Construction	Nov	2	4.223	4.223	4.249	78	0.217	0.217	0.237	45	0.238	0.238	0.258	-13	0.114	0.114	0.119	22	0.204	0.204	0.206	-8	0.335	0.335	0.335	0
Fe, Tot	Construction	Dec	2	4.676	4.676	4.710	103	0.217	0.217	0.230	49	0.261	0.261	0.277	-25	0.108	0.108	0.112	17	0.195	0.195	0.197	-10	0.332	0.332	0.332	-1
Fe, Tot	Operations	Jan	5	4.803	4.822	4.868	113	0.221	0.220	0.229	54	0.274	0.272	0.278	-38	0.106	0.105	0.108	16	0.191	0.191	0.194	-9	0.329	0.329	0.329	-1
Fe, Tot	Operations	Feb	5	5.270	5.292	5.339	108	0.232	0.232	0.243	53	0.302	0.302	0.313	-50	0.107	0.106	0.109	12	0.190	0.191	0.193	-10	0.342	0.342	0.342	-1
Fe, Tot	Operations	Mar	5	4.788	4.810	4.859	118	0.209	0.210	0.232	41	0.256	0.256	0.282	-61	0.102	0.101	0.104	7	0.184	0.185	0.187	-12	0.325	0.325	0.326	-1
Fe, Tot	Operations	Apr	5	4.891	4.914	4.967	125	0.194	0.193	0.211	32	0.238	0.237	0.257	-66	0.096	0.095	0.098	2	0.178	0.178	0.180	-14	0.321	0.321	0.322	-1
Fe, Tot	Operations	May	5	3.426	3.440	3.476	145	0.472	0.475	0.496	163	0.291	0.292	0.304	8	0.087	0.086	0.089	6	0.188	0.187	0.189	-14	0.297	0.297	0.297	-1
Fe, Tot	Operations	Jun	5	3.763	3.777	3.816	164	0.578	0.587	0.613	194	0.563	0.569	0.591	107	0.126	0.125	0.129	33	0.184	0.183	0.185	-13	0.324	0.324	0.324	-1
Fe, Tot	Operations	Jul	5	3.258	3.270	3.305	150	0.398	0.408	0.428	130	0.299	0.305	0.318	55	0.140	0.139	0.144	43	0.181	0.180	0.182	-11	0.324	0.323	0.324	0
Fe, Tot	Operations	Aug	5	2.459	2.468	2.497	127	0.284	0.293	0.310	89	0.158	0.162	0.170	33	0.126	0.126	0.130	38	0.173	0.172	0.174	-9	0.307	0.307	0.307	0
Fe, Tot	Operations	Sep	5	2.095	2.103	2.129	125	0.220	0.228	0.242	63	0.126	0.129	0.136	17	0.115	0.115	0.119	33	0.165	0.164	0.167	-7	0.297	0.297	0.297	0
Fe, Tot	Operations	Oct	5	1.937	1.945	1.970	137	0.187	0.193	0.206	51	0.111	0.114	0.120	3	0.106	0.107	0.111	28	0.157	0.157	0.159	-7	0.292	0.292	0.292	0
Fe, Tot	Operations	Nov	5	4.131	4.144	4.189	74	0.213	0.219	0.232	46	0.238	0.244	0.256	-11	0.114	0.114	0.119	23	0.206	0.205	0.208	-6	0.335	0.335	0.335	0
Fe, Tot	Operations	Dec	5	4.561	4.576	4.633	99	0.212	0.216	0.226	48	0.261	0.266	0.276	-24	0.108	0.109	0.113	19	0.197	0.197	0.200	-7	0.332	0.332	0.332	-1
Fe, Tot	Closure	Jan	6	4.866	4.867	4.955	115	0.238	0.238	0.257	67	0.300	0.299	0.323	-31	0.109	0.109	0.115	22	0.194	0.194	0.199	-6	0.330	0.330	0.331	0
Fe, Tot	Closure	Feb	6	5.355	5.356	5.451	110	0.251	0.253	0.270	67	0.334	0.335	0.362	-45	0.110	0.110	0.117	18	0.193	0.193	0.199	-7	0.344	0.343	0.344	0
Fe, Tot	Closure	Mar	6	4.852	4.855	4.938	120	0.246	0.248	0.264	66	0.309	0.311	0.334	-52	0.105	0.106	0.113	14	0.187	0.187	0.193	-9	0.327	0.327	0.328	0
Fe, Tot	Closure	Apr	6	4.957	4.961	5.047	127	0.241	0.243	0.258	66	0.303	0.305	0.328	-57	0.101	0.101	0.108	9	0.181	0.181	0.188	-11	0.323	0.323	0.324	0
Fe, Tot	Closure	May	6	3.446	3.462	3.525	146	0.519	0.527	0.561	192	0.312	0.313	0.332	15	0.091	0.091	0.095	14	0.191	0.192	0.197	-11	0.299	0.299	0.299	0
Fe, Tot	Closure	Jun	6	3.779	3.793	3.870	165	0.659	0.668	0.710	234	0.615	0.623	0.662	127	0.130	0.129	0.136	39	0.187	0.188	0.193	-10	0.325	0.325	0.325	0
Fe, Tot	Closure	Jul	6	3.294	3.308	3.371	153	0.496	0.497	0.524	181	0.362	0.362	0.381	84	0.143	0.144	0.151	48	0.184	0.185	0.189	-8	0.325	0.324	0.325	0
Fe, Tot	Closure	Aug	6	2.521	2.514	2.558	131	0.376	0.376	0.395	143	0.203	0.203	0.212	66	0.131	0.131	0.137	45	0.177	0.177	0.180	-5	0.308	0.308	0.308	0
Fe, Tot	Closure	Sep	6	2.156	2.147	2.184	129	0.298	0.300	0.320	114	0.165	0.165	0.174	48	0.120	0.120	0.125	41	0.169	0.169	0.172	-3	0.298	0.298	0.299	0
Fe, Tot	Closure	Oct	6	1.983	1.979	2.014	141	0.246	0.248	0.269	94	0.144	0.144	0.155	29	0.113	0.113	0.117	37	0.161	0.161	0.164	-2	0.293	0.293	0.294	0
Fe, Tot	Closure	Nov	6	4.172	4.170	4.240	75	0.266	0.268	0.292	79	0.296	0.298	0.329	9	0.122	0.121	0.126	33	0.211	0.211	0.214	-2	0.336	0.336	0.336	0
Fe, Tot	Closure	Dec	6	4.611	4.612	4.707	101	0.252	0.252	0.272	73	0.312	0.315	0.352	-9	0.116	0.116	0.120	29	0.202	0.203	0.207	-3	0.333	0.333	0.333	0
Fe, Tot	Post-Closure	Jan	117	2.369	2.400	4.786	6	0.179	0.181	0.299	26	0.467	0.471	0.580	8	0.091	0.092	0.118	4	0.205	0.205	0.216	1	0.331	0.331	0.331	0
Fe, Tot	Post-Closure	Feb	117	2.663	2.698	5.328	6	0.189	0.191	0.315	26	0.621	0.628	0.782	4	0.095	0.096	0.123	4	0.208	0.208	0.219	1	0.345	0.344	0.345	0
Fe, Tot	Post-Closure	Mar	117	2.305	2.337	4.886	6	0.185	0.187	0.309	26	0.620	0.632	0.825	-3	0.095	0.096	0.122	4	0.205	0.205	0.216	1	0.328	0.328	0.328	0
Fe, Tot	Post-Closure	Apr	117	2.269	2.301	4.978	5	0.181	0.183	0.302	25	0.607	0.626	0.877	-11	0.094	0.095	0.122	4	0.202	0.203	0.214	1	0.324	0.324	0.324	0
Fe, Tot	Post-Closure	May	117	1.470	1.491	3.370	6	0.217	0.218	0.470	21	0.255	0.260	0.315	-4	0.081	0.082	0.102	4	0.213	0.213	0.223	1	0.299	0.299	0.299	0
Fe, Tot	Post-Closure	Jun	117	1.486	1.507	3.555	5	0.241	0.243	0.598	22	0.296	0.299	0.543	9	0.095	0.095	0.124	3	0.208	0.208	0.217	0	0.325	0.325	0.325	0
Fe, Tot	Post-Closure	Jul	117	1.373	1.391	3.183	6	0.215	0.217	0.478	23	0.218	0.220	0.347	11	0.099	0.099	0.134	3	0.199	0.199	0.208	1	0.325	0.325	0.325	0
Fe, Tot	Post-Closure	Aug	117	1.158	1.172	2.513	8	0.191	0.192	0.385	24	0.137	0.138	0.205	13	0.092	0.092	0.123	3	0.185	0.186	0.194	1	0.308	0.308	0.308	0
Fe, Tot	Post-Closure	Sep	117	1.008	1.019	2.153	9	0.174	0.175	0.322	25	0.125	0.126	0.174	13	0.087	0.087	0.114	4	0.174	0.174	0.182	1	0.299	0.299	0.299	0
Fe, Tot	Post-Closure	Oct	117	0.893	0.903	1.876	10	0.161	0.161	0.277	26	0.125	0.125	0.163	13	0.084	0.084	0.108	4	0.164	0.165	0.173	1	0.294	0.294	0.294	0
Fe, Tot	Post-Closure	Nov	117	2.503	2.515	3.699	6	0.188	0.189	0.319	26	0.309	0.311	0.398	13	0.093	0.094	0.121	4	0.215	0.216	0.226	1	0.336	0.336	0.336	0
Fe, Tot	Post-Closure	Dec	117	2.419	2.430	3.540	6	0.183	0.184	0.307	26	0.386	0.389	0.488	12	0.092	0.092	0.119	4	0.209	0.210	0.220	1	0.334	0.333	0.334	0
Pb, Diss	Construction	Jan	2	0.000112	0.000112	0.000153	332	0.000058	0.000058	0.000088	293	0.000009	0.000009	0.000013	4	0.000031	0.000031	0.000033	-7	0.000019	0.000019	0.000020	-6	0.000051	0.000051	0.000051	0
Pb, Diss	Construction	Feb	2	0.000126	0.000126	0.000143	322	0.000065	0.000065	0.000089	303	0.000008	0.000008	0.000011	-25	0.000030	0.000030	0.000032	-13	0.000019	0.000019	0.000020	-7	0.000054	0.000054	0.000054	0
Pb, Diss	Construction	Mar	2	0.000108	0.000108	0.000113	310	0.000063	0.000063	0.000082	284	0.000007	0.000007	0.000010	-30	0.000028	0.000028	0.000029	-19	0.000019	0.000019	0.000020	-7	0.000051	0.000051	0.000051	0
Pb, Diss	Construction	Apr	2	0.000104	0.000104	0.000106	297	0.000061	0.000061	0.000076	267	0.000007	0.000007	0.000008	-38	0.000025	0.000025	0.000025	-26	0.000019	0.000019	0.000020	-9	0.000051	0.000051	0.000051	0
Pb, Diss	Construction	May	2	0.000078	0.000078	0.000079	400	0.000050	0.000050	0.000059	322	0.000022	0.000022	0.000025	21	0.000020	0.000020	0.000020	-27	0.000017	0.000017	0.000018	-9	0.000044	0.000044	0.000044	0
Pb, Diss	Construction	Jun	2	0.000106	0.000106	0.000108	615	0.000059	0.000059	0.000066	396	0.000040	0.000040	0.000044	70	0.000021	0.000021	0.000022	-22	0.000020	0.000020	0.000021	-8	0.000044	0.000044	0.000044	0
Pb, Diss	Construction	Jul	2	0.000132	0.000132	0.000134	728	0.000066	0.000066	0.000072	458	0.000057	0.000057	0.000061	76	0.000026	0.000026	0.000026	-12	0.000020	0.000020	0.000020	-10	0.000044	0.000044	0.000044	0
Pb, Diss	Construction	Aug	2	0.000148	0.000148	0.000150	750	0.000071	0.000071	0.000075	500	0.000067	0.000067	0.000071	83	0.000032	0.000032	0.000033	1	0.000018	0.000018	0.000019	-11	0.000044	0.000044	0.000044	0
Pb, Diss	Construction	Sep	2	0.000159	0.000159	0.000162	783	0.000074	0.000074	0.000078	537	0.000036	0.000036	0.000038	45	0.000035	0.000035	0.000036	5	0.000017	0.000017	0.000018	-12	0.000044	0.000044	0.000044	0
Pb, Diss	Construction	Oct	2	0.000167	0.000167	0.000170	826	0.000077	0.000077	0.000080	572	0.000019	0.000019	0.000020	46	0.000033	0.000033	0.000034	2	0.000016	0.000016	0.000016	-13	0.000044	0.000044	0.000044	0
Pb, Diss	Construction	Nov	2	0.000212	0.000212	0.000216	730	0.000094	0.000094	0.000096	561	0.000020	0.000020	0.000021	42	0.000035	0.000035	0.000036	-2	0.000018	0.000018	0.000018	-13	0.000051	0.000051	0.000051	0
Pb, Diss	Construction	Dec	2	0.000173	0.000173	0.000176	576	0.000091	0.000091	0.000092	530	0.000014	0.000014	0.000015	60	0.000032	0.000032	0.000034	-6	0.000018	0.000018	0.000018	-12	0.000051	0.000051	0.000051	0
Pb, Diss	Operations	Jan	5	0.000139	0.000141	0.000146	447	0.000083	0.000084	0.000088	470	0.000012	0.000012	0.000013	36	0.000033	0.000032	0.000033	-5	0.000018	0.000018	0.000018	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Operations	Feb	5	0.000130	0.000132	0.000136	343	0.000082	0.000084	0.000088	416	0.000011	0.000011	0.000011	-1	0.000032	0.000032	0.000032	-9	0.000019	0.000019	0.000019	-10	0.000054	0.000054	0.000054	0
Pb, Diss	Operations	Mar	5	0.000104	0.000105	0.000109	301	0.000076	0.000078	0.000080	371	0.000009	0.000009	0.000010	-14	0.000030	0.000030	0.000030	-14	0.000019	0.000018	0.000019	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Operations	Apr	5	0.000097	0.000099	0.000102	276	0.000073	0.000073	0.000074	336	0.000008	0.000008	0.000008	-26	0.000028	0.000028	0.000028	-20	0.000018	0.000018	0.000018	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Operations	May	5	0.000072	0.000073	0.000076	368	0.000056	0.000056	0.000058	374	0.000024	0.000024	0.000024	30	0.000022	0.000022	0.000022	-21	0.000017	0.000017	0.000017	-9	0.000044	0.000044	0.000044	0
Pb, Diss	Operations	Jun	5	0.000098	0.000099	0.000103	566	0.000063	0.000063	0.000065	436	0.000042	0.000043	0.000043	82	0.000023	0.000023	0.000023	-17	0.000020	0.000020	0.000020	-8	0.000044	0.000044	0.000044	0
Pb, Diss	Operations	Jul	5	0.000121	0.000122	0.000127	669	0.000070	0.000070	0.000072	494	0.000060	0.000060	0.000060	85	0.000027	0.000027	0.000028	-7	0.000020	0.000020	0.000020	-9	0.000044	0.000044	0.000044	0
Pb, Diss	Operations	Aug	5	0.000135	0.000137	0.000142	690	0.000074	0.000074	0.000076	531	0.000070	0.000070	0.000071	91	0.000034	0.000034	0.000034	4	0.000019	0.000019	0.000019	-10	0.000044	0.000044	0.000044	0
Pb, Diss	Operations	Sep	5	0.000146	0.000148	0.000153	721	0.000077	0.000077	0.000078	559	0.000037	0.000037	0.000038	52	0.000037	0.000036	0.000037	9	0.000018	0.000018	0.000018	-10	0.000044	0.000044	0.000044	0
Pb, Diss	Operations	Oct	5	0.000154	0.000155	0.000161	763	0.000078	0.000077	0.000078	572	0.000019	0.000019	0.000020	51	0.000034	0.000034	0.000035	6	0.000017	0.000017	0.000017	-11	0.000044	0.000044	0.000044	0
Pb, Diss	Operations	Nov	5	0.000195	0.000197	0.000204	672	0.000091	0.000092	0.000093	544	0.000020	0.000020	0.000020	44	0.000037	0.000037	0.000037	3	0.000018	0.000018	0.000018	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Operations	Dec	5	0.000159	0.000160	0.000166	528	0.000086	0.000087	0.000089	503	0.000014	0.000014	0.000014	57	0.000035	0.000035	0.000035	-1	0.000018	0.000018	0.000018	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Closure	Jan	6	0.000147	0.000147	0.000155	468	0.000082	0.000083	0.000089	461	0.000012	0.000012	0.000013	36	0.000031	0.000032	0.000033	-9	0.000018	0.000018	0.000018	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Closure	Feb	6	0.000138	0.000138	0.000146	363	0.000082	0.000082	0.000089	410	0.000011	0.000011	0.000012	0	0.000031	0.000031	0.000033	-14	0.000018	0.000018	0.000019	-10	0.000054	0.000054	0.000054	0
Pb, Diss	Closure	Mar	6	0.000111	0.000110	0.000116	319	0.000075	0.000076	0.000082	360	0.000009	0.000009	0.000010	-13	0.000029	0.000029	0.000031	-18	0.000018	0.000018	0.000019	-11	0.000051	0.000051	0.000051	0
Pb, Diss	Closure	Apr	6	0.000105	0.000103	0.000109	294	0.000070	0.000070	0.000076	319	0.000008	0.000008	0.000009	-26	0.000027	0.000027	0.000029	-22	0.000018	0.000018	0.000018	-11	0.000051	0.000051	0.000051	0
Pb, Diss	Closure	May	6	0.000077	0.000076	0.000080	387	0.000051	0.000052	0.000055	336	0.000022	0.000022	0.000023	22	0.000022	0.000022	0.000023	-23	0.000017	0.000017	0.000017	-10	0.000044	0.000044	0.000044	0
Pb, Diss	Closure	Jun	6	0.000102	0.000102	0.000108	588	0.000056	0.000056	0.000060	375	0.000039	0.000039	0.000042	68	0.000023	0.000023	0.000024	-19	0.000020	0.000020	0.000020	-8	0.000044	0.000044	0.000044	0
Pb, Diss	Closure	Jul	6	0.000126	0.000127	0.000134	696	0.000062	0.000062	0.000067	424	0.000054	0.000054	0.000058	69	0.000027	0.000027	0.000028	-11	0.000020	0.000020	0.000020	-9	0.000044	0.000044	0.000044	0
Pb, Diss	Closure	Aug	6	0.000141	0.000142	0.000150	718	0.000065	0.000066	0.000072	463	0.000064	0.000064	0.000069	75	0.000033	0.000033	0.000034	-1	0.000019	0.000019	0.000019	-10	0.000044	0.000044	0.000044	0
Pb, Diss	Closure	Sep	6	0.000153	0.000153	0.000162	752	0.000069	0.000070	0.000075	497	0.000036	0.000036	0.000038	47	0.000035	0.000035	0.000036	3	0.000018	0.000018	0.000018	-10	0.000044	0.000044	0.000044	0
Pb, Diss	Closure	Oct	6	0.000161	0.000161	0.000170	797	0.000071	0.000072	0.000078	527	0.000019	0.000019	0.000020	45	0.000033	0.000033	0.000034	1	0.000016	0.000016	0.000017	-11	0.000044	0.000044	0.000044	0
Pb, Diss	Closure	Nov	6	0.000209	0.000207	0.000217	711	0.000088	0.000088	0.000094	521	0.000020	0.000020	0.000021	41	0.000036	0.000036	0.000036	-2	0.000018	0.000018	0.000018	-11	0.000051	0.000051	0.000051	0
Pb, Diss	Closure	Dec	6	0.000175	0.000171	0.000178	569	0.000086	0.000086	0.000091	496	0.000014	0.000014	0.000015	57	0.000033	0.000033	0.000035	-6	0.000018	0.000018	0.000018	-10	0.000051	0.000051	0.000051	0
Pb, Diss	Post-Closure	Jan	117	0.000025	0.000028	0.000158	7	0.000036	0.000035	0.000086	140	0.000011	0.000011	0.000015	26	0.000037	0.000037	0.000038	5	0.000021	0.000021	0.000021	2	0.000052	0.000052	0.000052	2
Pb, Diss	Post-Closure	Feb	117	0.000029	0.000031	0.000167	5	0.000040	0.000039	0.000088	139	0.000013	0.000013	0.000017	19	0.000038	0.000038	0.000039	5	0.000021	0.000021	0.000021	3	0.000055	0.000055	0.000055	2
Pb, Diss	Post-Closure	Mar	117	0.000025	0.000027	0.000142	5	0.000041	0.000040	0.000082	143	0.000012	0.000012	0.000016	11	0.000038	0.000038	0.000038	4	0.000021	0.000021	0.000021	3	0.000052	0.000052	0.000052	2
Pb, Diss	Post-Closure	Apr	117	0.000025	0.000027	0.000137	4	0.000043	0.000041	0.000077	147	0.000011	0.000011	0.000016	2	0.000037	0.000037	0.000038	4	0.000021	0.000021	0.000021	3	0.000052	0.000052	0.000052	2
Pb, Diss	Post-Closure	May	117	0.000015	0.000017	0.000076	5	0.000030	0.000029	0.000055	144	0.000019	0.000019	0.000022	4	0.000030	0.000030	0.000031	4	0.000019	0.000019	0.000019	2	0.000045	0.000045	0.000045	2
Pb, Diss	Post-Closure	Jun	117	0.000015	0.000016	0.000094	7	0.000029	0.000028	0.000056	137	0.000030	0.000029	0.000040	26	0.000029	0.000029	0.000030	4	0.000022	0.000022	0.000022	2	0.000045	0.000045	0.000045	2
Pb, Diss	Post-Closure	Jul	117	0.000016	0.000017	0.000113	6	0.000029	0.000028	0.000060	133	0.000040	0.000040	0.000054	25	0.000032	0.000032	0.000032	4	0.000023	0.000023	0.000023	2	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Aug	117	0.000017	0.000018	0.000126	4	0.000028	0.000027	0.000062	130	0.000046	0.000046	0.000062	25	0.000035	0.000035	0.000036	4	0.000021	0.000021	0.000021	2	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Sep	117	0.000018	0.000019	0.000136	4	0.000028	0.000027	0.000064	132	0.000031	0.000031	0.000037	26	0.000036	0.000036	0.000037	4	0.000020	0.000020	0.000020	2	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Oct	117	0.000018	0.000019	0.000129	4	0.000028	0.000027	0.000062	137	0.000017	0.000017	0.000020	28	0.000035	0.000035	0.000035	5	0.000019	0.000019	0.000019	2	0.000045	0.000045	0.000045	1
Pb, Diss	Post-Closure	Nov	117	0.000025	0.000027	0.000165	4	0.000035	0.000034	0.000071	139	0.000018	0.000018	0.000024	32	0.000039	0.000039	0.000039	5	0.000021	0.000021	0.000021	2	0.000052	0.000052	0.000052	1
Pb, Diss	Post-Closure	Dec	117	0.000025	0.000026	0.000157	3	0.000036	0.000034	0.000069	138	0.000012	0.000012	0.000017	33	0.000038	0.000038	0.000038	5	0.000021	0.000021	0.000021	3	0.000052	0.000052	0.000052	1

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake				West Farley Lake				East Farley Lake				Swede Lake				Ellystan Lake				Susan Lake last one			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Pb, Tot	Construction	Jan	2	0.000359	0.000359	0.000429	94	0.000092	0.000092	0.000118	29	0.000015	0.000015	0.000017	-8	0.000077	0.000077	0.000081	-6	0.000086	0.000086	0.000099	-13	0.000443	0.000443	0.000444	0
Pb, Tot	Construction	Feb	2	0.000394	0.000394	0.000419	89	0.000082	0.000082	0.000106	10	0.000011	0.000011	0.000014	-41	0.000075	0.000075	0.000078	-12	0.000086	0.000086	0.000099	-14	0.000459	0.000459	0.000460	-1
Pb, Tot	Construction	Mar	2	0.000345	0.000345	0.000352	92	0.000069	0.000069	0.000089	-5	0.000008	0.000008	0.000011	-49	0.000068	0.000068	0.000069	-19	0.000083	0.000083	0.000094	-16	0.000435	0.000435	0.000437	-1
Pb, Tot	Construction	Apr	2	0.000347	0.000347	0.000349	97	0.000062	0.000062	0.000077	-13	0.000007	0.000007	0.000009	-57	0.000061	0.000061	0.000061	-26	0.000078	0.000078	0.000088	-20	0.000428	0.000428	0.000430	-1
Pb, Tot	Construction	May	2	0.000224	0.000224	0.000224	107	0.000117	0.000117	0.000129	128	0.000064	0.000064	0.000067	2	0.000059	0.000059	0.000059	-24	0.000079	0.000079	0.000087	-19	0.000416	0.000416	0.000417	-1
Pb, Tot	Construction	Jun	2	0.000232	0.000232	0.000234	130	0.000219	0.000219	0.000232	280	0.000138	0.000138	0.000145	76	0.000080	0.000080	0.000081	-15	0.000116	0.000116	0.000121	-14	0.000474	0.000474	0.000475	0
Pb, Tot	Construction	Jul	2	0.000366	0.000366	0.000370	197	0.000301	0.000301	0.000315	364	0.000221	0.000221	0.000229	172	0.000088	0.000088	0.000089	-7	0.000114	0.000114	0.000117	-15	0.000481	0.000481	0.000482	0
Pb, Tot	Construction	Aug	2	0.000517	0.000517	0.000524	224	0.000382	0.000382	0.000393	408	0.000302	0.000302	0.000309	269	0.000090	0.000090	0.000091	2	0.000098	0.000098	0.000101	-18	0.000457	0.000457	0.000458	0
Pb, Tot	Construction	Sep	2	0.000502	0.000502	0.000508	210	0.000339	0.000339	0.000352	351	0.000163	0.000163	0.000169	203	0.000091	0.000091	0.000092	9	0.000085	0.000085	0.000087	-20	0.000429	0.000429	0.000430	0
Pb, Tot	Construction	Oct	2	0.000434	0.000434	0.000439	196	0.000232	0.000232	0.000246	246	0.000062	0.000062	0.000066	131	0.000084	0.000084	0.000085	7	0.000076	0.000076	0.000077	-22	0.000402	0.000402	0.000402	-1
Pb, Tot	Construction	Nov	2	0.000532	0.000532	0.000538	171	0.000203	0.000203	0.000220	164	0.000047	0.000047	0.000051	56	0.000088	0.000088	0.000090	2	0.000079	0.000079	0.000080	-23	0.000450	0.000450	0.000451	-1
Pb, Tot	Construction	Dec	2	0.000458	0.000458	0.000464	142	0.000155	0.000155	0.000167	110	0.000026	0.000026	0.000028	38	0.000081	0.000081	0.000083	-3	0.000076	0.000076	0.000077	-24	0.000445	0.000445	0.000446	-1
Pb, Tot	Operations	Jan	5	0.000406	0.000410	0.000418	121	0.000131	0.000131	0.000132	84	0.000020	0.000020	0.000020	21	0.000079	0.000079	0.000080	-2	0.000073	0.000073	0.000074	-24	0.000441	0.000440	0.000441	-1
Pb, Tot	Operations	Feb	5	0.000397	0.000400	0.000408	92	0.000112	0.000113	0.000114	51	0.000015	0.000015	0.000015	-17	0.000078	0.000078	0.000079	-7	0.000074	0.000074	0.000074	-25	0.000457	0.000457	0.000457	-1
Pb, Tot	Operations	Mar	5	0.000335	0.000337	0.000345	88	0.000090	0.000090	0.000093	23	0.000011	0.000011	0.000011	-34	0.000072	0.000072	0.000072	-13	0.000072	0.000071	0.000072	-26	0.000434	0.000434	0.000434	-1
Pb, Tot	Operations	Apr	5	0.000332	0.000335	0.000343	90	0.000076	0.000077	0.000079	8	0.000009	0.000009	0.000009	-46	0.000065	0.000065	0.000066	-20	0.000069	0.000069	0.000069	-28	0.000427	0.000427	0.000427	-1
Pb, Tot	Operations	May	5	0.000213	0.000215	0.000220	99	0.000123	0.000124	0.000127	141	0.000066	0.000066	0.000067	5	0.000063	0.000063	0.000063	-19	0.000073	0.000073	0.000073	-24	0.000415	0.000415	0.000415	-1
Pb, Tot	Operations	Jun	5	0.000221	0.000223	0.000227	120	0.000226	0.000226	0.000230	293	0.000141	0.000141	0.000143	80	0.000084	0.000083	0.000084	-10	0.000111	0.000112	0.000112	-16	0.000473	0.000473	0.000473	-1
Pb, Tot	Operations	Jul	5	0.000350	0.000352	0.000359	185	0.000311	0.000310	0.000316	379	0.000226	0.000226	0.000230	178	0.000091	0.000091	0.000091	-4	0.000111	0.000111	0.000111	-16	0.000480	0.000480	0.000480	-1
Pb, Tot	Operations	Aug	5	0.000495	0.000498	0.000508	211	0.000390	0.000389	0.000396	418	0.000308	0.000307	0.000313	274	0.000092	0.000092	0.000093	5	0.000095	0.000095	0.000096	-18	0.000456	0.000456	0.000456	-1
Pb, Tot	Operations	Sep	5	0.000478	0.000481	0.000492	197	0.000347	0.000347	0.000352	362	0.000167	0.000167	0.000169	211	0.000092	0.000092	0.000093	13	0.000083	0.000083	0.000084	-20	0.000429	0.000429	0.000429	-1
Pb, Tot	Operations	Oct	5	0.000413	0.000416	0.000425	184	0.000243	0.000245	0.000248	265	0.000065	0.000066	0.000067	144	0.000086	0.000086	0.000086	11	0.000074	0.000075	0.000075	-22	0.000401	0.000401	0.000402	-1
Pb, Tot	Operations	Nov	5	0.000506	0.000509	0.000521	160	0.000219	0.000220	0.000224	186	0.000052	0.000052	0.000053	73	0.000091	0.000091	0.000091	8	0.000078	0.000078	0.000079	-22	0.000450	0.000450	0.000450	-1
Pb, Tot	Operations	Dec	5	0.000436	0.000439	0.000448	132	0.000166	0.000167	0.000169	126	0.000028	0.000028	0.000028	51	0.000085	0.000085	0.000085	3	0.000076	0.000076	0.000076	-23	0.000445	0.000445	0.000445	-1
Pb, Tot	Closure	Jan	6	0.000420	0.000420	0.000433	126	0.000131	0.000133	0.000143	86	0.000020	0.000020	0.000022	23	0.000074	0.000074	0.000080	-6	0.000072	0.000072	0.000075	-23	0.000443	0.000443	0.000445	0
Pb, Tot	Closure	Feb	6	0.000413	0.000411	0.000426	93	0.000114	0.000115	0.000126	54	0.000015	0.000015	0.000017	-14	0.000072	0.000073	0.000079	-11	0.000072	0.000072	0.000075	-24	0.000460	0.000460	0.000462	0
Pb, Tot	Closure	Mar	6	0.000348	0.000346	0.000358	93	0.000094	0.000095	0.000104	30	0.000011	0.000012	0.000013	-29	0.000067	0.000068	0.000074	-16	0.000069	0.000070	0.000072	-26	0.000437	0.000437	0.000439	0
Pb, Tot	Closure	Apr	6	0.000347	0.000344	0.000354	95	0.000080	0.000081	0.000089	15	0.000009	0.000010	0.000011	-41	0.000062	0.000063	0.000069	-21	0.000067	0.000068	0.000070	-27	0.000431	0.000430	0.000432	0
Pb, Tot	Closure	May	6	0.000222	0.000220	0.000226	104	0.000111	0.000112	0.000118	116	0.000062	0.000062	0.000064	-1	0.000060	0.000061	0.000065	-19	0.000072	0.000072	0.000074	-23	0.000418	0.000417	0.000418	0
Pb, Tot	Closure	Jun	6	0.000228	0.000227	0.000234	125	0.000191	0.000194	0.000208	238	0.000123	0.000125	0.000132	59	0.000081	0.000081	0.000084	-12	0.000111	0.000111	0.000113	-15	0.000475	0.000475	0.000476	0
Pb, Tot	Closure	Jul	6	0.000355	0.000356	0.000369	189	0.000264	0.000271	0.000291	318	0.000189	0.000192	0.000206	137	0.000087	0.000087	0.000089	-7	0.000110	0.000110	0.000112	-15	0.000482	0.000481	0.000482	0
Pb, Tot	Closure	Aug	6	0.000504	0.000503	0.000521	215	0.000347	0.000353	0.000378	370	0.000264	0.000267	0.000287	226	0.000086	0.000086	0.000087	0	0.000094	0.000095	0.000097	-17	0.000458	0.000458	0.000459	0
Pb, Tot	Closure	Sep	6	0.000489	0.000490	0.000507	203	0.000325	0.000331	0.000352	340	0.000154	0.000156	0.000166	192	0.000085	0.000085	0.000086	6	0.000082	0.000083	0.000085	-18	0.000431	0.000430	0.000431	0
Pb, Tot	Closure	Oct	6	0.000427	0.000426	0.000439	191	0.000242	0.000242	0.000257	261	0.000065	0.000065	0.000069	141	0.000079	0.000079	0.000080	5	0.000073	0.000074	0.000076	-20	0.000404	0.000403	0.000404	0
Pb, Tot	Closure	Nov	6	0.000531	0.000526	0.000540	169	0.000222	0.000222	0.000236	189	0.000052	0.000053	0.000057	74	0.000084	0.000084	0.000086	2	0.000077	0.000077	0.000080	-21	0.000453	0.000452	0.000453	0
Pb, Tot	Closure	Dec	6	0.000464	0.000457	0.000467	131	0.000169	0.000171	0.000189	132	0.000028	0.000029	0.000032	55	0.000079	0.000078	0.000080	-2	0.000074	0.000075	0.000077	-22	0.000448	0.000448	0.000449	0
Pb, Tot	Post-Closure	Jan	117	0.000185	0.000189	0.000456	2	0.000107	0.000106	0.000246	48	0.000021	0.000021	0.000038	26	0.000079	0.000079	0.000084	3	0.000093	0.000092	0.000095	0	0.000446	0.000445	0.000446	0
Pb, Tot	Post-Closure	Feb	117	0.000207	0.000212	0.000504	2	0.000111	0.000110	0.000257	47	0.000021	0.000021	0.000038	20	0.000082	0.000082	0.000087	2	0.000094	0.000094	0.000096	0	0.000463	0.000463	0.000463	0
Pb, Tot	Post-Closure	Mar	117	0.000178	0.000182	0.000429	2	0.000107	0.000106	0.000249	45	0.000019	0.000019	0.000033	15	0.000081	0.000081	0.000086	2	0.000093	0.000093	0.000095	0	0.000440	0.000439	0.000440	0
Pb, Tot	Post-Closure	Apr	117	0.000175	0.000178	0.000414	1	0.000102	0.000102	0.000242	43	0.000017	0.000017	0.000031	7	0.000079	0.000079	0.000084	2	0.000091	0.000091	0.000094	0	0.000433	0.000433	0.000433	0
Pb, Tot	Post-Closure	May	117	0.000107	0.000109	0.000228	1	0.000077	0.000076	0.000160	48	0.000063	0.000063	0.000071	1	0.000075	0.000075	0.000080	1	0.000092	0.000092	0.000095	0	0.000419	0.000419	0.000419	0
Pb, Tot	Post-Closure	Jun	117	0.000100	0.000102	0.000222	1	0.000087	0.000086	0.000174	50	0.000089	0.000089	0.000115	13	0.000092	0.000092	0.000096	1	0.000130	0.000130	0.000132	0	0.000477	0.000477	0.000477	0
Pb, Tot	Post-Closure	Jul	117	0.000120	0.000123	0.000318	-1	0.000099	0.000098	0.000234	51	0.000096	0.000096	0.000163	18	0.000093	0.000094	0.000097	2	0.000129	0.000129	0.000131	0	0.000483	0.000483	0.000483	0
Pb, Tot	Post-Closure	Aug	117	0.000154	0.000157	0.000438	-2	0.000113	0.000112	0.000297	49	0.000101	0.000101	0.000216	23	0.000086	0.000086	0.000090	2	0.000114	0.000114	0.000116	0	0.000459	0.000459	0.000459	0
Pb, Tot	Post-Closure	Sep	117	0.000158	0.000160	0.000443	-1	0.000113	0.000111	0.000289	48	0.000067	0.000067	0.000136	25	0.000081	0.000081	0.000084	2	0.000101	0.000101	0.000103	0	0.000432	0.000432	0.000432	0
Pb, Tot	Post-Closure	Oct	117	0.000145	0.000147	0.000385	0	0.000101	0.000100	0.000237	49	0.000034	0.000034	0.000064	27	0.000076	0.000076	0.000079	3	0.000091	0.000091	0.000093	1	0.000405	0.000405	0.000405	0
Pb, Tot	Post-Closure	Nov	117	0.000195	0.000198	0.000498	1	0.000116	0.000114	0.000268	49	0.000039	0.000039	0.000073	28	0.000083	0.000083	0.000087	3	0.000097	0.000097	0.000099	1	0.000454	0.000454	0.000454	0
Pb, Tot	Post-Closure	Dec	117	0.000189	0.000191	0.000473	1	0.000110	0.000109	0.000255	48	0.000024	0.000024	0.000046	29	0.000081	0.000081	0.000085	3	0.000094	0.000094	0.000097	1	0.000450	0.000449	0.000450	0
Mn, Diss	Construction	Jan	2	0.655	0.655	0.821	-29	0.487	0.487	0.507	55	0.480	0.480	0.494	16	0.016	0.016	0.020	29	0.074	0.074	0.080	-7	0.049	0.049	0.049	0
Mn, Diss	Construction	Feb	2	0.599	0.599	0.688	-41	0.626	0.626	0.758	83	0.629	0.629	0.738	58	0.017	0.017	0.021	30	0.073	0.073	0.079	-10	0.051	0.051	0.051	0
Mn, Diss	Construction	Mar	2	0.488	0.488	0.522	-44	0.639	0.639	0.803	85	0.632	0.632	0.790	85	0.017	0.017	0.020	32	0.069	0.069	0.074	-13	0.049	0.049	0.049	0
Mn, Diss	Construction	Apr	2	0.473	0.473	0.487	-44	0.612	0.612	0.767	77	0.613	0.613	0.772	90	0.018	0.018	0.019	35	0.064	0.064	0.068	-18	0.049	0.049	0.049	0
Mn, Diss	Construction	May	2	0.360	0.360	0.364	-28	0.324	0.324	0.391	49	0.091	0.091	0.112	56	0.018	0.018	0.018	59	0.051	0.051	0.053	-21	0.047	0.047	0.047	0
Mn, Diss	Construction	Jun	2	0.418	0.418	0.420	-11	0.280	0.280	0.324	40	0.169	0.169	0.199	95	0.023	0.023	0.025	65	0.046	0.046	0.048	-21	0.053	0.053	0.053	0
Mn, Diss	Construction	Jul	2	0.310	0.310	0.311	-22	0.328	0.328	0.370	60	0.255	0.255	0.291	119	0.027	0.027	0.029	76	0.043	0.043	0.045	-20	0.053	0.053	0.053	0
Mn, Diss	Construction	Aug	2	0.154	0.154	0.155	-48	0.326	0.326	0.369	63	0.270	0.270	0.305	128	0.023	0.023	0.025	72	0.039	0.039	0.041	-18	0.049	0.049	0.049	0
Mn, Diss	Construction	Sep	2	0.081	0.081	0.081	-65	0.316	0.316	0.354	61	0.269	0.269	0.303	120	0.021	0.021	0.022	67	0.036	0.036	0.037	-17	0.045	0.045	0.046	0
Mn, Diss	Construction	Oct	2	0.044	0.044	0.044	-76	0.300	0.300	0.336	60	0.265	0.265	0.299	109	0.018	0.018	0.020	60	0.033	0.033	0.034	-17	0.043	0.043	0.043	0
Mn, Diss	Construction	Nov	2	0.611	0.611	0.612	-39	0.426	0.426	0.460	46	0.506	0.506	0.537	2	0.020	0.020	0.021	54	0.076	0.076	0.078	-11	0.049	0.049	0.049	0
Mn, Diss	Construction	Dec	2	0.521	0.521	0.524	-46	0.447	0.447	0.466	45	0.543	0.543	0.562	-20	0.019	0.019	0.021	51	0.071	0.071	0.072	-13	0.049	0.049	0.049	0
Mn, Diss	Operations	Jan	5	0.476	0.478	0.481	-48	0.431	0.434	0.442	38	0.428	0.430	0.438	4	0.016	0.017	0.017	31	0.065	0.066	0.066	-17	0.049	0.049	0.049	0
Mn, Diss	Operations	Feb	5	0.495	0.497	0.502	-51	0.460	0.464	0.475	35	0.483	0.486	0.498	22	0.017	0.017	0.018	29	0.064	0.064	0.065	-19	0.051	0.051	0.051	0
Mn, Diss	Operations	Mar	5	0.439	0.441	0.446	-49	0.448	0.452	0.463	31	0.446	0.449	0.460	31	0.017	0.017	0.018	28	0.061	0.061	0.062	-22	0.049	0.049	0.049	0
Mn, Diss	Operations	Apr	5	0.445	0.447	0.451	-47	0.440	0.443	0.449	28	0.436	0.439	0.445	36	0.016	0.016	0.017	26	0.058	0.058	0.059	-25	0.049	0.049	0.049	0
Mn, Diss	Operations	May	5	0.348	0.349	0.352	-30	0.249	0.249	0.253	15	0.068	0.068	0.069	16	0.016	0.016	0.016	38	0.046	0.046	0.047	-27	0.047	0.047	0.047	0
Mn, Diss	Operations	Jun	5	0.407	0.409	0.412	-12	0.229	0.230	0.233	15	0.137	0.137	0.138	58	0.020	0.020	0.020	41	0.042	0.042	0.043	-27	0.053	0.053	0.053	0
Mn, Diss	Operations	Jul	5	0.301	0.302	0.305	-24	0.282	0.282	0.285	37	0.215	0.215	0.216	84	0.023	0.023	0.023	48	0.040	0.040	0.040	-25	0.053	0.053	0.053	0
Mn, Diss	Operations	Aug	5	0.149	0.149	0.151	-49	0.288	0.288	0.290	42	0.233	0.233	0.235	97	0.020	0.020	0.020	45	0.036	0.036	0.036	-24	0.049	0.049	0.049	0
Mn, Diss	Operations	Sep	5	0.077	0.078	0.078	-66	0.279	0.279	0.280	42	0.235	0.234	0.236	92	0.017	0.017	0.018	42	0.032	0.032	0.033	-24	0.045	0.045	0.045	0
Mn, Diss	Operations	Oct	5	0.042	0.042	0.043	-77	0.263	0.263	0.264	40	0.231	0.230	0.232	81	0.015	0.016	0.016	37	0.030	0.030	0.030	-23	0.043	0.043	0.043	0
Mn, Diss	Operations	Nov	5	0.609	0.610	0.612	-39	0.388	0.388	0.390	32	0.475	0.475	0.478	-5	0.017	0.017	0.017	34	0.073	0.073	0.074	-13	0.049	0.049	0.049	0
Mn, Diss	Operations	Dec	5	0.513	0.514	0.518	-46	0.418	0.419	0.422	36	0.524	0.524	0.526	-23	0.017	0.017	0.017	32	0.069	0.069	0.070	-15	0.049	0.049	0.049	0
Mn, Diss	Closure	Jan	6	0.482	0.482	0.489	-48	0.434	0.436	0.443	39	0.430	0.431	0.438	4	0.016	0.016	0.016	28	0.065	0.065	0.066	-17	0.049	0.049	0.049	0
Mn, Diss	Closure	Feb	6	0.504	0.503	0.510	-51	0.470	0.471	0.480	37	0.491	0.493	0.502	24	0.016	0.016	0.017	26	0.063	0.063	0.065	-20	0.051	0.051	0.051	0
Mn, Diss	Closure	Mar	6	0.445	0.445	0.451	-49	0.463	0.464	0.473	34	0.460	0.461	0.470	35	0.016	0.016	0.016	25	0.060	0.060	0.061	-22	0.049	0.049	0.049	0
Mn, Diss	Closure	Apr	6	0.450	0.450	0.456	-47	0.455	0.456	0.465	32	0.450	0.451	0.459	39	0.016	0.016	0.016	24	0.057	0.057	0.058	-25	0.049	0.049	0.049	0
Mn, Diss	Closure	May	6	0.350	0.350	0.355	-30	0.263	0.264	0.273	21	0.070	0.070	0.072	20	0.015	0.015	0.015	36	0.046	0.046	0.047	-26	0.047	0.047	0.047	0
Mn, Diss	Closure	Jun	6	0.408	0.410	0.414	-12	0.238	0.239	0.244	19	0.136	0.136	0.139	57	0.019	0.019	0.020	38	0.043	0.043	0.043	-26	0.053	0.053	0.053	0
Mn, Diss	Closure	Jul	6	0.307	0.307	0.315	-23	0.281	0.282	0.288	37	0.207	0.207	0.214	78	0.022	0.022	0.022	44	0.040	0.040	0.040	-24	0.053	0.053	0.053	0
Mn, Diss	Closure	Aug	6	0.154	0.156	0.172	-47	0.282	0.284	0.290	40	0.222	0.222	0.229	87	0.019	0.019	0.019	42	0.036	0.036	0.036	-23	0.049	0.049	0.049	0
Mn, Diss	Closure	Sep	6	0.081	0.084	0.099	-64	0.270	0.271	0.276	38	0.222	0.222	0.228	82	0.017	0.017	0.017	39	0.032	0.032	0.033	-22	0.046	0.046	0.046	0
Mn, Diss	Closure	Oct	6	0.045	0.047	0.059	-75	0.254	0.254	0.259	36	0.218	0.219	0.224	73	0.015	0.015	0.015	35	0.029	0.030	0.030	-22	0.043	0.043	0.043	0
Mn, Diss	Closure	Nov	6	0.608	0.615	0.652	-39	0.382	0.382	0.387	31	0.468	0.469	0.485	-6	0.016	0.016	0.016	31	0.073	0.073	0.074	-12	0.049	0.049	0.049	0
Mn, Diss	Closure	Dec	6	0.521	0.524	0.555	-45	0.420	0.420	0.426	37	0.521	0.524	0.547	-23	0.016	0.016	0.016	30	0.068	0.069	0.070	-14	0.049	0.049	0.049	0
Mn, Diss	Post-Closure	Jan	117	0.994	0.987	0.994	7	0.355	0.353	0.438	12	0.437	0.437	0.458	5	0.013	0.013	0.016	6	0.078	0.078	0.079	0	0.049	0.049	0.049	0
Mn, Diss	Post-Closure	Feb	117	1.100	1.093	1.100	7	0.386	0.384	0.477	12	0.428	0.427	0.502	8	0.013	0.013	0.017	6	0.078	0.078	0.080	0	0.051	0.051	0.051	0
Mn, Diss	Post-Closure	Mar	117	0.937	0.931	0.937	7	0.386	0.384	0.474	11	0.388	0.385	0.468	12	0.013	0.013	0.016	6	0.077	0.077	0.078	0	0.049	0.049	0.049	0
Mn, Diss	Post-Closure	Apr	117	0.908	0.902	0.908	7	0.384	0.382	0.467	10	0.370	0.367	0.459	14	0.013	0.013	0.016	6	0.075	0.075	0.077	0	0.049	0.049	0.049	0
Mn, Diss	Post-Closure	May	117	0.544	0.542	0.545	9	0.245	0.243	0.280	12	0.066	0.065	0.072	12	0.012	0.011	0.015	6	0.062	0.062	0.064	0	0.047	0.047	0.047	0
Mn, Diss	Post-Closure	Jun	117	0.508	0.506	0.508	9	0.226	0.225	0.248	12	0.095	0.095	0.132	9	0.015	0.015	0.019	6	0.057	0.057	0.058	0	0.053	0.053	0.053	0
Mn, Diss	Post-Closure	Jul	117	0.441	0.439	0.441	11	0.232	0.231	0.275	12	0.127	0.126	0.191	8	0.016	0.016	0.021	5	0.052	0.052	0.053	0	0.053	0.053	0.053	0
Mn, Diss	Post-Closure	Aug	117	0.342	0.340	0.342	15	0.231	0.230	0.276	13	0.131	0.130	0.200	9	0.014	0.014	0.018	5	0.046	0.046	0.047	0	0.049	0.049	0.049	0
Mn, Diss	Post-Closure	Sep	117	0.275	0.273	0.275	19	0.227	0.226	0.267	15	0.137	0.136	0.204	11	0.012	0.012	0.016	6	0.041	0.041	0.042	0	0.046	0.046	0.046	0
Mn, Diss	Post-Closure	Oct	117	0.227	0.226	0.227	23	0.222	0.220	0.246	17	0.146	0.145	0.199	14	0.011	0.011	0.014	6	0.037	0.037	0.038	1	0.043	0.043	0.043	0
Mn, Diss	Post-Closure	Nov	117	1.080	1.078	1.081	7	0.335	0.333	0.351	14	0.533	0.532	0.563	7	0.013	0.013	0.016	6	0.083	0.083	0.084	0	0.049	0.049	0.049	0
Mn, Diss	Post-Closure	Dec	117	1.030	1.028	1.030	7	0.349	0.346	0.360	13	0.700	0.700	0.728	3	0.013	0.013	0.016	6	0.080	0.080	0.081	0	0.049	0.049	0.049	0
Hg, Diss	Construction	Jan	2	0.000003	0.000003	0.000003	81	0.000002	0.000002	0.000002	17	0.000002	0.000002	0.000002	12	0.000002	0.000002	0.000002	11	0.000001	0.000001	0.000001	-3	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Feb	2	0.000004	0.000004	0.000004	86	0.000002	0.000002	0.000002	8	0.000002	0.000002	0.000002	-6	0.000002	0.000002	0.000002	7	0.000001	0.000001	0.000001	-4	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Mar	2	0.000003	0.000003	0.000003	100	0.000002	0.000002	0.000002	2	0.000002	0.000002	0.000002	-15	0.000001	0.000001	0.000002	2	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Apr	2	0.000003	0.000003	0.000003	116	0.000002	0.000002	0.000002	0	0.000002	0.000002	0.000002	-19	0.000001	0.000001	0.000002	-4	0.000001	0.000001	0.000001	-9	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	May	2	0.000003	0.000003	0.000003	112	0.000002	0.000002	0.000002	41	0.000001	0.000001	0.000002	8	0.000001	0.000001	0.000001	-4	0.000001	0.000001	0.000001	-8	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Jun	2	0.000004	0.000004	0.000004	115	0.000003	0.000003	0.000003	86	0.000002	0.000002	0.000002	52	0.000001	0.000001	0.000001	2	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Jul	2	0.000004	0.000004	0.000004	117	0.000003	0.000003	0.000003	119	0.000003	0.000003	0.000003	82	0.000001	0.000001	0.000002	10	0.000001	0.000001	0.000001	-4	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Aug	2	0.000004	0.000004	0.000004	123	0.000004	0.000004	0.000004	138	0.000003	0.000003	0.000003	116	0.000002	0.000002	0.000002	20	0.000001	0.000001	0.000001	-1	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Sep	2	0.000003	0.000003	0.000003	110	0.000004	0.000004	0.000004	126	0.000003	0.000003	0.000003	121	0.000002	0.000002	0.000002	29	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Oct	2	0.000003	0.000003	0.000003	90	0.000003	0.000003	0.000003	102	0.000003	0.000003	0.000003	99	0.000002	0.000002	0.000002	35	0.000001	0.000001	0.000001	0	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Nov	2	0.000003	0.000003	0.000003	89	0.000003	0.000003	0.000003	74	0.000003	0.000003	0.000004	48	0.000002	0.000002	0.000002	35	0.000001	0.000001	0.000001	0	0.000002	0.000002	0.000002	0
Hg, Diss	Construction	Dec	2	0.000003	0.000003	0.000003	96	0.000003	0.000003	0.000003	52	0.000003	0.000003	0.000003	44	0.000002	0.000002	0.000002	32	0.000001	0.000001	0.000001	0	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Jan	5	0.000003	0.000003	0.000003	97	0.000002	0.000002	0.000002	42	0.000002	0.000002	0.000002	34	0.000002	0.000002	0.000002	36	0.000001	0.000001	0.000001	7	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Feb	5	0.000003	0.000003	0.000004	84	0.000002	0.000002	0.000002	29	0.000002	0.000002	0.000002	14	0.000002	0.000002	0.000002	31	0.000001	0.000001	0.000001	6	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Mar	5	0.000003	0.000003	0.000003	93	0.000002	0.000002	0.000002	20	0.000002	0.000002	0.000002	0	0.000002	0.000002	0.000002	26	0.000001	0.000001	0.000001	5	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Apr	5	0.000003	0.000003	0.000003	106	0.000002	0.000002	0.000002	16	0.000002	0.000002	0.000002	-6	0.000002	0.000002	0.000002	20	0.000001	0.000001	0.000001	3	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	May	5	0.000003	0.000003	0.000003	104	0.000002	0.000002	0.000002	52	0.000002	0.000002	0.000002	14	0.000001	0.000001	0.000001	17	0.000001	0.000001	0.000001	3	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Jun	5	0.000004	0.000004	0.000004	107	0.000003	0.000003	0.000003	94	0.000002	0.000002	0.000002	58	0.000002	0.000002	0.000002	19	0.000001	0.000001	0.000001	4	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Jul	5	0.000004	0.000004	0.000004	108	0.000003	0.000003	0.000004	128	0.000003	0.000003	0.000003	87	0.000002	0.000002	0.000002	23	0.000001	0.000001	0.000001	6	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Aug	5	0.000004	0.000004	0.000004	114	0.000004	0.000004	0.000004	146	0.000003	0.000003	0.000003	121	0.000002	0.000002	0.000002	31	0.000001	0.000001	0.000001	9	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Sep	5	0.000003	0.000003	0.000003	100	0.000004	0.000004	0.000004	134	0.000003	0.000003	0.000004	127	0.000002	0.000002	0.000002	38	0.000001	0.000001	0.000001	10	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Oct	5	0.000002	0.000002	0.000003	82	0.000003	0.000003	0.000003	109	0.000003	0.000003	0.000003	105	0.000002	0.000002	0.000002	43	0.000001	0.000001	0.000001	10	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Nov	5	0.000003	0.000003	0.000003	81	0.000003	0.000003	0.000003	82	0.000004	0.000004	0.000004	57	0.000002	0.000002	0.000002	43	0.000001	0.000001	0.000001	9	0.000002	0.000002	0.000002	0
Hg, Diss	Operations	Dec	5	0.000003	0.000003	0.000003	87	0.000003	0.000003	0.000003	57	0.000003	0.000003	0.000003	50	0.000002	0.000002	0.000002	40	0.000001	0.000001	0.000001	9	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Jan	6	0.000003	0.000003	0.000003	102	0.000002	0.000002	0.000002	43	0.000002	0.000002	0.000003	35	0.000002	0.000002	0.000002	30	0.000001	0.000001	0.000001	6	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Feb	6	0.000004	0.000004	0.000004	89	0.000002	0.000002	0.000002	31	0.000002	0.000002	0.000003	16	0.000002	0.000002	0.000002	26	0.000001	0.000001	0.000001	5	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Mar	6	0.000003	0.000003	0.000003	98	0.000002	0.000002	0.000002	22	0.000002	0.000002	0.000002	3	0.000002	0.000002	0.000002	22	0.000001	0.000001	0.000001	3	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Apr	6	0.000003	0.000003	0.000004	111	0.000002	0.000002	0.000002	17	0.000002	0.000002	0.000002	-4	0.000002	0.000002	0.000002	18	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	May	6	0.000003	0.000003	0.000003	107	0.000002	0.000002	0.000002	45	0.000001	0.000001	0.000002	9	0.000001	0.000001	0.000001	15	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Jun	6	0.000004	0.000004	0.000004	110	0.000002	0.000003	0.000003	81	0.000002	0.000002	0.000002	48	0.000001	0.000001	0.000002	16	0.000001	0.000001	0.000001	3	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Jul	6	0.000004	0.000004	0.000004	112	0.000003	0.000003	0.000003	112	0.000003	0.000003	0.000003	72	0.000002	0.000002	0.000002	19	0.000001	0.000001	0.000001	5	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Aug	6	0.000004	0.000004	0.000004	118	0.000004	0.000004	0.000004	132	0.000003	0.000003	0.000003	103	0.000002	0.000002	0.000002	24	0.000001	0.000001	0.000001	7	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Sep	6	0.000003	0.000003	0.000003	106	0.000004	0.000004	0.000004	126	0.000003	0.000003	0.000003	113	0.000002	0.000002	0.000002	30	0.000001	0.000001	0.000001	8	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Oct	6	0.000003	0.000003	0.000003	89	0.000003	0.000003	0.000003	107	0.000003	0.000003	0.000003	100	0.000002	0.000002	0.000002	34	0.000001	0.000001	0.000001	8	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Nov	6	0.000003	0.000003	0.000003	87	0.000003	0.000003	0.000003	82	0.000004	0.000004	0.000004	57	0.000002	0.000002	0.000002	35	0.000001	0.000001	0.000001	7	0.000002	0.000002	0.000002	0
Hg, Diss	Closure	Dec	6	0.000003	0.000003	0.000003	94	0.000003	0.000003	0.000003	59	0.000003	0.000003	0.000003	52	0.000002	0.000002	0.000002	32	0.000001	0.000001	0.000001	6	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Jan	117	0.000002	0.000002	0.000003	3	0.000002	0.000002	0.000003	25	0.000002	0.000002	0.000003	20	0.000001	0.000001	0.000002	5	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Feb	117	0.000002	0.000002	0.000004	2	0.000002	0.000002	0.000003	25	0.000003	0.000003	0.000004	18	0.000002	0.000002	0.000002	5	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Mar	117	0.000002	0.000002	0.000003	2	0.000002	0.000002	0.000003	25	0.000002	0.000002	0.000003	18	0.000002	0.000002	0.000002	5	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Apr	117	0.000002	0.000002	0.000003	2	0.000002	0.000002	0.000003	25	0.000002	0.000002	0.000003	15	0.000002	0.000002	0.000002	5	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	1
Hg, Diss	Post-Closure	May	117	0.000001	0.000001	0.000003	-4	0.000002	0.000002	0.000003	23	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Jun	117	0.000002	0.000002	0.000004	-5	0.000002	0.000002	0.000002	21	0.000002	0.000002	0.000002	10	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Jul	117	0.000002	0.000002	0.000004	-4	0.000002	0.000002	0.000003	21	0.000002	0.000002	0.000002	11	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Aug	117	0.000002	0.000002	0.000004	-2	0.000002	0.000002	0.000003	21	0.000002	0.000002	0.000003	12	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Sep	117	0.000002	0.000002	0.000003	-1	0.000002	0.000002	0.000003	22	0.000002	0.000002	0.000003	13	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Oct	117	0.000001	0.000001	0.000003	1	0.000002	0.000002	0.000003	24	0.000002	0.000002	0.000003	15	0.000001	0.000001	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Nov	117	0.000002	0.000002	0.000003	2	0.000002	0.000002	0.000003	25	0.000003	0.000003	0.000004	18	0.000002	0.000002	0.000002	4	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Diss	Post-Closure	Dec	117	0.000002	0.000002	0.000003	2	0.000002	0.000002	0.000003	25	0.000002	0.000002	0.000003	20	0.000002	0.000002	0.000002	5	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Jan	2	0.000005	0.000005	0.000007	135	0.000002	0.000002	0.000002	7	0.000002	0.000002	0.000002	4	0.000001	0.000001	0.000001	2	0.000001	0.000001	0.000001	-5	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Feb	2	0.000007	0.000007	0.000007	152	0.000002	0.000002	0.000002	5	0.000002	0.000002	0.000003	-6	0.000001	0.000001	0.000002	-1	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Mar	2	0.000006	0.000006	0.000006	170	0.000002	0.000002	0.000002	2	0.000002	0.000002	0.000002	-11	0.000001	0.000001	0.000001	-4	0.000001	0.000001	0.000001	-9	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Apr	2	0.000007	0.000007	0.000007	188	0.000002	0.000002	0.000002	3	0.000002	0.000002	0.000002	-12	0.000001	0.000001	0.000001	-8	0.000001	0.000001	0.000001	-12	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	May	2	0.000005	0.000005	0.000005	136	0.000003	0.000003	0.000003	25	0.000003	0.000003	0.000003	-29	0.000001	0.000001	0.000001	-2	0.000001	0.000001	0.000001	-11	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Jun	2	0.000006	0.000006	0.000006	112	0.000004	0.000004	0.000004	57	0.000003	0.000003	0.000003	32	0.000001	0.000001	0.000002	7	0.000001	0.000001	0.000001	-7	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	99	0.000004	0.000004	0.000004	59	0.000003	0.000003	0.000004	55	0.000002	0.000002	0.000002	14	0.000001	0.000001	0.000001	-5	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Aug	2	0.000005	0.000005	0.000005	91	0.000003	0.000003	0.000003	49	0.000003	0.000003	0.000003	52	0.000002	0.000002	0.000002	18	0.000001	0.000001	0.000002	-2	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Sep	2	0.000004	0.000004	0.000004	77	0.000003	0.000003	0.000003	35	0.000003	0.000003	0.000003	41	0.000002	0.000002	0.000002	19	0.000001	0.000001	0.000001	-1	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Oct	2	0.000003	0.000003	0.000003	62	0.000002	0.000002	0.000002	19	0.000002	0.000002	0.000002	25	0.000002	0.000002	0.000002	17	0.000001	0.000001	0.000001	-3	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Nov	2	0.000005	0.000005	0.000005	99	0.000002	0.000002	0.000002	11	0.000003	0.000003	0.000003	-5	0.000002	0.000002	0.000002	14	0.000001	0.000001	0.000001	-4	0.000002	0.000002	0.000002	0
Hg, Tot	Construction	Dec	2	0.000006	0.000006	0.000006	151	0.000002	0.000002	0.000002	13	0.000002	0.000002	0.000002	5	0.000002	0.000002	0.000002	12	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Jan	5	0.000006	0.000006	0.000006	173	0.000002	0.000002	0.000002	19	0.000002	0.000002	0.000002	13	0.000002	0.000002	0.000002	15	0.000001	0.000001	0.000001	-2	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Feb	5	0.000007	0.000007	0.000007	159	0.000002	0.000002	0.000002	20	0.000003	0.000003	0.000003	8	0.000002	0.000002	0.000002	13	0.000001	0.000001	0.000001	-3	0.000002	0.000002	0.000002	-1
Hg, Tot	Operations	Mar	5	0.000006	0.000006	0.000006	169	0.000002	0.000002	0.000002	17	0.000002	0.000002	0.000002	2	0.000002	0.000002	0.000002	10	0.000001	0.000001	0.000001	-5	0.000002	0.000002	0.000002	-1
Hg, Tot	Operations	Apr	5	0.000007	0.000007	0.000007	183	0.000002	0.000002	0.000002	16	0.000002	0.000002	0.000002	0	0.000002	0.000002	0.000002	7	0.000001	0.000001	0.000001	-7	0.000002	0.000002	0.000002	-1
Hg, Tot	Operations	May	5	0.000005	0.000005	0.000005	132	0.000003	0.000003	0.000003	32	0.000003	0.000003	0.000003	-25	0.000001	0.000001	0.000001	10	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Jun	5	0.000006	0.000006	0.000006	108	0.000004	0.000004	0.000004	63	0.000003	0.000003	0.000003	36	0.000002	0.000002	0.000002	16	0.000001	0.000001	0.000001	-3	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Jul	5	0.000005	0.000005	0.000005	95	0.000004	0.000004	0.000004	65	0.000003	0.000003	0.000004	60	0.000002	0.000002	0.000002	21	0.000002	0.000002	0.000002	0	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Aug	5	0.000004	0.000004	0.000004	86	0.000003	0.000003	0.000003	55	0.000003	0.000003	0.000003	57	0.000002	0.000002	0.000002	24	0.000002	0.000002	0.000002	3	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Sep	5	0.000004	0.000004	0.000004	72	0.000003	0.000003	0.000003	41	0.000003	0.000003	0.000003	46	0.000002	0.000002	0.000002	25	0.000002	0.000002	0.000002	3	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Oct	5	0.000003	0.000003	0.000003	58	0.000002	0.000002	0.000002	26	0.000002	0.000002	0.000002	30	0.000002	0.000002	0.000002	23	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Nov	5	0.000005	0.000005	0.000005	94	0.000002	0.000002	0.000002	16	0.000003	0.000003	0.000003	1	0.000002	0.000002	0.000002	21	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Operations	Dec	5	0.000006	0.000006	0.000006	145	0.000002	0.000002	0.000002	15	0.000002	0.000002	0.000002	8	0.000002	0.000002	0.000002	18	0.000001	0.000001	0.000001	0	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Jan	6	0.000006	0.000006	0.000007	176	0.000002	0.000002	0.000002	22	0.000002	0.000002	0.000002	16	0.000002	0.000002	0.000002	15	0.000001	0.000001	0.000001	-2	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Feb	6	0.000007	0.000007	0.000007	162	0.000002	0.000002	0.000003	23	0.000003	0.000003	0.000003	11	0.000002	0.000002	0.000002	12	0.000001	0.000001	0.000001	-3	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Mar	6	0.000006	0.000006	0.000006	172	0.000002	0.000002	0.000003	22	0.000002	0.000002	0.000003	7	0.000002	0.000002	0.000002	10	0.000001	0.000001	0.000001	-5	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Apr	6	0.000007	0.000007	0.000007	186	0.000002	0.000002	0.000002	22	0.000002	0.000002	0.000002	5	0.000002	0.000002	0.000002	8	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	May	6	0.000005	0.000005	0.000005	133	0.000003	0.000003	0.000003	31	0.000003	0.000003	0.000003	-24	0.000001	0.000001	0.000001	11	0.000001	0.000001	0.000001	-6	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Jun	6	0.000006	0.000006	0.000006	109	0.000004	0.000004	0.000004	58	0.000003	0.000003	0.000003	32	0.000002	0.000002	0.000002	15	0.000001	0.000001	0.000001	-3	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Jul	6	0.000005	0.000005	0.000005	96	0.000004	0.000004	0.000004	64	0.000003	0.000003	0.000003	54	0.000002	0.000002	0.000002	19	0.000002	0.000002	0.000002	0	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Aug	6	0.000004	0.000004	0.000005	89	0.000003	0.000003	0.000004	58	0.000003	0.000003	0.000003	56	0.000002	0.000002	0.000002	21	0.000002	0.000002	0.000002	2	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Sep	6	0.000004	0.000004	0.000004	76	0.000003	0.000003	0.000003	47	0.000003	0.000003	0.000003	49	0.000002	0.000002	0.000002	22	0.000001	0.000001	0.000001	3	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Oct	6	0.000003	0.000003	0.000003	62	0.000002	0.000002	0.000002	32	0.000002	0.000002	0.000002	36	0.000002	0.000002	0.000002	21	0.000001	0.000001	0.000001	2	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Nov	6	0.000005	0.000005	0.000005	96	0.000002	0.000002	0.000003	22	0.000003	0.000003	0.000003	6	0.000002	0.000002	0.000002	19	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Closure	Dec	6	0.000006	0.000006	0.000006	147	0.000002	0.000002	0.000003	21	0.000002	0.000002	0.000003	14	0.000002	0.000002	0.000002	17	0.000001	0.000001	0.000001	0	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Jan	117	0.000002	0.000002	0.000006	4	0.000002	0.000002	0.000003	15	0.000002	0.000002	0.000003	13	0.000001	0.000001	0.000002	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Feb	117	0.000003	0.000003	0.000007	4	0.000002	0.000002	0.000003	15	0.000003	0.000003	0.000003	12	0.000001	0.000001	0.000002	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Mar	117	0.000002	0.000002	0.000006	3	0.000002	0.000002	0.000003	15	0.000003	0.000003	0.000003	13	0.000001	0.000001	0.000002	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Apr	117	0.000002	0.000002	0.000007	3	0.000002	0.000002	0.000003	15	0.000003	0.000003	0.000003	10	0.000001	0.000001	0.000002	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	May	117	0.000002	0.000002	0.000005	-2	0.000002	0.000002	0.000003	9	0.000004	0.000004	0.000004	-3	0.000001	0.000001	0.000001	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Jun	117	0.000003	0.000003	0.000005	-4	0.000003	0.000003	0.000004	9	0.000003	0.000003	0.000003	4	0.000001	0.000001	0.000002	2	0.000001	0.000001	0.000002	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Jul	117	0.000003	0.000003	0.000005	-3	0.000003	0.000003	0.000004	10	0.000002	0.000002	0.000003	5	0.000001	0.000001	0.000002	2	0.000002	0.000002	0.000002	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Aug	117	0.000002	0.000002	0.000004	-1	0.000002	0.000002	0.000003	11	0.000002	0.000002	0.000003	6	0.000001	0.000001	0.000002	2	0.000002	0.000002	0.000002	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Sep	117	0.000002	0.000002	0.000004	1	0.000002	0.000002	0.000003	12	0.000002	0.000002	0.000003	7	0.000001	0.000001	0.000002	2	0.000001	0.000001	0.000002	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Oct	117	0.000002	0.000002	0.000003	2	0.000002	0.000002	0.000003	14	0.000002	0.000002	0.000002	8	0.000001	0.000001	0.000002	2	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Nov	117	0.000002	0.000002	0.000003	3	0.000002	0.000002	0.000003	14	0.000002	0.000002	0.000003	12	0.000001	0.000001	0.000002	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0
Hg, Tot	Post-Closure	Dec	117	0.000002	0.000002	0.000004	3	0.000002	0.000002	0.000003	14	0.000002	0.000002	0.000003	12	0.000001	0.000001	0.000002	3	0.000001	0.000001	0.000001	1	0.000002	0.000002	0.000002	0

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake				West Farley Lake				East Farley Lake				Swede Lake				Ellystan Lake				Susan Lake last one			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Mo, Tot	Construction	Jan	2	0.0021	0.0021	0.0030	675	0.0017	0.0017	0.0026	380	0.0005	0.0005	0.0008	112	0.0009	0.0009	0.0010	2	0.00053	0.00053	0.00053	0	0.0016	0.0016	0.0016	0
Mo, Tot	Construction	Feb	2	0.0025	0.0025	0.0028	656	0.0020	0.0020	0.0027	409	0.0005	0.0005	0.0007	84	0.0010	0.0010	0.0010	-1	0.00055	0.00055	0.00055	0	0.0016	0.0016	0.0016	0
Mo, Tot	Construction	Mar	2	0.0022	0.0022	0.0023	628	0.0020	0.0020	0.0025	394	0.0005	0.0005	0.0006	79	0.0009	0.0009	0.0010	-5	0.00054	0.00054	0.00055	0	0.0016	0.0016	0.0016	0
Mo, Tot	Construction	Apr	2	0.0022	0.0022	0.0022	600	0.0020	0.0020	0.0024	382	0.0005	0.0005	0.0006	71	0.0009	0.0009	0.0009	-9	0.00053	0.00053	0.00054	-1	0.0016	0.0016	0.0016	0
Mo, Tot	Construction	May	2	0.0014	0.0014	0.0014	689	0.0015	0.0015	0.0018	434	0.0006	0.0006	0.0007	116	0.0009	0.0009	0.0009	-9	0.00046	0.00046	0.00047	0	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Jun	2	0.0017	0.0017	0.0017	918	0.0016	0.0016	0.0019	499	0.0010	0.0010	0.0011	191	0.0009	0.0009	0.0009	-6	0.00046	0.00046	0.00048	1	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Jul	2	0.0017	0.0017	0.0017	1005	0.0018	0.0018	0.0020	564	0.0009	0.0009	0.0009	153	0.0009	0.0009	0.0010	-2	0.00048	0.00048	0.00050	2	0.0013	0.0013	0.0013	0
Mo, Tot	Construction	Aug	2	0.0016	0.0016	0.0016	1005	0.0019	0.0019	0.0020	608	0.0008	0.0008	0.0008	162	0.0009	0.0009	0.0010	0	0.00049	0.00049	0.00051	3	0.0014	0.0014	0.0014	0
Mo, Tot	Construction	Sep	2	0.0019	0.0019	0.0020	1211	0.0019	0.0019	0.0020	632	0.0010	0.0010	0.0010	211	0.0009	0.0009	0.0010	3	0.00050	0.00050	0.00052	3	0.0014	0.0014	0.0014	0
Mo, Tot	Construction	Oct	2	0.0024	0.0024	0.0024	1423	0.0020	0.0020	0.0020	663	0.0011	0.0011	0.0011	245	0.0009	0.0009	0.0010	7	0.00050	0.00050	0.00052	4	0.0014	0.0014	0.0014	0
Mo, Tot	Construction	Nov	2	0.0034	0.0034	0.0035	1339	0.0025	0.0025	0.0026	673	0.0011	0.0011	0.0011	176	0.0011	0.0011	0.0011	11	0.00056	0.00056	0.00058	4	0.0016	0.0016	0.0016	0
Mo, Tot	Construction	Dec	2	0.0031	0.0031	0.0032	1132	0.0025	0.0025	0.0026	663	0.0008	0.0008	0.0008	234	0.0010	0.0010	0.0010	11	0.00056	0.00056	0.00059	5	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	Jan	5	0.0027	0.0028	0.0029	916	0.0026	0.0026	0.0027	653	0.0008	0.0008	0.0009	232	0.0011	0.0011	0.0012	25	0.00062	0.00063	0.00067	18	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	Feb	5	0.0026	0.0027	0.0027	708	0.0027	0.0027	0.0029	609	0.0007	0.0008	0.0008	163	0.0012	0.0012	0.0013	23	0.00064	0.00064	0.00069	18	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	Mar	5	0.0021	0.0022	0.0022	622	0.0027	0.0027	0.0030	583	0.0007	0.0007	0.0007	145	0.0011	0.0011	0.0012	20	0.00064	0.00064	0.00069	18	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	Apr	5	0.0021	0.0021	0.0022	573	0.0026	0.0026	0.0030	551	0.0006	0.0006	0.0007	131	0.0011	0.0011	0.0012	16	0.00063	0.00064	0.00068	18	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	May	5	0.0013	0.0014	0.0014	648	0.0019	0.0020	0.0022	587	0.0007	0.0008	0.0008	161	0.0010	0.0011	0.0011	10	0.00054	0.00055	0.00059	19	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Jun	5	0.0015	0.0016	0.0016	860	0.0021	0.0021	0.0024	667	0.0012	0.0012	0.0014	261	0.0010	0.0010	0.0011	12	0.00054	0.00054	0.00058	19	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Jul	5	0.0016	0.0016	0.0017	938	0.0024	0.0024	0.0028	775	0.0011	0.0011	0.0012	220	0.0010	0.0011	0.0011	16	0.00056	0.00056	0.00060	19	0.0013	0.0013	0.0013	0
Mo, Tot	Operations	Aug	5	0.0015	0.0015	0.0015	937	0.0025	0.0025	0.0030	845	0.0010	0.0010	0.0012	238	0.0010	0.0010	0.0011	18	0.00057	0.00057	0.00061	19	0.0014	0.0014	0.0014	0
Mo, Tot	Operations	Sep	5	0.0018	0.0018	0.0019	1133	0.0026	0.0026	0.0030	861	0.0012	0.0012	0.0014	299	0.0010	0.0011	0.0011	20	0.00058	0.00058	0.00062	19	0.0014	0.0014	0.0014	0
Mo, Tot	Operations	Oct	5	0.0022	0.0023	0.0023	1337	0.0025	0.0025	0.0029	842	0.0014	0.0014	0.0016	325	0.0011	0.0011	0.0012	25	0.00057	0.00058	0.00062	20	0.0014	0.0014	0.0014	0
Mo, Tot	Operations	Nov	5	0.0032	0.0032	0.0033	1257	0.0029	0.0029	0.0032	784	0.0014	0.0014	0.0015	234	0.0012	0.0012	0.0014	30	0.00064	0.00065	0.00069	20	0.0016	0.0016	0.0016	0
Mo, Tot	Operations	Dec	5	0.0029	0.0030	0.0031	1062	0.0027	0.0028	0.0030	724	0.0009	0.0009	0.0010	268	0.0012	0.0012	0.0013	31	0.00065	0.00065	0.00069	21	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	Jan	6	0.0029	0.0029	0.0030	948	0.0024	0.0025	0.0028	610	0.0008	0.0008	0.0009	213	0.0010	0.0011	0.0013	18	0.00060	0.00062	0.00069	16	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	Feb	6	0.0028	0.0027	0.0029	738	0.0025	0.0025	0.0027	555	0.0007	0.0007	0.0008	148	0.0011	0.0011	0.0013	16	0.00061	0.00063	0.00071	16	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	Mar	6	0.0023	0.0022	0.0024	648	0.0024	0.0024	0.0025	494	0.0006	0.0006	0.0006	119	0.0010	0.0011	0.0013	13	0.00061	0.00063	0.00071	16	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	Apr	6	0.0022	0.0022	0.0023	597	0.0022	0.0022	0.0023	443	0.0006	0.0005	0.0006	96	0.0010	0.0010	0.0012	10	0.00060	0.00062	0.00071	15	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	May	6	0.0014	0.0014	0.0015	674	0.0016	0.0016	0.0016	449	0.0006	0.0006	0.0006	107	0.0010	0.0010	0.0012	5	0.00052	0.00053	0.00061	16	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Jun	6	0.0016	0.0016	0.0017	888	0.0016	0.0016	0.0017	475	0.0010	0.0010	0.0010	179	0.0010	0.0010	0.0011	6	0.00051	0.00053	0.00059	15	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Jul	6	0.0017	0.0017	0.0017	972	0.0017	0.0017	0.0018	517	0.0008	0.0008	0.0009	141	0.0010	0.0010	0.0011	8	0.00052	0.00054	0.00060	14	0.0013	0.0013	0.0013	0
Mo, Tot	Closure	Aug	6	0.0015	0.0015	0.0016	973	0.0017	0.0017	0.0018	550	0.0007	0.0007	0.0008	142	0.0009	0.0010	0.0010	8	0.00054	0.00055	0.00061	14	0.0014	0.0014	0.0014	0
Mo, Tot	Closure	Sep	6	0.0019	0.0019	0.0020	1168	0.0017	0.0018	0.0019	569	0.0009	0.0009	0.0009	181	0.0009	0.0010	0.0010	9	0.00054	0.00055	0.00061	13	0.0014	0.0014	0.0014	0
Mo, Tot	Closure	Oct	6	0.0023	0.0023	0.0024	1372	0.0018	0.0018	0.0019	594	0.0010	0.0010	0.0011	212	0.0009	0.0010	0.0010	11	0.00054	0.00055	0.00060	13	0.0014	0.0014	0.0014	0
Mo, Tot	Closure	Nov	6	0.0033	0.0033	0.0035	1302	0.0023	0.0023	0.0024	610	0.0011	0.0011	0.0011	161	0.0011	0.0011	0.0011	14	0.00060	0.00061	0.00066	13	0.0016	0.0016	0.0016	0
Mo, Tot	Closure	Dec	6	0.0031	0.0031	0.0032	1113	0.0024	0.0024	0.0025	610	0.0008	0.0008	0.0008	213	0.0011	0.0011	0.0011	14	0.00060	0.00060	0.00066	13	0.0016	0.0016	0.0016	0
Mo, Tot	Post-Closure	Jan	117	0.0003	0.0003	0.0030	12	0.0020	0.0018	0.0024	432	0.0007	0.0006	0.0007	157	0.0011	0.0011	0.0011	19	0.00061	0.00060	0.00061	12	0.0016	0.0016	0.0016	4
Mo, Tot	Post-Closure	Feb	117	0.0003	0.0004	0.0029	9	0.0023	0.0020	0.0025	430	0.0007	0.0007	0.0007	136	0.0012	0.0011	0.0012	19	0.00062	0.00062	0.00062	13	0.0017	0.0017	0.0017	4
Mo, Tot	Post-Closure	Mar	117	0.0003	0.0003	0.0024	7	0.0024	0.0022	0.0024	452	0.0007	0.0006	0.0007	127	0.0012	0.0011	0.0012	19	0.00062	0.00061	0.00062	13	0.0016	0.0016	0.0016	4
Mo, Tot	Post-Closure	Apr	117	0.0003	0.0003	0.0023	6	0.0026	0.0023	0.0026	472	0.0007	0.0006	0.0007	127	0.0011	0.0011	0.0011	19	0.00062	0.00061	0.00062	13	0.0016	0.0016	0.0016	4
Mo, Tot	Post-Closure	May	117	0.0002	0.0002	0.0014	8	0.0018	0.0016	0.0018	465	0.0004	0.0004	0.0006	41	0.0011	0.0011	0.0011	14	0.00053	0.00052	0.00053	12	0.0014	0.0014	0.0014	4
Mo, Tot	Post-Closure	Jun	117	0.0002	0.0002	0.0015	10	0.0017	0.0015	0.0017	446	0.0008	0.0008	0.0009	121	0.0011	0.0011	0.0011	14	0.00052	0.00051	0.00052	12	0.0014	0.0014	0.0014	4
Mo, Tot	Post-Closure	Jul	117	0.0002	0.0002	0.0015	11	0.0016	0.0015	0.0016	436	0.0008	0.0007	0.0008	110	0.0011	0.0010	0.0011	15	0.00053	0.00053	0.00053	11	0.0014	0.0014	0.0014	4
Mo, Tot	Post-Closure	Aug	117	0.0001	0.0002	0.0014	10	0.0016	0.0014	0.0016	427	0.0006	0.0006	0.0007	103	0.0010	0.0010	0.0010	15	0.00055	0.00054	0.00055	11	0.0014	0.0014	0.0014	4
Mo, Tot	Post-Closure	Sep	117	0.0001	0.0002	0.0016	11	0.0015	0.0014	0.0017	427	0.0007	0.0007	0.0008	110	0.0010	0.0010	0.0010	15	0.00055	0.00054	0.00055	11	0.0014	0.0014	0.0014	4
Mo, Tot	Post-Closure	Oct	117	0.0002	0.0002	0.0017	9	0.0016	0.0014	0.0016	437	0.0008	0.0007	0.0009	127	0.0010	0.0010	0.0010	16	0.00055	0.00054	0.00055	12	0.0014	0.0014	0.0014	3
Mo, Tot	Post-Closure	Nov	117	0.0002	0.0003	0.0022	7	0.0020	0.0018	0.0020	440	0.0011	0.0010	0.0011	154	0.0011	0.0011	0.0011	17	0.00061	0.00060	0.00061	12	0.0016	0.0016	0.0016	3
Mo, Tot	Post-Closure	Dec	117	0.0003	0.0003	0.0021	5	0.0020	0.0018	0.0020	436	0.0007	0.0007	0.0008	176	0.0011	0.0011	0.0011	18	0.00061	0.00060	0.00061	12	0.0016	0.0016	0.0016	4
Ni, Diss	Construction	Jan	2	0.00030	0.00030	0.00032	33	0.00058	0.00058	0.00067	82	0.00023	0.00023	0.00028	74	0.00025	0.00025	0.00029	19	0.00023	0.00023	0.00024	7	0.00035	0.00035	0.00035	0
Ni, Diss	Construction	Feb	2	0.00033	0.00033	0.00033	28	0.00070	0.00070	0.00071	101	0.00027	0.00027	0.00028	82	0.00026	0.00026	0.00030	18	0.00023	0.00023	0.00025	7	0.00037	0.00037	0.00037	0
Ni, Diss	Construction	Mar	2	0.00029	0.00029	0.00029	34	0.00071	0.00071	0.00077	105	0.00029	0.00029	0.00031	105	0.00026	0.00026	0.00029	17	0.00023	0.00023	0.00023	7	0.00035	0.00035	0.00035	0
Ni, Diss	Construction	Apr	2	0.00031	0.00031	0.00031	44	0.00073	0.00073	0.00078	107	0.00030	0.00030	0.00032	111	0.00025	0.00025	0.00028	18	0.00023	0.00023	0.00025	7	0.00035	0.00035	0.00035	0
Ni, Diss	Construction	May	2	0.00021	0.00021	0.00021	53	0.00054	0.00054	0.00056	114	0.00022	0.00022	0.00023	131	0.00021	0.00021	0.00023	19	0.00020	0.00020	0.00021	7	0.00029	0.00029	0.00029	0
Ni, Diss	Construction	Jun	2	0.00023	0.00023	0.00023	65	0.00056	0.00056	0.00058	112	0.00026	0.00026	0.00027	111	0.00021	0.00021	0.00023	22	0.00020	0.00020	0.00022	7	0.00029	0.00029	0.00029	0
Ni, Diss	Construction	Jul	2	0.00027	0.00027	0.00027	76	0.00058	0.00058	0.00060	118	0.00030	0.00030	0.00031	109	0.00022	0.00022	0.00024	24	0.00021	0.00021	0.00022	8	0.00030	0.00030	0.00030	0
Ni, Diss	Construction	Aug	2	0.00031	0.00031	0.00031	76	0.00059	0.00059	0.00062	123	0.00033	0.00033	0.00035	108	0.00024	0.00024	0.00025	27	0.00022	0.00022	0.00023	10	0.00031	0.00031	0.00031	0
Ni, Diss	Construction	Sep	2	0.00032	0.00032	0.00032	76	0.00060	0.00060	0.00063	128	0.00034	0.00034	0.00036	110	0.00025	0.00025	0.00025	31	0.00022	0.00022	0.00023	12	0.00031	0.00031	0.00031	0
Ni, Diss	Construction	Oct	2	0.00032	0.00032	0.00033	82	0.00060	0.00060	0.00064	131	0.00034	0.00034	0.00036	117	0.00025	0.00025	0.00026	35	0.00022	0.00022	0.00023	14	0.00031	0.00031	0.00031	0
Ni, Diss	Construction	Nov	2	0.00041	0.00041	0.00041	66	0.00071	0.00071	0.00076	124	0.00038	0.00038	0.00040	70	0.00029	0.00029	0.00030	38	0.00025	0.00025	0.00026	16	0.00036	0.00036	0.00036	0
Ni, Diss	Construction	Dec	2	0.00034	0.00034	0.00034	44	0.00067	0.00067	0.00070	110	0.00029	0.00029	0.00030	93	0.00029	0.00029	0.00029	37	0.00025	0.00025	0.00026	17	0.00035	0.00035	0.00035	0
Ni, Diss	Operations	Jan	5	0.00030	0.00030	0.00031	33	0.00064	0.00065	0.00071	105	0.00032	0.00033	0.00035	107	0.00030	0.00031	0.00035	46	0.00027	0.00027	0.00030	27	0.00035	0.00035	0.00035	0
Ni, Diss	Operations	Feb	5	0.00031	0.00031	0.00032	22	0.00069	0.00070	0.00077	103	0.00028	0.00028	0.00031	88	0.00031	0.00031	0.00035	44	0.00027	0.00028	0.00030	27	0.00037	0.00037	0.00037	0
Ni, Diss	Operations	Mar	5	0.00027	0.00028	0.00028	27	0.00075	0.00076	0.00089	120	0.00030	0.00030	0.00035	116	0.00030	0.00031	0.00034	41	0.00027	0.00028	0.00030	27	0.00035	0.00035	0.00035	0
Ni, Diss	Operations	Apr	5	0.00029	0.00029	0.00030	36	0.00079	0.00080	0.00094	129	0.00032	0.00033	0.00039	132	0.00029	0.00030	0.00034	40	0.00027	0.00027	0.00030	27	0.00035	0.00035	0.00035	0
Ni, Diss	Operations	May	5	0.00020	0.00020	0.00021	45	0.00060	0.00061	0.00071	140	0.00023	0.00023	0.00027	147	0.00024	0.00024	0.00027	40	0.00023	0.00024	0.00026	27	0.00029	0.00029	0.00029	0
Ni, Diss	Operations	Jun	5	0.00021	0.00021	0.00022	57	0.00065	0.00065	0.00076	148	0.00030	0.00030	0.00034	138	0.00024	0.00025	0.00028	40	0.00023	0.00024	0.00026	24	0.00029	0.00029	0.00029	0
Ni, Diss	Operations	Jul	5	0.00025	0.00026	0.00026	68	0.00072	0.00072	0.00085	169	0.00036	0.00036	0.00042	147	0.00025	0.00026	0.00028	40	0.00023	0.00024	0.00026	24	0.00030	0.00029	0.00030	0
Ni, Diss	Operations	Aug	5	0.00029	0.00029	0.00030	68	0.00076	0.00075	0.00090	184	0.00041	0.00041	0.00049	156	0.00027	0.00027	0.00030	43	0.00024	0.00024	0.00027	25	0.00031	0.00031	0.00031	0
Ni, Diss	Operations	Sep	5	0.00030	0.00030	0.00031	68	0.00076	0.00075	0.00090	187	0.00042	0.00042	0.00050	160	0.00028	0.00028	0.00032	47	0.00025	0.00025	0.00027	26	0.00031	0.00031	0.00031	0
Ni, Diss	Operations	Oct	5	0.00030	0.00031	0.00031	73	0.00073	0.00072	0.00085	177	0.00042	0.00044	0.00048	160	0.00029	0.00029	0.00033	52	0.00025	0.00025	0.00028	28	0.00031	0.00031	0.00031	0
Ni, Diss	Operations	Nov	5	0.00038	0.00039	0.00040	58	0.00081	0.00080	0.00092	150	0.00045	0.00044	0.00051	99	0.00033	0.00034	0.00038	55	0.00028	0.00028	0.00031	30	0.00036	0.00036	0.00036	0
Ni, Diss	Operations	Dec	5	0.00032	0.00032	0.00033	37	0.00072	0.00072	0.00080	127	0.00032	0.00032	0.00035	112	0.00033	0.00033	0.00037	55	0.00028	0.00028	0.00031	31	0.00035	0.00035	0.00035	0
Ni, Diss	Closure	Jan	6	0.00031	0.00031	0.00032	37	0.00057	0.00059	0.00072	84	0.00024	0.00025	0.00031	85	0.00025	0.00027	0.00036	28	0.00024	0.00026	0.00031	20	0.00035	0.00035	0.00035	0
Ni, Diss	Closure	Feb	6	0.00032	0.00032	0.00033	25	0.00059	0.00061	0.00070	75	0.00024	0.00025	0.00029	67	0.00026	0.00028	0.00037	27	0.00025	0.00026	0.00032	19	0.00037	0.00037	0.00037	0
Ni, Diss	Closure	Mar	6	0.00029	0.00029	0.00030	30	0.00057	0.00058	0.00064	67	0.00023	0.00024	0.00026	69	0.00025	0.00027	0.00036	24	0.00024	0.00026	0.00032	19	0.00035	0.00035	0.00035	0
Ni, Diss	Closure	Apr	6	0.00030	0.00030	0.00031	40	0.00056	0.00056	0.00060	60	0.00023	0.00023	0.00025	64	0.00024	0.00026	0.00035	22	0.00024	0.00026	0.00032	19	0.00035	0.00035	0.00035	0
Ni, Diss	Closure	May	6	0.00021	0.00021	0.00021	49	0.00042	0.00042	0.00043	64	0.00016	0.00016	0.00016	71	0.00020	0.00021	0.00027	21	0.00021	0.00022	0.00027	18	0.00029	0.00029	0.00030	0
Ni, Diss	Closure	Jun	6	0.00022	0.00022	0.00023	61	0.00043	0.00043	0.00044	63	0.00020	0.00020	0.00021	63	0.00020	0.00021	0.00026	19	0.00021	0.00022	0.00026	15	0.00029	0.00029	0.00029	0
Ni, Diss	Closure	Jul	6	0.00026	0.00026	0.00027	72	0.00044	0.00044	0.00045	67	0.00023	0.00023	0.00024	61	0.00021	0.00022	0.00026	18	0.00021	0.00022	0.00026	14	0.00030	0.00030	0.00030	0
Ni, Diss	Closure	Aug	6	0.00030	0.00030	0.00031	72	0.00046	0.00046	0.00047	73	0.00026	0.00026	0.00026	61	0.00022	0.00022	0.00026	18	0.00021	0.00022	0.00026	14	0.00031	0.00031	0.00031	0
Ni, Diss	Closure	Sep	6	0.00031	0.00031	0.00032	72	0.00047	0.00047	0.00048	79	0.00026	0.00026	0.00027	64	0.00022	0.00023	0.00026	18	0.00021	0.00022	0.00026	13	0.00031	0.00031	0.00031	0
Ni, Diss	Closure	Oct	6	0.00032	0.00032	0.00033	78	0.00047	0.00047	0.00048	83	0.00027	0.00027	0.00028	71	0.00023	0.00023	0.00026	20	0.00022	0.00023	0.00026	14	0.00031	0.00031	0.00031	0
Ni, Diss	Closure	Nov	6	0.00040	0.00040	0.00041	64	0.00058	0.00058	0.00059	82	0.00031	0.00031	0.00032	40	0.00026	0.00026	0.00029	21	0.00024	0.00025	0.00029	14	0.00036	0.00036	0.00036	0
Ni, Diss	Closure	Dec	6	0.00034	0.00034	0.00035	44	0.00057	0.00057	0.00058	79	0.00024	0.00024	0.00025	63	0.00025	0.00026	0.00028	20	0.00024	0.00025	0.00028	14	0.00035	0.00035	0.00035	0
Ni, Diss	Post-Closure	Jan	117	0.00021	0.00022	0.00035	-5	0.00065	0.00060	0.00065	87	0.00025	0.00023	0.00025	72	0.00025	0.00025	0.00025	16	0.00024	0.00024	0.00024	10	0.00036	0.00036	0.00036	2
Ni, Diss	Post-Closure	Feb	117	0.00024	0.00024	0.00038	-5	0.00071	0.00065	0.00071	89	0.00027	0.00026	0.00027	71	0.00027	0.00026	0.00027	17	0.00025	0.00024	0.00025	10	0.00038	0.00038	0.00038	3
Ni, Diss	Post-Closure	Mar	117	0.00021	0.00021	0.00033	-5	0.00075	0.00069	0.00075	97	0.00027	0.00025	0.00027	80	0.00026	0.00026	0.00026	17	0.00025	0.00024	0.00025	10	0.00036	0.00036	0.00036	3
Ni, Diss	Post-Closure	Apr	117	0.00020	0.00020	0.00033	-5	0.00078	0.00072	0.00078	105	0.00028	0.00026	0.00028	85	0.00026	0.00025	0.00026	17	0.00024	0.00024	0.00024	10	0.00036	0.00036	0.00036	3
Ni, Diss	Post-Closure	May	117	0.00013	0.00013	0.00021	-4	0.00056	0.00051	0.00056	101	0.00013	0.00012	0.00015	34	0.00021	0.00021	0.00021	16	0.00021	0.00021	0.00021	10	0.00030	0.00030	0.00030	3
Ni, Diss	Post-Closure	Jun	117	0.00013	0.00013	0.00022	-3	0.00054	0.00050	0.00055	91	0.00020	0.00019	0.00020	52	0.00021	0.00021	0.00021	16	0.00021	0.00021	0.00021	9	0.00030	0.00030	0.00030	3
Ni, Diss	Post-Closure	Jul	117	0.00014	0.00015	0.00025	-5	0.00054	0.00050	0.00054	87	0.00023	0.00021	0.00023	48	0.00022	0.00021	0.00022	15	0.00021	0.00021	0.00021	9	0.00030	0.00030	0.00030	2
Ni, Diss	Post-Closure	Aug	117	0.00016	0.00016	0.00028	-7	0.00053	0.00049	0.00053	85	0.00025	0.00024	0.00025	47	0.00022	0.00022	0.00022	14	0.00022	0.00022	0.00022	9	0.00032	0.00032	0.00032	2
Ni, Diss	Post-Closure	Sep	117	0.00017	0.00017	0.00029	-6	0.00052	0.00048	0.00052	84	0.00025	0.00024	0.00025	48	0.00023	0.00022	0.00023	14	0.00022	0.00022	0.00022	9	0.00032	0.00032	0.00032	2
Ni, Diss	Post-Closure	Oct	117	0.00017	0.00017	0.00028	-6	0.00052	0.00048	0.00052	86	0.00026	0.00024	0.00026	53	0.00023	0.00022	0.00023	14	0.00022	0.00022	0.00022	9	0.00032	0.00032	0.00032	2
Ni, Diss	Post-Closure	Nov	117	0.00023	0.00023	0.00037	-5	0.00064	0.00059	0.00064	86	0.00038	0.00036	0.00038	61	0.00026	0.00025	0.00026	15	0.00024	0.00024	0.00024	9	0.00036	0.00036	0.00036	2
Ni, Diss	Post-Closure	Dec	117	0.00022	0.00022	0.00036	-5	0.00064	0.00059	0.00064	86	0.00027	0.00025	0.00027	71	0.00026	0.00025	0.00026	16	0.00024	0.00024	0.00024	10	0.00036	0.00036	0.00036	2
Ni, Tot	Construction	Jan	2	0.00050	0.00050	0.00063	-32	0.00072	0.00072	0.00075	32	0.00040	0.00040	0.00044	39	0.00036	0.00036	0.00039	11	0.00050	0.00050	0.00052	-2	0.00061	0.00061	0.00061	0
Ni, Tot	Construction	Feb	2	0.00042	0.00042	0.00049	-48	0.00080	0.00080	0.00085	37	0.00044	0.00044	0.00045	38	0.00036	0.00036	0.00040	8	0.00051	0.00051	0.00052	-3	0.00063	0.00063	0.00063	0
Ni, Tot	Construction	Mar	2	0.00033	0.00033	0.00036	-52	0.00079	0.00079	0.00086	34	0.00044	0.00044	0.00048	50	0.00035	0.00035	0.00038	5	0.00050	0.00050	0.00050	-5	0.00060	0.00060	0.00060	0
Ni, Tot	Construction	Apr	2	0.00033	0.00033	0.00034	-51	0.00078	0.00078	0.00084	34	0.00046	0.00046	0.00049	54	0.00034	0.00034	0.00037	3	0.00048	0.00048	0.00048	-7	0.00059	0.00059	0.00060	0
Ni, Tot	Construction	May	2	0.00023	0.00023	0.00023	-39	0.00058	0.00058	0.00060	42	0.00025	0.00025	0.00026	96	0.00026	0.00026	0.00028	2	0.00040	0.00040	0.00040	-8	0.00048	0.00048	0.00048	-1
Ni, Tot	Construction	Jun	2	0.00025	0.00025	0.00025	-25	0.00059	0.00059	0.00061	45	0.00028	0.00028	0.00029	67	0.00025	0.00025	0.00026	2	0.00037	0.00037	0.00037	-9	0.00046	0.00046	0.00046	-1
Ni, Tot	Construction	Jul	2	0.00043	0.00043	0.00043	7	0.00062	0.00062	0.00065	53	0.00045	0.00045	0.00047	71	0.00026	0.00026	0.00027	5	0.00036	0.00036	0.00036	-10	0.00047	0.00047	0.00047	0
Ni, Tot	Construction	Aug	2	0.00063	0.00063	0.00064	19	0.00067	0.00067	0.00070	61	0.00056	0.00056	0.00058	63	0.00031	0.00031	0.00032	12	0.00035	0.00035	0.00036	-9	0.00052	0.00052	0.00052	0
Ni, Tot	Construction	Sep	2	0.00065	0.00065	0.00066	12	0.00071	0.00071	0.00074	67	0.00054	0.00054	0.00056	67	0.00034	0.00034	0.00035	18	0.00035	0.00035	0.00036	-7	0.00054	0.00054	0.00054	0
Ni, Tot	Construction	Oct	2	0.00060	0.00060	0.00061	2	0.00072	0.00072	0.00076	69	0.00054	0.00054	0.00057	80	0.00036	0.00036	0.00036	23	0.00035	0.00035	0.00036	-5	0.00053	0.00053	0.00053	0
Ni, Tot	Construction	Nov	2	0.00065	0.00065	0.00065	-19	0.00086	0.00086	0.00090	59	0.00061	0.00061	0.00063	38	0.00042	0.00042	0.00042	25	0.00052	0.00052	0.00052	-3	0.00061	0.00061	0.00062	0
Ni, Tot	Construction	Dec	2	0.00044	0.00044	0.00045	-42	0.00079	0.00079	0.00082	46	0.00047	0.00047	0.00049	48	0.00040	0.00040	0.00041	23	0.00051	0.00051	0.00051	-4	0.00061	0.00061	0.00061	0
Ni, Tot	Operations	Jan	5	0.00035	0.00035	0.00036	-52	0.00074	0.00076	0.00081	39	0.00043	0.00044	0.00047	53	0.00041	0.00042	0.00047	28	0.00051	0.00052	0.00055	0	0.00061	0.00061	0.00061	0
Ni, Tot	Operations	Feb	5	0.00033	0.00034	0.00034	-58	0.00077	0.00079	0.00086	34	0.00043	0.00044	0.00047	38	0.00041	0.00042	0.00047	25	0.00052	0.00053	0.00056	0	0.00063	0.00063	0.00063	0
Ni, Tot	Operations	Mar	5	0.00029	0.00029	0.00030	-58	0.00082	0.00083	0.00096	42	0.00045	0.00046	0.00053	55	0.00040	0.00041	0.00045	21	0.00051	0.00052	0.00055	-1	0.00060	0.00060	0.00060	-1
Ni, Tot	Operations	Apr	5	0.00030	0.00030	0.00031	-55	0.00084	0.00086	0.00100	46	0.00049	0.00049	0.00058	67	0.00038	0.00039	0.00044	18	0.00050	0.00051	0.00054	-2	0.00059	0.00059	0.00059	-1
Ni, Tot	Operations	May	5	0.00022	0.00022	0.00022	-43	0.00063	0.00064	0.00074	58	0.00026	0.00026	0.00030	109	0.00030	0.00030	0.00034	16	0.00042	0.00042	0.00045	-3	0.00048	0.00048	0.00048	-1
Ni, Tot	Operations	Jun	5	0.00023	0.00024	0.00024	-28	0.00068	0.00068	0.00079	68	0.00031	0.00031	0.00036	87	0.00027	0.00028	0.00031	14	0.00039	0.00039	0.00042	-4	0.00046	0.00046	0.00046	-1
Ni, Tot	Operations	Jul	5	0.00041	0.00041	0.00042	4	0.00077	0.00076	0.00090	87	0.00053	0.00053	0.00061	100	0.00029	0.00030	0.00033	17	0.00038	0.00038	0.00041	-4	0.00047	0.00047	0.00047	-1
Ni, Tot	Operations	Aug	5	0.00061	0.00061	0.00062	16	0.00084	0.00084	0.00099	100	0.00068	0.00067	0.00078	96	0.00034	0.00035	0.00039	24	0.00037	0.00038	0.00040	-2	0.00052	0.00052	0.00052	0
Ni, Tot	Operations	Sep	5	0.00063	0.00063	0.00064	9	0.00088	0.00087	0.00102	104	0.00065	0.00065	0.00075	101	0.00039	0.00039	0.00043	30	0.00037	0.00038	0.00040	0	0.00053	0.00053	0.00054	0
Ni, Tot	Operations	Oct	5	0.00058	0.00058	0.00059	-1	0.00085	0.00084	0.00098	98	0.00064	0.00063	0.00073	110	0.00041	0.00041	0.00045	36	0.00037	0.00038	0.00041	2	0.00053	0.00053	0.00053	0
Ni, Tot	Operations	Nov	5	0.00062	0.00063	0.00064	-22	0.00096	0.00095	0.00107	77	0.00071	0.00071	0.00080	59	0.00047	0.00047	0.00052	38	0.00055	0.00055	0.00058	3	0.00061	0.00061	0.00061	0
Ni, Tot	Operations	Dec	5	0.00042	0.00043	0.00043	-44	0.00086	0.00085	0.00094	58	0.00052	0.00052	0.00057	62	0.00045	0.00045	0.00051	36	0.00054	0.00054	0.00058	3	0.00061	0.00061	0.00061	0
Ni, Tot	Closure	Jan	6	0.00036	0.00036	0.00038	-51	0.00066	0.00069	0.00082	26	0.00038	0.00040	0.00049	39	0.00035	0.00038	0.00049	13	0.00049	0.00051	0.00057	-3	0.00061	0.00061	0.00061	0
Ni, Tot	Closure	Feb	6	0.00035	0.00035	0.00036	-57	0.00067	0.00068	0.00078	17	0.00038	0.00039	0.00045	23	0.00036	0.00038	0.00050	10	0.00049	0.00051	0.00058	-4	0.00063	0.00063	0.00063	0
Ni, Tot	Closure	Mar	6	0.00030	0.00030	0.00031	-57	0.00062	0.00063	0.00070	8	0.00035	0.00036	0.00040	22	0.00034	0.00037	0.00048	7	0.00048	0.00050	0.00057	-5	0.00060	0.00060	0.00060	0
Ni, Tot	Closure	Apr	6	0.00031	0.00031	0.00032	-54	0.00059	0.00060	0.00064	3	0.00035	0.00035	0.00038	19	0.00033	0.00035	0.00046	4	0.00047	0.00049	0.00056	-6	0.00060	0.00060	0.00060	0
Ni, Tot	Closure	May	6	0.00022	0.00022	0.00023	-41	0.00044	0.00044	0.00046	8	0.00018	0.00018	0.00019	45	0.00026	0.00027	0.00035	2	0.00039	0.00041	0.00047	-7	0.00049	0.00048	0.00049	0
Ni, Tot	Closure	Jun	6	0.00024	0.00024	0.00025	-26	0.00045	0.00045	0.00046	10	0.00021	0.00021	0.00022	28	0.00024	0.00025	0.00031	0	0.00037	0.00038	0.00044	-8	0.00046	0.00046	0.00046	0
Ni, Tot	Closure	Jul	6	0.00042	0.00042	0.00043	5	0.00048	0.00048	0.00049	17	0.00035	0.00034	0.00035	31	0.00025	0.00026	0.00031	0	0.00035	0.00037	0.00042	-8	0.00047	0.00047	0.00047	0
Ni, Tot	Closure	Aug	6	0.00062	0.00062	0.00063	17	0.00053	0.00053	0.00054	27	0.00044	0.00044	0.00045	28	0.00029	0.00030	0.00034	3	0.00035	0.00036	0.00041	-8	0.00052	0.00052	0.00052	0
Ni, Tot	Closure	Sep	6	0.00065	0.00064	0.00066	11	0.00058	0.00058	0.00059	36	0.00043	0.00043	0.00044	34	0.00032	0.00032	0.00036	6	0.00034	0.00035	0.00040	-7	0.00054	0.00054	0.00054	0
Ni, Tot	Closure	Oct	6	0.00060	0.00060	0.00061	1	0.00060	0.00060	0.00061	40	0.00044	0.00044	0.00045	46	0.00033	0.00033	0.00036	9	0.00034	0.00035	0.00040	-6	0.00053	0.00053	0.00054	0
Ni, Tot	Closure	Nov	6	0.00065	0.00065	0.00068	-19	0.00073	0.00073	0.00074	36	0.00053	0.00053	0.00053	19	0.00037	0.00038	0.00041	9	0.00050	0.00052	0.00057	-5	0.00062	0.00062	0.00062	0
Ni, Tot	Closure	Dec	6	0.00045	0.00045	0.00050	-41	0.00070	0.00070	0.00071	29	0.00041	0.00041	0.00042	30	0.00036	0.00037	0.00040	7	0.00049	0.00050	0.00055	-5	0.00061	0.00061	0.00061	0
Ni, Tot	Post-Closure	Jan	117	0.00068	0.00068	0.00074	-8	0.00085	0.00080	0.00086	48	0.00044	0.00041	0.00044	44	0.00039	0.00038	0.00039	11	0.00055	0.00055	0.00055	4	0.00062	0.00062	0.00062	1
Ni, Tot	Post-Closure	Feb	117	0.00075	0.00075	0.00082	-8	0.00093	0.00087	0.00093	49	0.00048	0.00045	0.00048	44	0.00040	0.00040	0.00040	11	0.00056	0.00056	0.00056	4	0.00064	0.00064	0.00064	1
Ni, Tot	Post-Closure	Mar	117	0.00064	0.00063	0.00070	-8	0.00097	0.00090	0.00097	54	0.00048	0.00045	0.00048	53	0.00040	0.00039	0.00040	11	0.00056	0.00055	0.00056	4	0.00061	0.00061	0.00061	2
Ni, Tot	Post-Closure	Apr	117	0.00062	0.00061	0.00067	-7	0.00100	0.00093	0.00100	59	0.00050	0.00047	0.00050	58	0.00039	0.00039	0.00039	11	0.00055	0.00055	0.00055	4	0.00061	0.00061	0.00061	2
Ni, Tot	Post-Closure	May	117	0.00036	0.00036	0.00039	-6	0.00070	0.00065	0.00070	60	0.00017	0.00017	0.00017	32	0.00031	0.00030	0.00031	11	0.00046	0.00046	0.00046	4	0.00049	0.00049	0.00049	2
Ni, Tot	Post-Closure	Jun	117	0.00032	0.00032	0.00034	-3	0.00068	0.00064	0.00068	57	0.00024	0.00023	0.00024	38	0.00029	0.00028	0.00029	11	0.00044	0.00043	0.00044	4	0.00047	0.00047	0.00047	2
Ni, Tot	Post-Closure	Jul	117	0.00038	0.00038	0.00039	-6	0.00067	0.00063	0.00067	55	0.00036	0.00035	0.00036	31	0.00030	0.00029	0.00030	10	0.00042	0.00042	0.00042	4	0.00048	0.00048	0.00048	2
Ni, Tot	Post-Closure	Aug	117	0.00049	0.00049	0.00058	-8	0.00067	0.00063	0.00067	51	0.00046	0.00044	0.00046	30	0.00033	0.00032	0.00033	9	0.00041	0.00041	0.00041	4	0.00053	0.00053	0.00053	1
Ni, Tot	Post-Closure	Sep	117	0.00053	0.00053	0.00062	-8	0.00068	0.00064	0.00068	49	0.00044	0.00042	0.00044	32	0.00034	0.00034	0.00034	9	0.00040	0.00040	0.00040	5	0.00054	0.00054	0.00054	1
Ni, Tot	Post-Closure	Oct	117	0.00054	0.00054	0.00060	-8	0.00068	0.00064	0.00068	50	0.00043	0.00041	0.00043	35	0.00035	0.00034	0.00035	10	0.00040	0.00039	0.00040	5	0.00054	0.00054	0.00054	1
Ni, Tot	Post-Closure	Nov	117	0.00074	0.00074	0.00081	-8	0.00085	0.00080	0.00085	48	0.00065	0.00062	0.00065	39	0.00040	0.00039	0.00040	10	0.00057	0.00056	0.00057	4	0.00062	0.00062	0.00062	1
Ni, Tot	Post-Closure	Dec	117	0.00070	0.00070	0.00077	-8	0.00085	0.00080	0.00085	48	0.00048	0.00046	0.00048	43	0.00039	0.00038	0.00039	11	0.00056	0.00055	0.00056	4	0.00062	0.00062	0.00062	1
Se, Tot	Construction	Jan	2	0.00009	0.00009	0.00011	-28	0.00006	0.00006	0.00006	5	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	-5	0.00019	0.00019	0.00021	-12	0.00007	0.00007	0.00007	0
Se, Tot	Construction	Feb	2	0.00008	0.00008	0.00009	-41	0.00006	0.00006	0.00006	-1	0.00006	0.00006	0.00007	-13	0.00004	0.00004	0.00005	-6	0.00018	0.00018	0.00021	-15	0.00007	0.00007	0.00007	0
Se, Tot	Construction	Mar	2	0.00007	0.00007	0.00007	-43	0.00005	0.00005	0.00006	-7	0.00005	0.00005	0.00006	-21	0.00004	0.00004	0.00004	-9	0.00017	0.00017	0.00020	-18	0.00007	0.00007	0.00007	0
Se, Tot	Construction	Apr	2	0.00007	0.00007	0.00007	-40	0.00005	0.00005	0.00006	-7	0.00005	0.00005	0.00006	-23	0.00004	0.00004	0.00004	-11	0.00016	0.00016	0.00018	-23	0.00007	0.00007	0.00007	0
Se, Tot	Construction	May	2	0.00013	0.00013	0.00013	-13	0.00005	0.00005	0.00005	15	0.00010	0.00010	0.00010	-39	0.00003	0.00003	0.00003	-10	0.00013	0.00013	0.00014	-26	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Jun	2	0.00021	0.00021	0.00022	-6	0.00006	0.00006	0.00006	38	0.00010	0.00010	0.00011	-39	0.00004	0.00004	0.00004	-9	0.00012	0.00012	0.00013	-26	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Jul	2	0.00018	0.00018	0.00018	-19	0.00007	0.00007	0.00007	43	0.00008	0.00008	0.00008	-29	0.00004	0.00004	0.00004	-8	0.00012	0.00012	0.00013	-26	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Aug	2	0.00011	0.00011	0.00011	-35	0.00006	0.00006	0.00007	35	0.00006	0.00006	0.00007	-2	0.00004	0.00004	0.00004	-8	0.00011	0.00011	0.00012	-26	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Sep	2	0.00008	0.00008	0.00008	-41	0.00006	0.00006	0.00006	32	0.00006	0.00006	0.00006	11	0.00004	0.00004	0.00004	-8	0.00010	0.00010	0.00011	-27	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Oct	2	0.00007	0.00007	0.00007	-38	0.00006	0.00006	0.00006	34	0.00006	0.00006	0.00006	18	0.00004	0.00004	0.00004	-7	0.00009	0.00009	0.00010	-29	0.00006	0.00006	0.00006	0
Se, Tot	Construction	Nov	2	0.00008	0.00008	0.00008	-41	0.00007	0.00007	0.00007	26	0.00008	0.00008	0.00008	1	0.00004	0.00004	0.00004	-6	0.00018	0.00018	0.00018	-20	0.00007	0.00007	0.00007	0
Se, Tot	Construction	Dec	2	0.00007	0.00007	0.00007	-46	0.00006	0.00006	0.00006	16	0.00007	0.00007	0.00007	8	0.00004	0.00004	0.00004	-6	0.00017	0.00017	0.00017	-23	0.00007	0.00007	0.00007	0
Se, Tot	Operations	Jan	5	0.00006	0.00006	0.00007	-49	0.00007	0.00007	0.00009	34	0.00007	0.00008	0.00009	27	0.00005	0.00005	0.00006	11	0.00016	0.00016	0.00017	-23	0.00007	0.00007	0.00007	0
Se, Tot	Operations	Feb	5	0.00006	0.00007	0.00007	-53	0.00007	0.00008	0.00009	34	0.00008	0.00008	0.00010	15	0.00005	0.00005	0.00006	10	0.00016	0.00016	0.00017	-25	0.00007	0.00007	0.00007	0
Se, Tot	Operations	Mar	5	0.00006	0.00006	0.00006	-50	0.00008	0.00008	0.00011	45	0.00008	0.00008	0.00010	18	0.00005	0.00005	0.00006	9	0.00015	0.00015	0.00016	-27	0.00007	0.00007	0.00007	0
Se, Tot	Operations	Apr	5	0.00006	0.00006	0.00006	-45	0.00008	0.00008	0.00011	51	0.00008	0.00008	0.00011	22	0.00005	0.00005	0.00006	9	0.00014	0.00014	0.00015	-30	0.00007	0.00007	0.00007	0
Se, Tot	Operations	May	5	0.00013	0.00013	0.00013	-15	0.00007	0.00007	0.00009	77	0.00012	0.00012	0.00013	-28	0.00004	0.00004	0.00005	11	0.00012	0.00012	0.00012	-31	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Jun	5	0.00021	0.00021	0.00021	-9	0.00009	0.00009	0.00011	108	0.00012	0.00013	0.00014	-24	0.00004	0.00005	0.00005	10	0.00012	0.00012	0.00012	-29	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Jul	5	0.00017	0.00017	0.00017	-22	0.00011	0.00011	0.00014	128	0.00011	0.00011	0.00013	-2	0.00005	0.00005	0.00005	10	0.00012	0.00012	0.00012	-28	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Aug	5	0.00010	0.00010	0.00010	-38	0.00011	0.00011	0.00014	126	0.00010	0.00010	0.00013	50	0.00005	0.00005	0.00005	11	0.00011	0.00011	0.00012	-27	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Sep	5	0.00007	0.00007	0.00008	-44	0.00011	0.00011	0.00014	124	0.00010	0.00010	0.00013	75	0.00005	0.00005	0.00005	14	0.00010	0.00010	0.00011	-26	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Oct	5	0.00006	0.00006	0.00007	-41	0.00010	0.00010	0.00013	118	0.00010	0.00010	0.00012	85	0.00005	0.00005	0.00005	17	0.00009	0.00009	0.00010	-27	0.00006	0.00006	0.00006	0
Se, Tot	Operations	Nov	5	0.00008	0.00008	0.00008	-43	0.00011	0.00011	0.00014	90	0.00012	0.00012	0.00016	55	0.00005	0.00005	0.00006	20	0.00018	0.00018	0.00019	-18	0.00007	0.00007	0.00007	0
Se, Tot	Operations	Dec	5	0.00007	0.00007	0.00007	-49	0.00009	0.00009	0.00011	62	0.00009	0.00009	0.00012	53	0.00005	0.00005	0.00006	21	0.00017	0.00017	0.00018	-20	0.00007	0.00007	0.00007	0
Se, Tot	Closure	Jan	6	0.00007	0.00007	0.00007	-47	0.00006	0.00006	0.00009	15	0.00006	0.00007	0.00010	10	0.00004	0.00005	0.00006	5	0.00016	0.00016	0.00017	-22	0.00007	0.00007	0.00007	0
Se, Tot	Closure	Feb	6	0.00007	0.00007	0.00007	-51	0.00006	0.00006	0.00008	6	0.00006	0.00007	0.00009	-4	0.00004	0.00005	0.00007	3	0.00016	0.00016	0.00017	-24	0.00007	0.00007	0.00007	0
Se, Tot	Closure	Mar	6	0.00006	0.00006	0.00006	-49	0.00005	0.00006	0.00007	0	0.00006	0.00006	0.00007	-14	0.00004	0.00005	0.00006	2	0.00015	0.00015	0.00016	-26	0.00007	0.00007	0.00007	0
Se, Tot	Closure	Apr	6	0.00006	0.00006	0.00007	-44	0.00005	0.00005	0.00006	-4	0.00005	0.00005	0.00006	-19	0.00004	0.00004	0.00006	0	0.00014	0.00014	0.00016	-28	0.00007	0.00007	0.00007	0
Se, Tot	Closure	May	6	0.00013	0.00013	0.00013	-15	0.00004	0.00004	0.00005	11	0.00011	0.00011	0.00011	-35	0.00003	0.00004	0.00005	0	0.00012	0.00012	0.00013	-30	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Jun	6	0.00021	0.00021	0.00021	-8	0.00006	0.00006	0.00006	30	0.00011	0.00011	0.00011	-35	0.00004	0.00004	0.00005	-1	0.00012	0.00012	0.00013	-28	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Jul	6	0.00018	0.00017	0.00018	-20	0.00006	0.00006	0.00007	37	0.00008	0.00008	0.00008	-27	0.00004	0.00004	0.00005	-2	0.00011	0.00012	0.00013	-26	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Aug	6	0.00011	0.00011	0.00011	-35	0.00006	0.00006	0.00006	31	0.00006	0.00006	0.00007	-3	0.00004	0.00004	0.00005	-3	0.00011	0.00011	0.00012	-26	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Sep	6	0.00008	0.00008	0.00008	-41	0.00006	0.00006	0.00006	27	0.00006	0.00006	0.00006	9	0.00004	0.00004	0.00005	-3	0.00010	0.00010	0.00011	-26	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Oct	6	0.00007	0.00007	0.00007	-38	0.00006	0.00006	0.00006	27	0.00006	0.00006	0.00006	13	0.00004	0.00004	0.00004	-2	0.00009	0.00009	0.00010	-26	0.00006	0.00006	0.00006	0
Se, Tot	Closure	Nov	6	0.00008	0.00008	0.00009	-41	0.00007	0.00007	0.00007	20	0.00008	0.00008	0.00008	-2	0.00004	0.00004	0.00005	-3	0.00018	0.00018	0.00019	-18	0.00007	0.00007	0.00007	0
Se, Tot	Closure	Dec	6	0.00007	0.00007	0.00007	-46	0.00006	0.00006	0.00006	11	0.00006	0.00006	0.00007	4	0.00004	0.00004	0.00005	-3	0.00017	0.00017	0.00018	-20	0.00007	0.00007	0.00007	0
Se, Tot	Post-Closure	Jan	117	0.00014	0.00013	0.00014	7	0.00011	0.00010	0.00011	87	0.00010	0.00010	0.00010	63	0.00005	0.00005	0.00005	15	0.00021	0.00021	0.00021	1	0.00007	0.00007	0.00007	7
Se, Tot	Post-Closure	Feb	117	0.00015	0.00015	0.00015	7	0.00012	0.00011	0.00012	90	0.00012	0.00011	0.00012	61	0.00005	0.00005	0.00005	15	0.00021	0.00021	0.00021	1	0.00007	0.00007	0.00007	8
Se, Tot	Post-Closure	Mar	117	0.00013	0.00013	0.00013	7	0.00012	0.00011	0.00012	99	0.00012	0.00011	0.00012	66	0.00005	0.00005	0.00005	16	0.00021	0.00021	0.00021	1	0.00007	0.00007	0.00007	8
Se, Tot	Post-Closure	Apr	117	0.00012	0.00012	0.00012	7	0.00013	0.00011	0.00013	108	0.00012	0.00011	0.00012	66	0.00005	0.00005	0.00005	16	0.00020	0.00020	0.00020	1	0.00007	0.00007	0.00007	8
Se, Tot	Post-Closure	May	117	0.00015	0.00015	0.00015	-3	0.00009	0.00008	0.00009	106	0.00017	0.00017	0.00017	5	0.00004	0.00004	0.00004	15	0.00017	0.00017	0.00017	1	0.00006	0.00006	0.00006	8
Se, Tot	Post-Closure	Jun	117	0.00022	0.00021	0.00022	-6	0.00009	0.00008	0.00009	89	0.00019	0.00019	0.00019	13	0.00005	0.00005	0.00005	13	0.00016	0.00016	0.00017	1	0.00006	0.00006	0.00006	7
Se, Tot	Post-Closure	Jul	117	0.00021	0.00021	0.00021	-4	0.00009	0.00008	0.00009	79	0.00014	0.00013	0.00014	20	0.00005	0.00005	0.00005	12	0.00016	0.00016	0.00016	1	0.00006	0.00006	0.00006	7
Se, Tot	Post-Closure	Aug	117	0.00017	0.00016	0.00017	0	0.00009	0.00008	0.00009	73	0.00009	0.00009	0.00009	31	0.00005	0.00005	0.00005	12	0.00015	0.00015	0.00015	2	0.00006	0.00006	0.00006	7
Se, Tot	Post-Closure	Sep	117	0.00014	0.00014	0.00014	3	0.00009	0.00008	0.00009	73	0.00008	0.00008	0.00008	36	0.00005	0.00004	0.00005	12	0.00014	0.00014	0.00014	2	0.00006	0.00006	0.00006	6
Se, Tot	Post-Closure	Oct	117	0.00012	0.00011	0.00012	5	0.00009	0.00008	0.00009	78	0.00008	0.00007	0.00008	41	0.00004	0.00004	0.00004	13	0.00013	0.00013	0.00013	2	0.00006	0.00006	0.00006	6
Se, Tot	Post-Closure	Nov	117	0.00015	0.00015	0.00015	7	0.00011	0.00010	0.00011	82	0.00013	0.00012	0.00013	53	0.00005	0.00005	0.00005	14	0.00022	0.00022	0.00022	1	0.00007	0.00007	0.00007	7
Se, Tot	Post-Closure	Dec	117	0.00014	0.00014	0.00014	7	0.00011	0.00010	0.00011	84	0.00011	0.00010	0.00011	63	0.00005	0.00005	0.00005	14	0.00021	0.00021	0.00021	2	0.00007	0.00007	0.00007	7

Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake Predicted Project Water Quality				West Farley Lake Predicted Project Water Quality				East Farley Lake Predicted Project Water Quality				Swede Lake Predicted Project Water Quality				Ellystan Lake Predicted Project Water Quality				Susan Lake last one Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Ag, Tot	Construction	Jan	2	0.000011	0.000011	0.000012	-15	0.000006	0.000006	0.000007	15	0.000003	0.000003	0.000004	-3	0.000007	0.000007	0.000009	-20	0.000018	0.000018	0.000021	-12	0.000019	0.000019	0.000019	0
Ag, Tot	Construction	Feb	2	0.000010	0.000010	0.000011	-27	0.000006	0.000006	0.000007	10	0.000003	0.000003	0.000004	-23	0.000007	0.000007	0.000008	-25	0.000018	0.000018	0.000021	-14	0.000019	0.000019	0.000019	0
Ag, Tot	Construction	Mar	2	0.000008	0.000008	0.000009	-28	0.000006	0.000006	0.000007	5	0.000003	0.000003	0.000003	-26	0.000006	0.000006	0.000008	-30	0.000017	0.000017	0.000020	-17	0.000018	0.000018	0.000019	-1
Ag, Tot	Construction	Apr	2	0.000008	0.000008	0.000009	-25	0.000006	0.000006	0.000006	4	0.000003	0.000003	0.000003	-31	0.000006	0.000006	0.000007	-36	0.000016	0.000016	0.000018	-21	0.000018	0.000018	0.000018	-1
Ag, Tot	Construction	May	2	0.000017	0.000017	0.000017	9	0.000005	0.000005	0.000006	24	0.000010	0.000010	0.000010	-37	0.000005	0.000005	0.000006	-32	0.000013	0.000013	0.000015	-24	0.000015	0.000015	0.000015	-1
Ag, Tot	Construction	Jun	2	0.000028	0.000028	0.000028	21	0.000007	0.000007	0.000008	35	0.000011	0.000011	0.000012	-35	0.000008	0.000008	0.000008	-32	0.000013	0.000013	0.000014	-24	0.000014	0.000014	0.000014	-1
Ag, Tot	Construction	Jul	2	0.000023	0.000023	0.000024	7	0.000008	0.000008	0.000008	40	0.000006	0.000006	0.000006	-42	0.000009	0.000009	0.000009	-21	0.000013	0.000013	0.000014	-23	0.000015	0.000015	0.000015	-1
Ag, Tot	Construction	Aug	2	0.000014	0.000014	0.000014	-13	0.000007	0.000007	0.000008	39	0.000004	0.000004	0.000004	-17	0.000007	0.000007	0.000008	-25	0.000013	0.000013	0.000015	-23	0.000017	0.000017	0.000017	0
Ag, Tot	Construction	Sep	2	0.000011	0.000011	0.000011	-18	0.000007	0.000007	0.000007	39	0.000004	0.000004	0.000004	14	0.000007	0.000007	0.000007	-28	0.000012	0.000012	0.000013	-24	0.000018	0.000018	0.000018	0
Ag, Tot	Construction	Oct	2	0.000010	0.000010	0.000010	-12	0.000007	0.000007	0.000007	42	0.000004	0.000004	0.000005	24	0.000006	0.000006	0.000006	-31	0.000011	0.000011	0.000012	-26	0.000017	0.000017	0.000017	0
Ag, Tot	Construction	Nov	2	0.000012	0.000012	0.000012	-15	0.000008	0.000008	0.000008	39	0.000005	0.000005	0.000006	-2	0.000006	0.000006	0.000006	-34	0.000017	0.000017	0.000018	-22	0.000019	0.000019	0.000019	0
Ag, Tot	Construction	Dec	2	0.000010	0.000010	0.000010	-26	0.000007	0.000007	0.000007	33	0.000004	0.000004	0.000004	8	0.000006	0.000006	0.000006	-36	0.000016	0.000016	0.000017	-24	0.000019	0.000019	0.000019	-1
Ag, Tot	Operations	Jan	5	0.000008	0.000009	0.000009	-32	0.000007	0.000007	0.000007	28	0.000004	0.000004	0.000004	4	0.000006	0.000006	0.000006	-39	0.000015	0.000015	0.000015	-28	0.000019	0.000019	0.000019	-1
Ag, Tot	Operations	Feb	5	0.000008	0.000009	0.000009	-38	0.000007	0.000007	0.000007	23	0.000003	0.000003	0.000004	-13	0.000006	0.000005	0.000006	-41	0.000015	0.000015	0.000015	-30	0.000019	0.000019	0.000019	-1
Ag, Tot	Operations	Mar	5	0.000007	0.000008	0.000008	-36	0.000006	0.000006	0.000007	20	0.000003	0.000003	0.000003	-17	0.000005	0.000005	0.000005	-44	0.000014	0.000014	0.000014	-32	0.000018	0.000018	0.000018	-1
Ag, Tot	Operations	Apr	5	0.000008	0.000008	0.000008	-31	0.000006	0.000006	0.000007	20	0.000003	0.000003	0.000003	-20	0.000005	0.000005	0.000005	-48	0.000013	0.000013	0.000013	-35	0.000018	0.000018	0.000018	-1
Ag, Tot	Operations	May	5	0.000016	0.000016	0.000016	5	0.000006	0.000006	0.000006	36	0.000010	0.000010	0.000010	-34	0.000005	0.000005	0.000005	-41	0.000011	0.000011	0.000011	-36	0.000015	0.000015	0.000015	-1
Ag, Tot	Operations	Jun	5	0.000027	0.000027	0.000027	17	0.000008	0.000008	0.000008	43	0.000012	0.000012	0.000012	-31	0.000008	0.000008	0.000008	-28	0.000011	0.000011	0.000011	-33	0.000014	0.000014	0.000014	-1
Ag, Tot	Operations	Jul	5	0.000022	0.000022	0.000023	2	0.000008	0.000008	0.000009	48	0.000006	0.000006	0.000006	-39	0.000009	0.000009	0.000009	-25	0.000012	0.000012	0.000012	-30	0.000015	0.000015	0.000015	-1
Ag, Tot	Operations	Aug	5	0.000014	0.000014	0.000014	-17	0.000008	0.000008	0.000008	48	0.000004	0.000004	0.000004	-13	0.000007	0.000007	0.000007	-28	0.000012	0.000012	0.000012	-29	0.000017	0.000017	0.000017	0
Ag, Tot	Operations	Sep	5	0.000010	0.000010	0.000010	-22	0.000007	0.000007	0.000007	48	0.000004	0.000004	0.000004	20	0.000006	0.000006	0.000006	-30	0.000011	0.000011	0.000011	-30	0.000018	0.000018	0.000018	0
Ag, Tot	Operations	Oct	5	0.000009	0.000009	0.000009	-16	0.000007	0.000007	0.000007	48	0.000005	0.000005	0.000005	29	0.000006	0.000006	0.000006	-32	0.000010	0.000010	0.000010	-31	0.000017	0.000017	0.000017	0
Ag, Tot	Operations	Nov	5	0.000011	0.000011	0.000011	-20	0.000008	0.000008	0.000008	42	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	-34	0.000017	0.000017	0.000017	-24	0.000019	0.000019	0.000019	0
Ag, Tot	Operations	Dec	5	0.000009	0.000009	0.000009	-30	0.000007	0.000007	0.000007	33	0.000004	0.000004	0.000004	9	0.000006	0.000006	0.000006	-36	0.000016	0.000016	0.000016	-26	0.000019	0.000019	0.000019	-1
Ag, Tot	Closure	Jan	6	0.000009	0.000009	0.000009	-30	0.000007	0.000007	0.000007	27	0.000004	0.000004	0.000004	4	0.000006	0.000006	0.000006	-37	0.000015	0.000015	0.000015	-27	0.000019	0.000019	0.000019	0
Ag, Tot	Closure	Feb	6	0.000009	0.000009	0.000009	-36	0.000007	0.000007	0.000007	21	0.000003	0.000003	0.000004	-13	0.000006	0.000006	0.000006	-40	0.000015	0.000015	0.000015	-29	0.000020	0.000019	0.000020	0
Ag, Tot	Closure	Mar	6	0.000008	0.000008	0.000008	-34	0.000006	0.000006	0.000007	16	0.000003	0.000003	0.000003	-17	0.000005	0.000005	0.000005	-43	0.000014	0.000014	0.000015	-31	0.000019	0.000019	0.000019	0
Ag, Tot	Closure	Apr	6	0.000008	0.000008	0.000008	-29	0.000006	0.000006	0.000006	13	0.000003	0.000003	0.000003	-23	0.000005	0.000005	0.000005	-46	0.000014	0.000014	0.000014	-33	0.000018	0.000018	0.000018	0
Ag, Tot	Closure	May	6	0.000016	0.000016	0.000017	6	0.000005	0.000005	0.000006	26	0.000011	0.000011	0.000011	-33	0.000005	0.000005	0.000005	-40	0.000011	0.000011	0.000012	-34	0.000015	0.000015	0.000015	0
Ag, Tot	Closure	Jun	6	0.000027	0.000027	0.000028	18	0.000007	0.000007	0.000007	34	0.000012	0.000012	0.000012	-30	0.000008	0.000008	0.000008	-26	0.000012	0.000012	0.000012	-31	0.000014	0.000014	0.000014	0
Ag, Tot	Closure	Jul	6	0.000023	0.000023	0.000023	3	0.000008	0.000008	0.000008	41	0.000006	0.000006	0.000006	-36	0.000009	0.000009	0.000009	-23	0.000012	0.000012	0.000012	-29	0.000015	0.000015	0.000015	0
Ag, Tot	Closure	Aug	6	0.000014	0.000014	0.000015	-14	0.000008	0.000008	0.000008	43	0.000004	0.000004	0.000004	-13	0.000007	0.000007	0.000008	-25	0.000012	0.000012	0.000012	-28	0.000017	0.000017	0.000017	0
Ag, Tot	Closure	Sep	6	0.000011	0.000011	0.000011	-18	0.000007	0.000007	0.000007	42	0.000004	0.000004	0.000004	16	0.000007	0.000007	0.000007	-27	0.000011	0.000011	0.000012	-28	0.000018	0.000018	0.000018	0
Ag, Tot	Closure	Oct	6	0.000010	0.000010	0.000010	-12	0.000007	0.000007	0.000007	44	0.000004	0.000004	0.000005	26	0.000006	0.000006	0.000006	-29	0.000011	0.000011	0.000011	-28	0.000017	0.000017	0.000017	0
Ag, Tot	Closure	Nov	6	0.000012	0.000012	0.000012	-16	0.000008	0.000008	0.000008	39	0.000005	0.000005	0.000006	2	0.000006	0.000006	0.000007	-31	0.000017	0.000017	0.000017	-23	0.000019	0.000019	0.000019	0
Ag, Tot	Closure	Dec	6	0.000010	0.000010	0.000010	-26	0.000007	0.000007	0.000007	33	0.000004	0.000004	0.000004	10	0.000006	0.000006	0.000006	-34	0.000016	0.000016	0.000016	-25	0.000019	0.000019	0.000019	0
Ag, Tot	Post-Closure	Jan	117	0.000014	0.000013	0.000014	7	0.000007	0.000007	0.000007	29	0.000004	0.000004	0.000004	19	0.000009	0.000009	0.000009	0	0.000020	0.000020	0.000021	0	0.000019	0.000019	0.000019	0
Ag, Tot	Post-Closure	Feb	117	0.000015	0.000015	0.000015	7	0.000007	0.000007	0.000007	30	0.000005	0.000005	0.000005	17	0.000009	0.000009	0.000009	0	0.000021	0.000021	0.000021	0	0.000020	0.000020	0.000020	1
Ag, Tot	Post-Closure	Mar	117	0.000013	0.000013	0.000013	7	0.000007	0.000007	0.000007	32	0.000004	0.000004	0.000005	16	0.000009	0.000009	0.000009	0	0.000020	0.000020	0.000021	0	0.000019	0.000019	0.000019	1
Ag, Tot	Post-Closure	Apr	117	0.000012	0.000012	0.000012	7	0.000007	0.000007	0.000007	34	0.000004	0.000004	0.000005	12	0.000009	0.000009	0.000009	0	0.000020	0.000020	0.000021	-1	0.000018	0.000018	0.000018	1
Ag, Tot	Post-Closure	May	117	0.000015	0.000015	0.000015	-3	0.000006	0.000006	0.000006	31	0.000016	0.000016	0.000017	-1	0.000008	0.000008	0.000008	0	0.000017	0.000017	0.000017	-1	0.000015	0.000015	0.000015	1
Ag, Tot	Post-Closure	Jun	117	0.000022	0.000022	0.000026	-5	0.000007	0.000007	0.000007	23	0.000018	0.000018	0.000019	5	0.000010	0.000010	0.000011	0	0.000017	0.000017	0.000017	-1	0.000014	0.000014	0.000014	1
Ag, Tot	Post-Closure	Jul	117	0.000021	0.000021	0.000023	-4	0.000007	0.000007	0.000008	21	0.000011	0.000011	0.000011	7	0.000011	0.000011	0.000012	0	0.000017	0.000017	0.000017	-1	0.000015	0.000015	0.000015	1
Ag, Tot	Post-Closure	Aug	117	0.000017	0.000017	0.000017	0	0.000007	0.000006	0.000007	21	0.000005	0.000005	0.000005	10	0.000010	0.000010	0.000010	0	0.000016	0.000016	0.000017	0	0.000017	0.000017	0.000017	0
Ag, Tot	Post-Closure	Sep	117	0.000014	0.000014	0.000014	3	0.000006	0.000006	0.000007	23	0.000004	0.000004	0.000004	12	0.000009	0.000009	0.000009	1	0.000016	0.000016	0.000016	0	0.000018	0.000018	0.000018	0
Ag, Tot	Post-Closure	Oct	117	0.000012	0.000012	0.000012	6	0.000006	0.000006	0.000006	26	0.000004	0.000004	0.000004	14	0.000008	0.000008	0.000009	1	0.000015	0.000015	0.000015	0	0.000017	0.000017	0.000017	0
Ag, Tot	Post-Closure	Nov	117	0.000015	0.000015	0.000015	7	0.000007	0.000007	0.000008	28	0.000006	0.000006	0.000006	17	0.000009	0.000009	0.000009	1	0.000021	0.000021	0.000022	0	0.000019	0.000019	0.000019	0
Ag, Tot	Post-Closure	Dec	117	0.000014	0.000014	0.000014	8	0.000007	0.000007	0.000007	28	0.000005	0.000004	0.000005	20	0.000009	0.000009	0.000009	1	0.000021	0.000021	0.000021	0	0.000019	0.000019	0.000019	0
Ta, Tot	Construction	Jan	2	0.000047	0.000047	0.000057	-24	0.000044	0.000044	0.000048	-11	0.000036	0.000036	0.000039	1	0.000048	0.000048	0.000051	-6	0.000048	0.000048	0.000050	-4	0.000057	0.000057	0.000057	0
Ta, Tot	Construction	Feb	2	0.000042	0.000042	0.000048	-38	0.000043	0.000043	0.000046	-19	0.000035	0.000035	0.000038	-11	0.000049	0.000049	0.000052	-9	0.000048	0.000048	0.000050	-5	0.000060	0.000060	0.000060	0
Ta, Tot	Construction	Mar	2	0.000035	0.000035	0.000037	-40	0.000038	0.000038	0.000041	-25	0.000034	0.000034	0.000036	-10	0.000046	0.000046	0.000049	-12	0.000048	0.000048	0.000050	-6	0.000057	0.000057	0.000057	0
Ta, Tot	Construction	Apr	2	0.000035	0.000035	0.000036	-38	0.000036	0.000036	0.000038	-29	0.000033	0.000033	0.000034	-13	0.000044	0.000044	0.000046	-15	0.000047	0.000047	0.000049	-7	0.000057	0.000057	0.000057	0
Ta, Tot	Construction	May	2	0.000033	0.000033	0.000033	-19	0.000031	0.000031	0.000032	-17	0.000030	0.000030	0.000030	-8	0.000036	0.000036	0.000037	-16	0.000040	0.000040	0.000042	-7	0.000049	0.000049	0.000049	0
Ta, Tot	Construction	Jun	2	0.000041	0.000041	0.000042	-6	0.000038	0.000038	0.000039	-7	0.000039	0.000039	0.000039	-9	0.000037	0.000037	0.000038	-14	0.000041	0.000041	0.000042	-7	0.000049	0.000049	0.000049	0
Ta, Tot	Construction	Jul	2	0.000046	0.000046	0.000046	-2	0.000042	0.000042	0.000043	-1	0.000043	0.000043	0.000044	-7	0.000039	0.000039	0.000040	-12	0.000041	0.000041	0.000043	-8	0.000049	0.000049	0.000049	0
Ta, Tot	Construction	Aug	2	0.000048	0.000048	0.000048	-3	0.000044	0.000044	0.000045	2	0.000045	0.000045	0.000046	-5	0.000041	0.000041	0.000042	-10	0.000042	0.000042	0.000043	-8	0.000049	0.000049	0.000049	0
Ta, Tot	Construction	Sep	2	0.000049	0.000049	0.000049	-3	0.000044	0.000044	0.000045	1	0.000044	0.000044	0.000045	-4	0.000042	0.000042	0.000043	-9	0.000042	0.000042	0.000043	-8	0.000049	0.000049	0.000049	0
Ta, Tot	Construction	Oct	2	0.000047	0.000047	0.000047	-5	0.000043	0.000043	0.000043	0	0.000043	0.000043	0.000043	-4	0.000042	0.000042	0.000043	-9	0.000042	0.000042	0.000043	-8	0.000049	0.000049	0.000049	0
Ta, Tot	Construction	Nov	2	0.000055	0.000055	0.000055	-19	0.000048	0.000048	0.000048	-7	0.000045	0.000045	0.000045	-26	0.000047	0.000047	0.000048	-10	0.000046	0.000046	0.000047	-9	0.000057	0.000057	0.000057	0
Ta, Tot	Construction	Dec	2	0.000042	0.000042	0.000042	-35	0.000043	0.000043	0.000044	-14	0.000034	0.000034	0.000034	-14	0.000046	0.000046	0.000046	-12	0.000045	0.000045	0.000046	-9	0.000057	0.000057	0.000057	0
Ta, Tot	Operations	Jan	5	0.000037	0.000037	0.000037	-41	0.000044	0.000044	0.000048	-11	0.000036	0.000036	0.000040	2	0.000046	0.000047	0.000051	-9	0.000044	0.000045	0.000047	-9	0.000057	0.000057	0.000057	0
Ta, Tot	Operations	Feb	5	0.000036	0.000036	0.000037	-47	0.000044	0.000044	0.000050	-16	0.000036	0.000036	0.000040	-8	0.000047	0.000048	0.000053	-10	0.000045	0.000046	0.000048	-10	0.000060	0.000060	0.000060	0
Ta, Tot	Operations	Mar	5	0.000032	0.000032	0.000033	-45	0.000042	0.000043	0.000050	-17	0.000036	0.000037	0.000043	-1	0.000046	0.000046	0.000051	-13	0.000045	0.000045	0.000048	-10	0.000057	0.000057	0.000057	0
Ta, Tot	Operations	Apr	5	0.000034	0.000034	0.000034	-40	0.000041	0.000042	0.000049	-18	0.000037	0.000038	0.000044	0	0.000044	0.000045	0.000049	-15	0.000044	0.000045	0.000047	-11	0.000057	0.000057	0.000057	0
Ta, Tot	Operations	May	5	0.000032	0.000032	0.000032	-20	0.000036	0.000036	0.000042	-4	0.000032	0.000032	0.000036	0	0.000036	0.000037	0.000040	-14	0.000038	0.000039	0.000041	-11	0.000049	0.000049	0.000049	0
Ta, Tot	Operations	Jun	5	0.000041	0.000041	0.000041	-7	0.000045	0.000045	0.000052	10	0.000043	0.000043	0.000049	3	0.000038	0.000038	0.000041	-12	0.000039	0.000040	0.000042	-10	0.000049	0.000049	0.000049	0
Ta, Tot	Operations	Jul	5	0.000046	0.000046	0.000046	-3	0.000052	0.000052	0.000062	22	0.000050	0.000050	0.000057	9	0.000040	0.000041	0.000044	-9	0.000040	0.000041	0.000043	-9	0.000049	0.000049	0.000049	0
Ta, Tot	Operations	Aug	5	0.000048	0.000048	0.000048	-2	0.000056	0.000056	0.000067	29	0.000054	0.000054	0.000063	15	0.000043	0.000043	0.000047	-6	0.000041	0.000042	0.000044	-9	0.000049	0.000049	0.000049	0
Ta, Tot	Operations	Sep	5	0.000048	0.000048	0.000048	-4	0.000056	0.000056	0.000067	29	0.000054	0.000054	0.000062	17	0.000044	0.000045	0.000049	-4	0.000042	0.000042	0.000045	-8	0.000049	0.000049	0.000049	0
Ta, Tot	Operations	Oct	5	0.000047	0.000047	0.000047	-5	0.000053	0.000053	0.000062	24	0.000052	0.000052	0.000060	17	0.000045	0.000045	0.000049	-2	0.000042	0.000042	0.000045	-7	0.000049	0.000049	0.000049	0
Ta, Tot	Operations	Nov	5	0.000054	0.000054	0.000055	-20	0.000059	0.000059	0.000067	14	0.000056	0.000056	0.000064	-8	0.000051	0.000051	0.000056	-2	0.000047	0.000047	0.000050	-7	0.000057	0.000057	0.000057	0
Ta, Tot	Operations	Dec	5	0.000041	0.000041	0.000041	-36	0.000051	0.000051	0.000057	1	0.000041	0.000041	0.000046	3	0.000050	0.000050	0.000055	-3	0.000046	0.000046	0.000050	-7	0.000057	0.000057	0.000057	0
Ta, Tot	Closure	Jan	6	0.000037	0.000037	0.000038	-40	0.000041	0.000042	0.000049	-15	0.000034	0.000035	0.000041	-2	0.000044	0.000046	0.000054	-10	0.000044	0.000045	0.000049	-9	0.000057	0.000057	0.000057	0
Ta, Tot	Closure	Feb	6	0.000037	0.000037	0.000037	-46	0.000040	0.000041	0.000046	-22	0.000033	0.000034	0.000039	-13	0.000045	0.000047	0.000055	-12	0.000045	0.000046	0.000050	-9	0.000060	0.000060	0.000060	0
Ta, Tot	Closure	Mar	6	0.000033	0.000033	0.000033	-44	0.000037	0.000038	0.000041	-27	0.000032	0.000033	0.000036	-12	0.000044	0.000046	0.000053	-14	0.000044	0.000046	0.000050	-10	0.000057	0.000057	0.000057	0
Ta, Tot	Closure	Apr	6	0.000034	0.000034	0.000035	-40	0.000035	0.000035	0.000037	-30	0.000032	0.000032	0.000034	-15	0.000042	0.000044	0.000051	-16	0.000044	0.000045	0.000049	-10	0.000057	0.000057	0.000057	0
Ta, Tot	Closure	May	6	0.000032	0.000032	0.000032	-21	0.000030	0.000030	0.000031	-20	0.000029	0.000029	0.000029	-11	0.000035	0.000036	0.000041	-16	0.000038	0.000039	0.000043	-10	0.000049	0.000049	0.000049	0
Ta, Tot	Closure	Jun	6	0.000041	0.000041	0.000041	-7	0.000036	0.000036	0.000037	-11	0.000037	0.000037	0.000038	-11	0.000036	0.000037	0.000041	-15	0.000039	0.000040	0.000043	-10	0.000049	0.000049	0.000049	0
Ta, Tot	Closure	Jul	6	0.000046	0.000046	0.000046	-3	0.000040	0.000040	0.000041	-5	0.000042	0.000042	0.000043	-9	0.000038	0.000039	0.000043	-13	0.000040	0.000041	0.000044	-10	0.000049	0.000049	0.000049	0
Ta, Tot	Closure	Aug	6	0.000048	0.000048	0.000048	-2	0.000043	0.000043	0.000044	-1	0.000044	0.000044	0.000045	-6	0.000040	0.000041	0.000044	-11	0.000040	0.000041	0.000044	-10	0.000049	0.000049	0.000049	0
Ta, Tot	Closure	Sep	6	0.000048	0.000048	0.000049	-3	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	-5	0.000041	0.000042	0.000045	-10	0.000041	0.000042	0.000045	-9	0.000049	0.000049	0.000049	0
Ta, Tot	Closure	Oct	6	0.000047	0.000047	0.000047	-5	0.000043	0.000043	0.000043	0	0.000043	0.000043	0.000043	-3	0.000042	0.000042	0.000044	-9	0.000041	0.000042	0.000044	-9	0.000049	0.000049	0.000049	0
Ta, Tot	Closure	Nov	6	0.000055	0.000055	0.000057	-19	0.000049	0.000049	0.000050	-5	0.000046	0.000047	0.000048	-23	0.000047	0.000048	0.000050	-10	0.000045	0.000046	0.000049	-10	0.000057	0.000057	0.000057	0
Ta, Tot	Closure	Dec	6	0.000042	0.000042	0.000045	-34	0.000045	0.000045	0.000046	-11	0.000035	0.000035	0.000036	-11	0.000046	0.000046	0.000049	-11	0.000044	0.000045	0.000048	-10	0.000057	0.000057	0.000057	0
Ta, Tot	Post-Closure	Jan	117	0.000062	0.000062	0.000062	-1	0.000076	0.000072	0.000076	45	0.000052	0.000050	0.000053	41	0.000057	0.000056	0.000057	9	0.000053	0.000052	0.000053	5	0.000058	0.000058	0.000058	1
Ta, Tot	Post-Closure	Feb	117	0.000069	0.000068	0.000069	-1	0.000081	0.000077	0.000081	46	0.000059	0.000056	0.000059	42	0.000059	0.000058	0.000060	9	0.000054	0.000053	0.000054	5	0.000061	0.000061	0.000061	2
Ta, Tot	Post-Closure	Mar	117	0.000058	0.000058	0.000059	-1	0.000082	0.000077	0.000082	50	0.000060	0.000057	0.000060	53	0.000059	0.000058	0.000059	9	0.000054	0.000053	0.000054	5	0.000058	0.000058	0.000058	2
Ta, Tot	Post-Closure	Apr	117	0.000057	0.000057	0.000057	0	0.000083	0.000078	0.000083	55	0.000063	0.000060	0.000064	58	0.000058	0.000057	0.000058	9	0.000053	0.000053	0.000053	5	0.000058	0.000058	0.000058	2
Ta, Tot	Post-Closure	May	117	0.000040	0.000040	0.000040	-1	0.000060	0.000057	0.000061	52	0.000038	0.000037	0.000038	15	0.000047	0.000047	0.000048	9	0.000046	0.000046	0.000046	5	0.000050	0.000050	0.000050	2
Ta, Tot	Post-Closure	Jun	117	0.000043	0.000043	0.000043	-2	0.000062	0.000059	0.000063	45	0.000053	0.000052	0.000053	22	0.000048	0.000047	0.000048	8	0.000047	0.000046	0.000047	5	0.000050	0.000050	0.000050	2
Ta, Tot	Post-Closure	Jul	117	0.000046	0.000046	0.000046	-2	0.000064	0.000061	0.000064	42	0.000057	0.000056	0.000058	21	0.000049	0.000048	0.000049	8	0.000048	0.000047	0.000048	5	0.000050	0.000050	0.000050	1
Ta, Tot	Post-Closure	Aug	117	0.000048	0.000048	0.000048	-2	0.000064	0.000061	0.000064	41	0.000058	0.000057	0.000058	20	0.000050	0.000050	0.000050	7	0.000048	0.000048	0.000048	5	0.000050	0.000050	0.000050	1
Ta, Tot	Post-Closure	Sep	117	0.000049	0.000049	0.000049	-1	0.000064	0.000061	0.000064	40	0.000057	0.000055	0.000057	21	0.000051	0.000050	0.000051	7	0.000049	0.000048	0.000049	5	0.000050	0.000050	0.000050	1
Ta, Tot	Post-Closure	Oct	117	0.000049	0.000049	0.000049	-1	0.000063	0.000061	0.000064	42	0.000056	0.000055	0.000056	23	0.000051	0.000050	0.000051	8	0.000048	0.000048	0.000049	5	0.000050	0.000050	0.000050	1
Ta, Tot	Post-Closure	Nov	117	0.000067	0.000067	0.000067	-1	0.000078	0.000074	0.000078	43	0.000081	0.000078	0.000081	29	0.000058	0.000057	0.000058	8	0.000054	0.000053	0.000054	5	0.000058	0.000058	0.000058	1
Ta, Tot	Post-Closure	Dec	117	0.000064	0.000064	0.000064	0	0.000076	0.000073	0.000076	44	0.000057	0.000055	0.000057	37	0.000057	0.000057	0.000057	9	0.000053	0.000053	0.000053	5	0.000058	0.000058	0.000058	1
U, Tot	Construction	Jan	2	0.0006	0.0006	0.0009	856	0.0027	0.0027	0.0040	524	0.0008	0.0008	0.0011	152	0.0001	0.0001	0.0002	198	0.00007	0.00007	0.00010	69	0.00011	0.00011	0.00012	0
U, Tot	Construction	Feb	2	0.0007	0.0007	0.0008	766	0.0034	0.0034	0.0042	571	0.0008	0.0008	0.0010	120	0.0001	0.0001	0.0002	226	0.00007	0.00007	0.00010	75	0.00012	0.00012	0.00012	0
U, Tot	Construction	Mar	2	0.0006	0.0006	0.0006	673	0.0034	0.0034	0.0040	537	0.0008	0.0008	0.0009	114	0.0002	0.0002	0.0002	251	0.00008	0.00008	0.00011	82	0.00011	0.00011	0.00011	0
U, Tot	Construction	Apr	2	0.0005	0.0005	0.0006	623	0.0034	0.0034	0.0039	502	0.0007	0.0007	0.0008	104	0.0002	0.0002	0.0002	276	0.00008	0.00008	0.00011	92	0.00011	0.00011	0.00011	0
U, Tot	Construction	May	2	0.0004	0.0004	0.0004	870	0.0026	0.0026	0.0029	570	0.0005	0.0005	0.0005	379	0.0001	0.0001	0.0002	293	0.00007	0.00007	0.00010	102	0.00010	0.00010	0.00010	0
U, Tot	Construction	Jun	2	0.0005	0.0005	0.0005	1489	0.0028	0.0028	0.0030	664	0.0008	0.0008	0.0008	540	0.0001	0.0001	0.0002	317	0.00008	0.00008	0.00011	110	0.00010	0.00010	0.00010	0
U, Tot	Construction	Jul	2	0.0007	0.0007	0.0007	2048	0.0028	0.0028	0.0029	714	0.0006	0.0006	0.0006	472	0.0002	0.0002	0.0002	336	0.00009	0.00009	0.00011	127	0.00010	0.00010	0.00010	0
U, Tot	Construction	Aug	2	0.0008	0.0008	0.0008	2452	0.0027	0.0027	0.0028	737	0.0005	0.0005	0.0005	494	0.0002	0.0002	0.0002	336	0.00010	0.00010	0.00012	145	0.00010	0.00010	0.00010	0
U, Tot	Construction	Sep	2	0.0009	0.0009	0.0009	2642	0.0025	0.0025	0.0026	739	0.0004	0.0004	0.0004	469	0.0001	0.0001	0.0002	337	0.00010	0.00010	0.00013	158	0.00010	0.00010	0.00010	0
U, Tot	Construction	Oct	2	0.0010	0.0010	0.0010	2698	0.0023	0.0023	0.0024	729	0.0004	0.0004	0.0004	439	0.0001	0.0001	0.0002	338	0.00010	0.00010	0.00013	169	0.00010	0.00010	0.00010	0
U, Tot	Construction	Nov	2	0.0013	0.0013	0.0013	2248	0.0032	0.0032	0.0032	783	0.0010	0.0010	0.0010	414	0.0002	0.0002	0.0002	356	0.00012	0.00012	0.00014	179	0.00012	0.00012	0.00012	0
U, Tot	Construction	Dec	2	0.0010	0.0010	0.0011	1635	0.0036	0.0036	0.0037	821	0.0012	0.0012	0.0012	351	0.0002	0.0002	0.0002	399	0.00012	0.00012	0.00015	189	0.00012	0.00012	0.00012	0
U, Tot	Operations	Jan	5	0.0008	0.0008	0.0009	1163	0.0038	0.0038	0.0038	767	0.0011	0.0011	0.0011	262	0.0002	0.0002	0.0003	497	0.00017	0.00016	0.00018	303	0.00011	0.00011	0.00011	0
U, Tot	Operations	Feb	5	0.0007	0.0007	0.0008	827	0.0041	0.0041	0.0041	708	0.0010	0.0010	0.0010	174	0.0003	0.0003	0.0003	509	0.00017	0.00017	0.00018	309	0.00012	0.00012	0.00012	0
U, Tot	Operations	Mar	5	0.0005	0.0006	0.0006	661	0.0041	0.0041	0.0044	669	0.0009	0.0009	0.0009	157	0.0003	0.0003	0.0003	513	0.00017	0.00017	0.00018	316	0.00011	0.00011	0.00011	0
U, Tot	Operations	Apr	5	0.0005	0.0005	0.0005	583	0.0040	0.0041	0.0044	621	0.0009	0.0009	0.0009	144	0.0003	0.0003	0.0003	518	0.00017	0.00017	0.00019	324	0.00011	0.00011	0.00011	0
U, Tot	Operations	May	5	0.0004	0.0004	0.0004	800	0.0030	0.0030	0.0033	675	0.0005	0.0005	0.0006	436	0.0002	0.0002	0.0002	512	0.00015	0.00015	0.00016	321	0.00010	0.00010	0.00010	0
U, Tot	Operations	Jun	5	0.0005	0.0005	0.0005	1363	0.0032	0.0032	0.0035	779	0.0009	0.0009	0.0009	625	0.0002	0.0002	0.0002	507	0.00014	0.00014	0.00015	291	0.00010	0.00010	0.00010	0
U, Tot	Operations	Jul	5	0.0006	0.0006	0.0007	1874	0.0033	0.0033	0.0037	854	0.0007	0.0007	0.0008	559	0.0002	0.0002	0.0002	502	0.00015	0.00015	0.00016	291	0.00010	0.00010	0.00010	0
U, Tot	Operations	Aug	5	0.0008	0.0008	0.0008	2245	0.0032	0.0032	0.0036	888	0.0006	0.0006	0.0006	593	0.0002	0.0002	0.0002	480	0.00015	0.00015	0.00016	297	0.00010	0.00010	0.00010	0
U, Tot	Operations	Sep	5	0.0008	0.0008	0.0009	2419	0.0029	0.0029	0.0033	880	0.0005	0.0005	0.0006	562	0.0002	0.0002	0.0002	467	0.00015	0.00015	0.00017	299	0.00010	0.00010	0.00010	0
U, Tot	Operations	Oct	5	0.0009	0.0009	0.0009	2478	0.0026	0.0026	0.0029	834	0.0004	0.0004	0.0005	508	0.0002	0.0002	0.0002	459	0.00015	0.00015	0.00016	302	0.00010	0.00010	0.00010	0
U, Tot	Operations	Nov	5	0.0012	0.0012	0.0012	2063	0.0033	0.0033	0.0035	815	0.0011	0.0011	0.0011	437	0.0002	0.0002	0.0002	466	0.00017	0.00017	0.00018	309	0.00012	0.00012	0.00012	0
U, Tot	Operations	Dec	5	0.0010	0.0010	0.0010	1498	0.0036	0.0036	0.0037	811	0.0012	0.0012	0.0012	351	0.0002	0.0002	0.0002	493	0.00017	0.00017	0.00018	315	0.00012	0.00012	0.00012	0
U, Tot	Closure	Jan	6	0.0009	0.0009	0.0009	1220	0.0036	0.0036	0.0038	720	0.0010	0.0010	0.0011	244	0.0002	0.0002	0.0003	443	0.00015	0.00015	0.00018	280	0.00011	0.00011	0.00012	0
U, Tot	Closure	Feb	6	0.0008	0.0008	0.0008	875	0.0038	0.0038	0.0040	649	0.0010	0.0009	0.0010	159	0.0002	0.0002	0.0003	459	0.00015	0.00016	0.00019	285	0.00012	0.00012	0.00012	0
U, Tot	Closure	Mar	6	0.0006	0.0006	0.0006	702	0.0036	0.0036	0.0038	571	0.0008	0.0008	0.0009	130	0.0002	0.0002	0.0003	462	0.00015	0.00016	0.00019	291	0.00011	0.00011	0.00011	0
U, Tot	Closure	Apr	6	0.0005	0.0005	0.0006	619	0.0035	0.0034	0.0036	504	0.0007	0.0007	0.0008	109	0.0002	0.0002	0.0003	462	0.00015	0.00016	0.00019	297	0.00011	0.00011	0.00011	0
U, Tot	Closure	May	6	0.0004	0.0004	0.0004	843	0.0024	0.0024	0.0026	526	0.0004	0.0004	0.0004	312	0.0002	0.0002	0.0002	450	0.00013	0.00014	0.00016	291	0.00010	0.00010	0.00010	0
U, Tot	Closure	Jun	6	0.0005	0.0005	0.0005	1423	0.0025	0.0025	0.0026	576	0.0007	0.0007	0.0007	455	0.0002	0.0002	0.0002	432	0.00013	0.00013	0.00015	260	0.00010	0.00010	0.00010	0
U, Tot	Closure	Jul	6	0.0007	0.0007	0.0007	1954	0.0025	0.0025	0.0026	615	0.0005	0.0005	0.0006	398	0.0002	0.0002	0.0002	412	0.00013	0.00013	0.00015	256	0.00010	0.00010	0.00010	0
U, Tot	Closure	Aug	6	0.0008	0.0008	0.0008	2342	0.0024	0.0024	0.0025	639	0.0004	0.0004	0.0005	412	0.0002	0.0002	0.0002	383	0.00013	0.00014	0.00016	256	0.00010	0.00010	0.00010	0
U, Tot	Closure	Sep	6	0.0009	0.0009	0.0009	2532	0.0022	0.0022	0.0024	647	0.0004	0.0004	0.0004	397	0.0002	0.0002	0.0002	364	0.00013	0.00014	0.00015	254	0.00010	0.00010	0.00010	0
U, Tot	Closure	Oct	6	0.0010	0.0010	0.0010	2595	0.0021	0.0021	0.0022	642	0.0003	0.0003	0.0004	376	0.0001	0.0001	0.0002	355	0.00013	0.00013	0.00015	254	0.00010	0.00010	0.00010	0
U, Tot	Closure	Nov	6	0.0013	0.0013	0.0013	2185	0.0028	0.0028	0.0030	682	0.0009	0.0009	0.0010	353	0.0002	0.0002	0.0002	362	0.00015	0.00015	0.00016	257	0.00012	0.00012	0.00012	0
U, Tot	Closure	Dec	6	0.0011	0.0010	0.0011	1614	0.0032	0.0033	0.0034	724	0.0010	0.0011	0.0011	305	0.0002	0.0002	0.0002	390	0.00014	0.00015	0.00016	260	0.00012	0.00012	0.00012	0
U, Tot	Post-Closure	Jan	117	0.0001	0.0001	0.0009	21	0.0016	0.0015	0.0035	241	0.0006	0.0006	0.0010	83	0.0001	0.0001	0.0002	77	0.00006	0.00006	0.00014	45	0.00016	0.00016	0.00016	37
U, Tot	Post-Closure	Feb	117	0.0001	0.0001	0.0009	16	0.0018	0.0017	0.0038	233	0.0006	0.0006	0.0010	68	0.0001	0.0001	0.0002	78	0.00006	0.00006	0.00015	46	0.00017	0.00017	0.00017	39
U, Tot	Post-Closure	Mar	117	0.0001	0.0001	0.0008	13	0.0020	0.0018	0.0037	240	0.0006	0.0006	0.0008	60	0.0001	0.0001	0.0002	78	0.00006	0.00006	0.00015	46	0.00016	0.00016	0.00016	41
U, Tot	Post-Closure	Apr	117	0.0001	0.0001	0.0008	11	0.0022	0.0020	0.0036	246	0.0006	0.0005	0.0008	53	0.0001	0.0001	0.0002	79	0.00006	0.00006	0.00015	47	0.00016	0.00016	0.00016	42
U, Tot	Post-Closure	May	117	0.0000	0.0000	0.0004	15	0.0015	0.0014	0.0025	252	0.0002	0.0002	0.0004	56	0.0001	0.0001	0.0002	77	0.00005	0.00005	0.00013	45	0.00014	0.00014	0.00014	40
U, Tot	Post-Closure	Jun	117	0.0000	0.0000	0.0005	20	0.0014	0.0013	0.0024	252	0.0003	0.0003	0.0006	129	0.0001	0.0001	0.0002	74	0.00005	0.00005	0.00012	40	0.00014	0.00014	0.00014	37
U, Tot	Post-Closure	Jul	117	0.0000	0.0000	0.0006	23	0.0013	0.0012	0.0024	255	0.0003	0.0002	0.0005	128	0.0001	0.0001	0.0002	72	0.00005	0.00005	0.00012	39	0.00014	0.00014	0.00014	35
U, Tot	Post-Closure	Aug	117	0.0000	0.0000	0.0007	25	0.0013	0.0011	0.0023	259	0.0002	0.0002	0.0004	129	0.0001	0.0001	0.0001	69	0.00005	0.00005	0.00013	40	0.00014	0.00014	0.00014	33
U, Tot	Post-Closure	Sep	117	0.0000	0.0000	0.0008	25	0.0012	0.0011	0.0022	264	0.0002	0.0002	0.0003	127	0.0001	0.0001	0.0001	67	0.00005	0.00005	0.00012	40	0.00013	0.00013	0.00013	32
U, Tot	Post-Closure	Oct	117	0.0000	0.0000	0.0007	21	0.0011	0.0010	0.0019	270	0.0002	0.0002	0.0003	126	0.0001	0.0001	0.0001	68	0.00005	0.00005	0.00012	41	0.00013	0.00013	0.00013	32
U, Tot	Post-Closure	Nov	117	0.0001	0.0001	0.0009	17	0.0014	0.0013	0.0022	264	0.0005	0.0004	0.0007	125	0.0001	0.0001	0.0002	70	0.00006	0.00006	0.00014	42	0.00015	0.00015	0.00015	33
U, Tot	Post-Closure	Dec	117	0.0001	0.0001	0.0009	13	0.0015	0.0014	0.0022	250	0.0006	0.0005	0.0008	104	0.0001	0.0001	0.0002	73	0.00006	0.00006	0.00013	43	0.00016	0.00016	0.00016	35
Zn, Diss	Construction	Jan	2	0.0041	0.0041	0.0054	241	0.0024	0.0024	0.0034	166	0.00072	0.00072	0.00096	27	0.0013	0.0013	0.0014	6	0.0004	0.0004	0.0005	14	0.0016	0.0016	0.0016	0
Zn, Diss	Construction	Feb	2	0.0048	0.0048	0.0053	249	0.0028	0.0028	0.0037	189	0.00068	0.00068	0.00091	5	0.0014	0.0014	0.0015	2	0.0004	0.0004	0.0005	19	0.0017	0.0017	0.0017	0
Zn, Diss	Construction	Mar	2	0.0043	0.0043	0.0045	256	0.0028	0.0028	0.0035	188	0.00063	0.00063	0.00080	4	0.0013	0.0013	0.0014	-2	0.0005	0.0005	0.0005	25	0.0016	0.0016	0.0016	0
Zn, Diss	Construction	Apr	2	0.0044	0.0044	0.0045	263	0.0029	0.0029	0.0035	191	0.00059	0.00059	0.00072	-2	0.0012	0.0012	0.0013	-7	0.0005	0.0005	0.0006	30	0.0016	0.0016	0.0016	0
Zn, Diss	Construction	May	2	0.0028	0.0028	0.0028	303	0.0025	0.0025	0.0029	249	0.00056	0.00056	0.00062	25	0.0012	0.0012	0.0013	-10	0.0004	0.0004	0.0005	29	0.0014	0.0014	0.0014	0
Zn, Diss	Construction	Jun	2	0.0031	0.0031	0.0032	399	0.0030	0.0030	0.0034	316	0.00082	0.00082	0.00091	80	0.0011	0.0011	0.0012	-10	0.0004	0.0004	0.0004	20	0.0014	0.0014	0.0014	0
Zn, Diss	Construction	Jul	2	0.0048	0.0048	0.0049	512	0.0037	0.0037	0.0040	364	0.00203	0.00203	0.00218	167	0.0011	0.0011	0.0012	-5	0.0003	0.0003	0.0004	14	0.0014	0.0014	0.0014	0
Zn, Diss	Construction	Aug	2	0.0064	0.0064	0.0065	522	0.0043	0.0043	0.0045	385	0.00309	0.00309	0.00326	195	0.0013	0.0013	0.0014	9	0.0003	0.0003	0.0003	11	0.0014	0.0014	0.0014	0
Zn, Diss	Construction	Sep	2	0.0059	0.0059	0.0060	477	0.0037	0.0037	0.0040	332	0.00229	0.00229	0.00242	145	0.0015	0.0015	0.0016	22	0.0003	0.0003	0.0003	9	0.0014	0.0014	0.0014	0
Zn, Diss	Construction	Oct	2	0.0049	0.0049	0.0050	437	0.0026	0.0026	0.0028	241	0.00137	0.00137	0.00146	87	0.0015	0.0015	0.0016	25	0.0003	0.0003	0.0003	9	0.0014	0.0014	0.0014	0
Zn, Diss	Construction	Nov	2	0.0061	0.0061	0.0062	399	0.0030	0.0030	0.0031	230	0.00120	0.00120	0.00130	34	0.0016	0.0016	0.0017	24	0.0004	0.0004	0.0004	17	0.0016	0.0016	0.0016	0
Zn, Diss	Construction	Dec	2	0.0055	0.0055	0.0056	358	0.0032	0.0032	0.0033	263	0.00100	0.00100	0.00103	70	0.0016	0.0016	0.0017	22	0.0004	0.0004	0.0005	28	0.0016	0.0016	0.0016	0
Zn, Diss	Operations	Jan	5	0.0050	0.0050	0.0052	314	0.0032	0.0033	0.0034	265	0.00093	0.00094	0.00097	66	0.0017	0.0016	0.0017	29	0.0005	0.0005	0.0005	48	0.0016	0.0016	0.0016	0
Zn, Diss	Operations	Feb	5	0.0049	0.0050	0.0051	258	0.0034	0.0035	0.0036	256	0.00085	0.00087	0.00091	34	0.0017	0.0017	0.0017	25	0.0006	0.0006	0.0006	53	0.0017	0.0017	0.0017	0
Zn, Diss	Operations	Mar	5	0.0042	0.0042	0.0044	246	0.0034	0.0034	0.0035	250	0.00075	0.00077	0.00079	26	0.0016	0.0016	0.0016	21	0.0006	0.0006	0.0006	58	0.0016	0.0016	0.0016	0
Zn, Diss	Operations	Apr	5	0.0041	0.0042	0.0043	244	0.0034	0.0034	0.0034	246	0.00071	0.00071	0.00072	17	0.0015	0.0015	0.0015	16	0.0006	0.0006	0.0006	64	0.0016	0.0016	0.0016	0
Zn, Diss	Operations	May	5	0.0026	0.0027	0.0027	279	0.0028	0.0028	0.0029	291	0.00060	0.00060	0.00061	36	0.0014	0.0014	0.0014	8	0.0005	0.0005	0.0005	61	0.0014	0.0014	0.0014	0
Zn, Diss	Operations	Jun	5	0.0029	0.0029	0.0030	369	0.0033	0.0033	0.0034	354	0.00088	0.00089	0.00090	94	0.0013	0.0013	0.0013	5	0.0005	0.0005	0.0005	48	0.0014	0.0014	0.0014	0
Zn, Diss	Operations	Jul	5	0.0044	0.0045	0.0046	475	0.0040	0.0039	0.0040	399	0.00216	0.00215	0.00219	184	0.0013	0.0013	0.0013	8	0.0004	0.0004	0.0004	39	0.0014	0.0014	0.0014	0
Zn, Diss	Operations	Aug	5	0.0059	0.0060	0.0062	485	0.0045	0.0045	0.0046	413	0.00325	0.00324	0.00330	210	0.0015	0.0015	0.0015	21	0.0004	0.0004	0.0004	33	0.0014	0.0014	0.0014	0
Zn, Diss	Operations	Sep	5	0.0055	0.0055	0.0057	441	0.0040	0.0039	0.0040	356	0.00241	0.00241	0.00244	158	0.0016	0.0016	0.0016	32	0.0004	0.0004	0.0004	30	0.0014	0.0014	0.0014	0
Zn, Diss	Operations	Oct	5	0.0045	0.0046	0.0047	404	0.0028	0.0028	0.0028	266	0.00147	0.00147	0.00148	101	0.0016	0.0016	0.0016	35	0.0003	0.0003	0.0003	29	0.0014	0.0014	0.0014	0
Zn, Diss	Operations	Nov	5	0.0057	0.0057	0.0059	368	0.0030	0.0030	0.0031	239	0.00130	0.00131	0.00133	45	0.0018	0.0018	0.0018	34	0.0004	0.0004	0.0004	34	0.0016	0.0016	0.0016	0
Zn, Diss	Operations	Dec	5	0.0052	0.0052	0.0054	330	0.0031	0.0032	0.0032	254	0.00099	0.00099	0.00102	70	0.0017	0.0017	0.0017	32	0.0005	0.0005	0.0005	42	0.0016	0.0016	0.0016	0
Zn, Diss	Closure	Jan	6	0.0052	0.0052	0.0054	327	0.0032	0.0032	0.0034	258	0.00092	0.00093	0.00099	64	0.0015	0.0015	0.0017	20	0.0005	0.0005	0.0005	43	0.0016	0.0016	0.0016	0
Zn, Diss	Closure	Feb	6	0.0052	0.0052	0.0054	272	0.0034	0.0034	0.0036	250	0.00085	0.00086	0.00092	33	0.0016	0.0016	0.0017	17	0.0006	0.0006	0.0006	48	0.0017	0.0017	0.0017	0
Zn, Diss	Closure	Mar	6	0.0044	0.0044	0.0046	259	0.0032	0.0032	0.0035	232	0.00074	0.00075	0.00080	23	0.0015	0.0015	0.0016	14	0.0006	0.0006	0.0006	53	0.0016	0.0016	0.0016	0
Zn, Diss	Closure	Apr	6	0.0044	0.0044	0.0045	257	0.0031	0.0031	0.0033	218	0.00067	0.00067	0.00072	10	0.0014	0.0014	0.0016	10	0.0006	0.0006	0.0006	57	0.0016	0.0016	0.0016	0
Zn, Diss	Closure	May	6	0.0028	0.0028	0.0029	293	0.0025	0.0025	0.0026	242	0.00054	0.00054	0.00057	22	0.0013	0.0013	0.0014	4	0.0005	0.0005	0.0005	55	0.0014	0.0014	0.0014	0
Zn, Diss	Closure	Jun	6	0.0030	0.0030	0.0032	384	0.0028	0.0028	0.0030	282	0.00077	0.00077	0.00082	69	0.0012	0.0013	0.0013	2	0.0004	0.0004	0.0005	43	0.0014	0.0014	0.0014	0
Zn, Diss	Closure	Jul	6	0.0046	0.0046	0.0048	490	0.0033	0.0033	0.0035	318	0.00175	0.00178	0.00190	134	0.0013	0.0013	0.0013	4	0.0004	0.0004	0.0004	35	0.0014	0.0014	0.0014	0
Zn, Diss	Closure	Aug	6	0.0061	0.0061	0.0064	499	0.0038	0.0039	0.0042	339	0.00268	0.00273	0.00293	161	0.0014	0.0014	0.0014	12	0.0004	0.0004	0.0004	29	0.0014	0.0014	0.0014	0
Zn, Diss	Closure	Sep	6	0.0057	0.0057	0.0060	460	0.0035	0.0035	0.0038	307	0.00212	0.00214	0.00228	129	0.0015	0.0015	0.0015	20	0.0003	0.0003	0.0004	26	0.0014	0.0014	0.0014	0
Zn, Diss	Closure	Oct	6	0.0048	0.0048	0.0050	425	0.0026	0.0026	0.0028	241	0.00137	0.00137	0.00145	88	0.0015	0.0015	0.0015	23	0.0003	0.0003	0.0003	24	0.0014	0.0014	0.0014	0
Zn, Diss	Closure	Nov	6	0.0061	0.0060	0.0063	391	0.0029	0.0029	0.0031	226	0.00125	0.00126	0.00137	40	0.0016	0.0016	0.0017	23	0.0004	0.0004	0.0004	28	0.0016	0.0016	0.0016	0
Zn, Diss	Closure	Dec	6	0.0056	0.0055	0.0057	354	0.0031	0.0031	0.0033	250	0.00099	0.00099	0.00104	69	0.0016	0.0016	0.0016	21	0.0005	0.0005	0.0005	35	0.0016	0.0016	0.0016	0
Zn, Diss	Post-Closure	Jan	117	0.0012	0.0013	0.0054	6	0.0015	0.0015	0.0033	62	0.00070	0.00070	0.00107	23	0.0014	0.0014	0.0016	6	0.0004	0.0004	0.0005	5	0.0016	0.0016	0.0016	1
Zn, Diss	Post-Closure	Feb	117	0.0014	0.0015	0.0057	5	0.0016	0.0016	0.0036	63	0.00077	0.00076	0.00116	18	0.0014	0.0014	0.0017	5	0.0004	0.0004	0.0005	5	0.0017	0.0017	0.0017	1
Zn, Diss	Post-Closure	Mar	117	0.0012	0.0013	0.0048	4	0.0017	0.0016	0.0034	67	0.00069	0.00068	0.00103	13	0.0014	0.0014	0.0016	5	0.0004	0.0004	0.0006	5	0.0016	0.0016	0.0016	1
Zn, Diss	Post-Closure	Apr	117	0.0012	0.0013	0.0047	4	0.0017	0.0017	0.0033	70	0.00064	0.00064	0.00098	6	0.0014	0.0014	0.0016	5	0.0004	0.0004	0.0006	5	0.0016	0.0016	0.0016	1
Zn, Diss	Post-Closure	May	117	0.0007	0.0007	0.0028	5	0.0013	0.0012	0.0025	69	0.00045	0.00045	0.00054	3	0.0013	0.0013	0.0015	4	0.0003	0.0003	0.0005	5	0.0014	0.0014	0.0014	1
Zn, Diss	Post-Closure	Jun	117	0.0006	0.0007	0.0029	7	0.0013	0.0012	0.0027	67	0.00054	0.00053	0.00076	17	0.0013	0.0013	0.0015	4	0.0003	0.0003	0.0004	5	0.0014	0.0014	0.0014	1
Zn, Diss	Post-Closure	Jul	117	0.0008	0.0008	0.0041	4	0.0013	0.0013	0.0031	64	0.00092	0.00091	0.00160	20	0.0013	0.0013	0.0014	4	0.0003	0.0003	0.0004	4	0.0014	0.0014	0.0014	1
Zn, Diss	Post-Closure	Aug	117	0.0010	0.0010	0.0053	1	0.0014	0.0014	0.0035	58	0.00130	0.00128	0.00242	22	0.0013	0.0013	0.0014	4	0.0003	0.0003	0.0004	4	0.0014	0.0014	0.0014	1
Zn, Diss	Post-Closure	Sep	117	0.0010	0.0010	0.0052	2	0.0014	0.0014	0.0033	57	0.00116	0.00114	0.00199	22	0.0013	0.0013	0.0014	4	0.0003	0.0003	0.0003	4	0.0014	0.0014	0.0014	1
Zn, Diss	Post-Closure	Oct	117	0.0009	0.0009	0.0044	3	0.0012	0.0012	0.0027	57	0.00090	0.00089	0.00141	22	0.0012	0.0012	0.0014	5	0.0003	0.0003	0.0003	4	0.0014	0.0014	0.0014	1
Zn, Diss	Post-Closure	Nov	117	0.0012	0.0013	0.0056	4	0.0015	0.0014	0.0031	58	0.00112	0.00111	0.00176	23	0.0014	0.0014	0.0016	5	0.0003	0.0003	0.0004	4	0.0016	0.0016	0.0016	1
Zn, Diss	Post-Closure	Dec	117	0.0012	0.0012	0.0053	3	0.0015	0.0014	0.0030	59	0.00075	0.00074	0.00119	26	0.0014	0.0014	0.0016	5	0.0004	0.0004	0.0004	4	0.0016	0.0016	0.0016	1

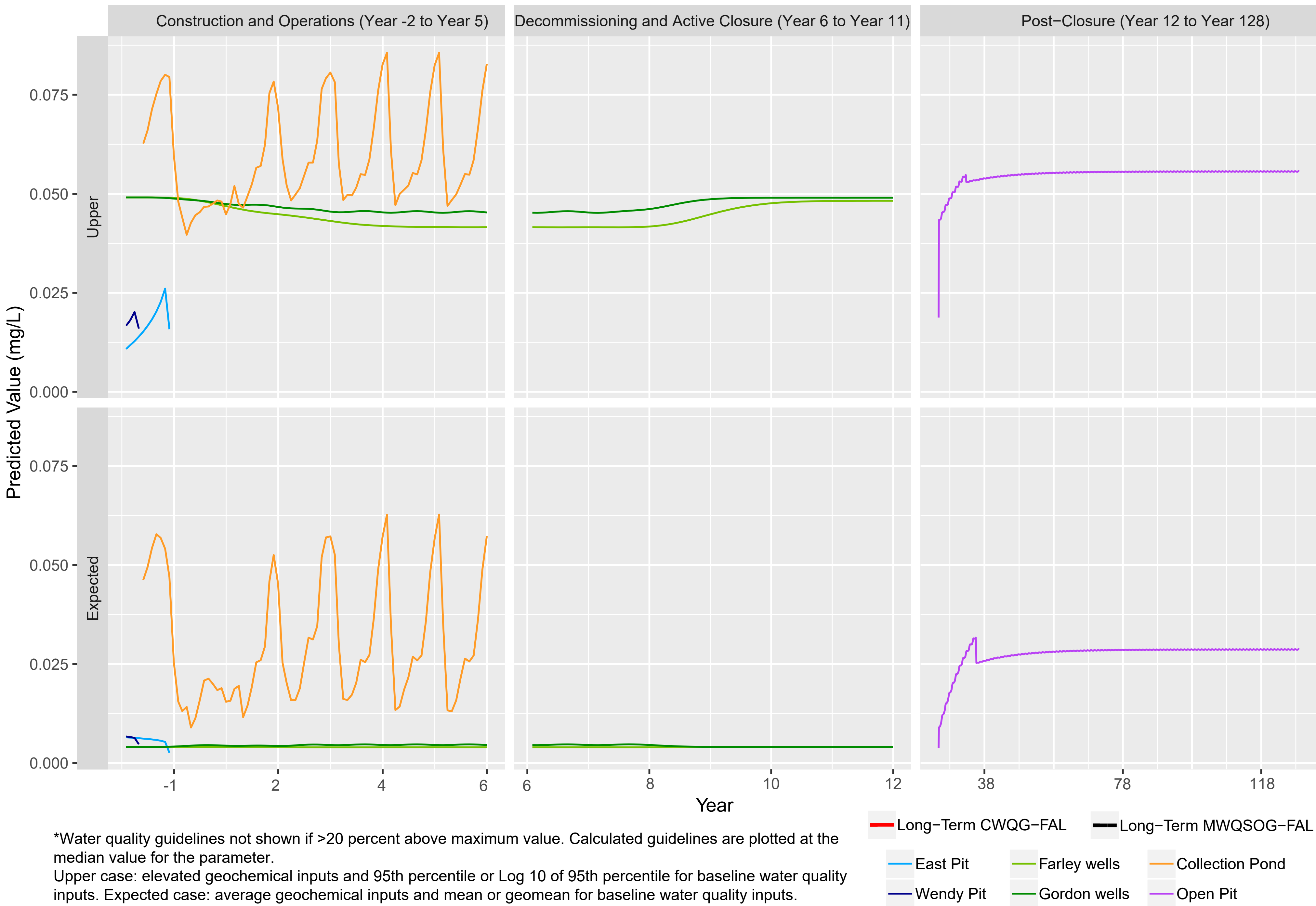
Appendix H-4: Summary of water quality model predictions for the receiving environmen - upper case

Parameter	Project Phase	Month	# of Years in Phase	Gordon Lake				West Farley Lake				East Farley Lake				Swede Lake				Ellystan Lake				Susan Lake last one			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change *	Median	Mean	Max	Change	Median	Mean	Max	Change*	Median	Mean	Max	Change*	Median	Mean	Max	Change*
Unit				mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	%
Zn, Tot	Construction	Jan	2	0.0046	0.0046	0.0054	82	0.0023	0.0023	0.0031	121	0.00130	0.00130	0.00166	13	0.0070	0.0070	0.0086	-19	0.0020	0.0020	0.0020	0	0.0021	0.0021	0.0021	0
Zn, Tot	Construction	Feb	2	0.0051	0.0051	0.0054	78	0.0026	0.0026	0.0033	133	0.00118	0.00118	0.00154	-9	0.0068	0.0068	0.0083	-24	0.0022	0.0022	0.0022	3	0.0022	0.0022	0.0022	0
Zn, Tot	Construction	Mar	2	0.0044	0.0044	0.0045	81	0.0025	0.0025	0.0032	131	0.00108	0.00108	0.00134	-11	0.0062	0.0062	0.0074	-30	0.0023	0.0023	0.0025	8	0.0021	0.0021	0.0021	0
Zn, Tot	Construction	Apr	2	0.0045	0.0045	0.0045	86	0.0025	0.0025	0.0031	131	0.00100	0.00100	0.00121	-18	0.0057	0.0057	0.0066	-35	0.0025	0.0025	0.0027	12	0.0021	0.0021	0.0021	0
Zn, Tot	Construction	May	2	0.0029	0.0029	0.0029	121	0.0019	0.0019	0.0022	150	0.00077	0.00077	0.00084	-26	0.0077	0.0077	0.0083	-28	0.0021	0.0021	0.0023	12	0.0017	0.0017	0.0017	0
Zn, Tot	Construction	Jun	2	0.0032	0.0032	0.0032	198	0.0019	0.0019	0.0022	170	0.00076	0.00076	0.00083	-19	0.0064	0.0064	0.0068	-33	0.0017	0.0017	0.0019	5	0.0017	0.0017	0.0017	0
Zn, Tot	Construction	Jul	2	0.0055	0.0055	0.0056	242	0.0021	0.0021	0.0023	185	0.00159	0.00159	0.00171	20	0.0055	0.0055	0.0059	-35	0.0016	0.0016	0.0017	0	0.0017	0.0017	0.0017	0
Zn, Tot	Construction	Aug	2	0.0074	0.0074	0.0075	208	0.0023	0.0023	0.0025	185	0.00232	0.00232	0.00246	34	0.0049	0.0049	0.0051	-36	0.0014	0.0014	0.0015	-6	0.0017	0.0017	0.0017	0
Zn, Tot	Construction	Sep	2	0.0066	0.0066	0.0067	176	0.0024	0.0024	0.0026	185	0.00250	0.00250	0.00263	38	0.0052	0.0052	0.0054	-33	0.0013	0.0013	0.0014	-10	0.0017	0.0017	0.0017	0
Zn, Tot	Construction	Oct	2	0.0053	0.0053	0.0054	158	0.0024	0.0024	0.0025	189	0.00249	0.00249	0.00259	45	0.0056	0.0056	0.0057	-31	0.0012	0.0012	0.0013	-13	0.0018	0.0018	0.0018	0
Zn, Tot	Construction	Nov	2	0.0065	0.0065	0.0066	139	0.0030	0.0030	0.0031	193	0.00243	0.00243	0.00254	12	0.0061	0.0061	0.0061	-33	0.0015	0.0015	0.0016	-11	0.0021	0.0021	0.0021	0
Zn, Tot	Construction	Dec	2	0.0057	0.0057	0.0058	119	0.0031	0.0031	0.0031	200	0.00178	0.00178	0.00180	42	0.0057	0.0057	0.0057	-35	0.0017	0.0017	0.0018	-8	0.0021	0.0021	0.0021	0
Zn, Tot	Operations	Jan	5	0.0050	0.0051	0.0052	100	0.0029	0.0029	0.0031	188	0.00156	0.00158	0.00165	38	0.0054	0.0054	0.0054	-37	0.0017	0.0017	0.0018	-13	0.0021	0.0021	0.0021	0
Zn, Tot	Operations	Feb	5	0.0049	0.0050	0.0052	76	0.0030	0.0031	0.0032	179	0.00142	0.00145	0.00153	12	0.0054	0.0054	0.0054	-40	0.0019	0.0019	0.0019	-11	0.0022	0.0022	0.0022	0
Zn, Tot	Operations	Mar	5	0.0042	0.0042	0.0044	73	0.0030	0.0030	0.0031	175	0.00125	0.00127	0.00131	6	0.0050	0.0050	0.0051	-43	0.0020	0.0020	0.0020	-8	0.0021	0.0021	0.0021	0
Zn, Tot	Operations	Apr	5	0.0042	0.0042	0.0043	75	0.0030	0.0030	0.0030	172	0.00118	0.00118	0.00120	-3	0.0047	0.0047	0.0047	-46	0.0021	0.0021	0.0021	-6	0.0021	0.0021	0.0021	0
Zn, Tot	Operations	May	5	0.0026	0.0027	0.0028	107	0.0021	0.0021	0.0022	183	0.00083	0.00083	0.00083	-20	0.0071	0.0071	0.0071	-34	0.0017	0.0017	0.0018	-6	0.0017	0.0017	0.0017	0
Zn, Tot	Operations	Jun	5	0.0029	0.0030	0.0031	180	0.0021	0.0021	0.0021	198	0.00082	0.00082	0.00083	-12	0.0059	0.0059	0.0060	-37	0.0015	0.0015	0.0015	-10	0.0017	0.0017	0.0017	0
Zn, Tot	Operations	Jul	5	0.0051	0.0052	0.0053	222	0.0023	0.0023	0.0023	209	0.00169	0.00169	0.00170	28	0.0051	0.0051	0.0052	-39	0.0013	0.0013	0.0014	-14	0.0017	0.0017	0.0017	0
Zn, Tot	Operations	Aug	5	0.0069	0.0070	0.0072	191	0.0025	0.0025	0.0025	203	0.00244	0.00243	0.00246	41	0.0046	0.0046	0.0046	-39	0.0012	0.0012	0.0012	-18	0.0017	0.0017	0.0017	0
Zn, Tot	Operations	Sep	5	0.0062	0.0062	0.0064	160	0.0025	0.0025	0.0025	198	0.00261	0.00261	0.00263	44	0.0050	0.0050	0.0051	-35	0.0011	0.0011	0.0011	-21	0.0017	0.0017	0.0017	0
Zn, Tot	Operations	Oct	5	0.0050	0.0050	0.0052	143	0.0024	0.0024	0.0025	192	0.00256	0.00256	0.00257	48	0.0055	0.0055	0.0055	-32	0.0011	0.0011	0.0011	-22	0.0018	0.0018	0.0018	0
Zn, Tot	Operations	Nov	5	0.0060	0.0061	0.0063	125	0.0029	0.0029	0.0030	185	0.00250	0.00250	0.00253	16	0.0060	0.0060	0.0060	-33	0.0013	0.0013	0.0014	-20	0.0021	0.0021	0.0021	0
Zn, Tot	Operations	Dec	5	0.0053	0.0054	0.0055	106	0.0029	0.0029	0.0030	185	0.00172	0.00172	0.00176	37	0.0057	0.0057	0.0057	-35	0.0016	0.0016	0.0016	-16	0.0021	0.0021	0.0021	0
Zn, Tot	Closure	Jan	6	0.0053	0.0053	0.0055	106	0.0029	0.0029	0.0031	182	0.00156	0.00157	0.00166	36	0.0055	0.0055	0.0056	-36	0.0018	0.0018	0.0018	-11	0.0021	0.0021	0.0021	0
Zn, Tot	Closure	Feb	6	0.0052	0.0052	0.0054	83	0.0030	0.0030	0.0032	174	0.00143	0.00144	0.00155	12	0.0054	0.0055	0.0056	-39	0.0019	0.0019	0.0020	-8	0.0022	0.0022	0.0022	0
Zn, Tot	Closure	Mar	6	0.0044	0.0044	0.0046	79	0.0029	0.0029	0.0031	161	0.00124	0.00125	0.00134	4	0.0051	0.0052	0.0053	-42	0.0020	0.0020	0.0020	-6	0.0021	0.0021	0.0021	0
Zn, Tot	Closure	Apr	6	0.0044	0.0044	0.0045	82	0.0027	0.0027	0.0029	149	0.00111	0.00112	0.00121	-8	0.0048	0.0048	0.0050	-44	0.0021	0.0021	0.0021	-4	0.0021	0.0021	0.0021	0
Zn, Tot	Closure	May	6	0.0028	0.0028	0.0029	115	0.0019	0.0019	0.0020	153	0.00080	0.00081	0.00084	-22	0.0073	0.0073	0.0074	-32	0.0018	0.0018	0.0018	-5	0.0017	0.0017	0.0017	0
Zn, Tot	Closure	Jun	6	0.0031	0.0031	0.0032	188	0.0018	0.0018	0.0019	161	0.00079	0.00080	0.00084	-15	0.0061	0.0061	0.0063	-35	0.0015	0.0015	0.0015	-8	0.0017	0.0017	0.0017	0
Zn, Tot	Closure	Jul	6	0.0052	0.0053	0.0055	229	0.0020	0.0020	0.0021	169	0.00155	0.00155	0.00162	17	0.0053	0.0053	0.0055	-36	0.0014	0.0014	0.0014	-12	0.0017	0.0017	0.0017	0
Zn, Tot	Closure	Aug	6	0.0071	0.0071	0.0074	197	0.0022	0.0022	0.0023	168	0.00224	0.00224	0.00235	30	0.0047	0.0047	0.0048	-36	0.0012	0.0012	0.0013	-16	0.0017	0.0017	0.0017	0
Zn, Tot	Closure	Sep	6	0.0064	0.0064	0.0067	169	0.0023	0.0023	0.0024	169	0.00243	0.00243	0.00255	34	0.0052	0.0053	0.0054	-32	0.0012	0.0012	0.0012	-18	0.0017	0.0017	0.0017	0
Zn, Tot	Closure	Oct	6	0.0053	0.0052	0.0054	153	0.0023	0.0023	0.0024	172	0.00242	0.00242	0.00253	40	0.0058	0.0058	0.0060	-29	0.0011	0.0011	0.0011	-19	0.0018	0.0018	0.0018	0
Zn, Tot	Closure	Nov	6	0.0065	0.0064	0.0066	136	0.0028	0.0028	0.0030	174	0.00242	0.00242	0.00256	12	0.0062	0.0062	0.0065	-31	0.0014	0.0014	0.0014	-17	0.0021	0.0021	0.0021	0
Zn, Tot	Closure	Dec	6	0.0058	0.0057	0.0059	117	0.0029	0.0029	0.0030	181	0.00173	0.00171	0.00180	36	0.0059	0.0059	0.0062	-33	0.0016	0.0016	0.0016	-13	0.0021	0.0021	0.0021	0
Zn, Tot	Post-Closure	Jan	117	0.0024	0.0024	0.0059	-5	0.0015	0.0015	0.0030	42	0.00134	0.00133	0.00177	16	0.0088	0.0088	0.0091	0	0.0020	0.0020	0.0021	1	0.0021	0.0021	0.0021	1
Zn, Tot	Post-Closure	Feb	117	0.0026	0.0027	0.0065	-5	0.0016	0.0016	0.0032	43	0.00145	0.00145	0.00193	12	0.0091	0.0091	0.0095	0	0.0022	0.0021	0.0022	1	0.0022	0.0022	0.0022	1
Zn, Tot	Post-Closure	Mar	117	0.0023	0.0023	0.0055	-5	0.0017	0.0016	0.0031	46	0.00129	0.00129	0.00174	8	0.0090	0.0090	0.0094	0	0.0022	0.0022	0.0023	1	0.0021	0.0021	0.0021	1
Zn, Tot	Post-Closure	Apr	117	0.0022	0.0023	0.0053	-5	0.0017	0.0016	0.0029	49	0.00122	0.00123	0.00170	1	0.0088	0.0088	0.0092	-1	0.0023	0.0022	0.0023	1	0.0021	0.0021	0.0021	1
Zn, Tot	Post-Closure	May	117	0.0012	0.0013	0.0028	-1	0.0012	0.0011	0.0020	51	0.00102	0.00103	0.00118	-1	0.0108	0.0107	0.0111	-1	0.0019	0.0019	0.0019	1	0.0017	0.0017	0.0017	1
Zn, Tot	Post-Closure	Jun	117	0.0011	0.0011	0.0029	2	0.0011	0.0011	0.0019	52	0.00099	0.00099	0.00112	7	0.0095	0.0095	0.0099	-1	0.0017	0.0017	0.0017	1	0.0017	0.0017	0.0017	1
Zn, Tot	Post-Closure	Jul	117	0.0015	0.0015	0.0047	-5	0.0011	0.0011	0.0020	48	0.00146	0.00145	0.00159	10	0.0084	0.0084	0.0088	-1	0.0016	0.0016	0.0016	1	0.0017	0.0017	0.0017	0
Zn, Tot	Post-Closure	Aug	117	0.0021	0.0022	0.0063	-10	0.0012	0.0011	0.0021	41	0.00193	0.00192	0.00224	12	0.0074	0.0074	0.0077	0	0.0015	0.0015	0.0015	1	0.0017	0.0017	0.0017	1
Zn, Tot	Post-Closure	Sep	117	0.0021	0.0022	0.0060	-9	0.0012	0.0012	0.0022	38	0.00204	0.00203	0.00241	12	0.0078	0.0078	0.0081	0	0.0014	0.0014	0.0015	1	0.0017	0.0017	0.0017	0
Zn, Tot	Post-Closure	Oct	117	0.0019	0.0019	0.0050	-7	0.0012	0.0012	0.0021	38	0.00195	0.00194	0.00241	13	0.0084	0.0084	0.0086	0	0.0014	0.0014	0.0014	1	0.0018	0.0018	0.0018	0
Zn, Tot	Post-Closure	Nov	117	0.0025	0.0025	0.0064	-6	0.0015	0.0014	0.0024	39	0.00248	0.00247	0.00314	14	0.0092	0.0092	0.0095	0	0.0017	0.0017	0.0017	1	0.0021	0.0021	0.0021	0
Zn, Tot	Post-Closure	Dec	117	0.0024	0.0025	0.0061	-6	0.0015	0.0014	0.0024	40	0.00149	0.00147	0.00198	17	0.0090	0.0090	0.0093	0	0.0019	0.0019	0.0019	1	0.0021	0.0021	0.0021	0

Appendix I TIME SERIES PLOTS

Appendix I-1: Gordon - Predicted Concentrations in Discharges

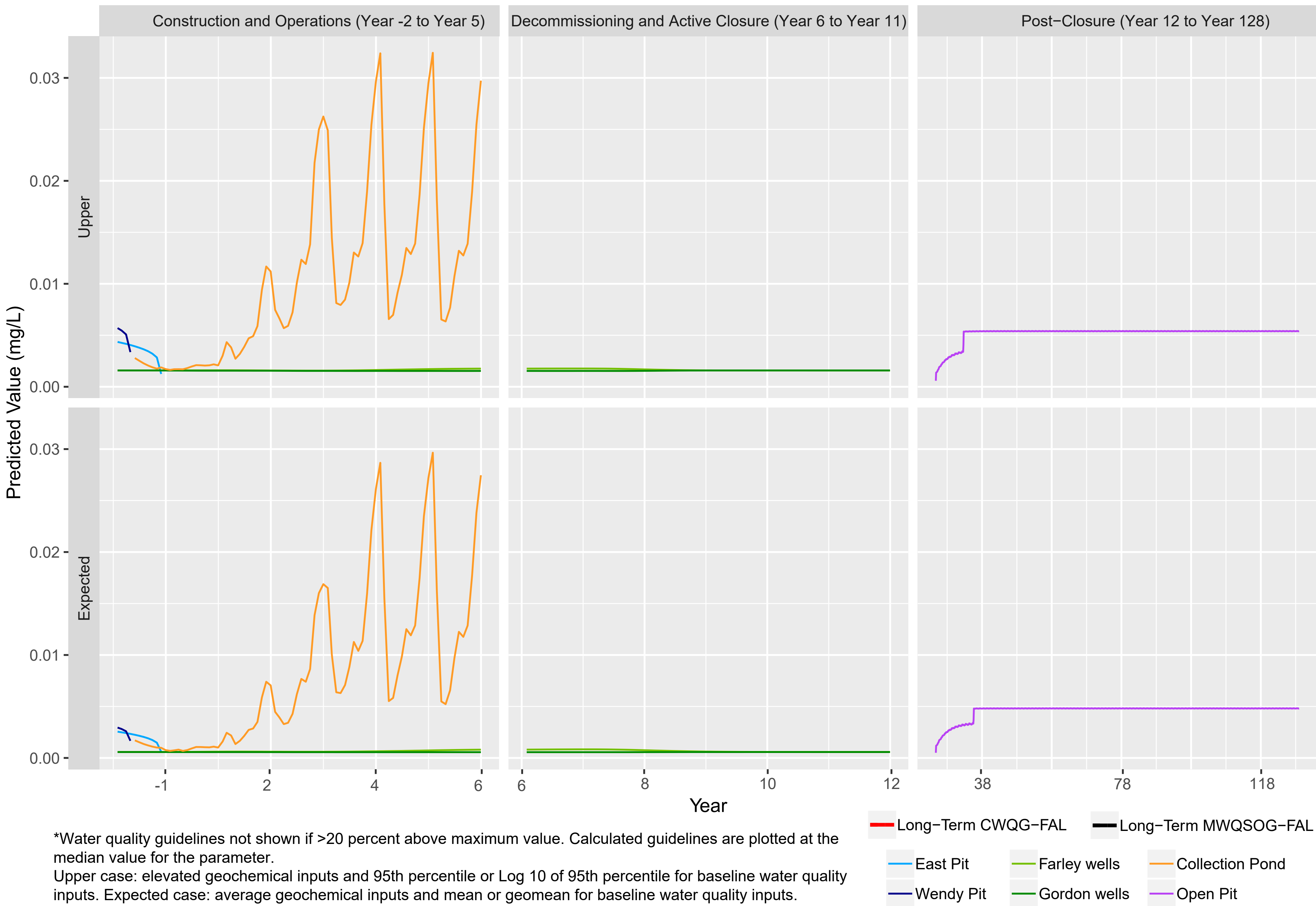
Aluminum, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

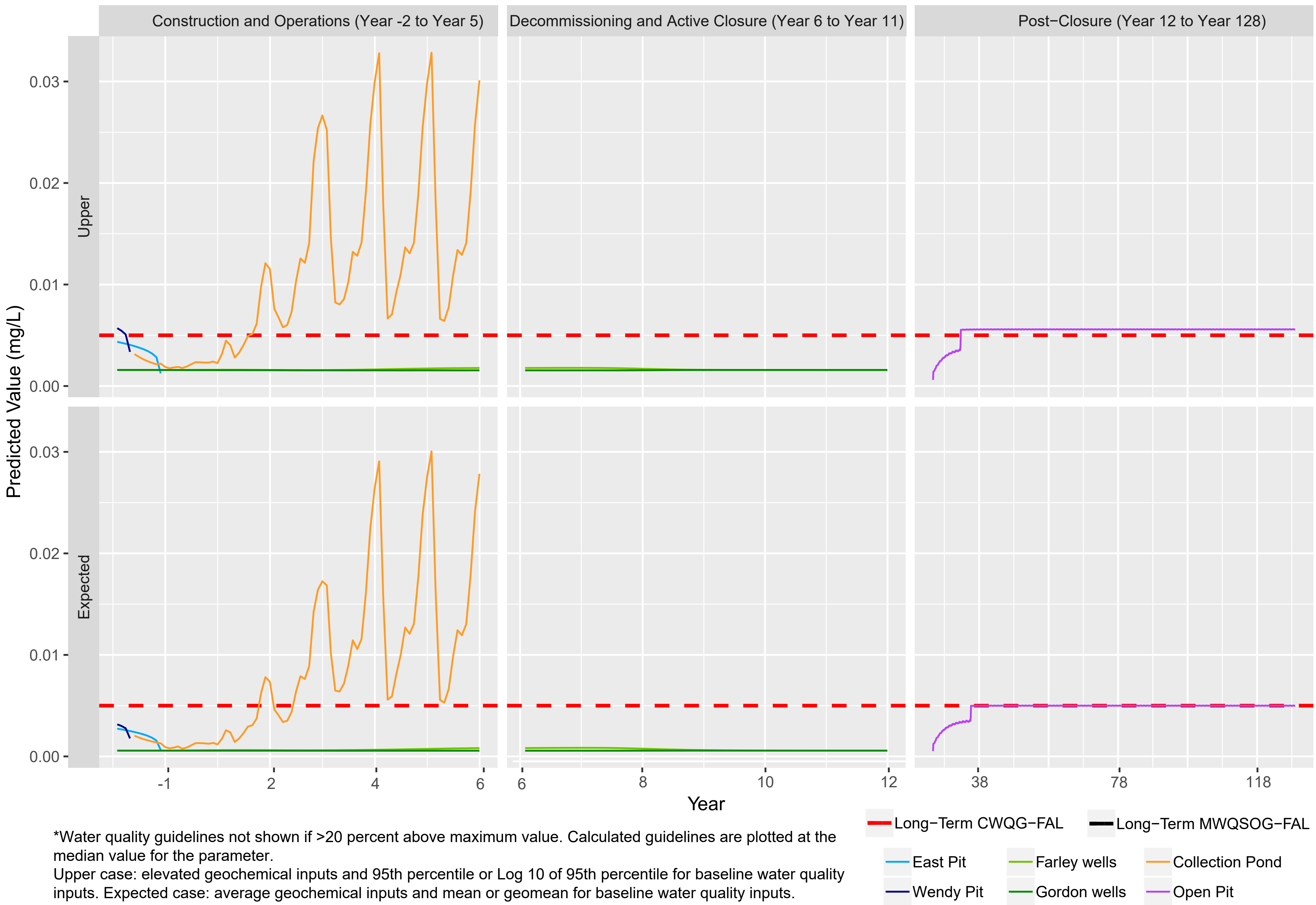
Arsenic, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

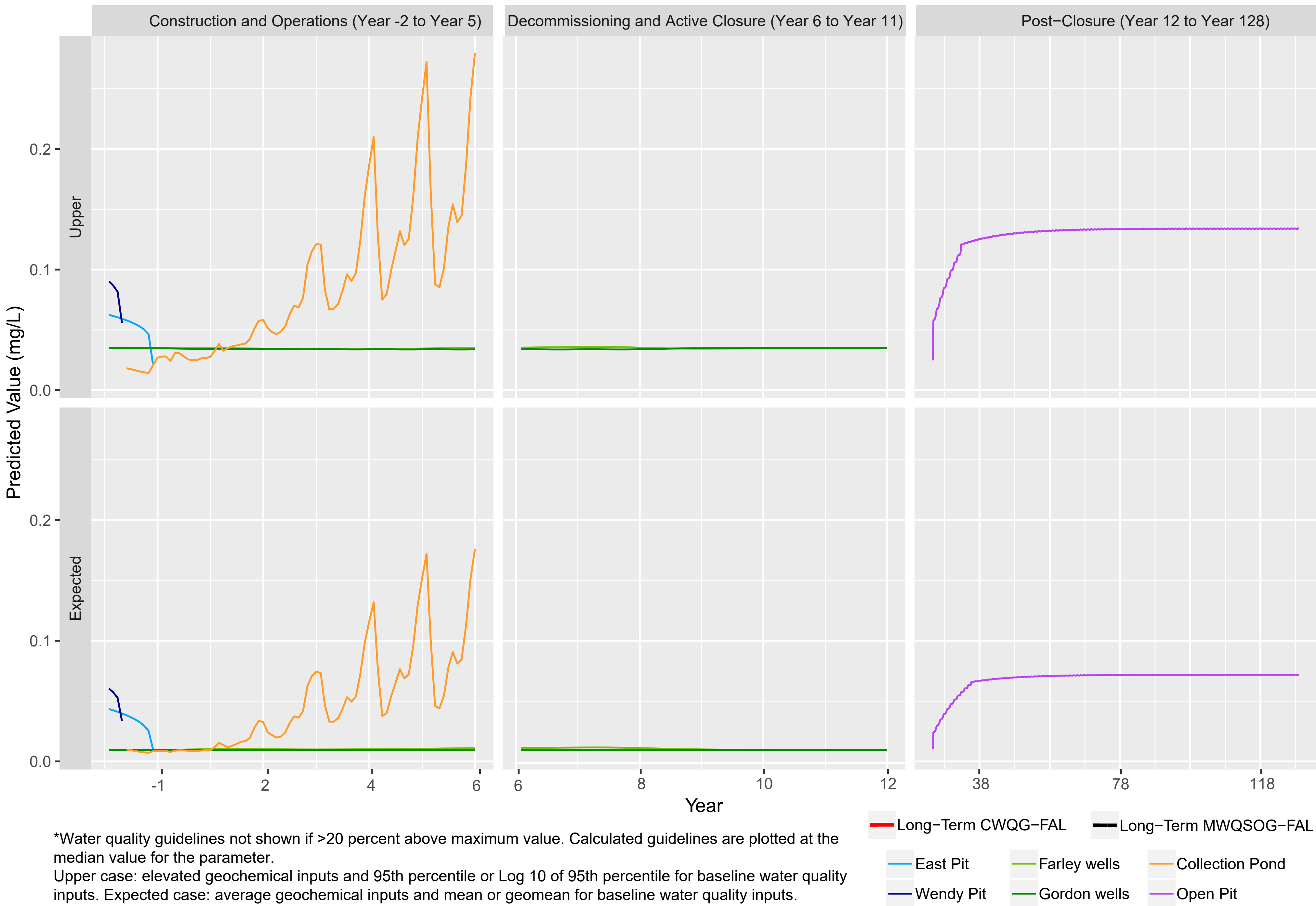
Arsenic, Total (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

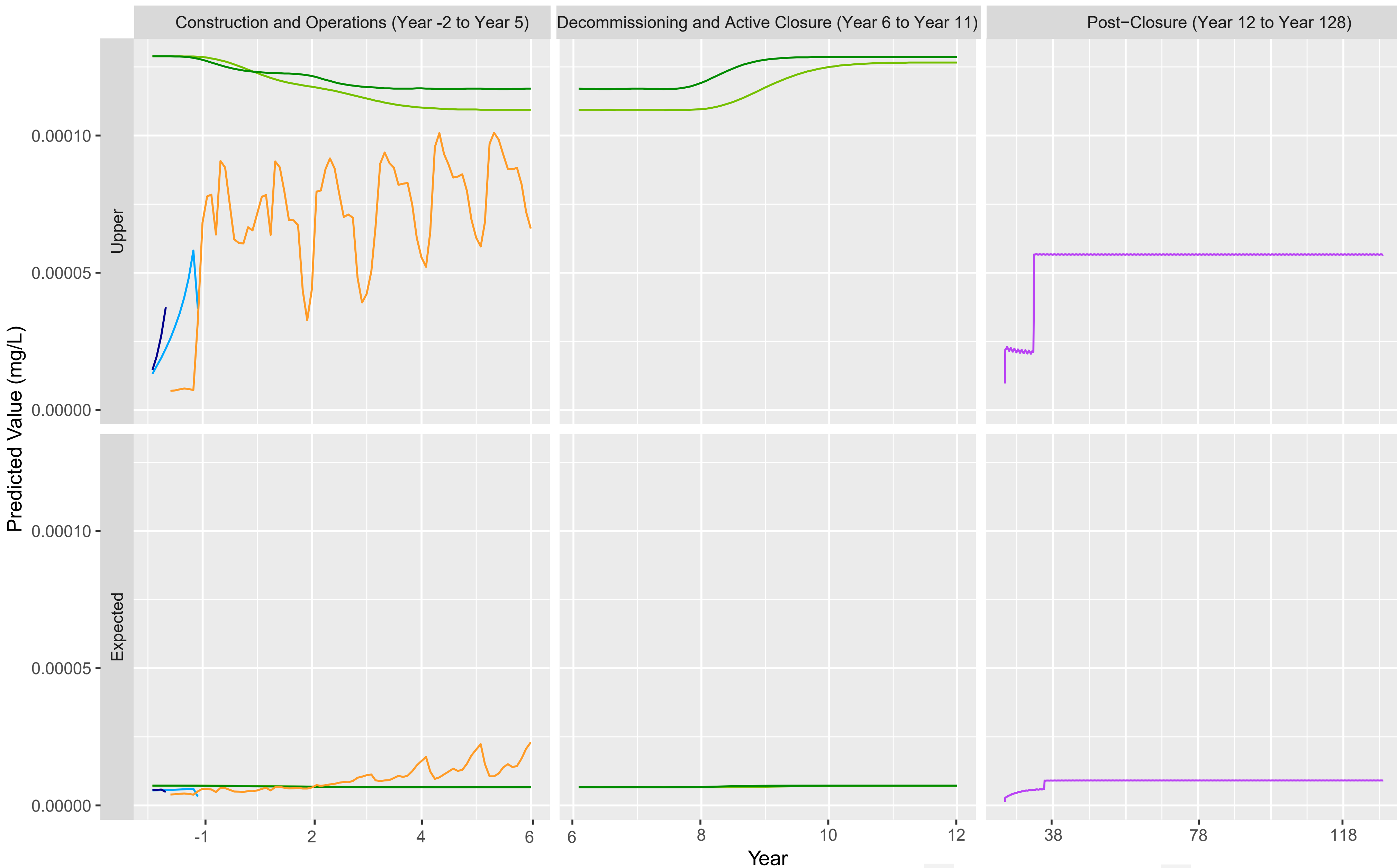
Boron, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

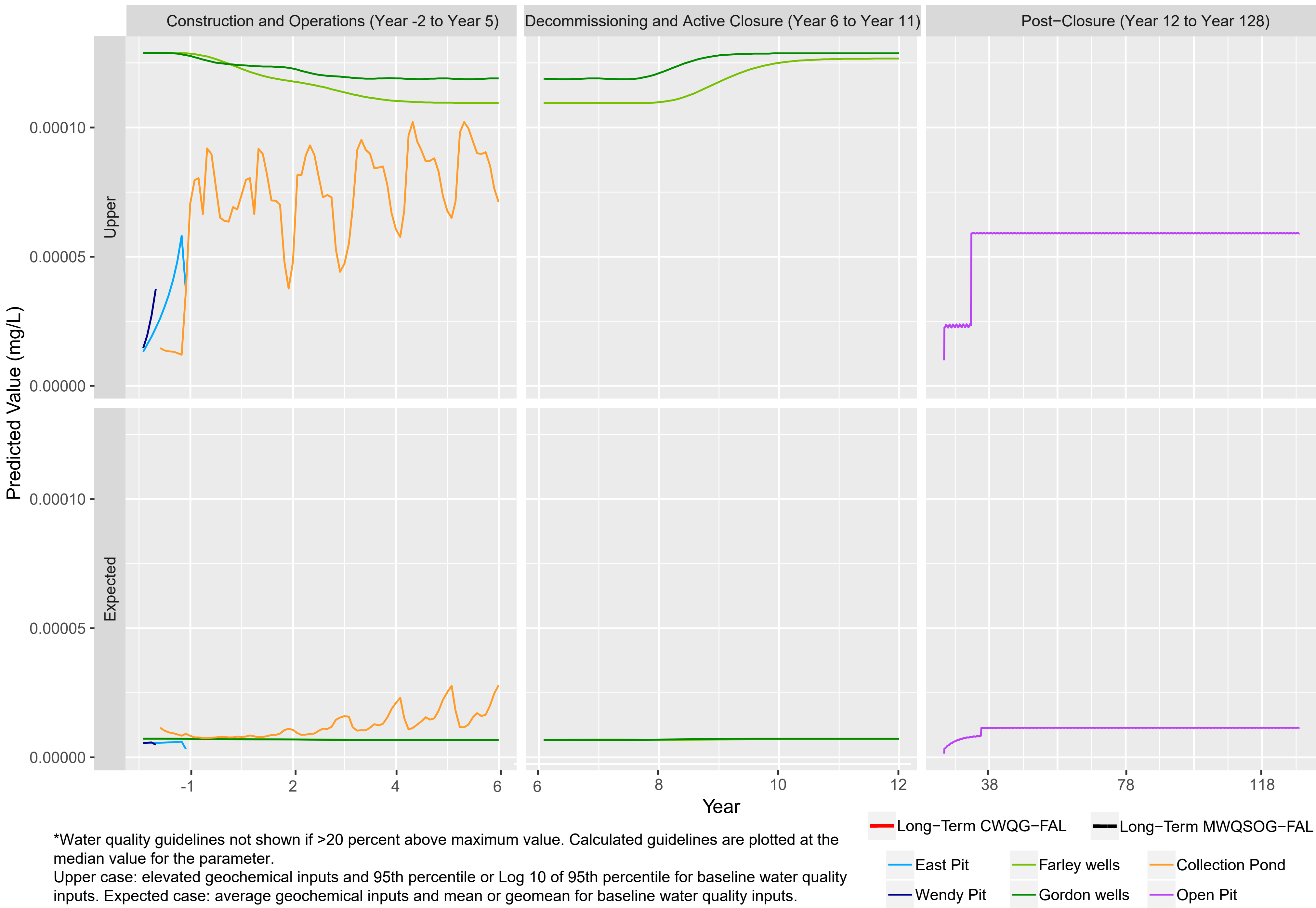
Cadmium, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

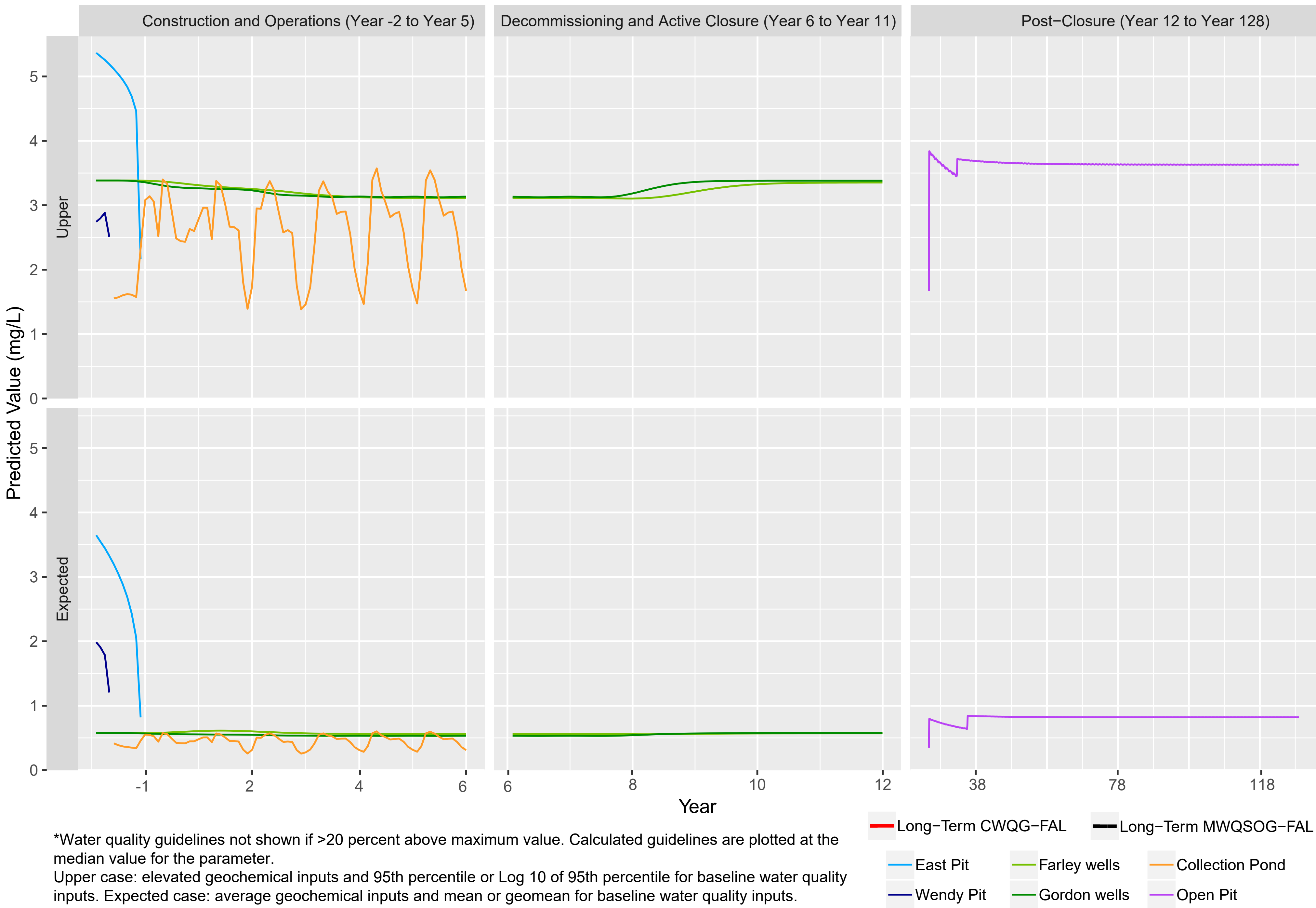
Cadmium, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

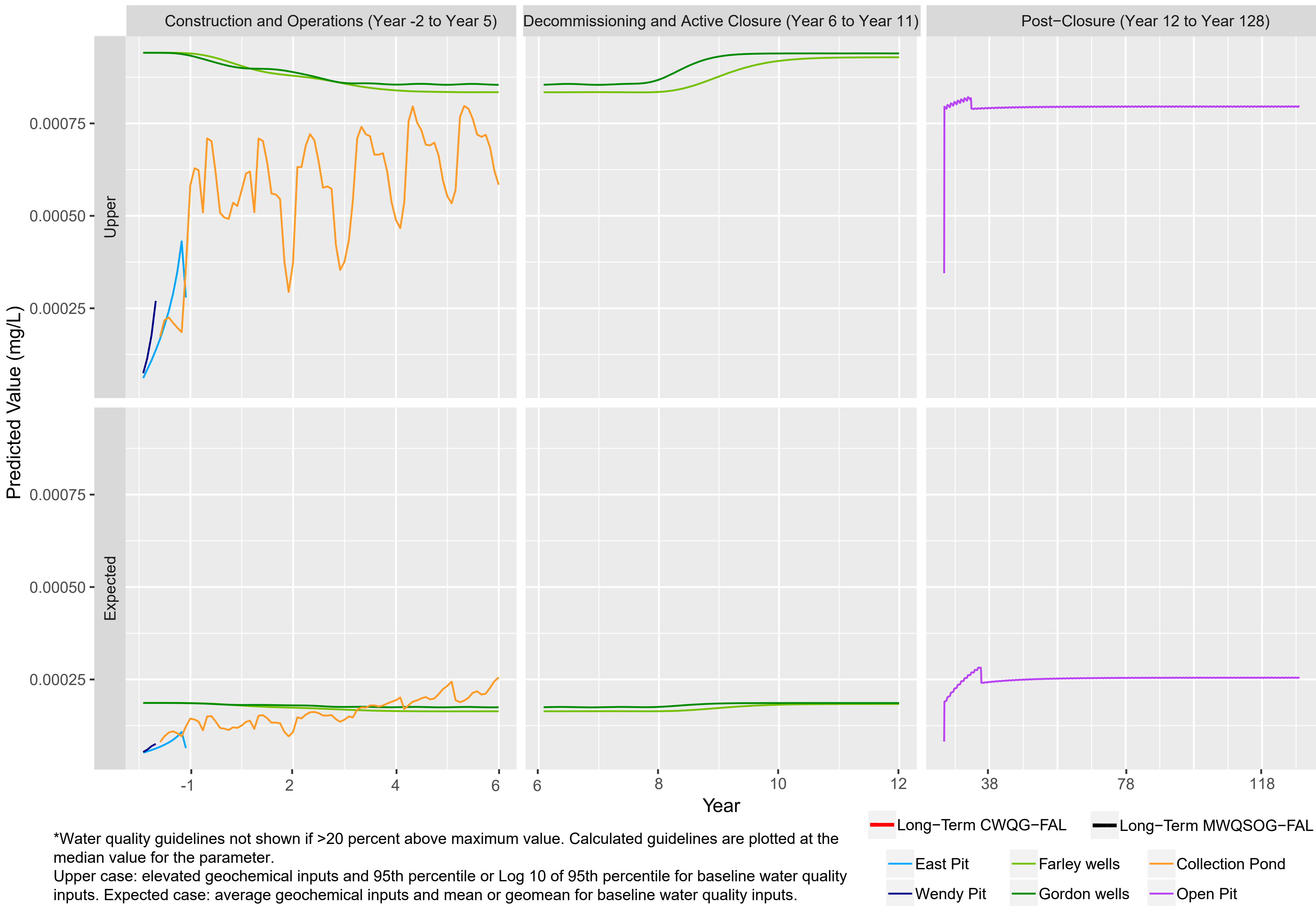
Chloride (Cl) (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

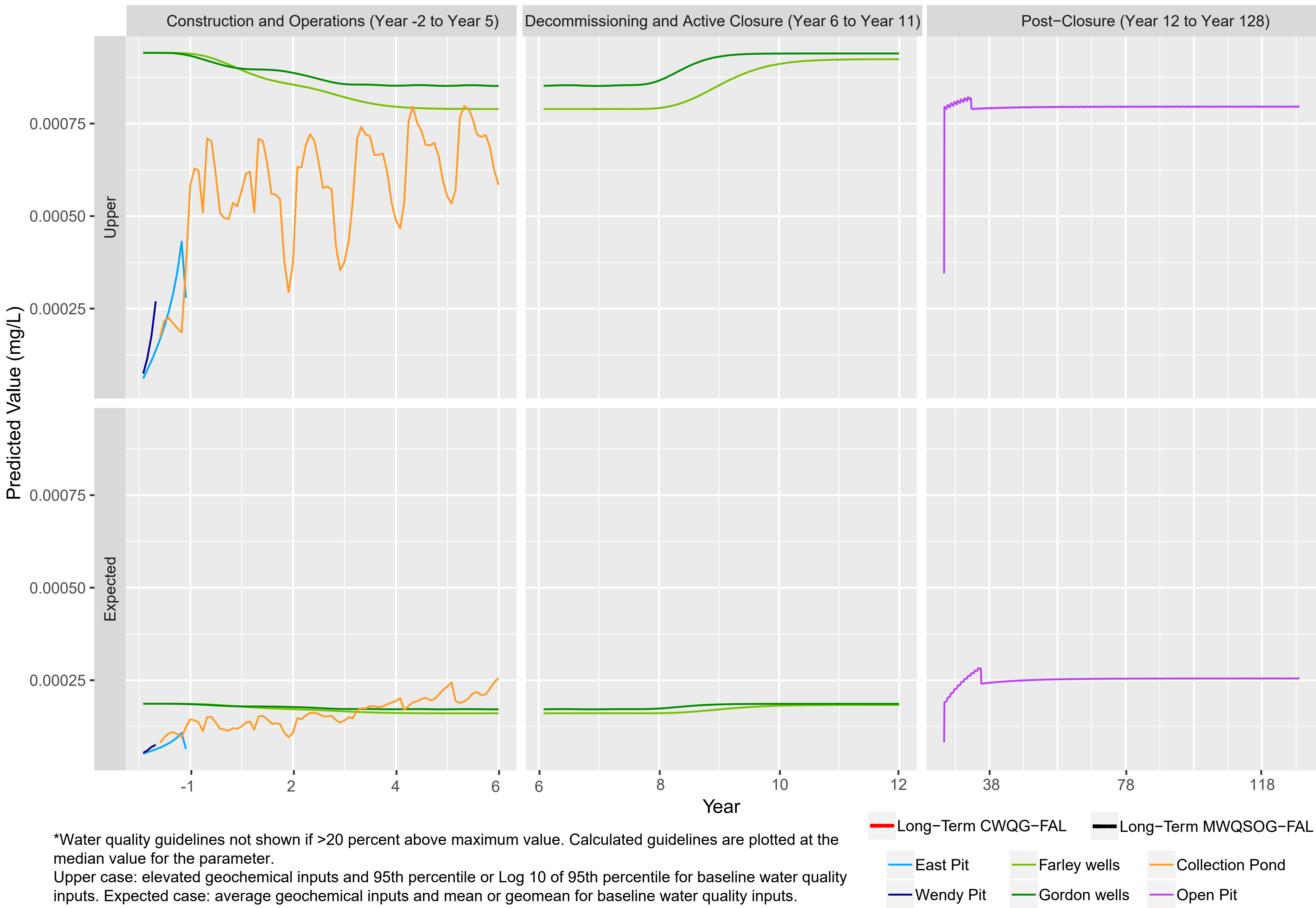
Chromium (Hexavalent), (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

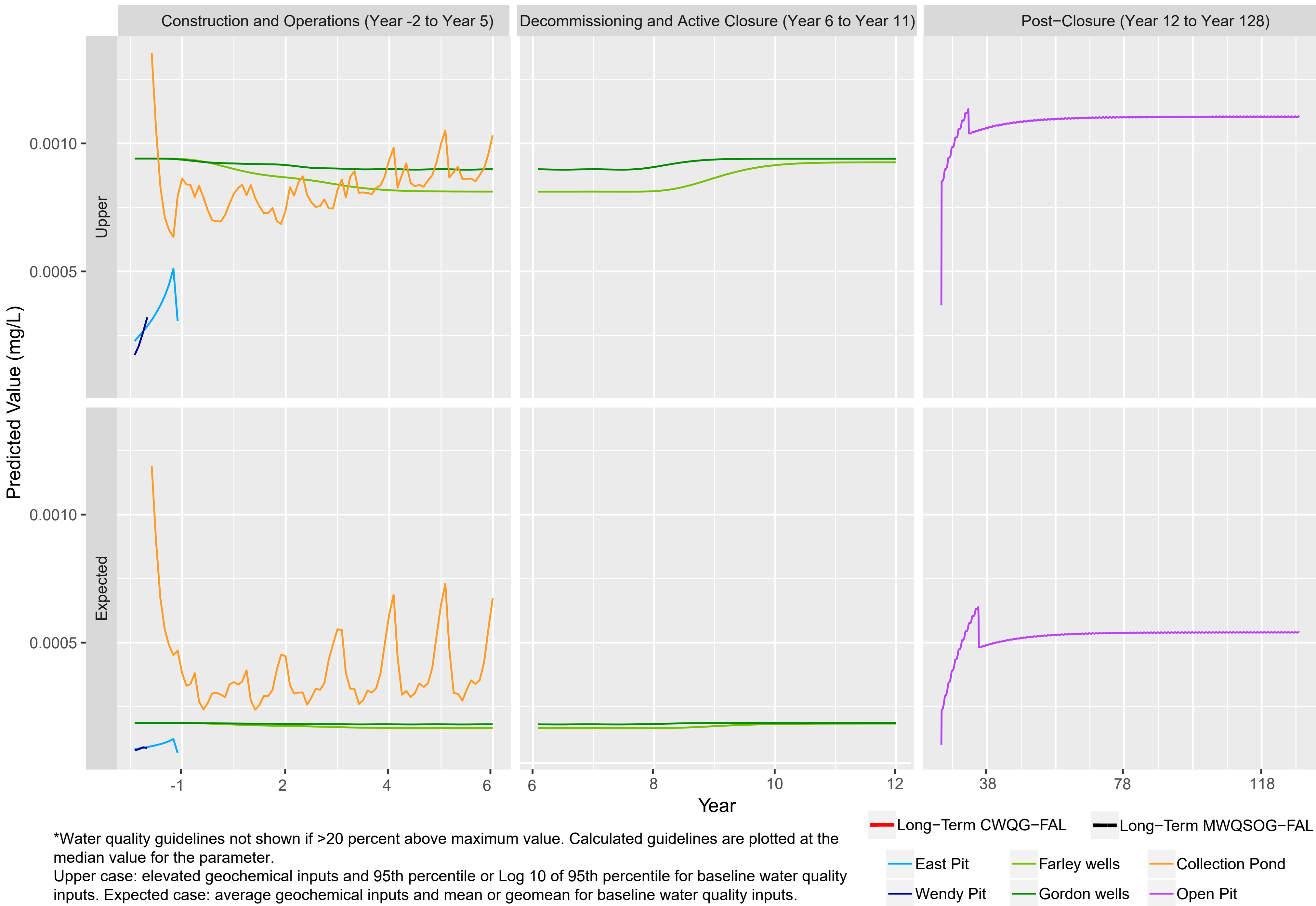
Chromium, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

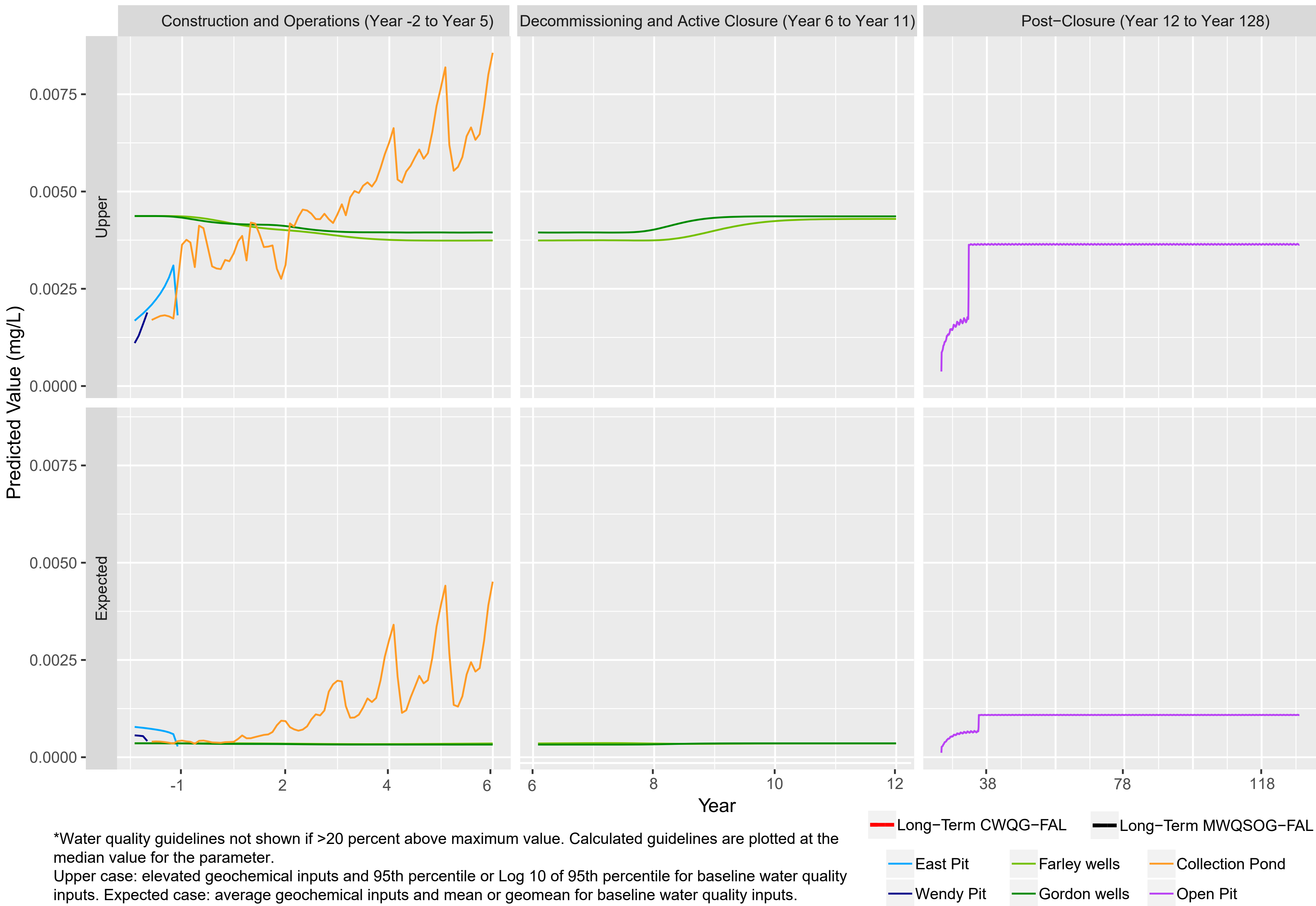
Chromium, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

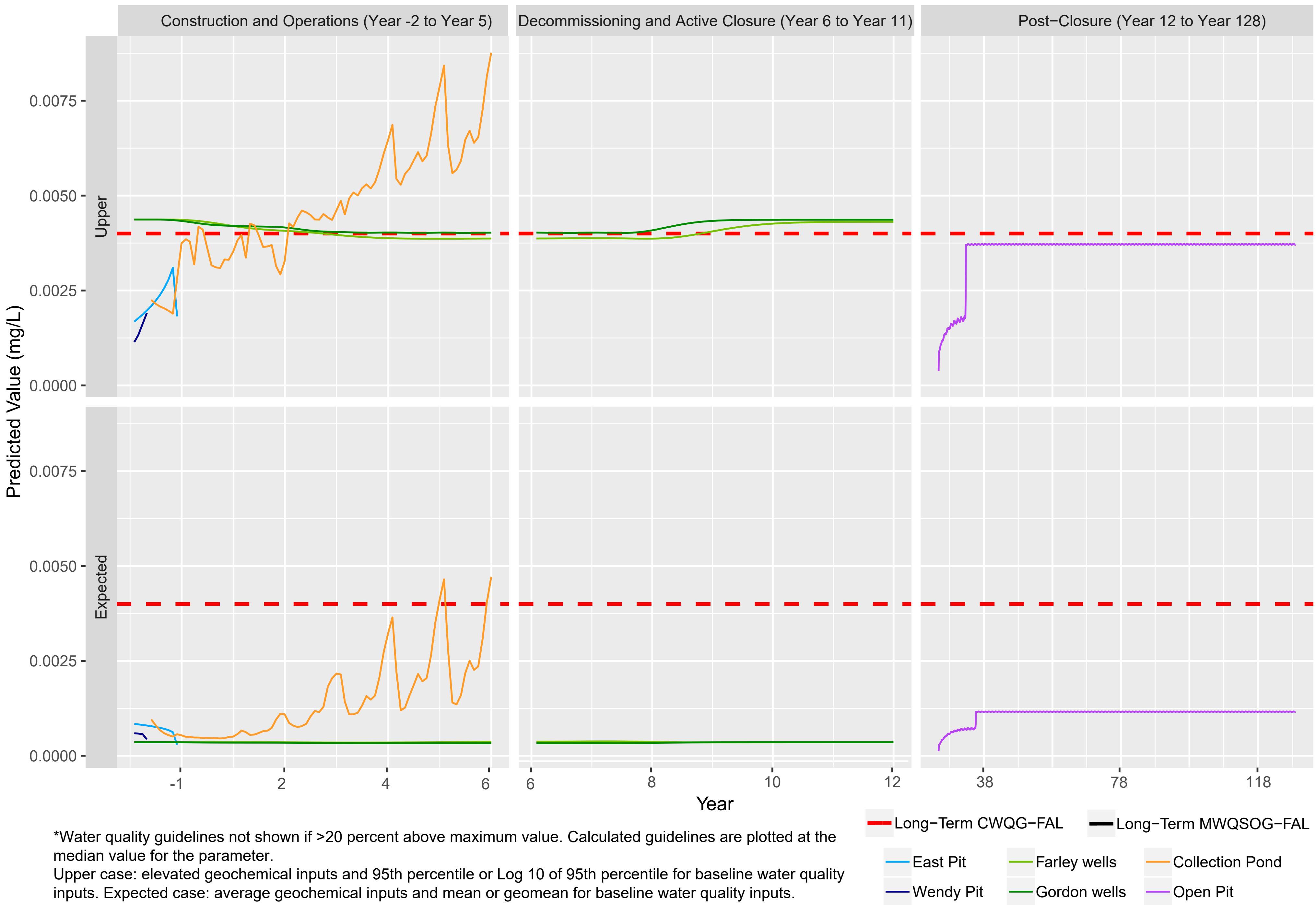
Copper, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

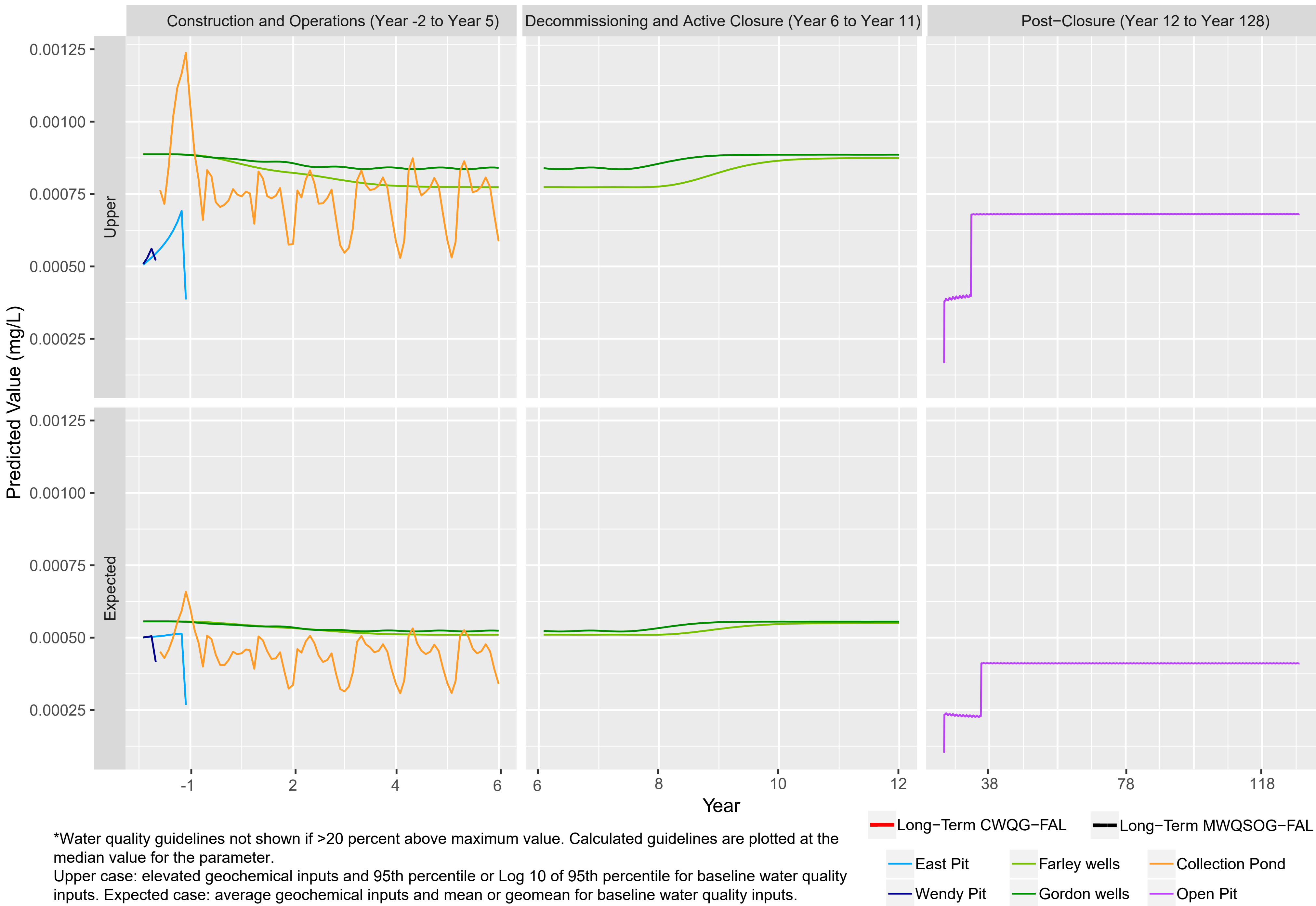
Copper, Total (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

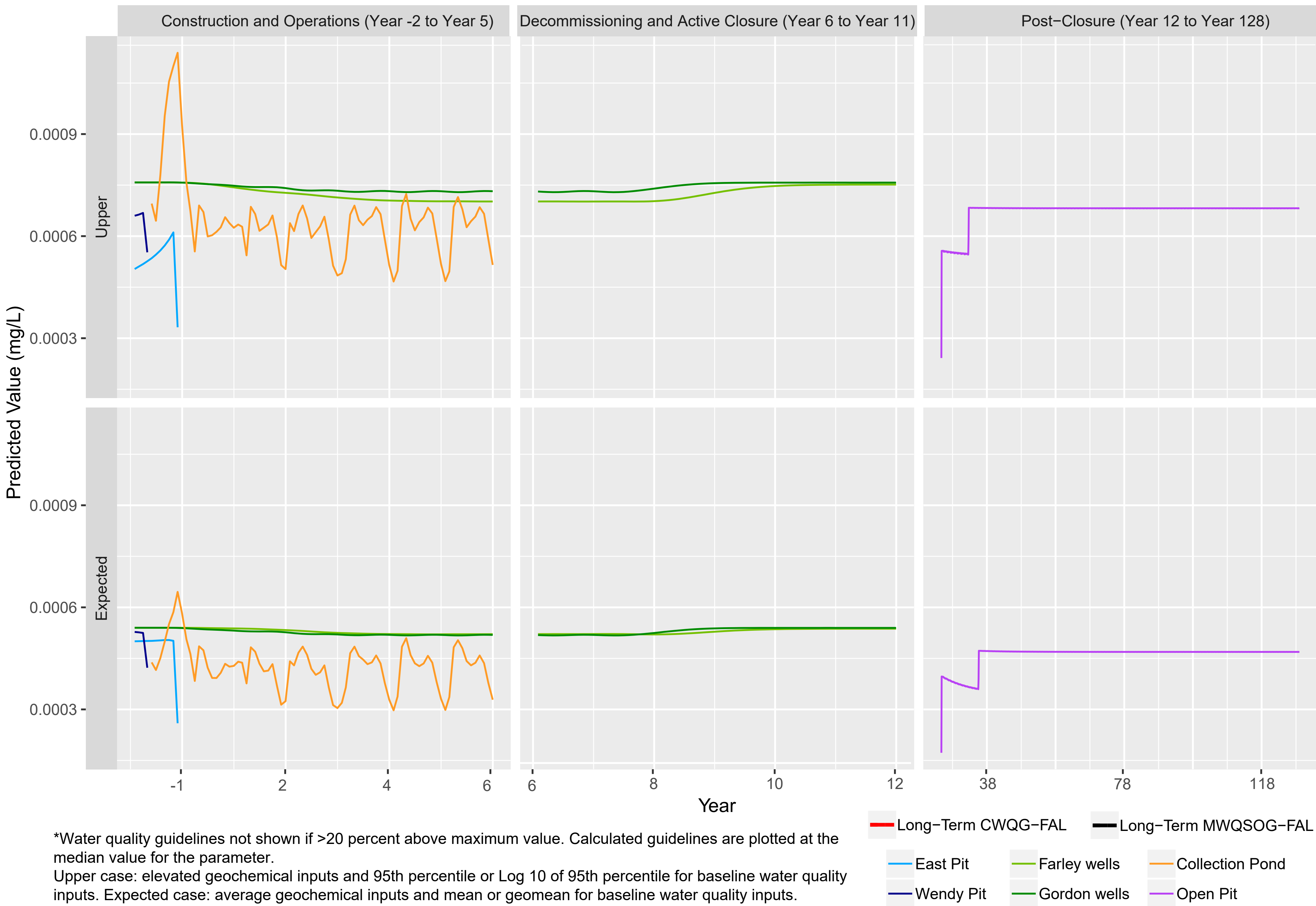
Cyanide (Free), (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

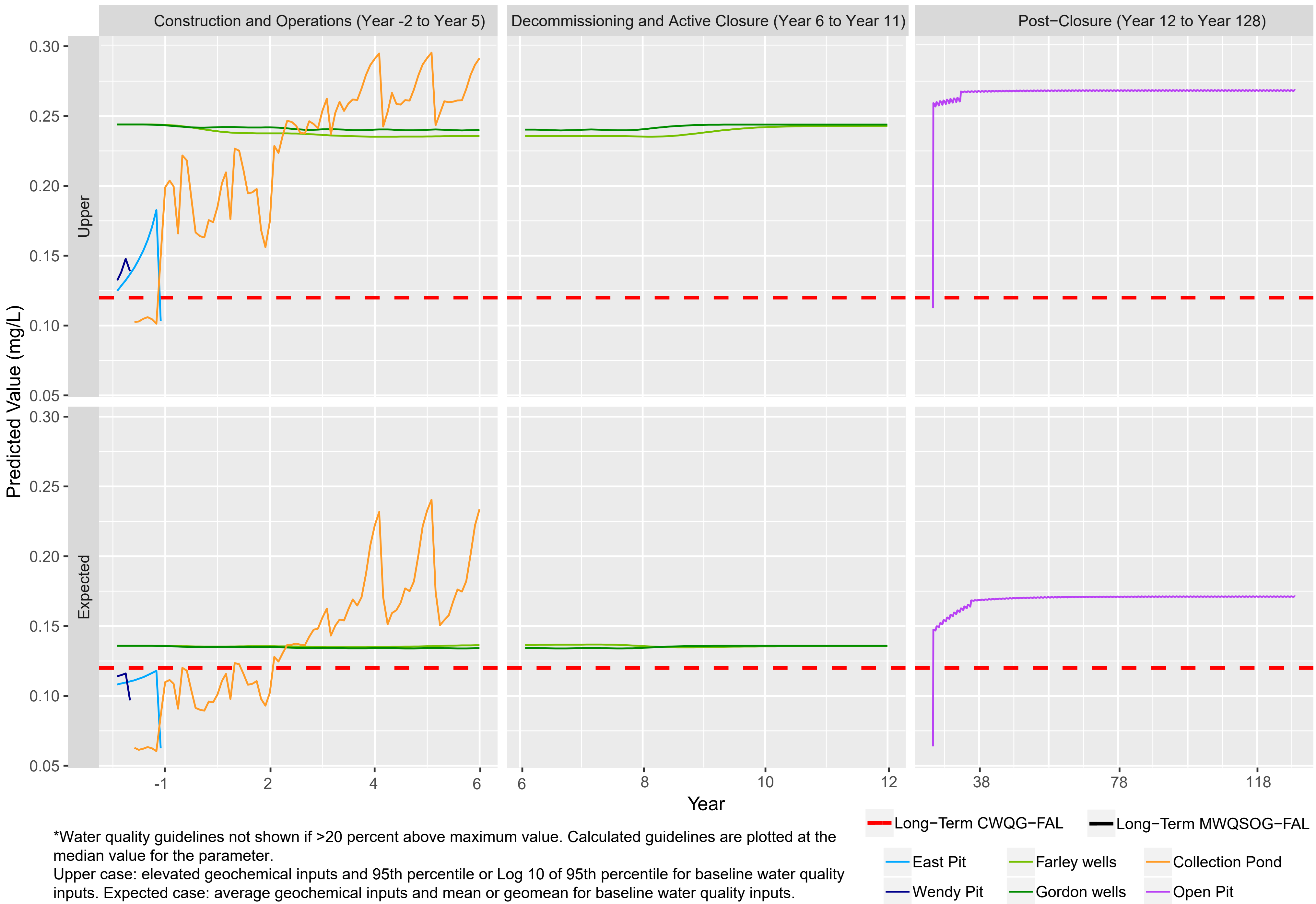
Cyanide, Total (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

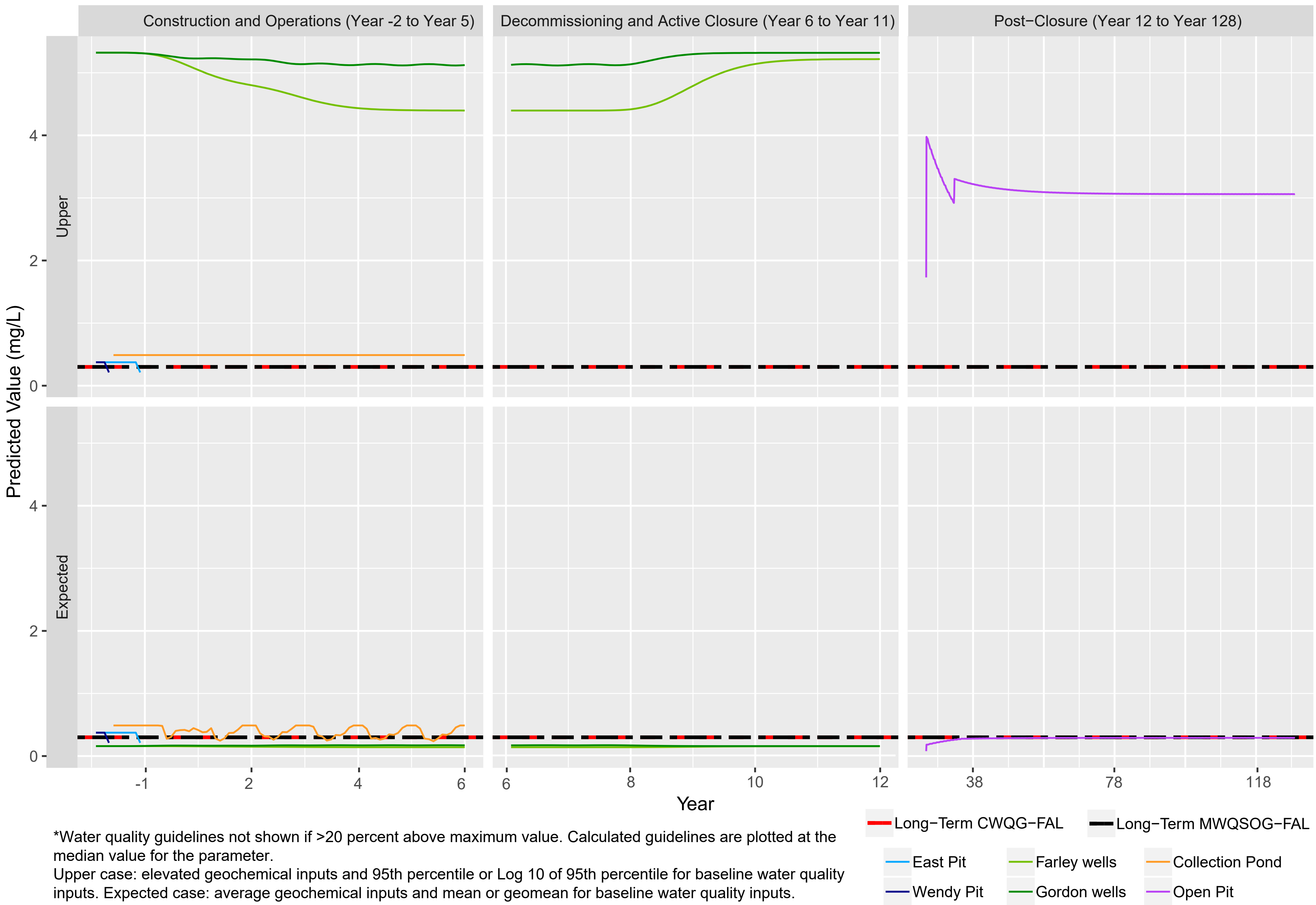
Fluoride, (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

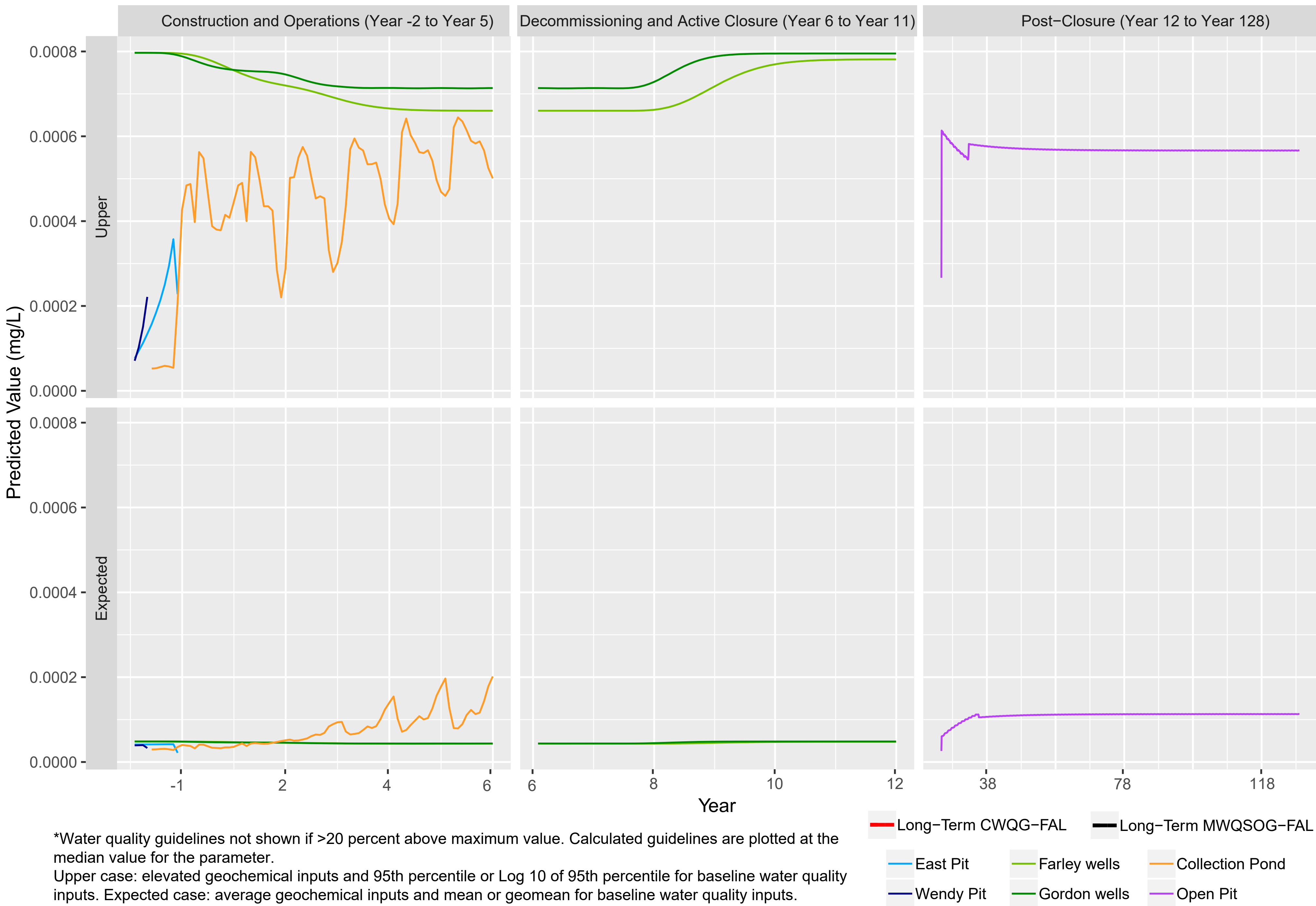
Iron, Total (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

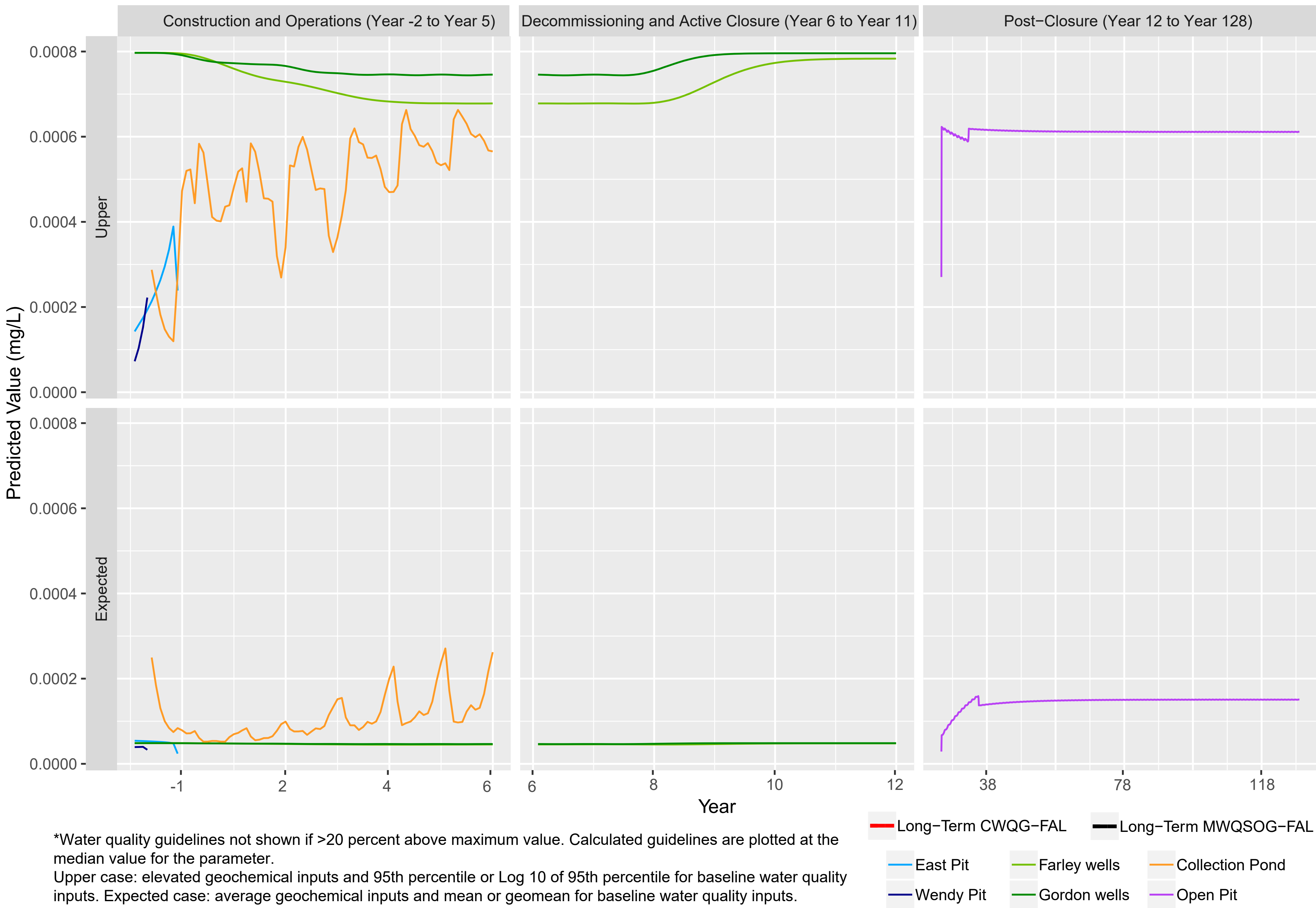
Lead, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

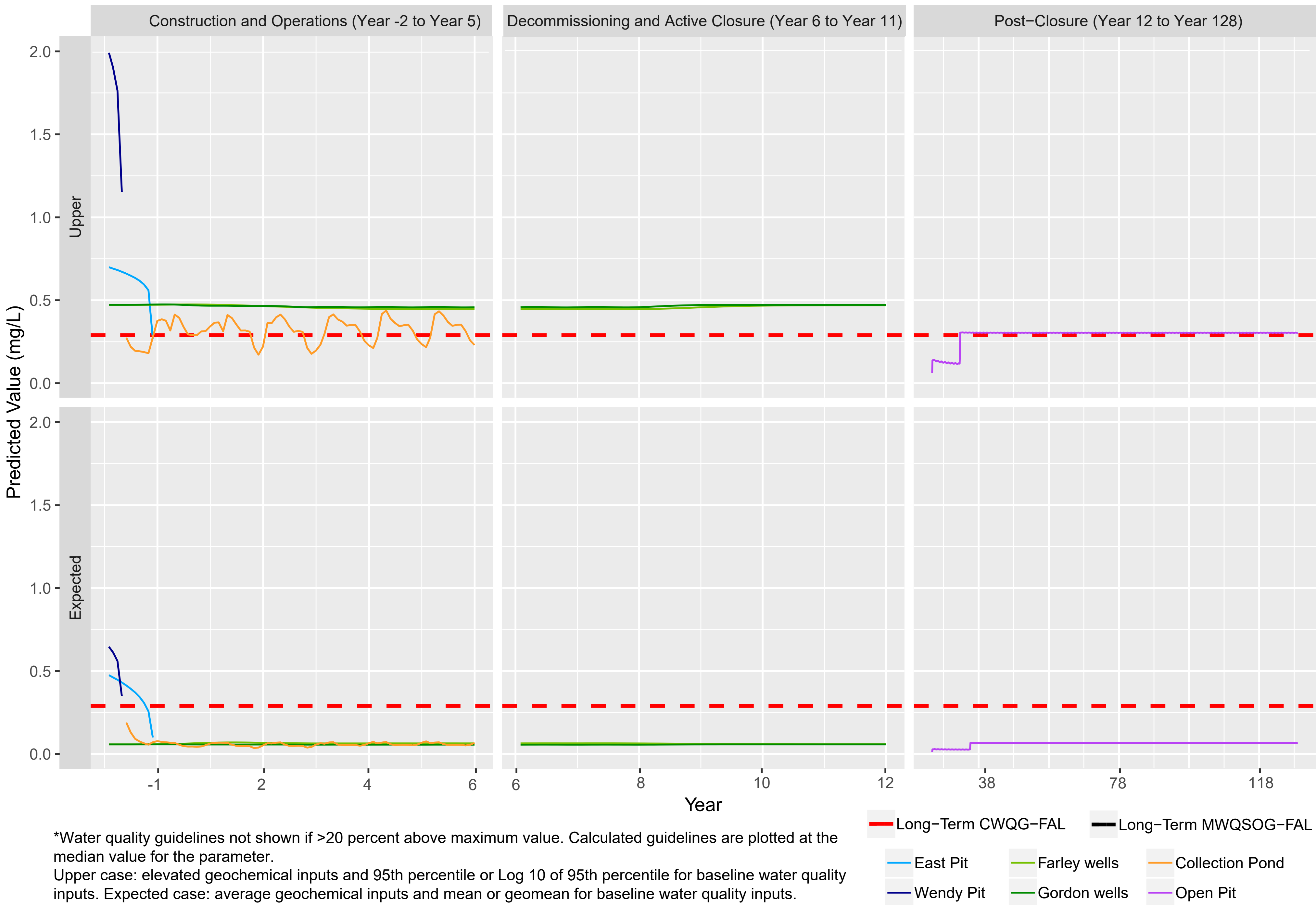
Lead, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

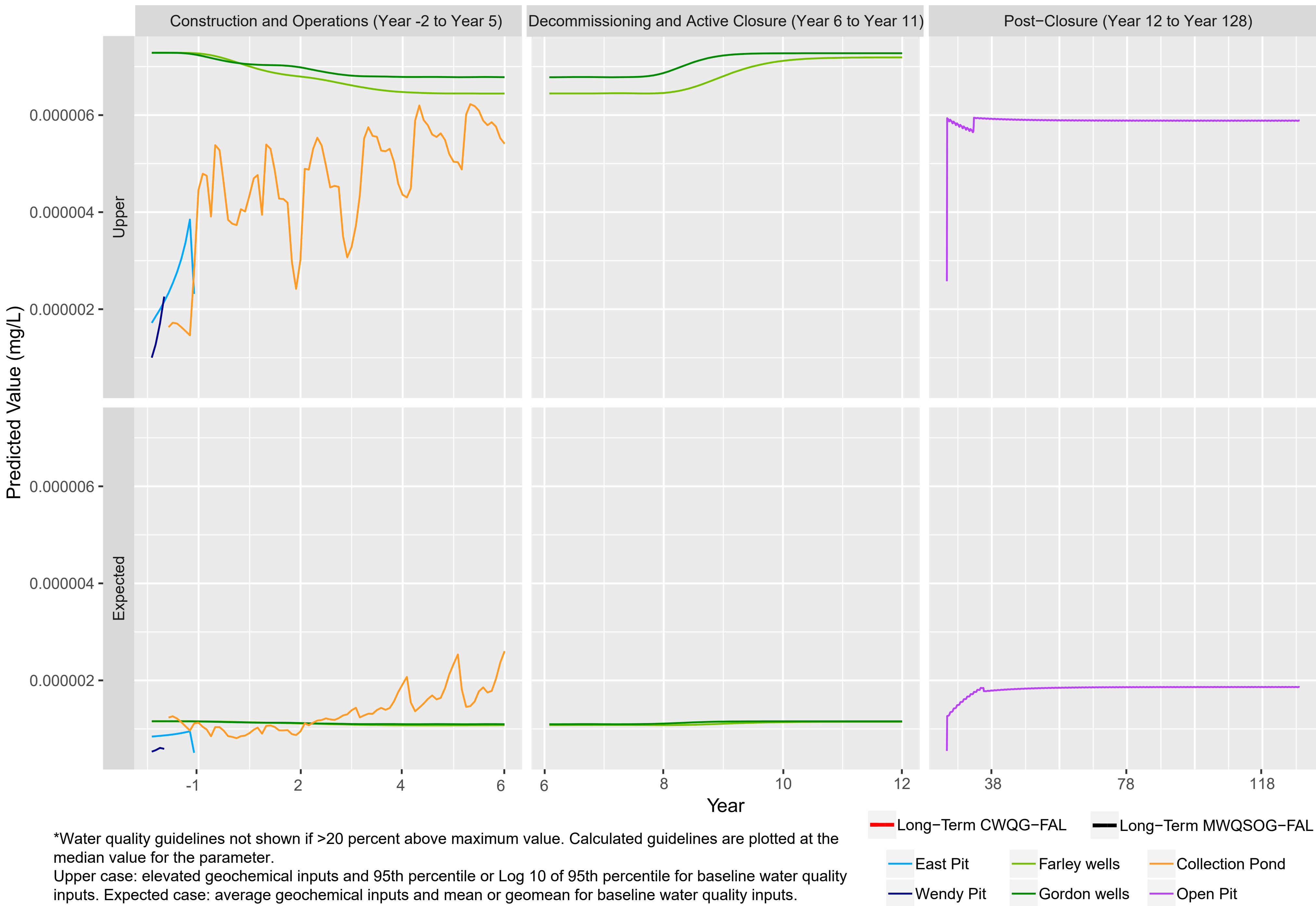
Manganese, Dissolved (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

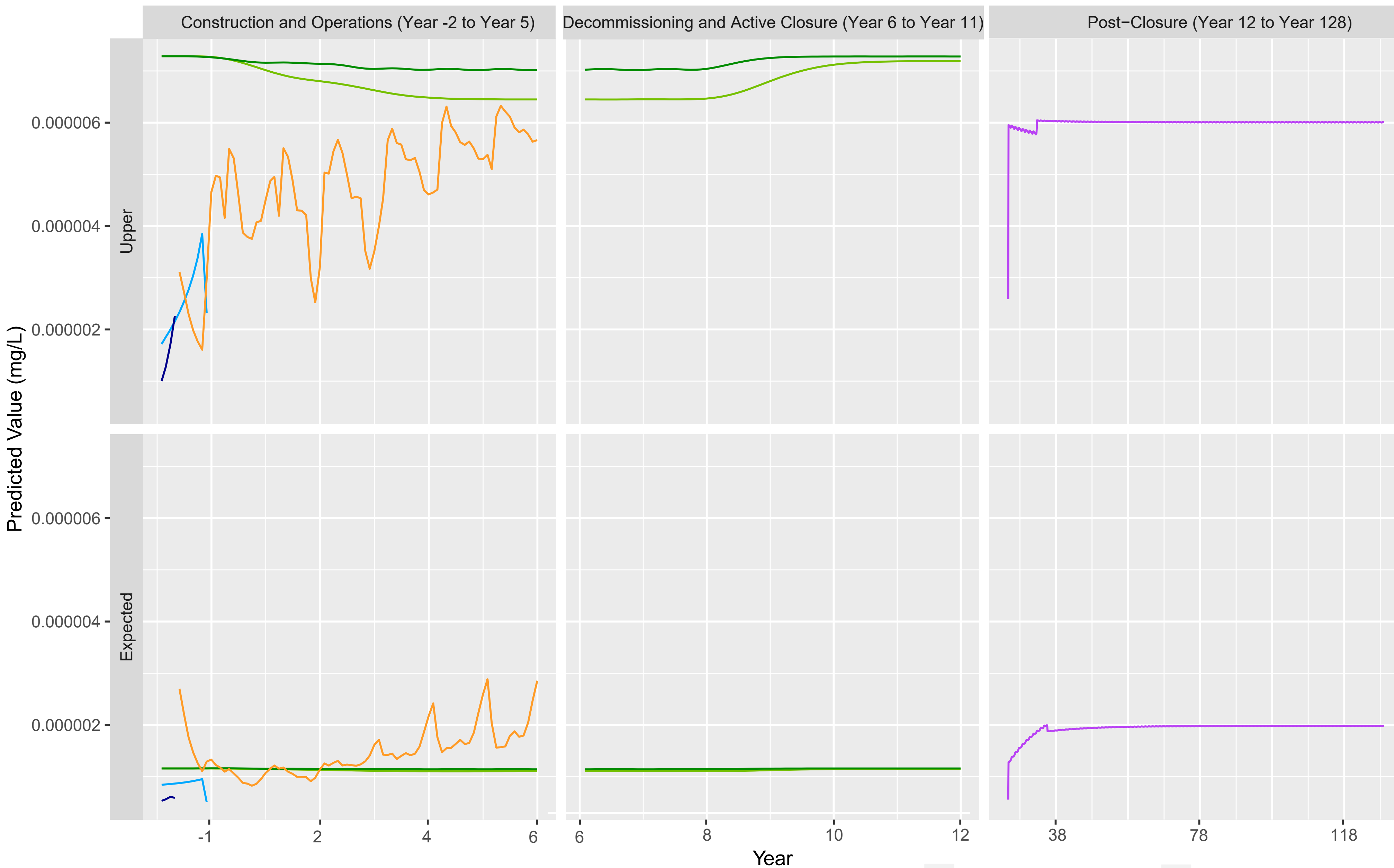
Mercury, Dissolved (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

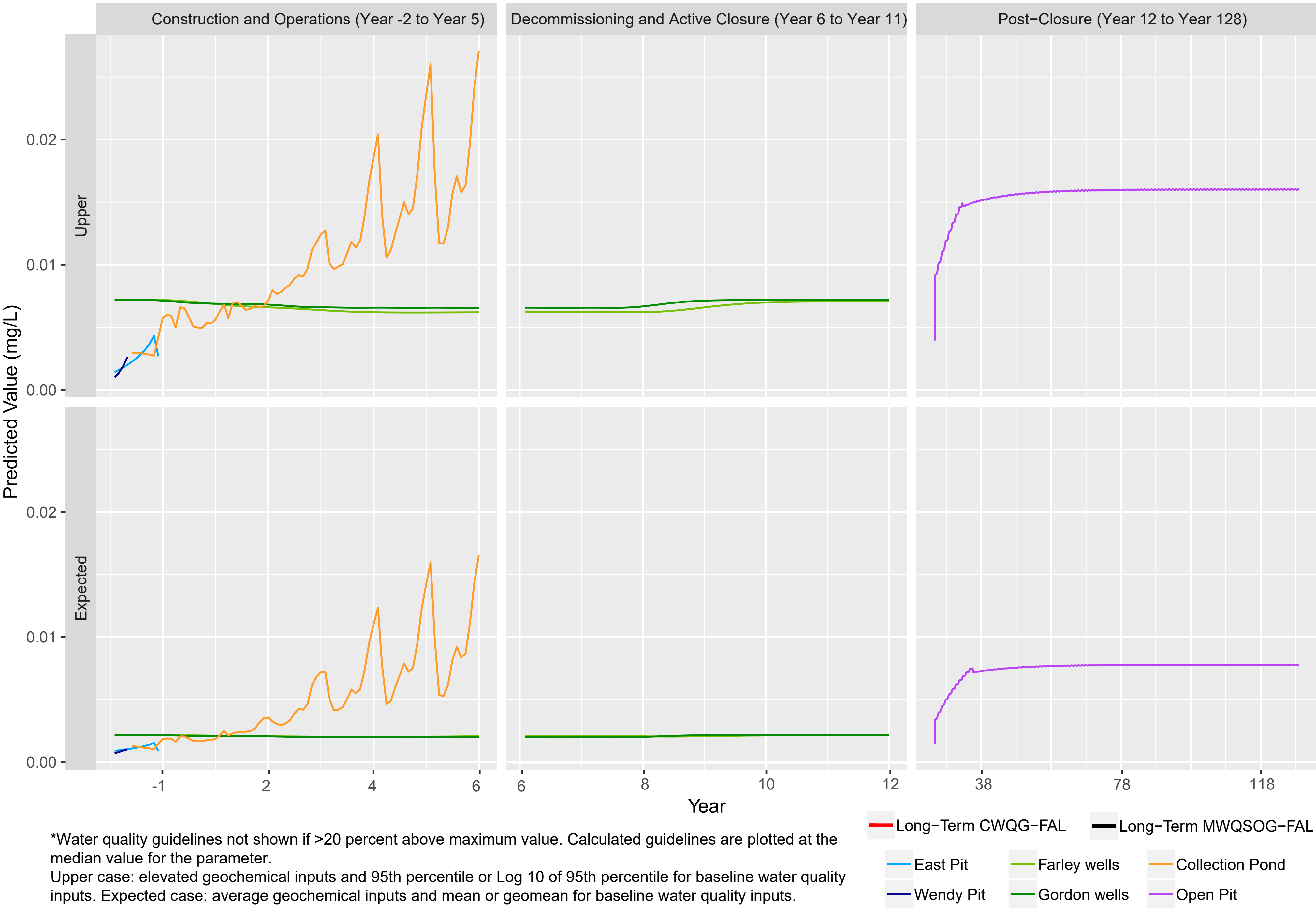
Mercury, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

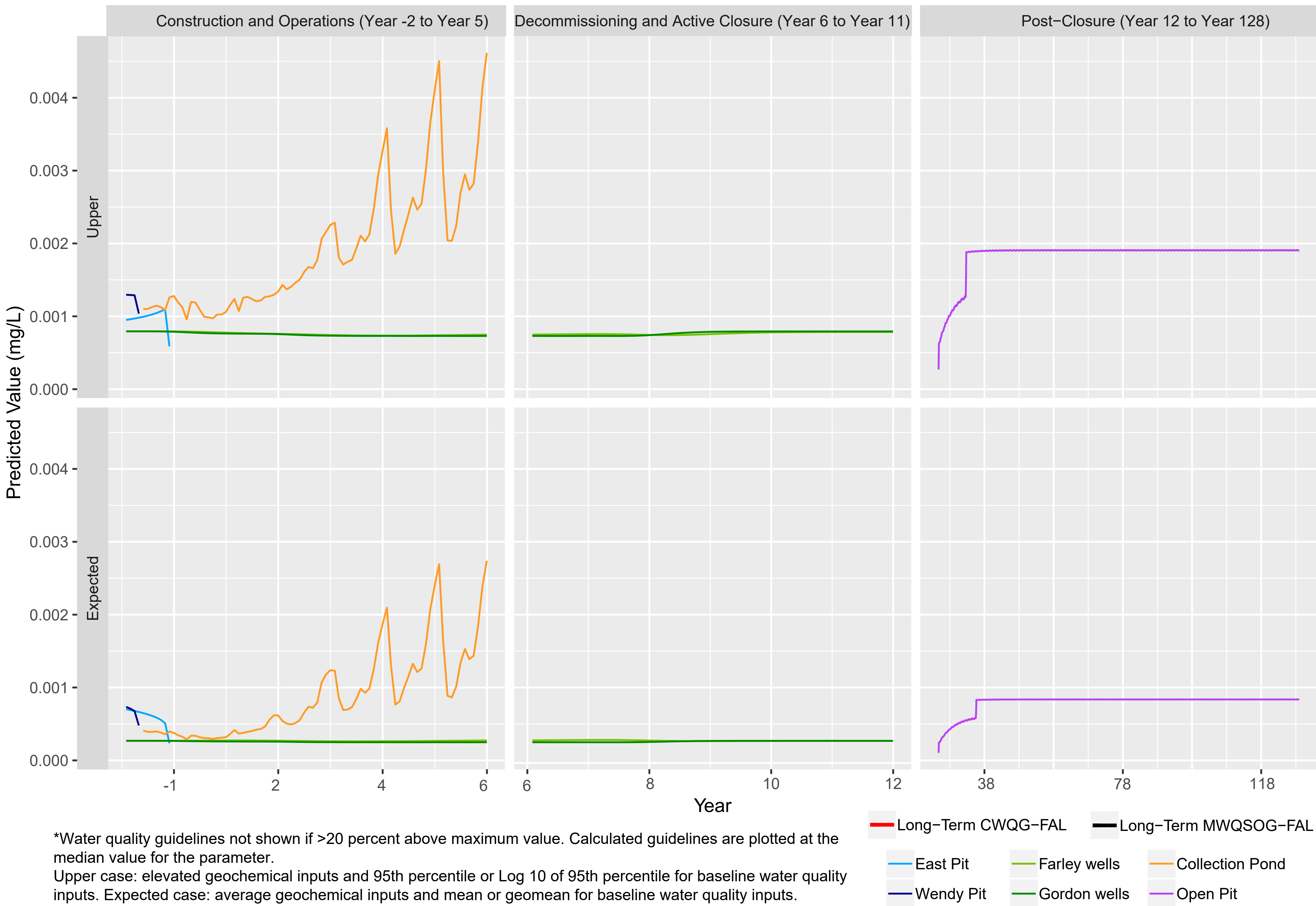
Molybdenum, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

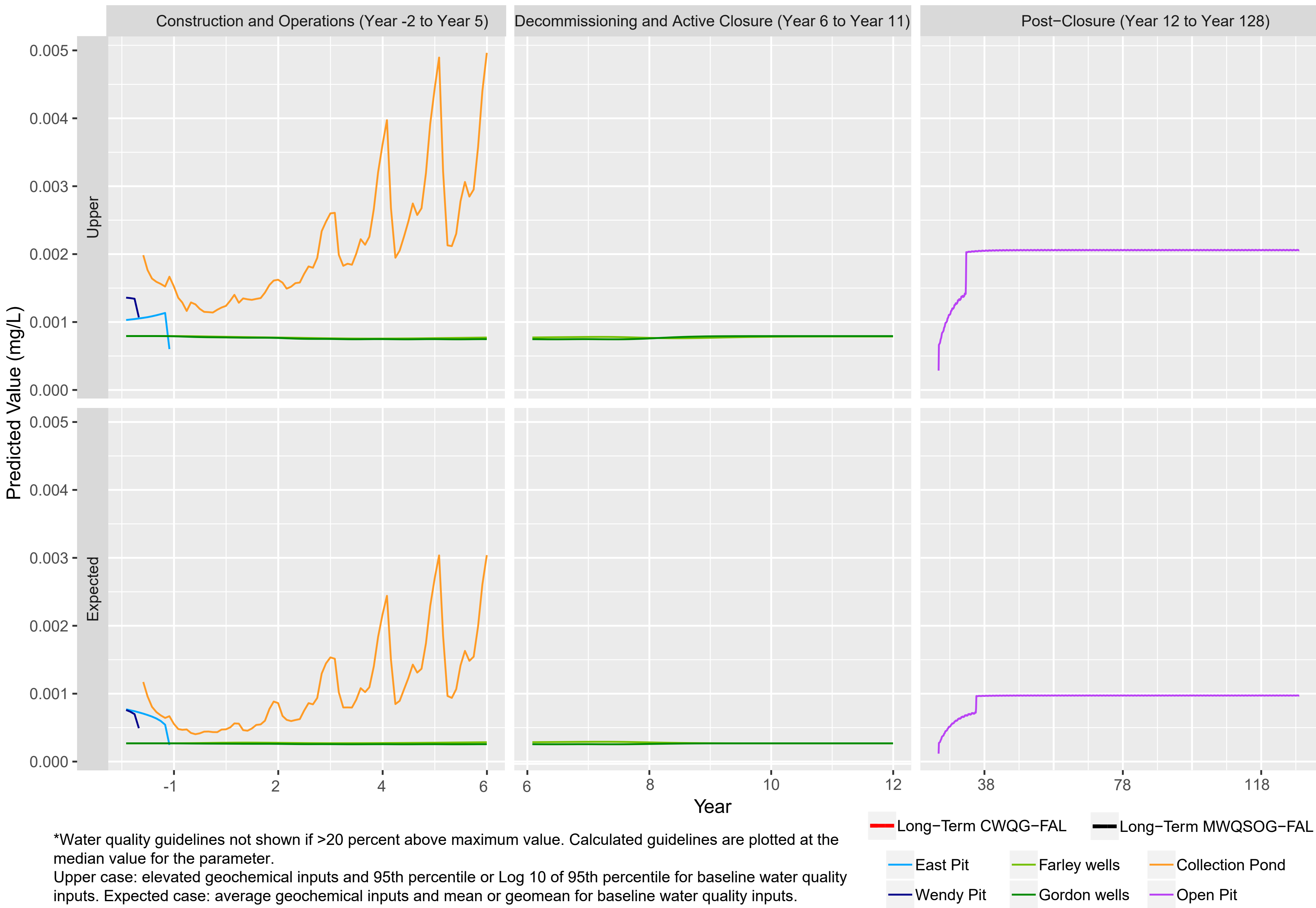
Nickel, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

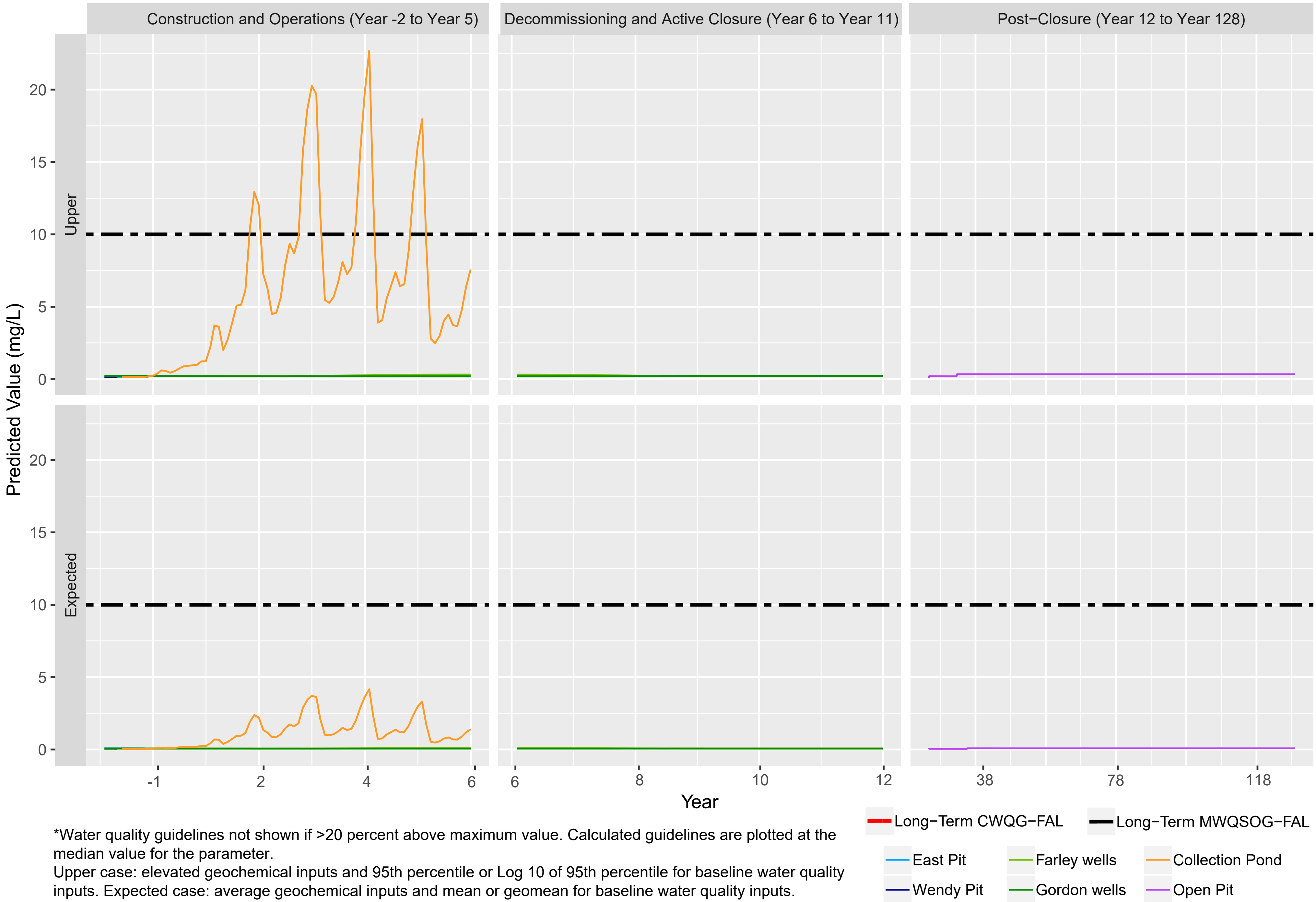
Nickel, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

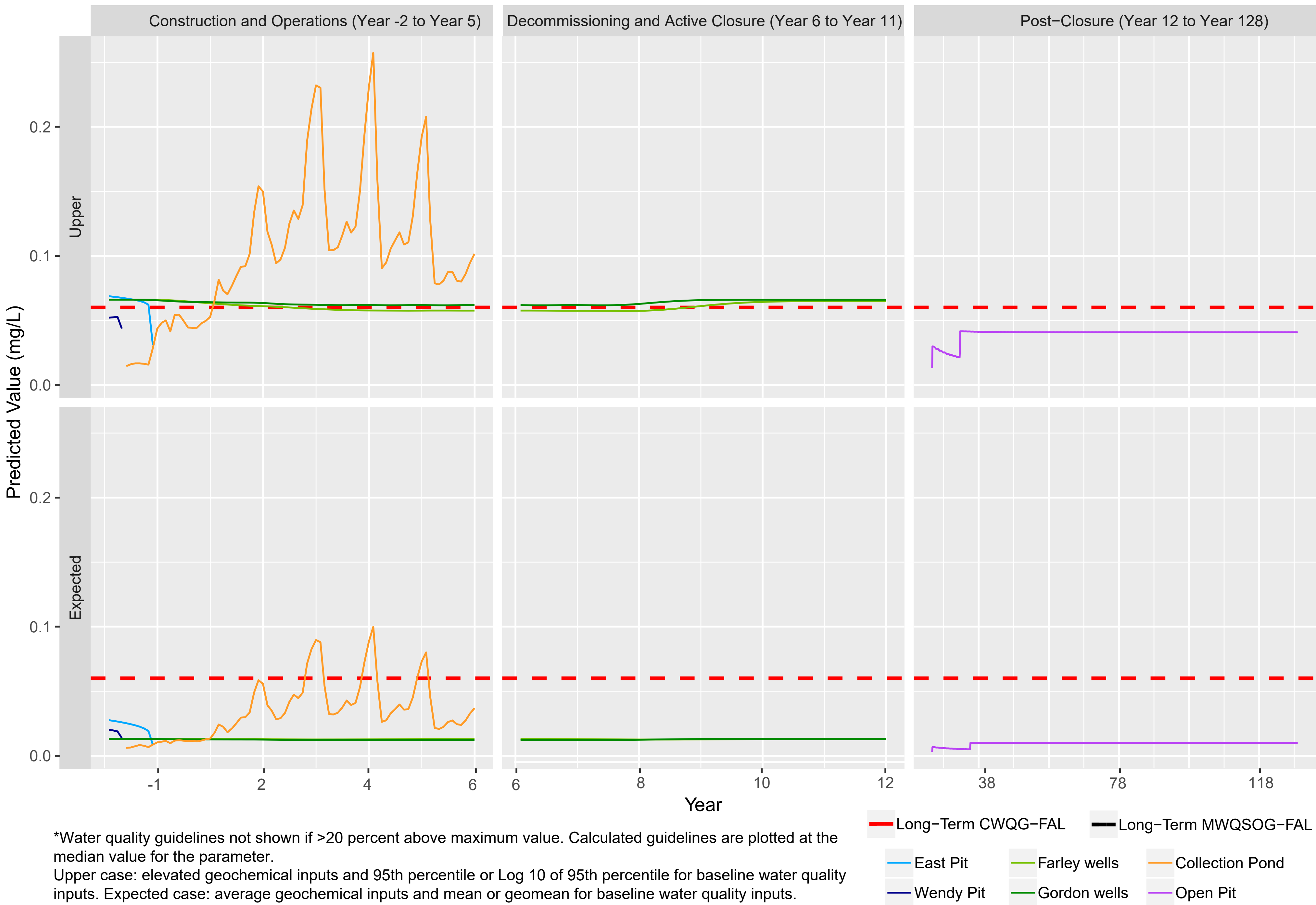
Nitrate + Nitrite (as N), (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

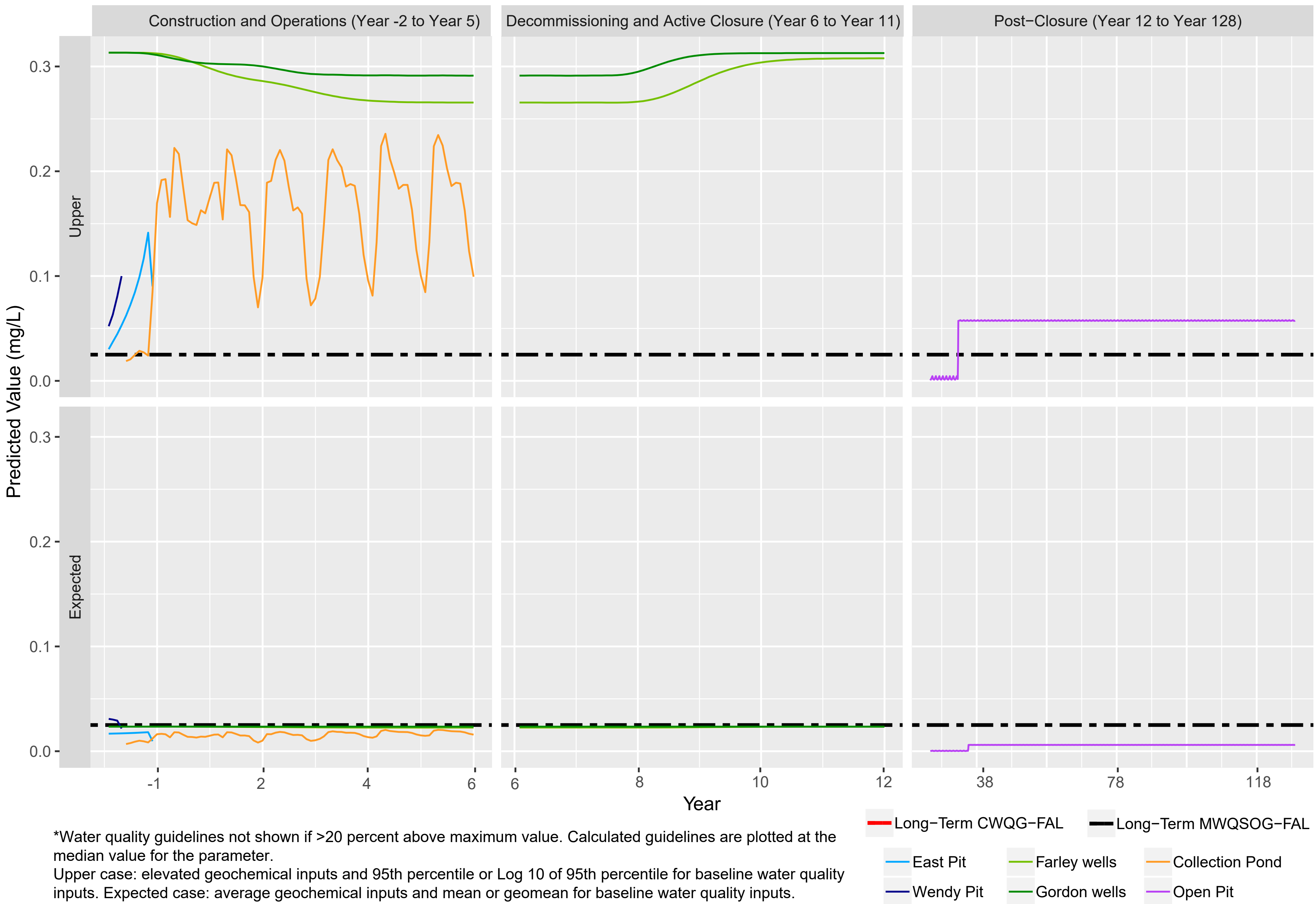
Nitrite (as N) (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

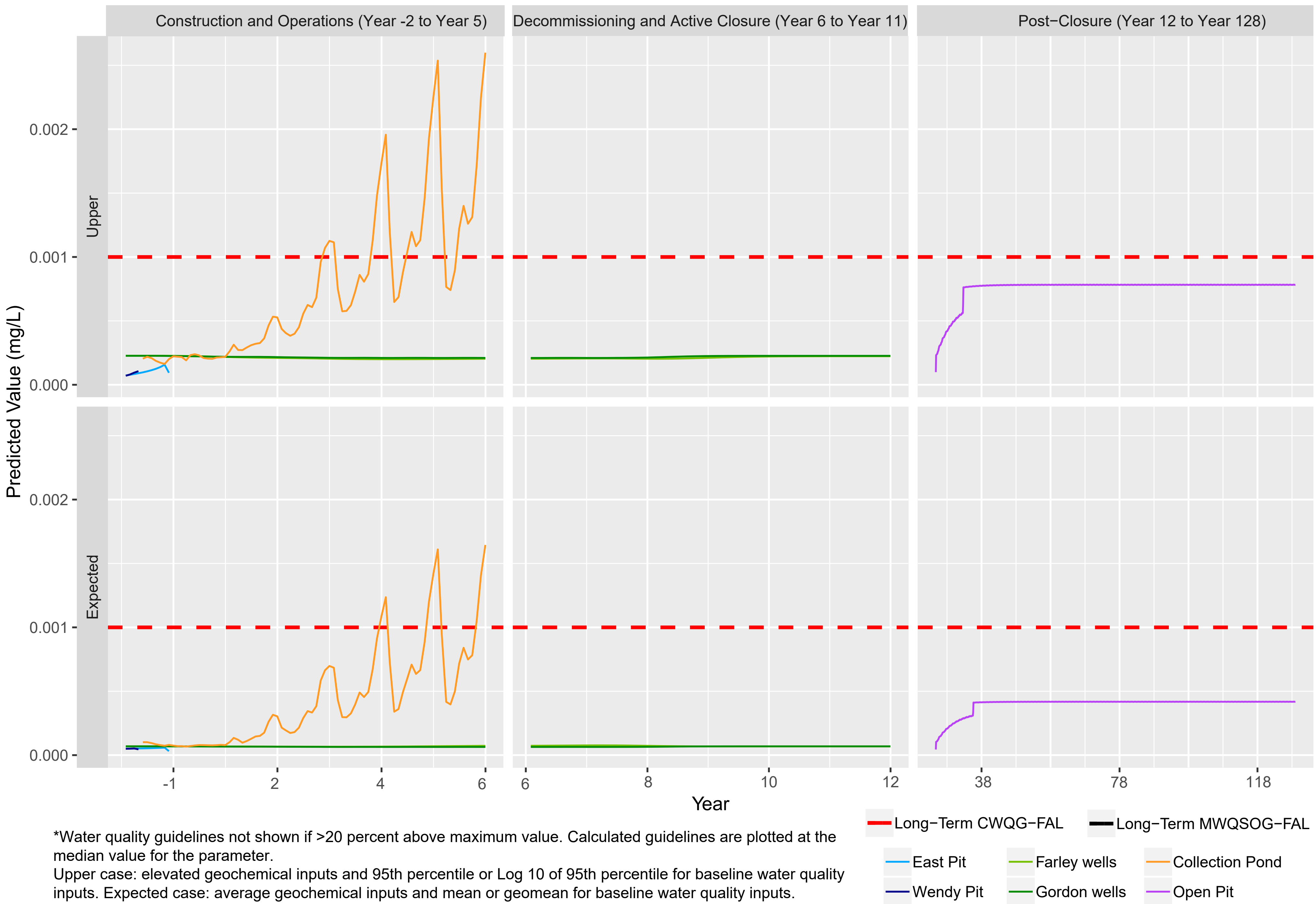
Phosphorus, Total, (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

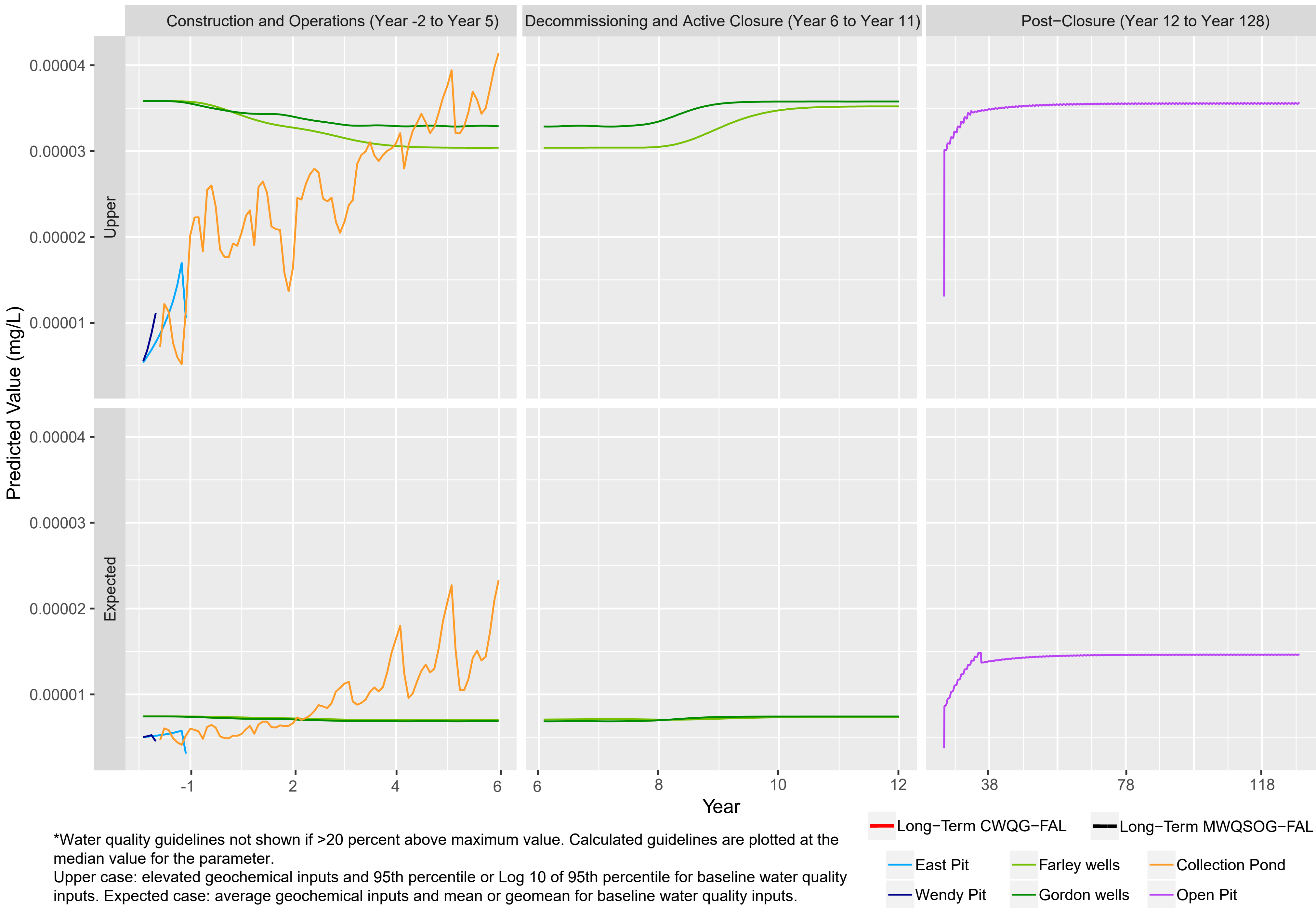
Selenium, Total (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

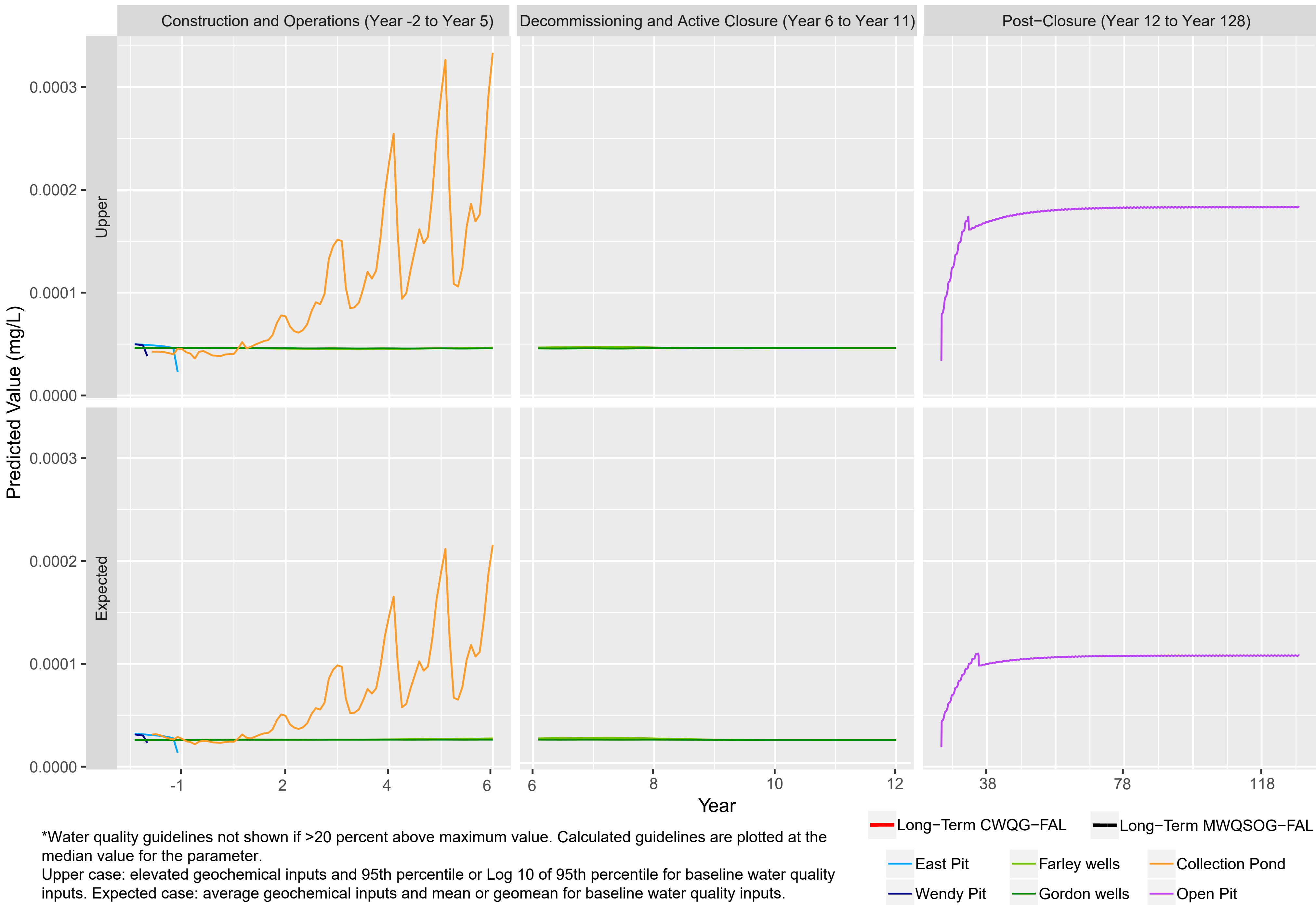
Silver, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

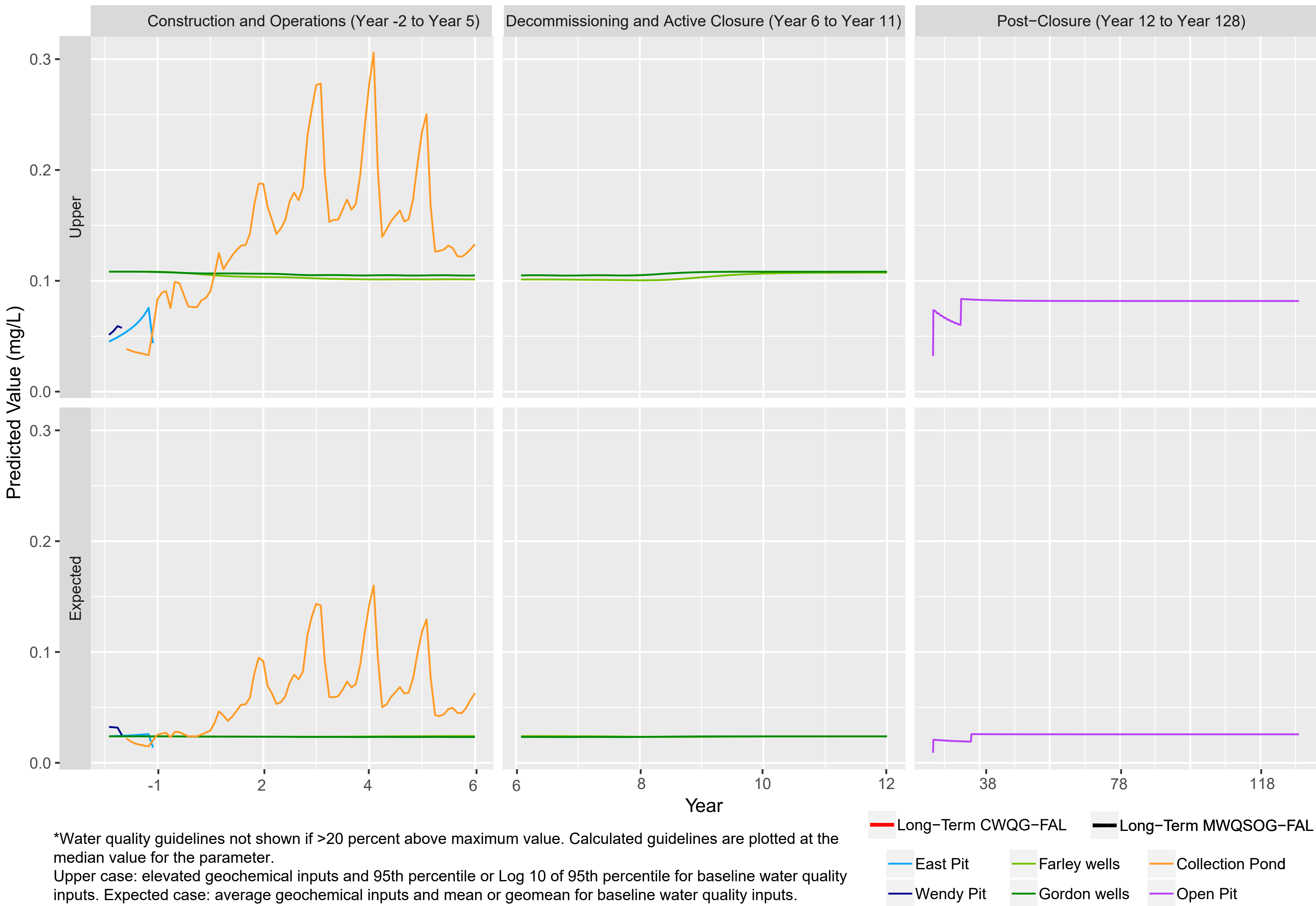
Thallium, Total (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

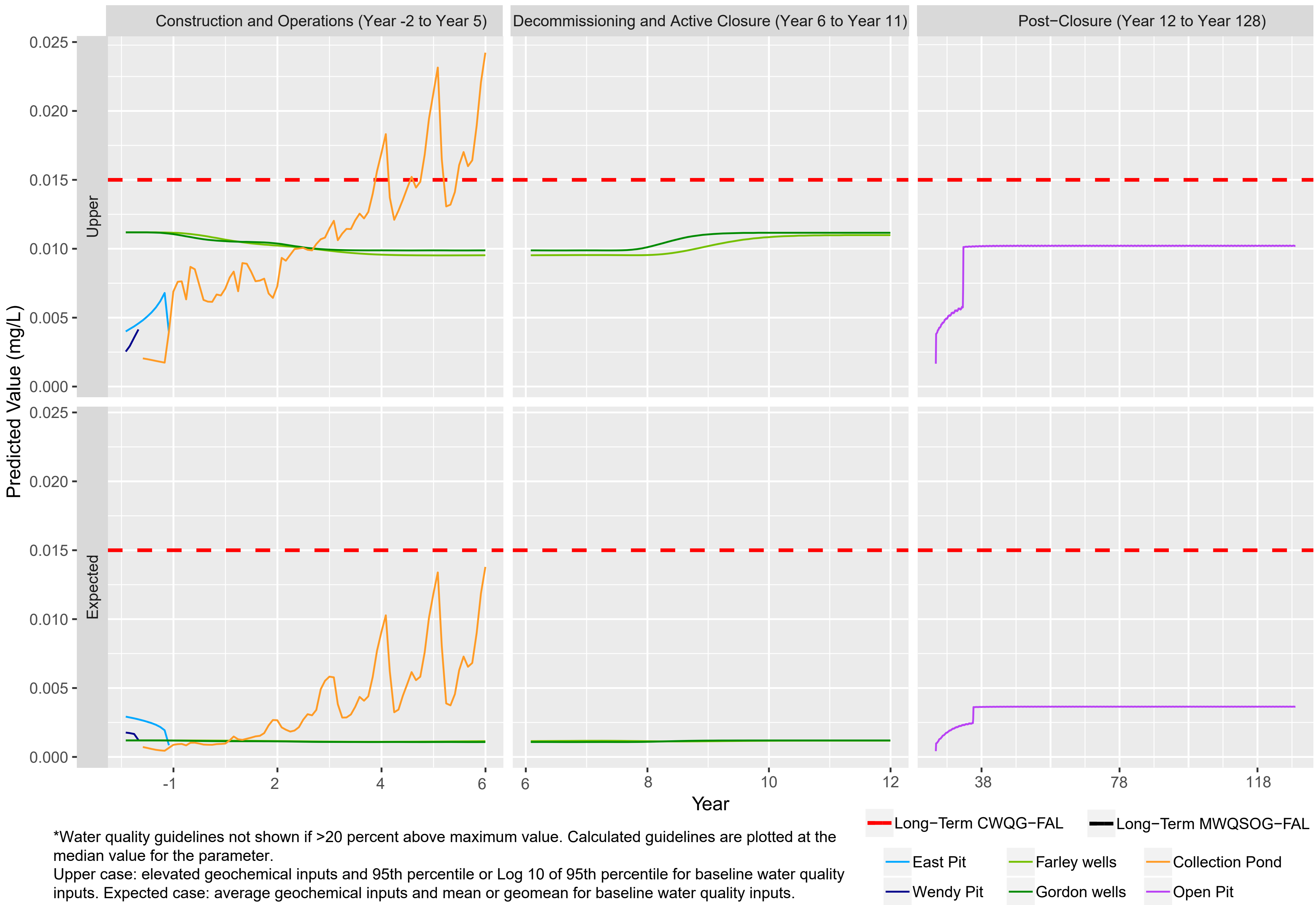
Unionized Ammonia (NH3), (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

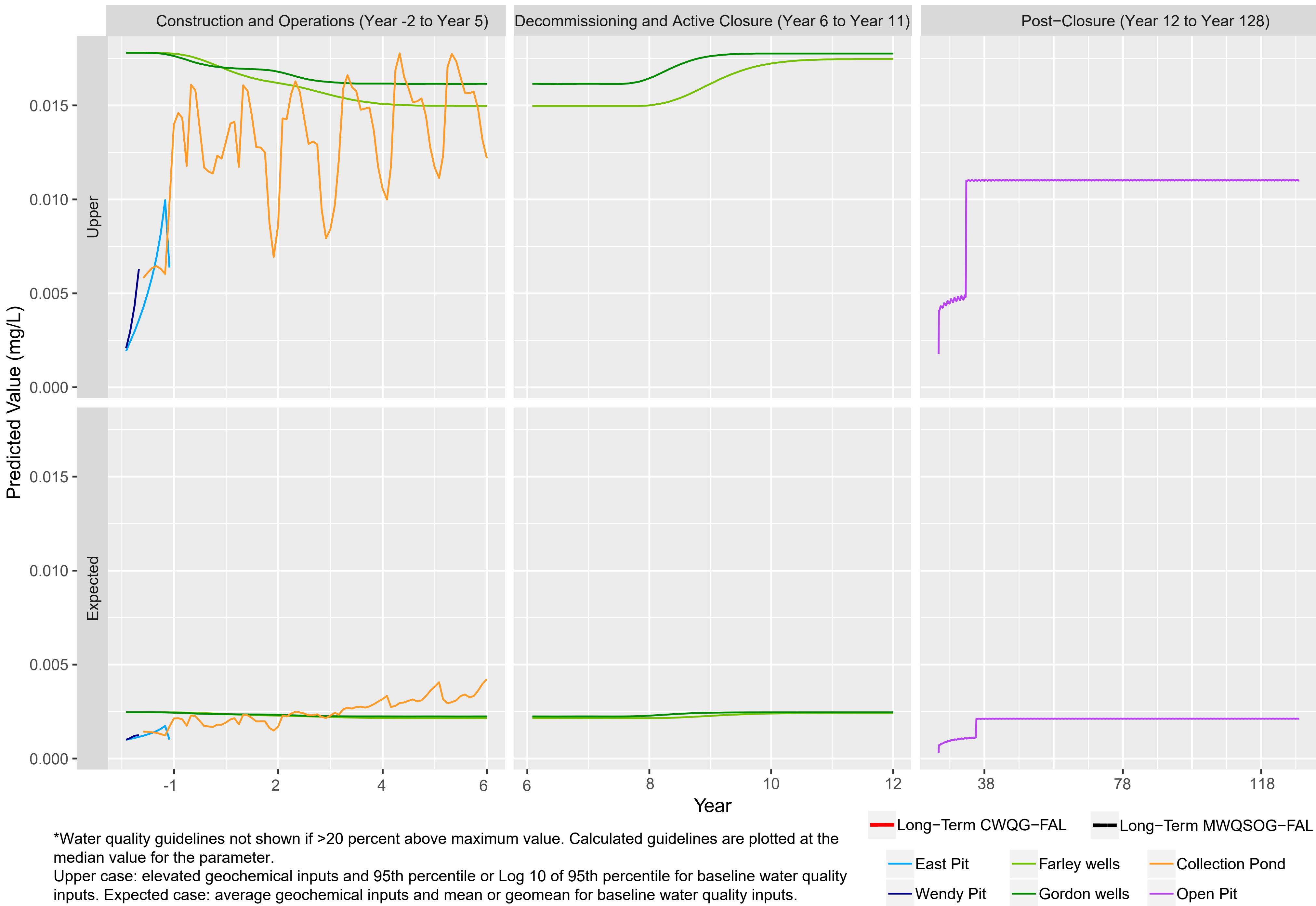
Uranium, Total (mg/L)



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-1: Gordon - Predicted Concentrations in Discharges

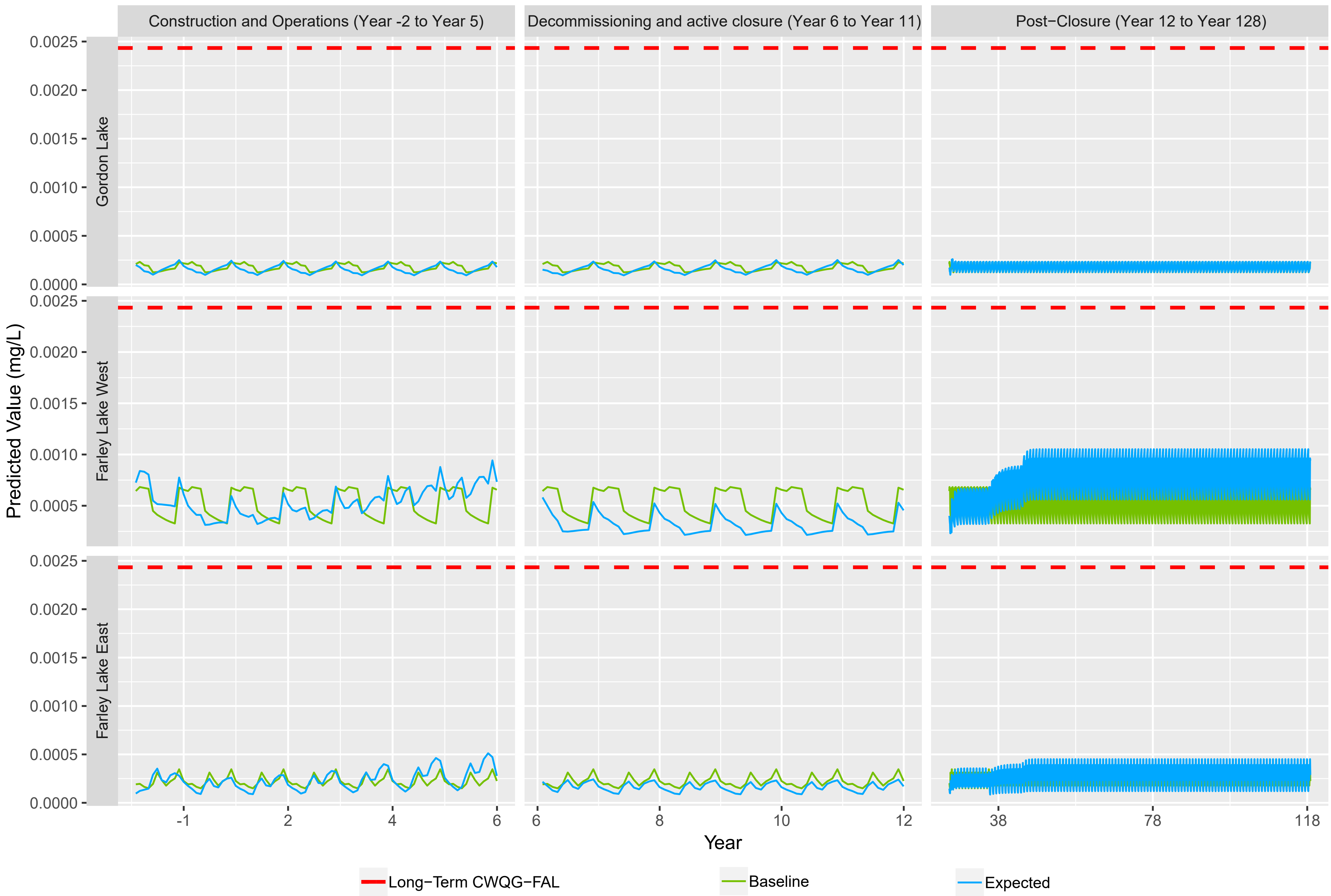
Zinc, Dissolved (mg/L)*



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.
Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs. Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

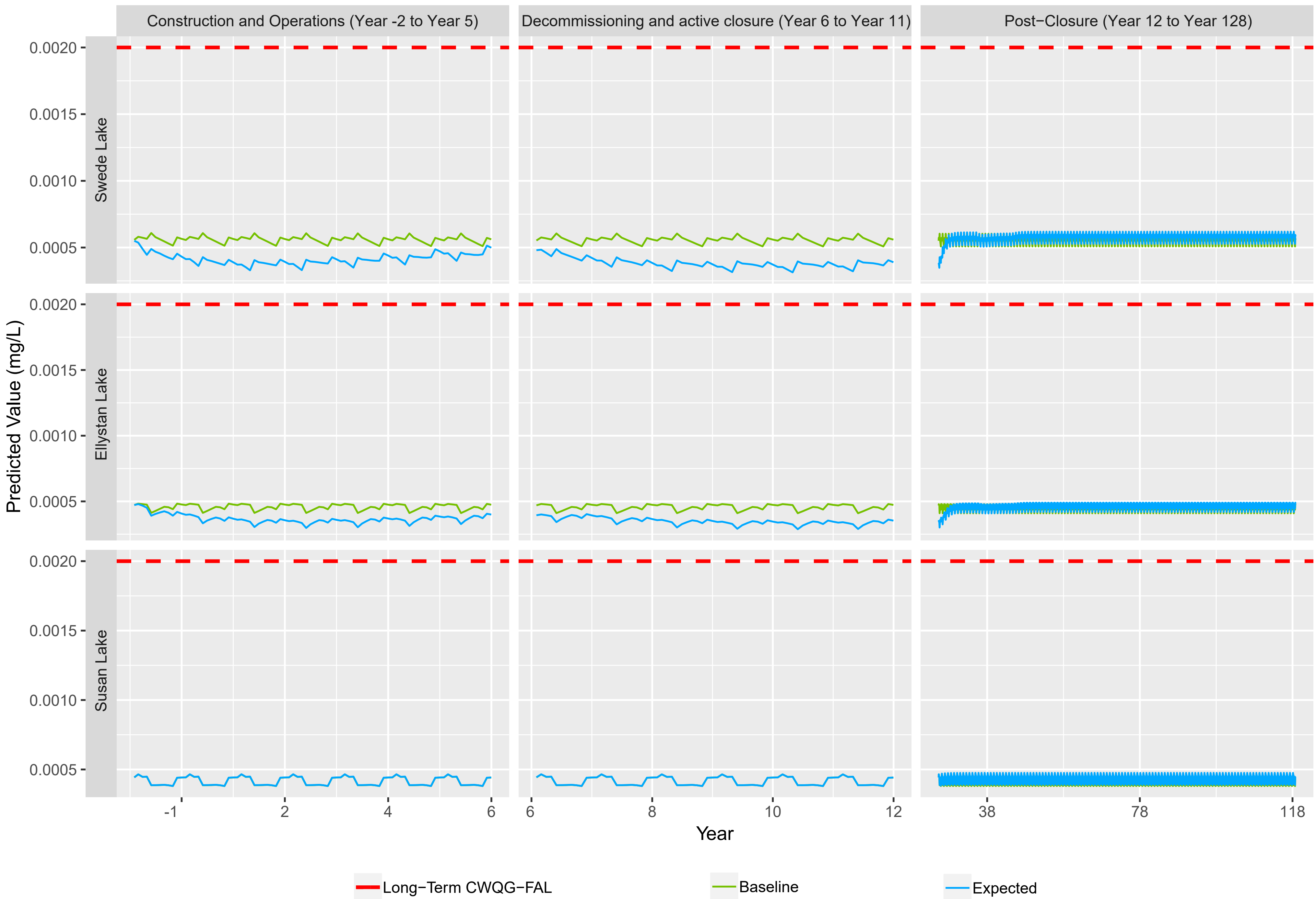
Copper, Total (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

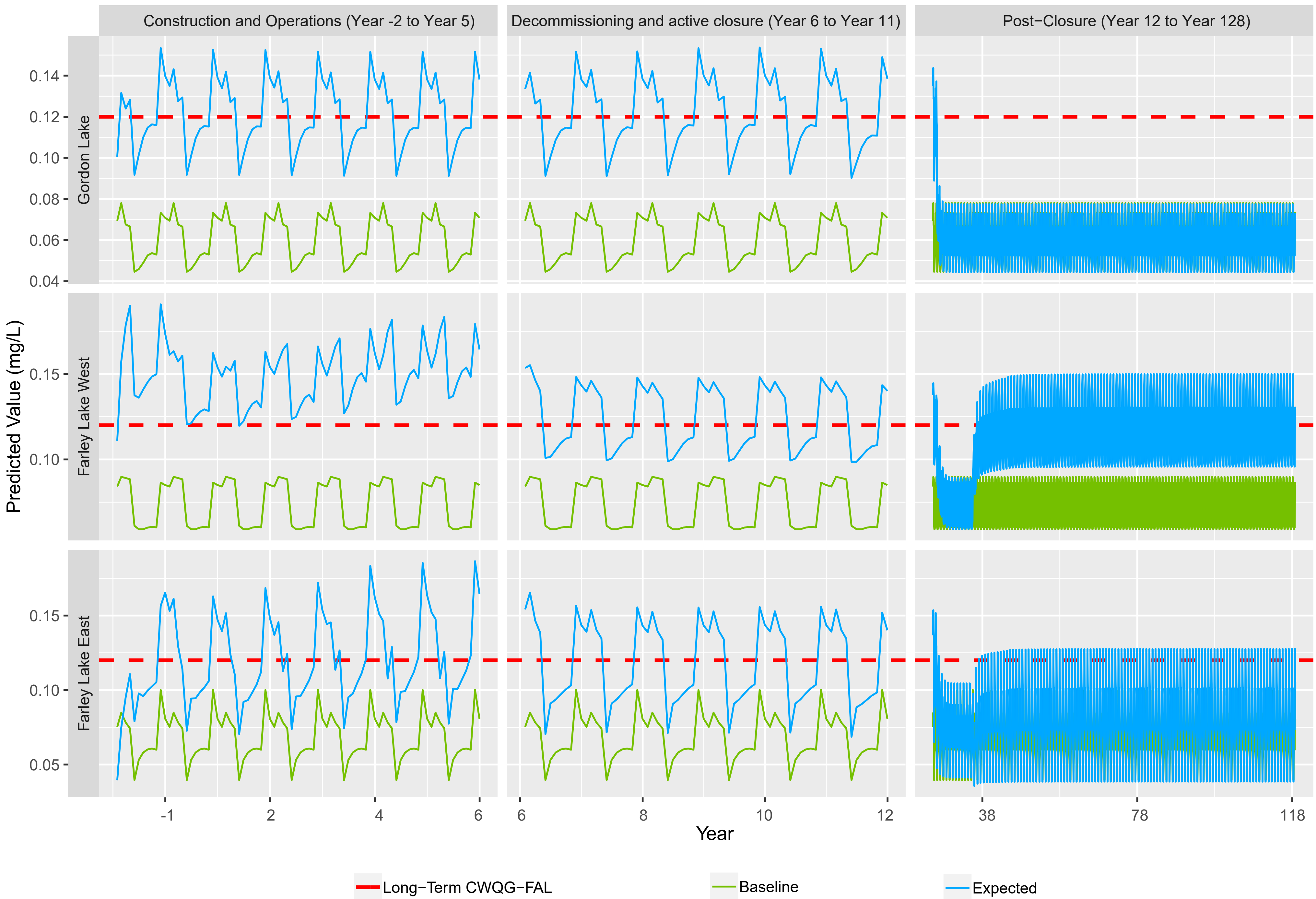
Copper, Total (mg/L)



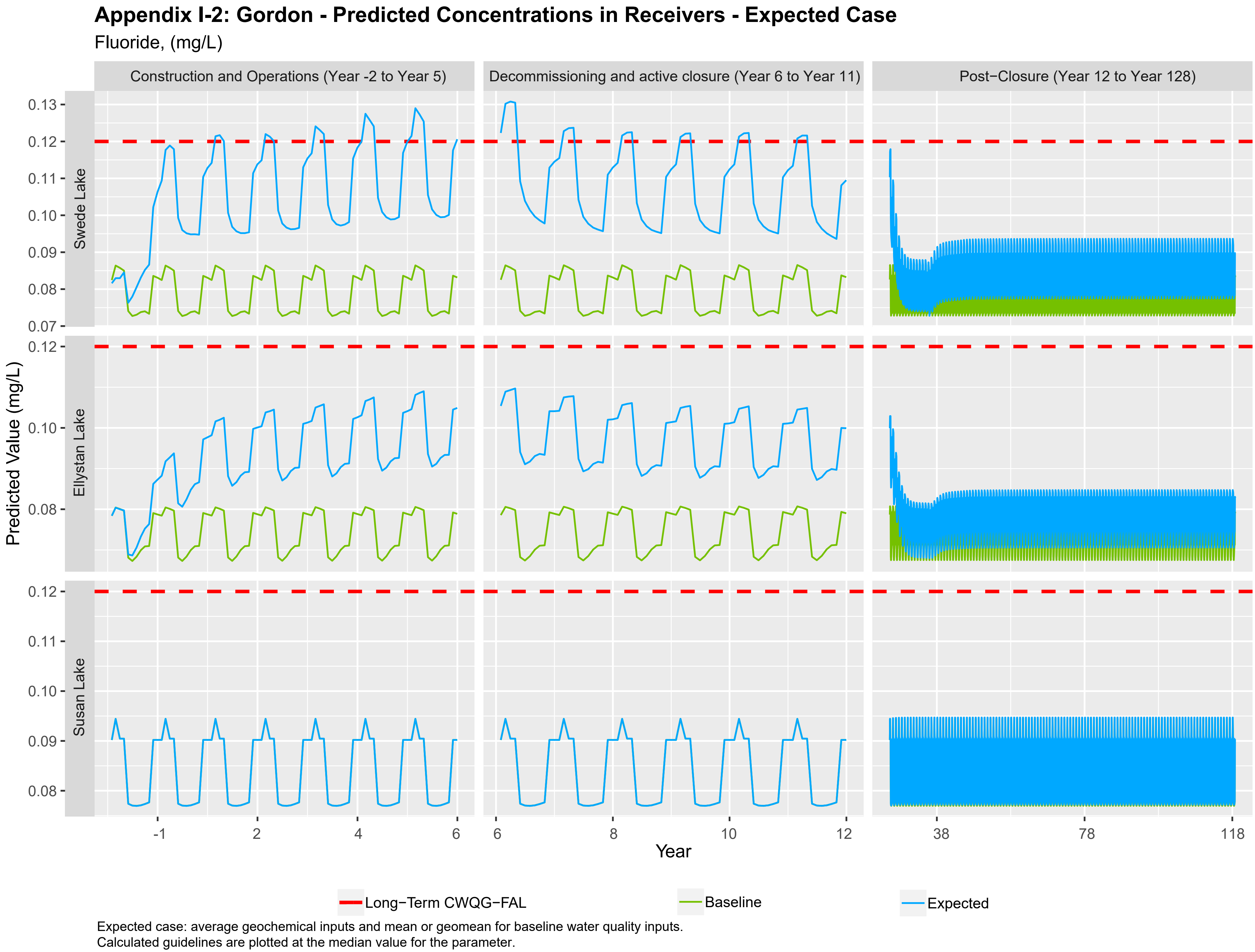
Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

Fluoride, (mg/L)

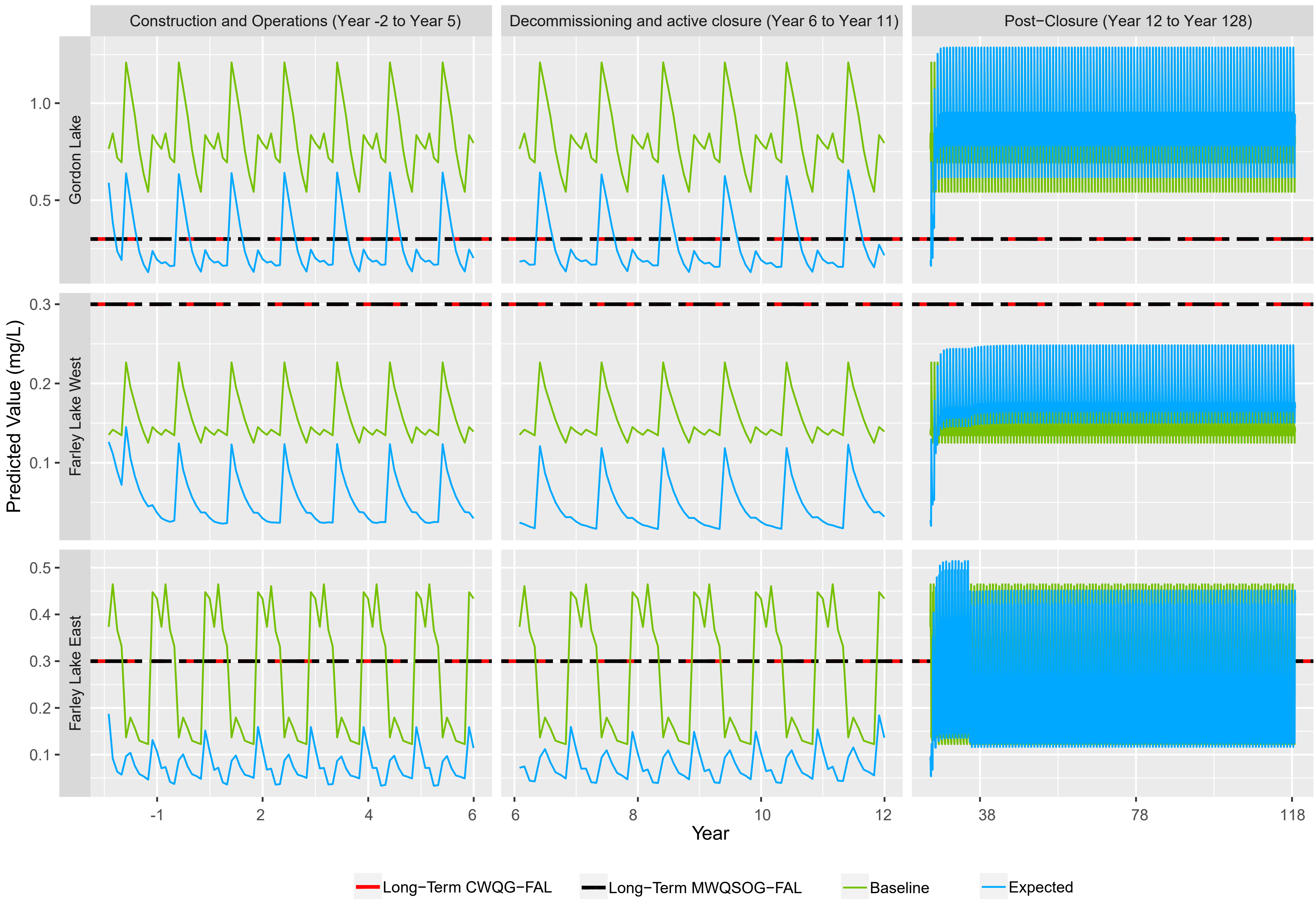


Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.


Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case
Fluoride, (mg/L)
Construction and Operations (Year -2 to Year 5)
Decommissioning and active closure (Year 6 to Year 11)
Post−Closure (Year 12 to Year 128)
Swede Lake
Ellystan Lake
Susan Lake
Predicted Value (mg/L)
Year
Long−Term CWQG−FAL
Baseline
Expected
Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

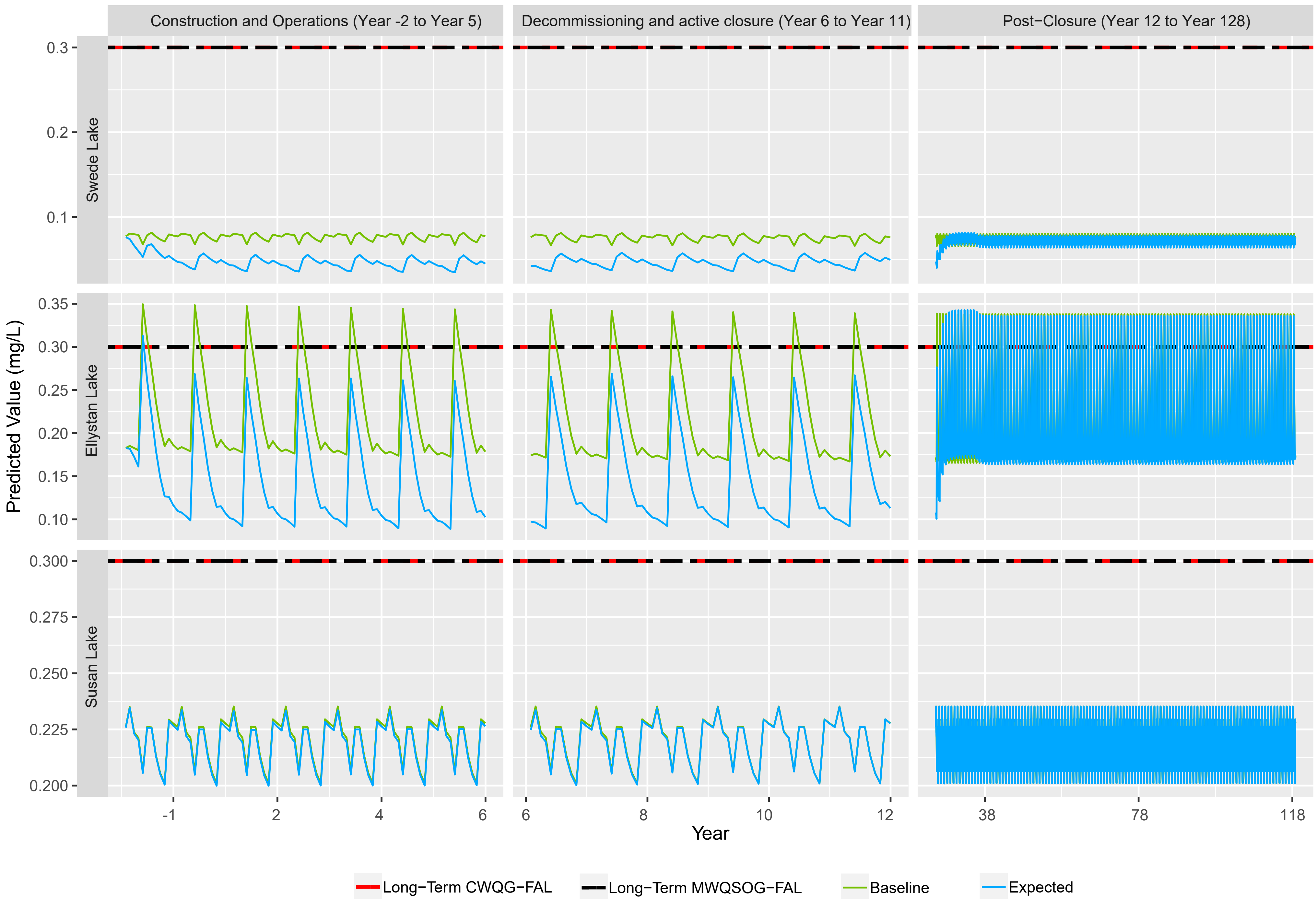
Iron, Total (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

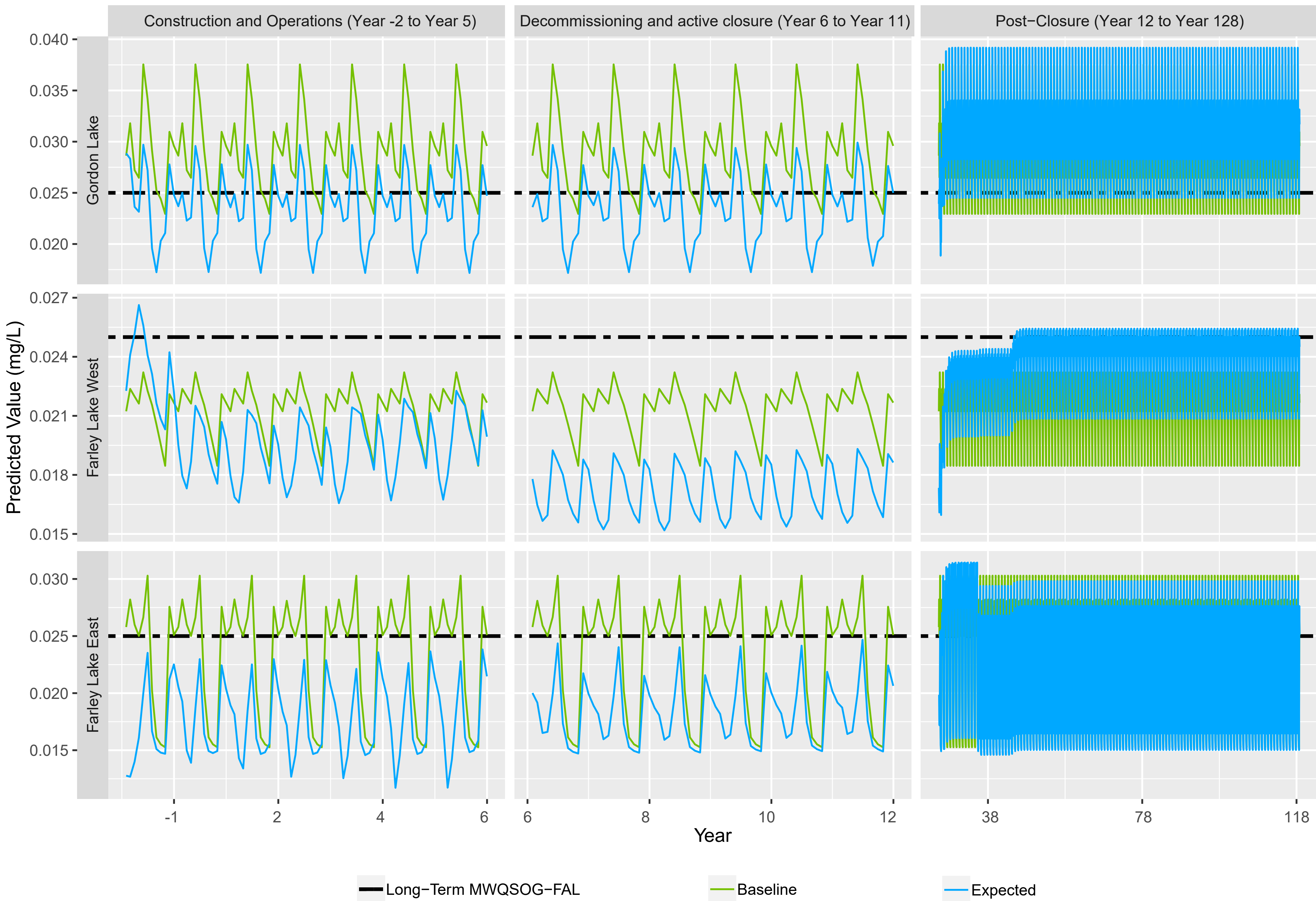
Iron, Total (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

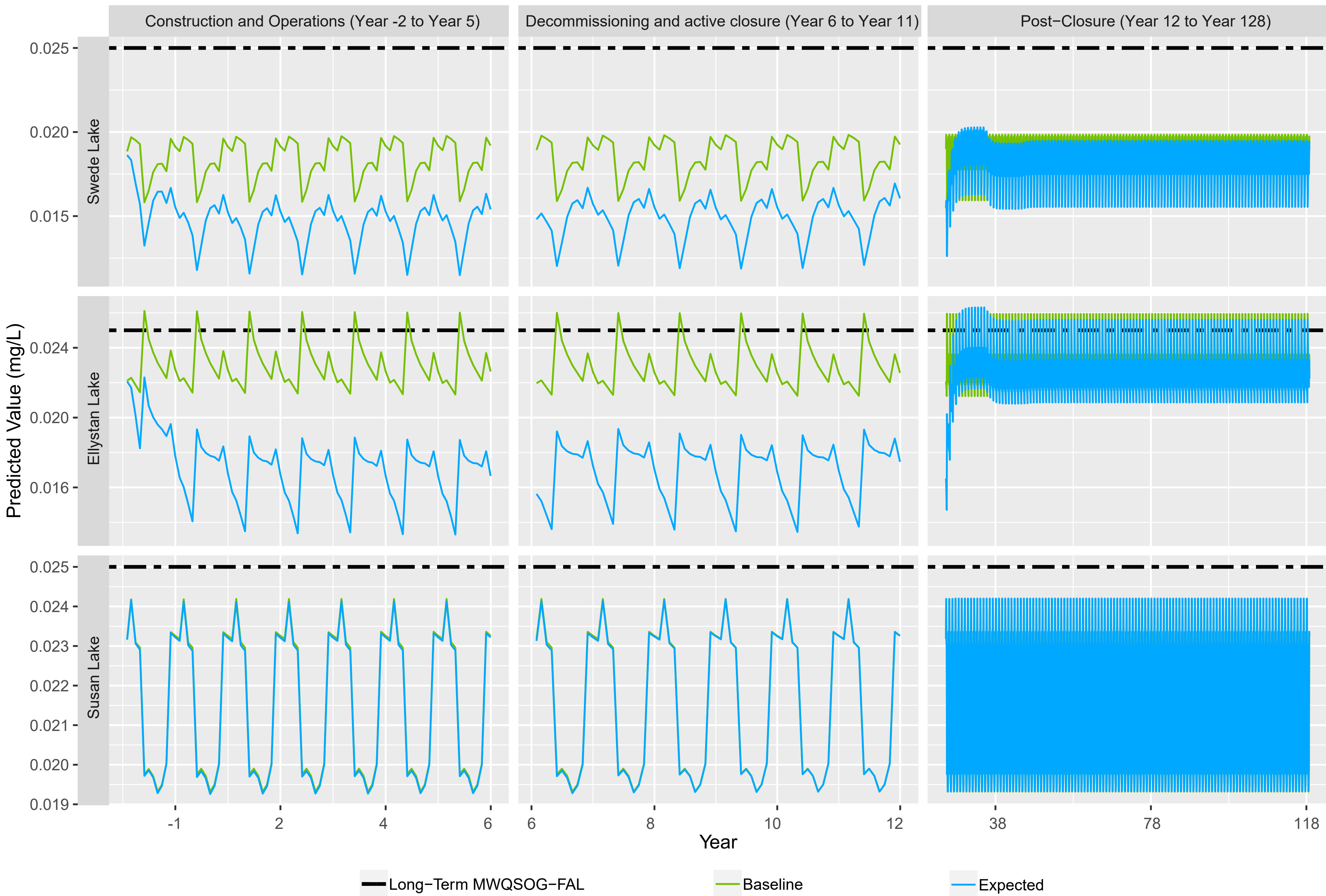
Phosphorus, Total, (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

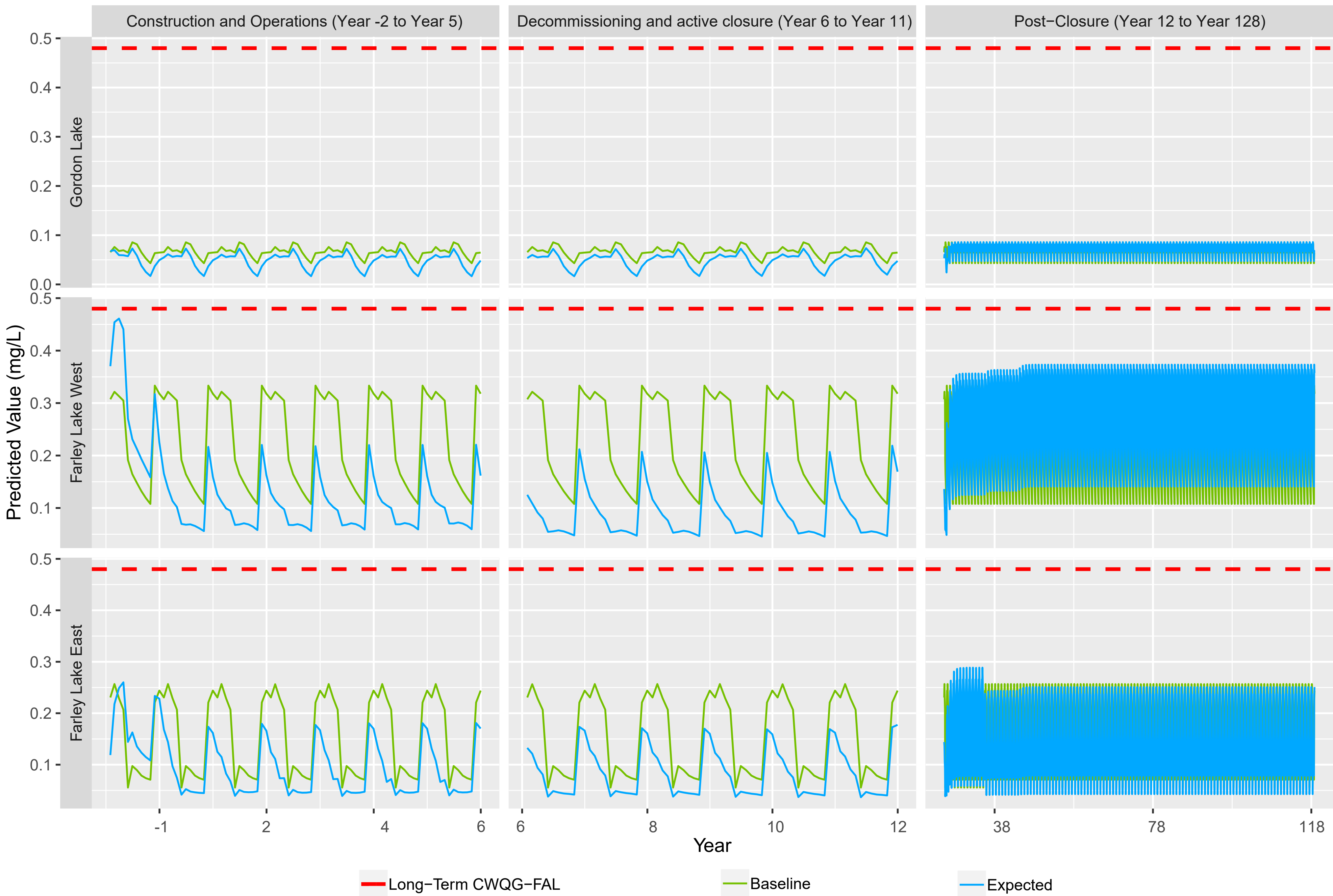
Phosphorus, Total, (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

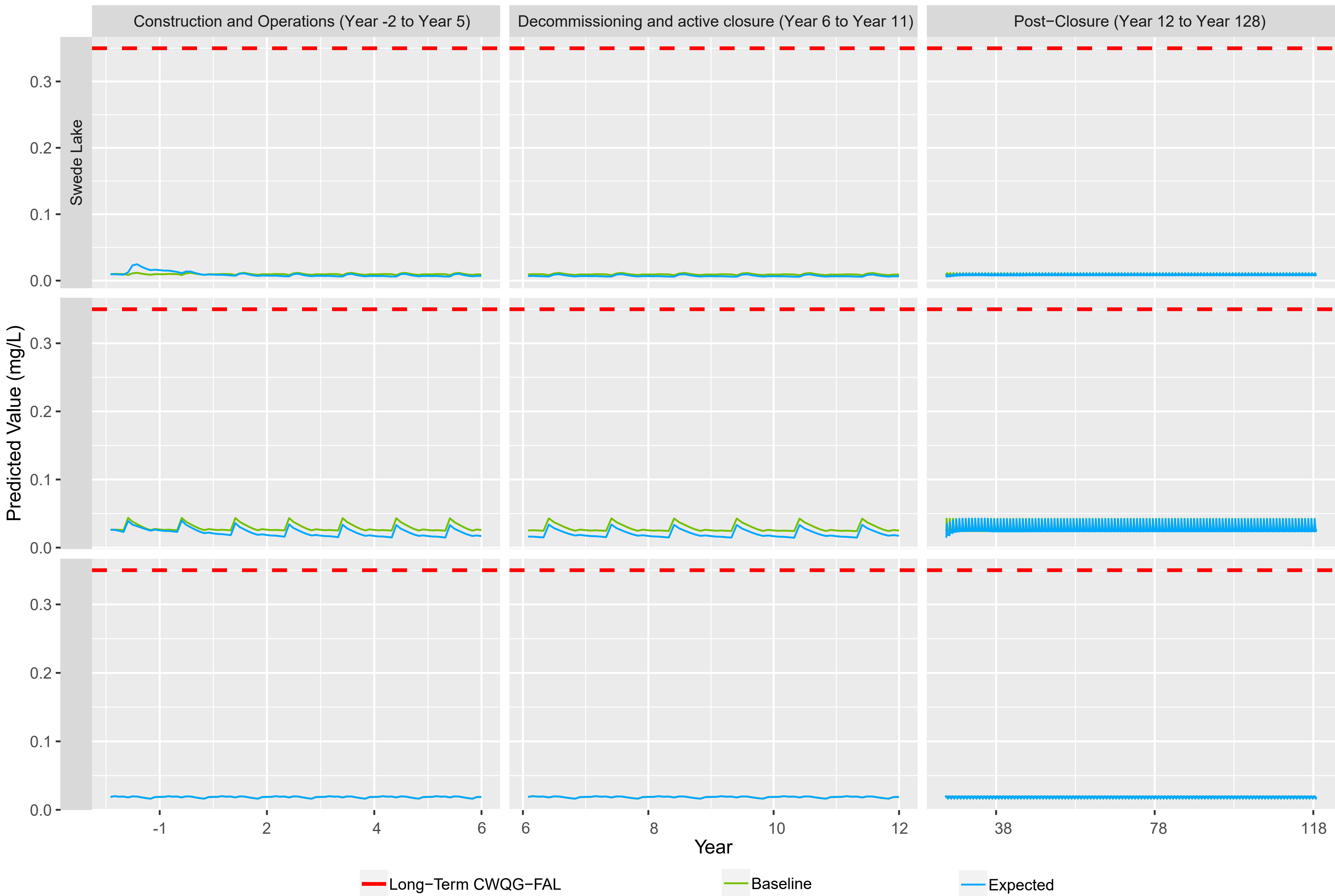
Manganese, Dissolved (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: Gordon - Predicted Concentrations in Receivers - Expected Case

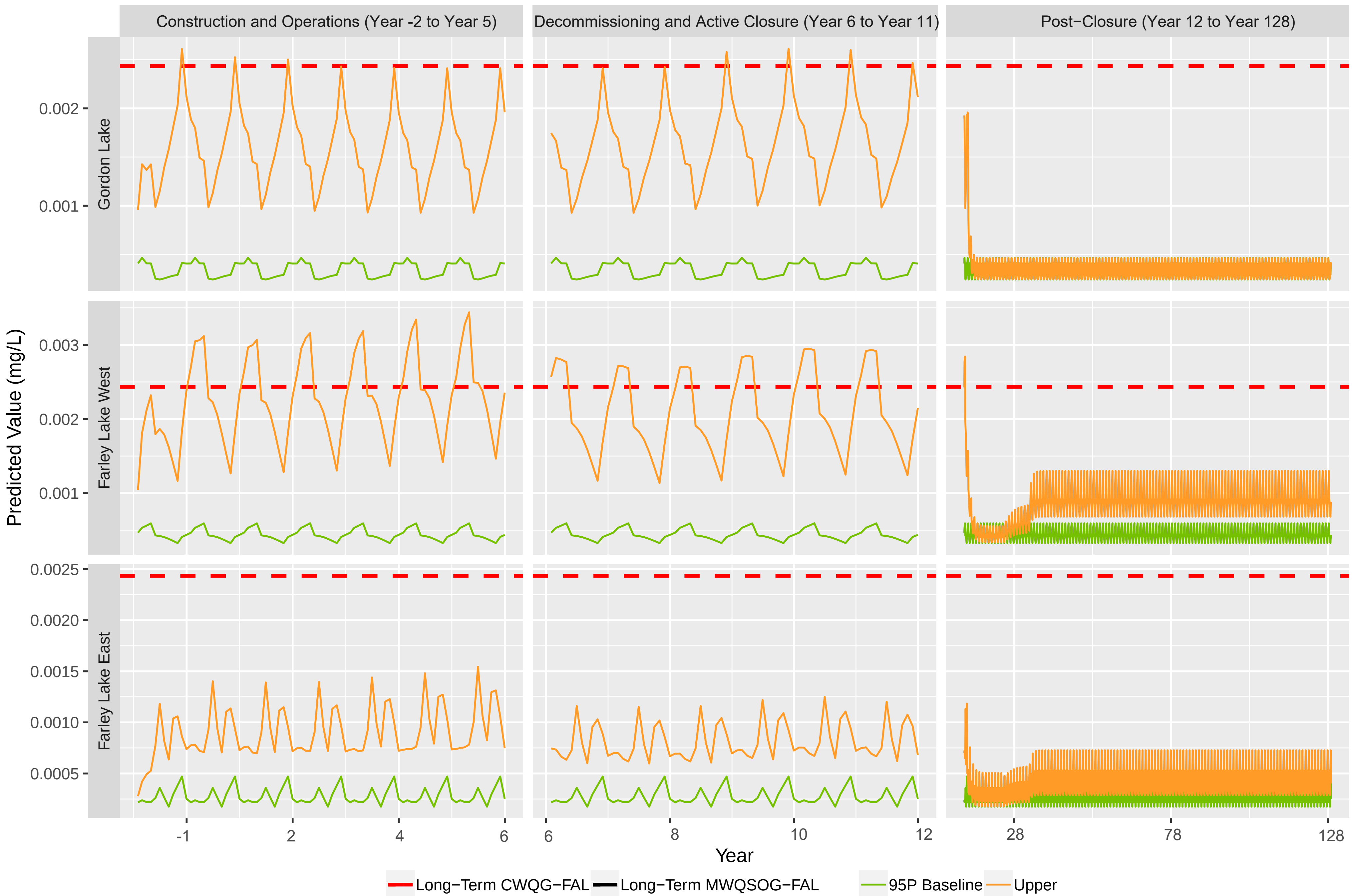
Manganese, Dissolved (mg/L)



Expected case: average geochemical inputs and mean or geomean for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

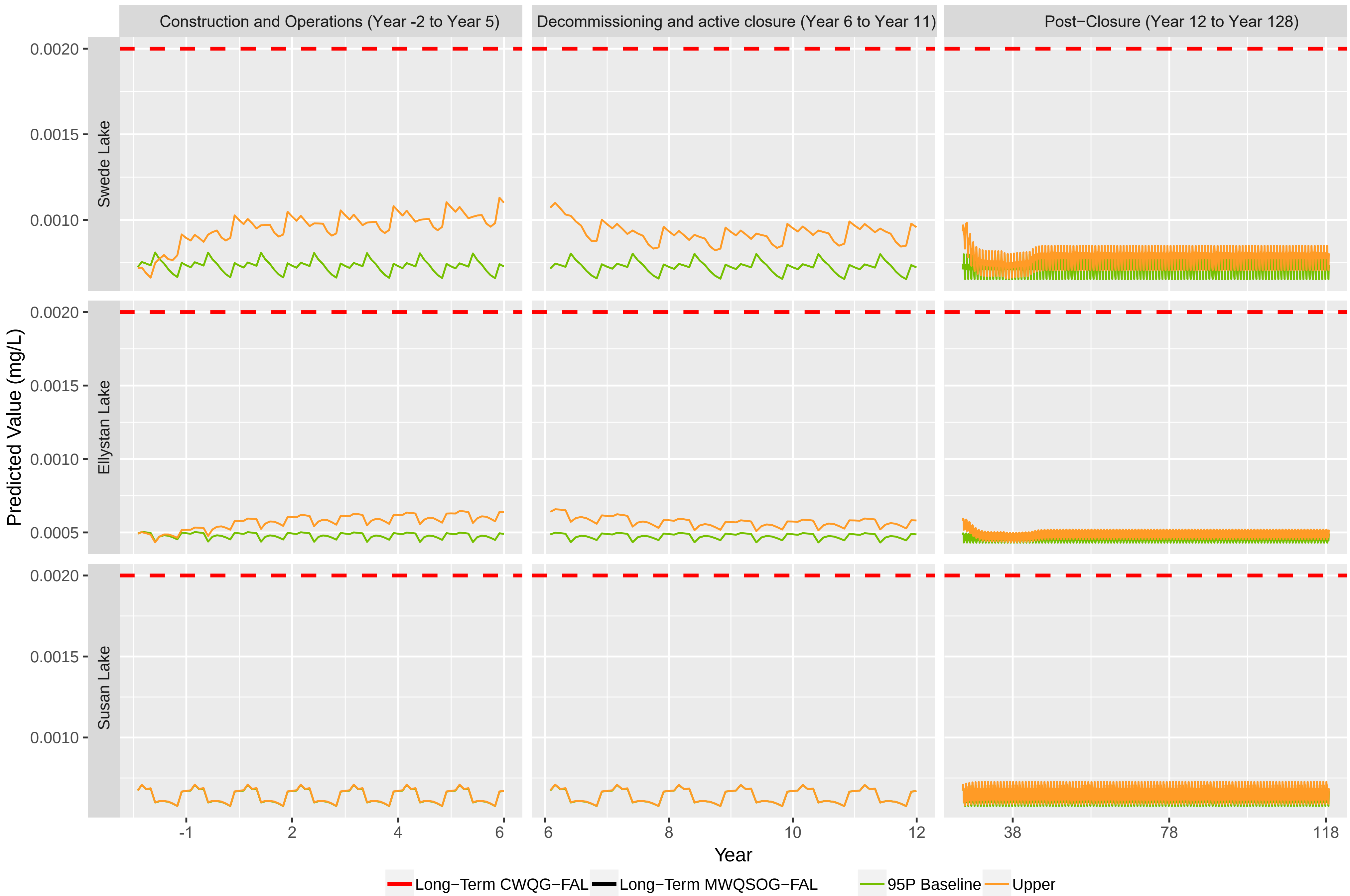
Copper, Total (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

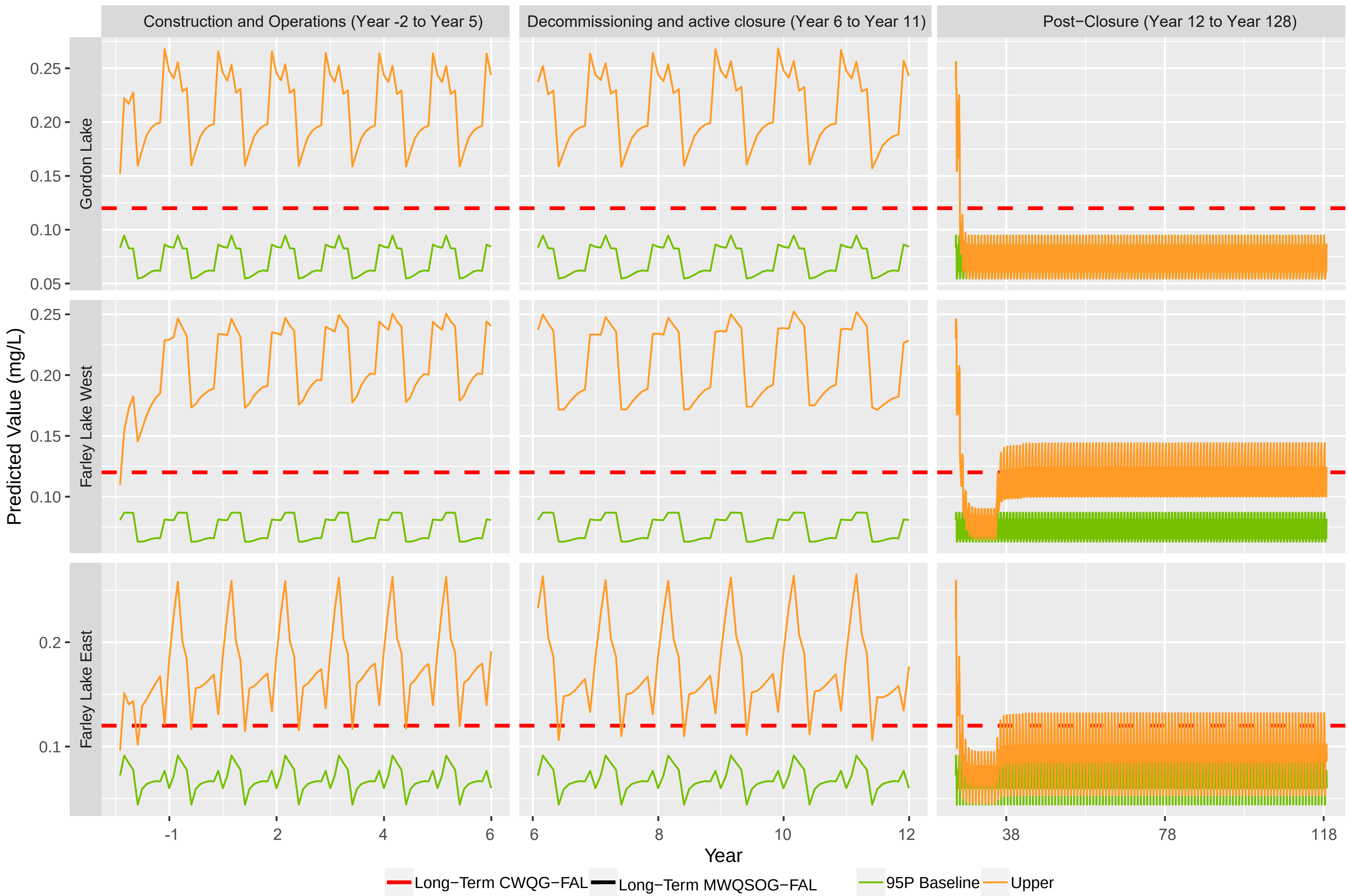
Copper, Total (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

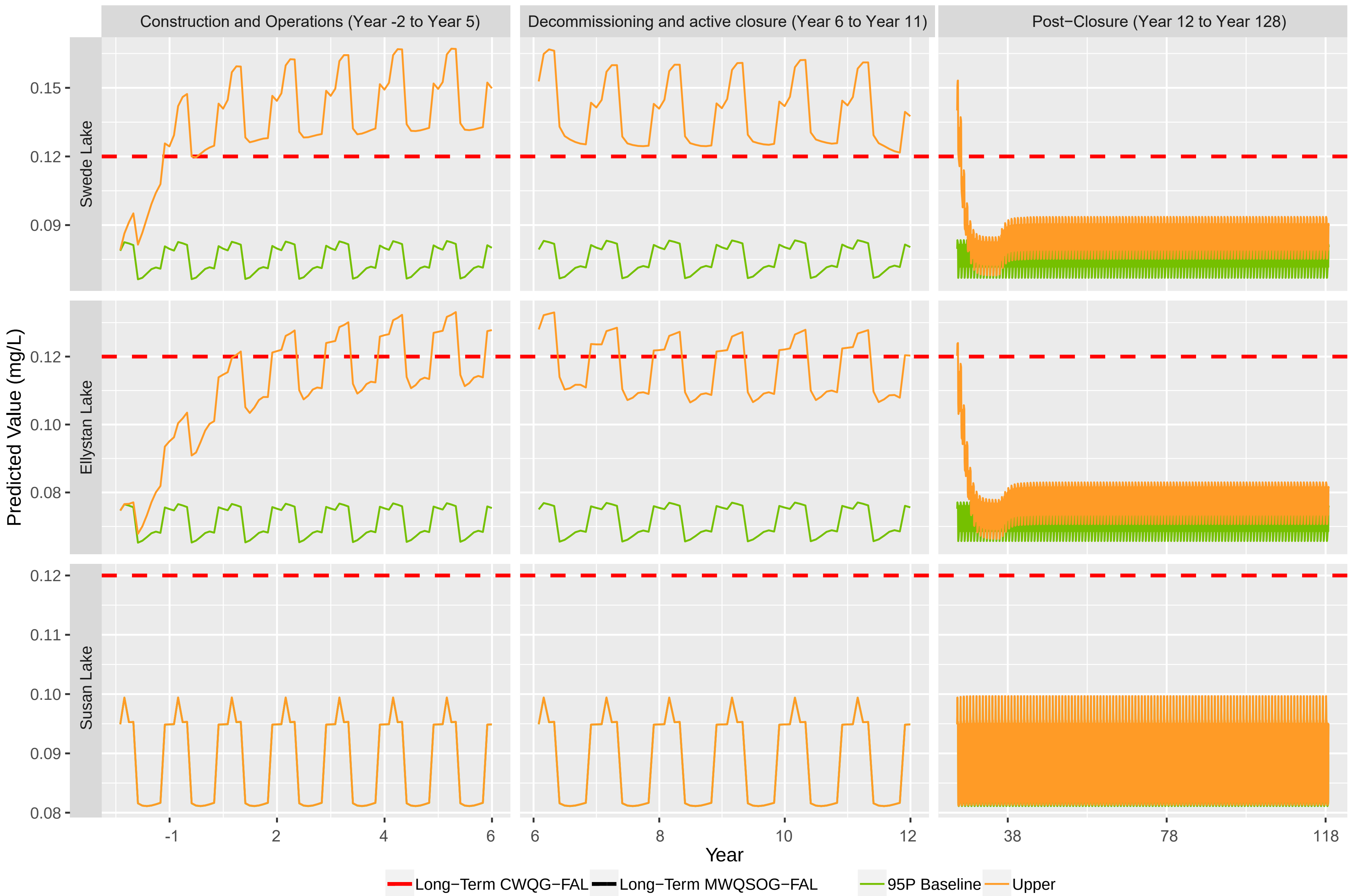
Fluoride, (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

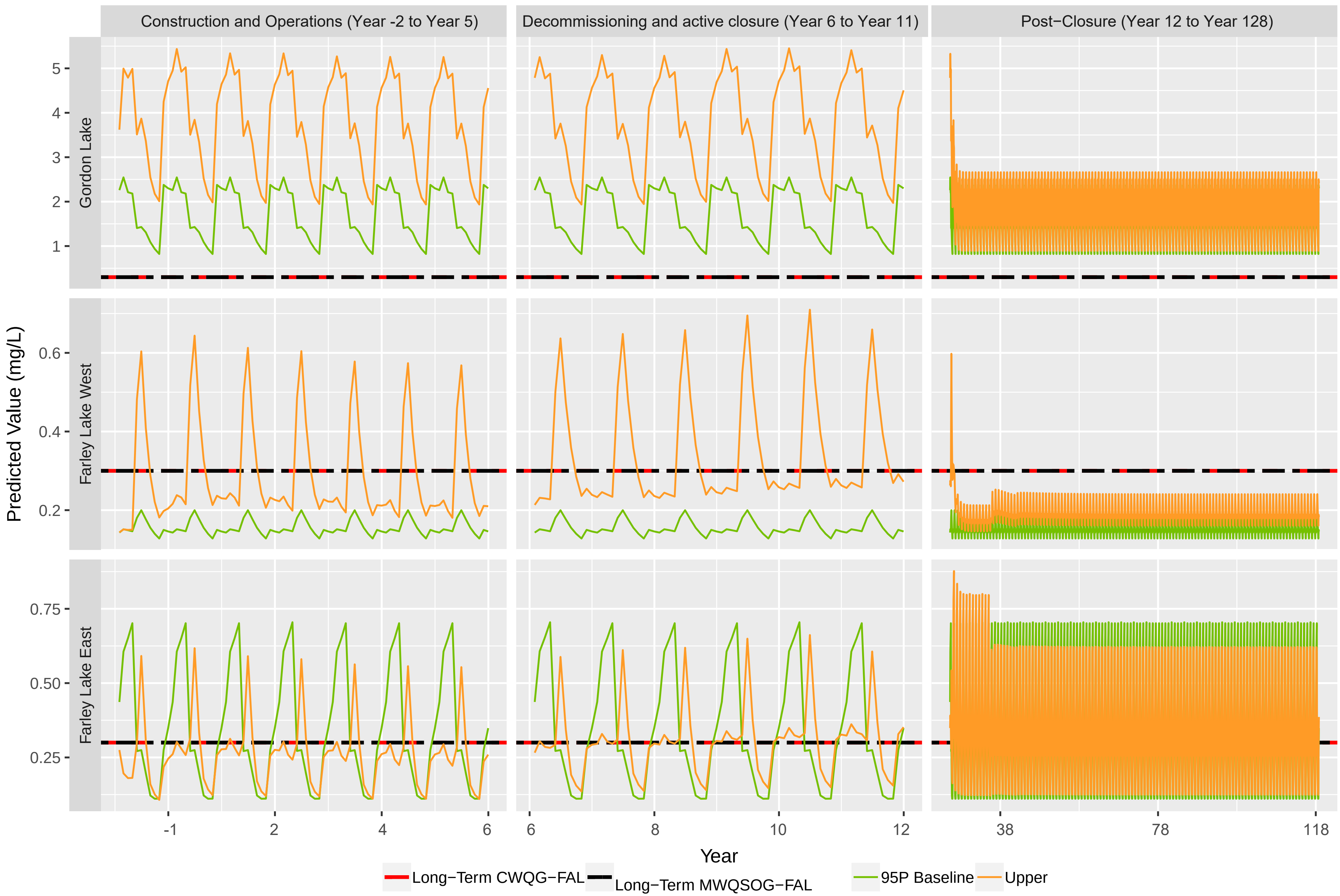
Fluoride, (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

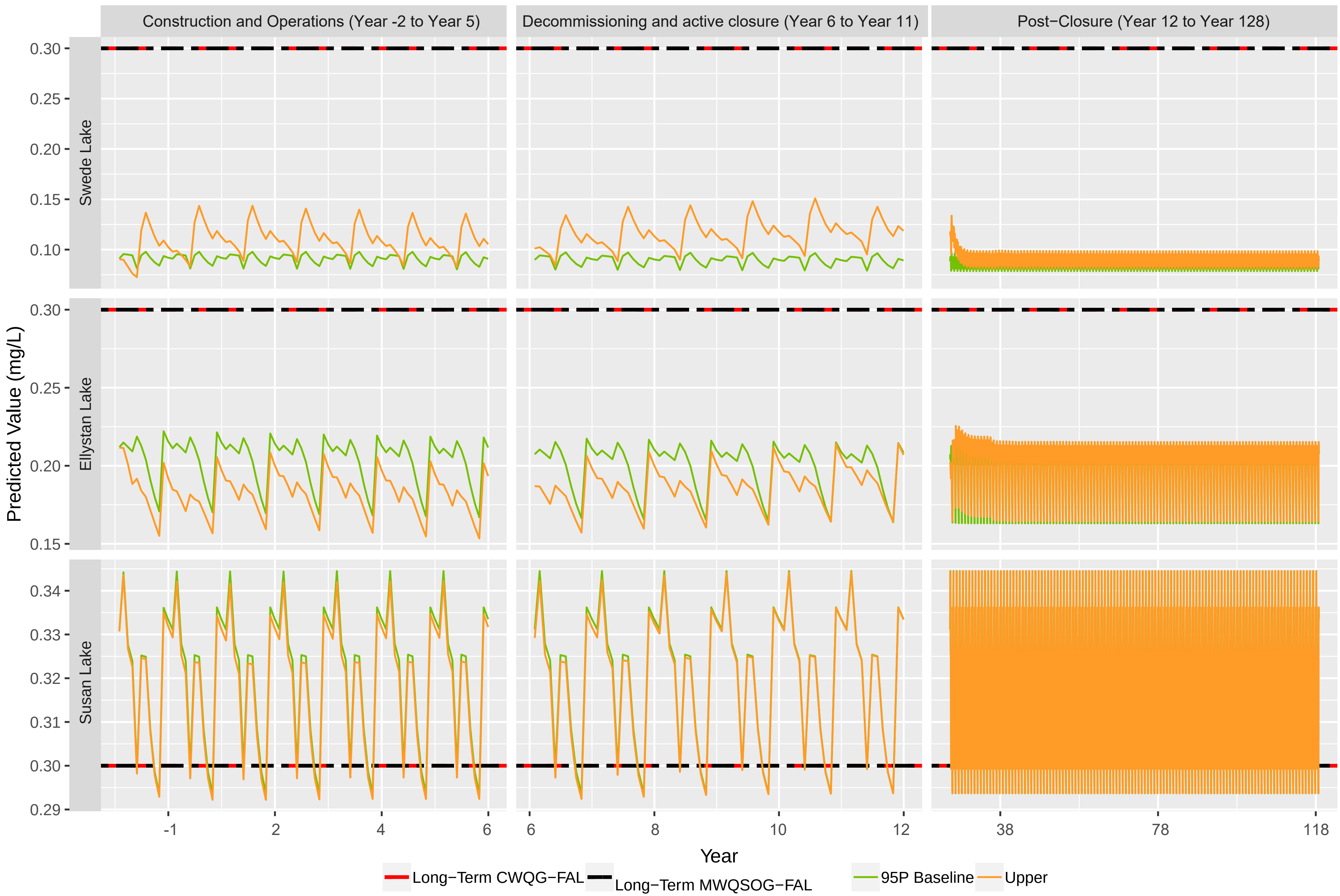
Iron, Total (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

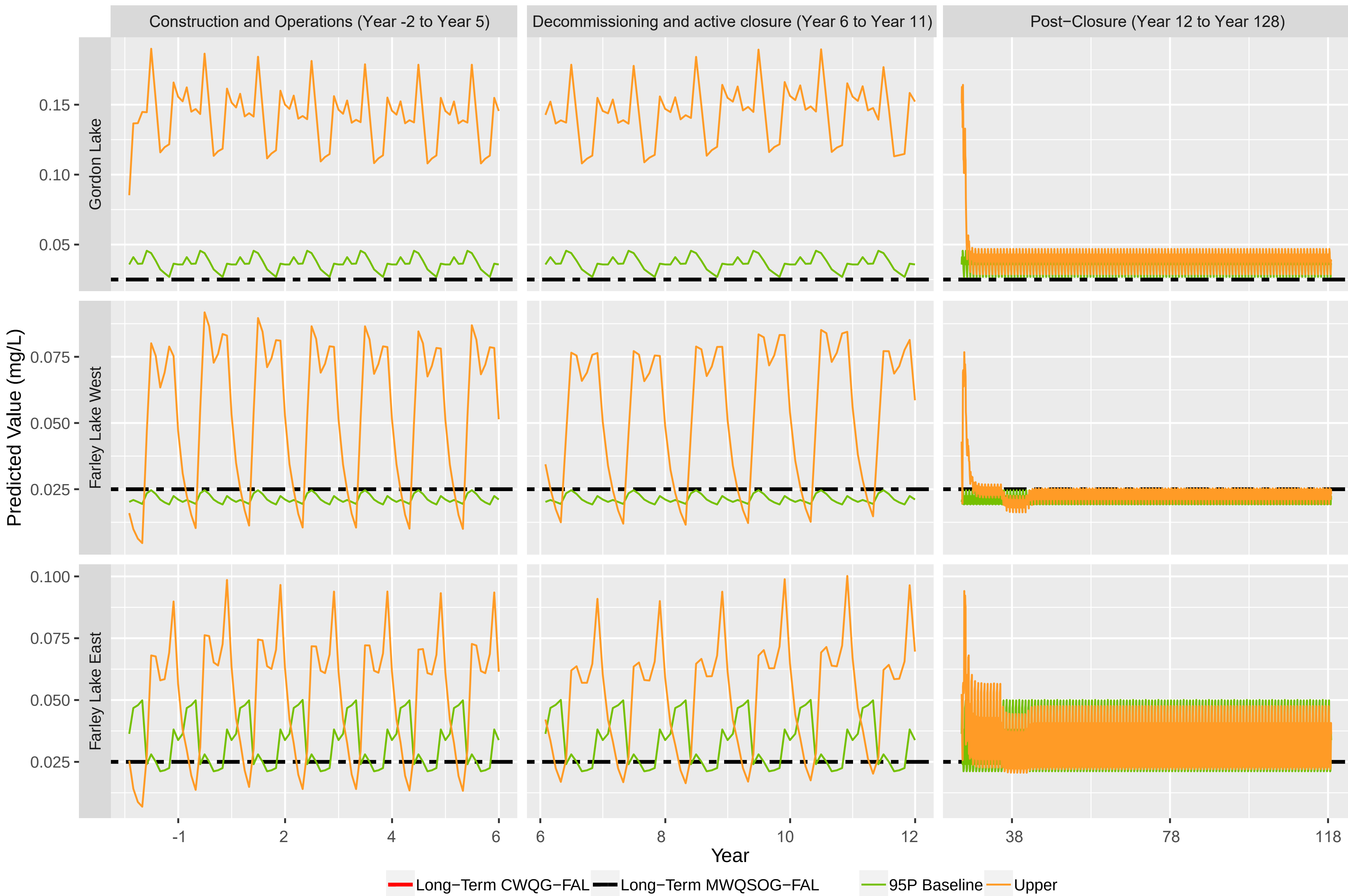
Iron, Total (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

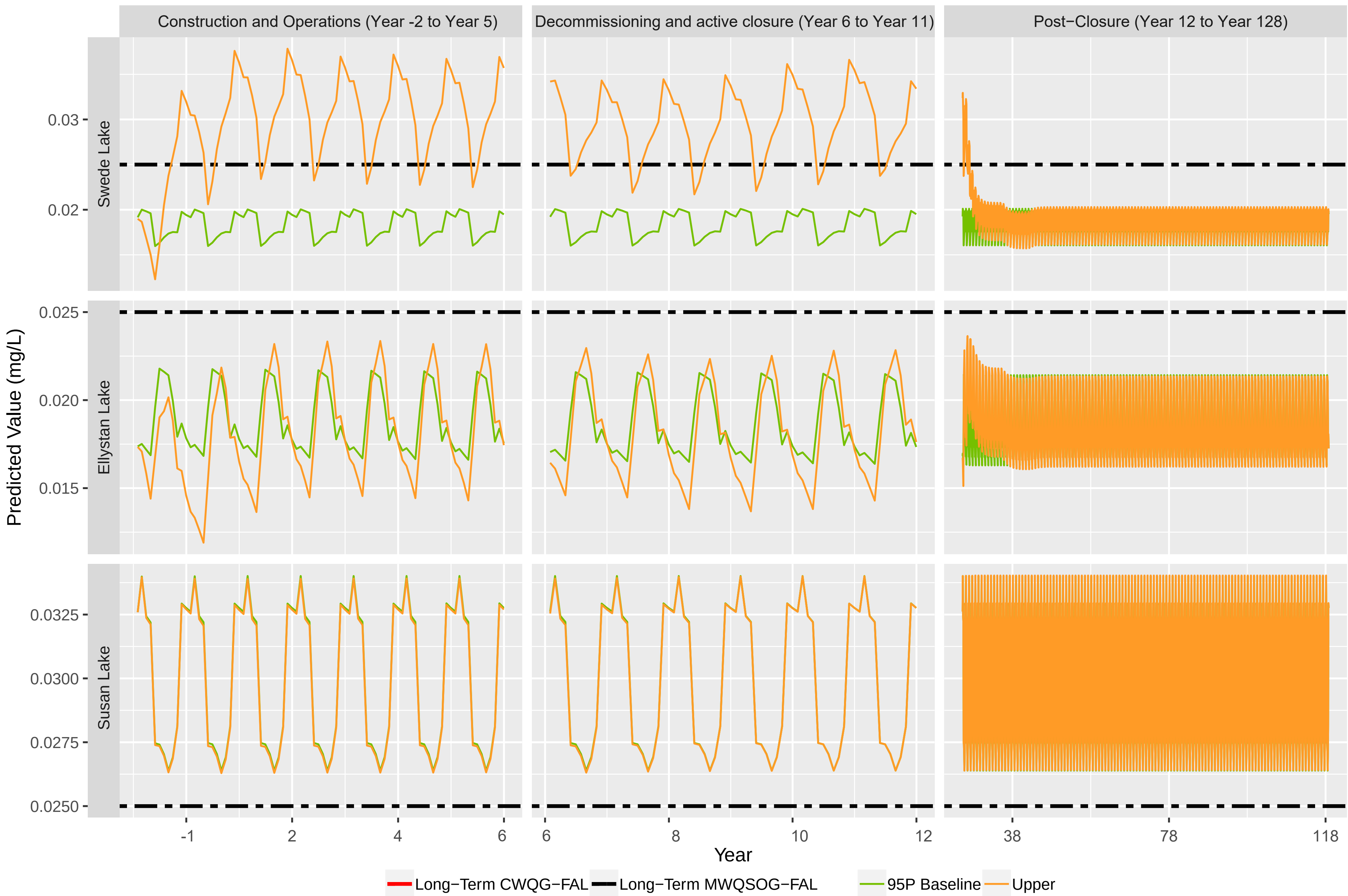
Phosphorus, Total, (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

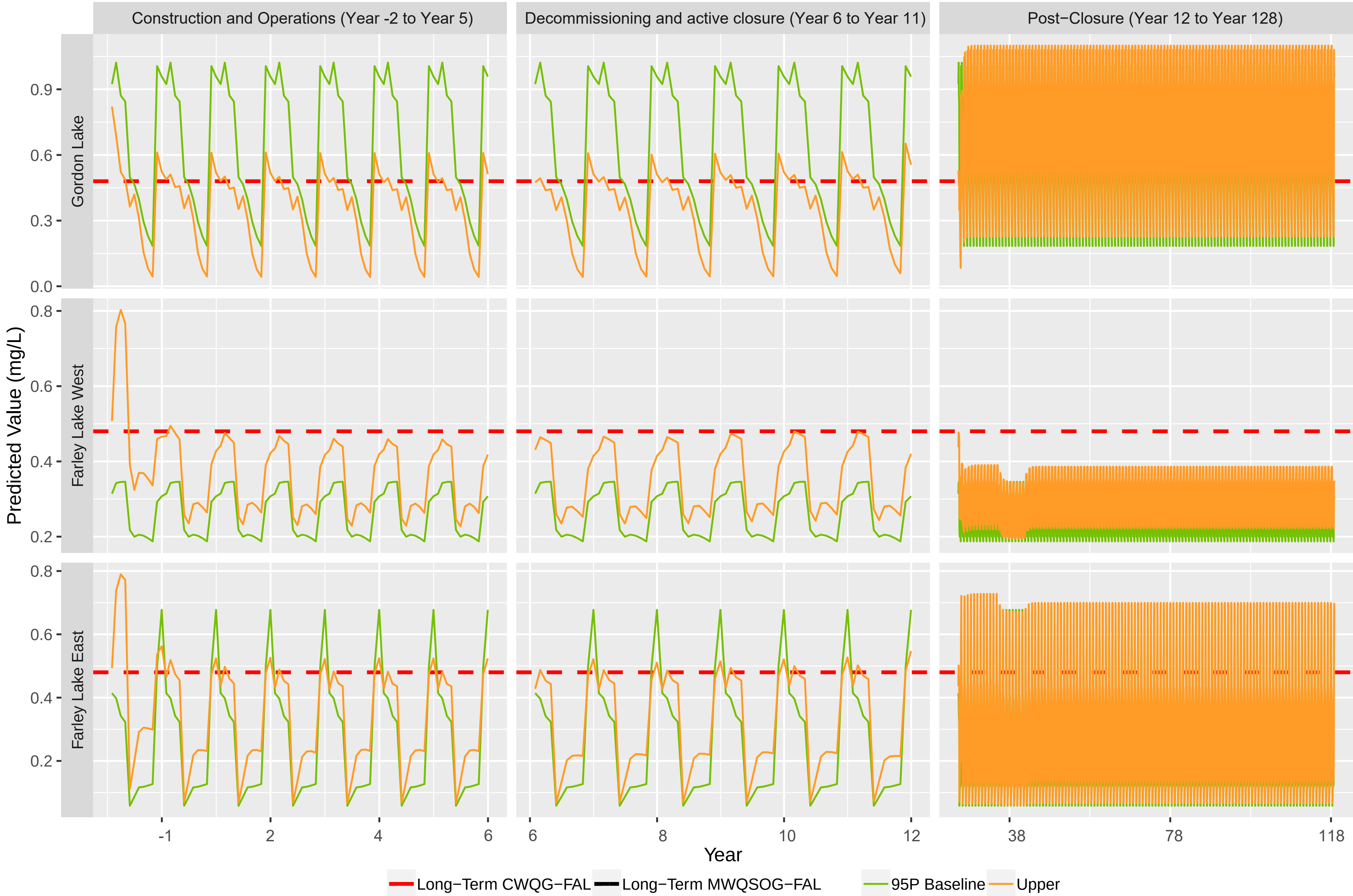
Phosphorus, Total, (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

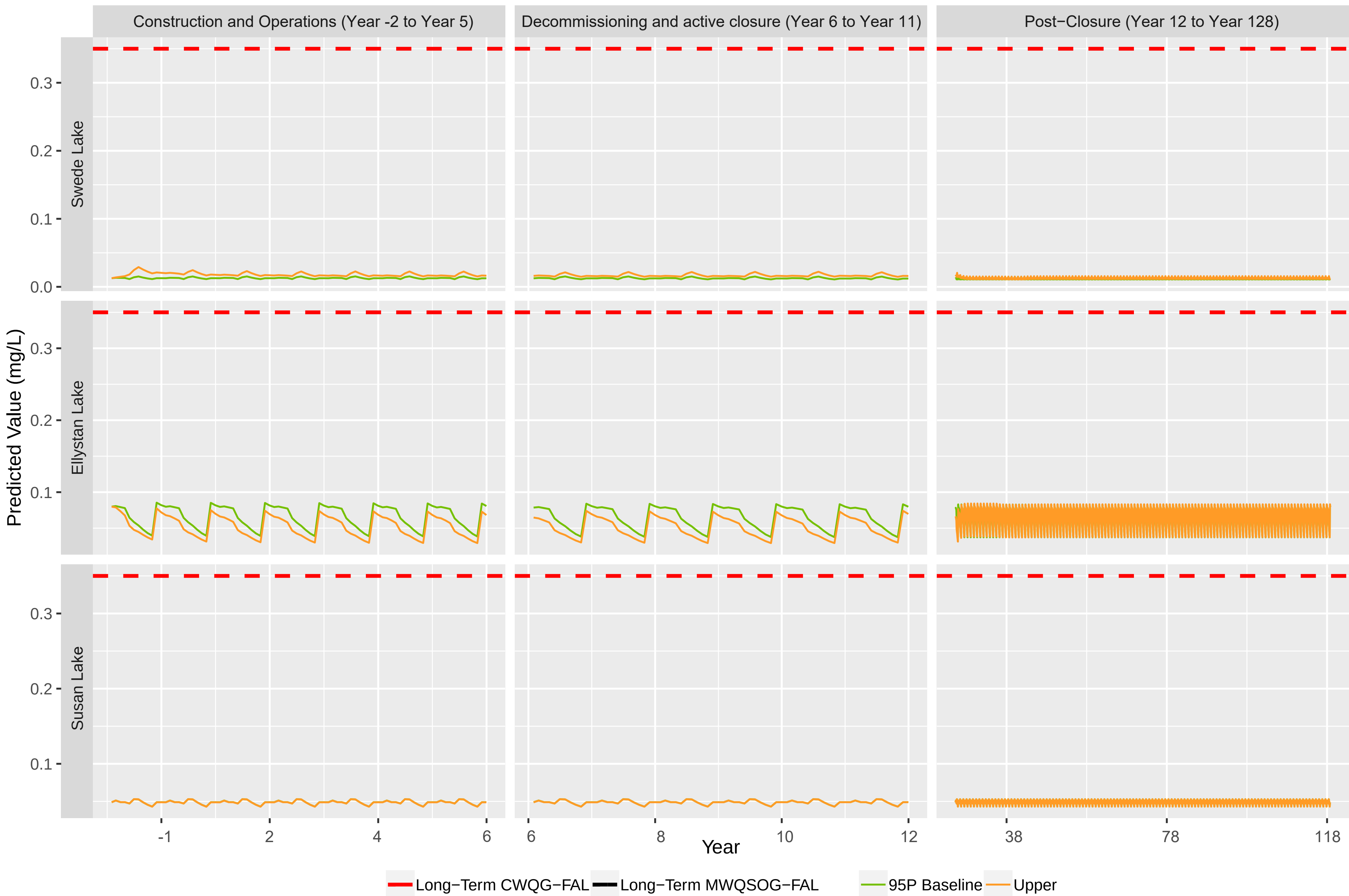
Manganese, Dissolved (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: Gordon - Predicted Concentrations in Receivers - Upper Case

Manganese, Dissolved (mg/L)



Upper case: elevated geochemical inputs and 95th percentile or Log 10 of 95th percentile for baseline water quality inputs.
Calculated guidelines are plotted at the median value for the parameter.

Appendix J SUMMARY OF PREDICTED SEEPAGE WATER QUALITY

Appendix J-1: Summary of predicted MRSA seepage water quality - expected case

Location	Units	Guidelines/Limits			Observed		Model Average			
Source		CWQG	MSOG	MDMER	South_RSA Groundwater	North_RSA Groundwater	Construction	Operation	Closure	Post-Closure
Statistic					Geomean	Geomean	Average	Average	Average	Average
Parameter										
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	7.18	6.76	7.18	7.18	7.18	7.18
Temperature, Field	deg C	n/v	n/v	n/v	2.7	2.3	2.7	2.7	2.7	2.7
Proton (Model)	mg/L	n/v	n/v	n/v	6.65E-08	1.76E-07	9.54E-10	1.73E-08	3.62E-08	3.66E-08
Bromide	mg/L	n/v	n/v	n/v	0.16	0.071	0	0	0	0
Chloride	mg/L	120	n/v	n/v	9.1	5.5	0	0	0	0
Fluoride	mg/L	0.12	0.12	n/v	0.11	0.069	0.030	0.43	0.61	0.61
Sulfate	mg/L	n/v	n/v	n/v	624	287	39	706	1477	1814
Phosphorus_T	mg/L	Narrative	0.025	n/v	0.016	**0.10**	0.00087	0.016	**0.033**	**0.038**
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.16	0.46	0.038	0.99	0.067	4.61E-06
N_Nitrite	mg/L	0.060	0.060	n/v	0.019	0.0089	0.007	**0.180**	0.012	8.38E-07
N_Nitrate_Nitrite	mg/L	13	n/v	n/v	0.44	0.11	0.302	7.842	0.527	3.64E-05
Cyanide_T	mg/L	n/v	n/v	0.5	0.00050	0.00050	0	0	0	0
Cyanide_F	mg/L	0.0050	0.0052	n/v	0.00050	0.00050	0	0	0	0
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.00050	0.00050	0	0	0	0
Hardness	mg/L	n/v	n/v	n/v	1013	469	37	671	1405	2225
Radium_226	Bq/L	n/v	n/v	0.37	0.020	0.026	0	0	0	0
Aluminum_D	mg/L	n/v	n/v	n/v	0.0029	0.015	0.019	0.079	0.086	0.086
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	0.0029	0.015	0.019	0.079	0.086	0.086
Antimony_D	mg/L	n/v	n/v	n/v	0.00021	0.00011	0.00048	0.0087	0.018	0.012
Antimony_T	mg/L	n/v	n/v	n/v	0.00021	0.00011	0.00048	0.0087	0.018	0.012
Arsenic_D	mg/L	n/v	0.15	0.3	0.00054	0.0012	0.0051	0.071	0.10	0.10
Arsenic_T	mg/L	0.005	n/v	0.3	0.00054	0.0012	0.0051	0.071	0.10	0.10
Barium_D	mg/L	n/v	n/v	n/v	0.063	0.094	0.0072	0.13	0.27	0.31
Barium_T	mg/L	n/v	n/v	n/v	0.063	0.094	0.0072	0.13	0.27	0.31
Beryllium_T	mg/L	n/v	n/v	n/v	0.000050	0.000050	0.000043	0.00079	0.0016	0.0019
Boron_D	mg/L	n/v	n/v	n/v	0.040	0.023	0.021	0.38	0.80	0.70
Boron_T	mg/L	1.5	1.5	n/v	0.040	0.023	0.021	0.38	0.80	0.70
Cadmium_D	mg/L	n/v	Equation*	n/v	0.000039	0.000006	0.0000024	0.000043	0.000091	0.00012
Cadmium_T	mg/L	Equation**	n/v	n/v	0.000039	0.000006	0.0000024	0.000043	0.000091	0.00012
Calcium_D	mg/L	n/v	n/v	n/v	286	128	11	208	435	725
Chromium_D	mg/L	n/v	Equation*	n/v	0.000050	0.00029	0.000022	0.00039	0.00082	0.0019
Chromium_D_Hex	mg/L	0.0010	0.011	n/v	0.000050	0.00029	0.000022	0.00039	0.00082	0.0019
Chromium_T	mg/L	0.0089	n/v	n/v	0.000050	0.00029	0.000022	0.00039	0.00082	0.0019
Cobalt_D	mg/L	n/v	n/v	n/v	0.00049	0.00012	0.000043	0.00079	0.0016	0.0019
Cobalt_T	mg/L	n/v	n/v	n/v	0.00049	0.00012	0.000043	0.00079	0.0016	0.0019
Copper_D	mg/L	n/v	Equation*	0.3	0.00029	0.00049	0.00052	0.0094	0.020	0.022
Copper_T	mg/L	Equation**	n/v	0.3	0.00029	0.00049	0.00052	0.0094	0.020	0.022
Iron_D	mg/L	n/v	n/v	n/v	0.19	2.2	0.0032	0.06	0.12	0.13
Iron_T	mg/L	0.3	0.3	n/v	0.19	**2.2**	0.0032	0.06	0.12	0.13
Lead_D	mg/L	n/v	Equation*	0.1	0.000025	0.000025	0.000022	0.00039	0.00082	0.00096
Lead_T	mg/L	Equation**	n/v	0.1	0.000025	0.000025	0.000022	0.00039	0.00082	0.00096
Magnesium_D	mg/L	n/v	n/v	n/v	75	29	2.0	37	78	101
Manganese_D	mg/L	Table 5	n/v	n/v	0.43	0.26	0.00048	0.009	0.018	0.015
Manganese_T	mg/L	Table 5	n/v	n/v	0.43	0.26	0.00048	0.009	0.018	0.015
Mercury_D	mg/L	n/v	n/v	n/v	0.00000039	0.00000057	0.00000024	0.0000043	0.0000091	0.000011
Mercury_T	mg/L	0.000026	0.000026	n/v	0.00000039	0.00000057	0.00000024	0.0000043	0.0000091	0.000011
Molybdenum_D	mg/L	n/v	n/v	n/v	0.0023	0.00084	0.0019	0.035	0.073	0.072
Molybdenum_T	mg/L	0.073	0.073	n/v	0.0023	0.00084	0.0019	0.035	**0.073**	0.072
Nickel_D	mg/L	n/v	Equation*	0.5	0.0017	0.00054	0.0003	0.0055	0.012	0.011
Nickel_T	mg/L	Equation**	n/v	0.5	0.0017	0.00054	0.0003	0.0055	0.012	0.011
Potassium_D	mg/L	n/v	n/v	n/v	9.0	4.64	5.9	107	224	281
Selenium_D	mg/L	n/v	n/v	n/v	0.00011	0.00013	0.00020	0.0035	0.0074	0.0058
Selenium_T	mg/L	0.001	0.001	n/v	0.00011	0.00013	0.00020	**0.0035**	**0.0074**	**0.0058**
Silicon_D	mg/L	n/v	n/v	n/v	5.5	7.0	0.76	14	29	31
Silicon_T	mg/L	n/v	n/v	n/v	5.5	7.0	0.76	14	29	31
Silver_D	mg/L	n/v	n/v	n/v	0.0000050	0.0000050	0.0000024	0.000043	0.000091	0.00012
Silver_T	mg/L	0.00025	0.0001	n/v	0.0000050	0.0000050	0.0000024	0.000043	0.000091	**0.00012**
Sodium_D	mg/L	n/v	n/v	n/v	37	45	13	241	504	396
Sodium_T	mg/L	n/v	n/v	n/v	37	45	13	241	504	396
Strontium_D	mg/L	n/v	n/v	n/v	0.64	0.22	0.048	0.87	1.8	2.9
Strontium_T	mg/L	n/v	n/v	n/v	0.64	0.22	0.048	0.87	1.8	2.9
Thallium_D	mg/L	n/v	n/v	n/v	0.000013	0.000024	0.000024	0.00043	0.00091	0.0011
Thallium_T	mg/L	0.0008	0.0008	n/v	0.000013	0.000024	0.000024	0.00043	**0.00091**	**0.0011**
Uranium_D	mg/L	n/v	n/v	n/v	0.0075	0.0013	0.0016	0.030	0.063	0.051
Uranium_T	mg/L	0.015	0.015	n/v	0.0075	0.0013	0.0016	**0.030**	**0.063**	**0.051**
Vanadium_T	mg/L	n/v	n/v	n/v	0.00024	0.00092	0.00017	0.0031	0.0066	0.0039
Zinc_D	mg/L	Equation**	Equation*	0.5	0.00050	0.00050	0.00037	0.0067	0.014	0.014
Zinc_T	mg/L	n/v	n/v	0.5	0.00050	0.00097	0.00037	0.0067	0.014	0.014

Note: See Appendix C-1 for details on Equation* and Equation**.

Appendix J-2: Summary of predicted MRSA seepage water quality - upper case

Location	Units	Guidelines/Limits			Observed		Model Average			
Source		CWQG	**MSOG**	MDMER	**South_RSA Groundwater**	**North_RSA Groundwater**	**Construction**	**Operation**	**Closure**	**Post-Closure**
Statistic					**Geomean**	**Geomean**	**Average**	**Average**	**Average**	**Average**
Parameter										
pH	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5	7.18	6.76	7.18	7.18	7.18	7.18
Temperature, Field	deg C	n/v	n/v	n/v	2.7	2.3	2.7	2.7	2.7	2.7
Proton (Model)	mg/L	n/v	n/v	n/v	6.65E-08	1.76E-07	1.48E-09	2.68E-08	5.60E-08	6.70E-08
Bromide	mg/L	n/v	n/v	n/v	0.16	0.071	0	0	0	0
Chloride	mg/L	120	n/v	n/v	9.1	5.5	0	0	0	0
Fluoride	mg/L	0.12	0.12	n/v	0.11	0.069	0.047	0.48	0.61	0.61
Sulfate	mg/L	n/v	n/v	n/v	624	287	60	1091	2284	3320
Phosphorus_T	mg/L	Narrative	0.025	n/v	0.016	**0.10**	0.0013	0.024	**0.051**	**0.070**
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.16	0.46	0.070	1.8	0.12	8.38E-06
N_Nitrite	mg/L	0.060	0.060	n/v	0.019	0.0089	0.017	**0.45**	0.030	2.09E-06
N_Nitrate_Nitrite	mg/L	13	n/v	n/v	0.44	0.11	1.7	43	2.9	1.99E-04
Cyanide_T	mg/L	n/v	n/v	0.5	0.00050	0.00050	0	0	0	0
Cyanide_F	mg/L	0.0050	0.0052	n/v	0.00050	0.00050	0	0	0	0
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.00050	0.00050	0	0	0	0
Hardness	mg/L	n/v	n/v	n/v	1013	469	57	1038	2173	4076
Radium_226	Bq/L	n/v	n/v	0.37	0.020	0.026	0	0	0	0
Aluminum_D	mg/L	n/v	n/v	n/v	0.0029	0.015	0.030	0.083	0.086	0.086
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	0.0029	0.015	0.030	0.083	0.086	0.086
Antimony_D	mg/L	n/v	n/v	n/v	0.00021	0.00011	0.00074	0.013	0.028	0.021
Antimony_T	mg/L	n/v	n/v	n/v	0.00021	0.00011	0.00074	0.013	0.028	0.021
Arsenic_D	mg/L	n/v	0.15	0.3	0.00054	0.0012	0.0079	0.079	0.10	0.10
Arsenic_T	mg/L	0.005	n/v	0.3	0.00054	0.0012	0.0079	0.079	0.10	0.10
Barium_D	mg/L	n/v	n/v	n/v	0.063	0.094	0.011	0.20	0.42	0.56
Barium_T	mg/L	n/v	n/v	n/v	0.063	0.094	0.011	0.20	0.42	0.56
Beryllium_T	mg/L	n/v	n/v	n/v	0.000050	0.000050	0.000067	0.0012	0.0025	0.0035
Boron_D	mg/L	n/v	n/v	n/v	0.040	0.023	0.033	0.59	1.2	1.3
Boron_T	mg/L	1.5	1.5	n/v	0.040	0.023	0.033	0.59	1.2	1.3
Cadmium_D	mg/L	n/v	Equation*	n/v	0.000039	0.000006	0.0000037	0.000067	0.00014	0.00021
Cadmium_T	mg/L	Equation**	n/v	n/v	0.000039	0.000006	0.0000037	0.000067	0.00014	0.00021
Calcium_D	mg/L	n/v	n/v	n/v	286	128	18	321	672	1328
Chromium_D	mg/L	n/v	Equation*	n/v	0.000050	0.00029	0.000034	0.00061	0.0013	0.0035
Chromium_D_Hex	mg/L	0.0010	0.011	n/v	0.000050	0.00029	0.000034	0.00061	0.0013	0.0035
Chromium_T	mg/L	0.0089	n/v	n/v	0.000050	0.00029	0.000034	0.00061	0.0013	0.0035
Cobalt_D	mg/L	n/v	n/v	n/v	0.00049	0.00012	0.000067	0.0012	0.0025	0.0035
Cobalt_T	mg/L	n/v	n/v	n/v	0.00049	0.00012	0.000067	0.0012	0.0025	0.0035
Copper_D	mg/L	n/v	Equation*	0.3	0.00029	0.00049	0.00080	0.015	0.031	0.04
Copper_T	mg/L	Equation**	n/v	0.3	0.00029	0.00049	0.00080	0.015	0.031	0.04
Iron_D	mg/L	n/v	n/v	n/v	0.19	2.2	0.0050	0.090	0.19	0.23
Iron_T	mg/L	0.3	0.3	n/v	0.19	**2.2**	0.0050	0.090	0.19	0.23
Lead_D	mg/L	n/v	Equation*	0.1	0.000025	0.000025	0.000034	0.00061	0.0013	0.0018
Lead_T	mg/L	Equation**	n/v	0.1	0.000025	0.000025	0.000034	0.00061	0.0013	0.0018
Magnesium_D	mg/L	n/v	n/v	n/v	75	29	3.2	57	120	184
Manganese_D	mg/L	Table 5	n/v	n/v	0.43	0.26	0.00074	0.013	0.028	0.027
Manganese_T	mg/L	Table 5	n/v	n/v	0.43	0.26	0.00074	0.013	0.028	0.027
Mercury_D	mg/L	n/v	n/v	n/v	0.00000039	0.00000057	0.00000037	0.0000067	0.000014	0.000019
Mercury_T	mg/L	0.000026	0.000026	n/v	0.00000039	0.00000057	0.00000037	0.0000067	0.000014	0.000019
Molybdenum_D	mg/L	n/v	n/v	n/v	0.0023	0.00084	0.0030	0.054	0.11	0.13
Molybdenum_T	mg/L	0.073	0.073	n/v	0.0023	0.00084	0.0030	0.054	**0.11**	**0.13**
Nickel_D	mg/L	n/v	Equation*	0.5	0.0017	0.00054	0.00047	0.0085	0.02	0.019
Nickel_T	mg/L	Equation**	n/v	0.5	0.0017	0.00054	0.00047	0.0085	0.02	0.019
Potassium_D	mg/L	n/v	n/v	n/v	9.0	4.64	9.1	165	346	515
Selenium_D	mg/L	n/v	n/v	n/v	0.00011	0.00013	0.00030	0.0055	0.011	0.011
Selenium_T	mg/L	0.001	0.001	n/v	0.00011	0.00013	0.00030	**0.0055**	**0.011**	**0.011**
Silicon_D	mg/L	n/v	n/v	n/v	5.5	7.0	1.2	21	45	56
Silicon_T	mg/L	n/v	n/v	n/v	5.5	7.0	1.2	21	45	56
Silver_D	mg/L	n/v	n/v	n/v	0.0000050	0.0000050	0.0000037	0.000067	0.00014	0.00021
Silver_T	mg/L	0.00025	0.0001	n/v	0.0000050	0.0000050	0.0000037	0.000067	**0.00014**	**0.00021**
Sodium_D	mg/L	n/v	n/v	n/v	37	45	21	372	779	725
Sodium_T	mg/L	n/v	n/v	n/v	37	45	21	372	779	725
Strontium_D	mg/L	n/v	n/v	n/v	0.64	0.22	0.074	1.3	2.80	5.3
Strontium_T	mg/L	n/v	n/v	n/v	0.64	0.22	0.074	1.3	2.80	5.3
Thallium_D	mg/L	n/v	n/v	n/v	0.000013	0.000024	0.000037	0.00067	0.0014	0.0019
Thallium_T	mg/L	0.0008	0.0008	n/v	0.000013	0.000024	0.000037	0.00067	**0.0014**	**0.0019**
Uranium_D	mg/L	n/v	n/v	n/v	0.0075	0.0013	0.0025	0.046	0.097	0.094
Uranium_T	mg/L	0.015	0.015	n/v	0.0075	0.0013	0.0025	**0.046**	**0.097**	**0.094**
Vanadium_T	mg/L	n/v	n/v	n/v	0.00024	0.00092	0.00027	0.0049	0.010	0.0071
Zinc_D	mg/L	Equation**	Equation*	0.5	0.00050	0.00050	0.00057	0.010	0.022	0.025
Zinc_T	mg/L	n/v	n/v	0.5	0.00050	0.00097	0.00057	0.010	0.022	0.025

Note: See Appendix C-1 for details on Equation* and Equation**.

Appendix K MEMORANDUM ON MINE ROCK WETTING

Stantec

Memo

To:	LLGP Project Team	From:	Mark Steinepreis Waterloo Office
File:	By Email	Date:	May 7, 2020

Reference: Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas

INTRODUCTION

Mine rock storage areas (MRSAs) are planned at the Gordon and MacLellan mine sites as part of the Lynn Lake Gold Project. The MRSAs are approximately 45 m and 40 m tall at Gordon and MacLellan respectively. Water that infiltrates into the MRSAs can potentially migrate to seepage collection ditches via toe seepage discharge, or to groundwater via basal seepage into the soil underlying the MRSAs. As the infiltrated water passes through the porous stockpile, metal leaching (ML) and acid rock drainage (ARD) processes may occur that could affect the quality of the toe seepage and basal seepage. Therefore, the mine rock wetting process has been evaluated for inclusion in the environmental water balance / water quality model for the Gordon and MacLellan sites.

Mine rock is typically placed dry and has the capacity to store infiltrating precipitation in the pore space. This storage capacity delays the wetting up of the pile. The wetting front that develops within the matrix material (<5 mm fraction) moves deeper into the pile over the years following placement, before breakthrough of matrix flow into the subsurface or seepage through the toe. Steady state flow will occur once the infiltration and the unsaturated hydraulic conductivity profile of the material reach an equilibrium.

This memo presents unsaturated seepage analyses to estimate the wetting time for the proposed MRSAs at the Gordon and MacLellan sites. These analyses include the simulation of flow through the MRSA during operations, and the continued progression of the wetting front into the closure period following the placement of a soil cover that is planned as part of the closure strategy.

MODELLING APPROACH

Flow pathways for precipitation falling on the crest of the MRSAs include evaporation, surface runoff and infiltration. As mine rock typically comprises grain sizes ranging from clay to boulder sizes (Amos et al. 2015), it is generally accepted that water infiltrating into the waste rock pile will follow two main pathways:

- gravity-driven flow through large pore spaces (macropores)
- capillary-driven flow through matrix materials (<5 mm fraction) that are present around and between cobbles and boulders (Smith and Beckie 2003; Nichol et al. 2005)

Figure 1 presents a schematic of the flow pathways for precipitation falling on the pile, and the infiltration within the pile.

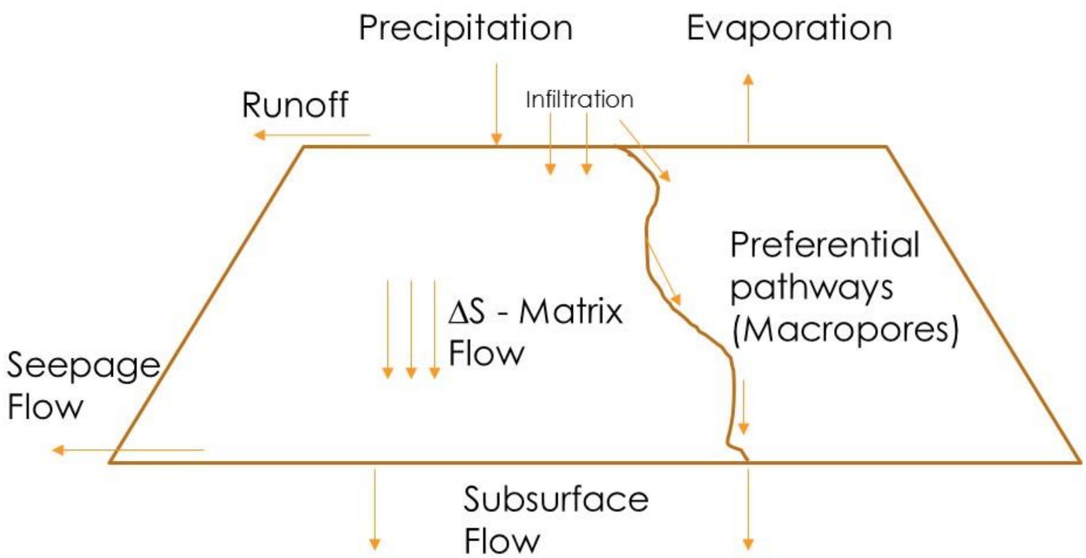


Figure 1 – Water Flow Pathways Around and Within a Mine Rock Pile

The simulations in this memo were conducted using the software code MACRO 5.2 (MACRO) to predict the flow through the MRSAs. MACRO is a 1-dimensional, dual-permeability model for water flow in porous media. The model separates flow through the micropores and macropores and is well suited for the mine rock context, as demonstrated by Keller et al. (2015).

Although mine rock is placed in lifts which has the potential to hasten the passage of the wetting front into the pile, MACRO is only able to simulate a single lift. A previous study (Steinepreis, 2018) considered the effect of multiple lifts in the software SEEP/W®, which is a single-permeability model and therefore cannot consider separate macropore and micropore flow. Informal analyses were carried out in SEEP/W®, and the difference in wetting time from a single lift and multiple lifts was relatively minor. Therefore, the results from MACRO are assumed to be suitable for evaluation of downstream effects.

The MACRO model inputs are discussed in the following subsections. The pertinent model outputs from the MACRO analyses were the flows through the micropores and macropores with time, for incorporation into the mine wide water balance. The wetting process is assessed through the moisture content profile of the material with depth and time.

MACRO MODEL INPUTS

Climate

An estimation of evaporation, runoff and infiltration was required. In lieu of a numerical evaporation model, it was assumed for the uncovered pile that 50% of the annual average precipitation is lost to evaporation and there is no runoff, i.e. the remaining 50% of annual precipitation will percolate into the pile. The 50% net infiltration assumption is similar and slightly more conservative than Smith and Beckie (2003), who observed a net annual infiltration of 55% for a constructed pile experiment in northern Saskatchewan. The assumed annual evaporation was split into a monthly breakdown based on a Thornthwaite analysis (Thornthwaite, 1948) using the United States Geological Survey graphical user interface.

The annual evaporation was increased to 55% of annual average precipitation for the covered pile, and runoff coefficients were estimated.

Precipitation data was obtained from Environment Canada, Lynn Lake Station A (Station ID 5061646, Years 1969-2005). The MACRO model considers daily input precipitation.

Material Properties - Mine Rock

MACRO models the flow through unsaturated porous media using the soil water content curve (SWCC) for each material type. A literature search was carried out to obtain the properties of mine rock for similar operations in lieu of site-specific data for the Gordon and MacLellan sites. The University of Waterloo in Ontario has carried out numerous studies on the hydrogeologic properties of the mine rock piles at the Detour Gold Mine. SWCCs were developed for the matrix (<4.75 mm) fraction of mine rock samples from a historical pile at Detour (Cash 2013). These SWCCs have been assumed to be applicable to the matrix of the mine material for this project.

Cash (2013) presented several SWCC curves for matrix samples, and the mean curve from the upper porosity range (>0.3) was selected for simulation. The MACRO model requires the Van Genuchten (1980) parameters as inputs, which were obtained by trial and error using SEEP/W®. The same software was used to calculate the unsaturated hydraulic conductivity curve from the input SWCC. The partition between micropore and macropore flow was set at 0.2 m^3/m^3, per the Keller et. al. (2015) study. The corresponding matric suction from the SWCC curves was 20 kPa, which is higher (i.e. wetter) than the corresponding matric suction (10 cm or approximately 1 kPa) in the Keller study. Flow will be through micropores when the moisture content of the material is less than 0.2 m^3/m^3, and macropore flow will be triggered when the moisture content is higher. Preferential micropore flow at lower moisture contents has been recognized as counterintuitive (Swanson, 1999).

Figure 2 presents the mean SWCC curves and the calculated unsaturated hydraulic curve that was input for the mine rock in the simulations, and Table 1 presents the Van Genuchten parameters. The shaded areas of the curves are essentially not used, as macropore flow is triggered in this range which is assumed to travel rapidly to the base of the pile.

Reference: **Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas**

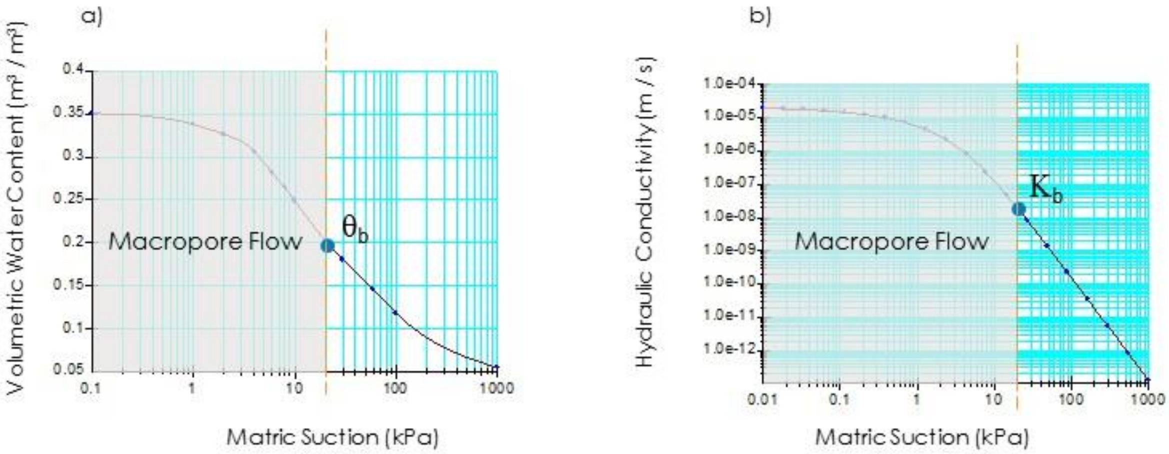


Figure 2 - a) Soil Water Content Curve (Cash 2013) and b) unsaturated hydraulic conductivity curve used for the simulated mine rock pile

Table 1 - Van Genuchten Parameters

Material	N (-)	α (cm^{-1})	K_{sat} m/s	K_b m/s	θ_b m^3/m^3	θ_{res} m^3/m^3
Waste Rock	1.5	0.014	$2x10^{-4}$	$2x10^{-8}$	0.2	0.03

Note: K_{sat} was set to ensure that flow through the macropore will essentially be instantaneous, and was assumed to be an order of magnitude above the saturated hydraulic conductivity of the matrix material (Figure 2b)

Mine rock is typically placed dry, i.e., the volumetric water content is below 0.06 m^3 / m^3 (Mine Environment Neutral Drainage,1995), and the initial water content was assigned accordingly. The flow boundary condition on the crest of the geometry was the infiltration from each precipitation event (i.e. precipitation subtract evaporation and runoff). The flow boundary condition at the base of the geometry was the unit hydraulic gradient, essentially simulating free drainage.

Material Properties - Cover Material

The mean average annual evaporation for the covered pile was assumed to be 55%, i.e. nominally higher than the bare waste rock. Runoff was assumed to occur, and to estimate the percentage of the excess water that runs off and infiltrates the infiltration factors from the Ontario Ministry of Environment and Energy (now the Ontario Ministry of Environment, Conservation and Parks) were used. An infiltration factor of 0.4 was used for open sandy loam (MOEE, 1995), i.e. 40% of the excess water was assumed to infiltrate the cover which is equal to 19% of the annual average precipitation.

The available material on site to use as cover is typically sandy with variable fines. Table 2 presents the Van Genuchten parameters for the cover material, which were obtained from a sample function of silty sand from SEEP/W®, typical of the overburden materials that will be available to use as a cover.

Table 2 - Van Genuchten Parameters

Material	N (-)	α (cm^{-1})	K_{sat} m/s	K_b m/s	θ_b m^3/m^3	θ_{res} m^3/m^3
Cover	1.85	0.02	$2x10^{-4}$	$6.5x10^{-6}$	0.295	0.01

SIMULATIONS – OPERATIONS AND CLOSURE

The MACRO model considered operations and closure. The operating mine lives of the Gordon and MacLellan sites are 5 years and 13 years respectively, after 3 years of pre-production with minimal waste rock production. Active Closure is assumed to take 6 years after completion of operations, during which a cover (0.5 m thick) will be constructed using available site materials. The time period after Active Closure is referred to as Post-Closure. For the purpose of the analysis the conservative assumption was that the cover was not in place during Active Closure, and placed instantly at the commencement of Post-Closure.

The proposed mine development schedule for the two sites is presented on Table 1.

Table 3 – Lynn Lake Gold Project – Mine Development Schedule

<table>
<tr><th>Mine Year</th><th>Gordon</th><th>MacLellan</th></tr>
<tr><td>1</td><td rowspan="5">Operations – No Cover</td><td rowspan="13">Operations – No Cover</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td></tr>
<tr><td>6</td><td rowspan="6">Active Closure – No Cover</td></tr>
<tr><td>7</td></tr>
<tr><td>8</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td></tr>
<tr><td>11</td></tr>
<tr><td>12</td><td rowspan="11">Post Closure – Cover in Place</td></tr>
<tr><td>13</td></tr>
<tr><td>14</td><td rowspan="6">ActiveClosure – No Cover</td></tr>
<tr><td>15</td></tr>
<tr><td>16</td></tr>
<tr><td>17</td></tr>
<tr><td>18</td></tr>
<tr><td>19</td></tr>
<tr><td>20</td><td rowspan="3">Post Closure – Cover in Place</td></tr>
<tr><td>21</td></tr>
<tr><td>22 +</td></tr>
</table>

Reference: **Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas**

RESULTS

WETTING FRONT AND TIMES FOR OPERATIONS/ACTIVE CLOSURE

Figure 3 presents the progression of the wetting front through the uncovered mine rock pile from the MACRO analysis. One model adequately describes the Gordon and MacLellan MRSAs, the only difference is the running time (mine years). The wetting front had progressed approximately 25 m by year 12, which is the assumed date of completion of the cover at Gordon. The progression by the end of cover construction at MacLellan was approximately 37 m for the MacLellan pile, near the base of the 40 m pile. The moisture content profile at these times becomes the initial condition for the Post-Closure model.

The equilibrium moisture content is approximately 0.18 m^3/m^3.

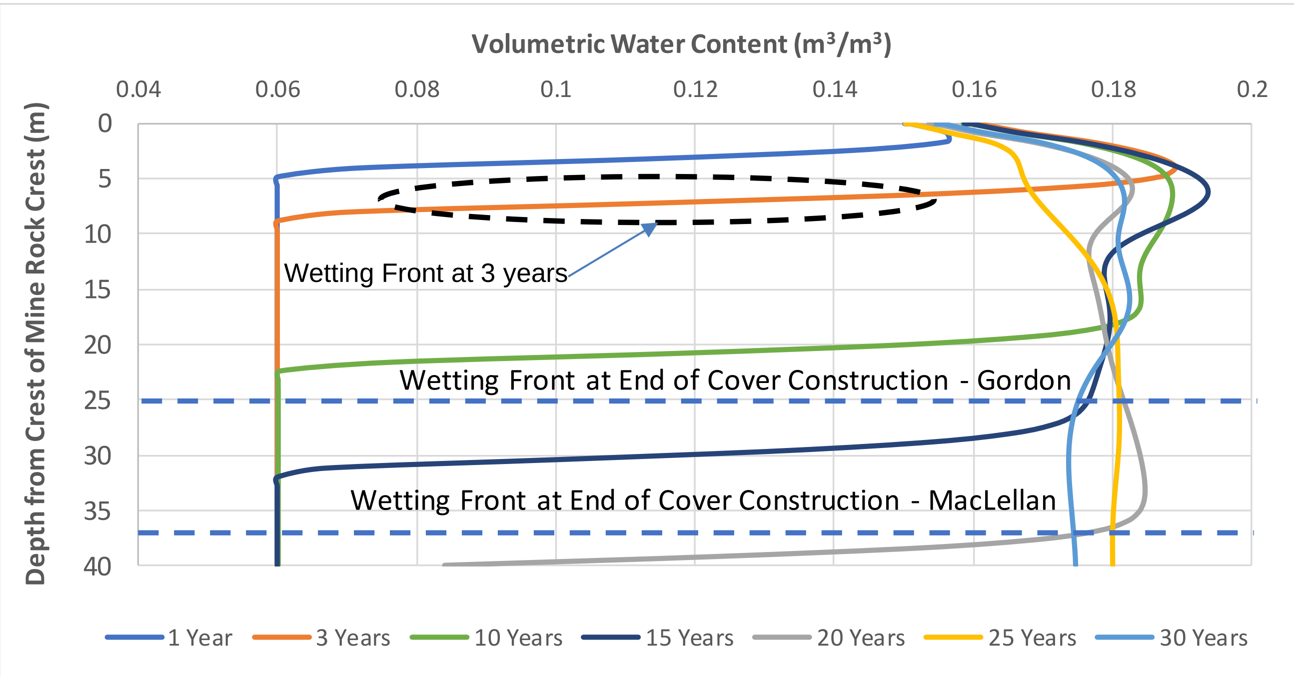


Figure 3 - Progression of the wetting front through the uncovered mine rock pile

Figure 4 presents the flow diagram for the uncovered pile. Macropore flow accounts for approximately 4.3% of the annual average precipitation and micropore flow accounts for the remaining 45.6% (sum total 50% per the assumption made for net annual infiltration).

Flows were calculated for the main body of the pile and the slopes. Considering only the main body would have led to the unreasonable assumption that there would be no runoff or seepage water associated with the mine rock piles until wet up was complete.

The flows for the slopes were similar to the main body, except that runoff was assumed to occur and macropore/micropore flow were both assumed to be instantaneous.

Reference: **Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas**

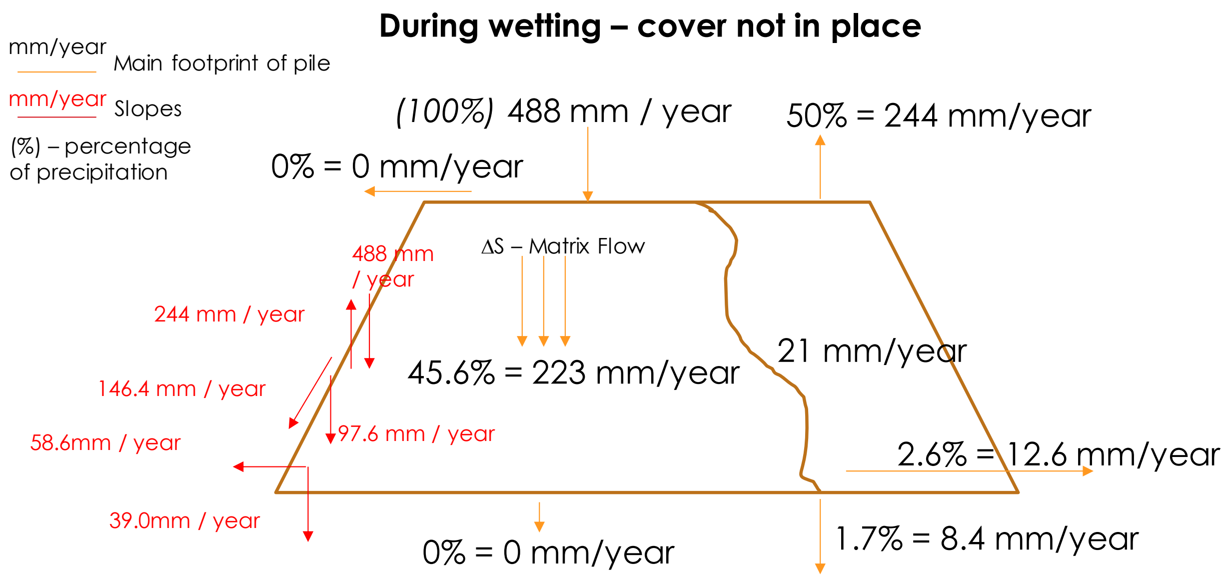


Figure 4 – Water Balance for the MacLellan and Gordon Mine Rock Piles: During the Matrix Wetting and before the Cover Construction is Complete

WETTING FRONT AND TIMES FOR POST-CLOSURE

The wetting up process continued after placement of the cover, and was complete after an additional 19 years at Gordon and 3 years at MacLellan. Figure 5a/b presents the progression of the wetting front through the covered pile. Separate models are required for the Gordon and MacLellan sites due to the different initial condition (Figure 3).

Reference: **Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas**

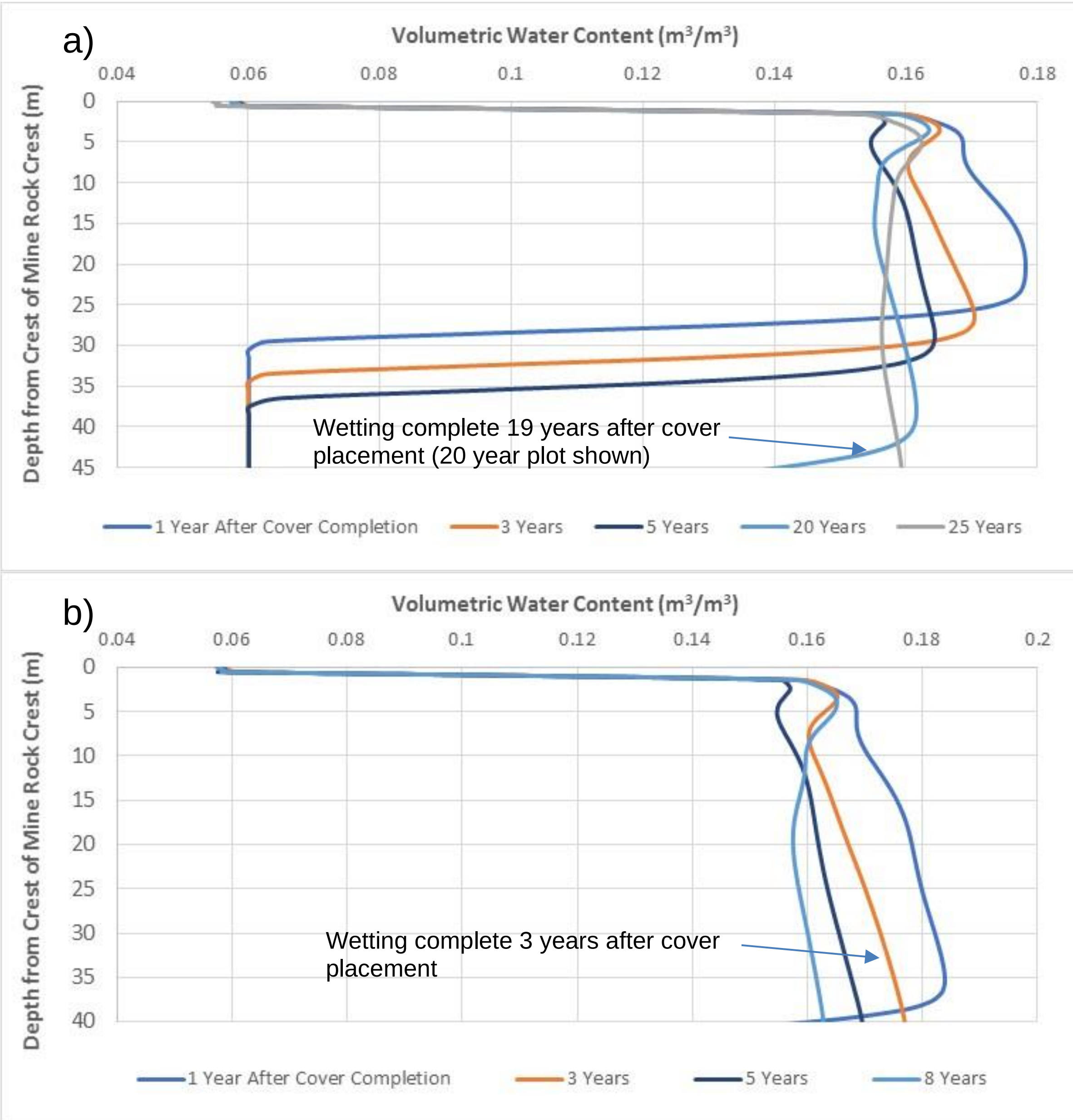


Figure 5 - Progression of the wetting front after placement of the cover on the a) Gordon and b) MacLellan MRSAs

Figure 6 presents the flow diagram for the time period that the cover is in place but before wetting is complete and Figure 7 presents the flows when the piles are completely wet. The flows at the base of the pile were assumed to partially flow into the subsurface and partially seep through the sides of the pile. The MECP infiltration factors were used in this calculation similar to the infiltration at the top of the pile.

Reference: **Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas**

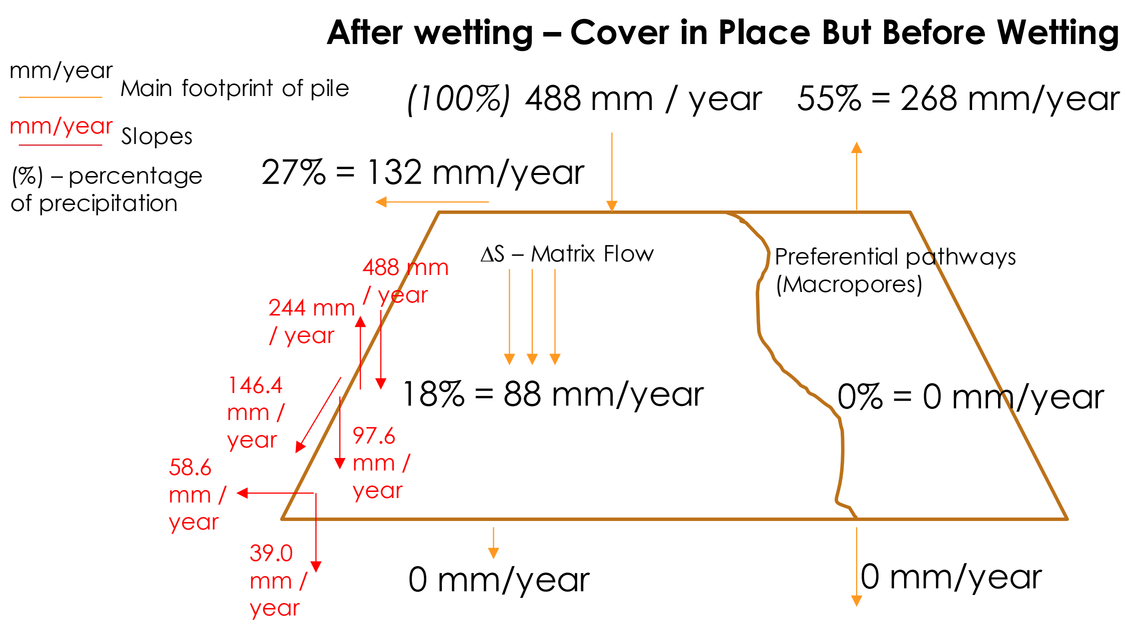


Figure 6 - Water Balance for the MacLellan and Gordon Mine Rock Piles: During the Matrix Wetting and after the Cover Construction is Complete

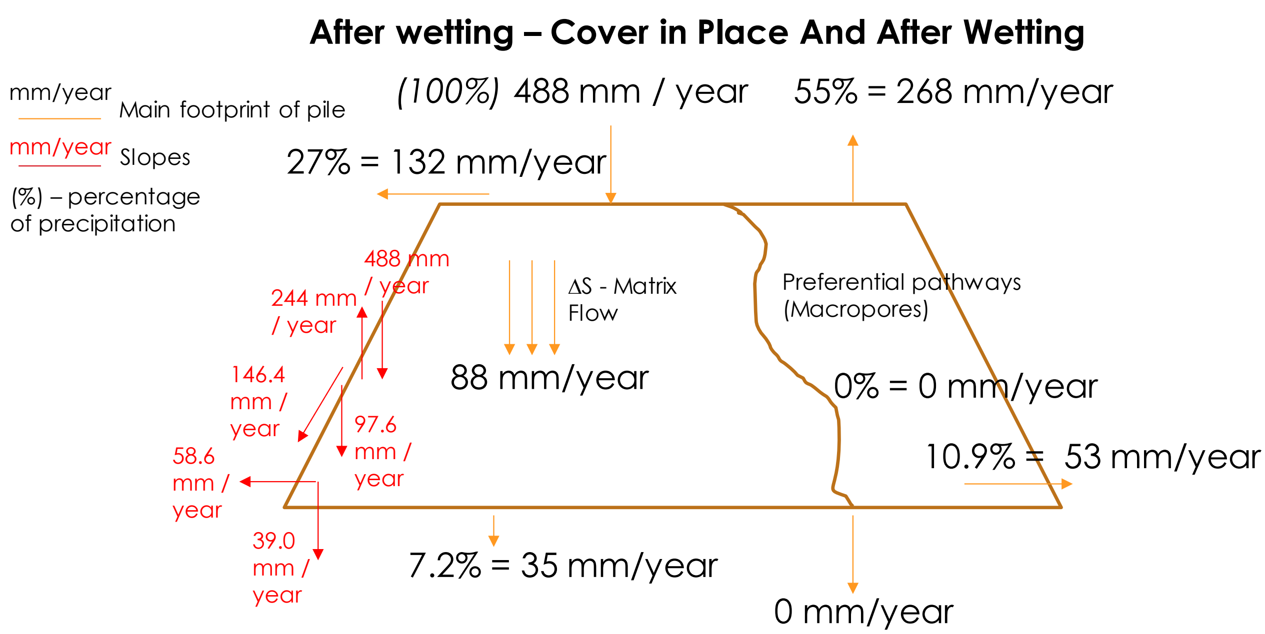


Figure 7 - Water Balance for the MacLellan and Gordon Mine Rock Piles: After the Matrix has Wetted.

LIMITATIONS

Little research has been published on waste rock wetting, and the analyses carried out herewith are considered to be approximate. However, even as the development of this theory continues, it is considered important to recognize that the impacts to water quality from mine rock contact percolation may not be realized until years or decades after placement of the pile.

Field data for climate and hydrogeological properties of the waste rock may be collected during operations to refine the analyses, and is recommended that this be done for to include waste rock wetting in the operational site wide water balance. Following are some limitations on the analyses that may be reconciled with data collection during operations:

- Evaporation on the pile was modelled using assumptions. A Thornthwaite analysis was attempted; however, it is judged that the results were not conservative.
- The hydrogeological characteristics of waste rock are generally not well understood in industry, and design curves for soil moisture content and unsaturated hydraulic conductivity have been developed from a different site and may not apply at the Gordon and MacLellan sites. Particle size distribution tests should be carried out on the matrix (<5mm fraction) material during operations and compared with the results Detour to consider the applicability of the data from the latter to the Gordon and MacLellan sites.
- The analyses have not been calibrated against field measurements. This is not possible at the pre-feasibility stage of the project. V-notch weirs or similar may be placed at toe seeps during operations to consider calibration of future models.

The waste rock wetting analyses discussed in this memorandum are considered to be reasonable for the MacLellan and Gordon sites at the feasibility stage. Field data should be collected to refine the analyses at a later stage in the Project.

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Reference: Infiltration of precipitation and wetting time for the proposed Gordon and MacLellan Mine Rock Storage Areas

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Lynn Lake Gold Project Hydrology Water Balance and Water Quality Impact Assessment: MacLellan Site

Technical Modelling Report

April 30, 2020

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Abbreviations

Alamos	Alamos Gold Inc.
AMSL	above mean sea level
BL-WB	baseline water balance
BL-WQM	baseline water quality model
EOM	end of mining
km	kilometres
km^2	square kilometres
LAA	Local Assessment Area
LiDAR	Light Detecting and Ranging
LLGP	Lynn Lake Gold Project
LOM	life of mine
m	metre
mm	millimetre
mm/yr	millimetres per year
m^3/mon	cubic metres per month
m/s	metres per second
m^3/s	cubic metres per second
MRSA	mine rock storage area
Mt	million tonnes
PAG	potentially acid generating
PDA	Project Development Area
POI	Parameter of interest
PROJ-WB	project water balance

PROJ-WQM	project water quality model
the Project	Lynn Lake Gold Project
RAA	Regional Assessment Area
ROM	run-of-mine
MRSA	mine rock storage area
SRM	snowmelt runoff model
t/day	tonnes per day
TDR	Technical data report
TMR	Technical Modelling Report
TMF	tailings management facility
WB	water balance model
WBWQM	water balance water quality model
WQM	water quality model

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: the 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open pit gold mines at both these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle) (Map 1, Appendix A). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Hydrology Water Balance and Water Quality Technical Modelling Report (TMR) for the MacLellan site has been prepared to assess the potential effects of the construction, operation, closure and post-closure phases of the Project on surface water resources (water quantity and water quality) at the MacLellan site. The TMR considers the MacLellan site components of the Project, baseline data collected for the Project since 2015, and comments received from agencies, Indigenous communities, and other stakeholders.

To evaluate the effects of the Project, a water balance and water quality model (WBWQM) has been developed for the MacLellan site to:

- Estimate the quantity and quality of surface water runoff associated with the Project including the open pit, mill feed storage and crushing plant, ore stockpiles, overburden stockpile, mine rock storage area (MRSA), and TMF during all phases.
- Predict the quantity and quality of water that will be discharged to the environment during all phases.
- Estimate quantity and quality of surface water in the environmental receptors for baseline condition and during all phases.
- Aid in the development of the conceptual closure plan for the Project.

This TMR, and a companion TMR conducted for the Gordon site (Stantec 2020a), form part of the supporting documentation for the Environmental Impact Statement/Environmental Assessment completed for the Project.

1.1 PROJECT BOUNDARIES

1.1.1 MacLellan Project Development Area (PDA)

The MacLellan Project Development Area (PDA) encompasses the immediate area in which Project activities and components may occur plus a 30-metre (m) buffer. It is the anticipated area of direct physical disturbance associated with the construction and operation of the Project. The historical MacLellan site has been in a 'care and maintenance' phase since 1989 with very little reclamation having taken place. The site consists of a 4.6 km gravel access road, abandoned power transmission line, infrastructure from the former underground mine, such as a headframe, hoist house, shaft, access ramp, maintenance and other storage buildings, core shack and racks, vent raise, and mine water settling ponds. The size of the MacLellan PDA is approximately 11.2 km^2.

1.1.2 MacLellan Local Assessment Area (LAA)

The MacLellan Local Assessment Area (LAA) includes the PDA, and watercourses and lakes potentially affected by the Project (Map 1-2, Appendix A). Alamos proposes to develop mine infrastructure at the MacLellan site, including a central ore milling and processing plant, associated infrastructure, mill feed storage and crushing plant, ore and overburden stockpiles, a MRSA, open pit and a TMF. The existing 4.6 km access road will be used to access the site. Upgrades to the existing access road will be required, which will involve the removal of existing granular and placement of new material and compacted granular. The existing side ditches will be cleared or reconstructed based on a suitable design. With the proposed development of this site, the existing approximately 48 m tall headframe, hoist house and maintenance building will be demolished. The LAA represents the extent of the WBWQM. The size of the MacLellan PDA is approximately 126.9 km^2.

1.1.3 Regional Assessment Area (RAA)

The MacLellan LAA is one small component of the Regional Assessment Area (RAA). The RAA represents an area of approximately 9,929 km^2. The RAA includes the drainage area that encompasses the PDAs, LAAs, of both Project sites and the streams and lakes that drain the LAAs to a common downstream location (i.e., Granville Lake). It also includes upstream lakes and streams in the Keewatin River watershed to provide regional context for the lakes and streams within the LAAs and has been defined to allow assessment of potential cumulative effects with past, present, and reasonably foreseeable future projects. The RAA is not included in the MacLellan model domain, beyond the MacLellan LAA.

1.2 PROJECT PHASES AND COMPONENTS

Alamos proposes to develop mine infrastructure at the MacLellan site, including an open pit, central ore milling and processing plant, associated mining infrastructure, ore and overburden stockpiles, a MRSA, and a TMF. The existing access road will be used to access the site.

1.2.1 Mine Life Phases and Mine Plan

For modelling purposes, the third Project phase, decommissioning/closure, was sub-divided into two sub-phases of active closure and post-closure. On this basis, the phases of the Project considered in the WBWQM included construction, operation, active closure, and post-closure. Each phase is described in Table 1-1, including the time lengths for each.

Table 1-1 Summary Table of Each Model Phase

Phase	Time Frames Incorporated into the Model	Description
Baseline	Before Year -2	Mine activity does not occur during the period. The baseline time period is extended in the model to allow reservoirs within the model to reach steady state conditions.
Construction	Year -2 – Year -1 (2 years)	During this phase the following activities will be done: site preparation, physical construction and equipment installation, and commissioning.
Operations	Year 1 – Year 13 (13 years)	During this period the open pit will be developed, a MRSA will be constructed, ore will be processed, and the mill plant and TMF will be operational
Active Closure	Year 14 – Year 19 (6 years)	During this period, the MRSA will be recontoured and reclaimed and the open pit will be allowed to flood. The mill plant will be decommissioned and the TMF will be reclaimed and will only receive only natural inflows.
Post-Closure	Year 19 – Year 128 (109 years)	During this period, the collection pond will drain to the open pit, which will then discharge to the environment, if water quality is suitable. Other discharges include groundwater from the MRSA. The TMF will receive only natural inflows.

1.2.2 Project Components

In this section, individual Project components and catchment areas at the MacLellan site are discussed below and shown on Map 1-3 (Appendix A).

1.2.2.1 Proposed Mine Components

Open Pit. The open pit will be developed. The total quantity of material to be excavated from the MacLellan open pit during Project mine operations is approximately 266 Mt; this includes 26.9 Mt of ore (Q'Pit 2019). The anticipated depth of the MacLellan open pit is approximately 450 m. The open pit will be developed in a series of benches based on the pit design parameters with drilling and blasting completed on each bench. The pit slopes will be designed based on industry standards and the results of site-specific geotechnical investigations. The proposed mine operation is a conventional open pit with shovel and truck removal of the mine rock and ore produced during blasting. Ramp widths will be designed to accommodate the deployed type and size of the mine equipment and vehicles.

Mill Feed Storage and Crushing Plant – The run-of-mine (ROM) ore from both sites will be transported to a pad directly adjacent to the ore milling and processing plant at the MacLellan site for short-term storage before it is used as feedstock for the plant. Ore will be transported to the ore milling and processing plant by a conveyor system. Potential dust emissions will be reduced through dust containment (e.g., enclosure) and collection systems.

Ore Stockpiles, Overburden Stockpiles, and Mine Rock Storage Areas – Some ore will be stockpiled for future processing at the MacLellan site. One ore stockpile area is planned for the MacLellan site, located south of the mill, and will be approximately 115,500 m^2 in area.

The MacLellan site will also contain stockpile areas for removed overburden and mine rock. The overburden stockpile area is proposed to be located to the west of the MRSA. Table 2-3 provides the estimated maximum volumes of each material at the MacLellan site.

Table 2-2 Approximate Quantity of Mine Materials for the MacLellan Site

Project Site	Ore Stockpile		Overburden		Mine Rock	
	Tonnage (Mt)	Total Volume (Mm^3)	Tonnage (Mt)	Volume (Mm^3)	Tonnage (Mt)	Total Volume (Mm^3)
MacLellan	2.7	1.2	8.2	4.8	230.9	102.6

Notes: Mine rock and ore stockpiled swelled densities assumed to be 2.25 t/m^3. Overburden stockpile swelled density assumed to be 1.7 t/m^3. Mine rock volumes based on a bulking factor of 1.3. Overburden volumes based on a bulking factor of 1.1.

Table 2-4 provides the general characteristics of each stockpile/storage area (i.e., surface area, height, and overall slope).

Ore Milling and Processing Plant – The ore milling and processing plant is designed to process 7,500 t/day of ore, with a maximum potential process rate of 8,250 t/day. Ore will first be crushed in a two-stage crushing circuit comprising a primary jaw crusher, followed by a secondary cone crusher. Processing will continue with semi-autogenous grinding, then further grinding in a closed-circuit ball mill and cyclone circuit. Water demand at the ore milling and processing plant will primarily be supplied with reclaimed water from the TMF to reduce the need for fresh surface water demand. Dewatering water from the open pit and other mine contact water (i.e., any water, surface water or groundwater, that contacts mine workings or interacts with any mine rock material) will be collected in a site water management pond for management and/or treatment (if required) prior to discharge.

Tailings Management Facility – The TMF is proposed to be located approximately 1.5 km from the ore milling and processing plant. Water demand at the ore milling and processing plant will primarily be supplied with reclaimed water from the TMF to reduce the need for fresh surface water demand.

Water Supply and Distribution System - The source of fresh water for the MacLellan site will be the Keewatin River, located to the west of the MacLellan site. An intake system will supply water to the fresh/fire water tank at the plant. Maximum freshwater requirements at plant start-up are anticipated to be be 312 m^3/h and normal requirements will be 40 m^3/h. The system will provide potable water for personnel working at the MacLellan site, for eyewash, safety shower, personal hygiene, and drinking water. Treated water is anticipated to be stored in an on-site tank at the MacLellan site with water distribution providing potable water to the buildings at the MacLellan site. Raw water will be used for non-potable use such as fire water.

Sewage Treatment – The average sanitary wastewater flow rate will be approximately 60,000 L/d. A package treatment plant will be required with a discharge consisting of an outfall pipe and diffuser to the selected surface water receiver. The sewage treatment requirements and discharge criteria have not been developed at this stage ad were not included in the MacLellan WBWQM.

2.0 MODELLING APPROACH

The WBWQM was constructed using GoldSim simulation software with the contaminant transport (CT) module add-on extension. GoldSim software is commonly used in the mining industry to develop water balances and to predict water quality at user-defined modelling nodes by combining system dynamics with discrete event simulations. The model was run dynamically on a daily time step for the construction, operation, active closure, and post-closure phases. Results are presented and interpreted based on monthly averaged values.

The model is compartmentalized into WB and the WQM. The WB is calculated by incorporating defined inputs, such as inflow rates and outflow rates into the model. These inflows and outflows are based on precipitation rates, catchment and facility areas and volumes, groundwater inflows rates, operational water management strategies and the movement of materials within the site. The water quality predictions are calculated at the model nodes by integrating source term development (loading sources) into the WB.

The WB model consists of two sub-models to facilitate the evaluation of the “relative” impacts of the Project on the baseline environment. The first sub-model is the baseline water balance (BL-WB) and the second sub-model is the project water balance (PROJ-WB). The PROJ-WB was developed to predict changes to flow in the receiving environment and within the Project site during each phase of mine life. The BL-WB was developed to predict baseline flows across the site throughout the life of the mine (i.e. it assumes the Project does not occur), and it runs concurrently within the GoldSim platform with the PROJ-WB, to facilitate comparison between unimpacted and impacted conditions at each time step in the model.

Like the WB, the WQM consists two sub-models, the baseline water quality model (BL-WQM) and the project water quality model (PROJ-WQM) to facilitate comparison between non-Project and Project conditions.

Within the WBWQM, model nodes are representative of water monitoring stations. Creeks, streams or rivers are represented by a flow-through function in the WB, for which inflows equal outflows. Lakes are represented by reservoirs in the WB for which inflows equal outflows plus or minus storage. The model nodes are often represented as cells in the WQM; the flow through and within the cell is dependent on the WB, while loads can be added independently to the WBWQM. A load refers the amount of mass entering a model reservoir. The WB and WQMs are presented in Section 3.0 and Section 4.0, respectively.

Three climate scenarios were considered to evaluate the potential effects of the Project on surface water. The WB models and climate scenarios are discussed in more detail in Section 3.0. Two load scenarios are included in this report to evaluate the sensitivity of the source terms on the predictions and to aid in the development of a contingency planning (Section 4.0).

3.0 WATER BALANCE

3.1 GENERAL APPROACH

The following subsections present the approaches used for modelling water quantity with the water balance (WB). The WB provides estimates of streamflow and water levels from the existing watersheds, rivers and lakes. The WB model consists of two models:

Baseline Water Balance (BL-WB): The model contains the baseline condition or pre-mine stage, with no mine features. The model encompasses the LAA. The baseline model is calibrated using data from 2015-2016.

Project Water Balance (PROJ-WB): This model is built within the BL-WB and includes the proposed Project infrastructure and water management of the mine within the PDA as well as all other non-Project affected watersheds within the LAA.

The model includes various climate scenarios intended to define the potential range of flows and water levels considering uncertainty associated with inputs and assumptions. The general approach was to:

- Develop the BL-WB that includes lakes (reservoirs) for the sub-watersheds within the LAA.
- Calibrate the BL-WB to a period of measured climatic and hydrologic data in 2015 and 2016.
- Use the calibrated BL-WB to estimate the baseline streamflow and water levels for all climate scenarios.
- Develop the PROJ-WB by adding Project specific components and flows to the BL-WB.
- Estimate streamflows and water levels during all phases of the Project.
- Compare the BL-WB stream flows and lake water levels to the PROJ-WB predictions during all phases of the project for wet, dry and average conditions.

3.2 BASELINE WATER BALANCE STRUCTURE

This section describes the inputs used to calibrate the BL-WB. The BL-WB was developed to model the baseline conditions of the LAA. This includes watersheds within the PDA as well as all watersheds and sub-watersheds connected to the Keewatin River watershed. The BL-WB models the LAA without the Project and represents the baseline or pre-Project conditions.

3.2.1 Baseline Water Balance Conceptual Model

The BL-WB is developed to predict streamflow for sub-watersheds and lake levels within the LAA of the MacLellan site. The overall LAA for MacLellan n is shown in Map 3-1, with more detail on the MacLellan site watersheds shown on Map 3-2. Details of the BL-WB input parameters and the calibration of the model are provided below in Section 3.2.3 and Section 3.2.4.

For the BL-WB model the Snowmelt-Runoff Model (SRM) was selected to simulate the hydrologic response of the watersheds within the LAA. The model was run on a daily time step and calculates the runoff from each watershed and integrated into lake water balance model for lakes in the modelled area. For each lake a stage-volume and stage-area relationship was used to balance the water in the lake and determine lake levels for model calibration and lake volumes for water quality modelling. The model provides an integrated hydrology and water balance. Table 3-1 presents a list of the watersheds modelled for the MacLellan site. Figure 3-1 presents the conceptual model for how the watershed and the lakes are connected in the model.

Table 3-1 Watersheds Modelled in the MacLellan LAA

<table>
<tr><th>Watershed Name</th><th>Sub-Watershed Name</th><th>Model Name</th><th>Waterbodies and Project Components within Watershed or Sub-Watershed</th><th>Area (km²)</th></tr>
<tr><td>ws_KEE4</td><td>n/a</td><td>QM01, QM01_sub</td><td>Keewatin River, Burge Lake</td><td>1,310</td></tr>
<tr><td rowspan="7">ws-KEE3
(West MacLellan site watershed)</td><td>sws_KEE3_PAY2</td><td>Q_KEE3_PAY2</td><td>Payne Lake</td><td>3.3</td></tr>
<tr><td>sws_KEE3_PAY1</td><td>Q_KEE3_PAY1</td><td>Payne Creek</td><td>4.5</td></tr>
<tr><td>sws_KEE3_4</td><td>Q_KEE3_4</td><td>MRSA and TMF</td><td>0.71</td></tr>
<tr><td>sws_KEE3_C1</td><td>Q_KEE3_C1</td><td>MRSA and Overburden Stockpile</td><td>0.25</td></tr>
<tr><td>sws_KEE3</td><td>Q_KEE3</td><td>Proposed Pit</td><td>2.6</td></tr>
<tr><td>sws_KEE3_B1</td><td>Q_KEE3_B1</td><td>East Pond
Processing Plant, Proposed Pit, Mine Rock Storage Area, Ore Stockpile, and Overburden Stockpile</td><td>2.0</td></tr>
<tr><td>sws-KEE3-A1</td><td>Q_KEE3_A1</td><td>Tributary tp Keewatin River</td><td>1.9</td></tr>
<tr><td>ws-KEE3.3</td><td>n/a</td><td>QM02</td><td>Keewatin River and small tributary</td><td>3.6</td></tr>
<tr><td>ws-KEE3-DOT1</td><td>n/a</td><td>QM09</td><td>Dot Lake</td><td>7.5</td></tr>
<tr><td>ws-KEE3.2</td><td>n/a</td><td>QM03</td><td>Keewatin River</td><td>1333.7</td></tr>
<tr><td>ws-KEE3.1</td><td>n/a</td><td>QM06</td><td>Keewatin River</td><td>2.7</td></tr>
<tr><td>ws-LYN1</td><td>n/a</td><td>QM05</td><td>Lynn River</td><td>470.4</td></tr>
<tr><td rowspan="2">ws-COC2-LOB2-MIN4
(East MacLellan site watershed)</td><td>sws-COC2-LOB2-MIN5</td><td>Q_MIN5</td><td>Unnamed lake COC2-LOB2-MIN5-A1
Tailings Management Facility</td><td>6.3</td></tr>
<tr><td>sws-COC2-LOB2-MIN4</td><td>Q_MIN4_5</td><td>Minton Lake
Tailings Management Facility</td><td>5.7</td></tr>
<tr><td>AQM10</td><td>n/a</td><td>QM11</td><td>Cockeram River</td><td>73.9</td></tr>
<tr><td>ws-KEE1</td><td>n/a</td><td>QM08</td><td>Cockeram Lake, Carr Lake, Huet Lake, Arbour Lake, Desieyes Lake, Lobster Lake, Unnamed lake COC2-LOB2-MIN2</td><td>143.8</td></tr>
</table>

The BL-WB was calibrated iteratively to measured stream flow and lake water level data during 2015 and 2016 at a number of hydrometric stations shown on Map 3-2 (Stantec 2017a). Statistical assessment of the BL-WB was performed to measure the model's performance. Detailed model inputs, calibration parameters and statistical assessment of the calibration is provided Section 3.2.3 and Section 3.2.4.

3.2.2 Baseline Water Balance Description

The SRM is designed to simulate streamflow at a daily timestep (additional details are provided in Martinec et al. 2008) in the BL-WB. Streamflow generated from snowmelt and rainfall is computed, using the following equation (*Equation 3-1*):

$$Q_{n+1} = [C_{Sn}.a_n(T_n + \Delta T_n)S_n + C_{Rn}P_n]\frac{A.10000}{86400}(1 - K_{n+1}) + Q_nK_{n+1} \quad \textit{Equation 3-1}$$

Where:

Q = average daily discharge ($m^3 s^{-1}$)

C = runoff coefficient; expresses losses to streamflow as a ratio (runoff/precipitation), with C_S referring to snowmelt and C_R to rain

a = degree-day factor (cm °C^{-1} d^{-1}) indicating the snowmelt depth resulting from 1 degree-day

T = number of degree-days (°C d)

Δ T = the adjustment by temperature lapse rate when extrapolating the temperature from the station to the average hypsometric elevation of the basin or zone (°C d)

S = ratio of the snow-covered area to the total area

P = precipitation contributing to runoff (cm).

T_{CRIT} = threshold temperature that determines whether the precipitation is rainfall or snow. A threshold temperature is used to decide whether a precipitation event will be treated as rain ($T \geq T_{CRIT}$) or as new snow ($T < T_{CRIT}$). If precipitation is determined by T_{CRIT} to be new snow, it is kept on storage over the hitherto snow free area until melting conditions occur.

A = area of the sub-catchment [km^2]

K = recession coefficient indicating the decline of discharge in a period without snowmelt or rainfall:

n = sequence of days during the discharge computation period.

$\frac{10000}{86400}$ = conversion from cm·km^2 d^{-1} to m^3 s^{-1}

T, *S* and *P* are variables to be measured or determined each day, C_R, C_S are lapse rate to be determined, Δ *T*, T_{CRIT}, *K* and the lag time are parameters which are characteristic for a given basin or, more generally, for a given climate. The lag time is the time difference between the start of increasing temperatures and the corresponding increase in runoff from the basin.

All parameters with unknown values (S, C_R, C_S, *K, a)* were determined during the calibration process.

3.2.2.1 Lake Level and Lake Outflow

Where no stage-discharge relation was available for lakes in the LAA, the relation was estimated using *Equation 3-2*:

$$Qout = CD * (Lake\ Water\ Level - Ho)^{\ P} \qquad \textit{Equation 3-2}$$

where*:*

Q_{out} = Lake Outflow (m^3/s)

CD = Lake Coefficient

H_o = Minimum water level for lake outflow (m^3/s)

P = Power Coefficient (m^3/s)

All parameters with unknown values (*CD*, *Ho*, *P)* were determined during the calibration process.

3.2.2.2 Baseline Water Balance Calibration

Models are mathematical approximations of physical systems. Calibration is a process wherein certain parameters of the model are altered in a systematic fashion and the model is run iteratively until the computed values matches the observed values within a range that is considered acceptable. The GoldSim model optimization tool was used for model calibration of the SRM. Model performance is measured in terms of the ability to reasonably predict key response variables such as streamflow and lake level. Statistical assessment of the calibrated hydrology model was performed to measure model performance. The following statistical parameters were used in this study:

Nash-Sutcliffe Model Efficiency

The Nash–Sutcliffe model efficiency coefficient, was used to assess the predictive results (flow or lake level) of the BL-WB (*Equation 3-3*). The Nash–Sutcliffe model efficiency coefficient (*E*) is defined as (Nash and Sutcliffe, 1970):

$$\boldsymbol{E = 1 - \frac{\sum_{t=1}^{T}\left(Q_o^t - Q_m^t\right)^2}{\sum_{t=1}^{T}\left(Q_o^t - Q_{o,avg}\right)^2}} \qquad \textit{Equation 3-3}$$

Where:

Q_o is observed value

Q_m is modelled value

$Q_{o,avg}$ is average observed value

Generally, Nash–Sutcliffe coefficient ranges from $-\infty$ to 1 with a value of 1 indicating a perfect match of modelled value to the observed data (i.e., the closer the model efficiency to 1, the more accurate the model is). An efficiency of 0 indicates that the model predictions are as accurate as the mean of the observed data. An efficiency less than zero indicates that the observed mean is a better predictor than the model.

Correlation Coefficient

The Pearson's Correlation Coefficient (*R*) indicates the strength and direction of a linear relationship between the model output and observed values. It is obtained by dividing the covariance of the two variables by the product of their standard deviations (*Equation 3-4*).

$$\boldsymbol{R} = \frac{\sum_{t=1}^{T}\left(Q_o^t - Q_{o,avg}\right)\cdot\left(Q_m^t - Q_{m,avg}\right)}{\sqrt{\sum_{t=1}^{T}\left(Q_o^t - Q_{o,avg}\right)^2 \cdot \sum_{t=1}^{T}\left(Q_m^t - Q_{m,avg}\right)^2}}$$

Equation 3- 4

where $Q_{m,avg}$ is average modelled value for the simulation period, and other variables are as previously defined.

Further details on inputs and calibration are discussed in Section 3.2.3 and Section 3.2.4.

3.2.3 Baseline Water Balance Inputs

3.2.3.1 Climate

Historical climate data were gathered from the Environment and Climate Change Canada (ECCC) National Climate Data and Information Archive (ECCC 2019). Climate data relevant to the Project area is available from four ECCC meteorological stations: Lynn Lake Airport (Climate ID 5061646), Lynn Lake (Climate ID 5061648), Lynn Lake (Climate ID 5061645), and Lynn Lake Reference Climate Station (RCS) (Climate ID 5061649). These four stations were chosen because of their proximity to the Project area and relatively long period of record. Stations 5061646, 5061648, and 5061645 are located at the Lynn Lake Airport and Station 5061649 is located just south of the airport. The Lynn Lake climate stations encompass data from 1968 to 2005 (5061646), 2005 to 2014 (5061648), and 2010 to 2017 (5061645 and 5061649). Together these stations have a continuous record going back more than 40 years; this record was used to generate historic temperature and precipitation. Stations 5061645 and 5061649 are currently in operation. Daily temperature, precipitation, and snowfall data was downloaded and used for input.

Additional analysis of climate data is provided in Stantec (2017b). The summary of the average temperature, precipitation, and snow on ground data for the 2015 and 2016 water years and climate normals (1981-2010) at the Lynn Lake stations (the combined record of ECCC stations 5061645 and 5061649) is provided in Table 3-2.

The 2015 and 2016 daily climate data were used for model calibration periods. The historical climate data were used to develop the average, 25-year wet and 25-year dry climate scenarios for the model simulations (Section 3.3.2). The Prairie Farm and Rehabilitation Administration (PFRA) estimated the Lynn Lake annual lake evaporation rate to be 476 mm based on historical gross evaporation data (PFRA 2002), with the

Table 3-2 Summary of Climate Normals (1981 – 2010) and Meteorological (2015 and 2016) Data at Lynn Lake, MB (ECCC 2019)

Parameter	Units	Data Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly Average Maximum Temperature	°C	1981-2010	-19	-14	-6.2	3.2	12	19	22	20	12	3.1	-8.4	-17	2.3
		2015	-17	-19	-4.8	4.5	13	20	22	20	13	4.1	-12	-13	2.4
		2016	-15	-15	-4.1	2.7	15	20	22	21	15	5	-4.3	-11	3.7
Monthly Average Temperature	°C	1981-2010	-24	-20	-13	-3.1	5.6	13	16	15	7.7	-0.6	-13	-21	-3.2
		2015	-22	-25	-12	-1.9	5.6	14	16	15	8	1.1	-17	-17	-3.2
		2016	-19	-22	-11	-4.4	8.6	14	17	14	10	1.4	-8.1	-14	-1.7
Monthly Average Minimum Temperature	°C	1981-2010	-29	-26	-20	-9.4	-0.8	6.6	10	9	3	-4.2	-17	-26	-8.6
		2015	-28	-30	-20	-8.3	-2.3	7.3	10	9.6	3.4	-1.9	-22	-21	-8.8
		2016	-24	-29	-19	-11	2.4	7.8	11	8.1	4.8	-2.2	-12	-17	-7.1
Average Total Precipitation (mm)	mm	1981-2010	20	16	20	24	37	62	85	69	61	38	27	19	478
		2015	11	11	19	25	29	58	60	30	90	17	8.2	11	370
		2016	11	13	20	14	32	40	104	55	42	45	16	8.9	399
Average Total Rainfall (mm)	mm	1981-2010	0.2	0.1	1.4	4.5	27	61	85	69	57	12	0.8	0.1	318
Average of Snow on Ground (cm)	cm	1981-2010	34	37	33	14	1	0	0	0	0	3	17	26	14
Average of Snow on Ground (cm) % of Precipitation as Rainfall	cm %	2015	20	34	41	19	0	0	0	0	0	0	10	13	11
		2016	34	50	51	34	0	0	0	0	0	5	14	28	18
		1981-2010	1	1	7	19	72	98	100	100	94	32	3	1	
Average of Snow on Ground (cm)	cm	1981-2010	34	37	33	14	1	0	0	0	0	3	17	26	14

Table 3-3 Gross Evaporation Data at Lynn Lake, MB (1971 – 2006) (PFRA 2002, 2017)

Parameter	**Units**	**Data Period**	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Lake Evaporation (mm)	mm	1971-2006	0	0	0	0	33.5	109.1	141.2	118.9	67	6.7	0	0	476

maximum monthly evaporation rate occurring in July at 141.2 mm (Table 3-3). The monthly lake evaporation data were used in the lake and pond (open pit and collection ponds) water balance models.

3.2.3.2 Watershed Areas

A geographic information system mapping approach was used to delineate sub-watersheds for the MacLellan Site. Site specific Light Detecting and Ranging (LiDAR) data at approximately 2 m x 2 m resolution was used. For areas where LiDAR coverage was not available, digital elevation model data from GeoBase (Natural Resources Canada 2014) at approximately 20 m x 20 m resolution was used. A naming system was designated for all reaches in the MacLellan LAA; where *ws* stands for watershed and *sws* stands for sub-watershed. Table 3-4 presents watershed characteristics.

Table 3-4 Physiographic Characteristics of Watersheds in the MacLellan Site

Watershed Name	Sub-Watershed Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Area (km²)	Minimum Elevation (m)	Maximum Elevation (m)	Lake Coverage (%)	Tributary to
ws-KEE4	n/a	Goldsand Lake and Burge Lake	1310	339	443	23	Keewatin River
ws-KEE3.3	n/a	Keewatin River	3.4	337	364	0.81	Keewatin River
ws-KEE3 (West MacLellan site watershed)	sws-KEE3-PAY2	Payne Lake	3.3	348	364	18	Unnamed stream KEE3-PAY1 to Keewatin River
	sws-KEE3-PAY1	n/a*	4.6	334	37	0	Keewatin River
	sws-KEE3-4	Keewatin River	0.71	334	372	7	Keewatin River
	sws-KEE3-C1	Mine Rock Storage Area and Overburden Stockpile	0.32	335	356	0	Keewatin River
	sws-KEE3	Keewatin River Proposed Pit	2.6	321	359	6	Keewatin River
	sws-KEE3-B1	East Pond Processing Plant, Proposed Pit, Mine Rock Storage Area, Ore Stockpile, and Overburden Stockpile	5.7	321	376	1	Keewatin River
	sws-KEE3-A1	Keewatin River	1.9	321	349	5	Keewatin River
ws-KEE3-DOT1	n/a	Dot Lake	7.2	336	368	1.4	Keewatin River

Table 3-4 Physiographic Characteristics of Watersheds in the MacLellan Site

Watershed Name	Sub-Watershed Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Area (km²)	Minimum Elevation (m)	Maximum Elevation (m)	Lake Coverage (%)	Tributary to
ws-KEE3.2	n/a	Keewatin River	2.3	335	367	0.99	Keewatin River
ws-KEE3.1	n/a	Keewatin River	3.0	319	351	0.98	Keewatin River
ws-LYN1	n/a	Lynn River	470	318	444	0	Keewatin River
ws-COC2-LOB2-MIN4 (East MacLellan site watershed)	sws-COC2-LOB2-MIN5	Unnamed lake COC2-LOB2-MIN5-A1 Tailings Management Facility	6.3	330	363	3	Unnamed stream COC2-LOB2-MIN5 to Minton Lake
	sws-COC2-LOB2-MIN4	Minton Lake Tailings Management Facility	5.7	329	363	29	Unnamed stream COC2-LOB2-MIN3 to unnamed lake COC2-LOB2-MIN2 to Cockeram River
ws-KEE1	n/a	Cockeram Lake, Carr Lake, Huet Lake, Arbour Lake, Desieyes Lake, Lobster Lake, Unnamed lake COC2-LOB2-MIN2	189	311	382	0	Moses Lake

Notes:
n/a – this watershed was not divided into subwatersheds
n/a* - no lake coverage or proposed project components exist within this subwatershed
"-" – available LiDAR data does not cover the entire watershed and therefore lake and wetland coverage cannot be calculated

3.2.3.3 Lake Bathymetry

Lake bathymetric data were collected at key lakes. Sites were chosen based on their proximity to the proposed mine operations and potential to be physically altered by the proposed development. Within the MacLellan LAA, sites included Dot Lake and Minton Lake. Additional details of the bathymetric field program are presented Stantec (2017a). Lake bathymetric data is used in in the development of the BL-WB. Lake volume-elevation and lake area-elevation relationships were established using the lake bathymetric data and topographic information surrounding the lake and used as an input to the lake water balance model. The results of lake surface area and volume for average lake levels in the hydrology model for the MacLellan site are presented in Table 2-5.

Table 3-5 Lake Surface Areas and Volumes for the MacLellan LAA

Lake Name	Surface Area (m^2)	Volume (m^3)
Burge Lake	4,747,961	No measured depth
Cockeram Lake	21,051,000	63,153,000
Minton Lake	1,666,440	2,525,880

3.2.3.4 Measured Streamflow and Water Level

The locations and watersheds of the hydrometric stations that are used for model calibration at MacLellan site are shown in Table 3-6**.** Five stations (QM01, QM03, QM05, QM06 and QM08) had sufficient data to allow a stage-discharge relationship to be developed and subsequent calculation of discharge for the 2015 and 2016 monitoring period (Stantec 2017a). The remaining stations are limited to stage data and point measurements of discharge. A more thorough explanation of the data limitations and field data analysis are provided in Stantec (2017a). The measured discharge at the five monitoring stations were used for BL-WB calibration. The drainage areas in Table 3-6 differ from the catchment areas in Table 3-1 in that those listed in Table 3-6 represent the cumulative watershed area the drains to the hydrometric station.

Table 3-6 Geographic and Physiographic Details for the MacLellan Hydrometric Monitoring Stations Used in the Model

Station	UTM Coordinates (Zone 14V)	Period of Operation	Available Parameters for model calibration	Drainage Area (km^2)	% Lakes	Description
QM01	379675 E 6310698 N	May 26, 2015 - present	Discharge	1,310.1	23.0	Keewatin River, upstream of the project area.
QM03	380709 E 6306104 N	May 25, 2015 - present	Discharge	1,333.7	22.8	Keewatin River, immediately downstream of the proposed open pit.
QM05	381934 E 6303916 N	June 1, 2015 - present	Discharge	470.4	10.0	Lynn River, above the confluence with the Keewatin River. The objective of this station is to measure flows into Cockeram Lake that are not influenced by the Project or the Keewatin River.
QM06	381889 E 6304247 N	May 27, 2015 - present	Discharge	1,344.8	22.7	Keewatin River, downstream of the potential PDA and upstream of the confluence with the Lynn River. The objective of this station is to measure flows into Cockeram Lake that may be influenced by the Project.
QM08	388377 E 6296094 N	May 31, 2015 - present	Discharge	2,004.5	19.1	Outlet at the south end of Cockeram Lake

3.2.3.5 Groundwater

Groundwater discharge to the lake and lake discharge to the groundwater system were predicted for Minton Lake for baseline condition using a hydrogeological model presented in Stantec (2020b). The steady-state calibrated groundwater flow model was used to quantify baseline groundwater levels and flow and groundwater discharge to the receiving environment under baseline conditions.

The groundwater discharge to Minton Lake and lake discharge rates to the groundwater were used as an input to BL-WB and PROJ-WB. The estimated groundwater discharges to the lakes under baseline conditions is presented in Table 3-7.

Groundwater also discharges to rivers as baseflow. Baseflow estimates in the model are based on inflows calibrated in the BL-WB using the SRM model.

Table 3-7 Estimated Groundwater Discharges for Minton Lake under Baseline Conditions (Stantec 2020b)

Phase	Groundwater to Lake (m^3/s)	Lake to Groundwater (m^3/s)	Net Groundwater Inflow (m^3/s)
Baseline	0.0390	0.0360	0.0030

3.2.4 Baseline Water Balance Calibration

3.2.4.1 Model Calibration

The BL-WB was calibrated based on streamflow and lake water level measurements at monitoring stations described in Section 3.2.3 for the period June 2015 to September 2016.

The overall calibration strategy was to compare the model results to observed datasets for the period of record (Stantec 2017a). The calibration was done by generating and comparing simulated and observed monthly and daily average streamflow and simulated and observed daily average lake water levels. Precipitation from June 1, 2015 to September 31, 2016 were used as inputs into the model. The model results were compared to observed values and the parameters comprising the SRM were adjusted until a satisfactory calibration was obtained.

During model calibration, runoff coefficient (*C*), recession coefficient (*K*) and degree-day factor (*a*) were adjusted for each watershed; and lake coefficient (*CD*), minimum water level for lake outflow (*Ho*) and Power Coefficient (*P*) were adjusted for each lake. Runoff coefficient values are different during rain and snowmelt periods for a given watershed. Snowmelt period is the time where the temperature is below threshold temperature that determines whether the precipitation is rainfall or snow. The rain period is the time where the temperature is above threshold temperature.

3.2.4.2 Calibration Result

Streamflow

As indicated above, streamflow data were only available for five of the monitoring stations (QM01, QM03, QM05, QM06 and QM08). The streamflow data at these stations were used to calibrate the hydrology model for MacLellan site.

Figure 3-2 and Figure 3-6 show monthly and daily measured and simulated streamflow at the five monitoring stations. The model captures the seasonal patterns of the observed streamflow. Statistical assessment of the model performance is presented in Section 3.2.4.3.

3.2.4.3 Statistical Assessment

Table 3-8 shows the Nash–Sutcliffe coefficient (*E*) and Pearson correlation coefficient (R) for the average monthly and daily discharge at QM01, QMO3, QM05, QM06 and QM08. As shown in this table, *E* for the monthly and daily average discharges at all five stations is greater than 0.78, and correlation coefficient s are greater than 0.90, representing a strong match between the modelled and observed data.

Table 3-8 Hydrology Model Performance Parameters: MacLellan Site

Parameter	Monthly Discharge				
	QM01	QM03	QM05	QM06	QM08
Nash-Sutcliffe Coefficient (E)	0.95	0.94	0.83	0.93	0.94
Correlation Coefficient (R)	0.97	0.97	0.97	0.97	0.97
	Daily Discharge				
	QM01	QM03	QM05	QM06	QM08
Nash-Sutcliffe Coefficient (E)	0.89	0.88	0.78	0.82	0.89
Correlation Coefficient (R)	0.94	0.94	0.94	0.91	0.95
	Lake Level				
	QM01	QM07	QM08		
Nash-Sutcliffe Coefficient (E)	0.89	0.09	0.63		
Correlation Coefficient (R)	0.94	0.43	0.92		

3.2.4.4 Application of Baseline Water Balance

With calibration of BL-WB complete, the PROJ-WB was constructed. The PROJ-WB will be used to assess potential effects of the Project on surface water flow and lake levels. This is accomplished through comparison of BL-WB streamflows to PROJ-WB streamflows (or BL-WB lake levels to PROJ-WB lake levels) during all phases of the Project (construction, operation, active closure, and post-closure phases).

3.3 PROJECT WATER BALANCE STRUCTURE

This section presents the conceptual model inputs and assumptions used to develop the PROJ-WB and includes a discussion of baseline catchments that change due to the Project as well as a discussion of the mine site and operational flows. The modelling assumptions used in watersheds that change as a result of the Project are described below.

3.3.1 Project Water Balance Conceptual Model

The PROJ-WB includes components of the BL-WB and details related to the overall Project mine plan from construction, operation, closure and post-closure.

The sub-watershed areas affected by site infrastructure were subtracted from the baseline watershed areas for each sub-watershed, and the streamflow from the unaffected watershed is estimated using the BL-WB. The PROJ-WB was used to estimate streamflow and lake level during all phases of the Project.

Figure 3-7 presents the model structure of the PROJ-WB and highlights the model nodes, the MacLellan PDA, and identifies which nodes are associated with either contact water (water that has contacted the Project) or non-contact water (water not affected by the Project).

For conservatism in the model, it is assumed that the catchment area for all mining features are fully realized at start of construction. This means that contact water from stockpiles start flowing to the collection ponds at the beginning of construction.

The following sections present a summary of the Project, schedule and the overall modelling approach used for the PROJ-WB. Wherever possible, conservative assumptions have been included in the modelling approach for the purposes of predicting potential environmental effects.

The Project components (described in Section 2.0) in the PROJ-WB include: the open pit, mill and processing plant, TMF, MRSAs, ore stockpile and overburden storage areas. It is assumed that the above facilities will have external drainage controls that prevent natural drainage from coming into contact with Project components and becoming contact water. The model differs from the BL-WB in that in areas with Project facilities the model uses runoff coefficients in place of the SRM.

Catchment areas for the open pit, overburden storage area, ore stockpile and MRSAs, mill and process plant, and TMF were delineated based on the site plan (Map 1-2). Using existing ground surface topography, the catchment areas were delineated where seepage from the bases of the MRSAs, ore stockpile and overburden storage areas are expected to report to the collection ditches and then to the collection pond. It is assumed that these catchment areas will not change during operation and active closure.

The model was run dynamically on a daily time step and results are presented on monthly reporting period for average, 25-year wet and 25-year dry climate scenarios (Section 3.3.2.1) for the construction, operation, active closure and post-closure phases.

Conceptual models showing the interactions of the Project components during operation, active closure and post-closure are presented in Figure 3-8 to Figure 3-10. To simulate closure, the PROJ-WB was extended to run until Year 128.

3.3.2 Project Water Balance Inputs

3.3.2.1 Climate Scenarios

An evaluation of climate and hydrologic data for the Project was previously presented by Stantec (2017a). For the PROJ-WB, precipitation data from Environment Canada's Lynn Lake climate station (Climate ID 5061646) were used to generate the climatic conditions for average, 25-year wet, and 25-year dry conditions.

The climate normals data for period 1981 to 2010 were used to represent average climatic conditions. For the 25-year wet and 25-year dry return climate scenarios, annual precipitation data was fit to the log normal probability distribution. The result of the 25-year dry and 25-year wet year precipitation conditions are provided in Table 3-9. Average annual lake evaporation presented in section 3.2.3.1 was used.

Table 3-9 Average Climate, Wet-Year and Dry-Year Precipitation Conditions

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average Year Total Precipitation (mm)	20.3	16.3	19.8	24.1	37.3	61.8	85.4	68.8	61	37.6	26.8	18.8	478
25-Year Dry Precipitation (mm)	14.6	11.7	14.3	17.4	26.9	44.5	61.5	49.6	44.0	27.1	19.3	13.5	344
25-Year Wet Total Precipitation (mm)	27.8	22.4	27.1	33.0	51.1	84.7	117.1	94.3	83.6	51.6	36.7	25.8	655

3.3.2.2 Runoff Coefficients

For areas changed by Project infrastructure, runoff coefficients were used to transform precipitation into surface runoff considering relief, surface storage, vegetation cover, evaporation, evapotranspiration, and infiltration losses. Runoff represents all surface water flows originating from overland flow, direct precipitation to waterbody surfaces, interflow and groundwater discharge. Table 3-10 presents the runoff coefficients used in the site water balance model for various mine infrastructure facilities.

Table 3-10 Facilities Runoff Coefficients used in PROJ-WB

Parameter	Runoff Coefficient
Ponds and Wet Tailings Beach	1.0
Dry Beach	0.7*
Open Pit Wall	0.95
Natural Ground	0.40
Disturbed/prepared Ground	0.85
Overburden	0.40
* Dry Beach runoff coefficient includes beach recharge that reports to the TMF pond	

Climate in the Project area is continental with lengthy cold winters. Very little surface runoff occurs during the winter months. Accumulated winter precipitation (snow) is released largely as surface runoff during the spring freshet and is accounted for in the runoff factors presented in Table 2-10. This process is modelled by applying a monthly precipitation-runoff factor that accounts for how much precipitation becomes runoff in a particular month (Table 3-11). The monthly precipitation-runoff factor was developed using the approximate monthly values of snowmelt and runoff generated by the SRM during baseline conditions and using the precipitation data. Available-runoff represents the current month's precipitation plus the remaining fraction of water from the previous month's precipitation that did not became actual-runoff, as it accumulated as snow (thus not available for runoff).

The surface runoff from the mine infrastructure facilities is estimated as the product of precipitation, precipitation-runoff factors and runoff coefficients. The balance of the precipitation that is not allocated to runoff is carried over to the next month.

Table 3-11 Precipitation-Runoff Factors used in PROJ-WB

Month	Precipitation-Runoff Factor	Month	Precipitation-Runoff Factor
January	0.01	July	1.0
February	0.01	August	1.0
March	0.01	September	0.95
April	0.01	October	0.50
May	0.40	November	0.05
June	0.98	December	0.01

3.3.2.3 Open Pit

Model inputs to the open pit include groundwater inflow, precipitation and runoff that occur within the open pit and evaporation losses from ponded water within the open pit. During operation, groundwater inflow, precipitation and runoff that accumulates in the open pit will be pumped to the collection pond.

This water will require management as part of open pit dewatering. The following provides a summary of the model assumptions and input parameters.

Groundwater Inflow

Groundwater inflow rates to the open pit were predicted using the numerical groundwater flow model developed for the Project (Stantec 2020b). Figure 3-11 shows the monthly average groundwater inflow rates to the open pit during construction and operation. Due to open pit wall freeze up, groundwater inflow rates are generally low in winter comparing to spring, summer and fall months.

Open Pit Dewatering Rates

In the PROJ-WB, open pit dewatering rates were calculated for each mining year. During operation, water from open pit dewatering will be pumped to collection pond. During freshet, 75% of open pit dewatering will be pumped to the TMF.

Open Pit Filling

Dewatering of the open pit is terminated with the end of the operation stage (Year 13), after which water levels within the open pit are allowed to recover as a result of groundwater inflow, direct precipitation, and runoff. The groundwater inflow rates were modelled using the three-dimensional groundwater flow model (Stantec 2020b) and are presented in Figure 3-12.

To accelerate the filling of the open pit and to deal with overflow from TMF, water from the TMF and collection pond will be directed to the open pit beginning at the closure stage until the open pit is filled to the design elevation of 330 m above sea level (masl). After the open pit is full, open pit overflow will be directed to the Keewatin River.

3.3.2.4 Site Catchment Areas

Catchment areas for runoff and seepage collection from the open pit, mill, ore stockpile, MRSAs and overburden storage area were obtained from site water balance model (Golder 2020) during construction and operation periods. The areas for plant site, overburden, open pit, MRSA, plant site stockpile, top soil stockpile and collection pond are summarized in Table 3-12 and the timing when each area is active in the model. It was conservatively assumed that all surface water in the catchment areas is contact water and requires management. The contact water is directed either to the collection ponds via collection ditches or to the open pit and TMF.

3.3.2.5 Project Changes to Watershed Areas

Streamflow during operation, active closure and post-closure were simulated using the PROJ-WB. In order to integrate the hydrology and site water balance models, the site infrastructure areas were subtracted from the baseline watershed area for each sub-watershed that are affected by the project. Streamflow for the unaffected watershed areas were estimated using the BL-WB. Streamflow for the affected areas were estimated using the PROJ-WB. Table 3-13 presents the affected and unaffected area in each sub-watershed for MacLellan Site.

Table 3-12 Catchment Areas (m^2) used in Water Balance (Golder 2020)

Mine Year	Plant Site			Overburden Stockpile			Open Pit			Mine Rock Stockpile			Plant Site Stockpiles			Topsoil Stockpile			Collection Pond	
	Total	Prepared Ground	Natural Ground	Total	Overburden	Natural Ground	Total	Pit	Natural Ground	Total	Stockpile	Natural Ground	Total	Stockpile	Natural Ground	Total	Stockpile	Natural Ground	Total	Pond Surface
-2	254,299	254,299	0	10,296	10,296	0	126,785	63,959	62,826	829,237	94,584	734,653	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
-1	254,299	254,299	0	282,026	62,338	219,688	387,229	148,524	238,705	691,440	205,430	486,010	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
1	254,299	254,299	0	344,800	169,223	175,577	918,789	312,430	606,359	943,918	456,994	486,924	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
2	254,299	254,299	0	333,781	167,399	166,382	927,198	509,010	418,188	1,574,722	696,356	878,366	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
3	254,299	254,299	0	332,832	166,440	166,392	927,199	509,011	418,188	1,837,514	1,083,359	754,155	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
4	254,299	254,299	0	332,832	166,440	166,392	931,526	513,338	418,188	2,169,098	1,512,983	656,115	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
5	254,299	254,299	0	332,832	166,440	166,392	926,959	513,368	413,591	2,550,821	2,011,031	539,790	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
6	254,299	254,299	0	332,718	150,737	181,980	990,731	645,378	345,353	2,482,882	2,280,155	202,728	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
7	254,299	254,299	0	332,718	150,737	181,980	996,238	655,188	341,049	3,102,698	2,704,644	398,054	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
8	254,299	254,299	0	332,718	150,737	181,980	996,239	655,189	341,049	3,573,352	3,158,439	414,913	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
9	254,299	254,299	0	332,718	150,737	181,980	996,239	655,189	341,049	3,678,337	3,290,490	387,847	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
10	254,299	254,299	0	332,718	150,737	181,980	996,240	655,190	341,049	3,761,242	3,388,717	372,525	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
11	254,299	254,299	0	332,718	150,737	181,980	996,241	655,191	341,049	3,792,592	3,470,293	322,300	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
12	254,299	254,299	0	332,718	150,737	181,980	996,242	655,192	341,049	3,806,489	3,522,312	284,177	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000
13	254,299	254,299	0	332,718	150,737	181,980	996,243	655,193	341,049	3,812,733	3,540,382	272,351	193,902	193,902	0	230,771	66,644	164,127	10,000	10,000

Table 3-13 Summary of Watershed Area Changes within the MacLellan Site due to the Project

Watershed Name	Sub-Watershed Name	Waterbodies and Project Components within Watershed or Sub-Watershed	Baseline Area (km²)	Area Affected by Project (km²)	Percent Area Affected by Project (% of decreased Baseline Area)	Tributary to
ws-KEE3 (West MacLellan site watershed)	sws-KEE3-PAY2	Payne Lake	3.3	0.24	7.3%	Unnamed stream KEE3-PAY1 to Keewatin River
	sws-KEE3-PAY1	n/a*	4.6	0.08	1.7%	Keewatin River
	sws-KEE3-4	Keewatin River	0.71	0.003	0.4%	Keewatin River
	sws-KEE3-C1	Mine Rock Storage Area and Overburden Stockpile	0.32	0.067	21%	Keewatin River
	sws-KEE3	Keewatin River Proposed Pit	2.6	0.59	23%	Keewatin River
	sws-KEE3-B1	East Pond Processing Plant, Proposed Pit, Mine Rock Storage Area, Ore Stockpile, and Overburden Stockpile	5.7	3.66	64%	Keewatin River
	sws-KEE3-A1	Keewatin River	1.9	0	0%	Keewatin River
ws-COC2-LOB2-MIN4 (East MacLellan site watershed)	sws-COC2-LOB2-MIN5	Unnamed lake COC2-LOB2-MIN5-A1 Tailings Management Facility	6.3	1.5	24%	Unnamed stream COC2-LOB2-MIN5 to Minton Lake
	sws-COC2-LOB2-MIN4	Minton Lake Tailings Management Facility	5.7	0.85	15%	Unnamed stream COC2-LOB2-MIN3 to unnamed lake COC2-LOB2-MIN2 to Cockeram River

Notes:

The catchment areas for watersheds ws-KEE4, ws-KEE3.3, ws-KEE3-DOT1, ws-KEE3.2, ws-KEE3.1, ws-LYN1, and ws-KEE1 are not affected by Project components and are not listed here.

n/a* - no lake coverage or proposed project components exist within this sub-watershed

3.3.2.6 Project Changes to Groundwater Flow

The groundwater that discharges to Minton Lake is predicted to change throughout construction, operations, and closure. Groundwater discharge to Minton Lake was predicted using the groundwater model (Stantec 2020b). The estimated groundwater discharges to the lakes during the Project is presented in Table 3-14.

Table 3-14 Estimated Groundwater Discharges to Minton Lake during Construction, Operation and Active Closure Phases - With Ditches

Phase	Groundwater to Lake (m^3/s)	Lake to Groundwater (m^3/s)	Net Groundwater Inflow (m^3/s)
Construction	0.040	0.036	0.004
Operation	0.039	0.035	0.004
Active Closure	0.039	0.036	0.003

The overall baseflow rates for KEE3-B1 tributary, KEE3-Pay1 tributary, and the Keewatin River are predicted using the SRM; however, the percentage change to baseflow was predicted using the groundwater model (Stantec 2020b). The percentage change to predicted baseflow rates was calculated and incorporated into the PROJ-WB (Table 3-15). The change in the Keewatin River was provided at model node QMO3 so that predictions remained conservative.

Table 3-15 Change to Baseflow at Model Nodes during Construction, Operation and Active Closure Phases

Phase	KEE3-PAY1 (m^3/s)	KEE3-B1 (m^3/s)	QM03 (m^3/s)
Construction	0.0	0.0	0.006
Operation	0.0022	0.0011	-0.001
Active Closure	0.0025	0.0017	-0.0001

3.3.3 Mine Rock Storage Areas

A conceptual model of flow through the MRSA was developed to model evaporation, infiltration, and runoff in the MRSA through all mine phases (Stantec 2020c). Key inputs and assumptions for the analysis were:

- The MRSA is divided in two components: slopes and central portion.
- The central portion is sub-divided in 2 sub-surface flow components: macropore flow and micropore flow.
- Infiltration is split between lateral seepage (toe seepage) and groundwater recharge at the base of the MRSA.

Figure 3-13 presents a schematic of the flow pathways for water around and within the pile. A simple evaporation, runoff and infiltration model was used for the slopes, the macro/micropore flow paths were not modelled. It is assumed that this process will have less effect on flows, particularly at the toe of the slope where the thickness of the slope approaches zero.

The flow behavior through the MRSA depends on the wetting phase, which is dependent on time and whether the MRSA is covered. Flow behavior through the MRSA depends on the following temporal conditions:

- *Wetting*: time during which a wetting front is progressing through the MRSA. The mine rock is initially placed dry, and the wetting process continues over the years following placement. The wetting process was not modelled for the slope, for a similar reason that separate macro/micropore flow paths were not considered.
- *Wet*: the wetting front has broken through the base of the pile and the infiltration and unsaturated hydraulic conductivity profile of the material has reached an equilibrium. Steady state has been reached.
- *No-cover*: There is no cover over the MRSA.
- *Cover*: there is a cover over the MRSA. The wetting process continues when the cover is in place.

The stages of MRSA development are defined as follows:

I **Wetting + No-Cover**: occurs during construction, operations and closure.

II **Wetting + Cover**: occurs during the first 25 years of post-closure (Stantec 2020c).

III **Wet + Cover**: occurs following 25 years (i.e., after Stage II) of post-closure.

Table 3-16 outlines the proportion of total precipitation that is routed through the MRSA per the flow paths shown on Figure 3-13. Every division of flow is proportionally calculated using the percentages shown in Table 3-16, according to the wetting phase (I, II or III), and the stockpile section (slope, macropore, micropore).

The following example can be used to explain how the data from the table is used:

To calculate surface flow on the MRSA slope for the stage II (wetting + cover), in the table select:

- row: “Surface flow” (Flow 2)

- column section: “a.slope”

- column: “II”

Value = 60% - which is the percentage to be applied to the calculated Flow 1 (Effective precipitation).

Table 3-16 MRSA Water Balance

<table>
<tr><th rowspan="2">Process</th><th rowspan="2">Flow</th><th colspan="3">a. Slopes</th><th colspan="3">b. Micropores</th><th colspan="3">c. Macropores</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>I</th><th>II</th><th>III</th><th>I</th><th>II</th><th>III</th></tr>
<tr><td>Effective Precipitation</td><td>1</td><td>50%</td><td>50%</td><td>50%</td><td>50%</td><td>45%</td><td>45%</td><td rowspan="3" colspan="3">same as Micro</td></tr>
<tr><td>Surface flow</td><td>2</td><td>60%</td><td>60%</td><td>60%</td><td>0%</td><td>60%</td><td>60%</td></tr>
<tr><td>Infiltration</td><td>3</td><td>40%</td><td>40%</td><td>40%</td><td>100%</td><td>40%</td><td>40%</td></tr>
<tr><td>Macro vs Micro</td><td>4</td><td rowspan="3" colspan="3">doesn't apply</td><td>91.3%</td><td>100%</td><td>100%</td><td>8.7%</td><td>0%</td><td>0%</td></tr>
<tr><td>Macro to toe</td><td>5.1</td><td rowspan="2" colspan="3">doesn't apply</td><td>60%</td><td>0%</td><td>0%</td></tr>
<tr><td>Macro to recharge</td><td>5.2</td><td>40%</td><td>0%</td><td>0%</td></tr>
<tr><td>Micro to toe</td><td>6.1</td><td>60%</td><td>60%</td><td>60%</td><td>60%</td><td>60%</td><td>60%</td><td rowspan="2" colspan="3">doesn't apply</td></tr>
<tr><td>Micro to recharge</td><td>6.2</td><td>40%</td><td>40%</td><td>40%</td><td>40%</td><td>40%</td><td>40%</td></tr>
</table>

Details of the MRSA water balance estimates is provided in the MRSA modelling memorandum (Stantec 2020c). Surface runoff and toe seepage are collected in the contact water collection ditches and directed to the collection pond. The efficiency of the ditches is assumed to be 100% and the recharge is lost to the environment.

3.3.4 Mill and Processing Plant

Inputs for production data for the process plant are presented in Table 3-17 and are based on data in Golder (2020).

Table 3-17 Mill Production and Model Input Data (Golder 2020)

Parameter	Rates	Units
Volume of water leaving the mill in tailings slurry	250,124	m^3/mon
Fresh water required for the mill	1,141	m^3/mon
Evaporation and spillage losses at the mill	2,501	m^3/mon

3.3.5 Tailing Management Facility (TMF)

The areas for the TMF used in the PROJ-WB are presented in Table 3-18 and were provided by Golder (2020). Water in the TMF is used in the model to meet mill demand until the end of Year 13. The TMF is a no discharge facility during operation. At closure and post closure, water from the TMF is directed to the open pit until the open pit is filled to the design elevation of 330 masl. Once the water level within the pit lake reaches this elevation, water from the pit will be overflow and discharge to the Keewatin River.

It is assumed that 20% of the beaches were wet and the remaining 80% of the beaches were dry (Golder 2020). From the total TMF prepared area, 75% represents the downstream dam face area (Golder 2020). The runoff from the wet and dry beaches are based on the runoff coefficients presented in Table 3-10.

Table 3-18 TMF Areas (Golder 2020)

Mine Year		Project Stage	TMF Area (m^2)				Total Prepared Ground (m^2)
			Total	Pond	Beach	Natural Ground	
-2	-0.34	0	0	0	0	0	0
-0.33	1	1	2,043,588	516,748	640,000	886,840	157,798
2	5	2	2,575,887	324,400	1,486,000	765,487	615,871
6	15	3	2,577,781	582,473	1,492,400	502,908	380,064

Tailings properties and TMF inputs are presented in **Table 3-19** and are from Golder (2020).

Table 3-19 Tailings Properties (Golder 2020)

Parameter	Stage 1	Stage 2	Stage 3
TAILINGS			
Volume of deposited tailings (m^3/day)	5,000	5,000	5,000
Groundwater seepage collected by Seepage Collection System and pumped back to TMF (m^3/day)	0	0	0
Seepage to environment (m^3/day)	423	423	423
Dead storage volume (m^3)	11,713	4,793	52,246
Pond maximum storage volume (m^3)	1,105,345	4,000,000	5,110,258

3.4 PROJECT WATER BALANCE RESULTS

3.4.1 Overview

The PROJ-WB combines the components of the BL-WB with components developed to model areas changed by the Project. The BL-WB provides estimates of streamflow for watersheds in the LAA under existing conditions. The PROJ-WB provides estimates of flow for the mine facility and incorporates the mine plan and water management features of the mine into the baseline environment. The PROJ-WB also incorporates results from groundwater modelling (Stantec 2020b) and runoff and seepage from key Project components. Runoff from the site infrastructure was estimated using modified model components developed for the PROJ-WB. The PROJ-WB was used to estimate streamflow and lake level during the construction, operation, active closure, and post-closure phases of the Project.

3.4.2 Baseline Water Balance Model Results

The calibrated BL-WB was used to model baseline flows and lake levels for the MacLellan LAA. The baseline streamflows for the average, 1:25 dry, and 1:25 wet climate scenarios are summarized in Table 3-20 for the MacLellan site.

Table 3-20 BL-WB Predicted Streamflow Results for MacLellan LAA

Month	Average Climate Scenario - Flow (m3/s)										
	QM01	QM02	QM09	QM03	QM04	QM06	QM05	AQM29	QM07	QM11	QM08
Jan	7.044	7.044	0.000	7.050	0.000	7.050	2.391	9.441	0.024	0.694	10.425
Feb	6.397	6.397	0.000	6.402	0.000	6.402	2.009	8.412	0.018	0.586	9.273
Mar	5.825	5.825	0.000	5.830	0.000	5.830	1.654	7.485	0.014	0.498	8.261
Apr	5.308	5.329	0.013	5.356	0.010	5.374	1.367	6.741	0.013	0.424	7.458
May	6.896	7.173	0.168	7.455	0.127	7.684	3.502	11.186	0.057	1.086	13.007
Jun	11.718	11.835	0.070	11.956	0.053	12.052	7.780	19.832	0.068	2.640	26.509
Jul	12.863	13.028	0.100	13.198	0.075	13.334	5.846	19.179	0.036	1.686	25.101
Aug	9.561	9.704	0.086	9.852	0.065	9.970	3.747	13.717	0.038	1.300	18.374
Sep	6.908	7.032	0.075	7.161	0.057	7.263	2.980	10.243	0.063	1.413	13.633
Oct	6.012	6.090	0.047	6.173	0.036	6.237	2.708	8.946	0.072	1.236	10.789
Nov	6.910	6.917	0.004	6.929	0.003	6.935	2.668	9.603	0.054	1.001	10.733
Dec	7.526	7.526	0.000	7.532	0.000	7.532	2.633	10.165	0.036	0.831	11.166
Annual	7.747	7.825	0.047	7.908	0.035	7.972	3.274	11.246	0.041	1.116	13.727
Month	**1:25 Dry Climate Scenario - Flow (m3/s)**										
	QM01	**QM02**	**QM09**	**QM03**	**QM04**	**QM06**	**QM05**	**AQM29**	**QM07**	**QM11**	**QM08**
Jan	5.083	5.083	0.000	5.089	0.000	5.089	1.674	6.763	0.018	0.172	7.150
Feb	4.636	4.636	0.000	4.642	0.000	4.642	1.415	6.057	0.014	0.149	6.414
Mar	4.245	4.245	0.000	4.251	0.000	4.251	1.171	5.422	0.011	0.129	5.760
Apr	3.890	3.915	0.015	3.945	0.011	3.966	0.973	4.939	0.010	0.114	5.264
May	4.596	4.782	0.112	4.973	0.085	5.126	2.458	7.584	0.042	0.579	8.309
Jun	7.231	7.315	0.051	7.404	0.038	7.473	4.377	11.850	0.048	1.496	15.298
Jul	8.140	8.260	0.072	8.384	0.054	8.482	3.157	11.640	0.022	0.504	12.908
Aug	6.459	6.563	0.063	6.672	0.047	6.758	2.366	9.124	0.016	0.420	9.800
Sep	4.992	5.081	0.054	5.176	0.041	5.249	1.956	7.205	0.031	0.382	7.679
Oct	4.393	4.449	0.034	4.510	0.026	4.556	1.837	6.393	0.041	0.305	6.965
Nov	4.967	4.972	0.003	4.982	0.002	4.987	1.842	6.828	0.034	0.240	7.136
Dec	5.393	5.393	0.000	5.399	0.000	5.399	1.833	7.231	0.025	0.203	7.542
Annual	5.335	5.391	0.034	5.452	0.025	5.498	2.088	7.586	0.026	0.391	8.352
Month	**1:25 Wet Climate Scenario - Flow (m3/s)**										
	QM01	**QM02**	**QM09**	**QM03**	**QM04**	**QM06**	**QM05**	**AQM29**	**QM07**	**QM11**	**QM08**
Jan	9.605	9.605	0.000	9.611	0.000	9.611	3.312	12.923	0.034	0.704	14.003
Feb	8.671	8.671	0.000	8.676	0.000	8.676	2.766	11.442	0.024	0.592	12.387
Mar	7.853	7.853	0.000	7.858	0.000	7.858	2.264	10.122	0.019	0.502	10.982
Apr	7.118	7.135	0.010	7.157	0.008	7.171	1.860	9.031	0.017	0.428	9.847
May	9.252	9.641	0.235	10.034	0.177	10.354	4.855	15.210	0.073	1.431	17.661
Jun	15.632	15.800	0.101	15.973	0.077	16.111	12.298	28.410	0.092	3.872	37.702
Jul	21.484	21.710	0.136	21.940	0.103	22.126	12.458	34.585	0.066	3.636	44.801

Table 3-20 BL-WB Predicted Streamflow Results for MacLellan LAA

Month	Average Climate Scenario - Flow (m3/s)										
	QM01	QM02	QM09	QM03	QM04	QM06	QM05	AQM29	QM07	QM11	QM08
Aug	23.448	23.645	0.119	23.846	0.090	24.008	6.818	30.826	0.096	1.776	36.663
Sep	17.935	18.104	0.102	18.277	0.077	18.416	4.698	23.114	0.123	1.532	27.239
Oct	10.731	10.836	0.063	10.947	0.048	11.033	3.972	15.006	0.122	1.325	17.564
Nov	9.690	9.704	0.008	9.724	0.006	9.735	3.776	13.511	0.090	1.036	14.801
Dec	10.353	10.353	0.000	10.358	0.000	10.358	3.677	14.035	0.055	0.851	15.124
Annual	12.648	12.755	0.065	12.867	0.049	12.955	5.230	18.185	0.068	1.474	21.564

* Flows lower than 0.0005 m3/s are shown as "0".

3.4.3 Project Water Balance Results

The results of the PROJ-WB for average and the 25-year wet and dry climate conditions are discussed in the following subsections for each of the Project components.

3.4.3.1 Open Pit

Flow components into the open pit include groundwater seepage, precipitation, surface runoff from prepared and natural areas, evaporation and dewatering. Figure 3-14 to Figure 3-16 present the average monthly groundwater inflow rate and flows from direct precipitation, contribution from natural ground and prepared ground under for climate average, 25-year dry and 25-year wet climate scenarios to the open pit. The total dewatering rates and losses due to evaporation are also presented. The total dewatering rate includes groundwater inflows and net precipitation.

Under the average case, monthly dewatering rates from the open pit ranges from 18 m^3/day to a maximum of 8,630 m^3/day. Under 25-year dry and 25-year wet climate scenarios the monthly dewatering rate from the open pit ranges from 13 m^3/day to a maximum of 8,535 m^3/day and from 24 m^3/day to a maximum of 9,350 m^3/day respectively. During spring freshet (April and May) 75% of the dewatering flows were directed to the TMF and 25% of the dewatering flows were directed to the collection pond. For the remaining months, all dewatering flows were directed to the collection pond. Groundwater inflow rates to the open pit ranges from 0 m^3/day to 8,288 m^3/day and accounts up to 96% of the pit dewatering flow.

Once mining is completed and dewatering is terminated, the open pit begins to fill from groundwater inflow, direct precipitation, surface water runoff, and water from collection pond and the TMF. Once water levels within the pit lake reach 330 m amsl, water from the pit lake will be directed to the Keewatin River via Kee3_B1. The model results demonstrate that it will take 30, 21 and 15 years to fill the open pit after the end of operation under 25-year dry, average and 25-year wet scenarios respectively (Figure 3-17). The annual discharge rate from the pit lake will range from 1,376 m^3/day to 8,108 m^3/day under average climatic conditions and is summarized in Table 3-21. The mean monthly pit lake over flow rates for 25-year dry and 25-year wet scenarios ranges from 1,217 m^3/day to 4,586 m^3/day and from 1,667 m^3/day to 12,759 m^3/day, respectively (Table 3-21).

Table 3-21 Open Pit Overflow Average Monthly Discharge Rates (m^3/day) Post-Closure – All Climate Scenarios

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
25-Year Dry	1,443	1,594	1,765	2,097	8,892	3,512	4,586	3,574	4,654	4,006	1,962	1,217	3,275
Average	1,784	2,182	2,431	2,764	12,643	6,219	8,108	6,411	7,246	5,510	2,576	1,376	4,938
25-Year Wet	2,380	2,847	3,188	3,646	17,599	9,794	12,759	10,157	10,671	7,497	3,388	1,667	7,133

3.4.3.2 Tailings Management Facility

The PROJ-WB was used to adjust the volume of water within storage in the TMF by balancing mill demand from the TMF with use of other contact water from the collection pond and from open pit. Figure 3-18 to Figure 3-20 presents the simulated TMF pond volumes which demonstrate surpluses above the 'dead' storage volume with all surplus water directed to the process plant to meet mill demand under average, 25-year dry and 25-year wet scenarios. The dead storage volume is the volume of water lost to the void spaces in the tailings. Potential storage is the maximum storage capacity of the TMF.

During active closure and post-closure, excess runoff from the TMF in the model is assumed to be directed to the open pit. Average monthly discharge rates from the TMF for average, 25-year dry and 25-wet climate scenarios are provided in Table 3-22.

Seepage through the TMF dams will be collected in the seepage collection ditches and ponds. During operation and closure, water from the TMF seepage collection ponds will be pumped back to the TMF and is already accounted for in the water balance. After closure, water from the seepage collection system will be discharged to the open pit.

Table 3-22 TMF Post-Closure Average Monthly Discharge Rates (m^3/day) – All Climate Scenarios

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Average	91	281	379	508	4167	1238	1809	1269	1864	1532	432	0	1131
25-Year Dry	0	0	65	248	2709	188	443	169	859	948	194	0	485
25-Year Wet	356	541	675	851	6092	2625	3613	2722	3193	2303	747	81	1983

3.4.3.3 Mill and Processing Plant

The process water supply for the mill is provided from surplus water from the TMF reclaim pond and contact water from collection pond. Figure 3-21 to Figure 3-23 presents the volume of reclaim water supplied by each of the sources in comparison to the total reclaim demand for average, 25-year dry and 25-year wet climate scenarios.

The TMF is capable of meeting approximately 100% of the mill demand under average and 25-year wet climate scenarios, but under 25-year dry climate scenario water from the collection pond and other sources (Keewatin River) will be needed to meet the mill demand (Figure 3-22).

3.4.3.4 MRSA and Collection Pond

Runoff and toe seepage from the MRSAs are collected in a series of ditches and ultimately pumped to the collection pond, a portion may be pumped to the TSF. Similarly, open pit dewatering is directed to the collection pond. Figure 3-24 to Figure 3-26 presents the water sources that are collected in the collection pond for average, 25-year dry and 25-year wet climate scenarios.

Water from the pond is discharged to the Keewatin River after the discharge water quality requirements are met. Under average condition mean monthly discharge from the collection pond to Keewatin River ranges from 0 m^3/day to 14,200 m^3/day. Under 25-year dry and 25-year wet scenarios the discharge from the collection pond to Keewatin River ranges from 0 m^3/day to 12,700 m^3/day and from 100 m^3/day to 25,100 m^3/day respectively.

3.4.4 Results on Streamflow and Lake level

Flows and lake levels under baseline conditions (BL-WB) were used as the benchmark against which Project-related changes during the construction, operation, active closure and post-closure phases were assessed. The predictions of streamflow and lake levels for baseline conditions and during the life of Project are presented below.

3.4.4.1 Streamflow

Average monthly and mean annual flow changes during construction, operation, closure and post closure from the baseline conditions for those nodes effected by the Project are provided in Table 3-23 to Table 3-29, and graphically in Figure 3-27 to Figure 3-32.

Monthly and mean annual flow changes during construction, operation, active closure and post-closure from the baseline conditions for 25-year dry and 25-year wet climate scenarios are provided in Appendix C.

Keewatin River Downstream of the Mine Site (QM03)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-23. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual flow is expected to increase by 0.022 m^3/s from baseline (7.908 m^3/s).
- Operation: Mean annual flow is expected to increase by 0.049 m^3/s from baseline (7.908 m^3/s).
- Active Closure: Mean annual flow is expected to decrease by 0.003 m^3/s from baseline (7.908 m^3/s).
- Post-Closure: Mean annual flow is expected to decrease by 0.001 m^3/s from baseline (7.908 m^3/s).

KEE3-B1 Unnamed tributary of the Keewatin River (QM04)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-24. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual flow is expected to decrease by 0.023 m^3/s from baseline (0.035 m^3/s).
- Operation: Mean annual flow is expected to decrease by 0.022 m^3/s from baseline (0.035 m^3/s).
- Active Closure: Mean annual flow is expected to decrease by 0.022 m^3/s from baseline (0.035 m^3/s).
- Post-Closure: Mean annual flow is expected to increase by 0.027 m^3/s from baseline (0.035 m^3/s).

Keewatin River Downstream of the Mine Site (QM06)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-25. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual change in flow is expected to decrease by 0.001 m^3/s from baseline (7.972 m^3/s).
- Operation: Mean annual change in flow is expected to increase by 0.026 m^3/s from baseline (7.972 m^3/s).
- Active Closure: Mean annual change in flow is expected to decrease by 0.025 m^3/s from baseline (7.972 m^3/s).
- Post-Closure: Mean annual change in flow is expected to increase by 0.025 m^3/s from baseline (7.972 m^3/s).

Minton Lake (QM07)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-26. The changes in mean annual flow for each Project phase are:

- Construction Mean annual change in flow is expected to decrease by 0.008 m^3/s from baseline (0.041 m^3/s).
- Operation: Mean annual change in flow is expected to decrease by 0.008 m^3/s from baseline (0.041 m^3/s).
- Active Closure: Mean annual change in flow is expected to decrease by 0.009 m^3/s from baseline (0.041 m^3/s).
- Post-Closure: Mean annual change in flow is expected to decrease by 0.009 m^3/s from baseline (0.041 m^3/s).

Cockeram River (QM11)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-27. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual change in flow is expected to decrease by 0.007 m^3/s from baseline (1.116 m^3/s). The reduction in flow of Cockeram River at the inlet of Cockeram Lake is associated with the reduction in total drainage area that drains into the Minton Lake where the TMF is located, and the reduction on area that drains directly to Cockeram Lake.
- Operation: Mean annual change in flow is expected to decrease by 0.008 m^3/s from baseline (1.116 m^3/s).
- Active Closure: Mean annual change in flow is expected to decrease by 0.008 m^3/s from baseline (1.116 m^3/s).
- Post Closure: Mean annual change in flow is expected to decrease by 0.008 m^3/s from baseline (0.041 m^3/s).

Cockeram Lake (QM08)

Results for predicted streamflows under baseline and Project conditions for the average climate scenario are presented in Table 3-28. The changes in mean annual flow for each Project phase are:

- Construction: Mean annual change in flow is expected to decrease by 0.002 m^3/s from baseline (13.727 m^3/s).
- Operation: Mean annual change in flow is expected to decrease by 0.030 m^3/s from baseline (13.727 m^3/s).
- Active Closure: Mean annual change in flow is expected to decrease by 0.023 m^3/s from baseline (13.727 m^3/s).
- Post Closure: Mean annual change in flow is expected to increase by 0.028 m^3/s from baseline (13.727 m^3/s).

Details of the predicted monthly streamflow plots at hydrometric stations listed in Table 6-2 for baseline condition and during the project life are presented in Appendix D (Figure D-1 to Figure D-11).

Table 3-23 Predicted Streamflow and Change for Existing and Project Conditions for QM03 (Keewatin River) – Average Climate Scenario

QM03

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	7.050	7.052	0.003	7.050	0.001	7.054	0.005	7.055	0.005	7.048	-0.002	7.063	0.013	7.049	-0.001	7.044	-0.006	7.057	0.008	7.049	0	7.044	-0.006	7.058	0.012
	Feb	6.402	6.418	0.016	6.417	0.015	6.419	0.017	6.453	0.051	6.418	0.016	6.475	0.073	6.408	0.006	6.399	-0.004	6.419	0.017	6.410	0.007	6.399	-0.004	6.420	0.021
	Mar	5.830	5.861	0.031	5.861	0.030	5.862	0.032	5.926	0.096	5.868	0.038	5.957	0.126	5.841	0.011	5.827	-0.004	5.854	0.024	5.843	0.013	5.827	-0.004	5.855	0.028
	Apr	5.356	5.387	0.030	5.385	0.029	5.389	0.032	5.386	0.029	5.367	0.010	5.397	0.041	5.362	0.005	5.349	-0.008	5.373	0.017	5.364	0.007	5.349	-0.008	5.374	0.025
	May	7.455	7.489	0.034	7.488	0.033	7.489	0.034	7.492	0.037	7.470	0.015	7.505	0.050	7.440	-0.015	7.427	-0.028	7.450	-0.005	7.441	-0.014	7.427	-0.028	7.451	0.024
	Jun	11.956	11.989	0.033	11.989	0.032	11.989	0.033	12.049	0.093	12.021	0.065	12.062	0.106	11.952	-0.005	11.941	-0.015	11.961	0.005	11.953	-0.003	11.941	-0.015	11.962	0.021
	Jul	13.198	13.233	0.035	13.232	0.034	13.234	0.036	13.296	0.099	13.268	0.070	13.312	0.115	13.190	-0.007	13.179	-0.019	13.201	0.004	13.192	-0.006	13.179	-0.019	13.202	0.023
	Aug	9.852	9.889	0.036	9.885	0.033	9.892	0.040	9.944	0.091	9.906	0.054	9.963	0.111	9.850	-0.002	9.835	-0.017	9.864	0.012	9.851	-0.001	9.835	-0.017	9.865	0.030
	Sep	7.161	7.191	0.030	7.188	0.028	7.194	0.033	7.228	0.067	7.195	0.034	7.247	0.086	7.159	-0.002	7.145	-0.016	7.172	0.011	7.160	-0.001	7.145	-0.016	7.172	0.027
	Oct	6.173	6.184	0.011	6.181	0.007	6.188	0.015	6.193	0.020	6.179	0.006	6.210	0.037	6.165	-0.008	6.161	-0.012	6.169	-0.004	6.166	-0.007	6.161	-0.012	6.170	0.009
	Nov	6.929	6.931	0.002	6.921	-0.008	6.942	0.012	6.931	0.001	6.920	-0.009	6.945	0.016	6.921	-0.009	6.913	-0.016	6.933	0.003	6.922	-0.008	6.913	-0.016	6.934	0.009
	Dec	7.532	7.532	0.001	7.524	-0.008	7.541	0.009	7.528	-0.004	7.521	-0.011	7.538	0.007	7.525	-0.007	7.519	-0.013	7.535	0.004	7.526	-0.006	7.519	-0.013	7.536	0.008
	Annual	7.908	7.930	0.022	7.927	0.019	7.933	0.025	7.957	0.049	7.932	0.024	7.973	0.065	7.905	-0.003	7.895	-0.013	7.916	0.008	7.907	-0.001	7.895	-0.013	7.916	0.020

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-24 Predicted Streamflow and Change for Existing and Project Conditions for QM04 (KEE3-B1) – Average Climate Scenario

QM04

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.019	0.019	0.002	0.002	0.023	0.021
	Feb	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.023	0.023	0.002	0.002	0.028	0.026
	Mar	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.026	0.026	0.002	0.002	0.030	0.029
	Apr	0.010	0.003	-0.006	0.003	-0.006	0.003	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.031	0.021	0.004	-0.006	0.036	0.033
	May	0.127	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.170	0.044	0.045	-0.082	0.192	0.147
	Jun	0.053	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.081	0.028	0.019	-0.034	0.091	0.072
	Jul	0.075	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.108	0.032	0.027	-0.048	0.121	0.094
	Aug	0.065	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.087	0.022	0.023	-0.042	0.098	0.075
	Sep	0.057	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.092	0.036	0.020	-0.036	0.105	0.084
	Oct	0.036	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.068	0.032	0.013	-0.023	0.077	0.064
	Nov	0.003	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.028	0.025	0.002	-0.001	0.033	0.030
	Dec	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.015	0.015	0.002	0.002	0.018	0.016
	Annual	0.035	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.062	0.027	0.013	-0.022	0.071	0.058

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-25 Predicted Streamflow and Change for Existing and Project Conditions for QM06 (Keewatin River Downstream of the Mine Site) – Average Climate Scenario

QMO6

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	7.050	7.052	0.003	7.050	0.001	7.054	0.005	7.056	0.006	7.049	-0.001	7.064	0.014	7.051	0.001	7.045	-0.004	7.059	0.009	7.069	0.019	7.045	-0.004	7.080	0.033
	Feb	6.402	6.418	0.016	6.417	0.015	6.419	0.017	6.454	0.052	6.419	0.017	6.476	0.074	6.410	0.008	6.400	-0.002	6.421	0.019	6.433	0.031	6.400	-0.002	6.447	0.047
	Mar	5.830	5.861	0.031	5.861	0.030	5.862	0.032	5.927	0.097	5.869	0.039	5.958	0.127	5.843	0.013	5.828	-0.002	5.856	0.025	5.869	0.039	5.828	-0.002	5.885	0.056
	Apr	5.374	5.398	0.024	5.396	0.022	5.400	0.026	5.397	0.023	5.378	0.004	5.409	0.035	5.373	-0.001	5.360	-0.014	5.384	0.011	5.402	0.028	5.360	-0.014	5.417	0.057
	May	7.684	7.636	-0.048	7.635	-0.049	7.637	-0.047	7.639	-0.045	7.617	-0.067	7.652	-0.032	7.587	-0.097	7.574	-0.110	7.598	-0.086	7.714	0.030	7.574	-0.110	7.745	0.170
	Jun	12.052	12.051	-0.002	12.051	-0.002	12.051	-0.001	12.111	0.059	12.083	0.030	12.124	0.071	12.014	-0.039	12.003	-0.050	12.023	-0.029	12.077	0.025	12.003	-0.050	12.095	0.093
	Jul	13.334	13.320	-0.013	13.319	-0.014	13.321	-0.012	13.384	0.050	13.355	0.022	13.400	0.066	13.278	-0.056	13.266	-0.068	13.289	-0.045	13.360	0.027	13.266	-0.068	13.383	0.117
	Aug	9.970	9.965	-0.006	9.961	-0.009	9.968	-0.002	10.019	0.049	9.982	0.012	10.039	0.069	9.926	-0.044	9.911	-0.059	9.940	-0.030	9.991	0.021	9.911	-0.059	10.015	0.104
	Sep	7.263	7.257	-0.006	7.254	-0.009	7.260	-0.003	7.294	0.031	7.261	-0.002	7.313	0.050	7.225	-0.038	7.211	-0.052	7.238	-0.025	7.298	0.035	7.211	-0.052	7.322	0.111
	Oct	6.237	6.226	-0.012	6.222	-0.015	6.229	-0.008	6.235	-0.003	6.220	-0.017	6.252	0.014	6.206	-0.031	6.202	-0.035	6.211	-0.027	6.262	0.025	6.202	-0.035	6.276	0.073
	Nov	6.935	6.935	0	6.925	-0.010	6.946	0.010	6.935	0	6.925	-0.010	6.950	0.014	6.926	-0.010	6.918	-0.017	6.938	0.002	6.952	0.017	6.918	-0.017	6.968	0.039
	Dec	7.532	7.532	0.001	7.524	-0.008	7.541	0.009	7.529	-0.002	7.522	-0.010	7.540	0.008	7.527	-0.005	7.520	-0.011	7.537	0.006	7.541	0.010	7.520	-0.011	7.554	0.024
	Annual	7.972	7.971	-0.001	7.968	-0.004	7.974	0.002	7.998	0.026	7.973	0.001	8.015	0.043	7.947	-0.025	7.937	-0.035	7.958	-0.014	7.997	0.025	7.937	-0.035	8.016	0.077

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-26 Predicted Streamflow and Change for Existing and Project Conditions for QM07 (Minton Lake Outlet) – Average Climate Scenario

QM07

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.024	0.023	-0.001	0.022	-0.002	0.024	0	0.022	-0.002	0.022	-0.002	0.022	-0.002	0.022	-0.003	0.021	-0.003	0.022	-0.002	0.021	-0.003	0.021	-0.003	0.021	0
	Feb	0.018	0.018	0	0.017	-0.001	0.019	0.001	0.017	-0.001	0.017	-0.001	0.017	-0.001	0.017	-0.002	0.016	-0.002	0.017	-0.001	0.017	-0.002	0.016	-0.002	0.017	0
	Mar	0.014	0.015	0	0.015	0	0.015	0.001	0.015	0	0.014	0	0.015	0	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	0
	Apr	0.013	0.014	0.001	0.013	0	0.014	0.001	0.013	0	0.013	0	0.013	0	0.012	0	0.012	-0.001	0.012	0	0.012	0	0.012	-0.001	0.012	0
	May	0.057	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.044	-0.013	0.044	-0.013	0.044	-0.013	0.044	-0.013	0.044	-0.013	0.044	0
	Jun	0.068	0.052	-0.016	0.052	-0.016	0.053	-0.015	0.052	-0.016	0.052	-0.016	0.052	-0.016	0.051	-0.017	0.051	-0.017	0.051	-0.017	0.051	-0.017	0.051	-0.017	0.051	0
	Jul	0.036	0.028	-0.008	0.027	-0.008	0.028	-0.008	0.027	-0.008	0.027	-0.008	0.027	-0.008	0.027	-0.009	0.027	-0.009	0.027	-0.009	0.027	-0.009	0.027	-0.009	0.027	0
	Aug	0.038	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.026	-0.012	0.026	-0.012	0.026	-0.012	0.026	-0.012	0.026	-0.012	0.026	0
	Sep	0.063	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.045	-0.018	0.045	-0.018	0.045	-0.018	0.045	-0.018	0.045	-0.018	0.045	0
	Oct	0.072	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.054	-0.018	0.054	-0.018	0.054	-0.018	0.054	-0.018	0.054	-0.018	0.054	0
	Nov	0.054	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.044	-0.011	0.044	-0.011	0.044	-0.011	0.044	-0.011	0.044	-0.011	0.044	0
	Dec	0.036	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.030	-0.006	0.030	-0.006	0.030	-0.006	0.030	-0.006	0.030	-0.006	0.030	0
	Annual	0.041	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.032	-0.009	0.032	-0.009	0.032	-0.009	0.032	-0.009	0.032	-0.009	0.032	0

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-27 Predicted Streamflow and Change for Existing and Project Conditions for QM11 (Cockeram River) – Average Climate Scenario

QM11 (AQM10)

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.694	0.692	-0.001	0.692	-0.002	0.693	0	0.692	-0.002	0.691	-0.002	0.692	-0.002	0.691	-0.003	0.690	-0.003	0.691	-0.002	0.691	-0.003	0.690	-0.003	0.691	0
	Feb	0.586	0.587	0.001	0.587	0.001	0.588	0.002	0.586	0	0.585	-0.001	0.587	0.001	0.585	-0.001	0.584	-0.002	0.586	0	0.585	-0.001	0.584	-0.002	0.586	0.002
	Mar	0.498	0.501	0.003	0.500	0.003	0.501	0.003	0.500	0.002	0.498	0	0.500	0.003	0.499	0.001	0.497	-0.001	0.500	0.002	0.499	0.001	0.497	-0.001	0.500	0.003
	Apr	0.424	0.427	0.003	0.427	0.003	0.427	0.003	0.426	0.002	0.425	0	0.427	0.003	0.425	0.001	0.424	-0.001	0.426	0.002	0.425	0.001	0.424	-0.001	0.426	0.002
	May	1.086	1.077	-0.009	1.077	-0.009	1.077	-0.009	1.076	-0.010	1.074	-0.012	1.077	-0.009	1.075	-0.012	1.073	-0.013	1.076	-0.011	1.075	-0.011	1.073	-0.013	1.076	0.003
	Jun	2.640	2.626	-0.014	2.626	-0.014	2.626	-0.014	2.626	-0.014	2.625	-0.016	2.626	-0.014	2.625	-0.016	2.624	-0.017	2.625	-0.015	2.625	-0.016	2.624	-0.017	2.625	0.002
	Jul	1.686	1.679	-0.007	1.679	-0.007	1.679	-0.007	1.679	-0.007	1.678	-0.008	1.679	-0.007	1.678	-0.008	1.677	-0.009	1.679	-0.008	1.678	-0.008	1.677	-0.009	1.679	0.001
	Aug	1.300	1.290	-0.010	1.290	-0.010	1.290	-0.010	1.290	-0.010	1.289	-0.011	1.290	-0.010	1.289	-0.011	1.288	-0.012	1.289	-0.010	1.289	-0.011	1.288	-0.012	1.289	0.001
	Sep	1.413	1.397	-0.016	1.397	-0.016	1.397	-0.016	1.397	-0.016	1.396	-0.017	1.397	-0.016	1.395	-0.018	1.395	-0.018	1.396	-0.017	1.396	-0.017	1.395	-0.018	1.396	0.001
	Oct	1.236	1.220	-0.016	1.220	-0.016	1.220	-0.016	1.220	-0.016	1.219	-0.017	1.220	-0.016	1.218	-0.018	1.218	-0.018	1.219	-0.017	1.218	-0.017	1.218	-0.018	1.219	0.001
	Nov	1.001	0.992	-0.009	0.992	-0.009	0.992	-0.009	0.991	-0.009	0.991	-0.010	0.992	-0.009	0.990	-0.010	0.990	-0.011	0.991	-0.010	0.990	-0.010	0.990	-0.011	0.991	0.001
	Dec	0.831	0.827	-0.004	0.827	-0.004	0.827	-0.004	0.827	-0.005	0.826	-0.005	0.827	-0.004	0.826	-0.006	0.825	-0.006	0.826	-0.005	0.826	-0.006	0.825	-0.006	0.826	0.001
	Annual	1.116	1.110	-0.007	1.109	-0.007	1.110	-0.006	1.109	-0.007	1.108	-0.008	1.109	-0.007	1.108	-0.008	1.107	-0.009	1.109	-0.008	1.108	-0.008	1.107	-0.009	1.108	0.001

* Flows lower than 0.0005 m3/s are shown as "0".

Table 3-28 Predicted Streamflow and Change for Existing and Project Conditions for QM08 (Cockeram Lake Outlet) – Average Climate Scenario

QM08

	Month	Existing Condition flow (m3/s)	Construction (Year -2 - Year -1)					
			Average		Minimum		Maximum	
			flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	10.425	10.425	0.001	10.423	-0.002	10.428	0.003
	Feb	9.273	9.300	0.026	9.299	0.026	9.300	0.027
	Mar	8.261	8.304	0.044	8.304	0.044	8.304	0.044
	Apr	7.458	7.494	0.036	7.493	0.034	7.496	0.037
	May	13.007	12.964	-0.044	12.963	-0.045	12.964	-0.043
	Jun	26.509	26.499	-0.009	26.499	-0.010	26.499	-0.009
	Jul	25.101	25.086	-0.015	25.086	-0.016	25.086	-0.015
	Aug	18.374	18.362	-0.012	18.357	-0.017	18.366	-0.008
	Sep	13.633	13.616	-0.017	13.614	-0.018	13.618	-0.015
	Oct	10.789	10.764	-0.025	10.762	-0.027	10.766	-0.023
	Nov	10.733	10.722	-0.010	10.712	-0.021	10.733	0
	Dec	11.166	11.164	-0.002	11.154	-0.011	11.173	0.007
	Annual	13.727	13.725	-0.002	13.722	-0.005	13.728	0

	Month	Existing Condition flow (m3/s)	Operations (Year 1 - Year 13)					
			Average		Minimum		Maximum	
			flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	10.425	10.434	0.010	10.428	0.003	10.443	0.018
	Feb	9.273	9.331	0.058	9.307	0.034	9.354	0.080
	Mar	8.261	8.373	0.113	8.320	0.059	8.408	0.148
	Apr	7.458	7.506	0.048	7.475	0.017	7.522	0.064
	May	13.007	12.971	-0.037	12.939	-0.069	12.988	-0.020
	Jun	26.509	26.561	0.052	26.527	0.018	26.575	0.067
	Jul	25.101	25.154	0.053	25.122	0.021	25.171	0.070
	Aug	18.374	18.423	0.049	18.389	0.014	18.443	0.069
	Sep	13.633	13.660	0.027	13.625	-0.008	13.680	0.047
	Oct	10.789	10.780	-0.008	10.761	-0.028	10.797	0.008
	Nov	10.733	10.729	-0.004	10.719	-0.014	10.745	0.012
	Dec	11.166	11.167	0.001	11.160	-0.006	11.179	0.013
	Annual	13.727	13.757	0.030	13.731	0.004	13.775	0.048

	Month	Existing Condition flow (m3/s)	Active Closure (Year 14 - Year 19)					
			Average		Minimum		Maximum	
			flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	10.425	10.429	0.004	10.424	-0.001	10.438	0.013
	Feb	9.273	9.293	0.020	9.276	0.003	9.309	0.036
	Mar	8.261	8.288	0.027	8.264	0.003	8.306	0.045
	Apr	7.458	7.472	0.014	7.452	-0.006	7.488	0.029
	May	13.007	12.915	-0.093	12.894	-0.114	12.931	-0.077
	Jun	26.509	26.464	-0.044	26.448	-0.060	26.477	-0.032
	Jul	25.101	25.048	-0.053	25.032	-0.069	25.060	-0.041
	Aug	18.374	18.328	-0.046	18.310	-0.064	18.344	-0.030
	Sep	13.633	13.586	-0.047	13.569	-0.064	13.600	-0.032
	Oct	10.789	10.748	-0.041	10.740	-0.049	10.754	-0.034
	Nov	10.733	10.716	-0.017	10.709	-0.023	10.730	-0.003
	Dec	11.166	11.162	-0.004	11.156	-0.010	11.174	0.008
	Annual	13.727	13.704	-0.023	13.690	-0.038	13.717	-0.010

	Month	Existing Condition flow (m3/s)	Post-Closure (from Year 20+)					
			Average		Minimum		Maximum	
			flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	10.425	10.446	0.021	10.424	-0.001	10.458	0.032
	Feb	9.273	9.317	0.044	9.276	0.003	9.334	0.059
	Mar	8.261	8.315	0.054	8.264	0.003	8.334	0.070
	Apr	7.458	7.502	0.043	7.452	-0.006	7.519	0.067
	May	13.007	13.043	0.036	12.894	-0.114	13.078	0.184
	Jun	26.509	26.529	0.020	26.448	-0.060	26.549	0.101
	Jul	25.101	25.128	0.027	25.032	-0.069	25.152	0.120
	Aug	18.374	18.394	0.020	18.310	-0.064	18.419	0.109
	Sep	13.633	13.658	0.025	13.569	-0.064	13.683	0.114
	Oct	10.789	10.805	0.017	10.740	-0.049	10.819	0.080
	Nov	10.733	10.746	0.013	10.709	-0.023	10.763	0.045
	Dec	11.166	11.179	0.013	11.156	-0.010	11.193	0.030
	Annual	13.727	13.755	0.028	13.690	-0.038	13.775	0.084

* Flows lower than 0.0005 m3/s are shown as "0".

3.4.4.2 Lake Level

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 2-21 to Table 2-21, 25-year dry and 25-yr wet climate scenarios can be found in Appendix C. The changes in mean annual lake level for all Project phases are:

Burge Lake

No results are provided for Burge Lake as it is upstream of any Project related effects.

Minton Lake

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 3-30. The changes in mean annual lake level for each Project phase are:

- Construction: Mean annual lake levels decrease 0.02 m from baseline. The reduction in flow at Minton Lake is associated with the reduction in total drainage area that drains into the Minton Lake where the TMF and MRSA are located.

- Operation, Active Closure and Post-closure: Mean annual lake levels decrease 0.03 m from the baseline. The reduction in flow at Minton Lake outflow is associated with the reduction in total drainage area that drains into the Minton Lake where the TMF and MRSA are located.

Cockeram Lake

Results for predicted lake level under baseline and Project conditions for the average climate scenario are presented in Table 3-31. The changes in mean annual lake level for each Project phase are:

- Construction, Operation, Active Closure, and Post-closure: Mean annual lake levels are predicted to have negligible change (<0.005 m) from baseline.

Predicted lake levels for the baseline conditions and during the Project life (construction, operation, active closure and post-closure) are also presented in Figure 3-33 to Figure 3-34 for Minton Lake, and Cockeram Lake, respectively.

Table 3-29 Predicted Lake Level for Existing and Project Conditions for Minton Lake - Average Climate Scenario

Minton Lake

		Existing Condition	Construction (2022-2023)						Operations (2024-2036)						Closure (2037-2042)						Post Closure (from 2043)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	329.92	329.92	0.00	329.91	-0.01	329.92	0.00	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	0.00
	Feb	329.89	329.89	0.00	329.89	0.00	329.89	0.00	329.89	0.00	329.89	0.00	329.89	0.00	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	0.00
	Mar	329.87	329.87	0.00	329.87	0.00	329.88	0.00	329.87	0.00	329.87	0.00	329.87	0.00	329.87	0.00	329.86	-0.01	329.87	0.00	329.87	0.00	329.86	-0.01	329.87	0.00
	Apr	329.86	329.86	0.00	329.86	0.00	329.87	0.01	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00
	May	330.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.04	329.99	-0.03	329.99	-0.04	329.99	-0.04	329.99	-0.04	329.99	-0.04	329.99	-0.04	329.99	0.00
	Jun	330.07	330.02	-0.04	330.02	-0.05	330.02	-0.04	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	0.00
	Jul	329.97	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	0.00
	Aug	329.97	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.05	329.93	-0.05	329.93	-0.05	329.93	-0.05	329.93	-0.05	329.93	0.00
	Sep	330.06	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.06	330.00	-0.06	330.00	-0.06	330.00	-0.06	330.00	-0.06	330.00	0.00
	Oct	330.08	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	0.00
	Nov	330.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	0.00
	Dec	329.97	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.94	-0.02	329.94	-0.02	329.94	-0.02	329.94	-0.02	329.94	-0.02	329.94	0.00
	Annual	329.98	329.95	-0.02	329.95	-0.03	329.95	-0.02	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	0.00

* Differences lower than 0.05 m are shown as "0".

Table 3-30 Predicted Lake Level for Existing and Project Conditions for Cockeram Lake - Average Climate Scenario

Cockeram Lake

		Existing Condition	Construction (2022-2023)						Operations (2024-2036)						Closure (2037-2042)						Post Closure (from 2043)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	312.14	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00
	Feb	312.12	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00
	Mar	312.11	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00
	Apr	312.09	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00
	May	312.17	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00
	Jun	312.31	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00
	Jul	312.30	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00
	Aug	312.23	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00
	Sep	312.18	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00
	Oct	312.14	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00
	Nov	312.14	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00
	Dec	312.15	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00
	Annual	312.17	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00

* Differences lower than 0.05 m are shown as "0".

4.0 WATER QUALITY MODEL

4.1 GENERAL APPROACH

As described in Section 2.0, the WQM consists of the BL-WQM and the PROJ-WQM sub-models. Like the WB, the PROJ-WQM builds upon the inputs and assumptions defined in the BL-WQM. The two sub-models run concurrently so that Project impacted predictions can be compared to baseline predictions at each timestep in the model. Scenario modelling (Section 4.1.1) and the parameters of interest (POIs; Section 4.1.2) in both sub-models are consistent.

4.1.1 Scenario Modelling for the WQM

Water quality predictions are presented for two cases/scenarios: Expected Case and Upper Case (Table 1-1).

Table 4-1 Water Quality Model Scenarios Descriptions

Scenarios	Flow Condition	Load Condition
Expected Case	Monthly Average	Median water quality or median of last 20 weeks for source terms with conservative assumptions.
Upper Case	Monthly Average	95th percentile of all datasets or the 95th percentile of geochemical test work or tests samples based on geochemical samples classified as extreme. Source term development also includes conservative assumptions.

The Expected Case scenario incorporates mass loading conditions based on average inputs and assumptions commonly incorporated into load models to predict the anticipated water quality. The Upper Case scenario includes adjustments to inputs in the WQM. Specifically, the background concentrations are adjusted to the 95th percentile of observed values and the source terms are calculated using loading rates from geochemical tests conducted on materials that are considered “extreme” based on ABA data (i.e. not representative of average static testing results as discussed in Stantec (2017c, 2020d). Further to this, the scaling factors and groundwater flow assumptions incorporated into the Upper Case scenario reflect “possible” values that are considered highly conservative. Due to the high level of conservatism in the inputs and assumptions applied to the Upper Case scenario, it is recommended that these predictions are used for contingency planning only.

4.1.2 Parameters of Interest and Guidelines

The mass loadings to and from each model node were calculated for the parameters of interest (POI), these POIs are regulated by the guidelines listed in Table E-1 (Appendix E), regardless of exceedances.

- *Canadian Water Quality Guidelines* (CWQG) for the Protection of Freshwater Aquatic Life by Canadian Council of Ministers of the Environment (CCME 2019).
- *Manitoba Water Quality Standards Objectives and Guidelines* (MSOG) for Freshwater Aquatic Life by Manitoba Water Stewardship (MWS 2011).

- *Metal and Diamond Mining Effluent Regulations of the Fisheries Act* (MDMER 2018).

In addition to the POIs listed in the documents mentioned above, the supporting parameters such as general water chemistry were modelled. The POIs that are modelled are summarized in Appendix E (Table E-1).

TSS is not predicted because it is assumed that all discharge from the open pit will meet the MDMER limit of 15 mg/L. pH is not predicted for the reasons discussed in section 4.1.3.

The predicted concentrations of POIs at model nodes were compared against applicable water quality guidelines Appendix E (Table E-1). Predicted POIs that exceed long term guidelines in the receiving environment, or short term and/or MDMER guidelines in effluent from the mine. Guidelines that are dependent on pH, hardness, or temperature are calculated based on the average observed baseline hardness, temperature, pH values.

4.1.3 Potential Development of Acidity

At mine sites, acidic rock drainage (ARD) occurs due to exposure of sulphide and sulphate mined minerals to the atmosphere. The minerals in the newly exposed mined rock will subsequently react with the oxygen in the atmosphere and oxidize. The oxidation of iron bearing sulphidic material will produce acid; however, this acidity can be buffered by alkalinity released by the dissolution of carbonate and aluminosilicate (neutralizing) minerals, which are also often contained in mined rock. As sulphides are oxidized and neutralizing minerals dissolve, the overall amount of sulphide minerals and neutralizing minerals in the rock depletes. If the initial amount (based on molar equivalency) of acid generating minerals (sulphides) exceeds neutralizing minerals, once all of the neutralizing minerals are depleted in the mined rock, they will no longer be able to buffer acid from the sulphidic minerals and net acidic condition will develop. The acidic drainage will accelerate the rate of sulphide oxidation and increase the rate POIs are released to contact water (i.e. increase the loading rate). The time it takes for the neutralizing minerals to deplete (and acidic drainage to ensue) is called the “ARD lag time”.

The waste management plan for the site will outline strategies for mine rock placement that will reduce the potential for mine rock to develop locally acidic conditions as a result of sulphide oxidation. As described in Stantec (2017c, 2020d), approximately 28% of mine rock material at the MacLellan site is classified as potentially acid generating (PAG). The loadings rates incorporated into the WQM account for the possibility that PAG rock will release POIs to contact water under acidic conditions during post-closure (described in section 3.2.1.2) so that predictions remain conservative; however, a key assumption in the PROJ-WQM is that the seepage will maintain a neutral pH. One strategy to reduce the potential for PAG rock to develop acidic drainage is to intimately blend the PAG material with the non-PAG materials (72%) so that there is a continual source of neutralizing minerals.

With respect to the PAG tailings material contained in the TMF, the model assumes the tailings material will not generate ARD at closure because of mitigation and management strategies implemented.

4.2 BASELINE WATER QUALITY MODEL

The BL-WQM has been constructed to predict baseline water quality at the MacLellan site. It is built upon the assumptions and predictions calculated in the BL-WB and integrates natural background source terms (catchments and groundwater) into the flows and reservoirs of the BL-WB (Stantec 2020f). The BL-WQM simulates the baseline water quality conditions by identifying the sources, pathways and receivers (which form the basis of the baseline conceptual model described in Section 4.2.1) and identifying and incorporating inputs and assumptions specific to pre-mining conditions (Sections 4.2.2) into the model.

4.2.1 Baseline Water Quality Conceptual Model

The conceptual model for the BL-WQM (Figure 4-1) is largely dependent on the catchments delineated as part of the water balance in Map 3-2 and Map 4-1. Overall, the conceptual model for the Maclellan BL-WQM accounts for two distinct flow paths. The first flow path begins in Burge Lake to the north. Burge lake drains into the Keewatin River. The Keewatin River travels south and mixes with the Lynn River and ultimately discharges into Cockeram Lake. The second flow path begins in Minton Lake (located to the south of the Project), which discharges into Cockeram River and ultimately drains into Cockeram Lake.

The conceptual model for the BL-WQM consists of "cells" which correspond to model nodes in the BL-WB. There are two types of cells (source cells and mixing cells). Each model cell receives inflows from the catchment equivalent to the inflows, reservoirs and flow-through functions calculated in the BL-WB, while mass loading rate of inflows are added to cells within the WQM portion of the WBWQM. The advective mass flux out of all cells is determined as concentrations calculated in the cell multiplied by the outflow rate determined in the WB at the equivalent model node.

The source cells represent undeveloped areas and lakes that do not receive any upstream or outside loads (i.e. behave as model boundary conditions and/or inputs). Source cells have defined water quality and are represented in the conceptual model by smaller icons on Figure 4-1. Ultimately, the WQM transfers mass from source cells to mixing cells (representing reservoirs, ponds, lakes and river sections). Mixing cells are connected by links (representative of flow paths) to other downstream mixing cells. These cells can also receive loads from outside sources as direct loads. In the conceptual model (Figure 4-1), larger icons represent mixing cells.

The naming convention for each cell is the same as the model node; however, the symbol "_CT" is added to the end of the model node (e.g., "QF01_CT"). Model nodes names are based on the corresponding hydrometric/flow station (where one exists), described in Table 4-2; however, model nodes do not always correspond to water quality monitoring stations. At times, the corresponding water quality monitoring stations are within the catchments; however, for catchments without stations, the nearest water quality station is used to represent predicted water quality. The water quality predictions for the BL-WQM are validated against the water quality observed in the corresponding water quality monitoring station. The location of the water quality stations are presented in Map 3-2 and Map 4-1 and the relationship between each catchment node and water quality monitoring station is described in Table 4-2.

Table 4-2 Relationship Between Assessment Model Node and Hydrometric/Water Quality Stations

WQM Node/cell (CT)	Hydrometric Station	Water Quality Station	Notes
Kee3_Pay1_CT	None	AQM31	AQM31 is significantly upstream in Payne Lake (KEE3_PAY2) while the model node is located at the foot of the tributary.
QM02_CT	QM02	AQM4	AQM4 is significantly upstream of the model node. KEE3_PAY1 discharges into this model node.
QM03_CT	QMO3	AQM7	Includes discharge from the collection pond during operations (described in the PROJ-WB)
KEE3_B1_CT	QMO4	QM18	Includes discharge from the open pit overflow at closure. QMO4 not used to calculate flow in the WBWQM. AQM18 is located in a lake located in the center of the catchment.
QM06_CT	QMO6	AQM8	Includes discharge from KEE3B1 catchment
QM05_CT	QM06+QM05	AQM29	QM05 is within Lynn River, prior to Lynn River and Keewatin River confluence. QMO6 is on Keewatin River prior to Lynn River and Keewatin River confluence AQM29 is downstream of confluence between rivers.
QM08_CT	QM08	AQM11	Receives inflows from Keewater River and Cockeram River Water quality at lake outlet
QM10_CT	QM11	AQM10	Combines two sub-water sheds
Minton Lake_CT	QMO7	AQ16	Minton Lake outlet includes catchment from the Lake (Min4_CT) and Min5_CT. AQM22 water quality exists for Min5_CT catchment but is not used in the model.

4.2.2 Baseline Source Terms and Assumptions

The source terms incorporated into the BL-WQM are based on observed baseline water quality. The water quality is applied to each source cell or groundwater mass loading input term. In both cases, the load is calculated by multiplying a defined water quality by the calculated flow in the BL-WB. The observed water quality that is used to calculate concentrations in each source cell is provided in Appendix E

4.2.2.1 Baseline Surface Water Quality Source Terms

The water quality applied to each source cells within the BL-WQM was obtained from datasets collected from surface water quality monitoring stations located at or near each equivalent cell (Appendix E, Tables E-3-1 and E-3-2).

All water quality inputs were prepared using following water quality dataset processing steps:

Step 1: Detection limits

Concentrations of some elements were reported below detection limits. For measured concentrations below detection limit, the full detection limit was used for the model inputs.

Step 2: Grouping and checking seasonal data

Surface water concentrations were grouped by season for selected stations as follows:

- Spring: May and June
- Summer: July and August
- Fall: September and October
- Winter: November, December, January February, March and April

Observed POI concentrations that exceeded or were approaching water quality guidelines (Appendix E), were checked for outliers. Outliers were removed if it was suspected to be caused by sampling/analytical error prior calculation of statistics.

Step 3: Calculation and adjustment of statistics

For surface water inputs, average and 95th percentiles were calculated for each station and season as defined in step 2.

For stations where sampling was not consistently conducted (e.g., steam frozen to the bottom), statistics from the preceding season were used. The water quality predictions were also reviewed to ensure that total concentration (particulate and dissolved concentrations) was greater than dissolved concentrations incorporated into the source term. The dissolved concentration was greater than the total concentrations, the following adjustments were made to the source term:

- If dissolved fraction> total, then dissolved fraction = total fraction
- If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr
- If free cyanide > WAD cyanide, then free cyanide = WAD cyanide
- If WAD cyanide > total cyanide, then WAD cyanide = total cyanide
- If nitrite (as N) > nitrate + nitrite (as N), then Nitrite (as N) = nitrate + nitrite (as N)

4.2.2.2 Groundwater Quality Source Terms

Baseline groundwater inflows were considered for only for cells/nodes were groundwater discharges were changed by the project according to Stantec 2020b). Concentrations applied to these groundwater inflows were based on the observed groundwater quality presented in the Stantec (2020e) and summaries are presented in Appendix E (Tables E-4-1 and E-4-2). Groundwater was filtered prior to sampling and only dissolved concentrations were presented for the trace metal POIs. Average and 95th percentile groundwater concentrations were calculated for each monitoring well by following the water quality dataset processing steps outlined in Section 4.2.2.1 with the notable difference that dissolved concentrations were assumed to be equivalent to the total concentrations to account for the natural filtration as water moves through geological units.

The averages/95th percentiles were grouped to represent various units/source, including:

- Background bedrock
- Background overburden

For each group, the geomean and $\log_{10}$ of 95th percentile concentrations were calculated, and a geometrical distribution was assumed. This approach was applied to the groundwater source term calculation due to the heterogeneity in the observed groundwater concentrations. The groundwater mass inflows to Minton Lake was based off an assumption that 20% of the overall inflows comes from the overburden unit and 80% bedrock of the inflows comes from the bedrock unit. Therefore, 20% of the water quality applied to this inflow is equivalent to overburden concentrations and 80% of the water quality is equivalent to bedrock concentrations.

4.2.2.3 Historic Mine Components Input Assumption

The Project site includes two historic mine components, an historic rock storage area (RSA) and underground workings from the former mine. The RSA is not adjacent to an existing river or water body and thus is not considered in the BL-WQM; however, any runoff and/or toe seepage that runs over and/or through the pile is captured in the BL-WQM because the observed catchment water quality is used as source term inputs to the BL-WQM. The existing underground workings are not currently discharging to surface water.

4.2.3 BL-WQM Validation

WBWQM validation is an important step in water quality modelling. Validation is the comparison of the calibrated model results to observed values. Predicted baseline concentrations at model nodes were compared to observed concentrations using relative percent of difference (RPD) as RPD = $(C_{model}-C_{observed})/C_{observed}\times100\%$. For the Expected Case, modelled concentrations were compared to average observed seasonal values (Appendix E, Table E-5-1 and Table E-5-7). The positive RPD's indicate the predicted concentrations are greater than observed concentrations (i.e. the model overpredicts concentration). Concentrations that are overpredicted are considered conservative, particularly when evaluating future project effects. Negative RPD's indicate the predicted concentrations are less than the observed concentrations (i.e. the model underpredicts concentrations).

A parameter was considered validated if the RPD was overpredicted and within 100% of the observed values or underpredicted and within 50% of the observed value in the Expected Case. Fifty percent was considered a satisfactory RPD for underpredictions for the following reasons:

- The degree of uncertainty associated with applying the average concentration of spot measurements (reflective of a single moment in time) and the uncertainty associated with the overall sample variability can be large (order of magnitude error is not uncommon for water quality datasets for some parameters). This variability is captured in the Upper Case model and is considered during model validation.
- Error associated with laboratory analysis is typically 20%.
- Error in field measurements can be as high as 25%.
- The concentrations of many parameters such as nitrite, chromium, cadmium, selenium, and silver were at or below the instrumental detection limit which could easily result in analytical errors +/-100%.

With the exception of modelling node QM05 (discussed below), in general, the comparison of predictions and observations show that the baseline model provides a solid basis for the further addition of project components (Appendix E, Table E-5-1 and Table E-5-7).

4.2.3.1 Model Validation and Calibration at QM05

Validation of the BL-WQM showed that parameters at AQM29 (model node QM05) were generally overpredicted (i.e., predicted greater than observed) due to inflows from the Lynn River (defined by water quality observed at water quality monitoring station AQM28). Further calibration of the AQM28 source term indicated that the concentration of some POIs in the Lynn River catchment was 60% greater than is calculated in the mass balance and that reducing concentrations in the Lynn River by 60% generally resulted in a reasonable model validation. However, a 60% loading reduction to concentrations from the Lynn River could not be applied universally to all parameters because this resulted in significant underprediction (i.e. predicted less than observed) of POIs.

To evaluate the overpredicted concentrations at QM05 in additional detail, the concentrations at the downgradient model node (QM08) were also considered in the validation process. If a parameter was found to be overpredicted at model node QM05 and QM08 in the Upper Case scenario, this was considered reasonable evidence of an attenuation mechanism and a 60% reduction to load was applied to the respective parameter in the Lynn River (AQM28). However, if the parameter was overpredicted at model node QM05 yet reasonably predicted (i.e. not overpredicted or underpredicted) at model node QM08, this indicated a likely combination of incomplete mixing, sampling error, overall variability in flow and/or observed concentrations, and the POI was not adjusted.

Parameters had an acceptable calibration (identified through visual inspection) were identified as reasonable and no modification to the source term was conducted. If the calibration indicated that parameters at model node QM05 were overpredicted but reasonably predicted at QM08, no adjustment to the source term was conducted but screening in of this parameter at QMO5 should only be conducted if there is significant deviation from baseline concentrations. If the parameter was overpredicted at model node QM05 and QM08, then a 60% reduction to load was applied to the following parameters: nitrite, dissolved cadmium, total cadmium, dissolved chromium, dissolved cobalt, total cobalt, total lead, and total manganese. A reduction of 20% was applied to total aluminum and total iron.

4.3 PROJECT WATER QUALITY MODEL

To model water quality effects, the PROJ-WQM is built upon operational flow rates and reservoirs volumes calculated in PROJ-WB. The PROJ-WQM includes the Project site and loadings related to mine operations, as described in the conceptual models (Section 4.3.1) and is based upon source terms and assumptions (Section 4.3.2) specific to each source (i.e. mine component). This information is used to predict impacts to discharge water quality and impacts to the receiving environment (Section 4.4).

4.3.1 Water Quality Model Conceptual Model

The conceptual model for the PROJ-WQM differs from the BL-WQM in that it includes the Project components. As such, presentation of the conceptual models described in this section follow the same approach outlined for the BL-WQM conceptual model in Section 4.1, with two notable differences. In addition to the blue icons representing nodes unimpacted by mine water, the PROJ-WQM conceptual models also include grey icons and orange icons. The grey icons signify mine rock loading source cells, and the orange cells indicate mixing cells that receive contact water from the Project.

The conceptual models outlined for each phase: construction, operation, closure/post-closure for the MacLellan Site are presented in Figure 4-2 to Figure 4-5, respectively. The major mine components include the MRSA, the TMF, the collection pond and the open pit. These mine components are the primary loading sources in the model. The domain within the PROJ-WQM outside of the PDA remains largely unchanged from baseline conditions, with the exception that mixing cells located downgradient of the PDA receive contact water (shown by orange icons). Furthermore, groundwater from the mine site is assumed to discharge into cells located outside of the PDA, as shown in Figure 4-3 and Figure 4-5.

4.3.2 Project WQM Inputs

This section discusses mass loading input specific to the PROJ-WQM. Inputs and assumptions that impact flow are discussed as part of the BL-WB and inputs common to both the BL-WQM and PROJ-WQM are discussed in Section 3.2.

4.3.2.1 Mine Components Assumptions and Source Terms

The assumptions and the source terms associated with each source (i.e. mine component) in the PRO-WQM are outlined below. At times, the methodology used to develop a source term is applicable to multiple mine components. If this is the case, the development of the source term is presented followed by a discussion of the mine component specific assumptions. For mine components that have source terms that are unique to that mine component, the source terms are discussed together with assumptions.

Source Terms for Loads Associated with Flow Rates

As with the baseline source term, the loading rate to each mixing cell in the PROJ-WQM from upgradient cells can be calculated by multiplying the observed water quality by the calculated flow rate (defined in the PROJ-WB). For source terms applied to a source cell this calculation is used to determine outflows from the cells and inflows to the subsequent mixing cell. This approach is used to calculate loads associated with:

- Natural runoff (TMF, open pit, collection pond, catchments potentially affected by the Project).
- Groundwater seepage / inflows to the open pit.

Mine Rock Source Terms

Mine rock includes mine rock in the MRSA, ore, TMF embankments, as well as the rock walls and rubble on the benches of the open pit. It does not include tailings material. Mine rock source terms include the loads from rock rubble pit and pit walls as a result of weathering and 2) of nitrogen species leached from undetonated explosives.

Source Terms for Exposed Mine material Loadings

The source term for the elemental leaching rates (R) of exposed mass are based on average rates estimated from representative sources (generally field bins tests) and by applying scaling factors (SF) to convert the loading rates of the geochemical tests to loading rates that would be expected from field components. Leaching rates are calculated using Equation 4-1:

$R = M \times R_{FB} \times SF_{SURFACE\ AREA} \times SF_{CONTACT} \times SF_{POSTCLOSURE}$ *Equation 4-1*

Where:

- M = kilotonnes rock/ore mass of rock exposed
- R_{BF} = Loading rate of the geochemical test, (typically the rate observed in the field bin).
- $SF_{SURFACE\ AREA}$ = scaling factor for rock surface area.
- $SF_{CONTACT}$ = contact factor accounting for a reduction in solute leaching due to hydraulic isolation, which is limited in field bin tests.
- $SF_{POSTLOSURE}$ = reduction of element leaching rates in post-closure due placement of covers.

A summary of all scaling factors applied to each mine component where mined material is a source term is provided in Table 4-5.

The loading rates incorporated into the source term are equivalent to loading rates calculated from field bin leachates (Appendix E, Table E-6). All loading rates were obtained from neutral drainage, as none of the geochemical tests have developed acidic leachate. Therefore, the source term for acidic drainage is not described in this section. Field bin loading rates were used instead of the humidity cell loadings rates for the reason that weathering in field bins occurs under site conditions and thus water quality from this source does not require adjustments for temperature. Initially, leaching rates for freshly mined rock are elevated (with respect to longer term loading rates) as soluble minerals are flushed from the rock. However, loading rate often tend to decrease over time in neutral leachate. So that operational loading rates remain conservative, the loading rates during operations are based on the average observed loading rates in the field bins while the closure loading rates are only based on the third year of collected data.

The rate at which materials leach POIs is related to the surface area of the material because there are less exposed mineral grains on smaller surface areas (i.e. coarser fragments). Rock in field bins were crushed to - ¼" and therefore loading rates are scaled to account for the difference between this surface area and the surface area expected for blasted rock, which is coarser and smaller. The surface area scaling factor is based on the particle site distributions (PSD) assuming spherical particles. Mine rock PSD were taken form Diavik mine studies (Bailey et al. 2012) and resulted in 1.94 m^2/kg. The average weighted surface areas for crushed mine rock are assumed to be 39.6 m^2/kg and 25.3 m^2/kg for Expected and Upper Case, respectively.

A contact scaling factor is applied to the calculation to account for the amount of rock that will be exposed to infiltrating water. A contact scaling factor of 0.3 and 0.65 is selected for Expected and sensitivity cases respectively. These numbers are based on a literature review (Kempton 2012).

Finally, an additional scaling factor (0.8) is applied to the source terms during post closure to account for the reduction in infiltration through the rock as a result of cover placement (MRSA and embankments only). During operation and closure the post-closure scaling factor for all mine components is equal to 1 conservatively assuming no reduction in the leaching rate.

Source Terms for N Species

The blasting of mine rock will release nitrite, nitrate and ammonia, which subsequently will be rinsed from the rock and contribute loads to contact water. The mass rate of lost (non-exploded) nitrogen (R_N, g/yr) was calculated using *Equation 4-2*:

$$R_N = MR \times PF \times F_N \times L_N \times FR_N \qquad \textit{Equation 4-2}$$

where,

> MR = total mining rate of ore + mine rock t/yr, (Appendix E, Table E-7) - PF = 300 g/t, Powder Factor based on the Mine Plan
>
> F_N = 0.333, fraction of nitrogen in the explosive based on 1/3 of nitrogen in the explosive (Bailey et al. 2012) dimensionless
>
> L_N = 0.002 and 0.01 for Expected and Upper Cases respectively based on 0.2% nitrogen of total nitrogen used loss from Ferguson and Leask 1988 and 1% as maximum observed in dry open pit mines in Table A-4 from Golder (2008)
>
> FR_N = 0.1 (10%), fraction of nitrogen released from rock and ore while in the open pit, prior material transfer to storage areas, assuming that another 90% will be leached in storage areas based on Golder (2007).

The release of nitrogen species was assumed to be instant and the leached nitrogen was speciated as follows based on recommendations from Ferguson and Leask (1988):

- for the Expected Case: N-NH3 - 11%, N-NO3 - 87%, N-NO2 – 2%
- for the Upper Case: N-NH3 - 4%, N-NO3 - 95%, N-NO2 – 1%.

Table 4-3 Scaling Factors Applied to Mined Rock Source Terms

Component	M	$R_{Operations}$	$R_{UClosure}$	SF SURFACE AREA	SF CONTACT	SF POSTCLOSURE
MRSA Seepage (non-PAG)	Cumulative mass calculated from Appendix E, Table E-7	Expected: FLB - ML WR AVG 2015-2018 Upper: FLB - ML WR S>1% AVG 2015-2018	Expected: FLB - ML WR AVG third year weight averaged Upper: FLB - ML WR S>1% third year weight averaged	Expected: 0.05 Upper: 0.16	Expected: 0.3 Upper: 0.65	0.85
MRSA Runoff (Operations)	1% MRSA	Expected: FLB - ML WR AVG 2015-2018 Upper: FLB - ML WR S>1% AVG 2015-2018	Expected: FLB - ML WR AVG third year weight averaged Upper: FLB - ML WR S>1% third year weight averaged	Expected: 0.05 Upper: 0.16	Expected: 0.3 Upper: 0.65	1
Embankment	2% MRSA	Expected: FLB - ML WR AVG 2015-2018 Upper: FLB - ML WR S>1% AVG 2015-2018	Expected: FLB - ML WR AVG third year weight averaged Upper: FLB - ML WR S>1% third year weight averaged	Expected: 0.05 Upper: 0.16	Expected: 0.3 Upper: 0.65	0.85
Ore	-	Expected: Avg FLB ML ORE Upper: Avg FLB ML ORE		0.039	Expected: 0.3 Upper: 0.65	1
Open Pit	5% MRSA (dewatered)	Expected: FLB - ML WR AVG 2015-2018 Upper: FLB - ML WR S>1% AVG 2015-2018	Expected: FLB - ML WR AVG third year weight averaged Upper: FLB - ML WR S>1% third year weight averaged	Expected: 0.05 Upper: 0.16	Expected: 0.3 Upper: 0.65	1

Notes: 1 FLB indicates field bin loading rate applied to calculation AVG indicates average loading rate over the time period indicates
Expected indicates Expected Case and Upper indicates Upper Case.
All loading rates are provided in Appendix E; Table E6

PAG Rock Loading Rates

Static test information suggests that 28% of the mine rock will be PAG which is not expected to generate net acidic conditions during operations (Stantec 2017c, 2020e). As described in Section 4.1.3, waste management practice will be developed to reduce the amount of acid generated within the mine rock to the extent possible. None the less, so that estimates remain conservative, an assumption in the PROJ-WQM is that 28% of the rock (equivalent to the % of PAG rock in the ABA static database) will release loadings to the environment at elevated rates during post-closure.

There is no representative acidic leachate water quality for the rock or ore. Therefore, the PAG loadings rates were based on the 95th percentile concentrations observed in monitoring well MW-11 (Appendix E, Tables E-4-1 and E-4-2) located downstream of historical mine rock. This water quality was selected as it is the worst-case water quality currently observed on the site or in geochemical testing leachate. The concentrations from well MW-11 were back calculated in the model and applied as loadings rates directly (i.e. there were not scaled in the model). Back-calculation in the model was conducted by assuming that 100% of the MRSA was PAG rock and calibrating a loading rate scaling adjustment factor in the PROJ-WQM so that predicted sulphate concentrations matched observed sulphate concentrations.

MRSA Assumptions

The primary source term from loadings released from the MRSA is mine rock. The MRSA is located downgradient of the TMF and the pit. The leaching rates from mine rock storage areas (MRSA _CT) were calculated using Equations 4-1 and 4-2. The leaching rates were dependent on the mass of the MRSA (Appendix E, Table E-7).

The calculated total leaching rate ($R_+ R_N$) released to porewater stored in the MRSA cell is used to determine the concentration inside the stockpile MRSA pore water at each time step, while a smaller amount (1%) was released to the runoff component of flow. When mine rock is fully wetted (assumed to be immediate in the model), the volume of infiltrating water equals seepage from the MRSA. As described in the PROJ-WB, porewater discharges from the MRSA model node (which is a mixing cell) as both toe seepage (captured by the ditches) and bed seepage (which recharges the underlying aquifer). Mass is divided proportionally according to flow (described in the Section 3.0).

Runoff overtop of the MRSA is captured by the ditches and directed to the collection pond. During closure, a key assumption is that the MRSA will be covered, and the overland runoff water will not interact with the underlying mine rock. Once a cover is placed on the MRSA, the source term for runoff water is calculated based on the total expected runoff rate and the natural water quality of the catchment (AQM18).

Ore Stockpile Assumptions

The primary source term for the ore pile loading rate is mine rock. The size of the ore pile and ore through-put rate is presented in Appendix E (Table E-7). At closure it is assumed that all remaining ore in the stockpiles will be milled and the area will be reclaimed.

Embankments Assumptions

The primary source term for loads attributed to the TMF embankment is mine rock. It was assumed that all water infiltrates through the embankments and is captured by seepage collection ditches and either returned the TMF (operations) or directed to the open pit (closure).

Overburden Stockpile Assumptions

The source term used to calculate loads to the collection pond from the overburden storage area is based on natural runoff using the catchment water quality (AQM018). It is assumed that overburden is used for reclamation during closure and is depleted by the end of closure.

Open Pit Source Terms and Assumptions

During operations, mine water will be collected in sumps at the bottom of the open pit and redirected to a collection pond. During construction and operations, the open pit will be dewatered and there will be no direct discharges to the environment. During closure, the open pit will begin to flood. Once the open pit is flooded (post-closure), the excess water within the pit will discharge through the overflow spillway to a tributary of the Keewatin (KEE3-B1).

The direct loads (i.e. not including inflows from upgradient sources) to the open pit include mass inflows from groundwater, local/disturbed runoff and direct loadings from exposed material.

The groundwater model (Stantec 2020b) predicted that approximately 80% of water will originate from bedrock and the remaining 20% from overburden. Therefore, the groundwater source term described in the BL-WQM (4.2.2.2) is also used to calculate loadings related to groundwater inflows to the pit. The groundwater source term assumes that to 80% of the loads are attributed to bedrock inflows and 20% are attributed to overburden inflows.

The mine rock source term is used to calculate loadings to the open pit from rubble on the benches and the rock walls. Loading calculations conservatively assumed that the exposed rock is equivalent to 5% of the total mass of the MRSA. Further, it was assumed that as the pit expanded, the amount of exposed mass in the pit expanded proportionally to the MRSA and as the pit flooded during closure, the amount of exposed rock decreases proportionally as well.

During closure, the PROJ-WQM directs loads associated with runoff and toe seepage from the MRSA (through the collection pond) and TSF to the open pit lake. The open pit also receives some base seepage from the MRSA, as described in the groundwater modelling report (Stantec 2020b). At closure, an assumption in the model is that the pit lake stratifies, meaning that the upper portion of the pit lake does not mix with the lower portion of the lake. The loads from the collection pond and TMF are assumed to discharge to the bottom of the pit lake. However, because the only outflow to the pit lake is through the overflow spillway, the lower portion of the pit lake does mix with the upper portion until it reaches 85% of the total open pit storage capacity. A removal function is also applied to the surface water in the open pit to approximate sorption and settling of arsenic, cadmium and copper at a rate of 0.26, 1, 0.46 1 per year, respectively. Mass removal is only assumed to occur between May and October. Annual removal fractions were based on estimates from 15 years of Zone 2 pit lake monitoring at the Colomac mine site (Stantec

2017e). The sorption/settling rates incorporated into the upper portion of the open pit are consistent with the assumptions incorporated into the Gordon PROJ-WQM and considered reasonable because the upper part of the historic pit lakes at the Gordon site have better water quality than the pit lake at depth (Stantec 2017c).

TMF Source Terms and Assumptions

During operation, the TMF pond will receive mass loadings from the following sources:

- Discharge from process plant.
- Spring freshet from the open pit (load from a mixing cell).
- Leaching of elements from tailings beaches exposed to the atmosphere.
- Water from TMF seepage collection system pumped back to the TMF reclaim pond (operations).

Two first inputs are described above, while two last inputs are described below:

Leaching of Elements from Tailings Beaches

Element leaching rates from exposed tailings ($R_{TAILINGS}$) are calculated using *Equation 4-3*.

$$R_{TAILINGS} = R_{HC} \times r \times A_{BEACHES} \times D_{BEACHES} \times SF_{O2} \times SF_{T} \qquad \textit{Equation 4-3}$$

R_{HC} - mean humidity cell loading rates.

r - tailings density (2800 kg/m^3).

$A_{BEACHES}$ - the area of TMF beaches (m^2) based on assumptions on the WB.

$D_{BEACHES}$ - the depth of active oxidation in exposed tailings

SF_{O2} - oxygen scaling factor accounting in differences between fully oxygenated humidity cells and decline in oxygen concentrations in pores with depth

SF_T - temperature scaling factor reflecting differences in oxidation rates between laboratory (20°C) and field temperatures

The mean (Expected Case) and 95th percentiles (Upper Case) leaching rates from tailings humidity cells are used to calculate the source term of the tailings beach (Appendix E; Table E-6). The rates calculated from the humidity cells during the first month of leachate analysis are applied in the model during the operation and closure periods, while values calculated from the leachate collected during the last month of analysis are used to calculate the beach source term during the post-closure period.

The tailing beach areas are calculated based on the total area of the tailings (wet and dry beach area) so that assumptions remain conservative. The depth of oxidation in the beaches is estimated from 1D oxygen diffusion model (Appendix F). The 1D modelled estimated oxidation depth was 0.5 m during the operation and closure and 0.2 m in post-closure, after a soil and vegetated cover placed over exposed tailings. The results from the 1D modelling are also used to calculate the oxidation scaling factor (SFo2), which accounts for differences between fully oxygenated humidity cells and decline in oxygen concentrations in pores with depth. The SFo2 is 0.3 for operations and 0.253 during post-closure. The temperature scaling factor (SFT) is applied to the source term to account for the differences in oxidation rates between laboratory (20°C) and field temperatures. This source term is based on the Arrhenius Equation, with rates that are based on average monthly temperature inputs shown in Appendix E (Table C-8).

Tailings Management Facility Seepage Water Quality

The PROJ-WQM is structured so that the tailings pond and the tailings pore water are different mixing cells. The tailings pond cell recharges tailings pore water cell at rate equivalent to seepage from the TMF (toe seepage + bed seepage). Toe seepage is assumed to be captured by ditches and diverted to the collection pond while the bed seepage recharges the underlying aquifer. By modelling the tailings pore water as a separate cell, the PROJ-WQM was able to account for mass released to the tailings pond water that may not be observed in geochemical tests (such as process water). However, subaqueous column experiments have demonstrated that mass can also be released through dissolution to the pore water. This addition of mass is not captured using the mixing cell approach. Therefore, the information gathered from the subaqueous columns was incorporated into the predictions as well. The pore water quality was set equal to greater of the tailings pore water calculated in the mixing cell and the mean concentrations observed in subaqueous columns CND2P and CND7 (Appendix E, Table E-6). For the subaqueous column inputs, the average of mean values from the first month were used during the operation, while averaged concentrations form the last month were applied for the closure and post-closure and periods.

Tailings Pond Removal Rate

Mass is removed in the tailings pond due to mineral precipitation, sorption/settling, and degradation of cyanide. Mineral precipitation and settling is not considered in the model; however, cyanide degradation was incorporated into the predictions. A removal rate (0.018 1/day) was applied to cyanide concentrations. This rate is based on the results of aging tests (R_{AGEING}), which were conducted under UV light without aeration for 56 days provides the results from the aging tests (Appendix E, Table E-6). These laboratory derived rates were scaled to the field rates using *Equation 4-4*.

$$R_{DEGRADATION} = R_{AGEING} \times SF_T \times SF_{LIGHT} \times SF_{AERATION} \quad \textit{Equation 4-4}$$

R_{AGEING} = rates derived from laboratory tests

SF_T = temperature scaling factor

SF_{LIGHT} = scaling factor reducing rate due to daylight

$SF_{AERATION}$ = scaling factor accounting for aeration in the TMF pond

The temperature scaling factor (S_{FT}) is applied to the source term to account for differences in rates between laboratory (20°C) and field temperatures based on temperatures shown in Appendix E (Table E-8). The light scaling factor (SF_{LIGHT}) is set equal to 0.5. It is applied to the source term to account for the fact that only 12hr of day light are expected on average in the field compared to the 24 in the laboratory. Finally, the aeration scaling factor ($SF_{AERATION}$) was set to 1.4. This factor accounts for aeration in the TMF pond from wave action resulting in faster decomposition of and volatilization of cyanide based on Simovic (1984).

Degradation of cyanide species results in formation of ammonia. Rate of ammonia addition in TMF pond from this process was calculated using Equation 4-4 assuming the same inputs and scaling factors.

Mill Source Terms and Assumptions

Water directed to the mill to meet processing requirements is typically reclaimed from the TMF pond; however, the PROJ-WQM, also assumes that water can be reclaimed from the collection pond should it be required. It is subsequently returned to the pond as slurry water. Elements/species are released from ore and/or added into the process solution during the milling and cyanidation process. These solutions are subjected to cyanide detoxification resulting in removal of many elements from the solution prior discharge to TMF. The concentrations in solutions after metallurgical testing and cyanide detoxification were used in *Equation 4-5* to calculate mass rate (R_{MILL}) added to the cell representing mill (Mill_CT).

$$R_{MILL} = Q_{SLURRY} \times C_{DETOX} \qquad \textit{Equation 4-5}$$

where,

Q_{SLURRY} = volume water discharged with tailings slurry (refer to Section 5.1.6)

C_{DETOX} = concentrations after cyanide detoxification. Average values were used for the Expected Case and 95 percentiles for sensitivity case (refer to day 0 for ageing tests in Appendix E (Table E-6).

Another important source of POIs to the water discharged to the TMF as slurry includes the mass already contained in water reclaimed from the TMF / collection pond. The source term for the reclaimed mass is equal to the concentration in the pond multiplied by the rate of recycled water pumped from the TMF (refer to Section 5.1.6). During processing, most trace metal cations tend to precipitate out of solutionl however some minerals accumulate. Oxyanions are mobile at neutral pH and tend to be the parameters that accumulate in TMF pond water. To account for this mass loss, the recirculation source term only maintains mass loads for bromide, chloride, fluoride, N-species, sulphate, cyanide species, arsenic, antimony, molybdenum, selenium, sodium and vanadium.

Collection Ditches Assumptions

There are no direct loads and/or source terms for the collection ditches. The assumptions for the collection ditches are flow-based and described in the WB.

Collection Pond Assumptions

There are no direct loads and/or source terms for the collection ponds. The assumptions for the collection pond are flow-based and described in the WB.

Groundwater Seepage Assumptions

The PROJ-WQM assumes that bed seepage from the TSF and the MRSA ultimately discharges into the receiving environment. The groundwater seepage rates are based on the groundwater particle tracking information described in the Stantec (2020b). The amount of seepage that discharges into each receiving node is assumed to be equivalent to the total amount that will discharge into the receiver 300 years following mine closure. This approach is considered conservative because the seepage rate at the last time step in the WBWQM (Year 128) is generally less than the 300-year seepage discharge rate. The particle tracking results indicate that is can take thousands of years for the plume to reach the receiver.

The amount of time it takes for seepage from the MRSA/TMF to reach the receiver is not modelled gradually in the PROJ-WQM. The model assumes that groundwater discharges at the mean predicted particle tracking travel time for the Expected Case and the minimum predicted travel time for the Upper Case scenario.

All groundwater mass flows are attenuated by 10% to account for potential dispersion, diffusion, retardation, and attenuation along the flow path. This amount of attenuation is well within the uncertainty in the PROJ-WQM and likely to be significantly higher within the aquifer, depending on the parameter. Further, bed seepage from the MRSA and TMF that discharges into catchment KEE3-B1 (tributary of the Keewatin) constitute the majority of flow in that tributary, as the bed seepage discharges slightly downgradient of the collection ditches. During the winter, bed seepage from the facilities to KEE3-B1 is assumed to freeze; however, it is also assumed to melt in April. This assumption is conservative for the reason that in April the stream flows are still low as snowmelt does not occur until later in the year. Therefore, adding seepage during this period of time results in minimal dilution of the bed seepage water with non-contact water.

Sewage Treatment Effluent

The collected sewage from the Gordon site buildings will be conveyed by gravity through buried PVC piping to two septic tanks at the truck shop and administration building. It will then be trucked to MacLellan for processing at the MacLellan sewage treatment plant. The sewage from the MacLellan site buildings will be collected via a network of buried PVC piping and manholes and conveyed by gravity to a 60 m3/d sewage treatment plant located at the MacLellan site. The effluent from the plant is not included in the model at this stage.

4.3.2.2 Solubility Constraints

The PROJ-WQM conservatively passes mass through the cells. The one exception includes solubility limits (cap) concentrations placed on aluminum, copper and iron predictions (i.e. the solubility caps do not allow predicted concentrations to increase above the cap concentrations). These caps are included in the model (applied to all model nodes) because the concentrations of these elements are often limited by thermodynamic constraints (i.e. once concentration reaches a certain value, minerals will precipitate out of the water column). In oxic neutral drainage, iron will precipitate out of solution as iron oxyhydroxides. Likewise, in neutral drainage, aluminum will precipitate out of solution is aluminum hydroxides or gibbsite. Copper commonly precipitates out of solution as tenorite or copper carbonates such as malachite.

The solubility, and therefore solubility caps of these minerals is highly dependent on reactant concentrations, pH and redox state. To determine the solubility cap for site specific conditions, the observed concentrations of these parameters were evaluated (presented in Table 4-6). Based on this evaluation, the solubility cap for dissolved aluminum was determined to be 0.2 mg/L. Higher surface water total aluminum concentrations were observed however this was assumed to represent suspended particulate matter and thus would likely be filtered through the ground. This solubility cap corresponded to concentrations generally observed in groundwater and in the Lynn River, which is a river highly influenced by upstream tailings deposits.

Iron solubility is highly dependent on redox state; therefore, the solubility cap was set to 0.7 mg/l (which is consistent with AQM28 and AWM16 and higher than in groundwater from the historical MRSA monitoring point (MW-11). Higher iron concentrations were observed in overburden and bedrock; however, iron is mobile in reducing conditions and concentrations tend to be elevated as a result. Once iron discharges to oxic surface water receivers it will precipitate out of solution. Groundwater concentrations are not considered reflective of the conditions associated with the surface water assessment nodes.

The copper concentration cap is set to 0.03 mg/l. This cap is higher than the MRSA concentration and the mean overburden concentration (not shown) and it is consistent with the AQM28 water quality which is assumed to be saturated with copper minerals.

Table 4-4 Range in Seasonal P95 Concentration at Key Model Nodes Used to Develop Solubility Caps

Water Quality Monitoring Station	Aluminum Concentrations (mg/L)		Iron Concentrations (mg/L)		Copper Concentrations (mg/L)	
	Dissolved	Total	Dissolved	Total	Dissolved	Total
MW-11	0.2		0.3		0.01	
Overburden	0.2		8		0.05	
Bedrock	0.2		4		0.01	
AQM16	0.04-0.12	0.06-0.2	0.2-0.6	0.4-0.8	0.0006-0.001	0.0006-0.002
AQM18	0.004-0.01	0.009-0.01	0.05-0.4	0.06-0.4	0.0001-0.0006	0.0002-0.0006
AQM22	0.01-0.04	0.03-0.05	0.04-2.3	0.2-2.3	0.0001	0.0001-0.0007
AQM31	0.02-0.07	0.04-0.1	0.5-7	0.8-8	0.0001-0.0004	0.0002-0.001
AQM4	0.008-0.02	0.02-0.05	0.06-0.1	0.1-0.3	0.0003-0.0006	0.0003-0.0008
AQM5	0.05-0.09	0.08-0.1	0.07-0.7	0.3-0.8	0.0005-0.0009	0.0006-0.0009
AQM8	0.008-0.02	0.02-0.09	0.1-0.2	0.2-0.4	0.0004-0.0005	0.0004-0.0008
AQM28	0.1-0.2	0.2-0.5	0.4-0.7	0.8-1	0.005-0.03	0.005-0.04
AQM29	0.02	0.03-0.1	0.09-0.2	0.3-0.4	0.0004-0.0008	0.0006-0.001

4.1 WATER QUALITY PREDICTIONS

The WQM prediction statistics (max, min, mean for each month of each phase of the project) of the Expected Case and Upper Case for point source discharge water quality and receiving environment water quality, are summarized as tables in Appendix G. Likewise, plots of POIs modelled in the PROJ-WQM for the Expected and Upper Cases are presented in Appendix H. The overall general trends observed at each model node and the predicted exceedances of relevant water quality guidelines / benchmarks are discussed in this section. The predicted water qualities of bed seepage (i.e. not captured in seepage collection ditches) from the TMF and the MRSA are presented in Appendix I for the Expected Case and Upper Case respectively; however, the seepage water quality is not discussed directly in this report as groundwater discharge to the receiving environment is assumed to be diffuse and subject to considerable dispersion and attenuation.

4.1.1 Point Source Mine Discharges

In the PROJ-WQM, point source discharges of contact water from the mine to the immediate downgradient receptors include:

- Discharge from the collection pond to the Keewatin River (model node QM03) during operations.
- Overflow from the open pit directly into a tributary of the Keewatin River (KEE3-B1) during post closure (once the open pit is flooded).

4.1.1.1 Collection Pond

As outlined in the conceptual model, the collection pond model node discharges to modelling node/cell QM03 during construction and operations. The collection pond collects dewatering water from the MRSA (east section), open pit, any overflow from the TMF, as well as site runoff. It also acts as a source of water to the mill during the periods of time the pond volume in the TMF is not sufficient for reclaim (not realized in the PROJ-WQM). During closure, the WQM assumes the collection pond continues to collect seepage from the site but the water is directed to the open pit and not directly discharged from the mine site.

The PROJ-WQM predicts that all POIs will meet MDMER guidelines and acute water quality within the collection pond during operations, with the exception of the maximum predicted concentration exceeding short-term CWQG-FAL and MSOG-FAL ammonia guideline for the Upper Case scenario (modelled for contingency planning purposes). The predictions for the collection pond are shown in Table 4-7.

Table 4-5 Predicted Effluent Concentrations from the Collection Pond for all POIs that Exceed Guidelines for the Expected or Upper Case Scenarios

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Sched. 4 Limit (mg/L)[2]	Expected Case				Upper Case			
				Construction Phase		Operations Phase		Construction Phase		Operations Phase	
				Mean	Max	Mean	Max	Mean	Max	Mean	Max
Ammonia (as N)		Equation[3]		0.176	0.332	0.282	1	0.664	0.895	1.04	**2.22**
Ammonia (NH_3)[1]			0.5	0.0493	0.0930	0.0790	0.280	0.186	0.251	0.291	**0.622**
Arsenic			0.1	0.0132	0.0205	0.0131	0.0292	0.0157	0.0211	0.0328	0.0733
Arsenic (d)		0.34		0.00135	0.00438	0.0114	0.0276	0.00381	0.0111	0.0309	0.0715
Boron	29			0.00827	0.0112	0.019	0.0379	0.0184	0.0234	0.0716	0.152
Cadmium	Equation			0.000115	0.000185	0.0000324	0.000106	0.000159	0.0002	0.000507	0.00117
Cadmium (d)		Equation		0.00000606	0.0000131	0.0000148	0.0000426	0.0000498	0.000111	0.000488	0.00115
Chloride	640			3.15	4.99	1.54	3.61	5.56	6.66	4.3	5.52
Chromium (d)		Equation		0.000105	0.000132	0.00015	0.000173	0.000302	0.000397	0.000752	0.00125
Chromium VI (d)		0.16		0.000106	0.00013	0.00015	0.000173	0.000302	0.000398	0.000752	0.00125
Copper			0.3	0.00101	0.00395	0.0016	0.00212	0.00222	0.00929	0.00439	0.0076
Copper (d)		Equation		0.000849	0.00496	0.000693	0.00121	0.00181	0.00947	0.00414	0.00724
Cyanide			0.5	0.00844	0.137	0.000544	0.00767	0.000963	0.00235	0.000637	0.0085
Cyanide (free)		0.022		0.000598	0.00171	0.000534	0.000614	0.00752	0.0117	0.000987	0.00124
Lead			0.1	0.00237	0.00385	0.00049	0.00218	0.000203	0.000494	0.000413	0.000615
Lead (d)		Equation		0.0000591	0.000105	0.0000936	0.000137	0.00983	0.159	0.0137	0.0171
Manganese (d)	Equation			0.24	0.635	0.157	0.386	0.00253	0.00389	0.000849	0.00232
Molybdenum	2			0.000773	0.00237	0.00562	0.0134	0.00365	0.00608	0.0185	0.039
Nickel			0.5	0.00371	0.00523	0.00756	0.0167	0.00686	0.0118	0.0383	0.0893
Nickel (d)		Equation		0.000946	0.00289	0.00619	0.0148	0.00406	0.00831	0.0369	0.0871
Uranium	0.033			0.000353	0.000552	0.00126	0.00266	0.00481	0.00676	0.00975	0.0133
Zinc			0.4	0.00924	0.0129	0.00443	0.00852	0.0281	0.0337	0.041	0.0516
Zinc (d)	Equation	Equation		0.00213	0.00271	0.00308	0.0036	0.021	0.0296	0.0396	0.0503

Notes:
The proposed collection pond is planned to discharge to the receiving environment only during the Construction and Operations phases.
CWQG-FAL = Canadian Water Quality Guidelines - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved
"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the collection pond (calculated from predicted Mg and Ca).
[1]Unionized ammonia (NH_3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.
[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021.
[3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

4.1.1.2 Open Pit Overflow

The predicted concentrations in the open pit increase throughout operations, as the pit expands, and additional mine rock is exposed. This water is directed to the collection pond. During closure the open pit collects contact water from the TMF, MRSA, and collection pond and a pit lake forms. Once the water level in the open pit reaches the overflow spillway, the surface water in the open pit will discharge to KEE3-B1 tributary (expected to occur between Year 34 and Year 36).

In the PROJ-WQM, the open pit is divided into shallow water (upper 15% of pit lake) and deeper water (lower 85% of pit lake) to simulate stratification. Initially, during closure, the predicted water quality in the open pit surfaces water is of significantly better water quality than bottom water. The reason for this is that the model assumes that all contact water is directed to the bottom of the open pit. The concentrations in the lower portion of the pit increases significantly at closure due to loads from the MRSA and TSF that are discharged to the pit at depth. During the initial years of post-closure, the predicted concentrations tend to increase as PAG rock at the site is assumed to load under locally acidic conditions; however, concentrations in the lower portion of the pit lake quickly reach steady state. Once the bottom water volume reaches 85% of the total pit capacity, the water at depth is assumed to mix with the surface water as there is no other outlet for this source.

Surface water in the open pit is initially of significantly better water quality than at depth (not shown); however, the surface water quality begins to deteriorate once the bottom of the pit begins to mix with the surface water. Overall, the predicted concentrations in the surface water are moderately lower than the concentrations at depth. The reason for this is that runoff from the area and precipitation on this pit only contributes to the surface water cell and provide a source of dilution. Further, some parameters undergo settling in the surface waters due to adsorption to organic matter/sediment and subsequent settling of this matter (arsenic, cadmium and copper). The predicted concentrations in the open pit surface water is presented in Table 4-8.

Table 4-6 Predicted Effluent Concentrations for the Open Pit Discharge

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Post-Closure			
				Expected Case		Upper Case	
				Mean	Max	Mean	Max
Ammonia (as N)		Equation[3]		0.191	0.316	0.505	0.838
Ammonia (NH3)[1]			0.5	0.0535	0.0885	0.141	0.235
Arsenic			0.1	0.00802	0.0104	0.0188	0.0261
Arsenic (d)		0.34		0.00736	0.00978	0.0181	0.0254
Boron	29			0.0179	0.0217	0.0593	0.0743
Cadmium	Equation			0.0000532	0.0000785	0.000376	0.000504
Cadmium (d)		Equation		0.0000495	0.0000732	0.000373	0.000499
Chloride	640			2.79	3.4	4.2	5.55
Chromium (d)		Equation		0.000269	0.000331	0.00175	0.0022
Chromium VI (d)		0.16		0.000269	0.000331	0.00175	0.0022
Copper			0.3	0.00286	0.00465	0.00819	0.0224
Copper (d)		Equation		0.00171	0.00221	0.00692	0.0224
Cyanide			0.5	0.0183	0.0333	0.0382	0.0628
Cyanide (free)		0.022		0.00264	0.00322	0.00306	0.00373

Table 4-6 Predicted Effluent Concentrations for the Open Pit Discharge

Parameter	Short-term CWQG-FAL (mg/L)	Short-term MSOG-FAL (mg/L)	MDMER Shedule 4 Limit (mg/L)[2]	Post-Closure			
				Expected Case		Upper Case	
				Mean	Max	Mean	Max
Lead			0.1	0.000526	0.000687	0.000966	0.00113
Lead (d)		Equation		0.000241	0.000307	0.000651	0.000747
Manganese (d)	Equation			0.268	0.322	0.839	0.938
Molybdenum	2			0.0036	0.00579	0.0129	0.0184
Nickel			0.5	0.0171	0.0224	0.0793	0.0992
Nickel (d)		Equation		0.0155	0.0203	0.0775	0.097
Uranium	0.033			0.00123	0.0015	0.00634	0.00827
Zinc			0.4	0.00813	0.0104	0.0413	0.0592
Zinc (d)	Equation	Equation		0.00697	0.00889	0.0401	0.0592

Notes:
The proposed open pit is planned to discharge to the receiving environment only during post-closure.
CWQG-FAL = Canadian Water Quality Guidline - Freshwater Aquatic Life; MSOG-FAL = Manitoba Standards, Objectives, and Guidelines - Freshwater Aquatic Life; MDMER = Metal and Diamond Mining Effluent Regulations; (d) = dissolved
"Equation" = the guideline is dependent on hardness (except the MSOG-FAL ammonia guideline, which is dependent on pH). All hardness-depended guidelines were calculated on a month-by-month basis using predicted hardness in the open pit (calculated from predicted Mg and Ca).
[1]Unionized ammonia (NH3) was calculated from total ammonia (as N) using the CCME (2010) equation originally developed by Emerson et al (1975). Values for water temperature and pH were conservatively assigned 20 C and 8.5 for all calculations.
[2]Predictions were screened against the future MDMER Schedule 4 limits coming into force on June 1, 2021. [3]The short-term MSOG-FAL for ammonia (as N) was calculated with a conservatively assumed pH of 8.5.

4.1.2 Receiving Environment Water Quality

The water quality predictions of the receiving environment are compared against long-term guidelines (CWQG-FAL and MSOG-FAL) at mixing cells (Appendix I). The POIs that are predicted to exceed long-term guidelines for the Expected Case are shown in Table 4-9.

Table 4-7 Parameters that Exceed Guidelines in the Receiving Environment from the Expected PROJ-WQM

Parameters	Background		Construction		Operations		Closure		Post-Closure	
	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG
AQM4 (QMO2)										
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
AQM8 (QMO6)										
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
AQM10 (QM11)										
Phosphorus, Total		X		X		X		X		X
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
AQM11 (QM08)										

Table 4-7 Parameters that Exceed Guidelines in the Receiving Environment from the Expected PROJ-WQM

Parameters	Background		Construction		Operations		Closure		Post-Closure	
	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG	CWQG	MSOG
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
Copper, Dissolved		X		X		X		X		X
Copper, Total	X		X		X		X		X	
Nickel, Dissolved		X		X		X		X		X
Nickel, Total	X		X		X		X		X	
Zinc, Dissolved	X		X		X		X		X	
AQM16 (Minton Lake)										
Phosphorus, Total		X		X		X		X		X
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
Cadmium, Total			X		X		X		X	
AQM18 (KEE3_B1)										
Fluoride									X	X
Phosphorus, Total		X		X		X		X		X
Aluminum, Total									X	X
Arsenic, Total									X	
Cadmium, Dissolved										X
Cadmium, Total									X	
Copper, Total									X	
Manganese, Dissolved	X		X		X		X		X	
AQM29 (QM05)										
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
Copper, Dissolved		X		X		X		X		X
Copper, Total	X		X		X		X		X	
Nickel, Dissolved		X		X		X		X		X
Nickel, Total	X		X		X		X		X	
Zinc, Dissolved	X		X		X		X		X	
AQM31 (KEE3-PAY1)										
Phosphorus, Total		X		X		X		X		X
Aluminum, Total	X	X	X	X	X	X	X	X	X	X
Iron, Total	X	X								

Note: X indicates an exceedance of a water quality guidelines was identified

During operations, water from the mine site is discharged directly to the Keewatin River; however, during closure, the open pit discharges into a tributary of the Keewatin River, KEE3-B1. KEE3-B1 also received contact groundwater seepage from the MRSA and TMF as does the tributary north of the mine, KEE3-PAY1. Groundwater seepage is also predicted to discharge into Minton Lake, which is located outside of the Keewatin River catchment, in the Cockeram River catchment. To facilitate discussion of the predicted water quality in the receiving environment, the receiving environment is discussed in the following order:

- Tributaries to the Keewatin River
- Keewatin River
- Minton Lake and Cockeram River
- Cockeram Lake.

4.1.2.1 KEE3-B1 Tributary

The KEE3-B1 tributary is located downgradient from the mine. During operations, the overall area contributing to this catchment is reduced as the Project is located partially in this catchment and the tributary receives seepage from the MRSA and TSF (Upper Case only). During closure and post-closure, the tributary receives seepage from the MRSA and TSF (Expected and Upper Case) as well as overflow from the open pit. Particle tracking modelling (Stantec 2020b) shows that the majority of the bed seepage from the MRSA and TMF discharges immediately beneath the seepage collection ditch. In the winter (November to March) the PROJ-WQM assumes groundwater seepage that discharges to the tributary will freeze. However, the PROJ-WQM also assumes that in April, the seepage will thaw and contribute to loads in the tributary. This is considered a conservative assumption because in April runoff (source of dilution to the tributary) is minimal (i.e. snowmelt typically occurs in May and June). Therefore, while seepage is the dominate source of loadings to the stream, the model predicts that the highest concentrations occur in April. Once the open pit discharges into catchment, concentrations in the tributary throughout the year are predicted to increase; however, the maximum predicted concentrations during the winter tend to decrease.

The predictions for the KEE3-B1 node are considered conservative for several reasons, outlined below:

- The placement of ditches and water management activities can be optimized on the mine site to capture more bed seepage than was predicted by the groundwater model, as ditch location optimization was not conducted. During operations, it is likely a greater degree of seepage water will be captured in the ditches.
- The predictions assumed that groundwater flows prior to snowmelt (April). In reality, it is likely that the thawing of frozen water within the tributary will coincide with snowmelt.
- The PROJ-WQM assumes the open pit will discharge during the winter. However, this is unlike to occur due to ice formation in the open pit (not considered in the model). The most sensitive times correspond to predictions during the winter, when runoff is minimized. During the spring and summer, in the tributary, discharge from the open pit will be diluted with unimpacted catchment runoff.

- The model does not consider controlled pit lake semi-passive treatment strategies. Concentrations in the surface water of the open pit can be reduced by controlling stratification of the pit lake and amending the surface waters of the lake with fertilizer to promote biological activity. Trace metals will sorb to the organic matter in the lake which will settle out of the water column and accumulate in the sediment.
- The mean particle travel time from the TMF to KEE3-B1 indicates that the bulk of the seepage from the TMF is not expected to discharge into the tributary for 244 years. The travel time in the model was shortened to 80 years so that predictions could account for this source of water and predictions would remain conservative.

Phosphorus, fluoride, total aluminum, total arsenic, total cadmium, total copper, total manganese, and dissolved cadmium are predicted to exceed long-term guidelines in the Expected Case model run. Phosphorus and manganese are naturally elevated in the catchment. Fluoride, total cadmium, and total copper are largely the result of seepage that bypasses the collection ditch and can likely be managed by optimizing placement of the ditch and subsequently rerouting that seepage to the open pit. The PROJ-WQM predicts multiple exceedances of long-term guidelines for the Upper Case scenario, including fluoride, phosphorus, ammonia, nitrite, nitrate, cyanide, arsenic, aluminum, cadmium, copper, iron, nickel, selenium and zinc. As discussed in Section 4.1.1, the assumptions used to develop the predictions for the Upper Case scenario are highly conservative and are recommended to be used for contingency planning only. None the less, the large number of exceedances at this model node points to the potential need for additional waste management strategies to ensure that all seepage from the MRSA and TMF is collected during all phases of mine life.

4.1.2.2 KEE3-PAY1 Tributary

The KEE3-PAY1 tributary is located north of the mine and it discharges to the Keewatin upgradient of all point source discharges from the Project. The groundwater model predicts that baseflow in this tributary will increase; however, the actual seepage that enters the tributary from the mine site is predicted to be relatively low. As a result, the model predicts that water quality in the KEE3-PAY1 tributary will not change from baseline conditions for the Expected Case or Upper Case scenarios.

4.1.2.3 Keewatin River – QM03

The Keewatin River at model node QM03 receives discharge from the collection pond during operations. Correspondingly, during this time, concentrations in the river are predicted to increase. Predicted concentrations are not expected to exceed long term water quality guidelines in the river for the Expected Case. Total phosphorus, total iron and total cadmium and total zinc are predicted to exceed long term guidelines in the Upper Case scenario; however, total iron and total phosphorus naturally exceed in the baseline data and the elevated cadmium concentration results from source terms based on concentrations observed in one monitoring well (MW-11), which are above 10 x guidelines. It is possible that cadmium concentrations will be reduce through adsorption and settling in the collection pond as well as along the groundwater flow path.

4.1.2.4 Keewatin River – QM06

The model node QM06 in the Keewatin River receives discharge from the KEE-3B1 tributary during post closure as well as upstream loads from the QM03 model node during operations. Corresponding, concentrations increase during operations as a result of effluent from the collection pond (which discharges to QMO3). Concentrations tend to decrease during closure and post-closure until the open pit discharges to KEE3B1. This differs from water quality at KEE3-B1 in that the bed seepage from the MRSA and TMF had a measurable impact on discharge water quality predicted at KEE3-B1, as the seepage constituted a large component of the total flow in the tributary; however, the load from KEE3-B1 to the QMO6 model node is predicted to be relative small. Once the open pit overflows into the tributary, the load from the tributary to the Keewatin River increases.

Total aluminum is predicted to exceed long term guidelines in the Expected Case scenario at OQM06, and that is largely the result of elevated background concentrations. The Upper Case scenario predicts that fluoride, phosphorus, total cadmium, total copper, dissolved cadmium, dissolved nickel and dissolved zinc will exceed long term guidelines as result of the Project; however, Upper Case predictions are only recommended to be used for contingency waste management planning.

4.1.2.5 Keewatin River – QM05

The QMO5 model node receives loads from upstream in the Keewatin River as well as loads from Lynn River. As discussed as part of the validation process, this model node could not be validated and required further calibration; however, the model was validated against concentrations further downgradient in OQM08 (Cockeram River). Therefore, predicted concentrations are only compared to predicted baseline concentrations at this node. Overall, the predicted water quality for the Expected Case is not expected to exceed baseline concentrations by 20%.

4.1.2.6 Minton Lake

Minton Lake does not receive any point-discharge from the Project, but it does receive groundwater seepage from the MRSA and TMF. Water quality in Minton Lake naturally exceeds phosphorus and total aluminum guidelines. The catchment of Minton Lake is predicted to decrease but this only marginally impacts predicted concentrations during construction and operations for the Expected Case. Typically, the concentrations in the lake undergo two identifiable changes. The first change occurs when seepage from the MRSA discharges into the lake and the second change occurs when the TMF seepage discharges into the lake. For the Expected Case, seepage from the Project site does not result in POIs that exceed long term guidelines with the exception of total cadmium, which meets long term guidelines for the Expected Case. Cadmium is expected to be highly attenuated in the groundwater; however, a high degree of attenuation is not considered in the model. Furthermore, groundwater seepage from the MRSA is not expended to result in an exceedance of long term guidelines in the lake; however, the combined seepage from the TMF (which is predicted to take longer to discharge into the Lake) and the MRSA does result in the total cadmium exceedances. An assumption in the model is that seepage from the TMF discharges into the lake 80 years into closure. In fact, the groundwater model indicates that the mean travel time for this flow pathway is 847 years. Over this time frame, dispersion, attenuation and diffusion are likely to significantly decrease plume concentrations.

The Upper Case scenario concentrations predicted for Minton Lake exceed long term phosphorus (naturally elevated), fluoride, total arsenic (temporarily during operations), total aluminum (naturally elevated), total cadmium, total copper, and dissolved cadmium, dissolved nickel and dissolved zinc guidelines. It should be noted that nitrite is not predicted to exceed long term guidelines; however, it was identified as being underpredicted at the Minton Lake model node during model validation. Therefore, it is assumed for the purposes of these discussions, that it is also considered an exceedance as background nitrite concentrations in Minton Lake exceed long term guidelines.

The nitrite and arsenic exceedances are related to seepage from the MRSA reaching Minton Lake during operations. This is because the Upper Case seepage is predicted to reach the lake in 4 years (minimum observed particle tracking time). The mean particle travel time for this flow pathway is 77 years; and therefore, it is unlikely that the predicted upper-case concentrations will be observed in the Lake during operations. Although total aluminum is predicted to exceed guidelines, the predicted aluminum concentrations are within the observed variability at the site. Cadmium and copper, nickel and zinc are very likely to be attenuated along the groundwater flow path, especially considering the relative long travel time between the receptors.

4.1.2.7 Cockeram Lake

Cockeram Lake receives inflows from both the Keewatin River and Cockeram River (which receives loads from Minton Lake). For the Expected Case, total aluminum, total copper, total iron total nickel, dissolved copper, dissolved nickel and dissolved zinc, exceed long term water quality guidelines; however, the background concentrations also exceed guidelines at these locations. In all cases, the predicted concentrations are within the variability currently observed in the Lake and generally the result of loadings from the Lynn River. These same parameters are predicted to exceed guidelines for Upper Case scenario.

5.0 CONCLUSIONS

Stantec developed a comprehensive WBWQM to determine discharge rates and quality of effluent from the Project and predict impacts on the water quantity and water quality in the receiving environment. The WBWQM includes sub-models which simulate baseline conditions at each time step (BL-WBWQM). The impacts of the project were predicted using the PROJ-WBWQM and compared against the BL-WBWQM at each timestep in the model. The BL-WB was calibrated to observed flow data and the BL-WQM was validated against observed water quality data. Overall, the WBWQM is able to reasonably predict baseline flow rates and observed concentrations.

The significant findings for the WB regarding water quantity include the following:

- The flow is predicted to increase at QMO3 during operations due to discharge of effluent from the collection pond. The effluent discharge rate is predicted to range between 0 m3/s and 0.33 m3/s.

- The flow in QMO6 is predicted to increase during operations due to discharge from the collection pond. Flow at this node is also predicted to increase during post closure due to overflow from the open pit to the KEE3-B1 (QM04).
- The open pit is predicted to spill in Year 35 and the overflow rate is predicted to range between 0.01 m3/s and 1.19 m3/s.
- During operations and closure, the flow rate in the KEE3-B1 (QM04) tributary is predicted to decrease by 64% due to the decrease in catchment area.

The significant findings for the WQM regarding water quality include the following:

- The water quality of the collection pond effluent during operations is expected to meet MDMER and short-term guidelines for all POIs.
- The water quality of the open pit overflow during post-closure is expected to meet MDMER and short-term guidelines.
- The WQM predicts that total aluminum, total arsenic, total cadmium total copper, and dissolved cadmium may exceed long term water quality guidelines during post closure at KEE3-B1 as a result of the Project. The source of these POIs includes seepage from the MRSA (closure and post closure), discharge from the TMF (post-closure) and overflow from the open pit (post closure). It is likely the water quality in the KEE3-B1 catchment can be managed by capturing seepage beneath the MRSA and TMF facilities and redirecting this seepage to the open pit and by developing a pit lake fertilization program to promote the sorption of POIs to organic matter and subsequent settling of the organic matter and corresponding removal of the POIs from the pit lake surface water.
- The WQM predicts that total aluminum will exceed guidelines in the Keewatin River during post-closure at the outlet of KEE3-B1 (QM06); however, the variability in the background aluminum concentrations exceed the predicted aluminum concentrations at this location.
- The WQM predicts that total cadmium may exceed guidelines in Minton Lake during post-closure. However, this is predicated on the assumption that cadmium from the TMF will reach Minton Lake within 80 years. The mean travel time from the TMF to Minton Lake is 872 years. Over this time span, it is assumed that cadmium concentrations will be significantly reduced by dispersion, attenuation, and diffusion.

6.0 REFERENCES

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7.0 STANTEC QUALITY MANAGEMENT PROGRAM

This Technical Modelling Report entitled **Lynn Lake Gold Project Hydrology Water Balance and Water Quality Impact Assessment: MacLellan Site**, prepared for Alamos Gold Inc., dated April 30, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individual:

Katie Jones, P.Geo. (ON, BC), P.Chem. (BC)
Senior Geochemist

Signature

Nikolay Sidenko, Ph.D., P.Geo. (MB)
Senior Environmental Geochemist

Signature

This report was reviewed by the following individual:

David Luzi, Ph.D., P.Geo. (MB)
Senior Hydrologist

Signature

Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC (MB), PMP
Senior Project Manager

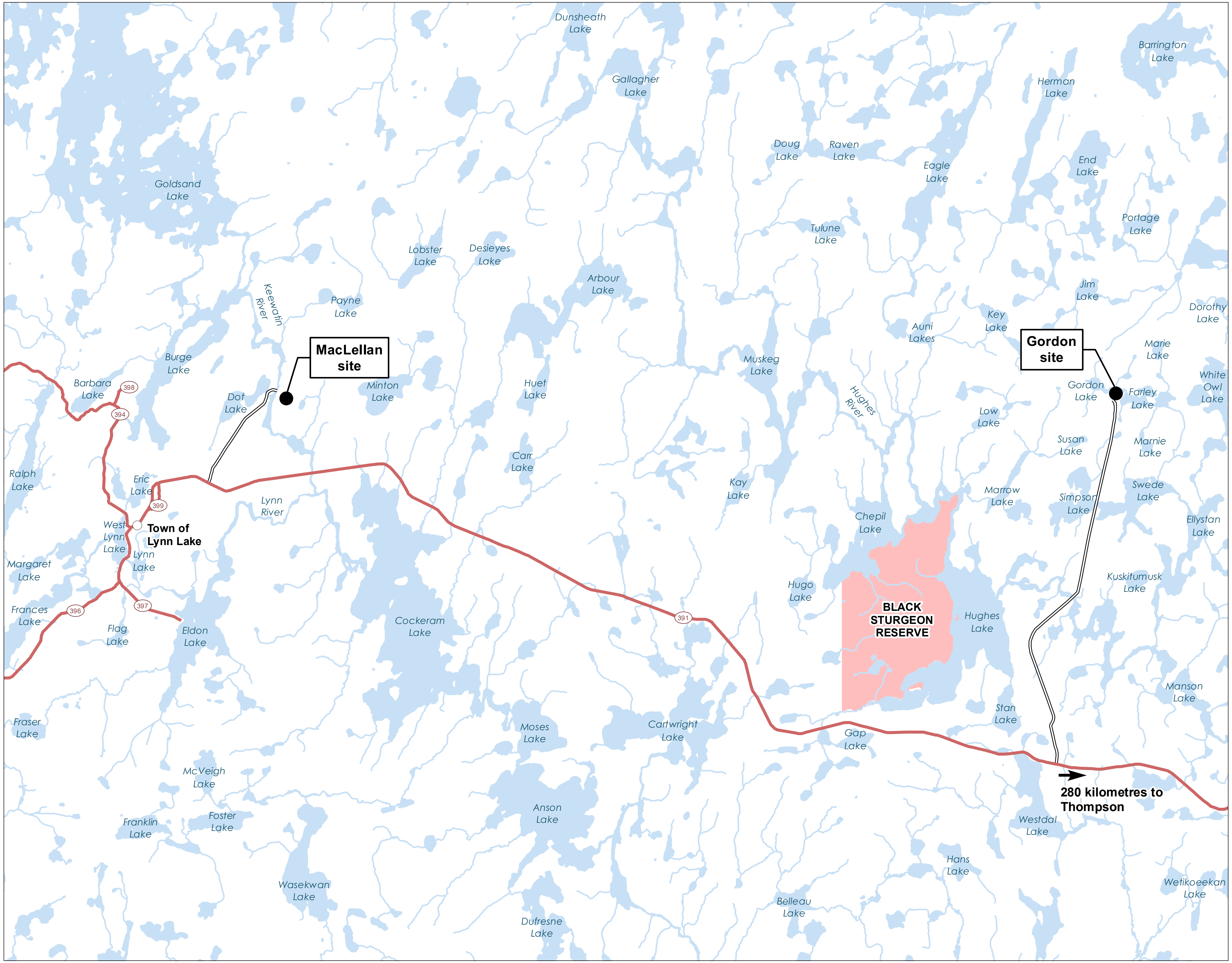
Signature

This report was independently reviewed by Kara Hewgill, B.Sc., Principal

8.0 LIMITATIONS

This Technical Modelling Report entitled Lynn Lake Gold Project Hydrology Water Balance and Water Quality Impact Assessment: MacLellan Site was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Alamos Gold Inc. (the "Client") to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A MAPS



Stantec

Landbase

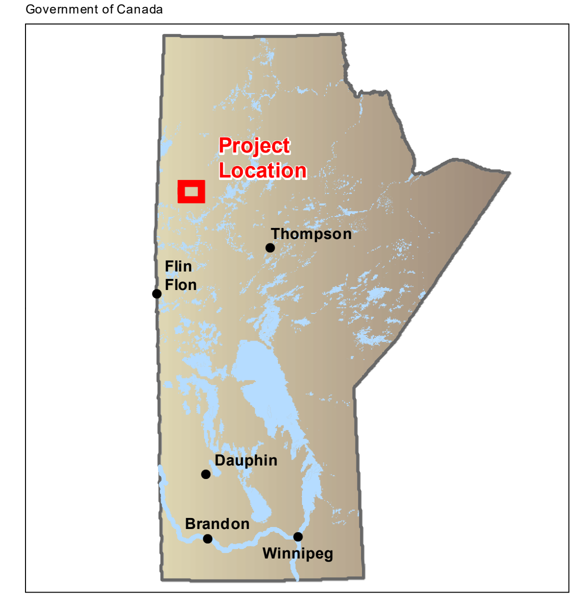
- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:150,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada



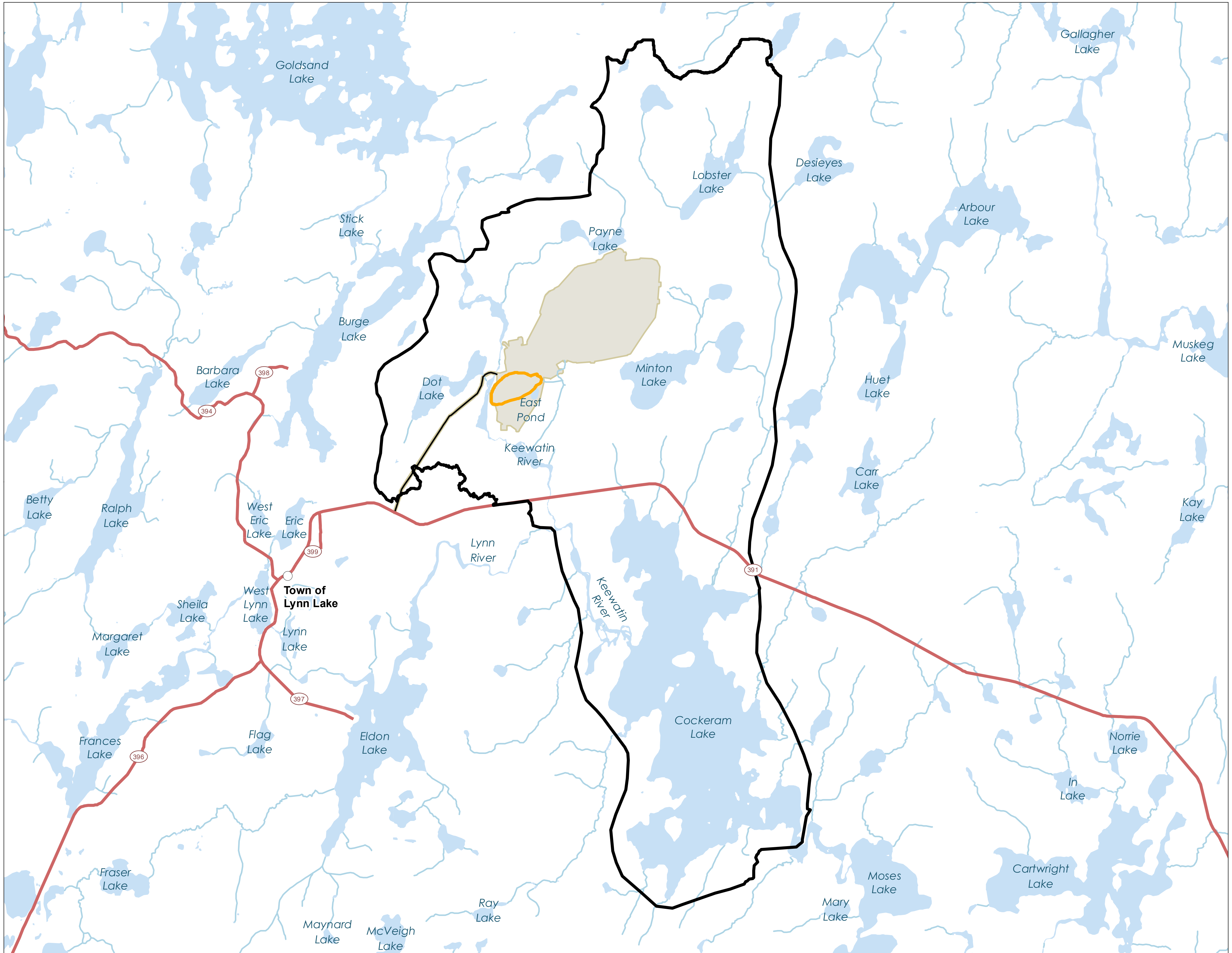
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-01
Technical Review by DLuzi on 2020-05-01

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
1-1

Title
General Project Area



Stantec

Alamos Gold Inc.

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- Surface Water Local Assessment Area (LAA)

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres

(At original document size of 11x17)
1:100,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location

Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-05
Technical Review by JJackson on 2020-05-05
Senior GIS Review by GKroupa on 2020-03-30

Client/Project 111473008

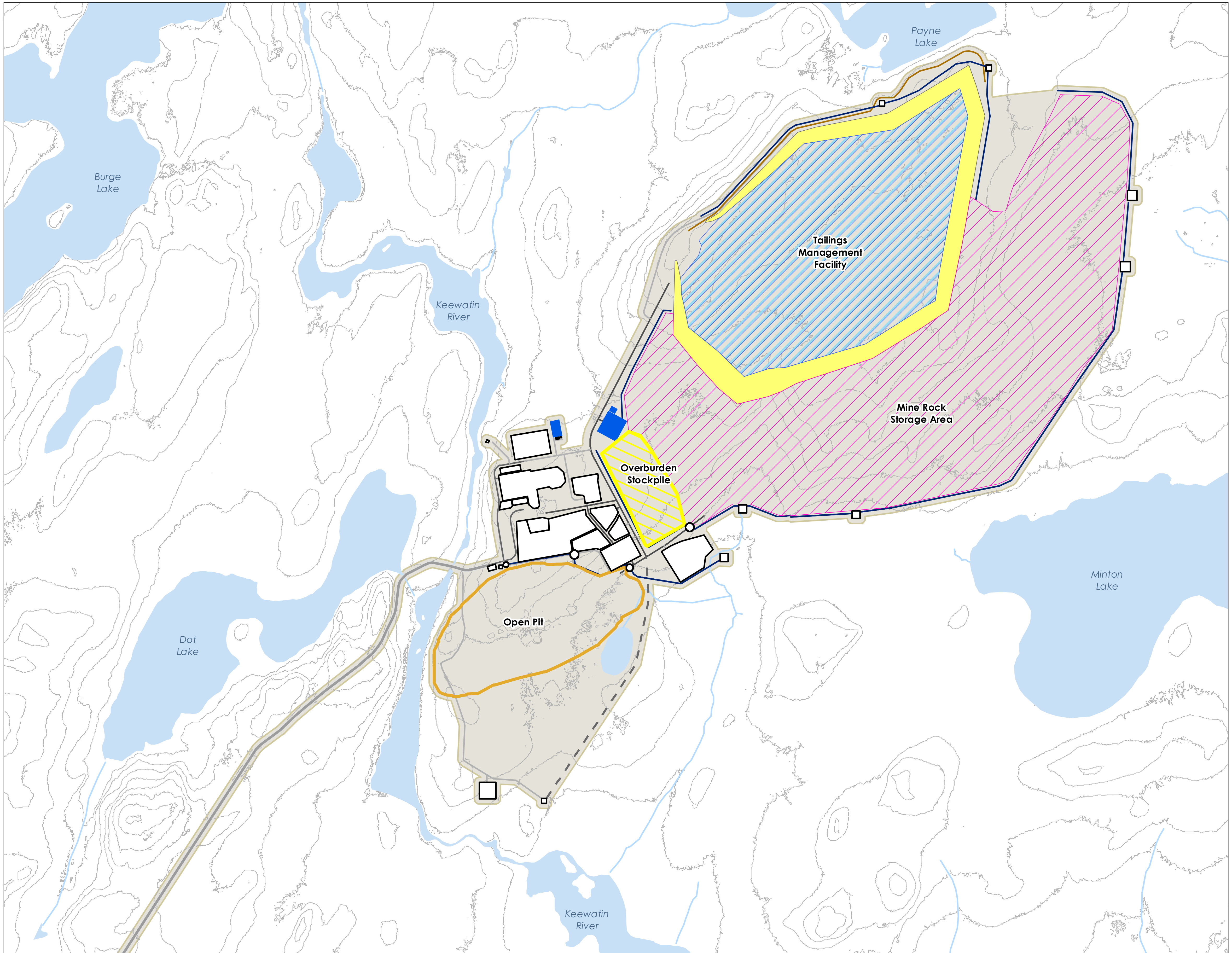
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

1-2

Title

Surface Water Local Assessment Area - MacLellan Site



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Proposed Mine Rock Stockpile
- Proposed Overburden Stockpile
- Proposed Tailings Management Facility
- Proposed Tailings Management Facility Pond
- Other Proposed Ponds
- Other Proposed Areas
- Drainage Ditch
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Landbase

- Existing Access Road
- Contour (5m Interval)
- Watercourse
- Waterbody

N

0 400 800 Metres

(At original document size of 11x17)
1:24,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake,
Manitoba

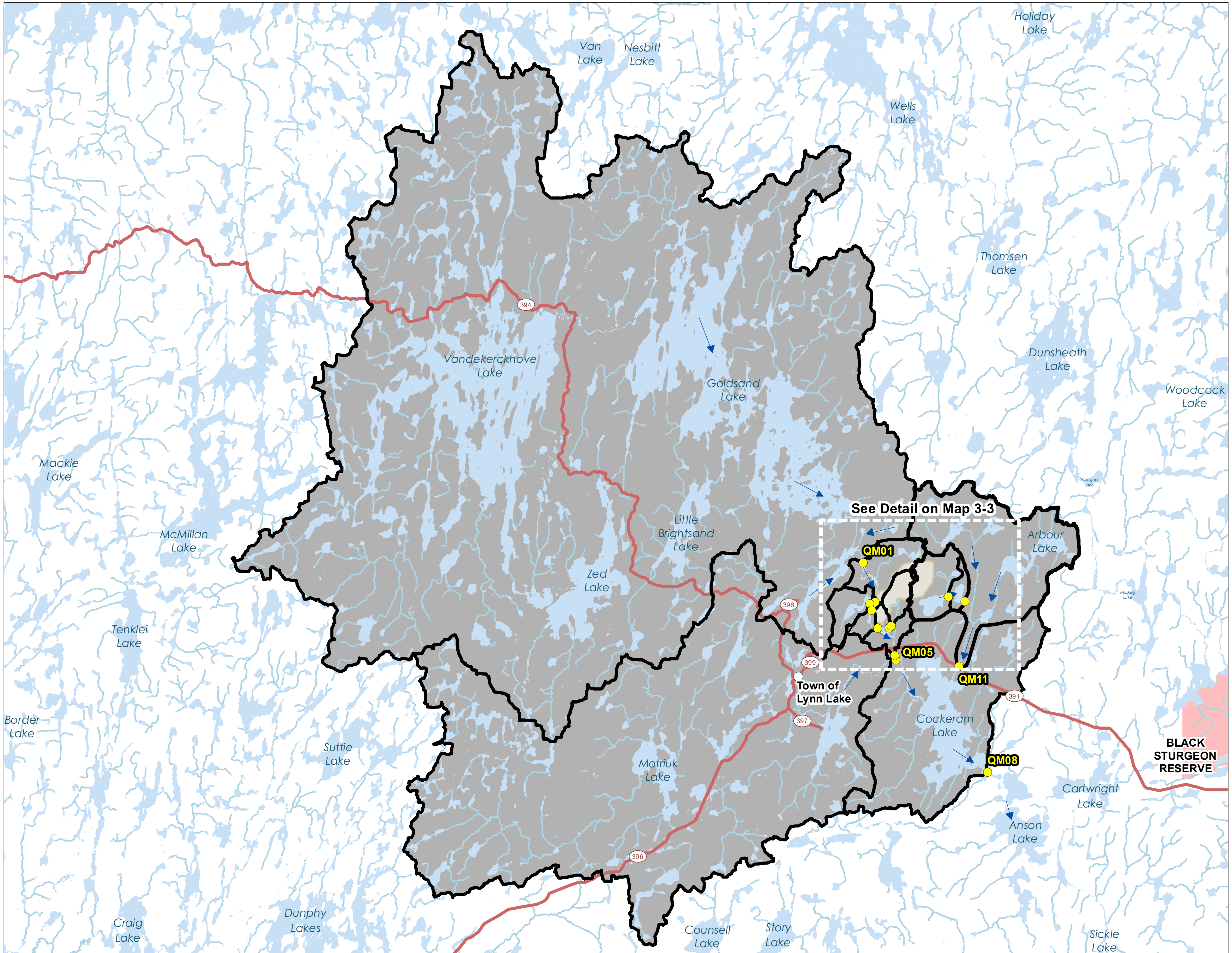
Prepared by ACampigotto on 2020-05-05
Technical Review by DLuzi on 2020-05-05

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
1-3

Title
Project Components at MacLellan Site

\\Ca0045-pbaaf01\gis_GIS_Project_Folder\111440293_AuRico\Figures\Hydrology\2017 Site Water Balance Model\Map2-1_ProjectComponents_MacLellan_20200505.mxd Revised: 2020-05-05 By: ACampigotto



Stantec

Project Infrastructure

Project Development Area

Sample Locations

Hydrology Monitoring Station

Surface Water Flow Direction

Hydrology Monitoring Station Drainage Area

Landbase

Existing Access Road

Highway

Watercourse

Waterbody

First Nation Reserve

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

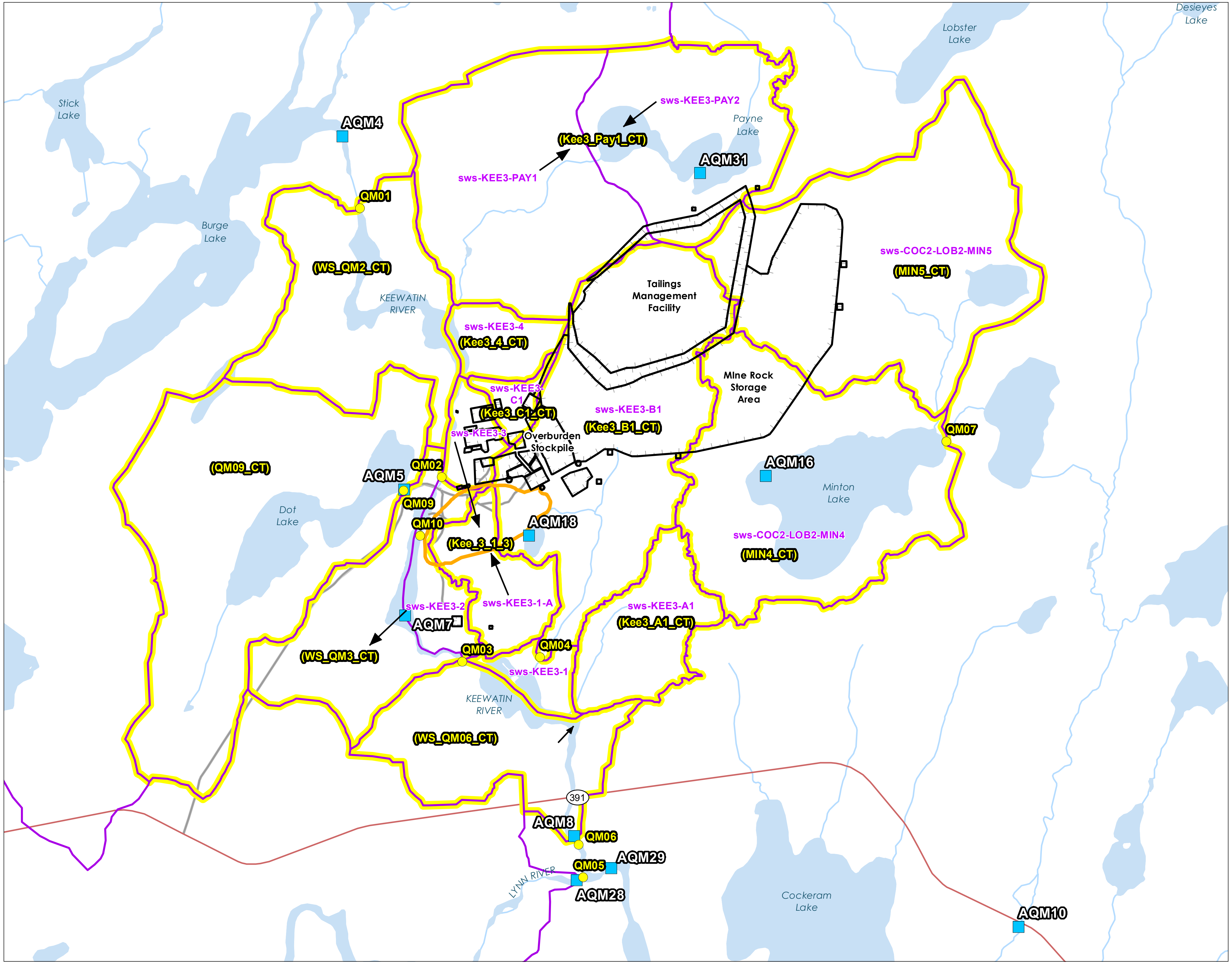
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-05
Technical Review by DLuzi on 2020-05-05

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
3-1

Title
Modelled Watersheds for MacLellan Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Proposed Infrastructure

Project Data

- Hydrology Model Subwatersheds
- sws-FAR5
- Water Quality Model Subcatchments
- (QF04_CT)
- Combined Subwatersheds
- Hydrology Monitoring Station
- Water Quality Station

Landbase

- Access Road
- Highway
- Watercourse
- Waterbody

N

0 0.5 1 Kilometres

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake, Manitoba

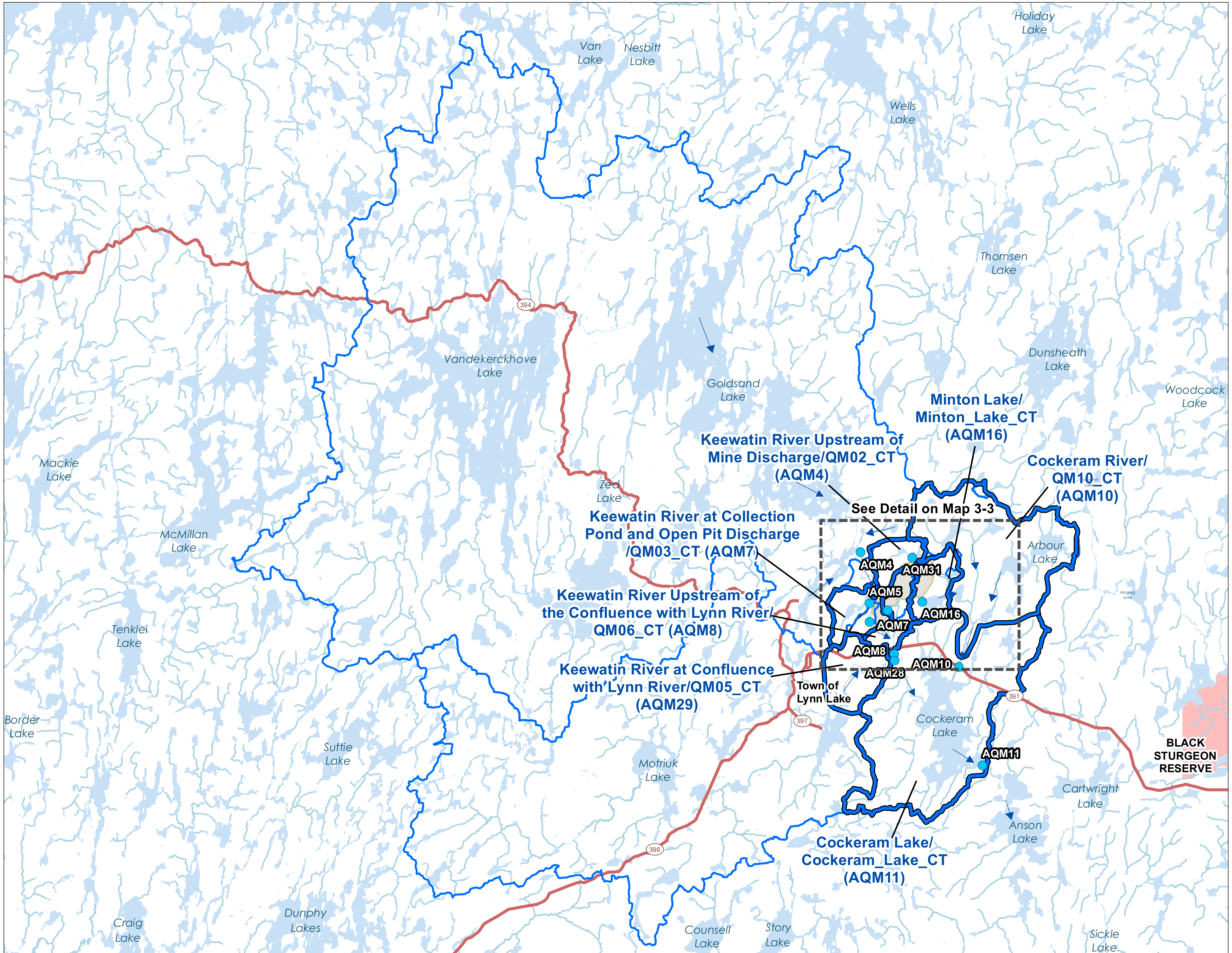
Prepared by ACampigotto on 2020-05-05
Technical Review by DLuzi on 2020-05-05

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
3-3

Title
Project Components and Catchment Areas at MacLellan Site

\\Ca0045-pbaaf01\gis_GIS_Project_Folder\111440293_AuRico\Figures\Hydrology\2017_Site_Water_Balance_Model\Map3-3_ProjectComponents_and_Catchments_MacLellan_20200505.mxd Revised: 2020-05-12 By: ACampigotto



Stantec

Project Infrastructure

- Project Development Area

Sample Locations

- Water Quality Station
- Surface Water Flow Direction
- Catchment (Mixing Cell)
- Subcatchments (Source Cells)

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 5 10 Kilometres

(At original document size of 11x17)
1:275,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-05
Technical Review by DLuzi on 2020-05-05

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
4-1

Title
Catchments for Water Quality Modelling at MacLellan Site

Appendix B FIGURES

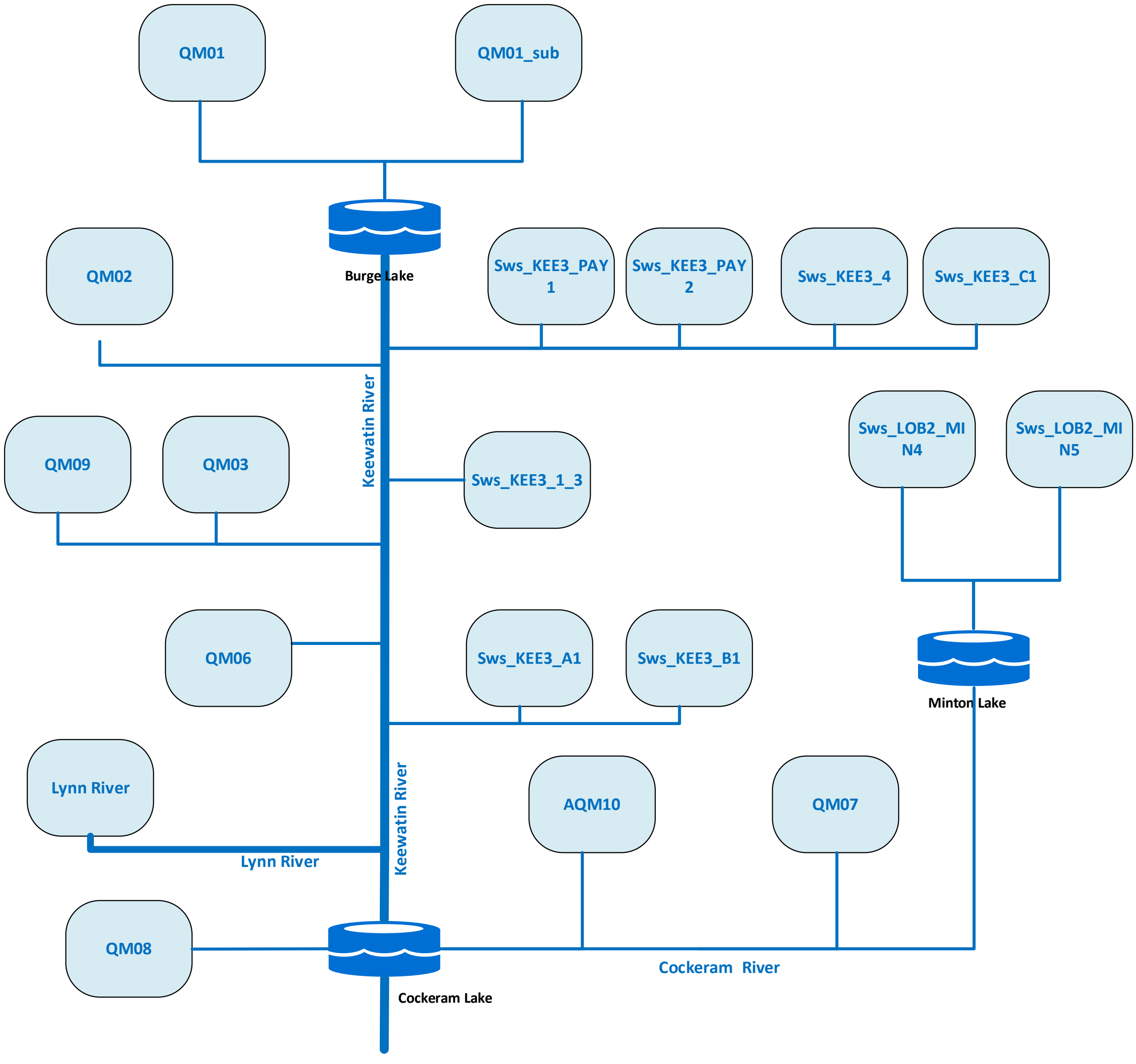


Figure 3-1 Conceptual Model of Catchments and Lakes at the MacLellan Site

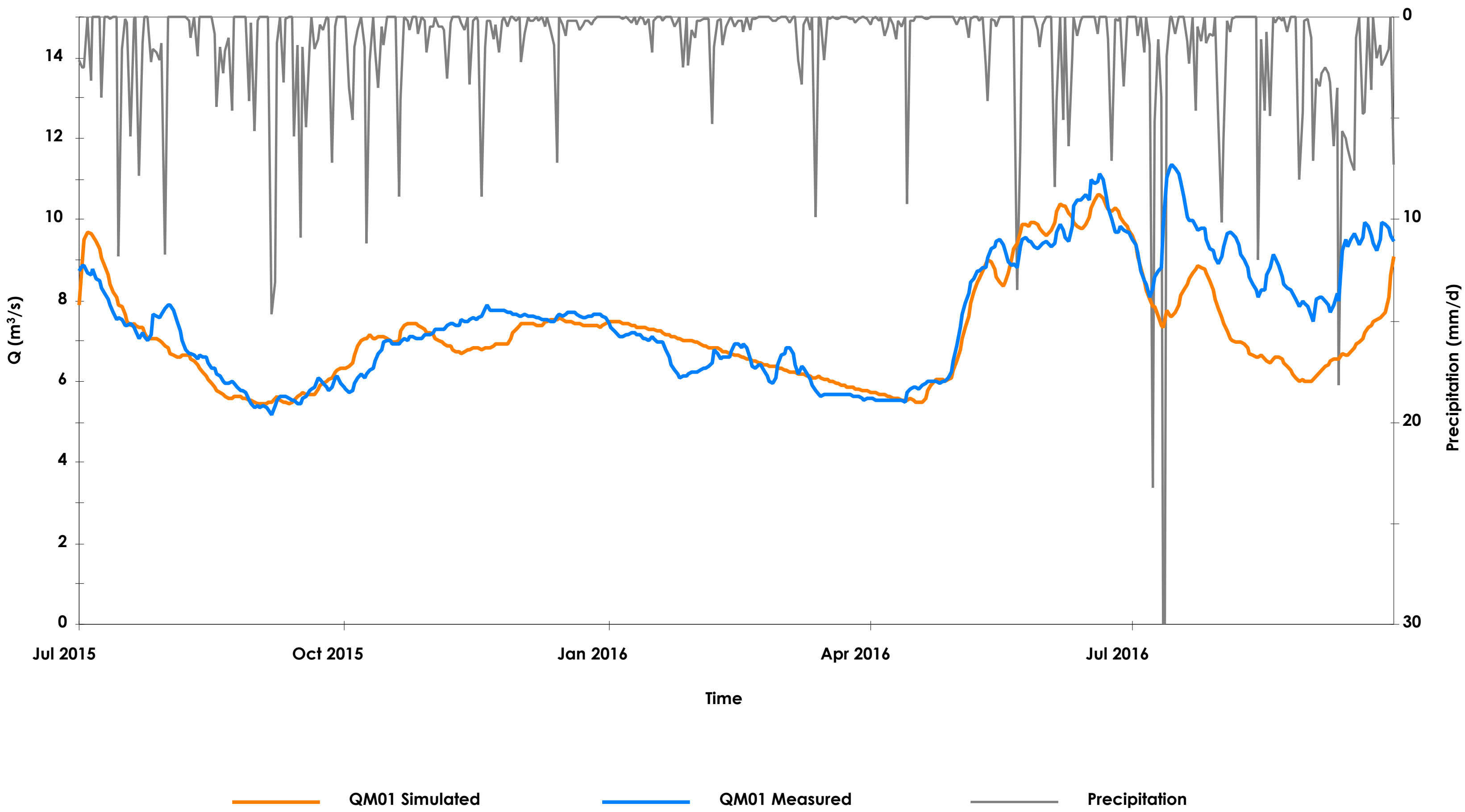


Figure 3-2 Measured and Simulated Monthly Streamflow (QM01)

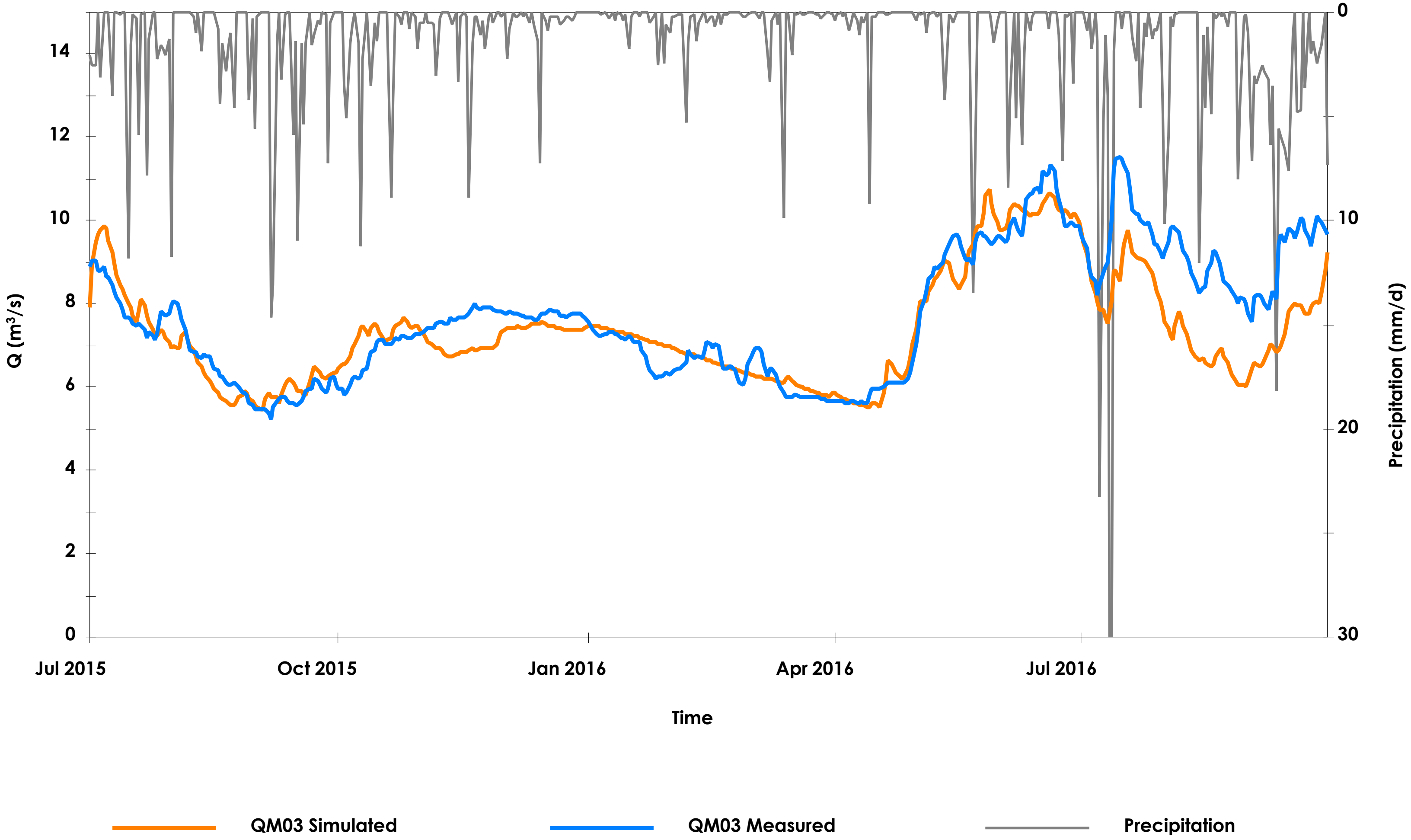


Figure 3-3 Measured and Simulated Daily Streamflow (QM03)

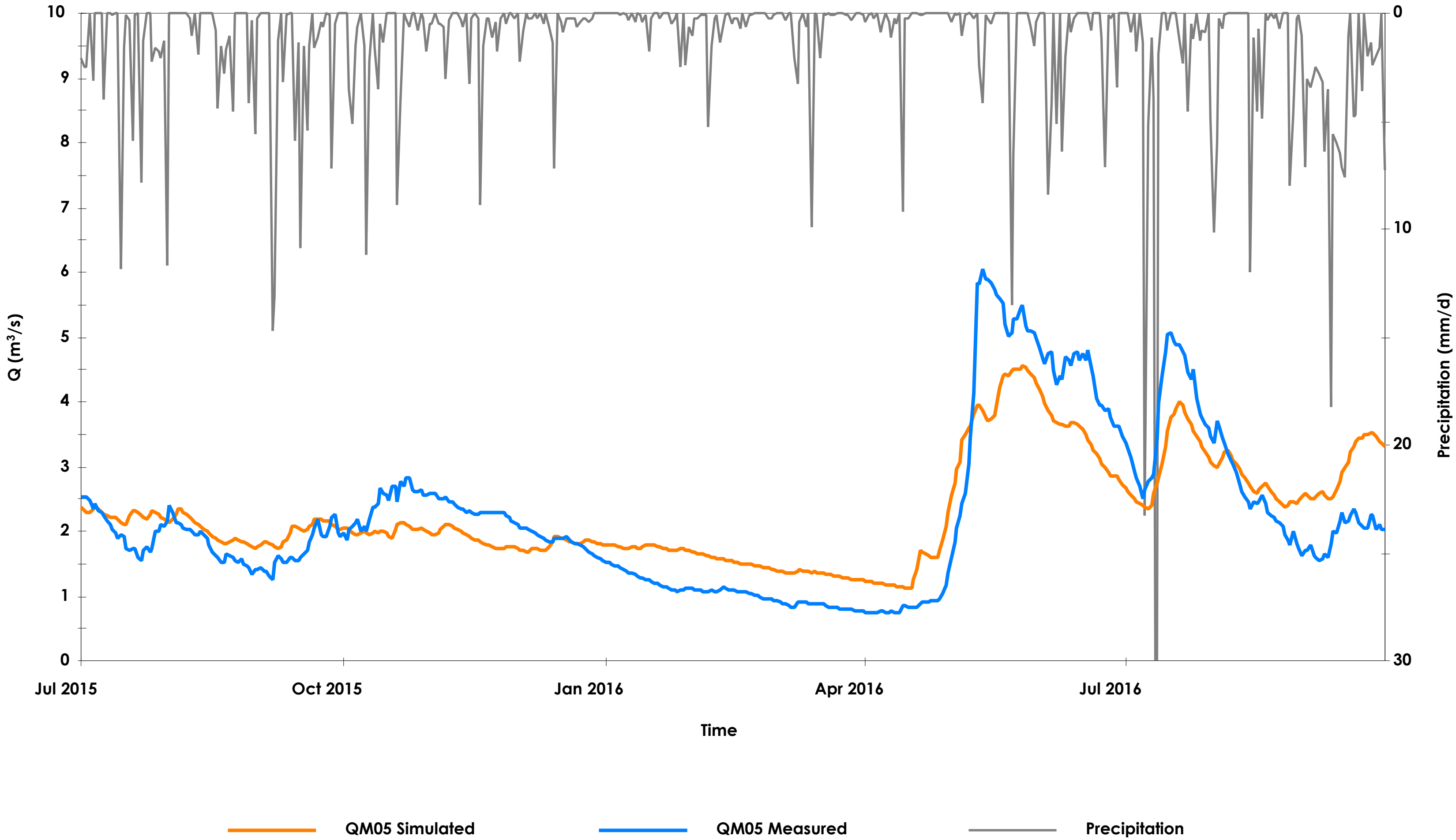


Figure 3-4 Measured and Simulated Daily Streamflow (QM05)

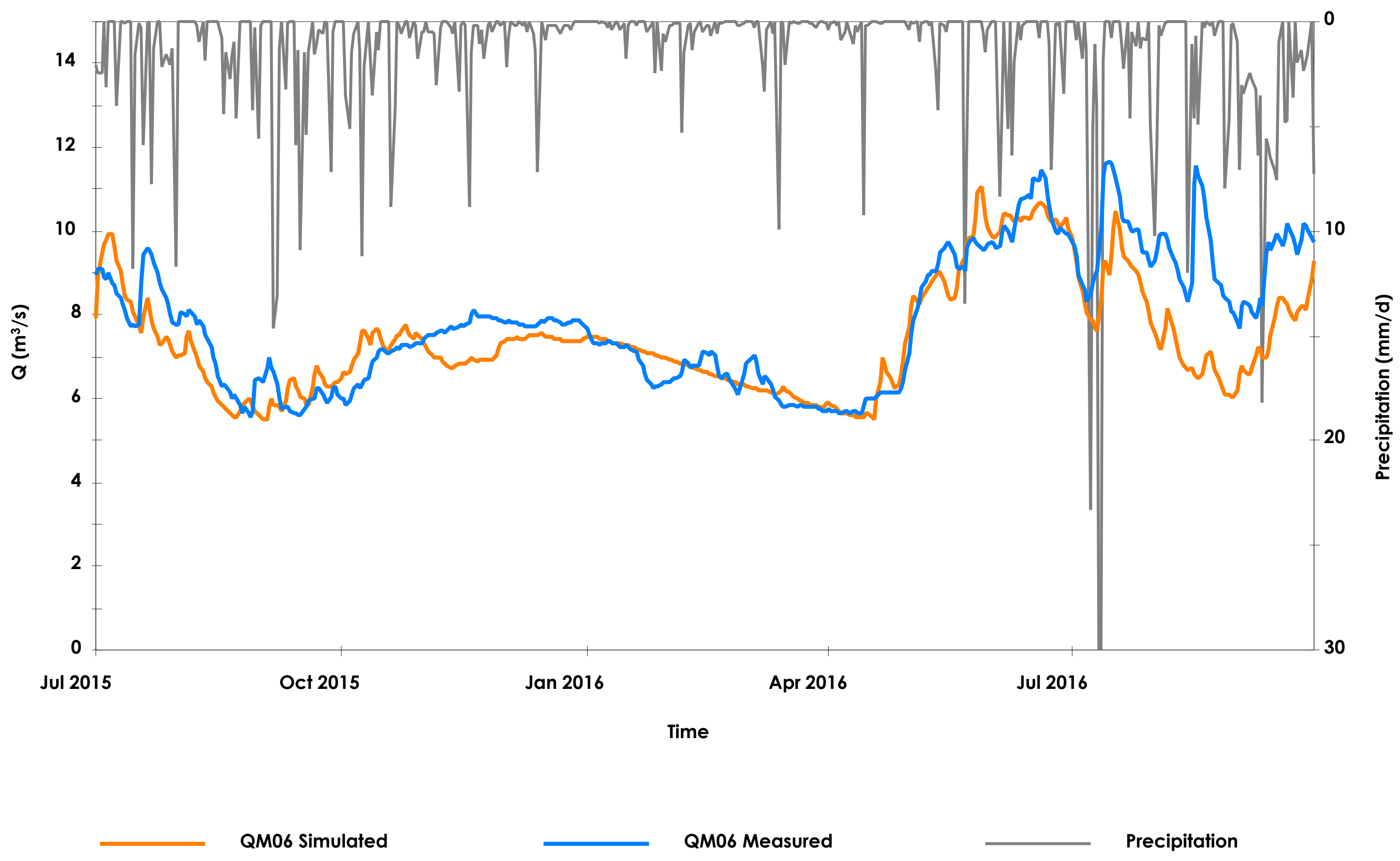


Figure 3-5 Measured and Simulated Daily Streamflow (QM06)

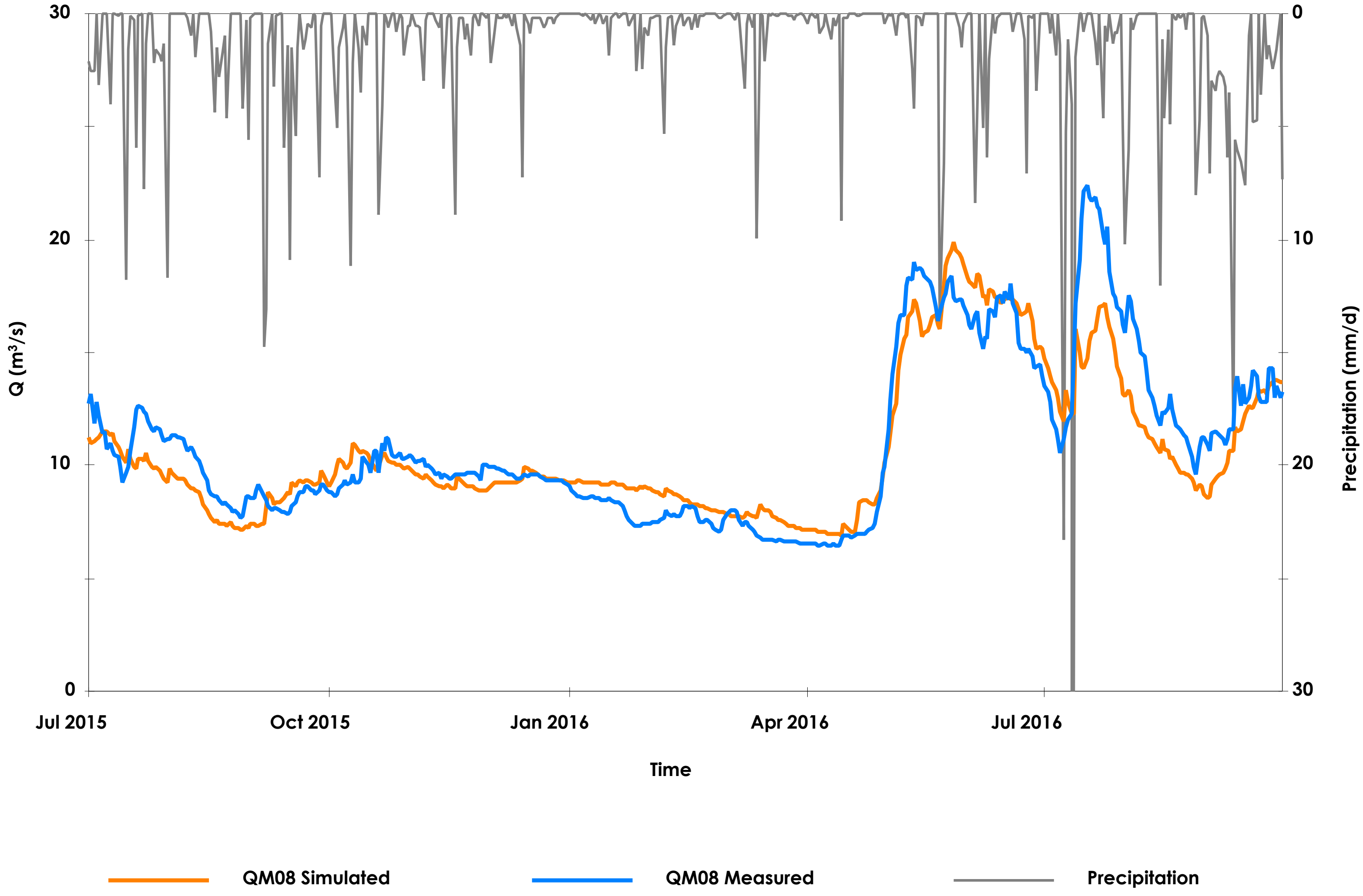


Figure 3-6 Measured and Simulated Daily Streamflow (QM08)

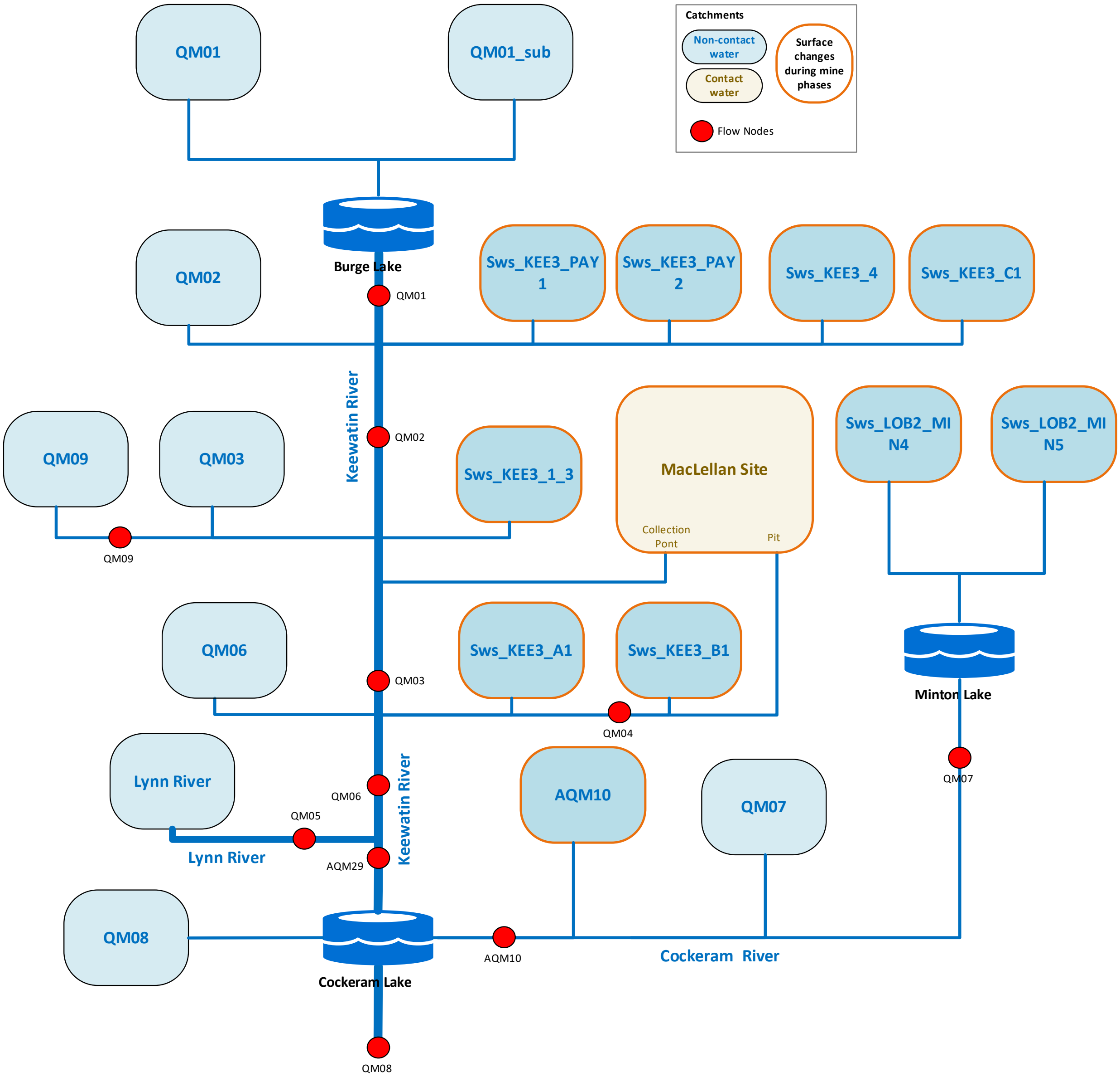


Figure 3-7 Model Structure and Nodes

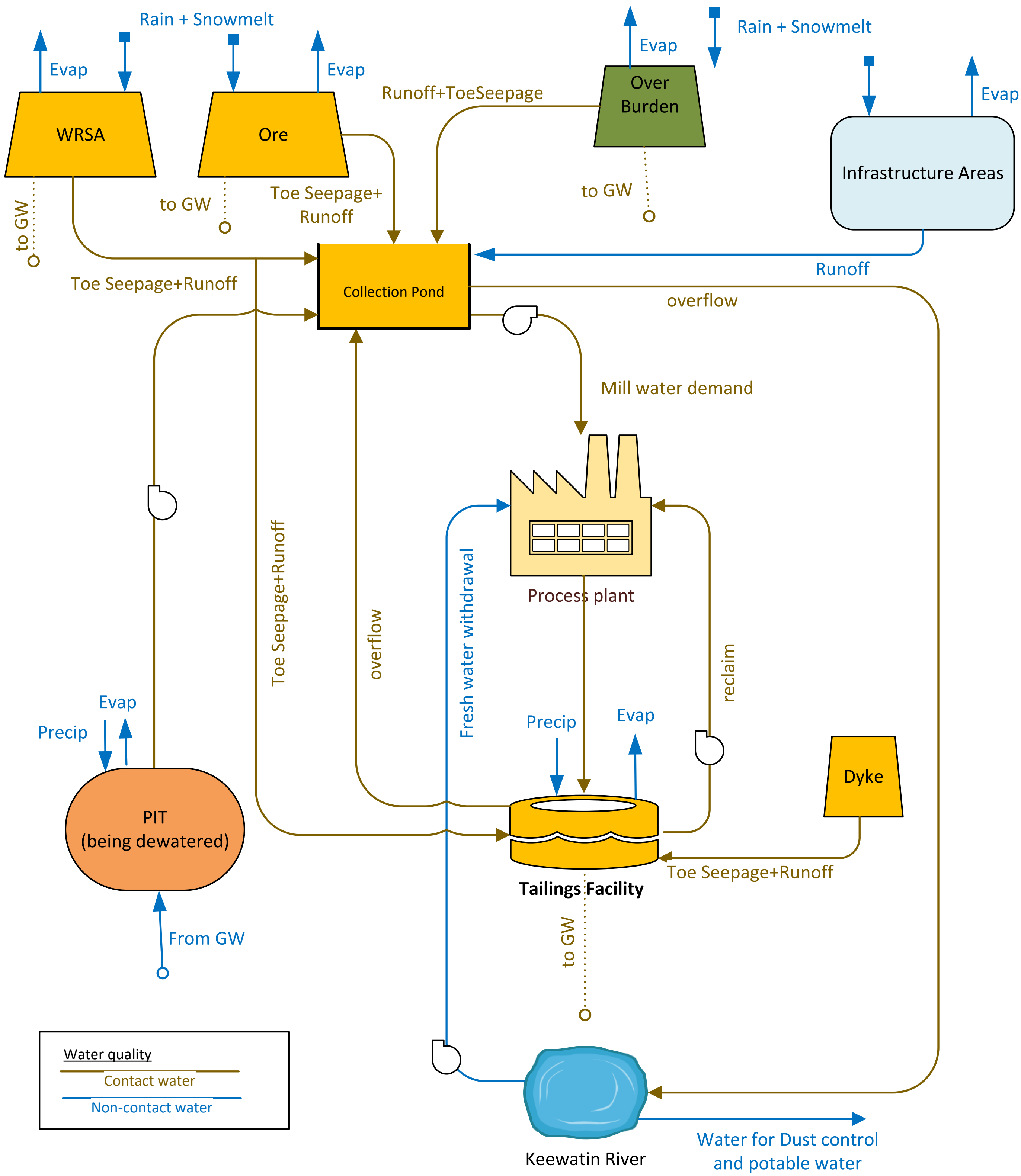


Figure 3-8 Conceptual Model of Mine Water Management - Operation

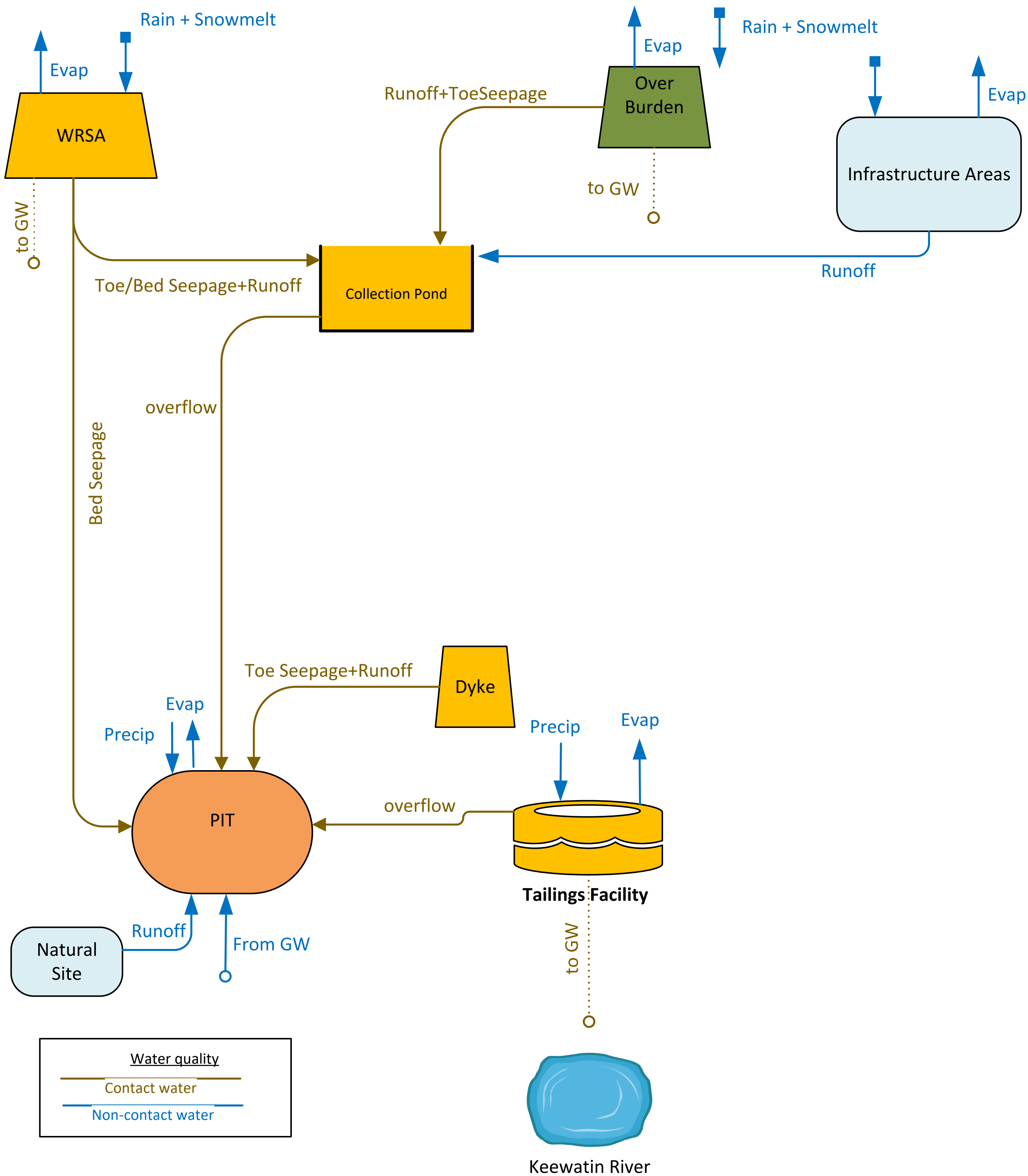


Figure 3-9 Conceptual Model of Mine Water Management - Active Closure

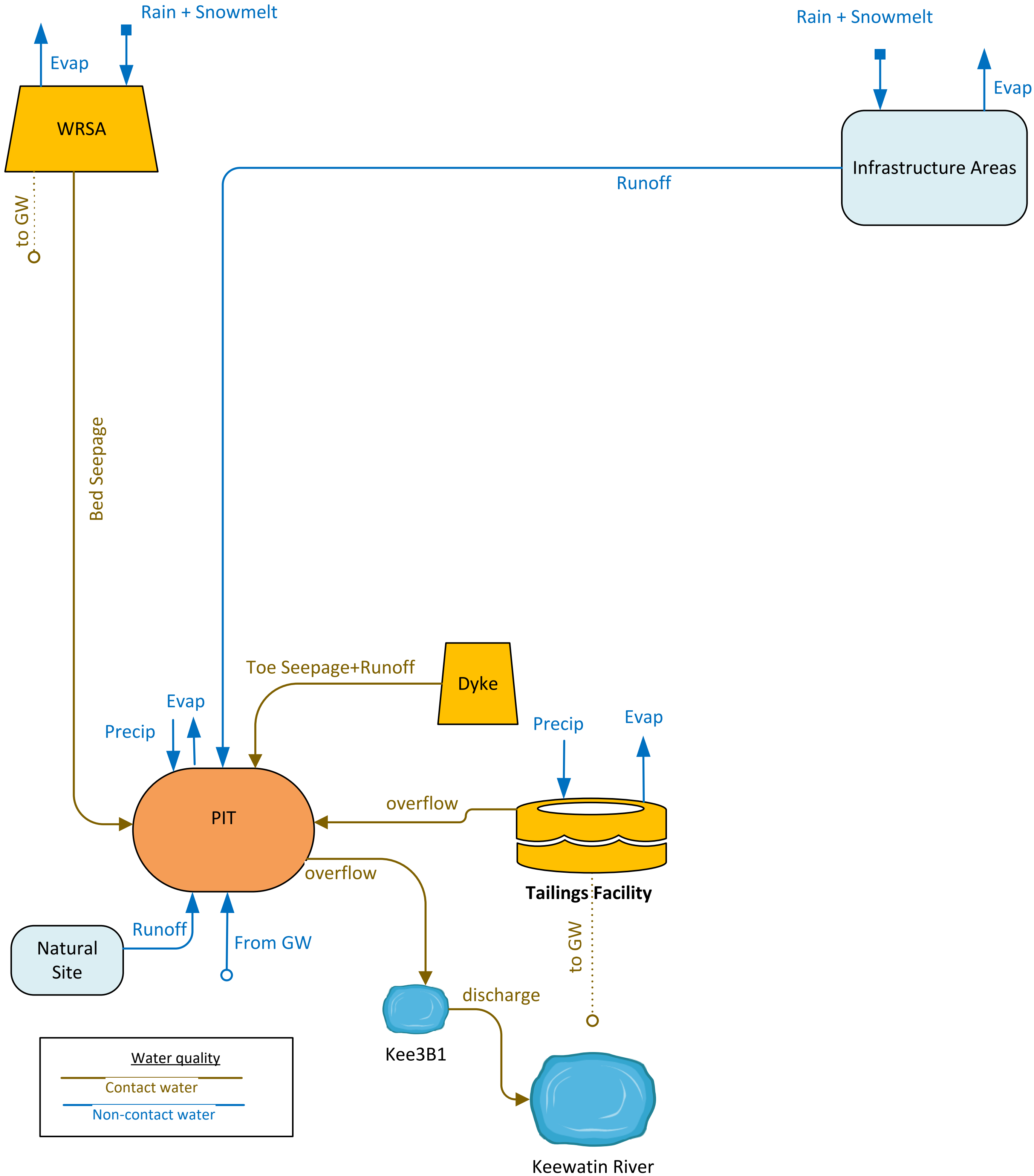


Figure 3-10 Conceptual Model of Mine Water Management - Post-Closure

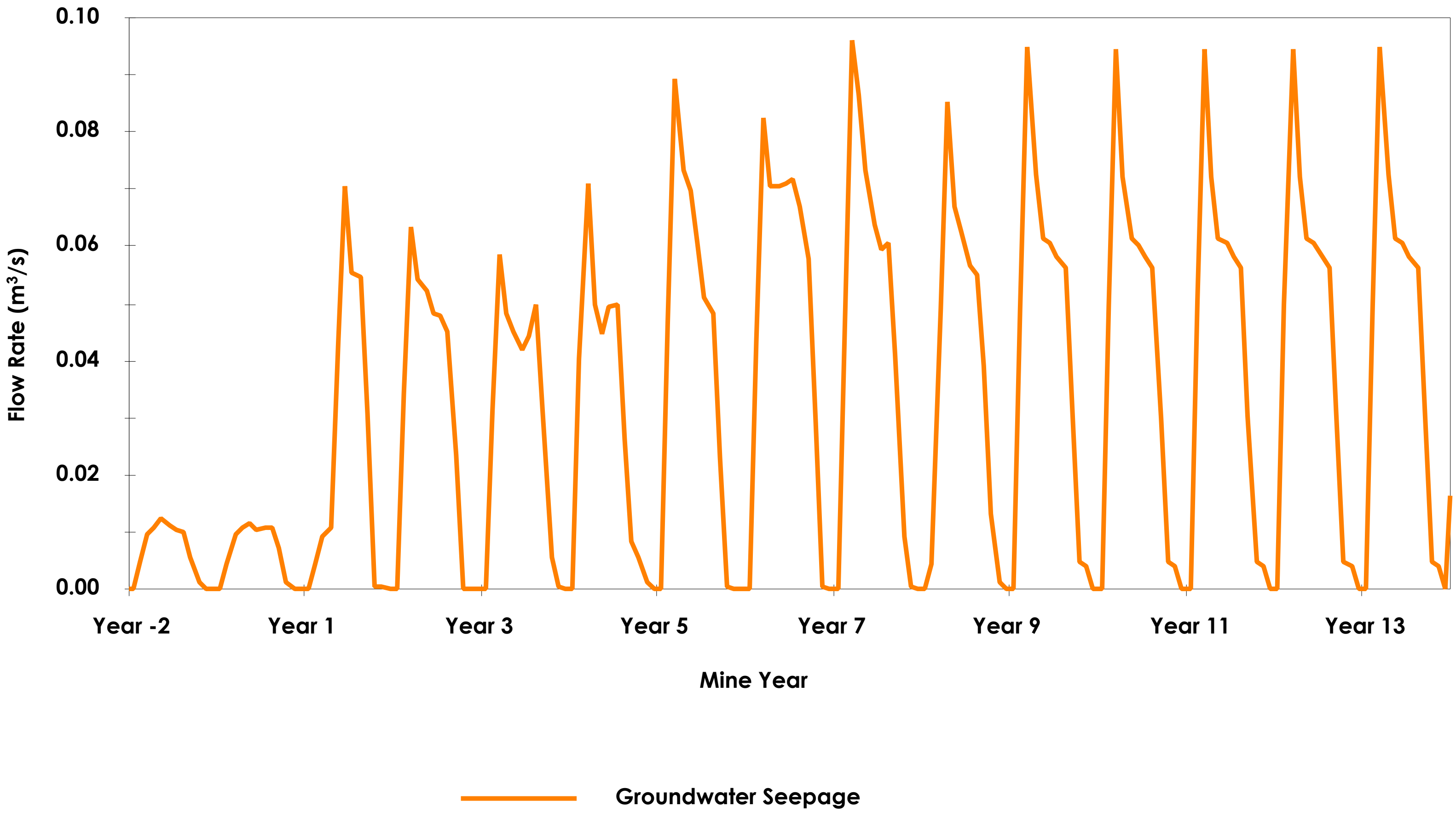


Figure 3-11 Average Groundwater Inflows to Open Pit

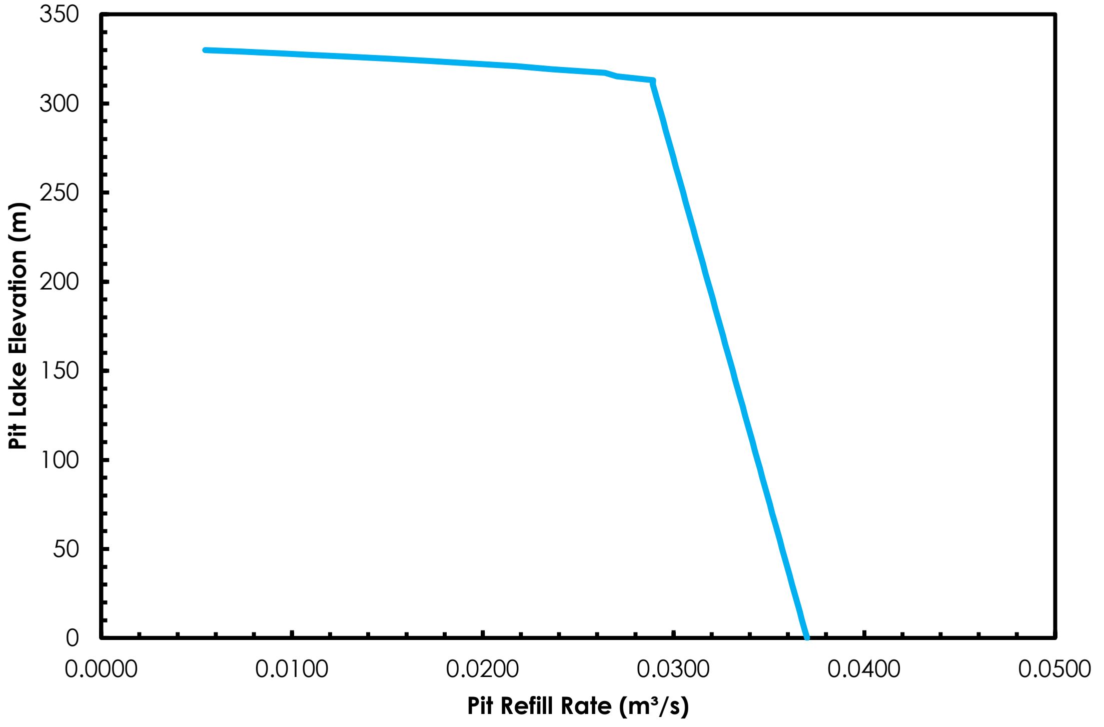


Figure 3-12 Open Pit Recovery Rates using Groundwater Inflows

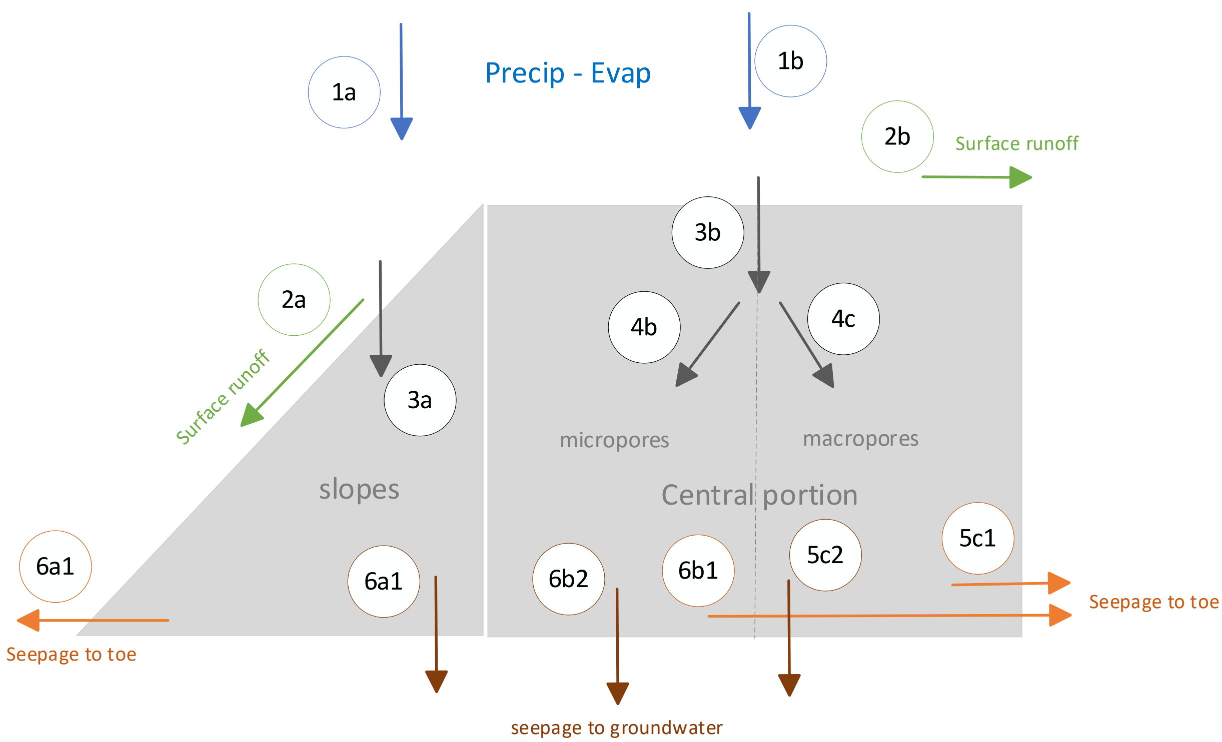


Figure 3-13 Flow Through MRSA

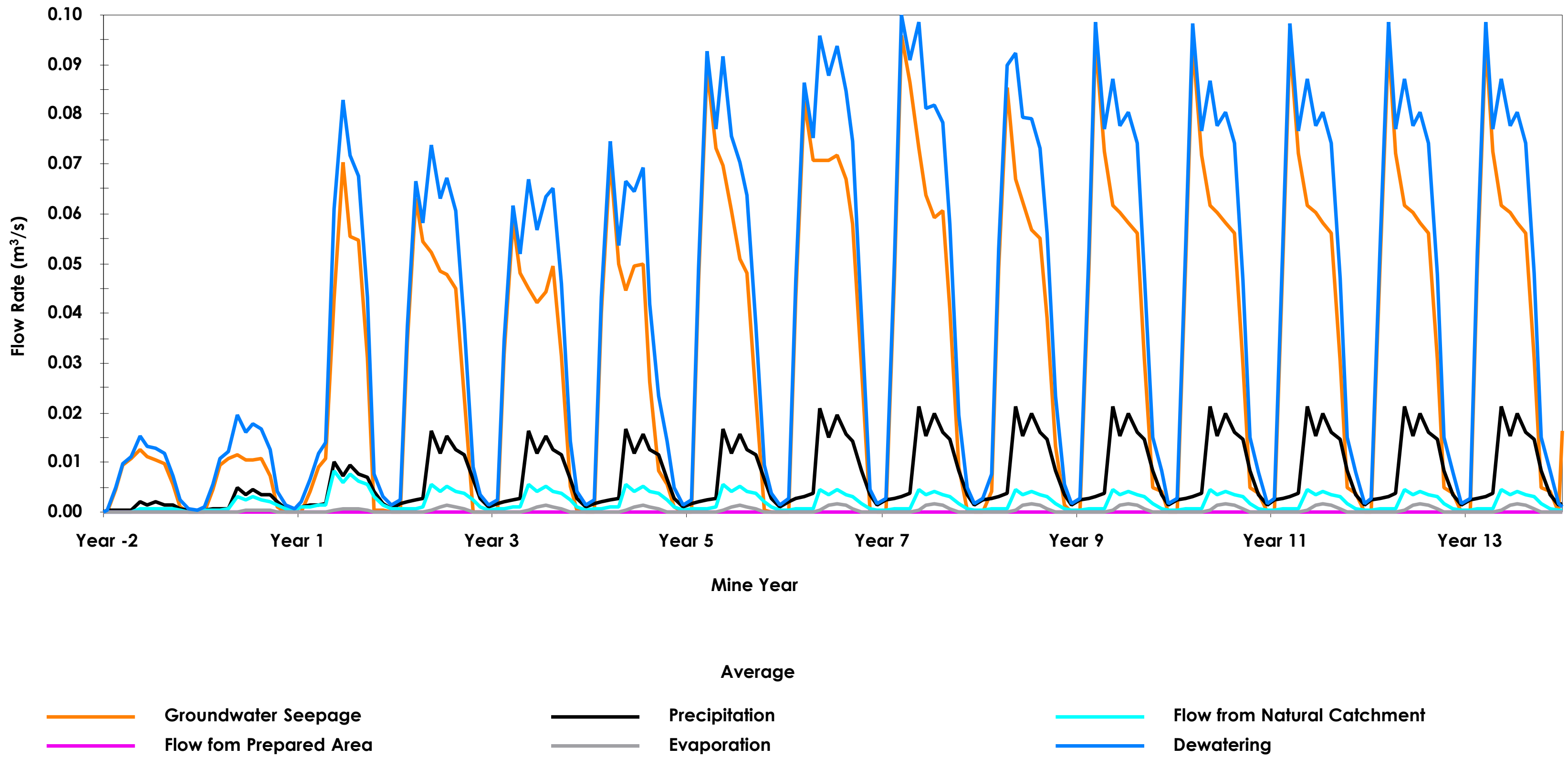


Figure 3-14 Open Pit Seepage and Dewatering Rates - Average Climate

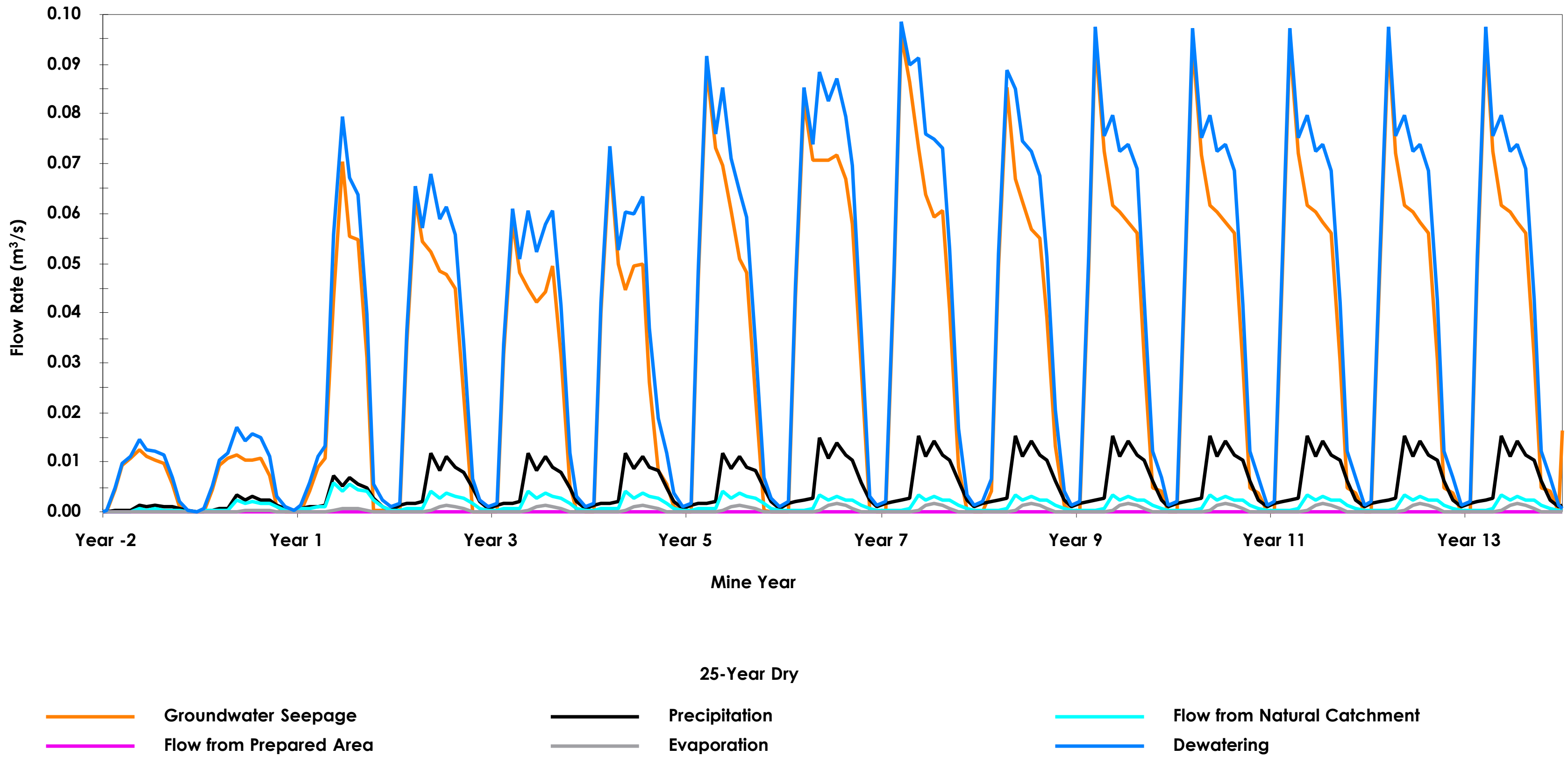


Figure 3-15 Open Pit Seepage and Dewatering Rates - 25-year Dry Climate Scenario

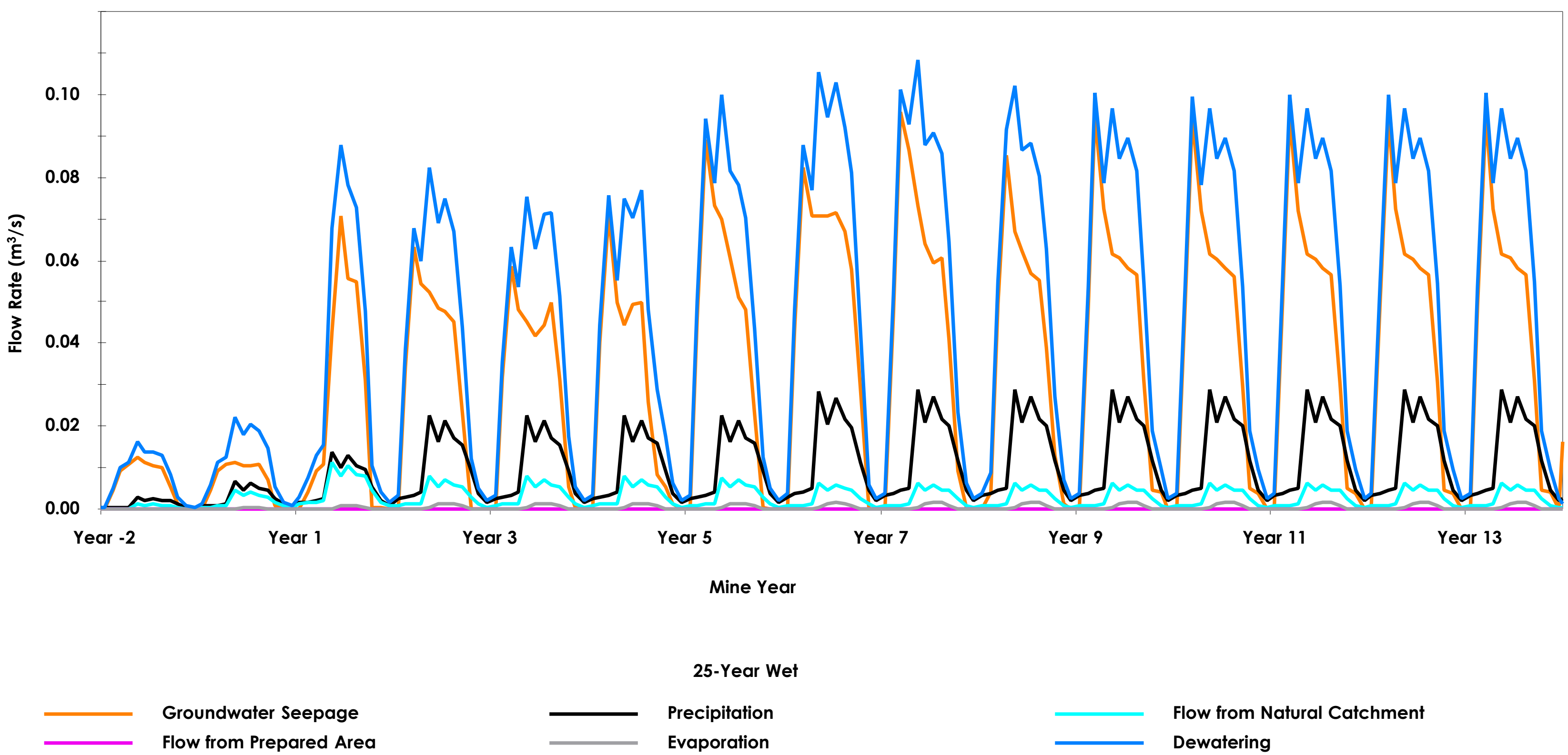


Figure 3-16 Open Pit Seepage and Dewatering Rates - 25-year Wet Climate Scenario

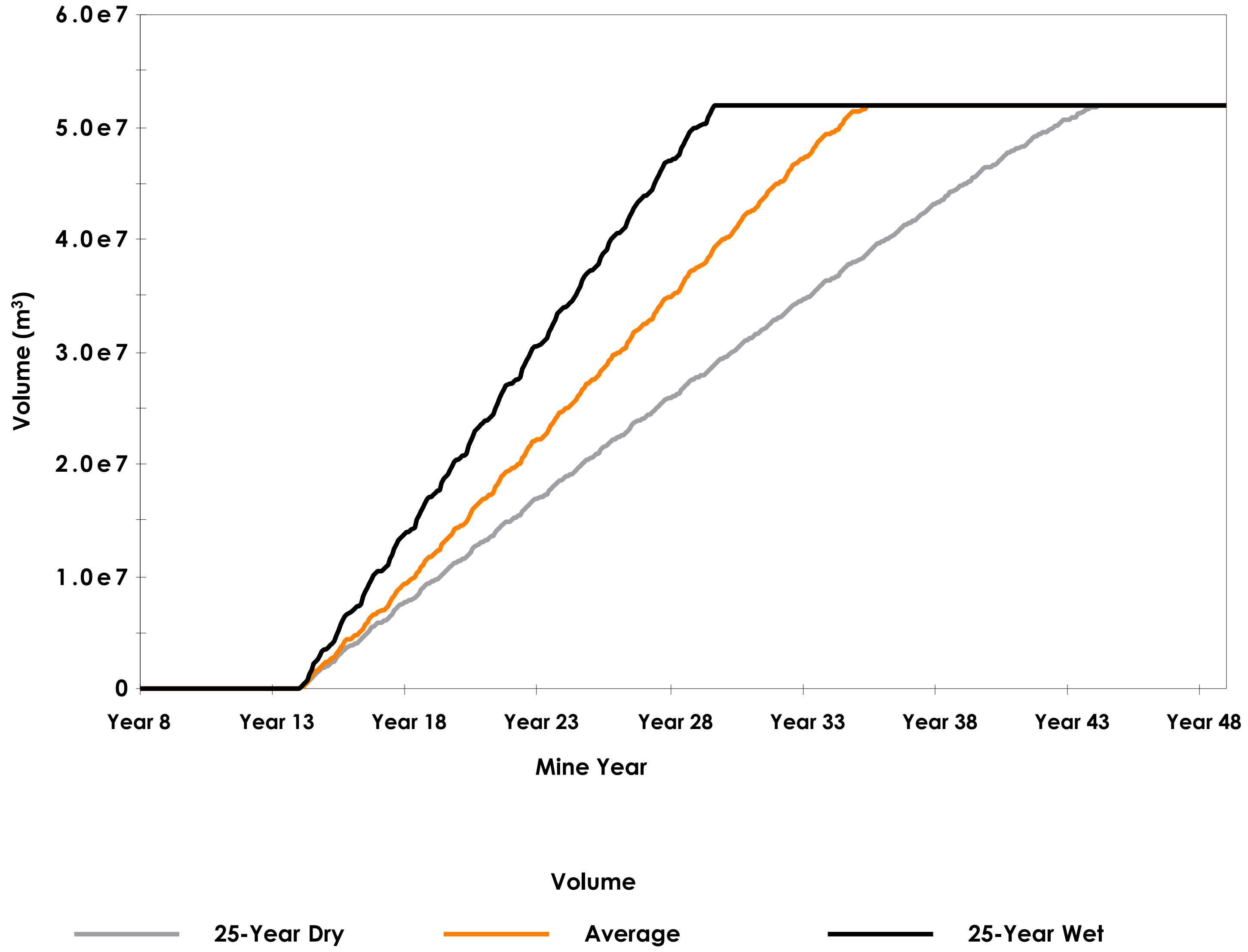


Figure 3-17 Open Pit Filling (MacLellan Site)

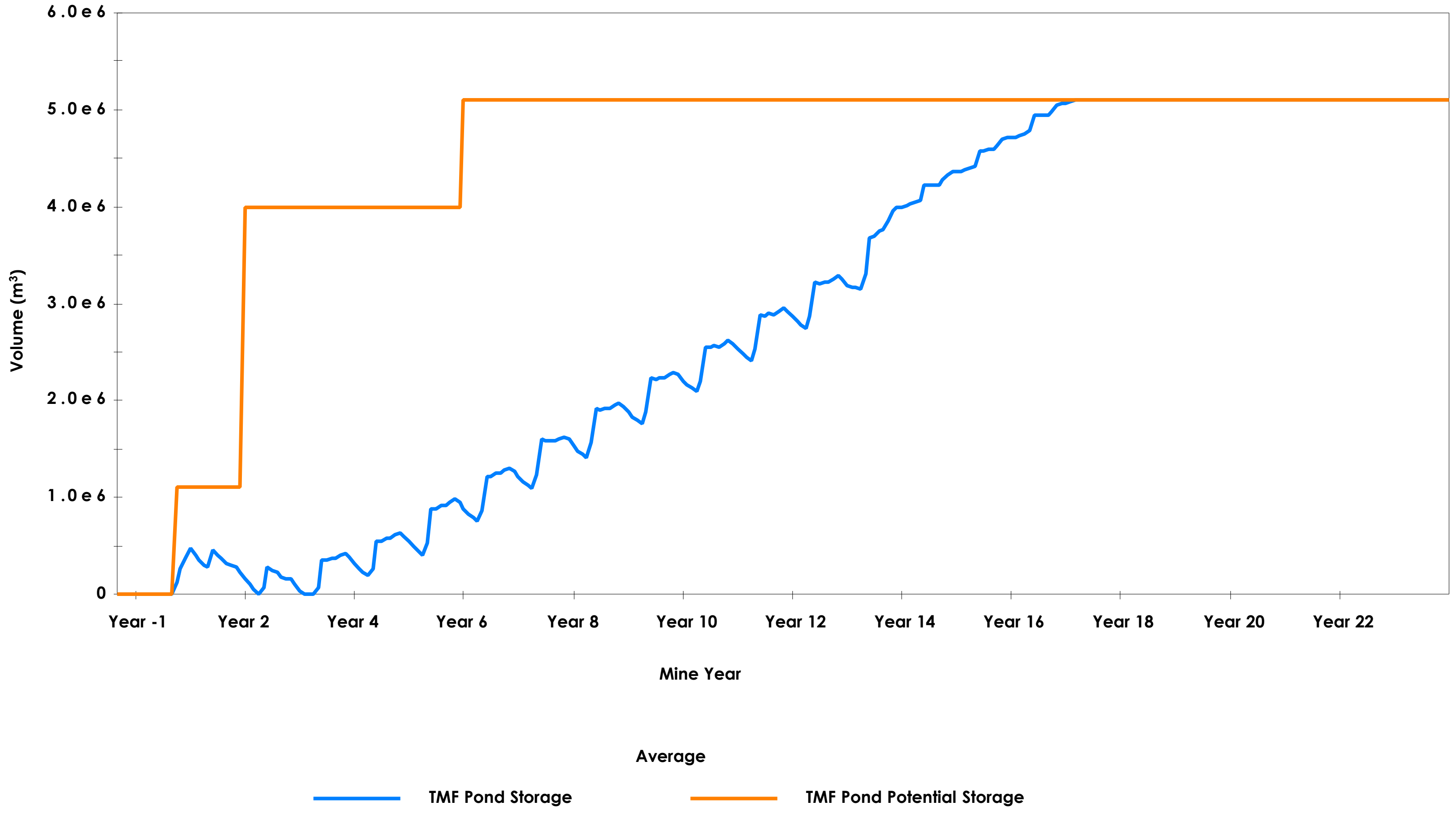


Figure 3-18 TMF Modelled Pond Storage and Potential Storage – Average Climate Scenario

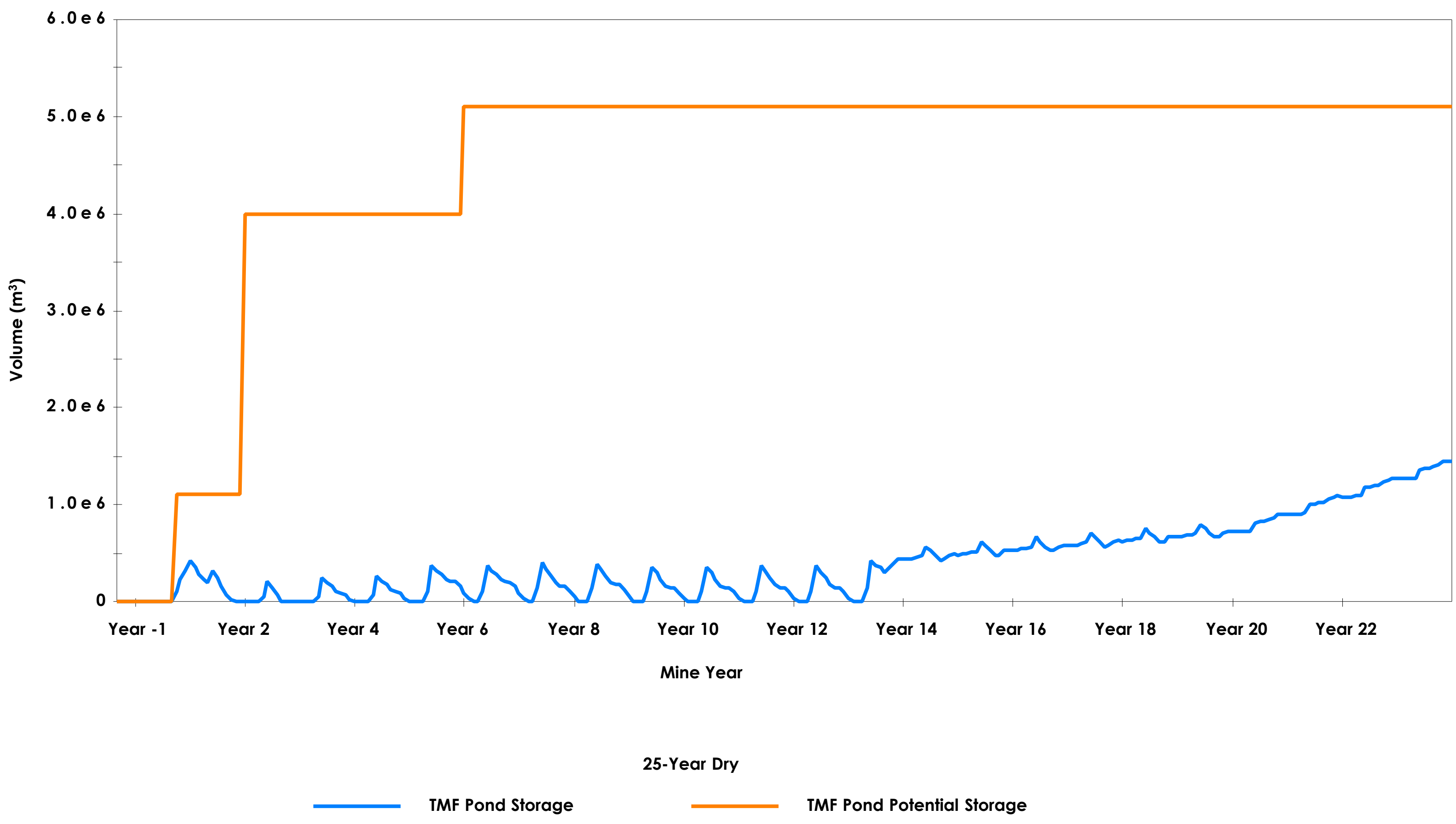


Figure 3-19 TMF Modelled Pond Storage and Potential Storage - 25-year Dry Scenario

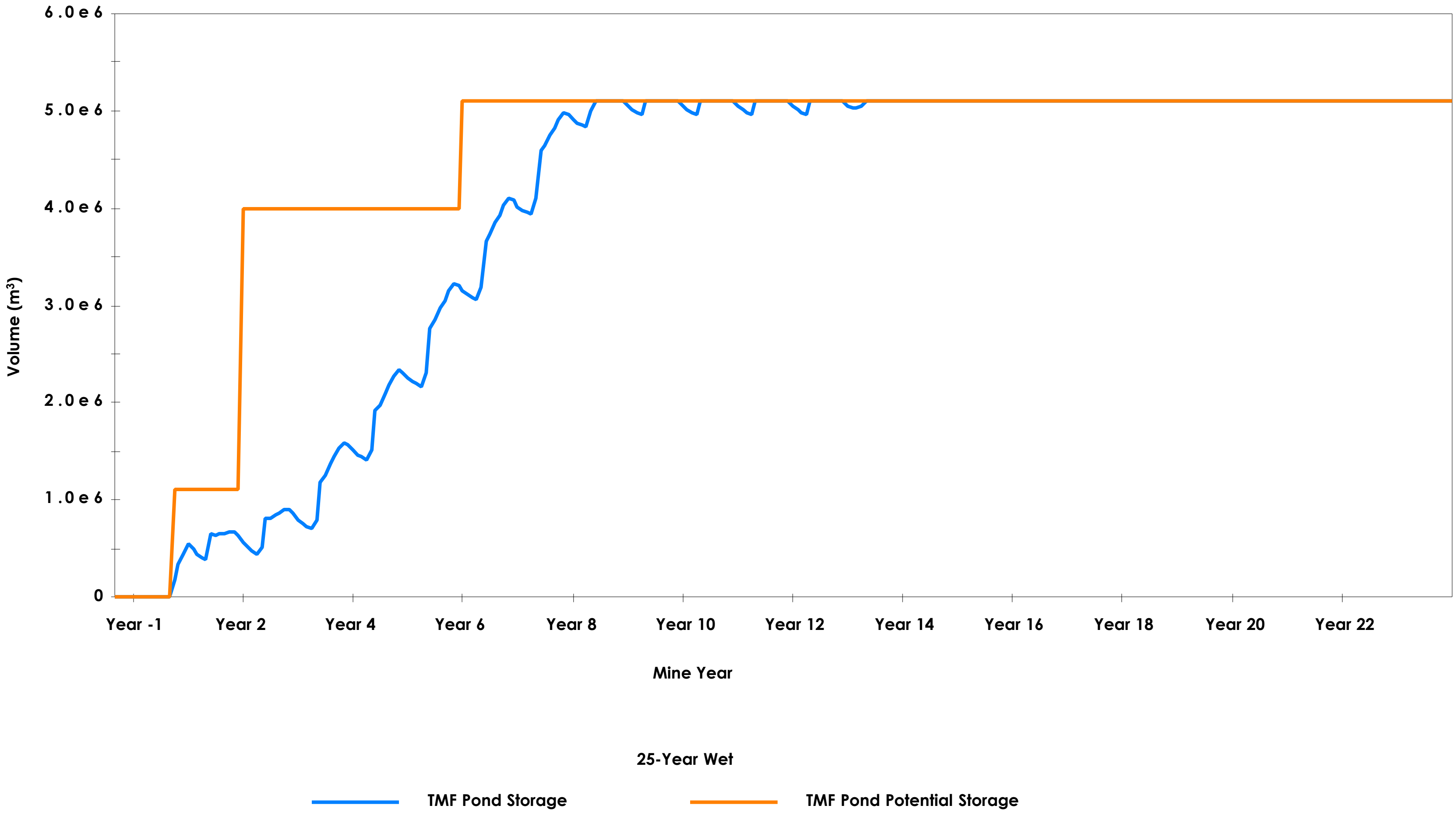


Figure 3-20 TMF Modelled Pond Storage and Potential Storage -25-year Wet Climate Scenario

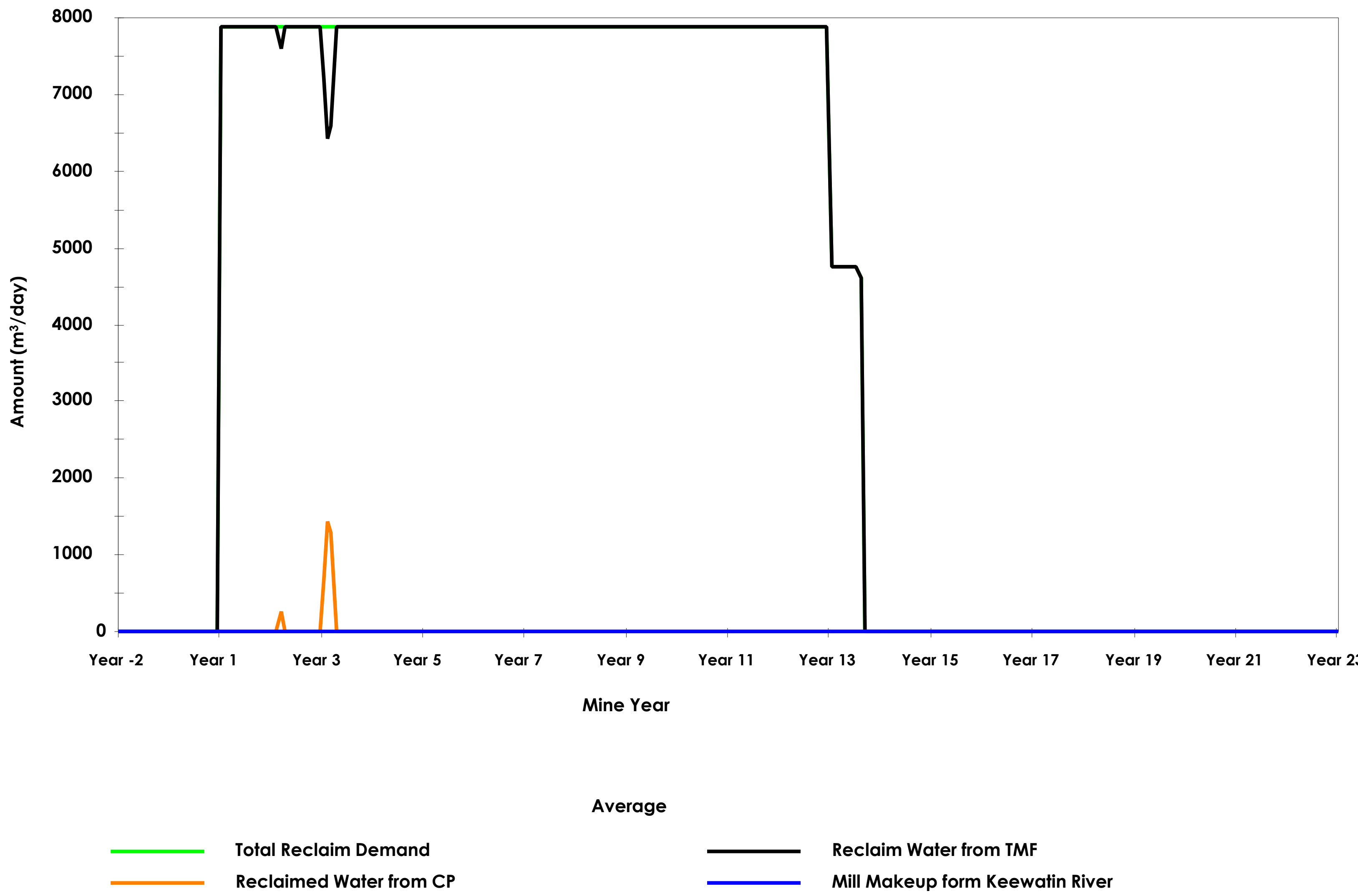


Figure 3-21 Mill Water Supply - Average Climate Scenario

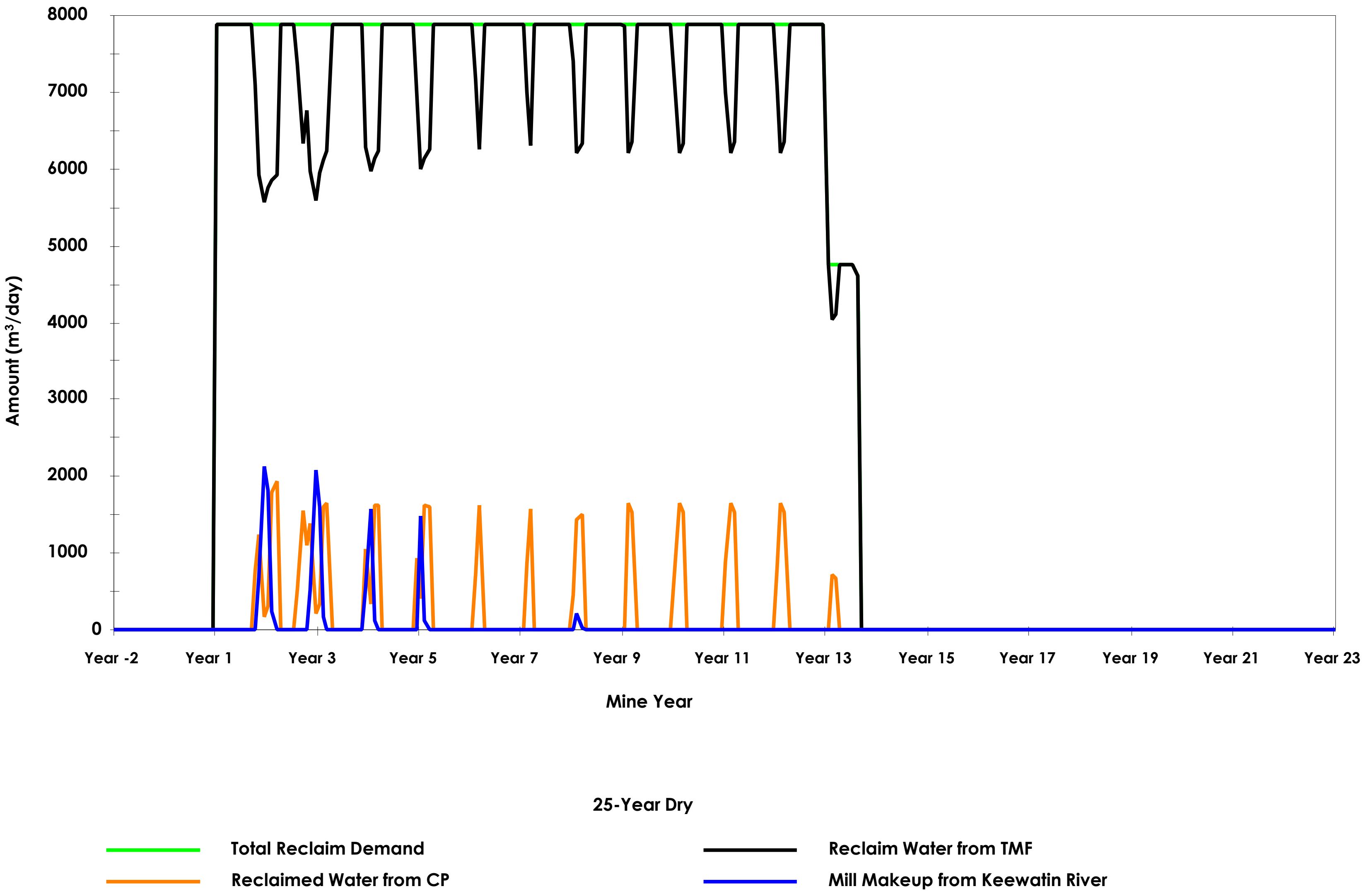


Figure 3-22 Mill Water Supply - 25-year Dry Climate Scenario

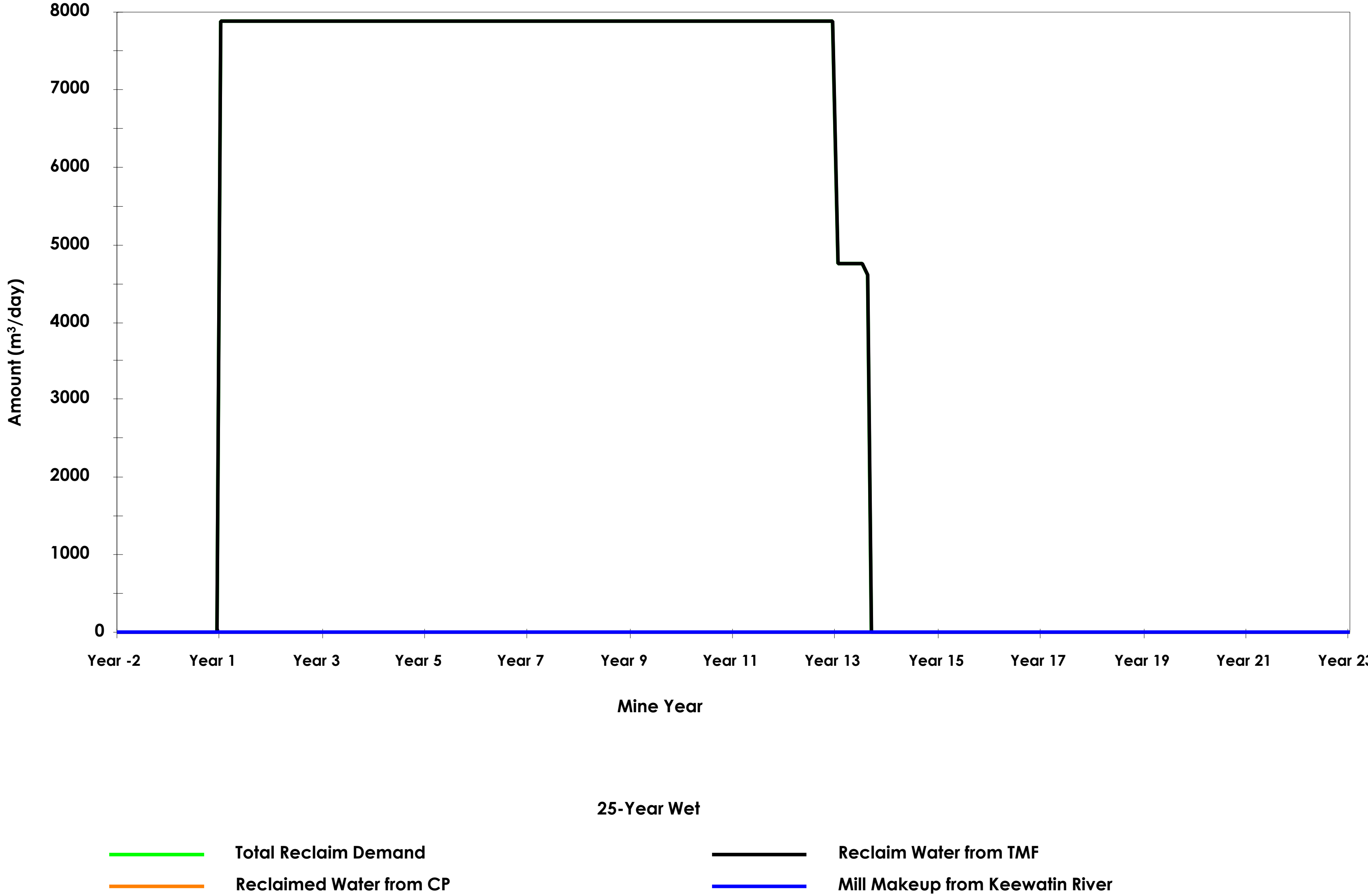


Figure 3-23 Mill Water Supply - 25-year Wet Climate Scenario

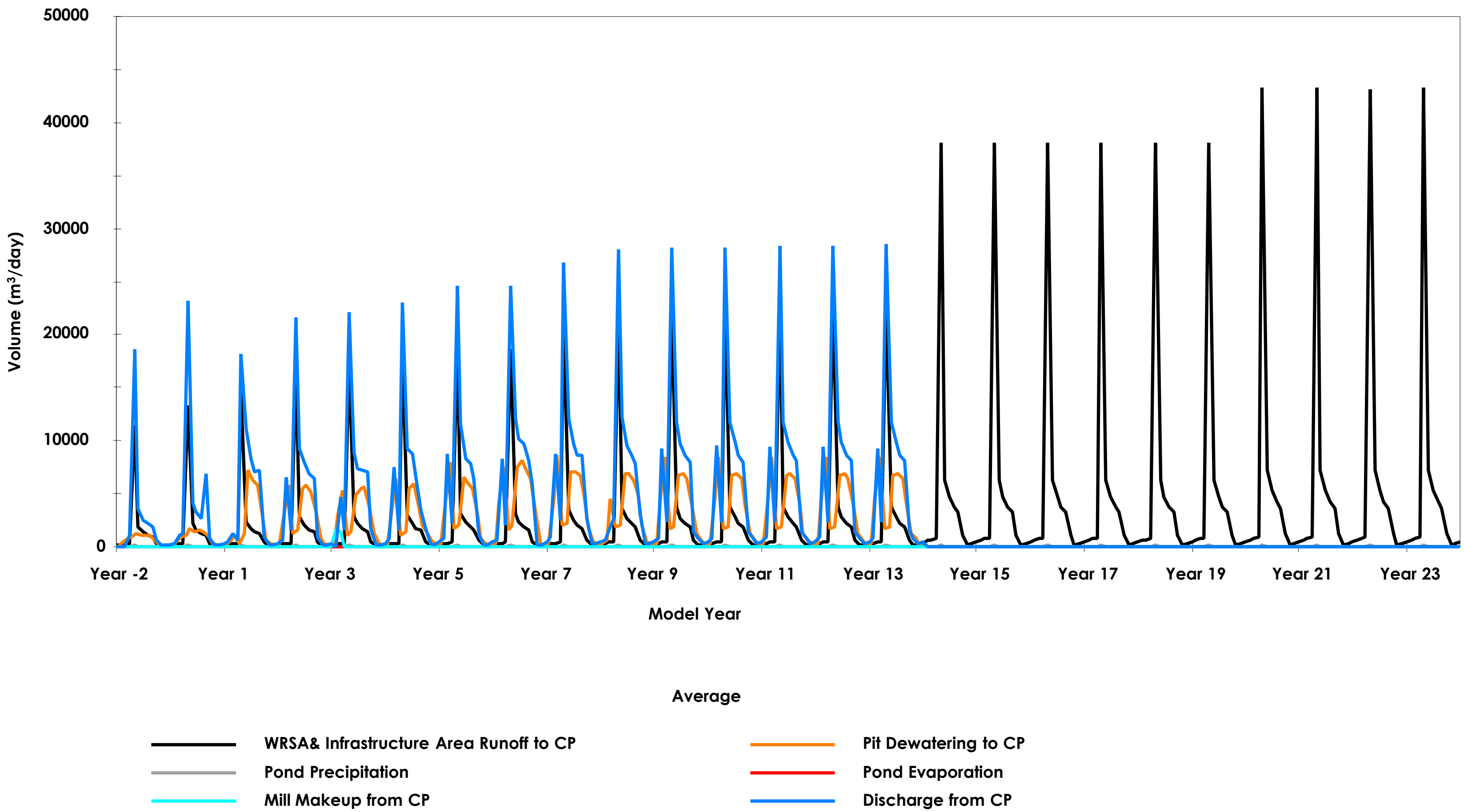


Figure 3-24 MRSA Runoff and Collection Pond Balance - Average Climate Scenario

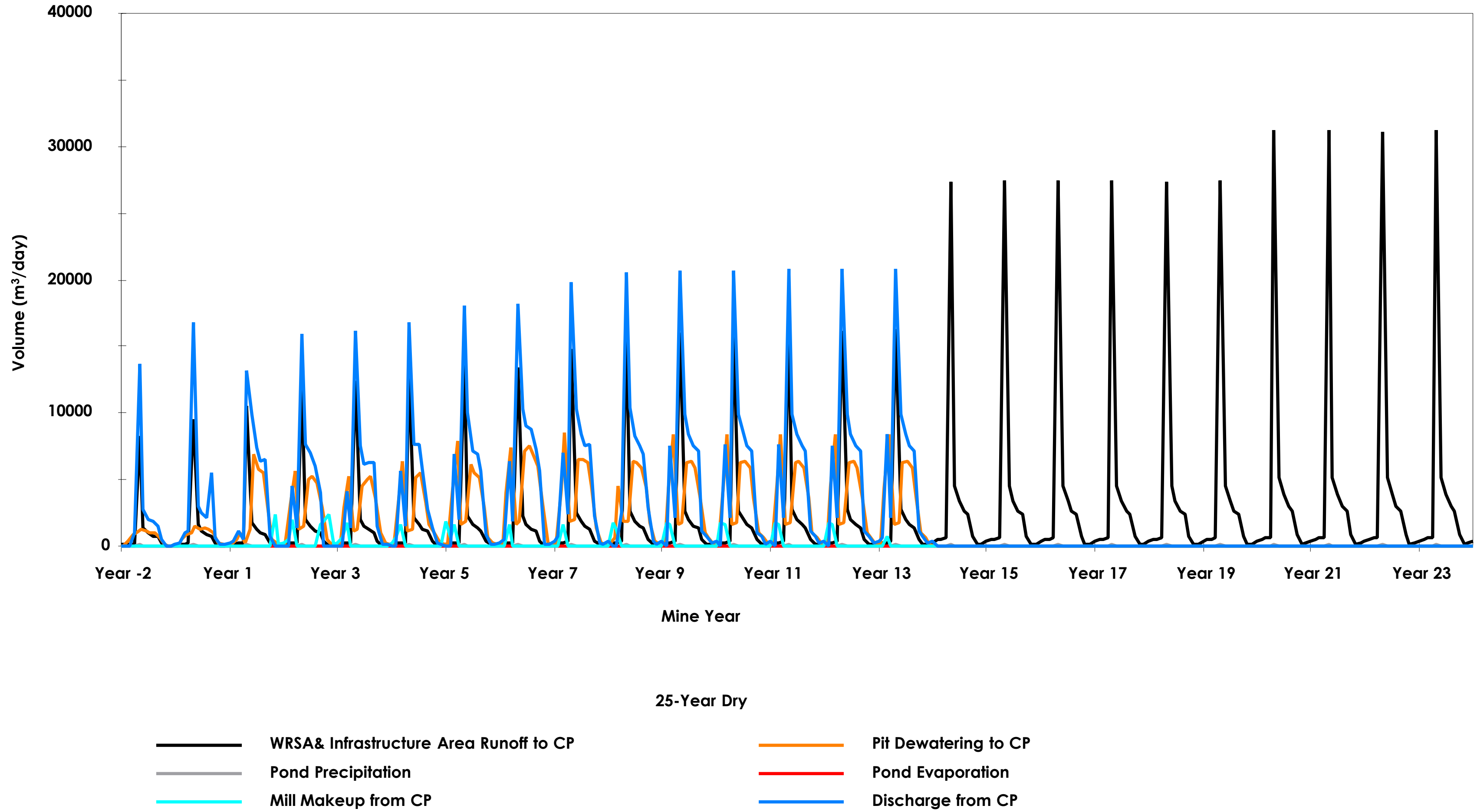


Figure 3-25 MRSA Runoff and Collection Pond Balance - 25-year Dry Climate Scenario

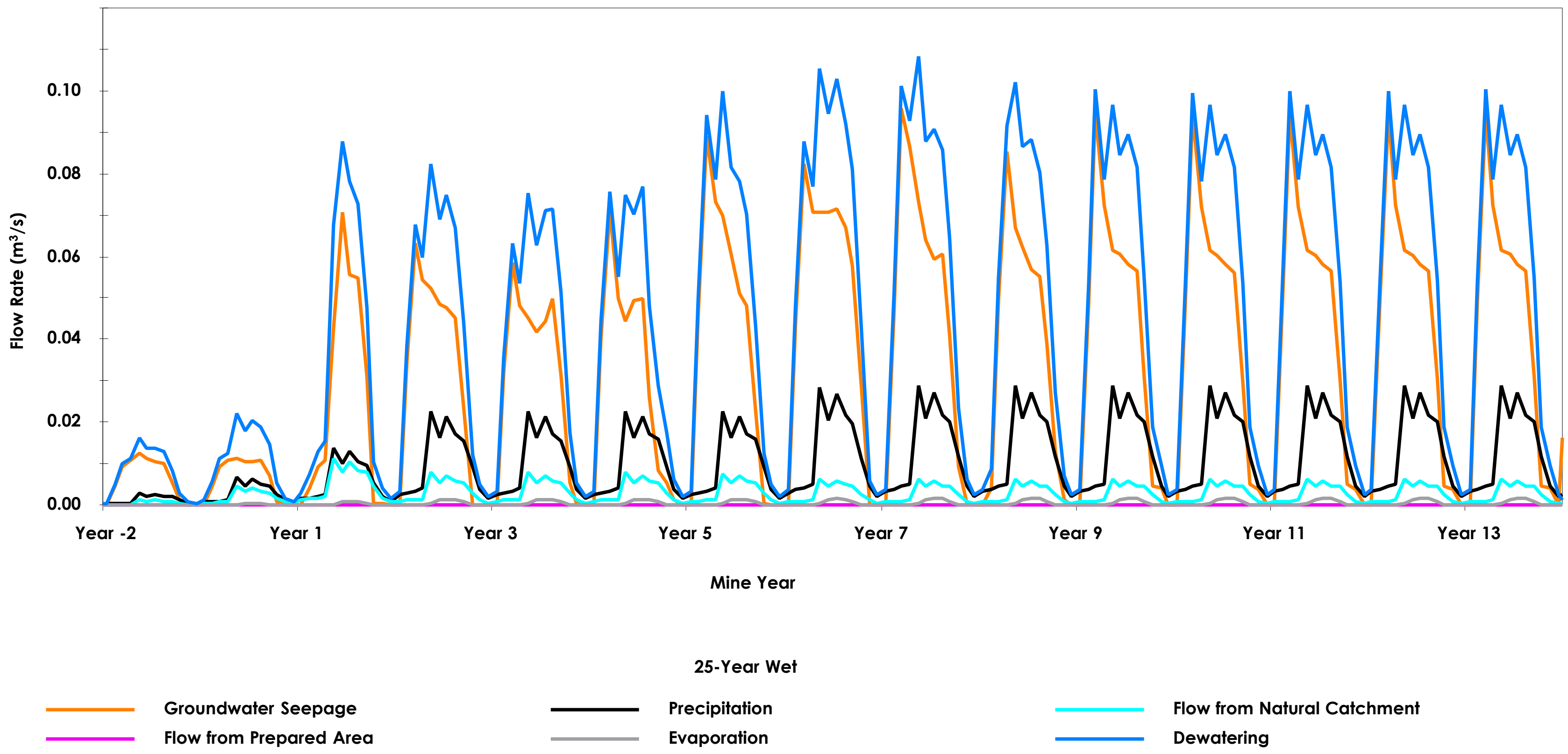


Figure 3-26 MRSA Runoff and Collection Pond Balance - 25-year Wet Climate Scenario

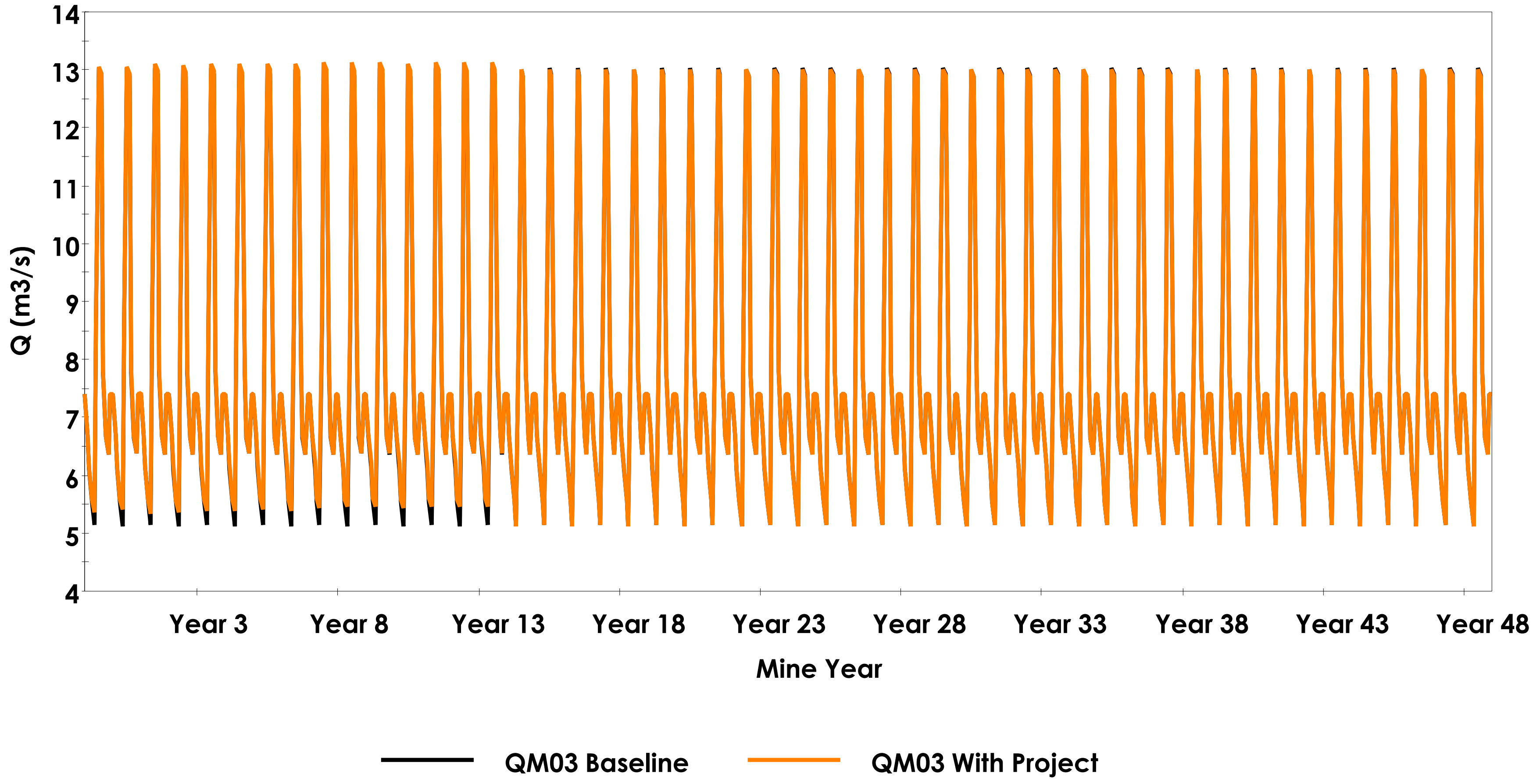


Figure 3-27 Predicted Streamflows for Existing and Project Conditions for Keewatin River (QM03)

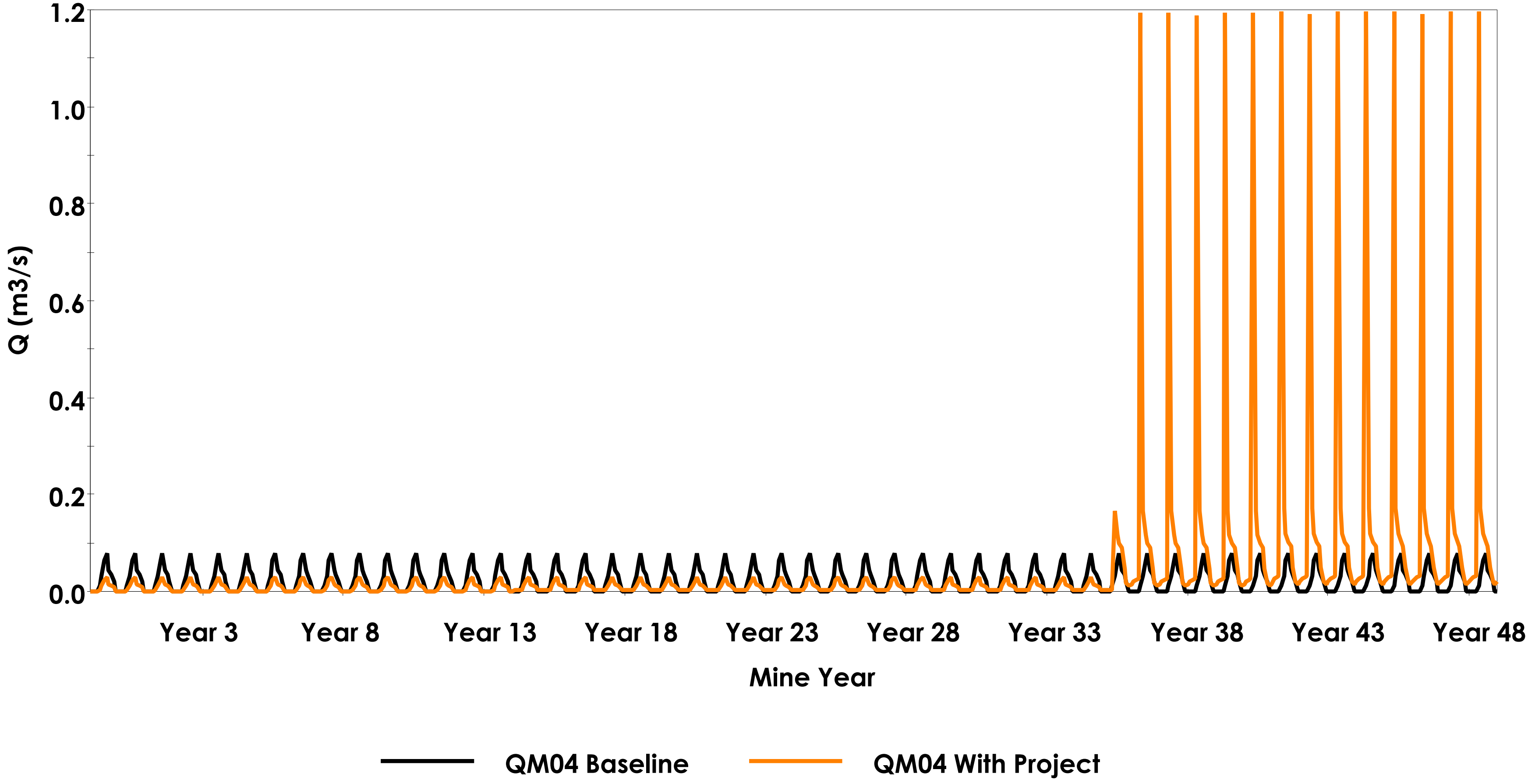


Figure 3-28 **Predicted Streamflows for Existing and Project Conditions for KEE-3 (QM04)**

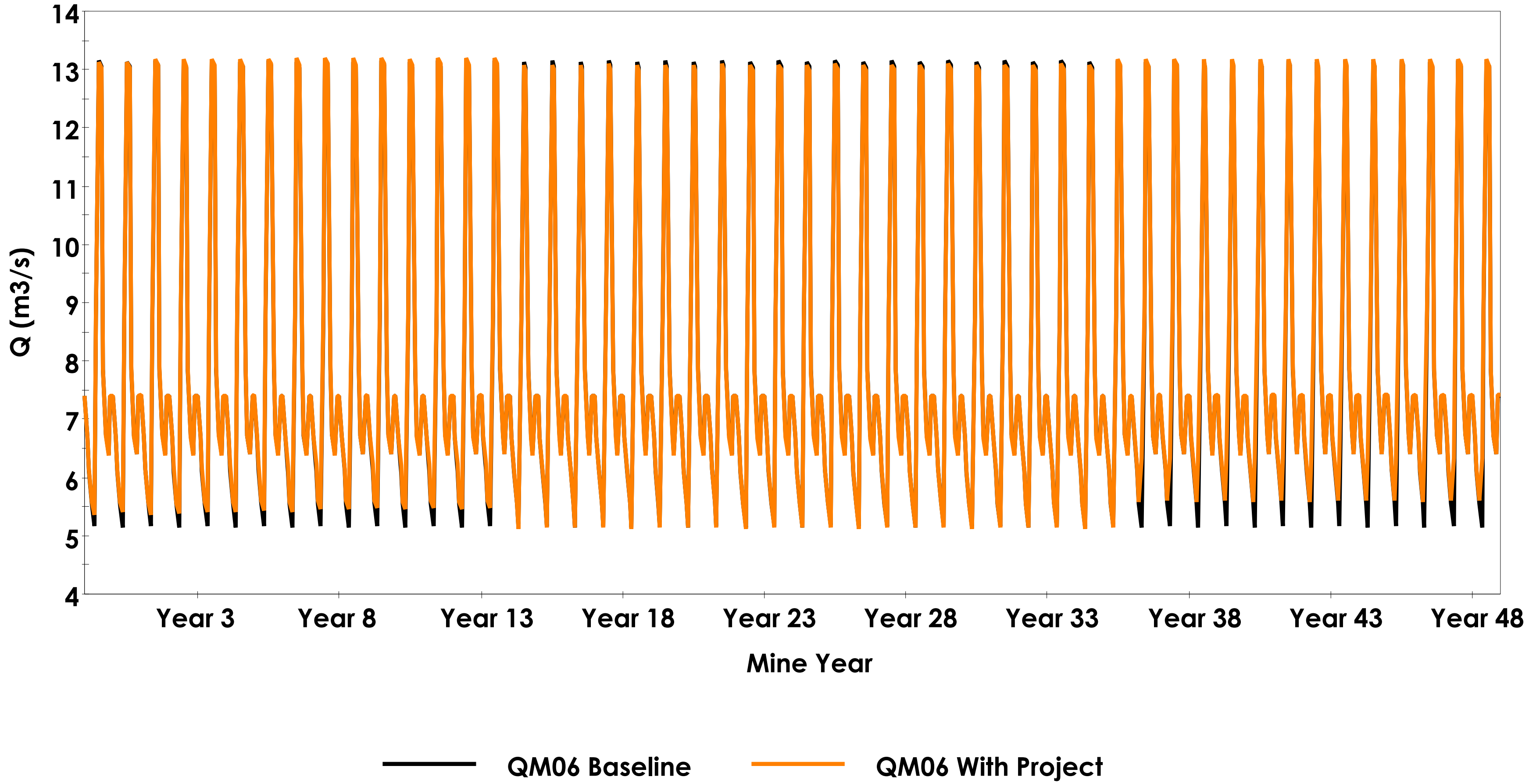


Figure 3-29 Predicted Streamflows for Existing and Project Conditions for Keewatin River (QM06)

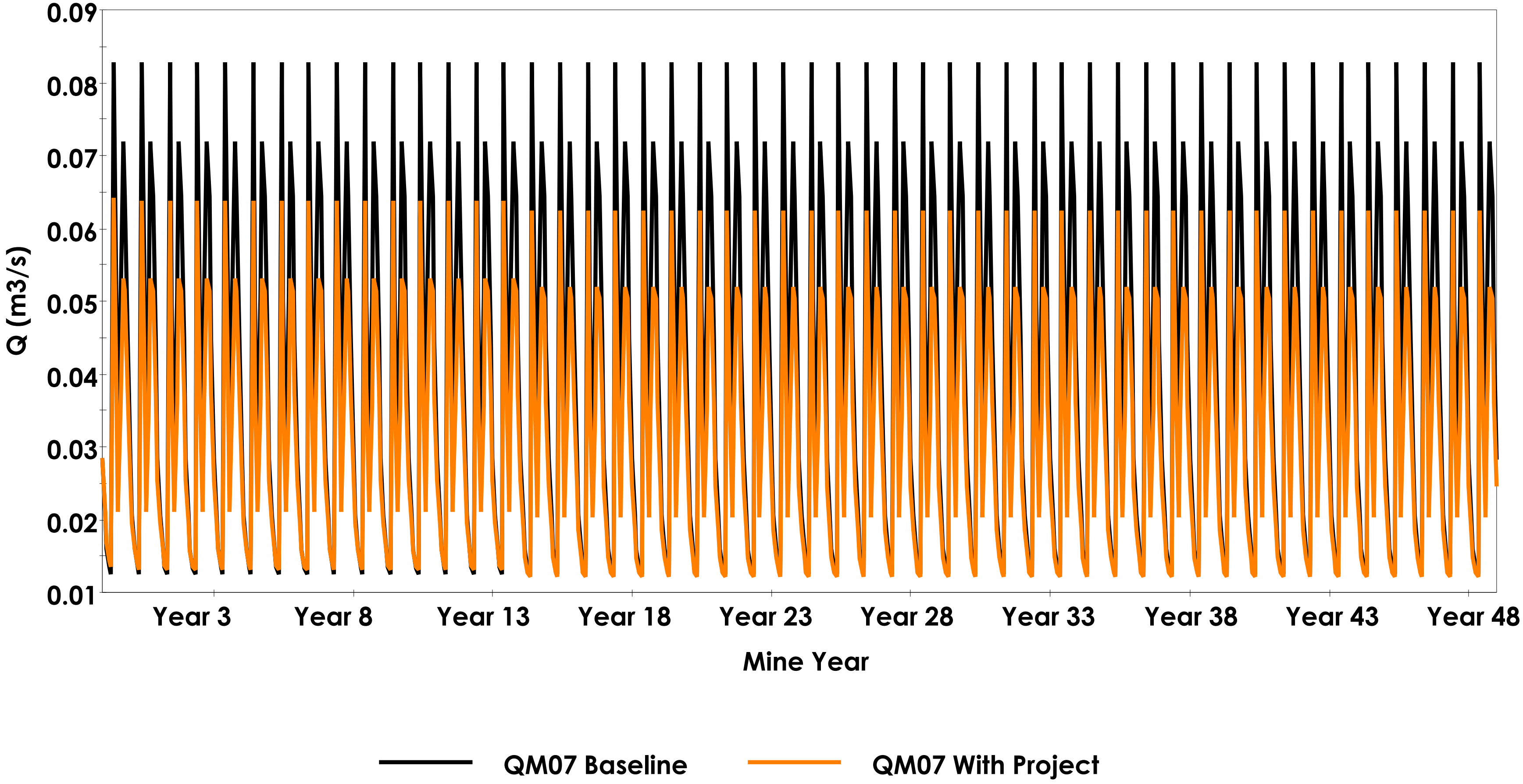


Figure 3-30 Predicted Streamflows for Existing and Project Conditions for Keewatin River (QM07)

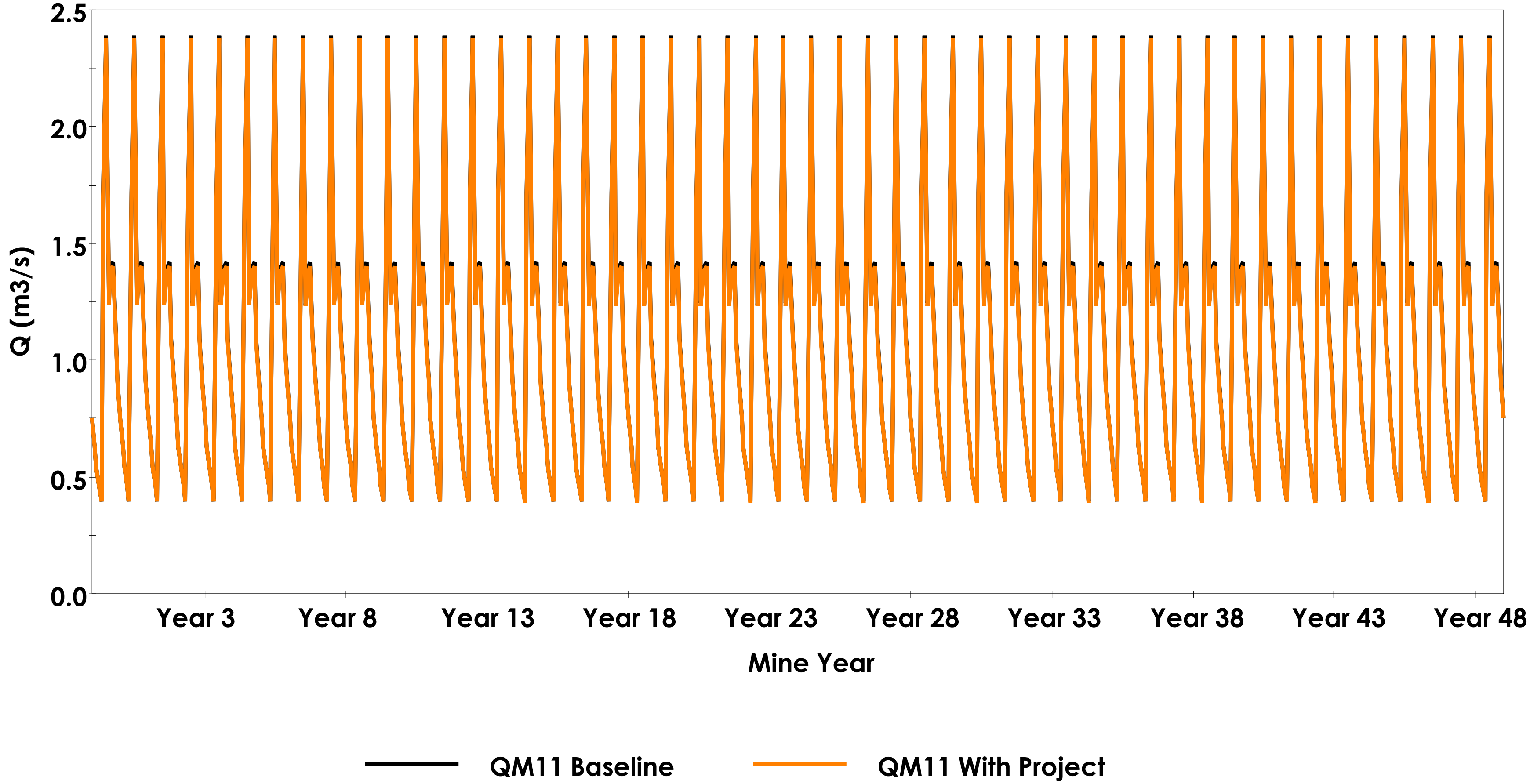


Figure 3-31 Predicted Streamflows for Existing and Project Conditions for Keewatin River (QM11)

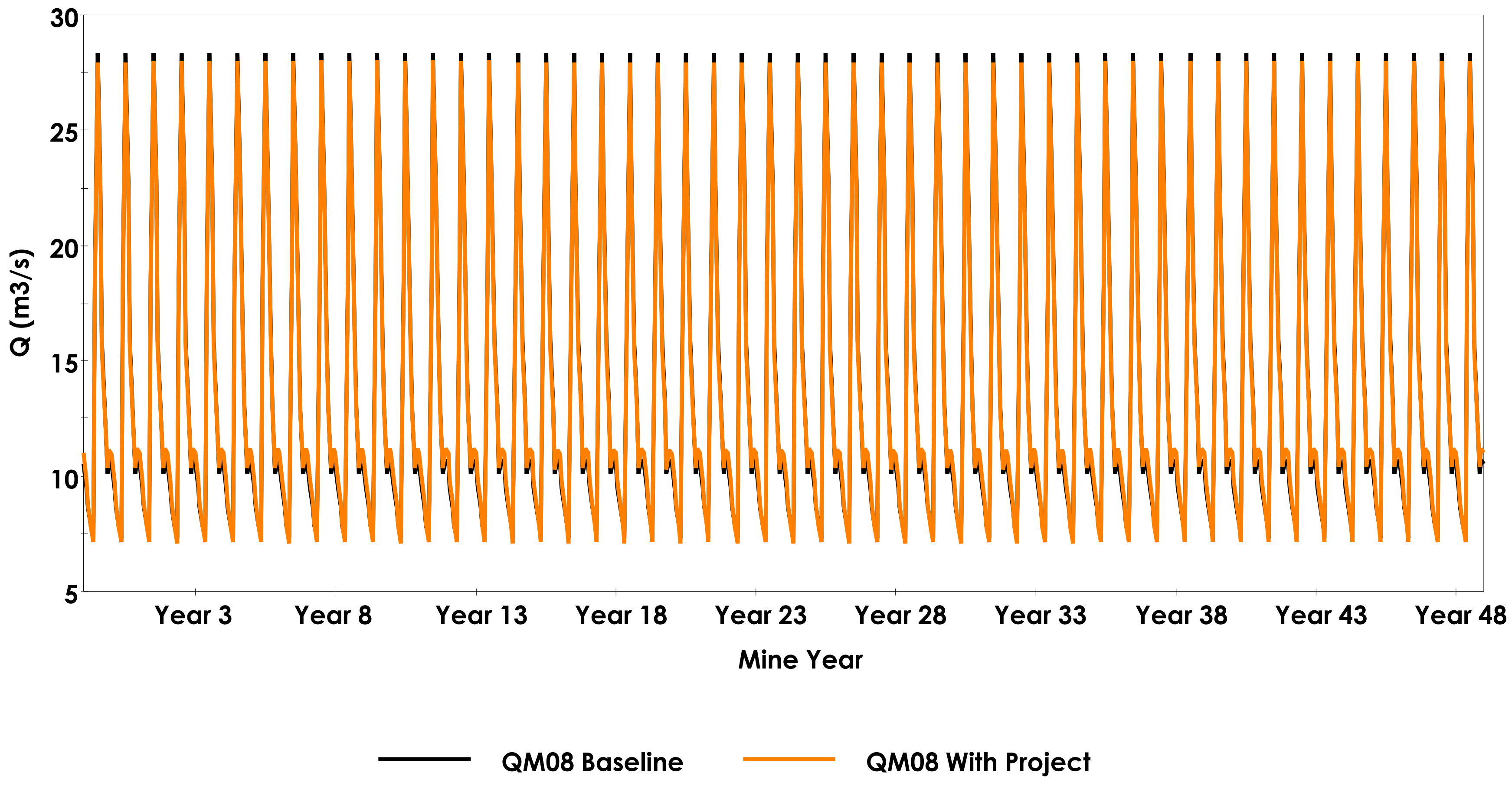


Figure 3-32 Predicted Streamflows for Existing and Project Conditions for Keewatin River (QM08)

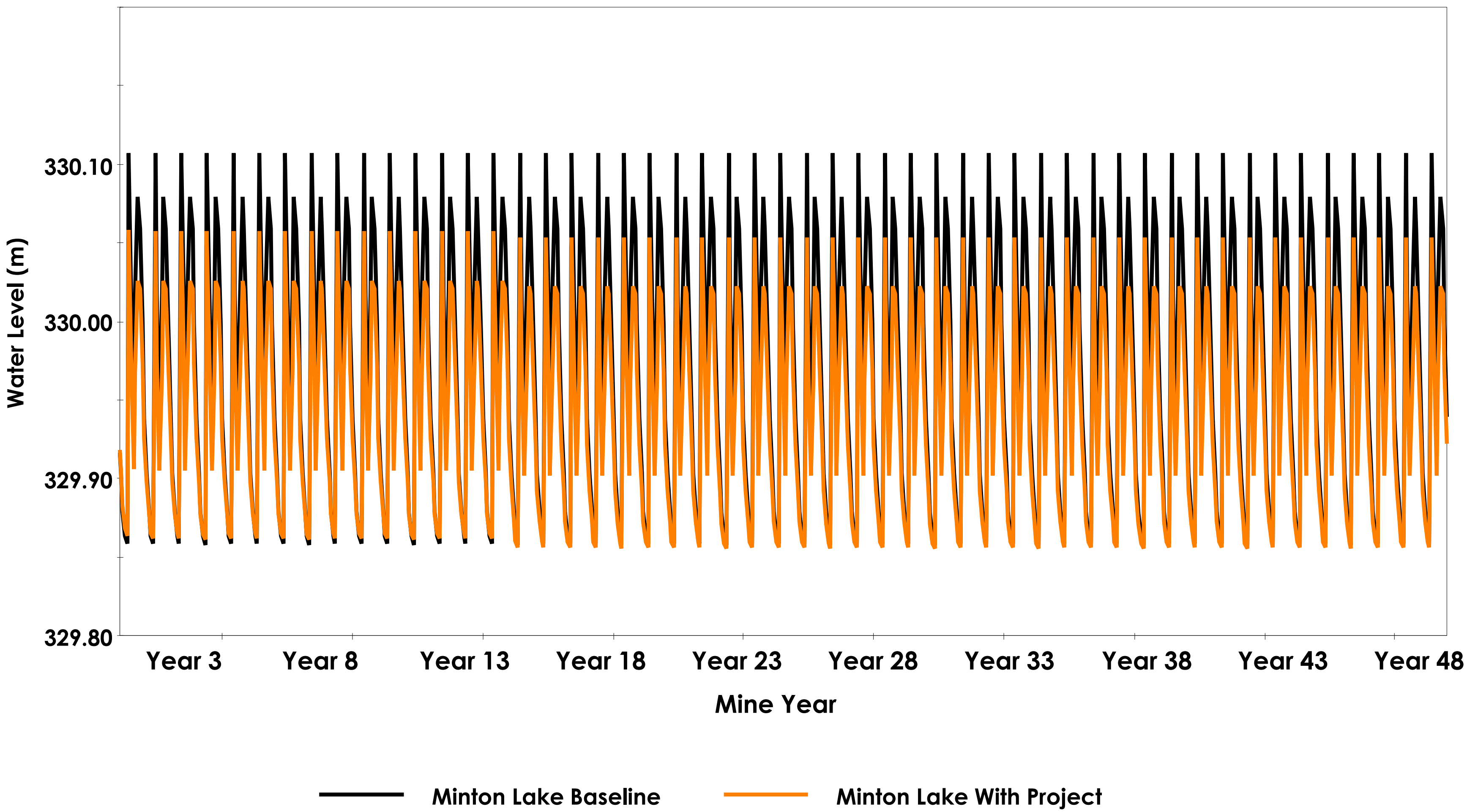


Figure 3-33 Predicted Lake Levels for Existing and Project Conditions for Minton Lake - Average Climate Scenario

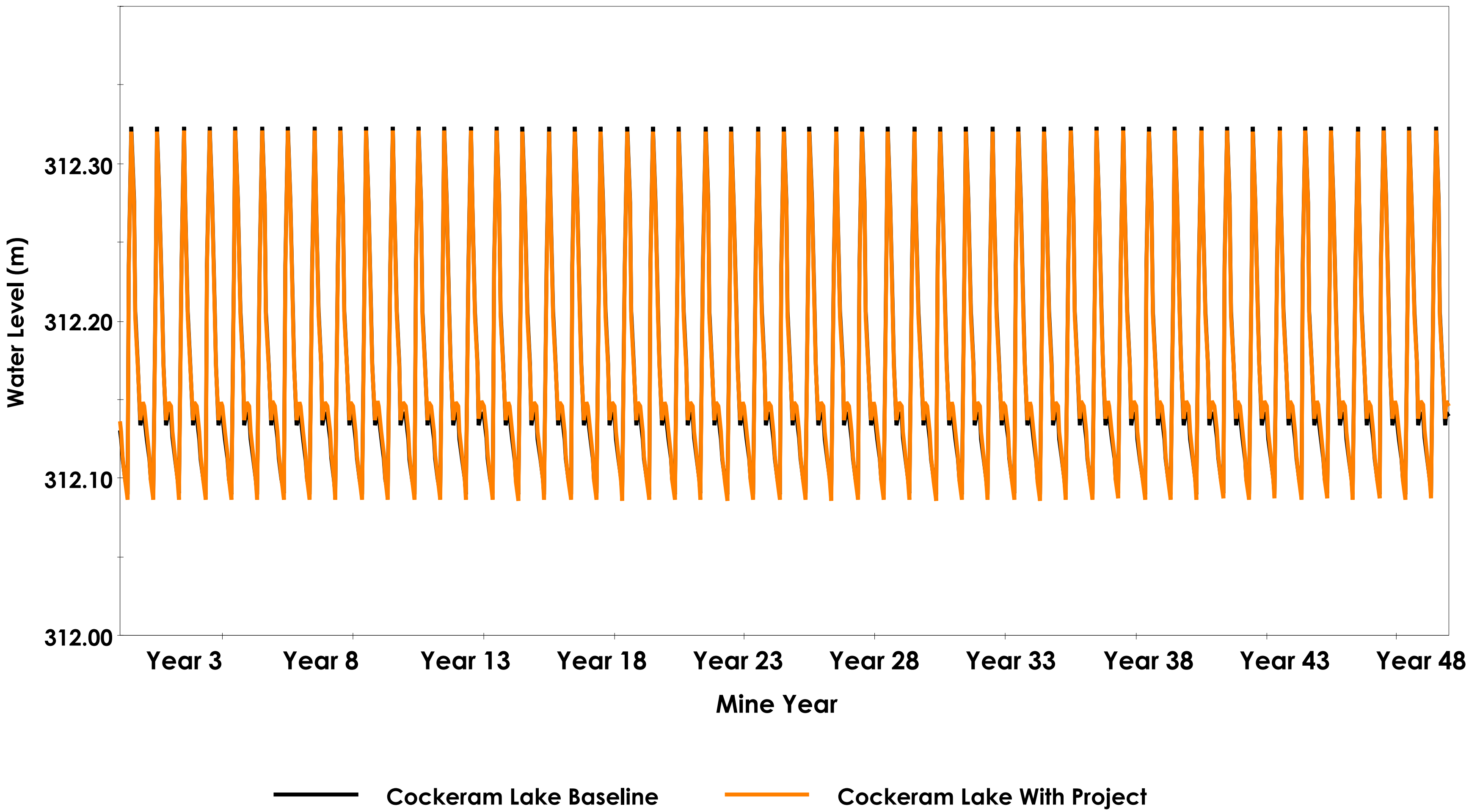


Figure 3-34 Predicted Lake Levels for Existing and Project Conditions for Cockeram Lake - Average Climate Scenario

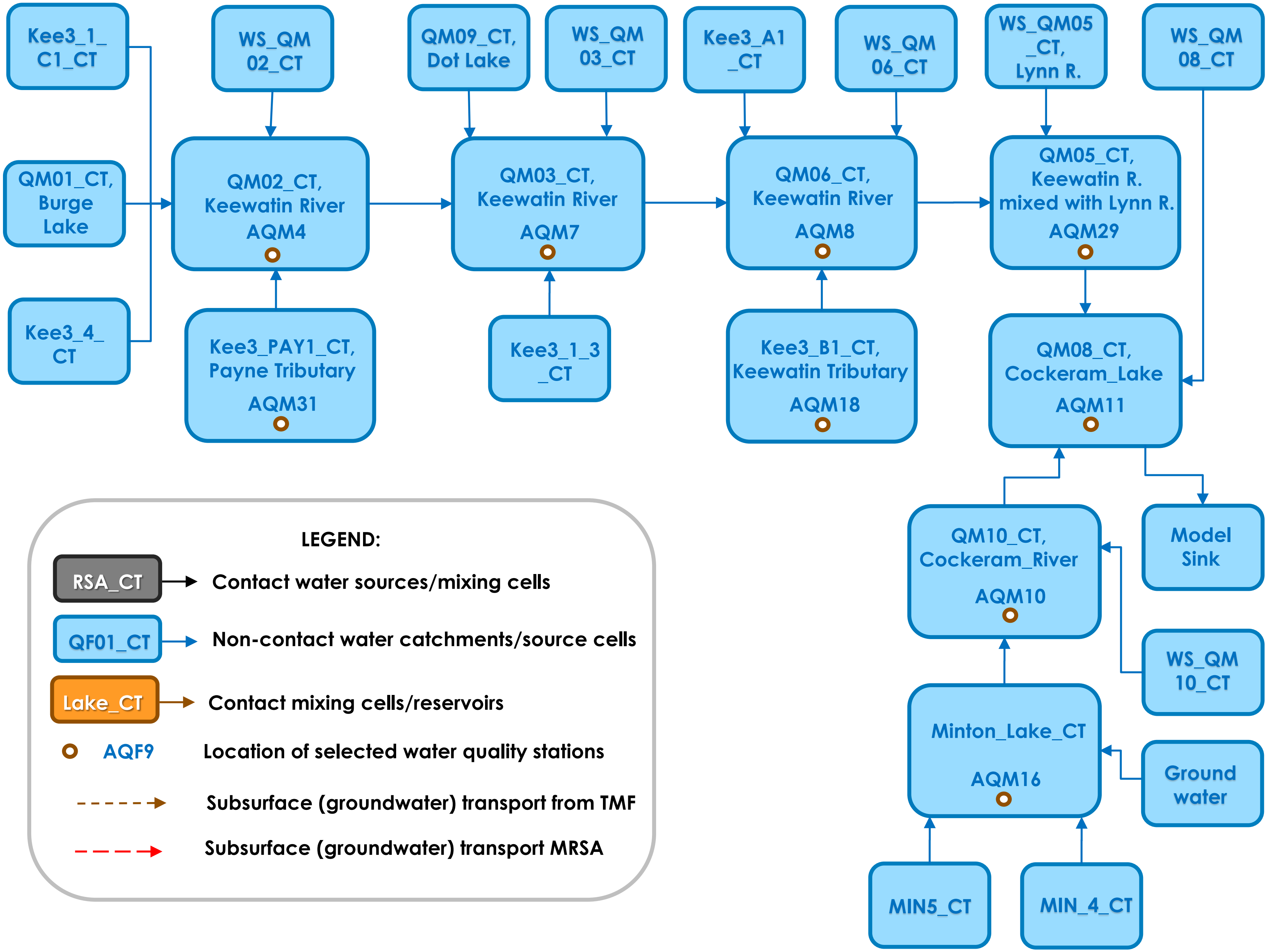


Figure 4-1: Mass transport network for baseline conditions at MacLellan Site

Stantec

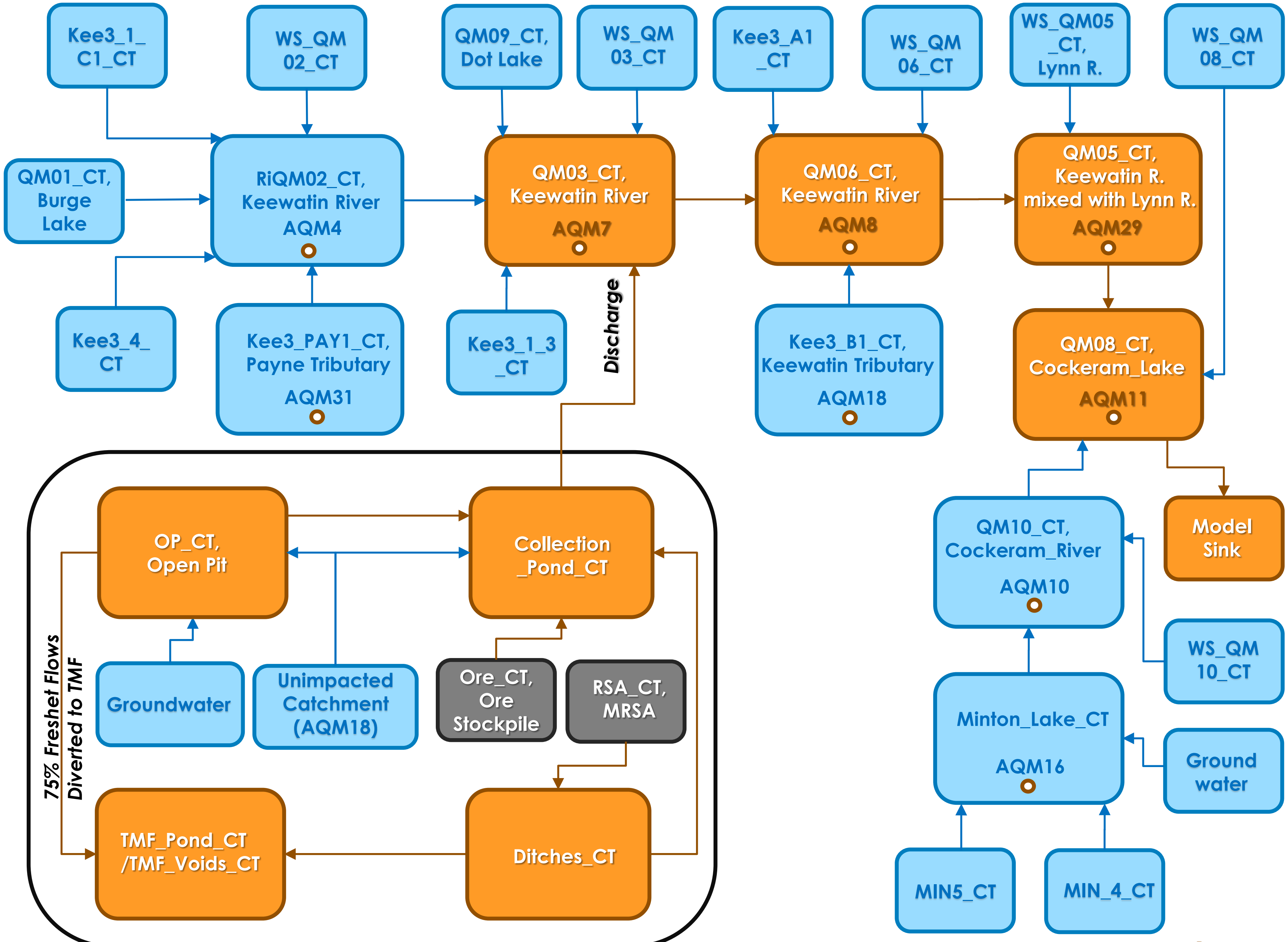


Figure 4-2: Mass transport network for the Construction Phase

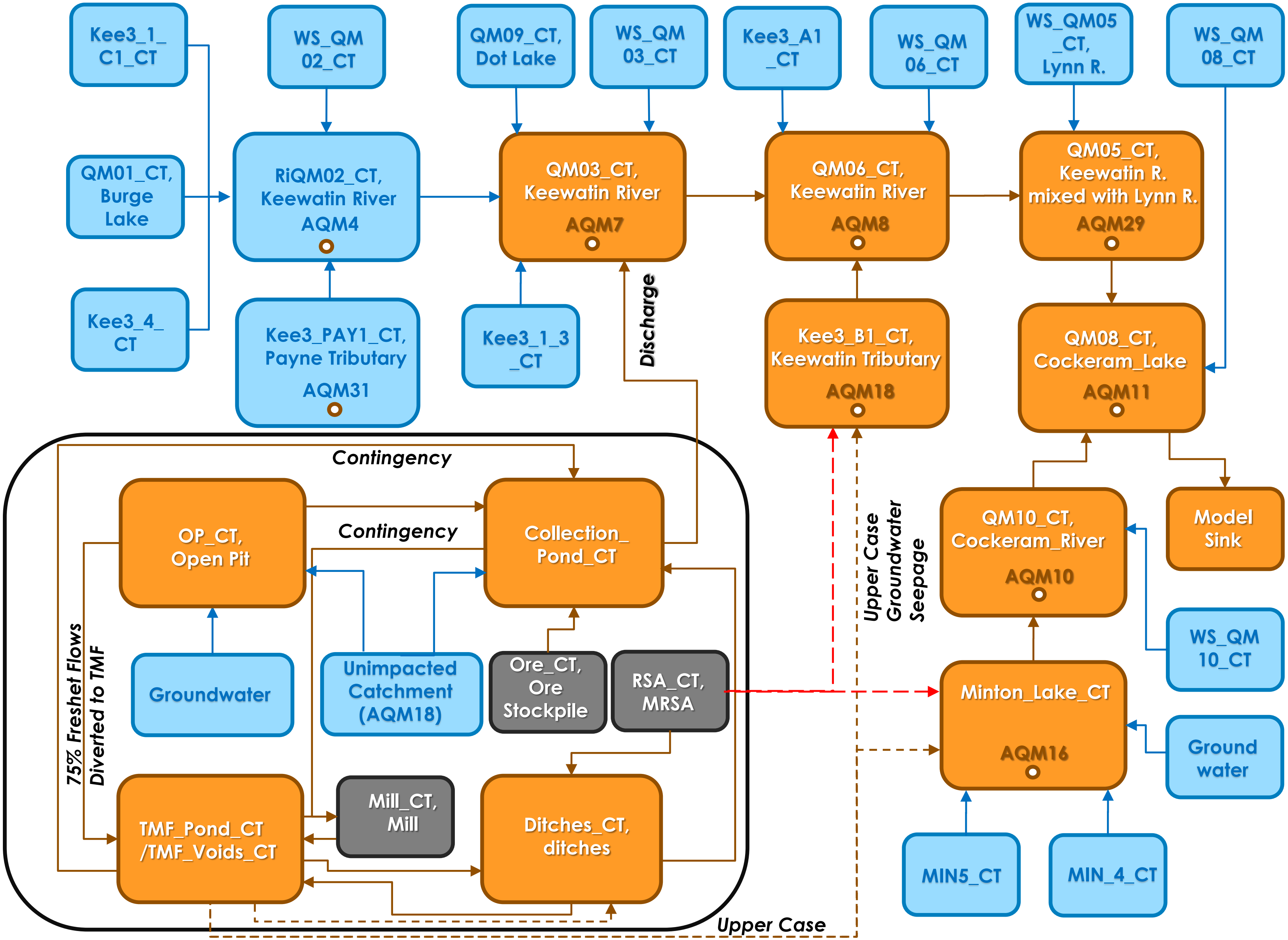


Figure 4-3: Mass transport network for the Operations

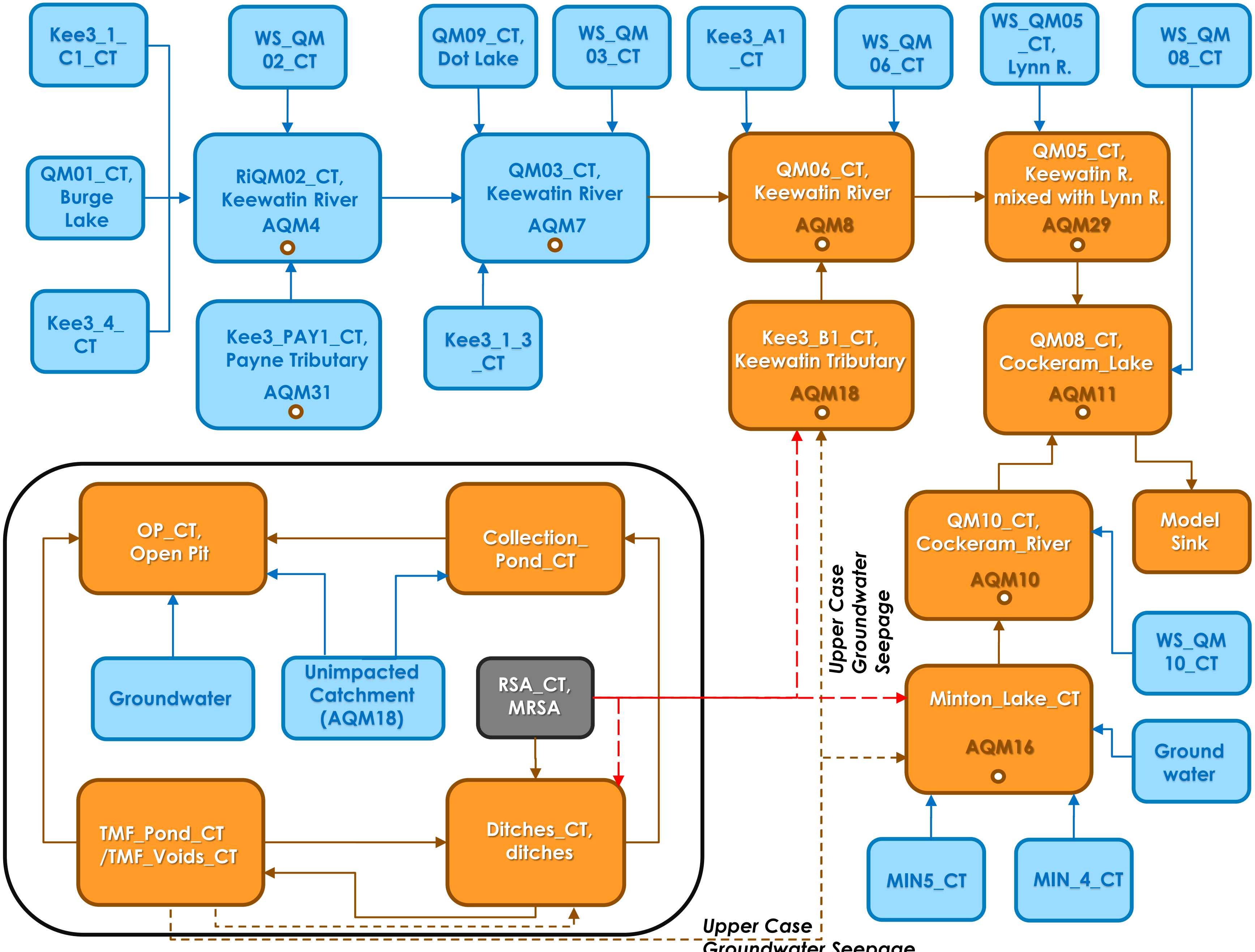


Figure 4-4: Mass transport network for Active Closure

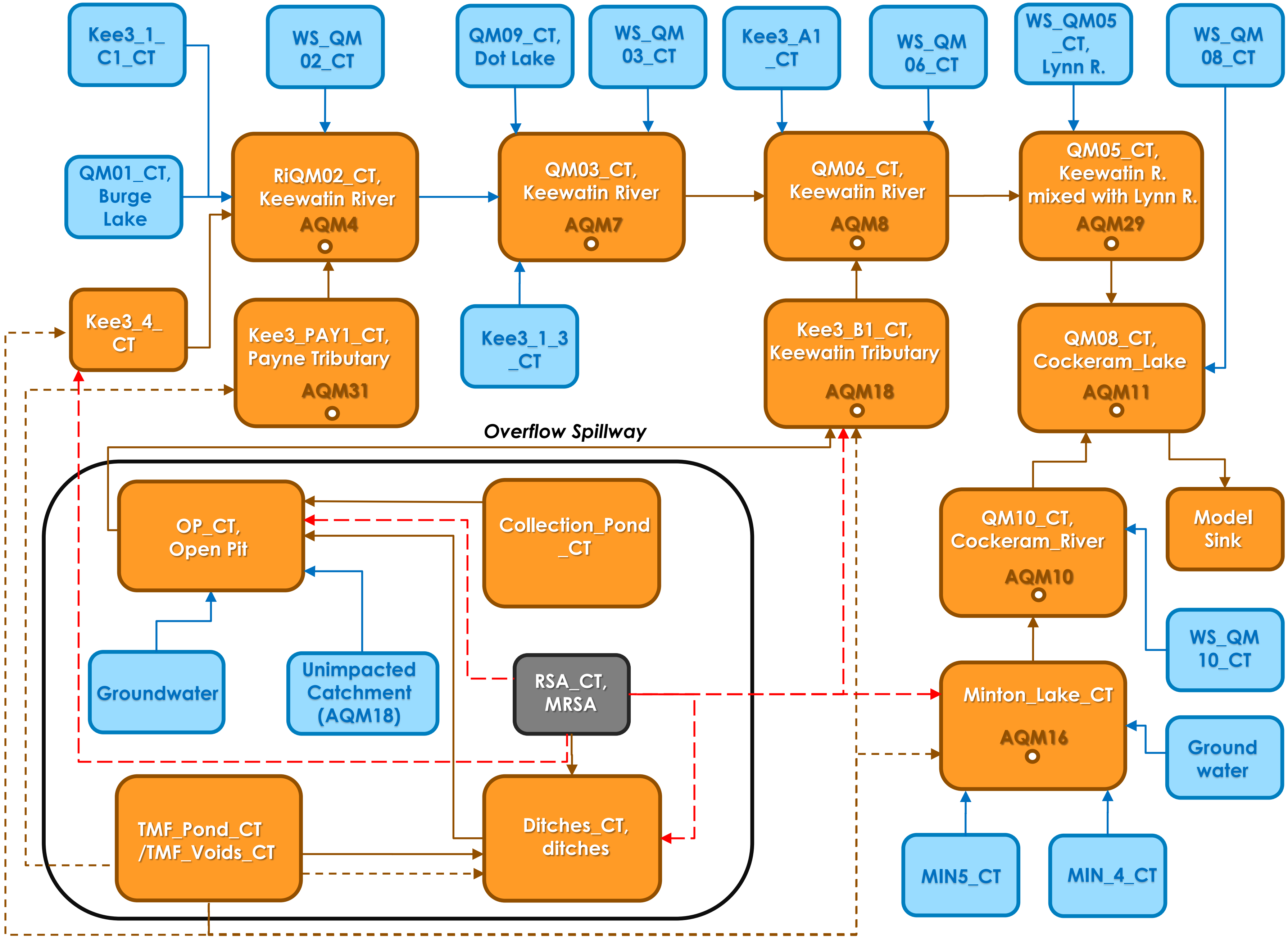


Figure 4-5: Mass transport network for the Post-Closure

Appendix C PREDICTED STREAMFLOWS – AVERAGE, 1:25 YEAR DRY AND 1:25 YEAR WET CLIMATE SCENARIOS

QM01

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	7.044	7.045	0.001	7.042	-0.002	7.049	0.005	7.048	0.004	7.042	-0.002	7.055	0.011	7.047	0.003	7.042	-0.002	7.055	0.011	7.048	0.003	7.042	-0.002	7.056	0.012
	Feb	6.397	6.408	0.012	6.405	0.008	6.411	0.015	6.408	0.012	6.397	0	6.417	0.021	6.406	0.010	6.397	0	6.417	0.021	6.408	0.011	6.397	0	6.418	0.021
	Mar	5.825	5.844	0.019	5.841	0.016	5.847	0.022	5.842	0.017	5.825	0	5.852	0.027	5.839	0.015	5.825	0	5.852	0.027	5.841	0.017	5.825	0	5.853	0.028
	Apr	5.308	5.325	0.017	5.323	0.015	5.328	0.020	5.323	0.015	5.308	0	5.332	0.024	5.321	0.013	5.308	0	5.332	0.024	5.323	0.015	5.308	0	5.333	0.025
	May	6.896	6.912	0.016	6.910	0.014	6.914	0.019	6.910	0.015	6.896	0	6.919	0.023	6.908	0.012	6.896	0	6.919	0.023	6.910	0.014	6.896	0	6.919	0.024
	Jun	11.718	11.732	0.014	11.730	0.012	11.734	0.016	11.731	0.013	11.718	0	11.738	0.020	11.729	0.011	11.718	0	11.738	0.020	11.730	0.012	11.718	0	11.739	0.021
	Jul	12.863	12.878	0.015	12.874	0.011	12.882	0.019	12.877	0.014	12.863	0	12.886	0.023	12.875	0.012	12.863	0	12.886	0.023	12.876	0.013	12.863	0	12.886	0.023
	Aug	9.561	9.579	0.018	9.571	0.010	9.588	0.026	9.579	0.017	9.561	0	9.591	0.030	9.577	0.015	9.561	0	9.591	0.030	9.578	0.017	9.561	0	9.591	0.030
	Sep	6.908	6.924	0.017	6.917	0.009	6.932	0.024	6.924	0.016	6.908	0	6.935	0.027	6.922	0.014	6.908	0	6.935	0.027	6.923	0.015	6.908	0	6.935	0.027
	Oct	6.012	6.018	0.006	6.016	0.004	6.020	0.008	6.017	0.005	6.012	0	6.020	0.008	6.016	0.004	6.012	0	6.020	0.008	6.017	0.005	6.012	0	6.021	0.009
	Nov	6.910	6.908	-0.002	6.898	-0.011	6.918	0.008	6.906	-0.003	6.898	-0.011	6.918	0.008	6.906	-0.004	6.898	-0.011	6.918	0.008	6.907	-0.003	6.898	-0.011	6.919	0.009
	Dec	7.526	7.525	-0.001	7.517	-0.009	7.534	0.007	7.524	-0.003	7.517	-0.009	7.534	0.007	7.523	-0.003	7.517	-0.009	7.534	0.007	7.524	-0.002	7.517	-0.009	7.534	0.008
	Annual	7.747	7.758	0.011	7.754	0.006	7.763	0.016	7.757	0.010	7.745	-0.002	7.766	0.019	7.756	0.008	7.745	-0.002	7.766	0.019	7.757	0.010	7.745	-0.002	7.767	0.020
1:25 Dry	Jan	5.083	5.083	0	5.081	-0.002	5.086	0.002	5.085	0.002	5.081	-0.002	5.090	0.007	5.085	0.002	5.081	-0.002	5.090	0.007	5.085	0.002	5.081	-0.002	5.091	0.008
	Feb	4.636	4.644	0.007	4.642	0.005	4.646	0.009	4.644	0.008	4.636	0	4.650	0.014	4.643	0.006	4.636	0	4.650	0.014	4.644	0.007	4.636	0	4.651	0.014
	Mar	4.245	4.258	0.013	4.256	0.011	4.260	0.014	4.257	0.011	4.245	0	4.263	0.018	4.255	0.010	4.245	0	4.263	0.018	4.256	0.011	4.245	0	4.264	0.019
	Apr	3.890	3.901	0.011	3.900	0.010	3.903	0.013	3.900	0.010	3.890	0	3.906	0.016	3.899	0.009	3.890	0	3.906	0.016	3.900	0.010	3.890	0	3.907	0.017
	May	4.596	4.607	0.011	4.605	0.009	4.608	0.012	4.605	0.010	4.596	0	4.611	0.015	4.604	0.008	4.596	0	4.611	0.015	4.605	0.009	4.596	0	4.612	0.016
	Jun	7.231	7.241	0.010	7.239	0.008	7.242	0.011	7.240	0.009	7.231	0	7.245	0.014	7.238	0.007	7.231	0	7.245	0.014	7.239	0.008	7.231	0	7.245	0.014
	Jul	8.140	8.150	0.010	8.148	0.007	8.153	0.013	8.149	0.009	8.140	0	8.156	0.015	8.148	0.008	8.140	0	8.156	0.015	8.149	0.009	8.140	0	8.156	0.016
	Aug	6.459	6.471	0.013	6.466	0.007	6.477	0.018	6.471	0.012	6.459	0	6.479	0.021	6.469	0.011	6.459	0	6.479	0.021	6.470	0.012	6.459	0	6.480	0.021
	Sep	4.992	5.004	0.012	4.999	0.006	5.009	0.017	5.004	0.011	4.992	0	5.012	0.019	5.002	0.010	4.992	0	5.012	0.019	5.003	0.011	4.992	0	5.012	0.020
	Oct	4.393	4.397	0.005	4.396	0.004	4.398	0.006	4.397	0.004	4.392	0	4.398	0.006	4.396	0.003	4.392	0	4.398	0.006	4.397	0.004	4.392	0	4.399	0.007
	Nov	4.967	4.966	-0.001	4.960	-0.007	4.972	0.006	4.965	-0.002	4.960	-0.007	4.972	0.006	4.964	-0.002	4.960	-0.007	4.972	0.006	4.965	-0.001	4.960	-0.007	4.973	0.007
	Dec	5.393	5.393	0	5.387	-0.006	5.398	0.005	5.392	-0.001	5.387	-0.006	5.398	0.005	5.391	-0.002	5.387	-0.006	5.398	0.005	5.392	-0.001	5.387	-0.006	5.399	0.006
	Annual	5.335	5.343	0.008	5.340	0.004	5.346	0.011	5.342	0.007	5.334	-0.001	5.348	0.013	5.341	0.006	5.334	-0.001	5.348	0.013	5.342	0.007	5.334	-0.001	5.349	0.014
1:25 Wet	Jan	9.605	9.608	0.003	9.602	-0.003	9.614	0.008	9.612	0.007	9.602	-0.003	9.623	0.018	9.610	0.005	9.602	-0.003	9.623	0.018	9.611	0.006	9.602	-0.003	9.624	0.019
	Feb	8.671	8.688	0.017	8.683	0.012	8.693	0.022	8.688	0.017	8.671	0	8.701	0.031	8.685	0.015	8.671	0	8.701	0.031	8.687	0.017	8.671	0	8.702	0.031
	Mar	7.853	7.881	0.028	7.876	0.024	7.885	0.033	7.878	0.025	7.853	0	7.892	0.040	7.874	0.021	7.853	0	7.892	0.040	7.877	0.024	7.853	0	7.893	0.041
	Apr	7.118	7.142	0.025	7.138	0.021	7.146	0.029	7.140	0.022	7.117	0	7.153	0.035	7.136	0.019	7.117	0	7.153	0.035	7.139	0.022	7.117	0	7.153	0.036
	May	9.252	9.276	0.024	9.272	0.020	9.280	0.027	9.274	0.021	9.252	0	9.286	0.033	9.270	0.018	9.252	0	9.286	0.033	9.273	0.020	9.252	0	9.286	0.034
	Jun	15.632	15.653	0.020	15.650	0.017	15.656	0.024	15.651	0.018	15.632	0	15.661	0.029	15.648	0.015	15.632	0	15.661	0.029	15.650	0.018	15.632	0	15.662	0.029
	Jul	21.484	21.506	0.022	21.500	0.016	21.512	0.028	21.504	0.020	21.484	0	21.517	0.033	21.502	0.017	21.484	0	21.517	0.033	21.504	0.019	21.484	0	21.518	0.033
	Aug	23.448	23.474	0.026	23.462	0.015	23.485	0.037	23.472	0.025	23.448	0	23.489	0.042	23.469	0.022	23.448	0	23.489	0.042	23.471	0.024	23.448	0	23.490	0.042
	Sep	17.935	17.958	0.023	17.948	0.013	17.968	0.033	17.957	0.022	17.935	0	17.972	0.037	17.954	0.019	17.935	0	17.972	0.037	17.956	0.021	17.935	0	17.972	0.037
	Oct	10.731	10.738	0.007	10.733	0.002	10.743	0.011	10.736	0.005	10.731	0	10.743	0.011	10.735	0.004	10.731	0	10.743	0.011	10.736	0.005	10.731	0	10.744	0.013
	Nov	9.690	9.687	-0.003	9.673	-0.018	9.702	0.011	9.685	-0.006	9.673	-0.018	9.702	0.011	9.684	-0.006	9.673	-0.018	9.702	0.011	9.686	-0.005	9.673	-0.018	9.703	0.012
	Dec	10.353	10.350	-0.002	10.338	-0.015	10.363	0.010	10.348	-0.005	10.338	-0.015	10.363	0.010	10.348	-0.005	10.338	-0.015	10.363	0.010	10.349	-0.004	10.338	-0.015	10.364	0.011
	Annual	12.648	12.663	0.016	12.656	0.009	12.671	0.023	12.662	0.014	12.645	-0.003	12.675	0.027	12.660	0.012	12.645	-0.003	12.675	0.027	12.662	0.014	12.645	-0.003	12.676	0.028

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM01 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM02

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	7.044	7.045	0.001	7.042	-0.002	7.049	0.005	7.050	0.006	7.044	0	7.058	0.014	7.050	0.006	7.044	0	7.058	0.014	7.050	0.006	7.044	0	7.059	0.012
	Feb	6.397	6.408	0.012	6.405	0.008	6.411	0.015	6.411	0.014	6.399	0.002	6.419	0.023	6.409	0.012	6.399	0.002	6.420	0.023	6.410	0.014	6.399	0.002	6.420	0.021
	Mar	5.825	5.844	0.019	5.841	0.016	5.847	0.022	5.844	0.019	5.827	0.002	5.854	0.029	5.842	0.017	5.827	0.002	5.855	0.030	5.844	0.019	5.827	0.002	5.855	0.028
	Apr	5.329	5.346	0.016	5.343	0.014	5.348	0.019	5.344	0.015	5.329	-0.001	5.353	0.024	5.342	0.012	5.329	-0.001	5.353	0.024	5.344	0.014	5.329	-0.001	5.354	0.025
	May	7.173	7.181	0.008	7.179	0.005	7.183	0.010	7.179	0.006	7.165	-0.009	7.188	0.015	7.177	0.004	7.165	-0.009	7.188	0.015	7.179	0.006	7.165	-0.009	7.188	0.024
	Jun	11.835	11.845	0.010	11.843	0.008	11.847	0.013	11.844	0.009	11.831	-0.004	11.851	0.016	11.842	0.007	11.831	-0.004	11.851	0.016	11.843	0.009	11.831	-0.004	11.852	0.021
	Jul	13.028	13.038	0.010	13.034	0.006	13.042	0.014	13.037	0.009	13.023	-0.005	13.045	0.017	13.035	0.007	13.023	-0.005	13.045	0.017	13.036	0.008	13.023	-0.005	13.046	0.023
	Aug	9.704	9.718	0.014	9.710	0.006	9.726	0.022	9.717	0.013	9.700	-0.005	9.729	0.025	9.715	0.011	9.700	-0.005	9.729	0.025	9.717	0.012	9.700	-0.005	9.730	0.030
	Sep	7.032	7.045	0.013	7.037	0.005	7.052	0.020	7.044	0.012	7.028	-0.004	7.055	0.023	7.042	0.010	7.028	-0.004	7.055	0.023	7.043	0.011	7.028	-0.004	7.055	0.027
	Oct	6.090	6.094	0.004	6.092	0.002	6.096	0.006	6.093	0.003	6.088	-0.002	6.096	0.006	6.092	0.002	6.088	-0.002	6.096	0.006	6.093	0.003	6.088	-0.002	6.097	0.009
	Nov	6.917	6.915	-0.002	6.905	-0.011	6.925	0.008	6.915	-0.002	6.907	-0.010	6.926	0.009	6.914	-0.002	6.907	-0.010	6.926	0.010	6.916	-0.001	6.907	-0.010	6.927	0.009
	Dec	7.526	7.525	-0.001	7.517	-0.009	7.534	0.007	7.526	0	7.519	-0.007	7.536	0.010	7.526	-0.001	7.519	-0.007	7.536	0.010	7.527	0	7.519	-0.007	7.537	0.008
	Annual	7.825	7.834	0.009	7.829	0.004	7.838	0.013	7.834	0.009	7.822	-0.004	7.843	0.018	7.832	0.007	7.822	-0.003	7.843	0.018	7.833	0.008	7.822	-0.003	7.843	0.020
1:25 Dry	Jan	5.083	5.083	0	5.081	-0.002	5.086	0.002	5.088	0.004	5.083	0	5.093	0.009	5.087	0.004	5.084	0.001	5.093	0.010	5.088	0.004	5.084	0.001	5.094	0.008
	Feb	4.636	4.644	0.007	4.642	0.005	4.646	0.009	4.646	0.010	4.638	0.002	4.652	0.016	4.645	0.009	4.639	0.002	4.652	0.016	4.646	0.010	4.639	0.002	4.653	0.014
	Mar	4.245	4.258	0.013	4.256	0.011	4.260	0.014	4.259	0.014	4.247	0.002	4.266	0.020	4.257	0.012	4.247	0.002	4.266	0.021	4.259	0.013	4.247	0.002	4.266	0.019
	Apr	3.915	3.925	0.011	3.924	0.009	3.927	0.012	3.924	0.010	3.914	-0.001	3.931	0.016	3.923	0.008	3.914	-0.001	3.931	0.016	3.924	0.009	3.914	-0.001	3.931	0.017
	May	4.782	4.787	0.005	4.785	0.003	4.788	0.006	4.786	0.004	4.776	-0.006	4.791	0.010	4.784	0.002	4.776	-0.006	4.791	0.010	4.785	0.003	4.776	-0.006	4.792	0.016
	Jun	7.315	7.322	0.007	7.321	0.006	7.323	0.008	7.321	0.006	7.312	-0.003	7.326	0.011	7.319	0.005	7.312	-0.003	7.326	0.011	7.321	0.006	7.312	-0.003	7.326	0.014
	Jul	8.260	8.266	0.006	8.263	0.004	8.269	0.009	8.265	0.006	8.256	-0.004	8.271	0.012	8.264	0.004	8.256	-0.004	8.271	0.012	8.265	0.005	8.256	-0.004	8.272	0.016
	Aug	6.563	6.572	0.009	6.566	0.004	6.578	0.015	6.572	0.009	6.559	-0.003	6.580	0.017	6.570	0.007	6.559	-0.003	6.580	0.017	6.571	0.008	6.559	-0.003	6.581	0.021
	Sep	5.081	5.090	0.009	5.085	0.004	5.096	0.014	5.090	0.009	5.078	-0.003	5.098	0.017	5.088	0.007	5.078	-0.003	5.098	0.017	5.089	0.008	5.078	-0.003	5.098	0.020
	Oct	4.449	4.452	0.003	4.451	0.002	4.453	0.004	4.451	0.002	4.447	-0.002	4.453	0.004	4.450	0.001	4.447	-0.002	4.453	0.004	4.451	0.002	4.447	-0.002	4.453	0.007
	Nov	4.972	4.971	-0.001	4.965	-0.007	4.977	0.005	4.971	0	4.966	-0.006	4.979	0.007	4.971	-0.001	4.966	-0.005	4.979	0.007	4.972	0	4.966	-0.005	4.980	0.007
	Dec	5.393	5.393	0	5.387	-0.006	5.398	0.005	5.394	0.001	5.389	-0.004	5.401	0.007	5.394	0.001	5.390	-0.003	5.401	0.008	5.395	0.001	5.390	-0.003	5.402	0.006
	Annual	5.391	5.397	0.006	5.394	0.003	5.400	0.009	5.397	0.006	5.389	-0.002	5.403	0.012	5.396	0.005	5.389	-0.002	5.403	0.012	5.397	0.006	5.389	-0.002	5.404	0.014
1:25 Wet	Jan	9.605	9.608	0.003	9.602	-0.003	9.614	0.008	9.614	0.009	9.605	-0.001	9.625	0.020	9.613	0.008	9.605	0	9.625	0.020	9.614	0.008	9.605	0	9.626	0.019
	Feb	8.671	8.688	0.017	8.683	0.012	8.693	0.022	8.690	0.020	8.673	0.002	8.704	0.033	8.688	0.017	8.673	0.002	8.704	0.033	8.690	0.019	8.673	0.002	8.705	0.031
	Mar	7.853	7.881	0.028	7.876	0.024	7.885	0.033	7.880	0.027	7.855	0.002	7.895	0.042	7.877	0.024	7.855	0.002	7.895	0.042	7.879	0.027	7.855	0.002	7.896	0.041
	Apr	7.135	7.159	0.024	7.155	0.020	7.163	0.028	7.157	0.022	7.134	0	7.169	0.035	7.153	0.019	7.134	0	7.169	0.035	7.156	0.021	7.134	0	7.170	0.036
	May	9.641	9.653	0.011	9.649	0.008	9.657	0.015	9.650	0.009	9.629	-0.012	9.662	0.021	9.647	0.006	9.629	-0.012	9.662	0.021	9.650	0.008	9.629	-0.012	9.663	0.034
	Jun	15.800	15.816	0.015	15.812	0.012	15.819	0.018	15.813	0.013	15.795	-0.005	15.824	0.024	15.811	0.010	15.795	-0.005	15.824	0.024	15.813	0.012	15.795	-0.005	15.824	0.029
	Jul	21.710	21.725	0.015	21.719	0.009	21.731	0.021	21.723	0.013	21.703	-0.007	21.736	0.026	21.720	0.010	21.703	-0.007	21.736	0.026	21.722	0.012	21.703	-0.007	21.736	0.033
	Aug	23.645	23.664	0.020	23.653	0.009	23.676	0.031	23.663	0.019	23.638	-0.006	23.680	0.036	23.660	0.016	23.638	-0.006	23.680	0.036	23.662	0.017	23.638	-0.006	23.681	0.042
	Sep	18.104	18.121	0.018	18.111	0.008	18.131	0.027	18.120	0.017	18.099	-0.005	18.135	0.031	18.118	0.014	18.099	-0.005	18.135	0.031	18.119	0.015	18.099	-0.005	18.136	0.037
	Oct	10.836	10.840	0.004	10.836	-0.001	10.845	0.008	10.838	0.002	10.833	-0.003	10.845	0.008	10.837	0	10.833	-0.003	10.845	0.008	10.838	0.002	10.833	-0.003	10.846	0.013
	Nov	9.704	9.701	-0.004	9.686	-0.018	9.715	0.011	9.699	-0.005	9.688	-0.017	9.717	0.012	9.699	-0.005	9.688	-0.017	9.717	0.012	9.701	-0.004	9.688	-0.017	9.718	0.012
	Dec	10.353	10.350	-0.002	10.338	-0.015	10.363	0.010	10.350	-0.002	10.340	-0.013	10.365	0.012	10.350	-0.003	10.340	-0.012	10.365	0.013	10.351	-0.001	10.340	-0.012	10.366	0.011
	Annual	12.755	12.767	0.012	12.760	0.005	12.774	0.020	12.767	0.012	12.749	-0.005	12.780	0.025	12.764	0.010	12.749	-0.005	12.780	0.025	12.766	0.011	12.749	-0.005	12.781	0.028

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM02 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM09

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.013	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0	0.013	0
	May	0.168	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0	0.168	0
	Jun	0.070	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0	0.070	0
	Jul	0.100	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0	0.100	0
	Aug	0.086	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0	0.086	0
	Sep	0.075	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0	0.075	0
	Oct	0.047	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0
	Nov	0.004	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0	0.004	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.047	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0	0.047	0
1:25 Dry	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.015	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0	0.015	0
	May	0.112	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0	0.112	0
	Jun	0.051	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0	0.051	0
	Jul	0.072	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0	0.072	0
	Aug	0.063	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0
	Sep	0.054	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0	0.054	0
	Oct	0.034	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0
	Nov	0.003	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0	0.003	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.034	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0	0.034	0
1:25 Wet	Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Apr	0.010	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0
	May	0.235	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0	0.235	0
	Jun	0.101	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0	0.101	0
	Jul	0.136	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0	0.136	0
	Aug	0.119	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0	0.119	0
	Sep	0.102	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0	0.102	0
	Oct	0.063	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0	0.063	0
	Nov	0.008	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0	0.008	0
	Dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	0.065	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0	0.065	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM09 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM03

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	7.050	7.052	0.003	7.050	0.001	7.054	0.005	7.055	0.005	7.048	-0.002	7.063	0.013	7.049	-0.001	7.044	-0.006	7.057	0.008	7.049	0	7.044	-0.006	7.058	0.012
	Feb	6.402	6.418	0.016	6.417	0.015	6.419	0.017	6.453	0.051	6.418	0.016	6.475	0.073	6.408	0.006	6.399	-0.004	6.419	0.017	6.410	0.007	6.399	-0.004	6.420	0.021
	Mar	5.830	5.861	0.031	5.861	0.030	5.862	0.032	5.926	0.096	5.868	0.038	5.957	0.126	5.841	0.011	5.827	-0.004	5.854	0.024	5.843	0.013	5.827	-0.004	5.855	0.028
	Apr	5.356	5.387	0.030	5.385	0.029	5.389	0.032	5.386	0.029	5.367	0.010	5.397	0.041	5.362	0.005	5.349	-0.008	5.373	0.017	5.364	0.007	5.349	-0.008	5.374	0.025
	May	7.455	7.489	0.034	7.488	0.033	7.489	0.034	7.492	0.037	7.470	0.015	7.505	0.050	7.440	-0.015	7.427	-0.028	7.450	-0.005	7.441	-0.014	7.427	-0.028	7.451	0.024
	Jun	11.956	11.989	0.033	11.989	0.032	11.989	0.033	12.049	0.093	12.021	0.065	12.062	0.106	11.952	-0.005	11.941	-0.015	11.961	0.005	11.953	-0.003	11.941	-0.015	11.962	0.021
	Jul	13.198	13.233	0.035	13.232	0.034	13.234	0.036	13.296	0.099	13.268	0.070	13.312	0.115	13.190	-0.007	13.179	-0.019	13.201	0.004	13.192	-0.006	13.179	-0.019	13.202	0.023
	Aug	9.852	9.889	0.036	9.885	0.033	9.892	0.040	9.944	0.091	9.906	0.054	9.963	0.111	9.850	-0.002	9.835	-0.017	9.864	0.012	9.851	-0.001	9.835	-0.017	9.865	0.030
	Sep	7.161	7.191	0.030	7.188	0.028	7.194	0.033	7.228	0.067	7.195	0.034	7.247	0.086	7.159	-0.002	7.145	-0.016	7.172	0.011	7.160	-0.001	7.145	-0.016	7.172	0.027
	Oct	6.173	6.184	0.011	6.181	0.007	6.188	0.015	6.193	0.020	6.179	0.006	6.210	0.037	6.165	-0.008	6.161	-0.012	6.169	-0.004	6.166	-0.007	6.161	-0.012	6.170	0.009
	Nov	6.929	6.931	0.002	6.921	-0.008	6.942	0.012	6.931	0.001	6.920	-0.009	6.945	0.016	6.921	-0.009	6.913	-0.016	6.933	0.003	6.922	-0.008	6.913	-0.016	6.934	0.009
	Dec	7.532	7.532	0.001	7.524	-0.008	7.541	0.009	7.528	-0.004	7.521	-0.011	7.538	0.007	7.525	-0.007	7.519	-0.013	7.535	0.004	7.526	-0.006	7.519	-0.013	7.536	0.008
	Annual	7.908	7.930	0.022	7.927	0.019	7.933	0.025	7.957	0.049	7.932	0.024	7.973	0.065	7.905	-0.003	7.895	-0.013	7.916	0.008	7.907	-0.001	7.895	-0.013	7.916	0.020
1:25 Dry	Jan	5.089	5.090	0.001	5.089	0	5.091	0.002	5.083	-0.006	5.063	-0.026	5.096	0.007	5.087	-0.002	5.083	-0.006	5.092	0.004	5.087	-0.002	5.083	-0.006	5.093	0.008
	Feb	4.642	4.653	0.011	4.651	0.009	4.655	0.013	4.668	0.026	4.640	-0.002	4.697	0.055	4.645	0.003	4.638	-0.004	4.652	0.010	4.645	0.004	4.638	-0.004	4.653	0.014
	Mar	4.251	4.273	0.023	4.273	0.022	4.274	0.023	4.322	0.072	4.278	0.027	4.358	0.107	4.257	0.006	4.247	-0.004	4.265	0.015	4.258	0.007	4.247	-0.004	4.266	0.019
	Apr	3.945	3.968	0.023	3.967	0.022	3.970	0.024	3.967	0.022	3.954	0.009	3.976	0.031	3.946	0.001	3.937	-0.008	3.954	0.008	3.947	0.002	3.937	-0.008	3.954	0.017
	May	4.973	5.000	0.027	4.999	0.027	5.000	0.028	5.001	0.029	4.986	0.013	5.011	0.038	4.960	-0.013	4.952	-0.021	4.967	-0.005	4.961	-0.011	4.952	-0.021	4.968	0.016
	Jun	7.404	7.430	0.026	7.429	0.026	7.430	0.026	7.485	0.081	7.461	0.058	7.494	0.091	7.398	-0.005	7.391	-0.013	7.405	0.001	7.399	-0.004	7.391	-0.013	7.405	0.014
	Jul	8.384	8.411	0.027	8.411	0.027	8.411	0.027	8.467	0.083	8.445	0.061	8.479	0.095	8.376	-0.007	8.368	-0.016	8.384	0	8.377	-0.006	8.368	-0.016	8.384	0.016
	Aug	6.672	6.700	0.028	6.698	0.026	6.702	0.031	6.749	0.077	6.715	0.043	6.764	0.093	6.668	-0.004	6.657	-0.014	6.678	0.006	6.669	-0.003	6.657	-0.014	6.679	0.021
	Sep	5.176	5.199	0.024	5.197	0.022	5.201	0.025	5.229	0.053	5.190	0.014	5.247	0.071	5.172	-0.003	5.162	-0.013	5.182	0.006	5.173	-0.002	5.162	-0.013	5.182	0.020
	Oct	4.510	4.518	0.009	4.516	0.006	4.520	0.011	4.523	0.013	4.499	-0.011	4.543	0.033	4.502	-0.007	4.499	-0.011	4.505	-0.005	4.503	-0.006	4.499	-0.011	4.506	0.007
	Nov	4.982	4.984	0.002	4.978	-0.005	4.991	0.009	4.981	-0.001	4.963	-0.019	4.993	0.011	4.975	-0.007	4.971	-0.012	4.983	0.001	4.976	-0.006	4.971	-0.012	4.984	0.007
	Dec	5.399	5.400	0.001	5.394	-0.005	5.405	0.007	5.390	-0.008	5.365	-0.034	5.402	0.003	5.393	-0.005	5.389	-0.010	5.400	0.002	5.394	-0.005	5.389	-0.010	5.401	0.006
	Annual	5.452	5.469	0.017	5.467	0.015	5.471	0.019	5.489	0.037	5.463	0.011	5.505	0.053	5.448	-0.004	5.441	-0.011	5.456	0.004	5.449	-0.003	5.441	-0.011	5.456	0.014
1:25 Wet	Jan	9.611	9.616	0.005	9.612	0.001	9.619	0.008	9.621	0.010	9.611	0	9.632	0.022	9.613	0.002	9.604	-0.006	9.625	0.014	9.613	0.002	9.604	-0.006	9.626	0.019
	Feb	8.676	8.699	0.022	8.699	0.022	8.699	0.022	8.737	0.061	8.699	0.023	8.762	0.086	8.687	0.011	8.673	-0.004	8.703	0.027	8.689	0.013	8.673	-0.004	8.704	0.031
	Mar	7.858	7.900	0.042	7.897	0.039	7.903	0.045	7.966	0.108	7.911	0.052	8.001	0.142	7.876	0.018	7.855	-0.004	7.894	0.036	7.879	0.021	7.855	-0.004	7.895	0.041
	Apr	7.157	7.197	0.040	7.194	0.037	7.200	0.043	7.200	0.043	7.170	0.013	7.253	0.096	7.169	0.012	7.150	-0.007	7.185	0.028	7.171	0.014	7.150	-0.007	7.186	0.036
	May	10.034	10.076	0.043	10.076	0.042	10.077	0.043	10.161	0.127	10.051	0.017	10.288	0.254	10.015	-0.019	9.997	-0.037	10.030	-0.003	10.018	-0.016	9.997	-0.037	10.031	0.034
	Jun	15.973	16.015	0.042	16.015	0.042	16.016	0.043	16.095	0.122	16.046	0.073	16.136	0.163	15.969	-0.004	15.954	-0.019	15.982	0.010	15.971	-0.002	15.954	-0.019	15.983	0.029
	Jul	21.940	21.988	0.048	21.986	0.046	21.990	0.050	22.081	0.140	22.022	0.082	22.136	0.196	21.934	-0.007	21.917	-0.024	21.949	0.009	21.936	-0.005	21.917	-0.024	21.950	0.033
	Aug	23.846	23.895	0.048	23.889	0.043	23.900	0.054	23.969	0.123	23.914	0.068	24.020	0.174	23.846	0	23.825	-0.022	23.866	0.020	23.848	0.002	23.825	-0.022	23.867	0.042
	Sep	18.277	18.317	0.040	18.313	0.035	18.322	0.045	18.381	0.104	18.324	0.047	18.447	0.170	18.277	0	18.258	-0.019	18.294	0.017	18.278	0.001	18.258	-0.019	18.295	0.037
	Oct	10.947	10.960	0.013	10.953	0.006	10.966	0.020	10.987	0.041	10.957	0.011	11.027	0.081	10.936	-0.011	10.932	-0.014	10.944	-0.003	10.937	-0.009	10.932	-0.014	10.945	0.013
	Nov	9.724	9.725	0.001	9.710	-0.014	9.741	0.017	9.727	0.003	9.711	-0.013	9.746	0.022	9.712	-0.012	9.701	-0.023	9.730	0.006	9.713	-0.011	9.701	-0.023	9.731	0.012
	Dec	10.358	10.358	0	10.345	-0.013	10.371	0.013	10.354	-0.004	10.343	-0.015	10.369	0.011	10.349	-0.009	10.340	-0.018	10.365	0.007	10.351	-0.007	10.340	-0.018	10.366	0.011
	Annual	12.867	12.896	0.029	12.891	0.024	12.900	0.034	12.940	0.073	12.897	0.030	12.985	0.118	12.865	-0.002	12.850	-0.016	12.881	0.014	12.867	0	12.850	-0.016	12.881	0.028

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM03 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM04

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.019	0.019	0.002	0.002	0.023	0.021
	Feb	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.023	0.023	0.002	0.002	0.028	0.026
	Mar	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.026	0.026	0.002	0.002	0.030	0.029
	Apr	0.010	0.003	-0.006	0.003	-0.006	0.003	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.004	-0.006	0.031	0.021	0.004	-0.006	0.036	0.033
	May	0.127	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.045	-0.082	0.170	0.044	0.045	-0.082	0.192	0.147
	Jun	0.053	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.019	-0.034	0.081	0.028	0.019	-0.034	0.091	0.072
	Jul	0.075	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.027	-0.048	0.108	0.032	0.027	-0.048	0.121	0.094
	Aug	0.065	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.023	-0.042	0.087	0.022	0.023	-0.042	0.098	0.075
	Sep	0.057	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.020	-0.036	0.092	0.036	0.020	-0.036	0.105	0.084
	Oct	0.036	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.068	0.032	0.013	-0.023	0.077	0.064
	Nov	0.003	0.001	-0.002	0.001	-0.002	0.001	-0.002	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.028	0.025	0.002	-0.001	0.033	0.030
	Dec	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.015	0.015	0.002	0.002	0.018	0.016
	Annual	0.035	0.013	-0.023	0.013	-0.023	0.013	-0.023	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.013	-0.022	0.062	0.027	0.013	-0.022	0.071	0.058
1:25 Dry	Jan	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.015	0.015	0.002	0.002	0.019	0.017
	Feb	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.016	0.016	0.002	0.002	0.021	0.019
	Mar	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.018	0.018	0.002	0.002	0.023	0.021
	Apr	0.011	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.004	-0.007	0.023	0.012	0.004	-0.007	0.029	0.025
	May	0.085	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.030	-0.055	0.111	0.026	0.030	-0.055	0.134	0.104
	Jun	0.038	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.014	-0.025	0.045	0.007	0.014	-0.025	0.055	0.041
	Jul	0.054	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.019	-0.035	0.061	0.006	0.019	-0.035	0.073	0.054
	Aug	0.047	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.049	0.002	0.017	-0.031	0.059	0.042
	Sep	0.041	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.014	-0.026	0.057	0.016	0.014	-0.026	0.069	0.054
	Oct	0.026	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.045	0.020	0.009	-0.016	0.056	0.047
	Nov	0.002	0.001	-0.001	0.001	-0.001	0.001	-0.001	0.002	-0.001	0.002	-0.001	0.002	-0.001	0.002	0	0.002	0	0.002	0	0.020	0.018	0.002	0	0.025	0.023
	Dec	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.013	0.013	0.002	0.002	0.016	0.015
	Annual	0.025	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.009	-0.016	0.010	-0.016	0.010	-0.016	0.010	-0.016	0.039	0.014	0.010	-0.016	0.048	0.038
1:25 Wet	Jan	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.026	0.026	0.002	0.002	0.030	0.028
	Feb	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.031	0.031	0.002	0.002	0.035	0.034
	Mar	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.035	0.035	0.002	0.002	0.039	0.038
	Apr	0.008	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.003	-0.005	0.041	0.033	0.003	-0.005	0.046	0.043
	May	0.177	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.063	-0.114	0.248	0.071	0.063	-0.114	0.268	0.205
	Jun	0.077	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.027	-0.049	0.130	0.053	0.027	-0.049	0.141	0.114
	Jul	0.103	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.037	-0.066	0.170	0.067	0.037	-0.066	0.185	0.148
	Aug	0.090	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.032	-0.058	0.139	0.049	0.032	-0.058	0.150	0.118
	Sep	0.077	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.027	-0.050	0.140	0.063	0.027	-0.050	0.151	0.124
	Oct	0.048	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.096	0.048	0.017	-0.031	0.104	0.087
	Nov	0.006	0.002	-0.004	0.002	-0.004	0.002	-0.004	0.003	-0.003	0.003	-0.003	0.003	-0.003	0.003	-0.003	0.003	-0.003	0.003	-0.003	0.039	0.033	0.003	-0.003	0.043	0.040
	Dec	0	0	0	0	0	0	0	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.019	0.019	0.002	0.002	0.021	0.020
	Annual	0.049	0.017	-0.031	0.017	-0.031	0.017	-0.031	0.018	-0.031	0.018	-0.031	0.018	-0.031	0.018	-0.031	0.018	-0.031	0.018	-0.031	0.093	0.044	0.018	-0.031	0.101	0.083

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM04 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM06

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	7.050	7.052	0.003	7.050	0.001	7.054	0.005	7.056	0.006	7.049	-0.001	7.064	0.014	7.051	0.001	7.045	-0.004	7.059	0.009	7.069	0.019	7.045	-0.004	7.080	0.033
	Feb	6.402	6.418	0.016	6.417	0.015	6.419	0.017	6.454	0.052	6.419	0.017	6.476	0.074	6.410	0.008	6.400	-0.002	6.421	0.019	6.433	0.031	6.400	-0.002	6.447	0.047
	Mar	5.830	5.861	0.031	5.861	0.030	5.862	0.032	5.927	0.097	5.869	0.039	5.958	0.127	5.843	0.013	5.828	-0.002	5.856	0.025	5.869	0.039	5.828	-0.002	5.885	0.056
	Apr	5.374	5.398	0.024	5.396	0.022	5.400	0.026	5.397	0.023	5.378	0.004	5.409	0.035	5.373	-0.001	5.360	-0.014	5.384	0.011	5.402	0.028	5.360	-0.014	5.417	0.057
	May	7.684	7.636	-0.048	7.635	-0.049	7.637	-0.047	7.639	-0.045	7.617	-0.067	7.652	-0.032	7.587	-0.097	7.574	-0.110	7.598	-0.086	7.714	0.030	7.574	-0.110	7.745	0.170
	Jun	12.052	12.051	-0.002	12.051	-0.002	12.051	-0.001	12.111	0.059	12.083	0.030	12.124	0.071	12.014	-0.039	12.003	-0.050	12.023	-0.029	12.077	0.025	12.003	-0.050	12.095	0.093
	Jul	13.334	13.320	-0.013	13.319	-0.014	13.321	-0.012	13.384	0.050	13.355	0.022	13.400	0.066	13.278	-0.056	13.266	-0.068	13.289	-0.045	13.360	0.027	13.266	-0.068	13.383	0.117
	Aug	9.970	9.965	-0.006	9.961	-0.009	9.968	-0.002	10.019	0.049	9.982	0.012	10.039	0.069	9.926	-0.044	9.911	-0.059	9.940	-0.030	9.991	0.021	9.911	-0.059	10.015	0.104
	Sep	7.263	7.257	-0.006	7.254	-0.009	7.260	-0.003	7.294	0.031	7.261	-0.002	7.313	0.050	7.225	-0.038	7.211	-0.052	7.238	-0.025	7.298	0.035	7.211	-0.052	7.322	0.111
	Oct	6.237	6.226	-0.012	6.222	-0.015	6.229	-0.008	6.235	-0.003	6.220	-0.017	6.252	0.014	6.206	-0.031	6.202	-0.035	6.211	-0.027	6.262	0.025	6.202	-0.035	6.276	0.073
	Nov	6.935	6.935	0	6.925	-0.010	6.946	0.010	6.935	0	6.925	-0.010	6.950	0.014	6.926	-0.010	6.918	-0.017	6.938	0.002	6.952	0.017	6.918	-0.017	6.968	0.039
	Dec	7.532	7.532	0.001	7.524	-0.008	7.541	0.009	7.529	-0.002	7.522	-0.010	7.540	0.008	7.527	-0.005	7.520	-0.011	7.537	0.006	7.541	0.010	7.520	-0.011	7.554	0.024
	Annual	7.972	7.971	-0.001	7.968	-0.004	7.974	0.002	7.998	0.026	7.973	0.001	8.015	0.043	7.947	-0.025	7.937	-0.035	7.958	-0.014	7.997	0.025	7.937	-0.035	8.016	0.077
1:25 Dry	Jan	5.089	5.090	0.001	5.089	0	5.091	0.002	5.084	-0.005	5.064	-0.025	5.097	0.008	5.088	0	5.085	-0.004	5.094	0.005	5.102	0.013	5.085	-0.004	5.111	0.025
	Feb	4.642	4.653	0.011	4.651	0.009	4.655	0.013	4.669	0.027	4.641	-0.001	4.698	0.056	4.646	0.004	4.640	-0.002	4.654	0.012	4.662	0.020	4.640	-0.002	4.673	0.033
	Mar	4.251	4.273	0.023	4.273	0.022	4.274	0.023	4.324	0.073	4.279	0.028	4.359	0.108	4.258	0.008	4.249	-0.002	4.267	0.016	4.276	0.025	4.249	-0.002	4.288	0.039
	Apr	3.966	3.982	0.016	3.981	0.015	3.983	0.017	3.981	0.015	3.967	0.001	3.989	0.024	3.959	-0.006	3.950	-0.015	3.967	0.001	3.980	0.014	3.950	-0.015	3.992	0.041
	May	5.126	5.098	-0.027	5.098	-0.028	5.099	-0.027	5.100	-0.026	5.084	-0.042	5.109	-0.017	5.059	-0.067	5.050	-0.076	5.066	-0.060	5.140	0.014	5.050	-0.076	5.169	0.119
	Jun	7.473	7.474	0.001	7.474	0.001	7.474	0.001	7.529	0.056	7.506	0.033	7.539	0.066	7.443	-0.030	7.435	-0.037	7.449	-0.024	7.476	0.003	7.435	-0.037	7.490	0.055
	Jul	8.482	8.474	-0.008	8.474	-0.008	8.474	-0.008	8.530	0.048	8.508	0.026	8.542	0.060	8.440	-0.043	8.431	-0.051	8.447	-0.035	8.482	0	8.431	-0.051	8.501	0.069
	Aug	6.758	6.755	-0.002	6.753	-0.005	6.758	0	6.804	0.047	6.770	0.013	6.820	0.062	6.723	-0.034	6.713	-0.045	6.733	-0.024	6.757	-0.001	6.713	-0.045	6.775	0.063
	Sep	5.249	5.246	-0.003	5.244	-0.005	5.248	-0.001	5.276	0.027	5.237	-0.012	5.294	0.045	5.220	-0.029	5.210	-0.039	5.229	-0.020	5.263	0.014	5.210	-0.039	5.283	0.074
	Oct	4.556	4.548	-0.008	4.546	-0.010	4.550	-0.006	4.553	-0.003	4.529	-0.027	4.572	0.016	4.532	-0.024	4.529	-0.027	4.535	-0.021	4.569	0.013	4.529	-0.027	4.582	0.053
	Nov	4.987	4.987	0	4.980	-0.006	4.994	0.007	4.984	-0.002	4.967	-0.020	4.997	0.010	4.979	-0.007	4.975	-0.012	4.987	0.001	4.998	0.011	4.975	-0.012	5.011	0.029
	Dec	5.399	5.400	0.001	5.394	-0.005	5.405	0.007	5.391	-0.007	5.366	-0.032	5.403	0.005	5.395	-0.004	5.391	-0.008	5.402	0.003	5.407	0.008	5.391	-0.008	5.417	0.020
	Annual	5.498	5.498	0	5.496	-0.002	5.500	0.002	5.519	0.021	5.493	-0.005	5.535	0.037	5.479	-0.019	5.471	-0.027	5.486	-0.012	5.509	0.011	5.471	-0.027	5.524	0.052
1:25 Wet	Jan	9.611	9.616	0.005	9.612	0.001	9.619	0.008	9.622	0.011	9.612	0.001	9.634	0.023	9.614	0.003	9.606	-0.005	9.626	0.016	9.639	0.029	9.606	-0.005	9.655	0.046
	Feb	8.676	8.699	0.022	8.699	0.022	8.699	0.022	8.739	0.062	8.700	0.024	8.763	0.087	8.689	0.013	8.674	-0.002	8.705	0.029	8.721	0.044	8.674	-0.002	8.739	0.064
	Mar	7.858	7.900	0.042	7.897	0.039	7.903	0.045	7.967	0.109	7.912	0.054	8.002	0.143	7.878	0.020	7.856	-0.002	7.896	0.038	7.914	0.056	7.856	-0.002	7.934	0.078
	Apr	7.171	7.206	0.035	7.203	0.032	7.209	0.038	7.209	0.038	7.179	0.008	7.262	0.091	7.178	0.007	7.159	-0.012	7.194	0.023	7.219	0.048	7.159	-0.012	7.237	0.078
	May	10.354	10.282	-0.072	10.282	-0.072	10.283	-0.071	10.367	0.013	10.257	-0.097	10.494	0.140	10.221	-0.133	10.203	-0.151	10.236	-0.118	10.409	0.054	10.203	-0.151	10.441	0.238
	Jun	16.111	16.104	-0.007	16.104	-0.007	16.105	-0.007	16.184	0.073	16.135	0.024	16.225	0.114	16.058	-0.053	16.043	-0.069	16.072	-0.040	16.163	0.052	16.043	-0.069	16.185	0.143
	Jul	22.126	22.108	-0.019	22.106	-0.021	22.110	-0.017	22.200	0.074	22.142	0.016	22.256	0.129	22.053	-0.073	22.036	-0.090	22.069	-0.058	22.189	0.063	22.036	-0.090	22.217	0.181
	Aug	24.008	23.999	-0.009	23.993	-0.015	24.005	-0.004	24.074	0.065	24.019	0.010	24.125	0.116	23.951	-0.058	23.929	-0.079	23.971	-0.038	24.059	0.051	23.929	-0.079	24.089	0.160
	Sep	18.416	18.407	-0.009	18.402	-0.014	18.412	-0.004	18.471	0.055	18.414	-0.003	18.536	0.120	18.366	-0.050	18.347	-0.069	18.384	-0.032	18.481	0.065	18.347	-0.069	18.508	0.161
	Oct	11.033	11.015	-0.018	11.009	-0.024	11.022	-0.011	11.043	0.010	11.013	-0.020	11.083	0.050	10.992	-0.042	10.988	-0.045	11.000	-0.034	11.072	0.039	10.988	-0.045	11.087	0.099
	Nov	9.735	9.733	-0.003	9.717	-0.018	9.748	0.012	9.735	-0.001	9.719	-0.017	9.754	0.018	9.720	-0.015	9.709	-0.026	9.738	0.003	9.758	0.022	9.709	-0.026	9.778	0.052
	Dec	10.358	10.358	0	10.345	-0.013	10.371	0.013	10.356	-0.003	10.344	-0.014	10.371	0.012	10.351	-0.007	10.342	-0.017	10.367	0.008	10.370	0.012	10.342	-0.017	10.387	0.031
	Annual	12.955	12.952	-0.003	12.947	-0.008	12.957	0.002	12.997	0.042	12.954	-0.001	13.042	0.087	12.923	-0.032	12.908	-0.047	12.938	-0.017	12.999	0.044	12.908	-0.047	13.022	0.111

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM06 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM05

Scenario	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	2.391	2.390	-0.001	2.389	-0.002	2.391	0	2.397	0.006	2.396	0.005	2.398	0.007	2.397	0.006	2.396	0.005	2.397	0.006	2.397	0.006	2.396	0.005	2.397	0
	Feb	2.009	2.015	0.006	2.014	0.005	2.016	0.006	2.021	0.011	2.016	0.007	2.022	0.013	2.019	0.010	2.016	0.006	2.022	0.013	2.020	0.011	2.016	0.006	2.022	0.006
	Mar	1.654	1.664	0.010	1.664	0.009	1.665	0.010	1.669	0.015	1.661	0.007	1.672	0.017	1.667	0.013	1.661	0.006	1.671	0.017	1.669	0.014	1.661	0.006	1.671	0.011
	Apr	1.367	1.375	0.008	1.374	0.008	1.375	0.008	1.380	0.013	1.373	0.007	1.382	0.015	1.378	0.012	1.373	0.006	1.382	0.015	1.379	0.013	1.373	0.006	1.382	0.008
	May	3.502	3.509	0.007	3.509	0.007	3.509	0.007	3.514	0.012	3.509	0.007	3.516	0.014	3.513	0.011	3.508	0.006	3.516	0.014	3.514	0.012	3.508	0.006	3.516	0.007
	Jun	7.780	7.785	0.005	7.785	0.005	7.785	0.006	7.791	0.011	7.786	0.007	7.792	0.013	7.790	0.010	7.786	0.006	7.792	0.012	7.790	0.011	7.786	0.006	7.792	0.006
	Jul	5.846	5.850	0.004	5.850	0.004	5.851	0.005	5.856	0.010	5.853	0.007	5.857	0.011	5.855	0.009	5.852	0.006	5.857	0.011	5.856	0.010	5.852	0.006	5.857	0.005
	Aug	3.747	3.751	0.004	3.750	0.003	3.751	0.004	3.757	0.010	3.754	0.007	3.758	0.011	3.756	0.009	3.753	0.006	3.757	0.010	3.756	0.009	3.753	0.006	3.757	0.004
	Sep	2.980	2.983	0.003	2.983	0.003	2.983	0.003	2.989	0.009	2.987	0.007	2.990	0.010	2.988	0.008	2.986	0.006	2.989	0.010	2.989	0.009	2.986	0.006	2.989	0.003
	Oct	2.708	2.711	0.003	2.711	0.002	2.711	0.003	2.717	0.009	2.715	0.007	2.718	0.010	2.716	0.008	2.715	0.006	2.717	0.009	2.717	0.008	2.715	0.006	2.717	0.003
	Nov	2.668	2.670	0.002	2.670	0.002	2.670	0.002	2.677	0.008	2.675	0.007	2.677	0.009	2.676	0.008	2.674	0.006	2.677	0.009	2.676	0.008	2.674	0.006	2.677	0.002
	Dec	2.633	2.635	0.002	2.635	0.002	2.635	0.002	2.641	0.008	2.640	0.007	2.642	0.009	2.641	0.008	2.640	0.006	2.642	0.008	2.641	0.008	2.640	0.006	2.642	0.002
	Annual	3.274	3.278	0.004	3.278	0.004	3.279	0.005	3.284	0.010	3.280	0.007	3.285	0.012	3.283	0.009	3.280	0.006	3.285	0.011	3.284	0.010	3.280	0.006	3.285	0.005
1:25 Dry	Jan	1.674	1.673	-0.001	1.673	-0.001	1.674	0	1.680	0.006	1.680	0.006	1.681	0.007	1.680	0.006	1.679	0.005	1.681	0.006	1.680	0.006	1.679	0.005	1.681	0
	Feb	1.415	1.418	0.004	1.418	0.003	1.419	0.004	1.424	0.010	1.421	0.007	1.426	0.011	1.424	0.009	1.421	0.006	1.425	0.011	1.424	0.009	1.421	0.006	1.425	0.004
	Mar	1.171	1.178	0.007	1.178	0.006	1.179	0.007	1.183	0.012	1.178	0.007	1.185	0.014	1.182	0.011	1.178	0.006	1.185	0.014	1.183	0.012	1.178	0.006	1.185	0.007
	Apr	0.973	0.979	0.005	0.978	0.005	0.979	0.006	0.984	0.011	0.980	0.007	0.986	0.013	0.983	0.010	0.980	0.006	0.985	0.012	0.984	0.011	0.980	0.006	0.985	0.006
	May	2.458	2.463	0.005	2.462	0.005	2.463	0.005	2.468	0.011	2.464	0.007	2.470	0.012	2.467	0.010	2.464	0.006	2.469	0.012	2.468	0.010	2.464	0.006	2.469	0.005
	Jun	4.377	4.381	0.004	4.380	0.004	4.381	0.004	4.387	0.010	4.383	0.007	4.388	0.011	4.386	0.009	4.383	0.006	4.387	0.010	4.386	0.009	4.383	0.006	4.387	0.004
	Jul	3.157	3.161	0.003	3.160	0.003	3.161	0.003	3.167	0.009	3.164	0.007	3.167	0.010	3.166	0.008	3.164	0.006	3.167	0.010	3.166	0.009	3.164	0.006	3.167	0.003
	Aug	2.366	2.369	0.003	2.368	0.002	2.369	0.003	2.375	0.009	2.373	0.007	2.375	0.009	2.374	0.008	2.372	0.006	2.375	0.009	2.374	0.008	2.372	0.006	2.375	0.003
	Sep	1.956	1.958	0.002	1.958	0.002	1.958	0.002	1.964	0.008	1.963	0.007	1.965	0.009	1.964	0.008	1.963	0.006	1.965	0.009	1.964	0.008	1.963	0.006	1.965	0.002
	Oct	1.837	1.839	0.002	1.839	0.002	1.839	0.002	1.845	0.008	1.844	0.007	1.846	0.009	1.845	0.008	1.843	0.006	1.845	0.008	1.845	0.008	1.843	0.006	1.845	0.002
	Nov	1.842	1.843	0.002	1.843	0.002	1.843	0.002	1.850	0.008	1.848	0.007	1.850	0.008	1.849	0.007	1.848	0.006	1.850	0.008	1.849	0.008	1.848	0.006	1.850	0.002
	Dec	1.833	1.834	0.001	1.834	0.001	1.834	0.001	1.840	0.008	1.839	0.007	1.841	0.008	1.840	0.007	1.839	0.006	1.840	0.008	1.840	0.007	1.839	0.006	1.840	0.001
	Annual	2.088	2.091	0.003	2.091	0.003	2.092	0.003	2.097	0.009	2.095	0.007	2.098	0.010	2.097	0.008	2.095	0.006	2.098	0.010	2.097	0.009	2.095	0.006	2.098	0.003
1:25 Wet	Jan	3.312	3.311	-0.001	3.310	-0.002	3.312	0	3.318	0.006	3.317	0.005	3.319	0.007	3.318	0.006	3.316	0.004	3.318	0.006	3.318	0.006	3.316	0.004	3.318	0
	Feb	2.766	2.774	0.008	2.773	0.007	2.775	0.009	2.779	0.013	2.773	0.007	2.782	0.016	2.778	0.012	2.772	0.006	2.782	0.015	2.779	0.013	2.772	0.006	2.782	0.009
	Mar	2.264	2.278	0.014	2.277	0.013	2.279	0.015	2.282	0.018	2.271	0.007	2.286	0.022	2.280	0.016	2.270	0.006	2.285	0.021	2.281	0.017	2.270	0.006	2.285	0.015
	Apr	1.860	1.871	0.011	1.870	0.011	1.871	0.012	1.875	0.016	1.866	0.007	1.878	0.019	1.873	0.014	1.866	0.006	1.878	0.018	1.875	0.015	1.866	0.006	1.878	0.012
	May	4.855	4.865	0.010	4.865	0.009	4.866	0.010	4.870	0.014	4.862	0.007	4.872	0.017	4.868	0.013	4.862	0.006	4.872	0.017	4.869	0.014	4.862	0.006	4.872	0.010
	Jun	12.298	12.306	0.008	12.306	0.007	12.306	0.008	12.311	0.013	12.305	0.007	12.313	0.015	12.310	0.011	12.305	0.006	12.313	0.014	12.311	0.012	12.305	0.006	12.313	0.008
	Jul	12.458	12.464	0.006	12.464	0.006	12.465	0.006	12.470	0.012	12.465	0.007	12.472	0.013	12.469	0.011	12.465	0.006	12.471	0.013	12.470	0.011	12.465	0.006	12.471	0.006
	Aug	6.818	6.823	0.005	6.823	0.005	6.823	0.005	6.829	0.011	6.825	0.007	6.830	0.012	6.828	0.010	6.824	0.006	6.830	0.012	6.828	0.010	6.824	0.006	6.830	0.005
	Sep	4.698	4.702	0.004	4.702	0.004	4.702	0.004	4.708	0.010	4.705	0.007	4.709	0.011	4.707	0.009	4.704	0.006	4.709	0.011	4.707	0.010	4.704	0.006	4.709	0.004
	Oct	3.972	3.976	0.004	3.976	0.003	3.976	0.004	3.982	0.010	3.979	0.007	3.983	0.011	3.981	0.009	3.979	0.006	3.982	0.010	3.981	0.009	3.979	0.006	3.982	0.004
	Nov	3.776	3.779	0.003	3.778	0.003	3.779	0.003	3.785	0.009	3.782	0.007	3.786	0.010	3.784	0.008	3.782	0.006	3.785	0.010	3.784	0.009	3.782	0.006	3.785	0.003
	Dec	3.677	3.679	0.003	3.679	0.002	3.679	0.003	3.685	0.009	3.683	0.007	3.686	0.009	3.685	0.008	3.683	0.006	3.686	0.009	3.685	0.008	3.683	0.006	3.686	0.003
	Annual	5.230	5.236	0.006	5.235	0.006	5.236	0.007	5.241	0.012	5.236	0.007	5.243	0.013	5.240	0.011	5.236	0.006	5.243	0.013	5.241	0.011	5.236	0.006	5.243	0.007

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM05 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

AQM29

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	9.441	9.443	0.002	9.441	0.001	9.444	0.003	9.453	0.012	9.447	0.006	9.461	0.021	9.448	0.007	9.443	0.002	9.456	0.016	9.466	0.025	9.443	0.002	9.478	0.033
	Feb	8.412	8.433	0.021	8.431	0.020	8.435	0.023	8.475	0.063	8.441	0.030	8.498	0.087	8.430	0.018	8.416	0.004	8.443	0.031	8.453	0.042	8.416	0.004	8.469	0.053
	Mar	7.485	7.526	0.041	7.525	0.041	7.526	0.041	7.596	0.111	7.541	0.056	7.630	0.145	7.511	0.026	7.489	0.004	7.527	0.042	7.538	0.053	7.489	0.004	7.556	0.067
	Apr	6.741	6.773	0.032	6.771	0.031	6.774	0.034	6.777	0.036	6.752	0.011	6.791	0.050	6.752	0.011	6.733	-0.007	6.766	0.025	6.782	0.041	6.733	-0.007	6.799	0.065
	May	11.186	11.145	-0.041	11.144	-0.042	11.146	-0.040	11.153	-0.033	11.126	-0.060	11.169	-0.017	11.100	-0.086	11.083	-0.103	11.113	-0.072	11.228	0.042	11.083	-0.103	11.261	0.178
	Jun	19.832	19.836	0.004	19.835	0.003	19.837	0.005	19.902	0.070	19.869	0.037	19.916	0.084	19.803	-0.029	19.789	-0.043	19.815	-0.017	19.867	0.035	19.789	-0.043	19.887	0.098
	Jul	19.179	19.171	-0.009	19.170	-0.010	19.171	-0.008	19.240	0.060	19.208	0.028	19.257	0.078	19.133	-0.046	19.118	-0.061	19.146	-0.034	19.216	0.036	19.118	-0.061	19.240	0.122
	Aug	13.717	13.715	-0.002	13.712	-0.005	13.718	0.001	13.776	0.059	13.740	0.022	13.797	0.079	13.682	-0.035	13.664	-0.053	13.698	-0.020	13.747	0.030	13.664	-0.053	13.772	0.108
	Sep	10.243	10.240	-0.003	10.237	-0.006	10.243	0	10.282	0.040	10.251	0.008	10.302	0.059	10.213	-0.030	10.197	-0.046	10.227	-0.016	10.287	0.044	10.197	-0.046	10.312	0.115
	Oct	8.946	8.936	-0.009	8.933	-0.013	8.940	-0.006	8.952	0.006	8.935	-0.010	8.967	0.021	8.923	-0.023	8.917	-0.029	8.928	-0.018	8.979	0.033	8.917	-0.029	8.993	0.076
	Nov	9.603	9.606	0.002	9.595	-0.008	9.616	0.013	9.612	0.008	9.602	-0.002	9.627	0.024	9.602	-0.002	9.595	-0.009	9.614	0.011	9.629	0.025	9.595	-0.009	9.645	0.041
	Dec	10.165	10.167	0.003	10.159	-0.006	10.176	0.011	10.171	0.006	10.164	-0.001	10.181	0.017	10.168	0.003	10.162	-0.003	10.179	0.014	10.182	0.018	10.162	-0.003	10.196	0.026
	Annual	11.246	11.249	0.003	11.246	0	11.252	0.006	11.282	0.037	11.256	0.010	11.300	0.054	11.230	-0.016	11.217	-0.029	11.243	-0.003	11.281	0.035	11.217	-0.029	11.301	0.082
1:25 Dry	Jan	6.763	6.764	0.001	6.763	0	6.764	0.001	6.764	0.002	6.745	-0.018	6.778	0.015	6.769	0.006	6.765	0.002	6.775	0.012	6.782	0.019	6.765	0.002	6.792	0.025
	Feb	6.057	6.071	0.015	6.069	0.013	6.074	0.017	6.093	0.037	6.064	0.008	6.124	0.067	6.070	0.013	6.061	0.004	6.079	0.022	6.086	0.029	6.061	0.004	6.098	0.037
	Mar	5.422	5.452	0.029	5.450	0.028	5.453	0.031	5.507	0.085	5.464	0.042	5.544	0.122	5.441	0.019	5.426	0.004	5.452	0.030	5.459	0.037	5.426	0.004	5.473	0.047
	Apr	4.939	4.960	0.021	4.960	0.021	4.961	0.022	4.965	0.026	4.947	0.008	4.975	0.036	4.943	0.004	4.930	-0.009	4.952	0.014	4.963	0.025	4.930	-0.009	4.977	0.047
	May	7.584	7.561	-0.022	7.560	-0.023	7.562	-0.022	7.568	-0.015	7.549	-0.035	7.579	-0.005	7.526	-0.058	7.514	-0.069	7.535	-0.048	7.608	0.025	7.514	-0.069	7.639	0.124
	Jun	11.850	11.855	0.005	11.854	0.005	11.855	0.006	11.915	0.066	11.889	0.040	11.926	0.077	11.829	-0.021	11.819	-0.031	11.837	-0.013	11.862	0.012	11.819	-0.031	11.878	0.059
	Jul	11.640	11.634	-0.005	11.634	-0.005	11.635	-0.005	11.697	0.057	11.672	0.033	11.710	0.070	11.606	-0.034	11.595	-0.044	11.614	-0.025	11.648	0.009	11.595	-0.044	11.668	0.072
	Aug	9.124	9.124	0	9.122	-0.002	9.126	0.002	9.179	0.055	9.146	0.022	9.195	0.071	9.097	-0.026	9.085	-0.039	9.109	-0.015	9.131	0.007	9.085	-0.039	9.150	0.065
	Sep	7.205	7.205	-0.001	7.203	-0.002	7.206	0.001	7.241	0.035	7.200	-0.005	7.259	0.054	7.184	-0.022	7.172	-0.033	7.194	-0.011	7.227	0.022	7.172	-0.033	7.248	0.076
	Oct	6.393	6.387	-0.006	6.385	-0.008	6.389	-0.004	6.398	0.005	6.373	-0.020	6.416	0.023	6.377	-0.016	6.372	-0.021	6.380	-0.013	6.414	0.021	6.372	-0.021	6.427	0.055
	Nov	6.828	6.830	0.002	6.824	-0.005	6.837	0.009	6.834	0.006	6.817	-0.011	6.847	0.018	6.829	0	6.824	-0.004	6.837	0.009	6.847	0.019	6.824	-0.004	6.861	0.031
	Dec	7.231	7.233	0.002	7.228	-0.004	7.239	0.008	7.232	0.001	7.207	-0.024	7.244	0.013	7.235	0.004	7.231	0	7.242	0.011	7.247	0.016	7.231	0	7.257	0.022
	Annual	7.586	7.590	0.003	7.588	0.001	7.592	0.006	7.616	0.030	7.589	0.003	7.633	0.047	7.575	-0.011	7.566	-0.020	7.584	-0.002	7.606	0.020	7.566	-0.020	7.622	0.055
1:25 Wet	Jan	12.923	12.927	0.004	12.924	0.001	12.929	0.006	12.940	0.017	12.930	0.007	12.952	0.029	12.932	0.009	12.924	0.001	12.945	0.022	12.957	0.034	12.924	0.001	12.973	0.046
	Feb	11.442	11.473	0.030	11.472	0.030	11.474	0.031	11.518	0.075	11.482	0.039	11.545	0.103	11.467	0.025	11.447	0.004	11.487	0.044	11.500	0.057	11.447	0.004	11.520	0.074
	Mar	10.122	10.178	0.056	10.176	0.054	10.181	0.059	10.249	0.127	10.197	0.075	10.287	0.165	10.158	0.035	10.127	0.004	10.181	0.059	10.195	0.073	10.127	0.004	10.219	0.093
	Apr	9.031	9.077	0.046	9.075	0.044	9.080	0.049	9.084	0.053	9.045	0.015	9.141	0.110	9.051	0.021	9.025	-0.006	9.072	0.041	9.093	0.063	9.025	-0.006	9.115	0.090
	May	15.210	15.148	-0.062	15.147	-0.063	15.149	-0.061	15.237	0.028	15.119	-0.090	15.366	0.157	15.090	-0.120	15.065	-0.145	15.109	-0.101	15.278	0.068	15.065	-0.145	15.313	0.248
	Jun	28.410	28.410	0.001	28.410	0.001	28.410	0.001	28.495	0.085	28.440	0.031	28.538	0.128	28.368	-0.042	28.348	-0.062	28.384	-0.025	28.474	0.064	28.348	-0.062	28.498	0.151
	Jul	34.585	34.572	-0.013	34.571	-0.014	34.574	-0.011	34.670	0.085	34.607	0.022	34.727	0.143	34.522	-0.062	34.501	-0.084	34.540	-0.045	34.659	0.074	34.501	-0.084	34.688	0.187
	Aug	30.826	30.822	-0.004	30.816	-0.010	30.827	0.001	30.902	0.076	30.845	0.019	30.954	0.128	30.778	-0.048	30.753	-0.073	30.800	-0.026	30.887	0.061	30.753	-0.073	30.918	0.165
	Sep	23.114	23.109	-0.005	23.104	-0.010	23.114	0	23.179	0.065	23.118	0.004	23.245	0.131	23.073	-0.041	23.051	-0.063	23.093	-0.021	23.188	0.074	23.051	-0.063	23.217	0.165
	Oct	15.006	14.991	-0.014	14.985	-0.021	14.998	-0.007	15.025	0.019	14.992	-0.013	15.066	0.060	14.973	-0.033	14.967	-0.039	14.982	-0.024	15.054	0.048	14.967	-0.039	15.070	0.103
	Nov	13.511	13.511	0	13.496	-0.015	13.527	0.016	13.520	0.009	13.504	-0.007	13.539	0.028	13.504	-0.007	13.494	-0.017	13.523	0.012	13.542	0.031	13.494	-0.017	13.564	0.055
	Dec	14.035	14.038	0.003	14.025	-0.010	14.051	0.016	14.041	0.006	14.030	-0.005	14.057	0.022	14.036	0.001	14.027	-0.008	14.052	0.017	14.055	0.020	14.027	-0.008	14.073	0.033
	Annual	18.185	18.188	0.004	18.183	-0.001	18.193	0.008	18.238	0.054	18.193	0.008	18.285	0.100	18.163	-0.022	18.144	-0.040	18.181	-0.004	18.240	0.056	18.144	-0.040	18.264	0.118

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for AQM29 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM07

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.024	0.023	-0.001	0.022	-0.002	0.024	0	0.022	-0.002	0.022	-0.002	0.022	-0.002	0.022	-0.003	0.021	-0.003	0.022	-0.002	0.021	-0.003	0.021	-0.003	0.021	0
	Feb	0.018	0.018	0	0.017	-0.001	0.019	0.001	0.017	-0.001	0.017	-0.001	0.017	-0.001	0.017	-0.002	0.016	-0.002	0.017	-0.001	0.017	-0.002	0.016	-0.002	0.017	0
	Mar	0.014	0.015	0	0.015	0	0.015	0.001	0.015	0	0.014	0	0.015	0	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	-0.001	0.014	0
	Apr	0.013	0.014	0.001	0.013	0	0.014	0.001	0.013	0	0.013	0	0.013	0	0.012	0	0.012	-0.001	0.012	0	0.012	0	0.012	-0.001	0.012	0
	May	0.057	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.045	-0.012	0.044	-0.013	0.044	-0.013	0.044	-0.013	0.044	-0.013	0.044	-0.013	0.044	0
	Jun	0.068	0.052	-0.016	0.052	-0.016	0.053	-0.015	0.052	-0.016	0.052	-0.016	0.052	-0.016	0.051	-0.017	0.051	-0.017	0.051	-0.017	0.051	-0.017	0.051	-0.017	0.051	0
	Jul	0.036	0.028	-0.008	0.027	-0.008	0.028	-0.008	0.027	-0.008	0.027	-0.008	0.027	-0.008	0.027	-0.009	0.027	-0.009	0.027	-0.009	0.027	-0.009	0.027	-0.009	0.027	0
	Aug	0.038	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.027	-0.011	0.026	-0.012	0.026	-0.012	0.026	-0.012	0.026	-0.012	0.026	-0.012	0.026	0
	Sep	0.063	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.046	-0.017	0.045	-0.018	0.045	-0.018	0.045	-0.018	0.045	-0.018	0.045	-0.018	0.045	0
	Oct	0.072	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.055	-0.017	0.054	-0.018	0.054	-0.018	0.054	-0.018	0.054	-0.018	0.054	-0.018	0.054	0
	Nov	0.054	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.044	-0.011	0.044	-0.011	0.044	-0.011	0.044	-0.011	0.044	-0.011	0.044	0
	Dec	0.036	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.031	-0.005	0.030	-0.006	0.030	-0.006	0.030	-0.006	0.030	-0.006	0.030	-0.006	0.030	0
	Annual	0.041	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.033	-0.008	0.032	-0.009	0.032	-0.009	0.032	-0.009	0.032	-0.009	0.032	-0.009	0.032	0
1:25 Dry	Jan	0.018	0.017	-0.001	0.016	-0.002	0.018	0	0.016	-0.002	0.016	-0.002	0.016	-0.002	0.016	-0.002	0.015	-0.002	0.016	-0.002	0.015	-0.002	0.015	-0.002	0.015	0
	Feb	0.014	0.014	0	0.013	0	0.014	0.001	0.013	0	0.013	0	0.013	0	0.013	-0.001	0.012	-0.001	0.013	-0.001	0.012	-0.001	0.012	-0.001	0.013	0
	Mar	0.011	0.012	0	0.012	0	0.012	0.001	0.012	0	0.012	0	0.012	0	0.011	-0.001	0.011	-0.001	0.011	-0.001	0.011	-0.001	0.011	-0.001	0.011	0
	Apr	0.010	0.011	0.001	0.011	0	0.011	0.001	0.011	0	0.011	0	0.011	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0	0.010	0
	May	0.042	0.034	-0.008	0.033	-0.008	0.034	-0.008	0.033	-0.008	0.033	-0.009	0.033	-0.008	0.032	-0.010	0.032	-0.010	0.032	-0.010	0.032	-0.010	0.032	-0.010	0.032	0
	Jun	0.048	0.037	-0.011	0.037	-0.011	0.037	-0.011	0.037	-0.011	0.037	-0.011	0.037	-0.011	0.036	-0.012	0.036	-0.013	0.036	-0.012	0.036	-0.012	0.036	-0.013	0.036	0
	Jul	0.022	0.017	-0.005	0.017	-0.006	0.017	-0.005	0.017	-0.005	0.017	-0.006	0.017	-0.005	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	-0.006	0.016	0
	Aug	0.016	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.011	-0.005	0.010	-0.006	0.010	-0.006	0.010	-0.006	0.010	-0.006	0.010	-0.006	0.010	0
	Sep	0.031	0.020	-0.010	0.020	-0.010	0.021	-0.010	0.020	-0.010	0.020	-0.010	0.021	-0.010	0.019	-0.011	0.019	-0.011	0.019	-0.011	0.019	-0.011	0.019	-0.011	0.019	0
	Oct	0.041	0.030	-0.012	0.030	-0.012	0.030	-0.012	0.030	-0.012	0.030	-0.012	0.030	-0.012	0.029	-0.013	0.029	-0.013	0.029	-0.013	0.029	-0.013	0.029	-0.013	0.029	0
	Nov	0.034	0.027	-0.007	0.027	-0.007	0.027	-0.007	0.027	-0.007	0.027	-0.007	0.027	-0.007	0.026	-0.008	0.026	-0.008	0.026	-0.008	0.026	-0.008	0.026	-0.008	0.026	0
	Dec	0.025	0.021	-0.003	0.021	-0.003	0.021	-0.003	0.021	-0.003	0.021	-0.003	0.021	-0.003	0.020	-0.004	0.020	-0.004	0.020	-0.004	0.020	-0.004	0.020	-0.004	0.020	0
	Annual	0.026	0.021	-0.005	0.021	-0.005	0.021	-0.005	0.021	-0.005	0.021	-0.005	0.021	-0.005	0.020	-0.006	0.020	-0.006	0.020	-0.006	0.020	-0.006	0.020	-0.006	0.020	0
1:25 Wet	Jan	0.034	0.033	-0.002	0.030	-0.004	0.035	0	0.030	-0.004	0.030	-0.004	0.030	-0.004	0.030	-0.005	0.030	-0.005	0.030	-0.004	0.030	-0.005	0.030	-0.005	0.030	0
	Feb	0.024	0.024	0	0.023	-0.001	0.025	0.001	0.023	-0.001	0.023	-0.001	0.023	-0.001	0.022	-0.002	0.022	-0.002	0.022	-0.002	0.022	-0.002	0.022	-0.002	0.022	0
	Mar	0.019	0.019	0	0.019	0	0.020	0.001	0.019	0	0.019	0	0.019	0	0.018	-0.001	0.018	-0.001	0.018	-0.001	0.018	-0.001	0.018	-0.001	0.018	0
	Apr	0.017	0.017	0.001	0.017	0	0.018	0.001	0.017	0	0.017	0	0.017	0	0.016	-0.001	0.016	-0.001	0.016	-0.001	0.016	-0.001	0.016	-0.001	0.016	0
	May	0.073	0.059	-0.014	0.059	-0.014	0.059	-0.013	0.059	-0.014	0.059	-0.014	0.059	-0.014	0.058	-0.015	0.057	-0.015	0.058	-0.015	0.058	-0.015	0.057	-0.015	0.058	0
	Jun	0.092	0.072	-0.020	0.071	-0.020	0.072	-0.020	0.071	-0.020	0.071	-0.020	0.071	-0.020	0.070	-0.021	0.070	-0.021	0.070	-0.021	0.070	-0.021	0.070	-0.021	0.070	0
	Jul	0.066	0.050	-0.015	0.050	-0.015	0.051	-0.015	0.050	-0.015	0.050	-0.015	0.050	-0.015	0.049	-0.016	0.049	-0.016	0.049	-0.016	0.049	-0.016	0.049	-0.016	0.049	0
	Aug	0.096	0.074	-0.022	0.074	-0.022	0.074	-0.022	0.074	-0.022	0.074	-0.022	0.074	-0.022	0.073	-0.023	0.073	-0.023	0.073	-0.023	0.073	-0.023	0.073	-0.023	0.073	0
	Sep	0.123	0.094	-0.029	0.094	-0.029	0.094	-0.029	0.094	-0.029	0.094	-0.029	0.094	-0.029	0.093	-0.030	0.093	-0.030	0.093	-0.030	0.093	-0.030	0.093	-0.030	0.093	0
	Oct	0.122	0.096	-0.026	0.096	-0.026	0.096	-0.026	0.096	-0.026	0.096	-0.026	0.096	-0.026	0.095	-0.027	0.095	-0.027	0.095	-0.027	0.095	-0.027	0.095	-0.027	0.095	0
	Nov	0.090	0.073	-0.017	0.073	-0.017	0.073	-0.017	0.073	-0.017	0.072	-0.017	0.073	-0.017	0.071	-0.018	0.071	-0.018	0.071	-0.018	0.071	-0.018	0.071	-0.018	0.071	0
	Dec	0.055	0.046	-0.009	0.046	-0.009	0.046	-0.009	0.046	-0.009	0.046	-0.009	0.046	-0.009	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	-0.010	0.045	0
	Annual	0.068	0.055	-0.013	0.054	-0.013	0.055	-0.012	0.054	-0.013	0.054	-0.013	0.054	-0.013	0.053	-0.014	0.053	-0.014	0.053	-0.014	0.053	-0.014	0.053	-0.014	0.053	0

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM07 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

AQM10

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	0.694	0.692	-0.001	0.692	-0.002	0.693	0	0.692	-0.002	0.691	-0.002	0.692	-0.002	0.691	-0.003	0.690	-0.003	0.691	-0.002	0.691	-0.003	0.690	-0.003	0.691	0
	Feb	0.586	0.587	0.001	0.587	0.001	0.588	0.002	0.586	0	0.585	-0.001	0.587	0.001	0.585	-0.001	0.584	-0.002	0.586	0	0.585	-0.001	0.584	-0.002	0.586	0.002
	Mar	0.498	0.501	0.003	0.500	0.003	0.501	0.003	0.500	0.002	0.498	0	0.500	0.003	0.499	0.001	0.497	-0.001	0.500	0.002	0.499	0.001	0.497	-0.001	0.500	0.003
	Apr	0.424	0.427	0.003	0.427	0.003	0.427	0.003	0.426	0.002	0.425	0	0.427	0.003	0.425	0.001	0.424	-0.001	0.426	0.002	0.425	0.001	0.424	-0.001	0.426	0.002
	May	1.086	1.077	-0.009	1.077	-0.009	1.077	-0.009	1.076	-0.010	1.074	-0.012	1.077	-0.009	1.075	-0.012	1.073	-0.013	1.076	-0.011	1.075	-0.011	1.073	-0.013	1.076	0.003
	Jun	2.640	2.626	-0.014	2.626	-0.014	2.626	-0.014	2.626	-0.014	2.625	-0.016	2.626	-0.014	2.625	-0.016	2.624	-0.017	2.625	-0.015	2.625	-0.016	2.624	-0.017	2.625	0.002
	Jul	1.686	1.679	-0.007	1.679	-0.007	1.679	-0.007	1.679	-0.007	1.678	-0.008	1.679	-0.007	1.678	-0.008	1.677	-0.009	1.679	-0.008	1.678	-0.008	1.677	-0.009	1.679	0.001
	Aug	1.300	1.290	-0.010	1.290	-0.010	1.290	-0.010	1.290	-0.010	1.289	-0.011	1.290	-0.010	1.289	-0.011	1.288	-0.012	1.289	-0.010	1.289	-0.011	1.288	-0.012	1.289	0.001
	Sep	1.413	1.397	-0.016	1.397	-0.016	1.397	-0.016	1.397	-0.016	1.396	-0.017	1.397	-0.016	1.395	-0.018	1.395	-0.018	1.396	-0.017	1.396	-0.017	1.395	-0.018	1.396	0.001
	Oct	1.236	1.220	-0.016	1.220	-0.016	1.220	-0.016	1.220	-0.016	1.219	-0.017	1.220	-0.016	1.218	-0.018	1.218	-0.018	1.219	-0.017	1.218	-0.017	1.218	-0.018	1.219	0.001
	Nov	1.001	0.992	-0.009	0.992	-0.009	0.992	-0.009	0.991	-0.009	0.991	-0.010	0.992	-0.009	0.990	-0.010	0.990	-0.011	0.991	-0.010	0.990	-0.010	0.990	-0.011	0.991	0.001
	Dec	0.831	0.827	-0.004	0.827	-0.004	0.827	-0.004	0.827	-0.005	0.826	-0.005	0.827	-0.004	0.826	-0.006	0.825	-0.006	0.826	-0.005	0.826	-0.006	0.825	-0.006	0.826	0.001
	Annual	1.116	1.110	-0.007	1.109	-0.007	1.110	-0.006	1.109	-0.007	1.108	-0.008	1.109	-0.007	1.108	-0.008	1.107	-0.009	1.109	-0.008	1.108	-0.008	1.107	-0.009	1.108	0.001
1:25 Dry	Jan	0.172	0.172	-0.001	0.171	-0.002	0.172	0	0.171	-0.002	0.171	-0.002	0.171	-0.002	0.170	-0.002	0.170	-0.003	0.171	-0.002	0.170	-0.002	0.170	-0.003	0.170	0
	Feb	0.149	0.149	0	0.148	0	0.149	0.001	0.148	0	0.148	0	0.148	0	0.147	-0.001	0.147	-0.001	0.148	-0.001	0.147	-0.001	0.147	-0.001	0.148	0
	Mar	0.129	0.130	0.001	0.130	0.001	0.131	0.001	0.130	0.001	0.129	0	0.130	0.001	0.129	0	0.129	-0.001	0.129	0	0.129	0	0.129	-0.001	0.129	0.001
	Apr	0.114	0.115	0.001	0.114	0.001	0.115	0.001	0.114	0.001	0.114	0	0.114	0.001	0.113	0	0.113	0	0.114	0	0.113	0	0.113	0	0.114	0.001
	May	0.579	0.571	-0.007	0.571	-0.007	0.572	-0.007	0.571	-0.008	0.570	-0.009	0.571	-0.007	0.570	-0.009	0.569	-0.010	0.570	-0.009	0.570	-0.009	0.569	-0.010	0.570	0.001
	Jun	1.496	1.485	-0.011	1.485	-0.011	1.486	-0.011	1.485	-0.011	1.485	-0.011	1.486	-0.011	1.484	-0.012	1.484	-0.013	1.484	-0.012	1.484	-0.012	1.484	-0.013	1.484	0.001
	Jul	0.504	0.499	-0.005	0.499	-0.005	0.499	-0.005	0.499	-0.005	0.499	-0.006	0.499	-0.005	0.498	-0.006	0.498	-0.006	0.499	-0.006	0.498	-0.006	0.498	-0.006	0.499	0
	Aug	0.420	0.415	-0.005	0.415	-0.005	0.415	-0.005	0.415	-0.005	0.415	-0.005	0.415	-0.005	0.414	-0.006	0.414	-0.006	0.414	-0.006	0.414	-0.006	0.414	-0.006	0.414	0
	Sep	0.382	0.372	-0.010	0.372	-0.010	0.372	-0.010	0.372	-0.010	0.372	-0.010	0.372	-0.010	0.371	-0.011	0.371	-0.011	0.371	-0.011	0.371	-0.011	0.371	-0.011	0.371	0
	Oct	0.305	0.293	-0.011	0.293	-0.011	0.293	-0.011	0.293	-0.011	0.293	-0.012	0.293	-0.011	0.292	-0.013	0.292	-0.013	0.292	-0.012	0.292	-0.013	0.292	-0.013	0.292	0
	Nov	0.240	0.234	-0.007	0.234	-0.007	0.234	-0.007	0.234	-0.007	0.234	-0.007	0.234	-0.007	0.233	-0.008	0.233	-0.008	0.233	-0.008	0.233	-0.008	0.233	-0.008	0.233	0
	Dec	0.203	0.200	-0.003	0.200	-0.003	0.200	-0.003	0.200	-0.003	0.200	-0.003	0.200	-0.003	0.199	-0.004	0.199	-0.004	0.199	-0.004	0.199	-0.004	0.199	-0.004	0.199	0
	Annual	0.391	0.386	-0.005	0.386	-0.005	0.386	-0.005	0.386	-0.005	0.386	-0.005	0.386	-0.005	0.385	-0.006	0.385	-0.006	0.385	-0.006	0.385	-0.006	0.385	-0.006	0.385	0
1:25 Wet	Jan	0.704	0.702	-0.002	0.700	-0.004	0.704	0	0.700	-0.004	0.699	-0.004	0.700	-0.004	0.699	-0.005	0.698	-0.005	0.700	-0.004	0.699	-0.005	0.698	-0.005	0.699	0
	Feb	0.592	0.593	0.001	0.592	0	0.594	0.002	0.592	0	0.591	-0.001	0.592	0	0.591	-0.001	0.590	-0.002	0.591	-0.001	0.591	-0.001	0.590	-0.002	0.591	0.002
	Mar	0.502	0.505	0.003	0.505	0.002	0.506	0.003	0.504	0.002	0.502	0	0.505	0.002	0.503	0	0.501	-0.001	0.504	0.001	0.503	0.001	0.501	-0.001	0.504	0.003
	Apr	0.428	0.431	0.003	0.430	0.002	0.431	0.003	0.430	0.002	0.428	0	0.430	0.002	0.429	0.001	0.427	-0.001	0.429	0.001	0.429	0.001	0.427	-0.001	0.429	0.002
	May	1.431	1.420	-0.011	1.420	-0.011	1.421	-0.011	1.419	-0.012	1.417	-0.014	1.420	-0.011	1.418	-0.013	1.416	-0.015	1.419	-0.012	1.418	-0.013	1.416	-0.015	1.419	0.003
	Jun	3.872	3.853	-0.019	3.853	-0.019	3.853	-0.018	3.853	-0.019	3.851	-0.020	3.853	-0.019	3.851	-0.020	3.850	-0.021	3.852	-0.020	3.851	-0.020	3.850	-0.021	3.852	0.002
	Jul	3.636	3.622	-0.014	3.622	-0.014	3.622	-0.014	3.622	-0.014	3.621	-0.015	3.622	-0.014	3.621	-0.016	3.620	-0.016	3.621	-0.015	3.621	-0.015	3.620	-0.016	3.621	0.001
	Aug	1.776	1.755	-0.021	1.755	-0.021	1.755	-0.021	1.755	-0.021	1.754	-0.022	1.755	-0.021	1.754	-0.022	1.753	-0.023	1.754	-0.022	1.754	-0.022	1.753	-0.023	1.754	0.001
	Sep	1.532	1.504	-0.028	1.504	-0.028	1.504	-0.028	1.504	-0.028	1.503	-0.029	1.504	-0.028	1.503	-0.029	1.502	-0.030	1.503	-0.029	1.503	-0.029	1.502	-0.030	1.503	0.001
	Oct	1.325	1.300	-0.025	1.300	-0.026	1.300	-0.025	1.299	-0.026	1.299	-0.026	1.300	-0.025	1.298	-0.027	1.298	-0.027	1.299	-0.026	1.299	-0.027	1.298	-0.027	1.299	0.001
	Nov	1.036	1.020	-0.017	1.019	-0.017	1.020	-0.017	1.019	-0.017	1.019	-0.017	1.020	-0.017	1.018	-0.018	1.018	-0.018	1.018	-0.018	1.018	-0.018	1.018	-0.018	1.018	0.001
	Dec	0.851	0.842	-0.009	0.842	-0.009	0.842	-0.009	0.842	-0.009	0.842	-0.009	0.842	-0.009	0.841	-0.010	0.841	-0.010	0.841	-0.010	0.841	-0.010	0.841	-0.010	0.841	0.001
	Annual	1.474	1.462	-0.012	1.462	-0.012	1.463	-0.011	1.462	-0.012	1.460	-0.013	1.462	-0.012	1.460	-0.013	1.459	-0.014	1.461	-0.013	1.461	-0.013	1.459	-0.014	1.461	0.001

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for AQM10 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

QM08

	Month	Existing Condition	Construction (Year -2 - Year -1)						Operations (Year 1 - Year 13)						Active Closure (Year 14 - Year 19)						Post-Closure (from Year 20+)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		flow (m^3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)	flow (m3/s)	Change from Existing (m3/s)
Average	Jan	10.425	10.425	0.001	10.423	-0.002	10.428	0.003	10.434	0.010	10.428	0.003	10.443	0.018	10.429	0.004	10.424	-0.001	10.438	0.013	10.446	0.021	10.424	-0.001	10.458	0.032
	Feb	9.273	9.300	0.026	9.299	0.026	9.300	0.027	9.331	0.058	9.307	0.034	9.354	0.080	9.293	0.020	9.276	0.003	9.309	0.036	9.317	0.044	9.276	0.003	9.334	0.059
	Mar	8.261	8.304	0.044	8.304	0.044	8.304	0.044	8.373	0.113	8.320	0.059	8.408	0.148	8.288	0.027	8.264	0.003	8.306	0.045	8.315	0.054	8.264	0.003	8.334	0.070
	Apr	7.458	7.494	0.036	7.493	0.034	7.496	0.037	7.506	0.048	7.475	0.017	7.522	0.064	7.472	0.014	7.452	-0.006	7.488	0.029	7.502	0.043	7.452	-0.006	7.519	0.067
	May	13.007	12.964	-0.044	12.963	-0.045	12.964	-0.043	12.971	-0.037	12.939	-0.069	12.988	-0.020	12.915	-0.093	12.894	-0.114	12.931	-0.077	13.043	0.036	12.894	-0.114	13.078	0.184
	Jun	26.509	26.499	-0.009	26.499	-0.010	26.499	-0.009	26.561	0.052	26.527	0.018	26.575	0.067	26.464	-0.044	26.448	-0.060	26.477	-0.032	26.529	0.020	26.448	-0.060	26.549	0.101
	Jul	25.101	25.086	-0.015	25.086	-0.016	25.086	-0.015	25.154	0.053	25.122	0.021	25.171	0.070	25.048	-0.053	25.032	-0.069	25.060	-0.041	25.128	0.027	25.032	-0.069	25.152	0.120
	Aug	18.374	18.362	-0.012	18.357	-0.017	18.366	-0.008	18.423	0.049	18.389	0.014	18.443	0.069	18.328	-0.046	18.310	-0.064	18.344	-0.030	18.394	0.020	18.310	-0.064	18.419	0.109
	Sep	13.633	13.616	-0.017	13.614	-0.018	13.618	-0.015	13.660	0.027	13.625	-0.008	13.680	0.047	13.586	-0.047	13.569	-0.064	13.600	-0.032	13.658	0.025	13.569	-0.064	13.683	0.114
	Oct	10.789	10.764	-0.025	10.762	-0.027	10.766	-0.023	10.780	-0.008	10.761	-0.028	10.797	0.008	10.748	-0.041	10.740	-0.049	10.754	-0.034	10.805	0.017	10.740	-0.049	10.819	0.080
	Nov	10.733	10.722	-0.010	10.712	-0.021	10.733	0	10.729	-0.004	10.719	-0.014	10.745	0.012	10.716	-0.017	10.709	-0.023	10.730	-0.003	10.746	0.013	10.709	-0.023	10.763	0.045
	Dec	11.166	11.164	-0.002	11.154	-0.011	11.173	0.007	11.167	0.001	11.160	-0.006	11.179	0.013	11.162	-0.004	11.156	-0.010	11.174	0.008	11.179	0.013	11.156	-0.010	11.193	0.030
	Annual	13.727	13.725	-0.002	13.722	-0.005	13.728	0	13.757	0.030	13.731	0.004	13.775	0.048	13.704	-0.023	13.690	-0.038	13.717	-0.010	13.755	0.028	13.690	-0.038	13.775	0.084
1:25 Dry	Jan	7.150	7.150	0	7.148	-0.002	7.151	0.001	7.150	0	7.130	-0.020	7.163	0.013	7.153	0.003	7.150	0	7.159	0.009	7.166	0.016	7.150	0	7.176	0.024
	Feb	6.414	6.432	0.018	6.431	0.017	6.432	0.018	6.444	0.030	6.413	-0.001	6.472	0.058	6.428	0.014	6.417	0.003	6.438	0.024	6.444	0.030	6.417	0.003	6.457	0.040
	Mar	5.760	5.790	0.030	5.789	0.029	5.792	0.032	5.844	0.084	5.799	0.039	5.882	0.122	5.779	0.019	5.764	0.003	5.791	0.031	5.797	0.037	5.764	0.003	5.811	0.048
	Apr	5.264	5.288	0.024	5.287	0.023	5.289	0.025	5.300	0.036	5.278	0.014	5.314	0.050	5.270	0.006	5.257	-0.007	5.281	0.016	5.291	0.027	5.257	-0.007	5.305	0.047
	May	8.309	8.284	-0.026	8.283	-0.026	8.284	-0.025	8.290	-0.019	8.268	-0.041	8.302	-0.007	8.246	-0.064	8.232	-0.077	8.256	-0.053	8.328	0.019	8.232	-0.077	8.360	0.128
	Jun	15.298	15.293	-0.005	15.293	-0.005	15.293	-0.005	15.349	0.051	15.322	0.024	15.360	0.062	15.265	-0.033	15.255	-0.043	15.274	-0.024	15.299	0.001	15.255	-0.043	15.316	0.061
	Jul	12.908	12.899	-0.010	12.898	-0.010	12.899	-0.009	12.960	0.052	12.936	0.028	12.972	0.064	12.869	-0.039	12.859	-0.049	12.878	-0.031	12.911	0.002	12.859	-0.049	12.929	0.070
	Aug	9.800	9.795	-0.005	9.792	-0.008	9.798	-0.002	9.850	0.050	9.821	0.021	9.865	0.065	9.769	-0.031	9.756	-0.044	9.780	-0.020	9.802	0.002	9.756	-0.044	9.822	0.065
	Sep	7.679	7.670	-0.008	7.670	-0.009	7.671	-0.008	7.709	0.030	7.668	-0.011	7.727	0.049	7.647	-0.032	7.635	-0.044	7.657	-0.022	7.688	0.009	7.635	-0.044	7.709	0.074
	Oct	6.965	6.948	-0.017	6.948	-0.018	6.949	-0.016	6.961	-0.004	6.933	-0.033	6.983	0.017	6.936	-0.029	6.930	-0.035	6.941	-0.024	6.974	0.009	6.930	-0.035	6.989	0.059
	Nov	7.136	7.128	-0.008	7.121	-0.015	7.135	-0.001	7.133	-0.003	7.116	-0.020	7.146	0.010	7.124	-0.012	7.120	-0.016	7.133	-0.003	7.145	0.009	7.120	-0.016	7.159	0.034
	Dec	7.542	7.541	-0.001	7.535	-0.007	7.547	0.005	7.540	-0.002	7.515	-0.027	7.552	0.010	7.541	-0.001	7.537	-0.005	7.549	0.007	7.555	0.013	7.537	-0.005	7.566	0.024
	Annual	8.352	8.352	-0.001	8.350	-0.003	8.353	0.001	8.378	0.025	8.350	-0.002	8.395	0.043	8.336	-0.017	8.326	-0.026	8.345	-0.007	8.367	0.014	8.326	-0.026	8.383	0.056
1:25 Wet	Jan	14.003	14.004	0.001	14.000	-0.003	14.009	0.006	14.015	0.012	14.006	0.003	14.028	0.025	14.007	0.004	13.999	-0.004	14.020	0.017	14.031	0.028	13.999	-0.004	14.047	0.045
	Feb	12.387	12.424	0.037	12.423	0.036	12.424	0.038	12.458	0.072	12.424	0.037	12.485	0.099	12.414	0.027	12.389	0.002	12.436	0.050	12.447	0.060	12.389	0.002	12.469	0.081
	Mar	10.982	11.041	0.059	11.039	0.057	11.044	0.062	11.111	0.128	11.058	0.076	11.150	0.168	11.019	0.036	10.985	0.003	11.044	0.062	11.056	0.074	10.985	0.003	11.081	0.096
	Apr	9.847	9.896	0.050	9.894	0.047	9.899	0.053	9.909	0.062	9.867	0.021	9.961	0.115	9.870	0.023	9.841	-0.005	9.891	0.045	9.911	0.064	9.841	-0.005	9.933	0.092
	May	17.661	17.603	-0.058	17.602	-0.059	17.603	-0.057	17.689	0.028	17.567	-0.093	17.823	0.163	17.540	-0.120	17.511	-0.149	17.562	-0.098	17.729	0.069	17.511	-0.149	17.767	0.256
	Jun	37.702	37.677	-0.025	37.677	-0.025	37.678	-0.025	37.760	0.058	37.702	0	37.806	0.104	37.633	-0.069	37.611	-0.091	37.650	-0.052	37.739	0.037	37.611	-0.091	37.764	0.153
	Jul	44.801	44.775	-0.025	44.774	-0.026	44.777	-0.024	44.872	0.072	44.809	0.009	44.929	0.128	44.725	-0.076	44.703	-0.098	44.742	-0.058	44.859	0.059	44.703	-0.098	44.889	0.186
	Aug	36.663	36.636	-0.026	36.630	-0.033	36.643	-0.020	36.718	0.055	36.659	-0.003	36.770	0.107	36.593	-0.070	36.567	-0.096	36.615	-0.048	36.702	0.039	36.567	-0.096	36.734	0.167
	Sep	27.239	27.209	-0.030	27.206	-0.034	27.212	-0.027	27.278	0.038	27.218	-0.022	27.344	0.105	27.171	-0.069	27.148	-0.091	27.190	-0.049	27.284	0.045	27.148	-0.091	27.312	0.164
	Oct	17.564	17.525	-0.039	17.520	-0.044	17.530	-0.034	17.559	-0.005	17.524	-0.041	17.602	0.037	17.505	-0.059	17.496	-0.068	17.512	-0.052	17.587	0.022	17.496	-0.068	17.601	0.104
	Nov	14.801	14.781	-0.020	14.765	-0.036	14.797	-0.004	14.791	-0.010	14.774	-0.027	14.813	0.012	14.772	-0.029	14.761	-0.039	14.791	-0.010	14.812	0.012	14.761	-0.039	14.835	0.059
	Dec	15.124	15.118	-0.007	15.104	-0.020	15.131	0.007	15.122	-0.003	15.110	-0.014	15.138	0.014	15.114	-0.010	15.105	-0.019	15.131	0.007	15.136	0.012	15.105	-0.019	15.155	0.037
	Annual	21.564	21.557	-0.007	21.553	-0.012	21.562	-0.002	21.607	0.042	21.560	-0.005	21.654	0.090	21.530	-0.034	21.510	-0.055	21.549	-0.016	21.608	0.043	21.510	-0.055	21.632	0.120

* Flows lower than 0.0005 m3/s are shown as "0".

Predicted Streamflow for QM08 – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

Burge Lake

		Existing Condition	Construction (2022-2023)						Operations (2024-2036)						Closure (2037-2042)						Post Closure (from 2043)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	334.36	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00
	Feb	334.32	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00
	Mar	334.29	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00	334.29	0.00
	Apr	334.26	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00
	May	334.35	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00
	Jun	334.55	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.55	0.00	334.56	0.00	334.56	0.00	334.55	0.00	334.56	0.00	334.56	0.00	334.55	0.00	334.56	0.00
	Jul	334.60	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00	334.60	0.00
	Aug	334.47	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00	334.47	0.00
	Sep	334.35	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00
	Oct	334.30	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00	334.30	0.00
	Nov	334.35	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00	334.35	0.00
	Dec	334.38	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00
	Annual	334.38	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00	334.38	0.00
1:25 Dry	Jan	334.24	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00
	Feb	334.21	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00
	Mar	334.18	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00	334.18	0.00
	Apr	334.15	334.16	0.00	334.16	0.00	334.16	0.00	334.16	0.00	334.15	0.00	334.16	0.00	334.16	0.00	334.15	0.00	334.16	0.00	334.16	0.00	334.15	0.00	334.16	0.00
	May	334.21	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00	334.21	0.00
	Jun	334.37	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00	334.37	0.00
	Jul	334.41	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00	334.41	0.00
	Aug	334.32	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00	334.32	0.00
	Sep	334.24	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00	334.24	0.00
	Oct	334.19	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00	334.19	0.00
	Nov	334.23	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00	334.23	0.00
	Dec	334.26	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00	334.26	0.00
	Annual	334.25	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00	334.25	0.00
1:25 Wet	Jan	334.48	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00
	Feb	334.44	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00
	Mar	334.40	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00
	Apr	334.36	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00
	May	334.46	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00
	Jun	334.68	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00
	Jul	334.83	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00
	Aug	334.88	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00
	Sep	334.74	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00
	Oct	334.52	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00
	Nov	334.48	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00
	Dec	334.51	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00
	Annual	334.56	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00

* Differences lower than 0.05 m are shown as "0".

Predicted Lake Level for Burge Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

Minton Lake

		Existing Condition	Construction (2022-2023)						Operations (2024-2036)						Closure (2037-2042)						Post Closure (from 2043)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	329.92	329.92	0.00	329.91	-0.01	329.92	0.00	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	-0.01	329.91	0.00
	Feb	329.89	329.89	0.00	329.89	0.00	329.89	0.00	329.89	0.00	329.89	0.00	329.89	0.00	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	0.00
	Mar	329.87	329.87	0.00	329.87	0.00	329.88	0.00	329.87	0.00	329.87	0.00	329.87	0.00	329.87	0.00	329.86	-0.01	329.87	0.00	329.87	0.00	329.86	-0.01	329.87	0.00
	Apr	329.86	329.86	0.00	329.86	0.00	329.87	0.01	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	0.00
	May	330.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.04	329.99	-0.03	329.99	-0.04	329.99	-0.04	329.99	-0.04	329.99	-0.04	329.99	-0.04	329.99	0.00
	Jun	330.07	330.02	-0.04	330.02	-0.05	330.02	-0.04	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	-0.05	330.02	0.00
	Jul	329.97	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	0.00
	Aug	329.97	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.04	329.93	-0.05	329.93	-0.05	329.93	-0.05	329.93	-0.05	329.93	-0.05	329.93	0.00
	Sep	330.06	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.05	330.00	-0.06	330.00	-0.06	330.00	-0.06	330.00	-0.06	330.00	-0.06	330.00	0.00
	Oct	330.08	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	-0.05	330.03	0.00
	Nov	330.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	330.00	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	-0.03	329.99	0.00
	Dec	329.97	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.95	-0.02	329.94	-0.02	329.94	-0.02	329.94	-0.02	329.94	-0.02	329.94	-0.02	329.94	0.00
	Annual	329.98	329.95	-0.02	329.95	-0.03	329.95	-0.02	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	0.00
1:25 Dry	Jan	329.89	329.89	0.00	329.88	-0.01	329.89	0.00	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	-0.01	329.88	0.00
	Feb	329.87	329.87	0.00	329.86	0.00	329.87	0.00	329.86	0.00	329.86	0.00	329.86	0.00	329.86	-0.01	329.86	-0.01	329.86	-0.01	329.86	-0.01	329.86	-0.01	329.86	0.00
	Mar	329.85	329.85	0.00	329.85	0.00	329.86	0.00	329.85	0.00	329.85	0.00	329.85	0.00	329.85	0.00	329.85	-0.01	329.85	0.00	329.85	0.00	329.85	-0.01	329.85	0.00
	Apr	329.84	329.85	0.00	329.85	0.00	329.85	0.01	329.85	0.00	329.85	0.00	329.85	0.00	329.84	0.00	329.84	0.00	329.84	0.00	329.84	0.00	329.84	0.00	329.84	0.00
	May	329.98	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	-0.03	329.95	0.00
	Jun	330.01	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	-0.04	329.97	0.00
	Jul	329.91	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	-0.03	329.88	0.00
	Aug	329.88	329.85	-0.03	329.85	-0.03	329.85	-0.03	329.85	-0.03	329.84	-0.03	329.85	-0.03	329.84	-0.04	329.84	-0.04	329.84	-0.04	329.84	-0.04	329.84	-0.04	329.84	0.00
	Sep	329.95	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	-0.05	329.90	0.00
	Oct	329.99	329.94	-0.04	329.94	-0.04	329.94	-0.04	329.94	-0.04	329.94	-0.04	329.94	-0.04	329.94	-0.05	329.94	-0.05	329.94	-0.05	329.94	-0.05	329.94	-0.05	329.94	0.00
	Nov	329.96	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	-0.03	329.93	0.00
	Dec	329.92	329.91	-0.02	329.91	-0.02	329.91	-0.01	329.91	-0.02	329.91	-0.02	329.91	-0.01	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.90	0.00
	Annual	329.92	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.90	-0.02	329.89	-0.03	329.89	-0.03	329.89	-0.03	329.89	-0.03	329.89	-0.03	329.89	0.00
1:25 Wet	Jan	334.48	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00
	Feb	334.44	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00	334.44	0.00
	Mar	334.40	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00	334.40	0.00
	Apr	334.36	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00	334.36	0.00
	May	334.46	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00	334.46	0.00
	Jun	334.68	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00	334.68	0.00
	Jul	334.83	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00	334.83	0.00
	Aug	334.88	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00	334.88	0.00
	Sep	334.74	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00	334.74	0.00
	Oct	334.52	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00	334.52	0.00
	Nov	334.48	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00	334.48	0.00
	Dec	334.51	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00	334.51	0.00
	Annual	334.56	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00	334.56	0.00

* Differences lower than 0.05 m are shown as "0".

Predicted Lake Level for Minton Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

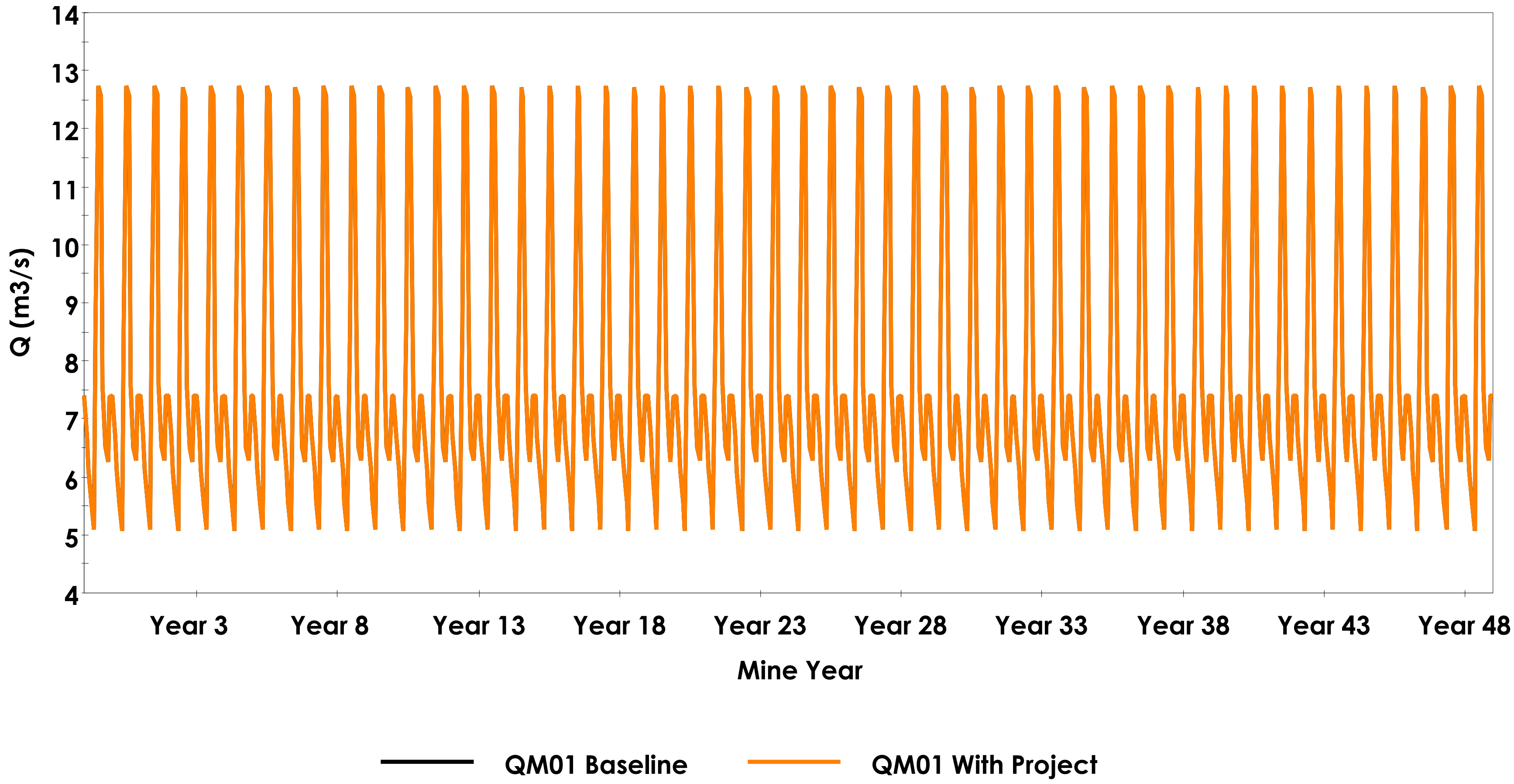
Cockeram Lake

		Existing Condition	Construction (2022-2023)						Operations (2024-2036)						Closure (2037-2042)						Post Closure (from 2043)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
	Month	Lake Level (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)	Lake Level (m)	Change from Existing (m)
Average	Jan	312.14	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00
	Feb	312.12	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00	312.12	0.00
	Mar	312.11	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00	312.11	0.00
	Apr	312.09	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00
	May	312.17	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00
	Jun	312.31	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00
	Jul	312.30	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00	312.30	0.00
	Aug	312.23	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00	312.23	0.00
	Sep	312.18	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00
	Oct	312.14	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00
	Nov	312.14	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00	312.14	0.00
	Dec	312.15	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00
	Annual	312.17	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00
1:25 Dry	Jan	312.09	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00
	Feb	312.07	312.07	0.00	312.07	0.00	312.07	0.00	312.07	0.00	312.07	0.00	312.08	0.00	312.07	0.00	312.07	0.00	312.07	0.00	312.07	0.00	312.07	0.00	312.07	0.00
	Mar	312.06	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00	312.06	0.00
	Apr	312.05	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00	312.05	0.00
	May	312.10	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00
	Jun	312.20	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00
	Jul	312.17	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00	312.17	0.00
	Aug	312.13	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00
	Sep	312.10	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00
	Oct	312.08	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00	312.08	0.00
	Nov	312.09	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00
	Dec	312.09	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00	312.09	0.00
	Annual	312.10	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00	312.10	0.00
1:25 Wet	Jan	312.18	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.18	0.00	312.19	0.00
	Feb	312.16	312.16	0.00	312.16	0.00	312.16	0.00	312.17	0.00	312.16	0.00	312.17	0.00	312.16	0.00	312.16	0.00	312.17	0.00	312.17	0.00	312.16	0.00	312.17	0.00
	Mar	312.15	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00	312.15	0.00
	Apr	312.13	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00	312.13	0.00
	May	312.22	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00
	Jun	312.39	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00
	Jul	312.44	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00	312.44	0.00
	Aug	312.39	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00	312.39	0.00
	Sep	312.31	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00	312.31	0.00
	Oct	312.22	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00	312.22	0.00
	Nov	312.19	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00	312.19	0.00
	Dec	312.20	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00	312.20	0.00
	Annual	312.25	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00	312.25	0.00

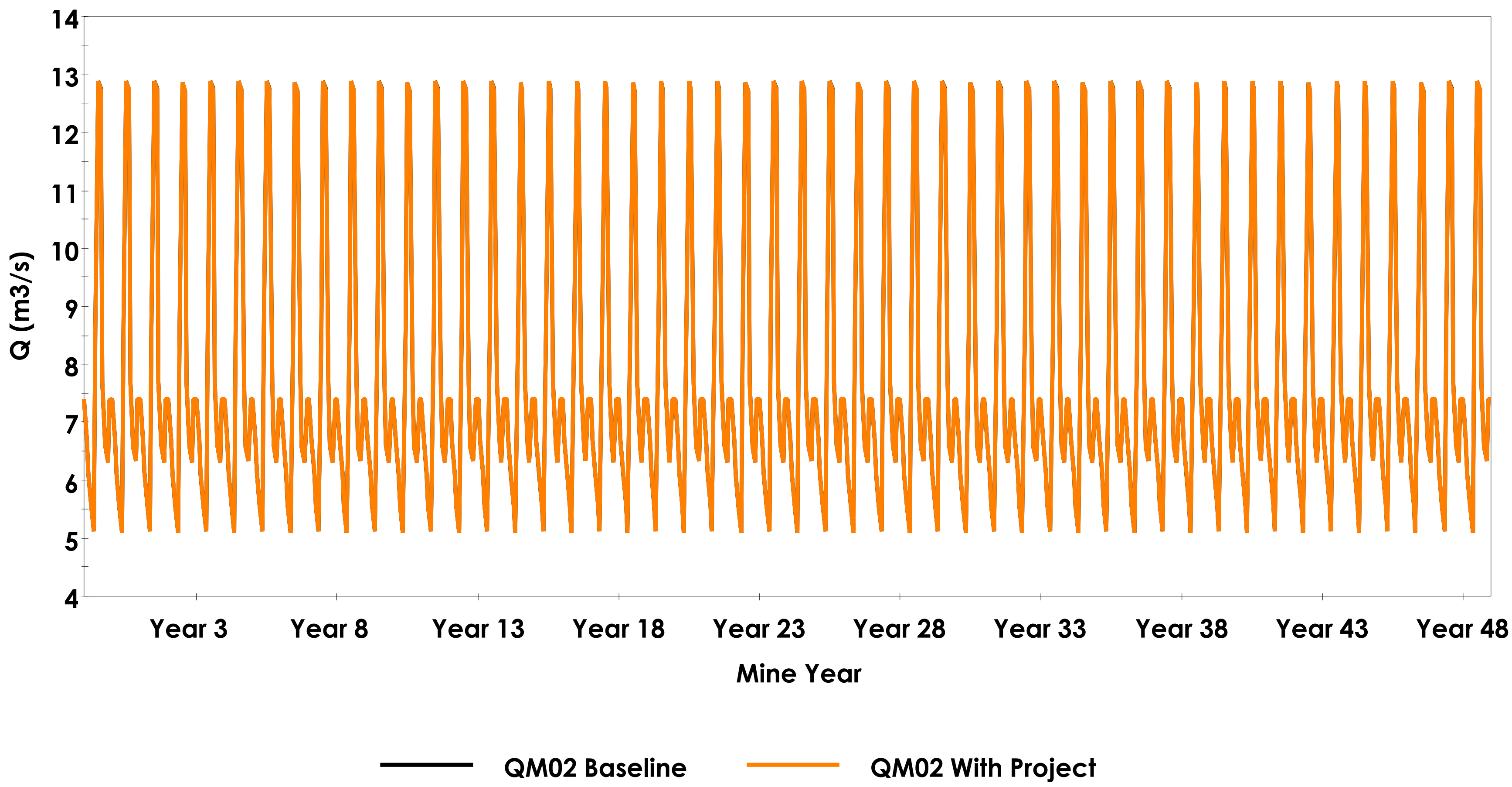
* Differences lower than 0.05 m are shown as "0".

Predicted Lake Level for Cockeram Lake – Average, 1:25 Year Dry and 1:25 Year Wet Climate Scenarios

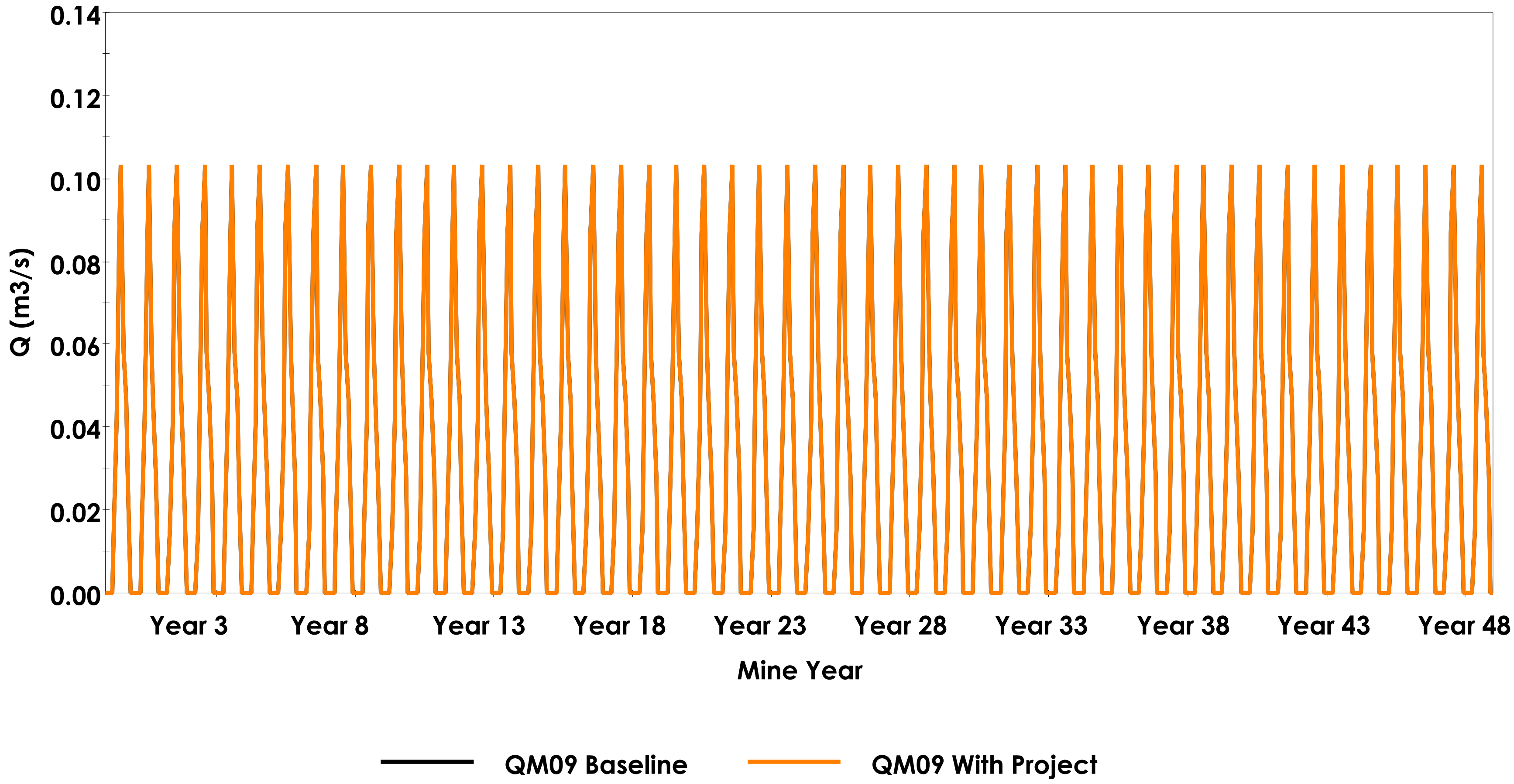
Appendix D MACLELLAN SITE FLOW PLOTS



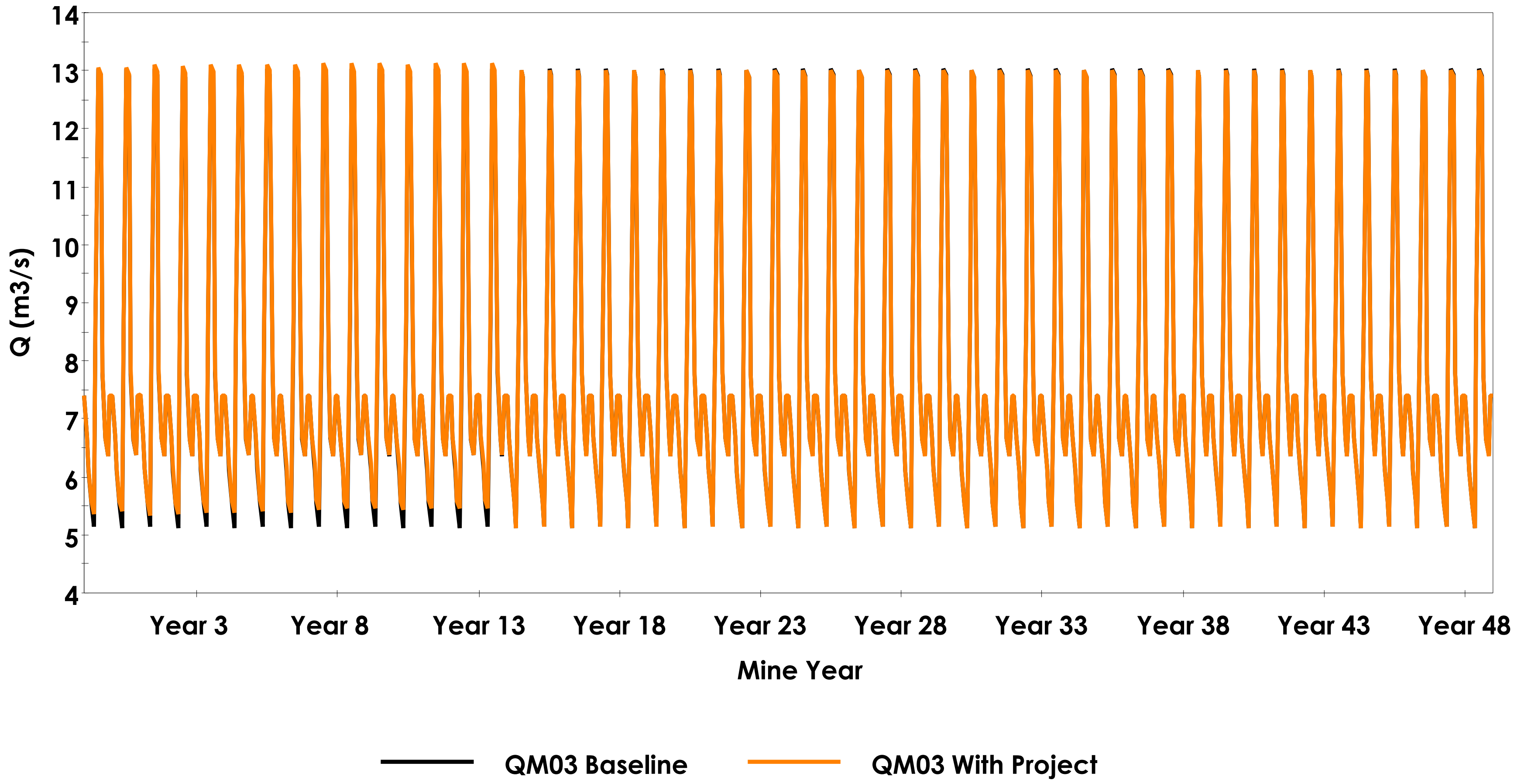
Predicted Streamflow for QM01 – Average Climate Scenario



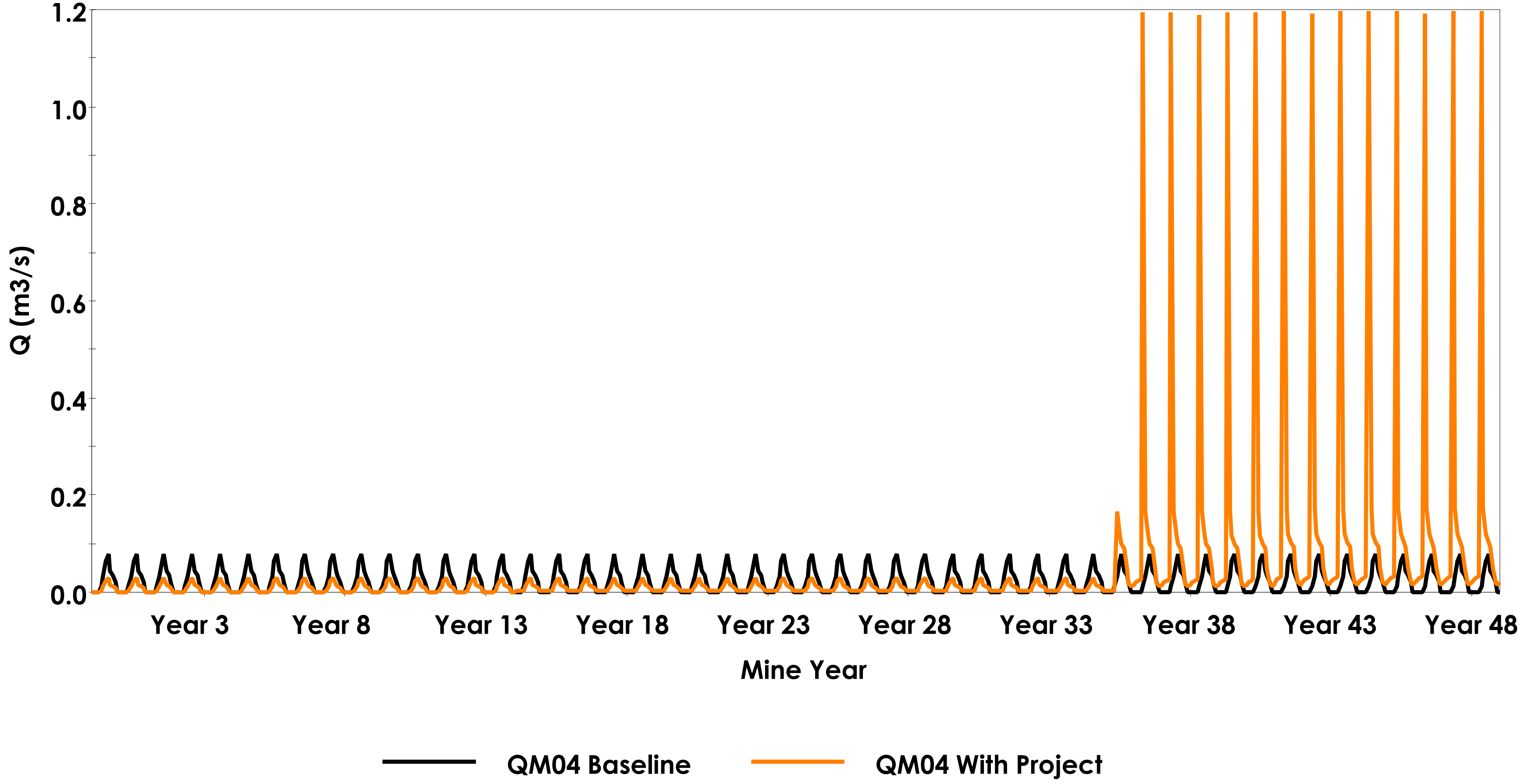
Predicted Streamflow for QM02 – Average Climate Scenario



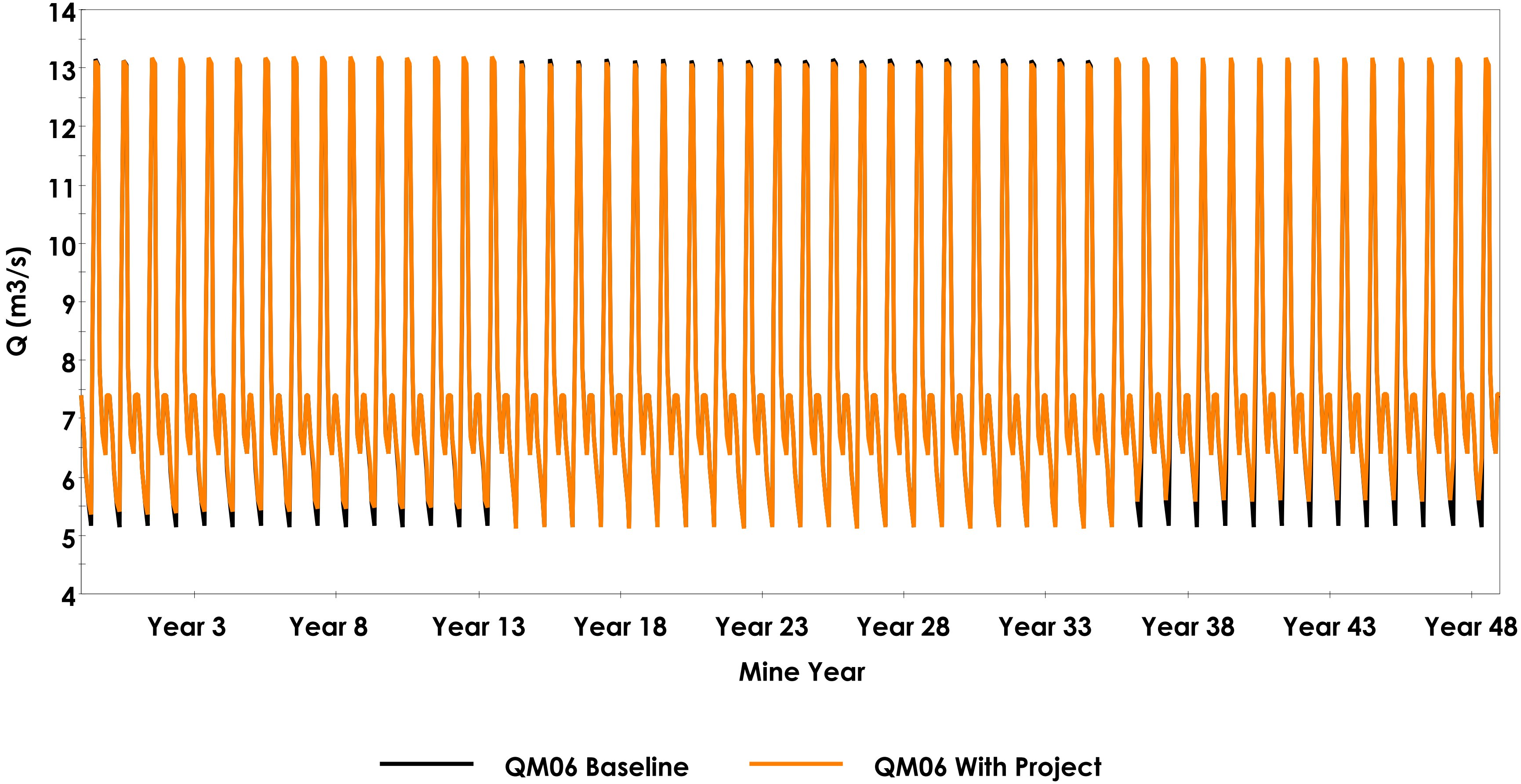
Predicted Streamflow for QM09 – Average Climate Scenario



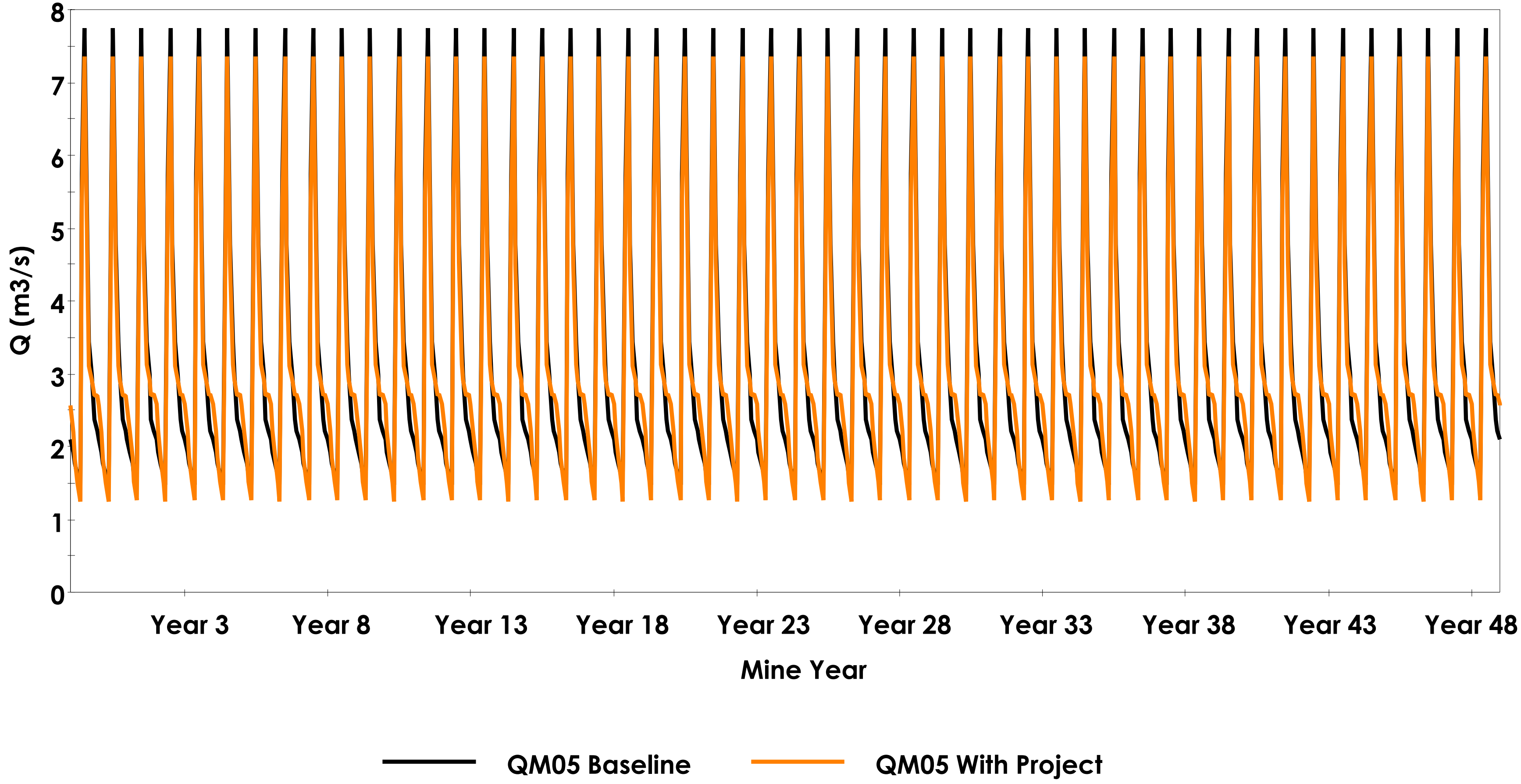
Predicted Streamflow for QM03 – Average Climate Scenario



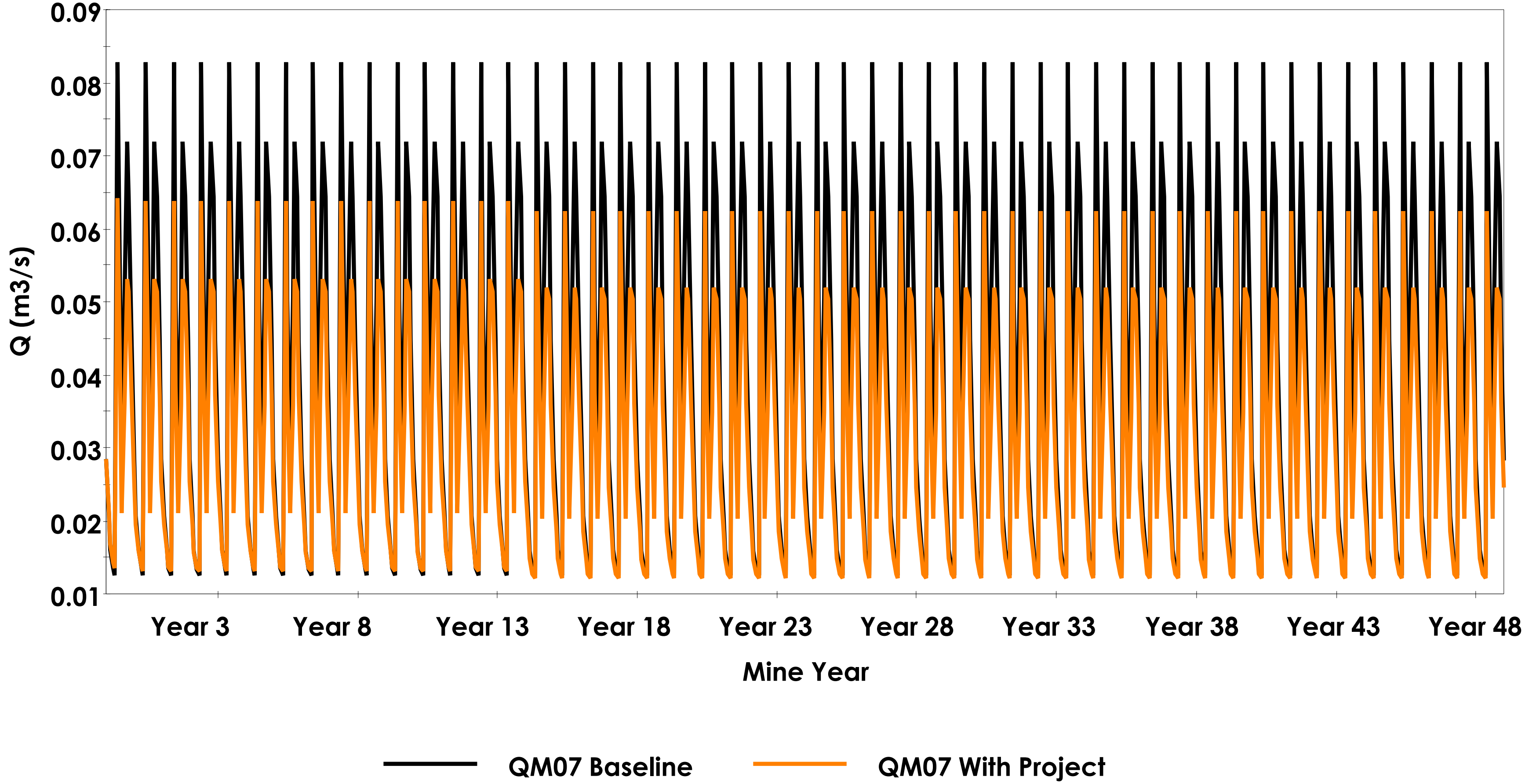
Predicted Streamflow for QM04 – Average Climate Scenario



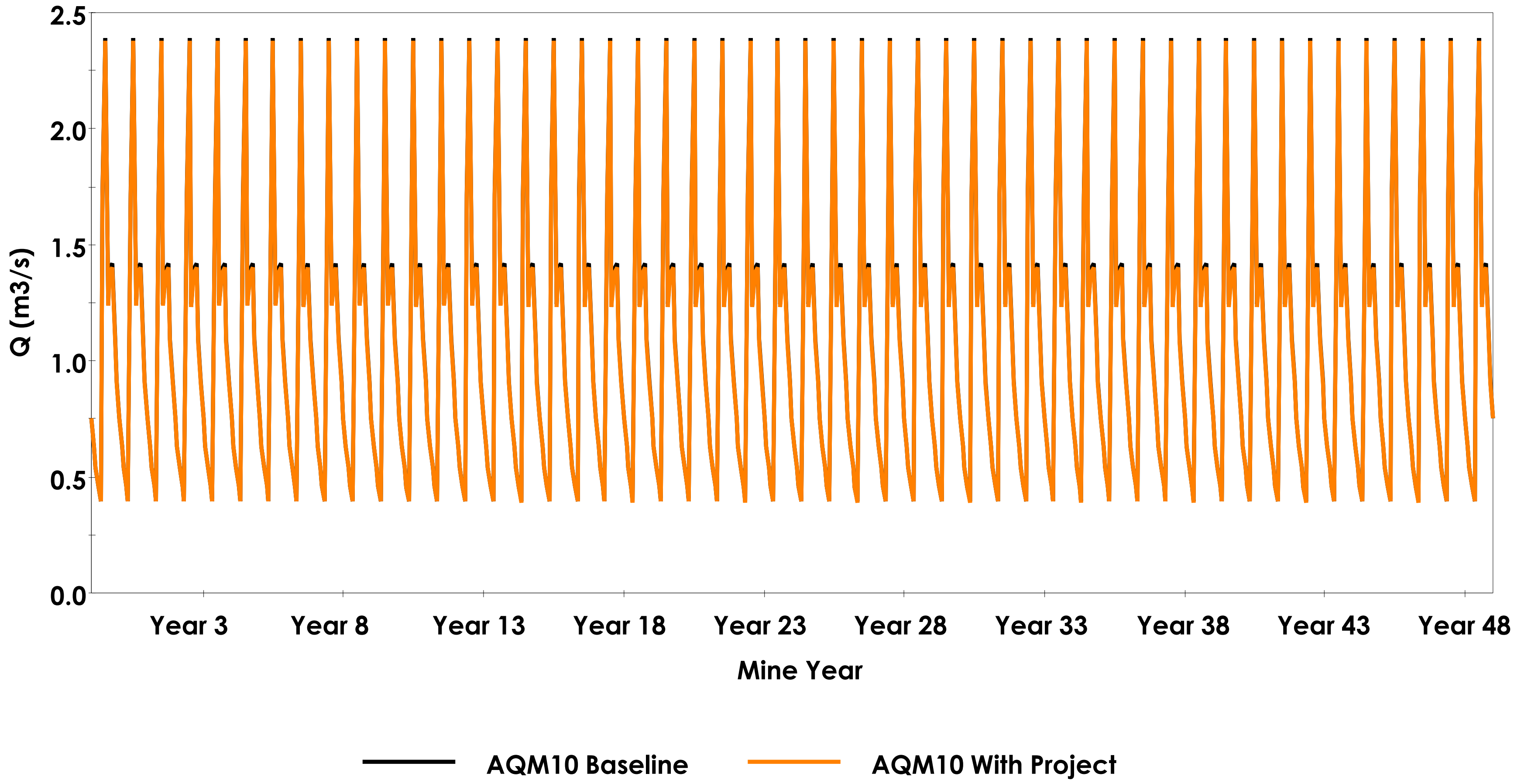
Predicted Streamflow for QM06 – Average Climate Scenario



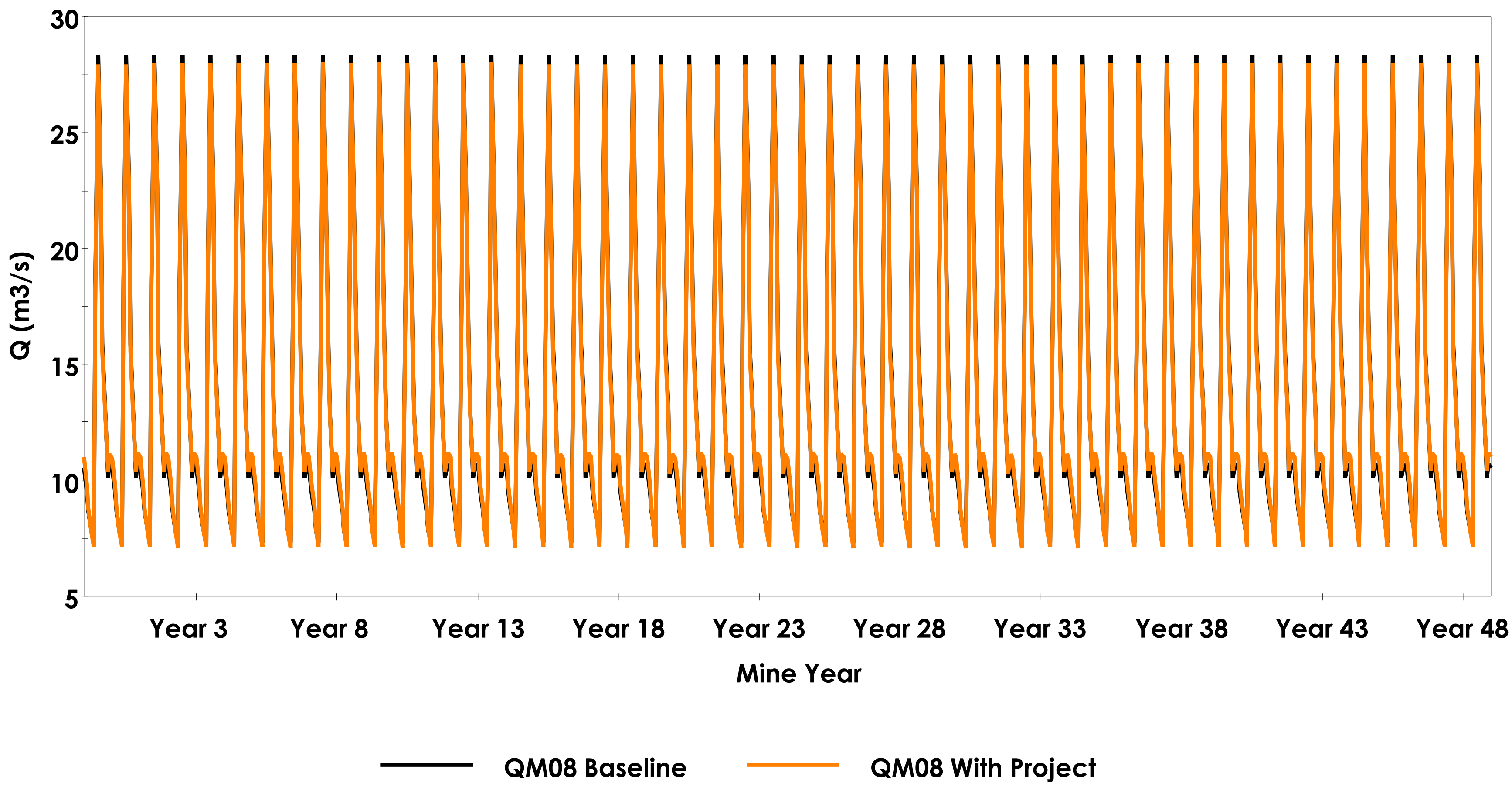
Predicted Streamflow for QM05 – Average Climate Scenario



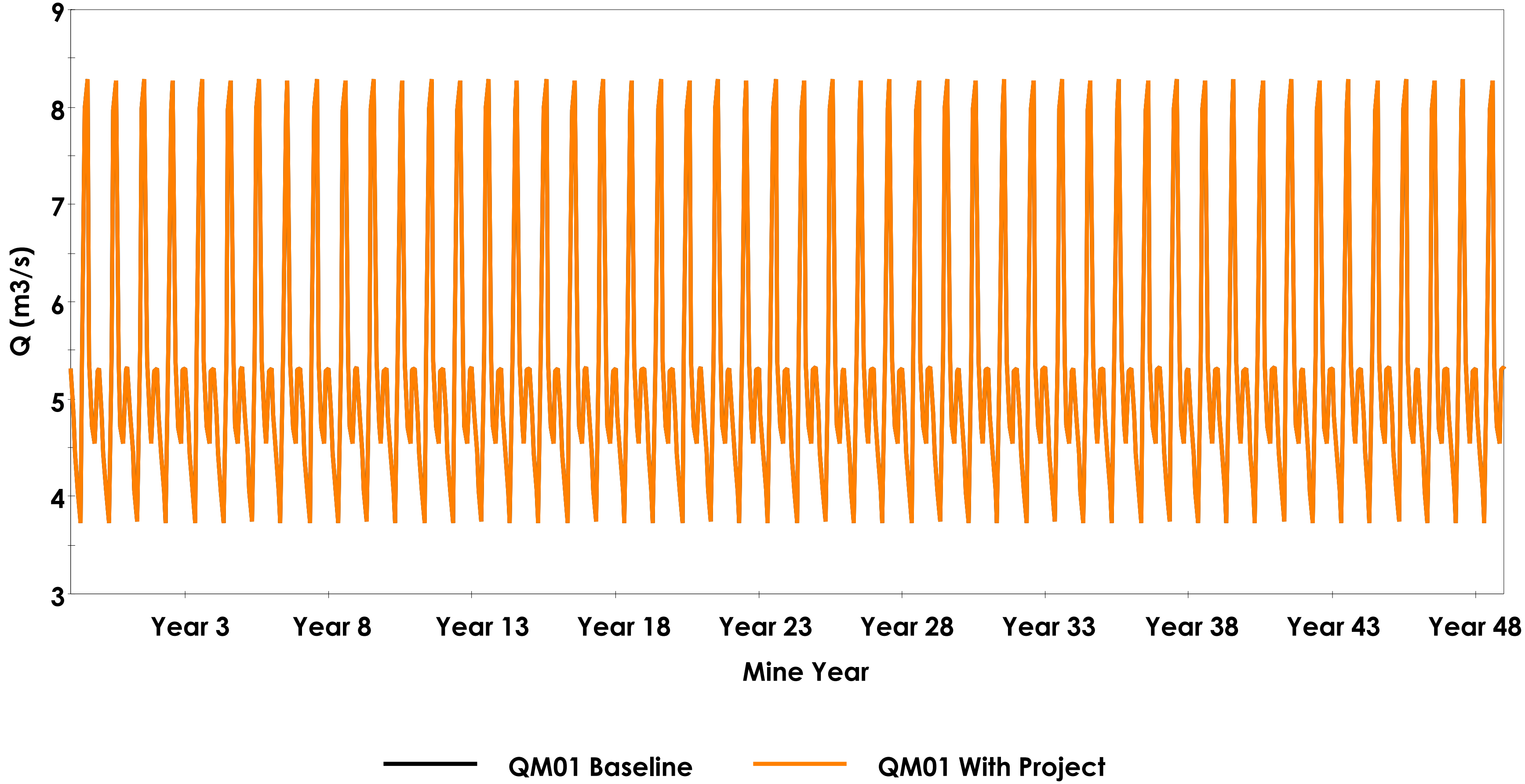
Predicted Streamflow for QM07 – Average Climate Scenario



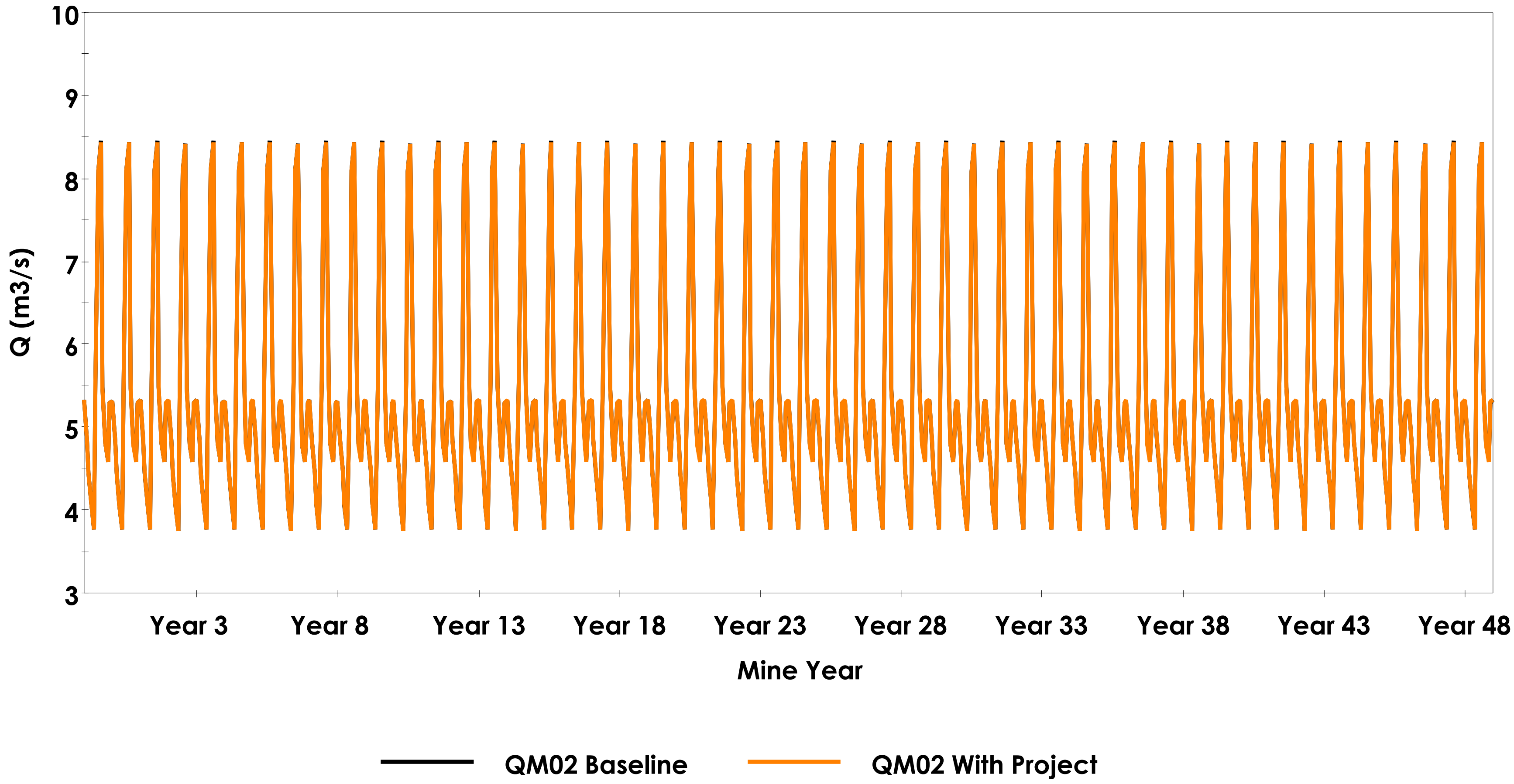
Predicted Streamflow for AQM10 (QM11) – Average Climate Scenario



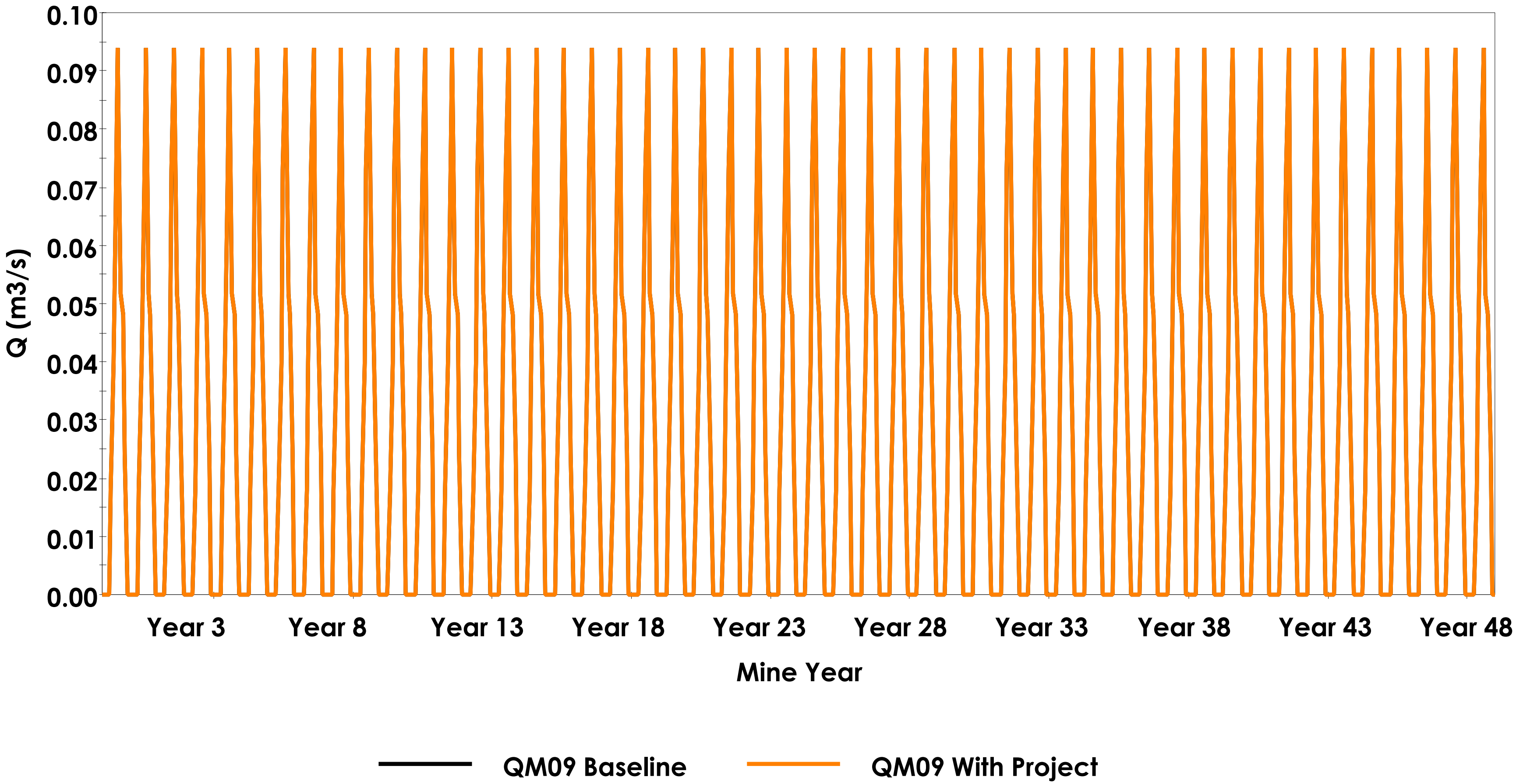
Predicted Streamflow for QM08 – Average Climate Scenario



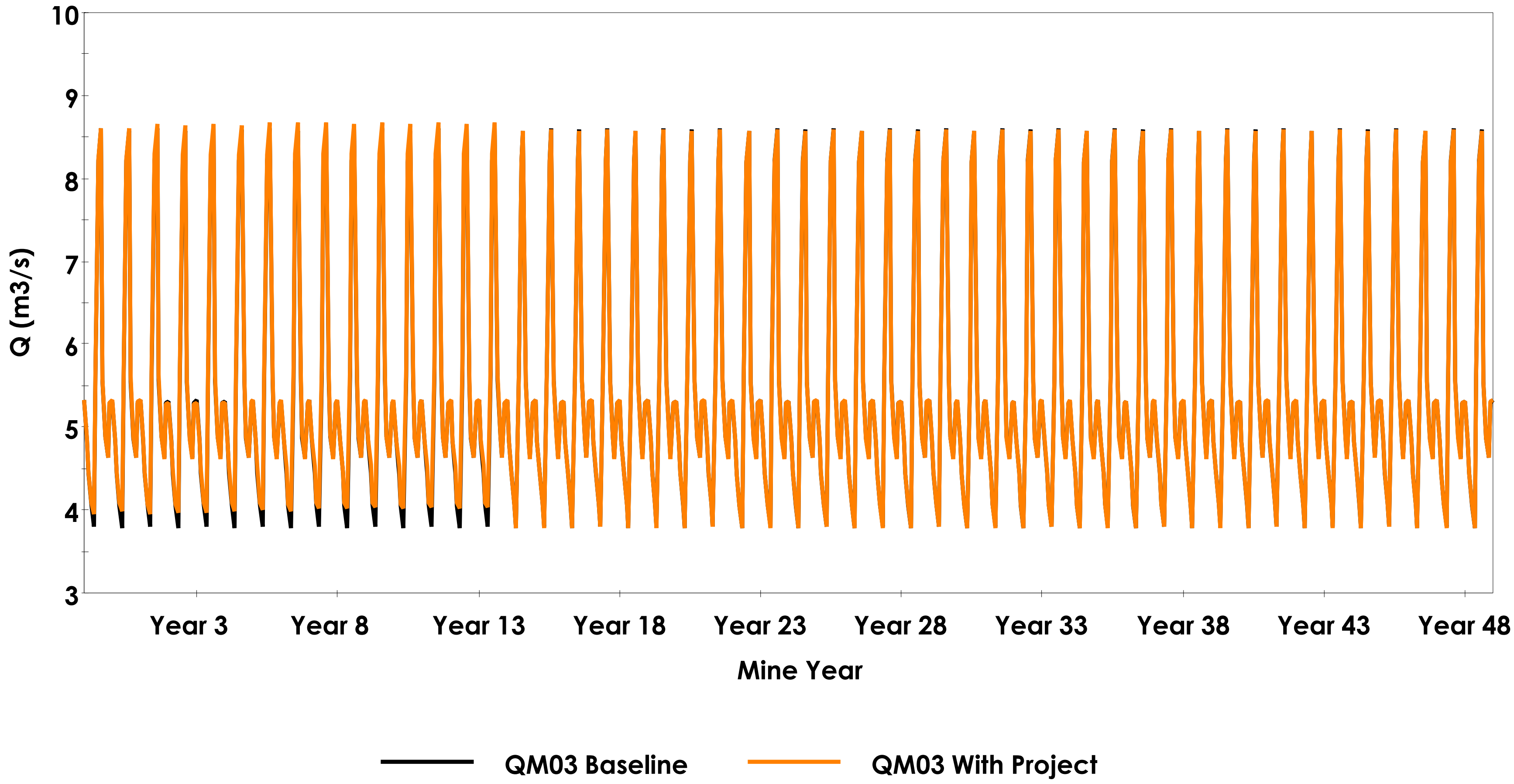
Predicted Streamflow for QM01 – 1:25 YR Dry Climate Scenario



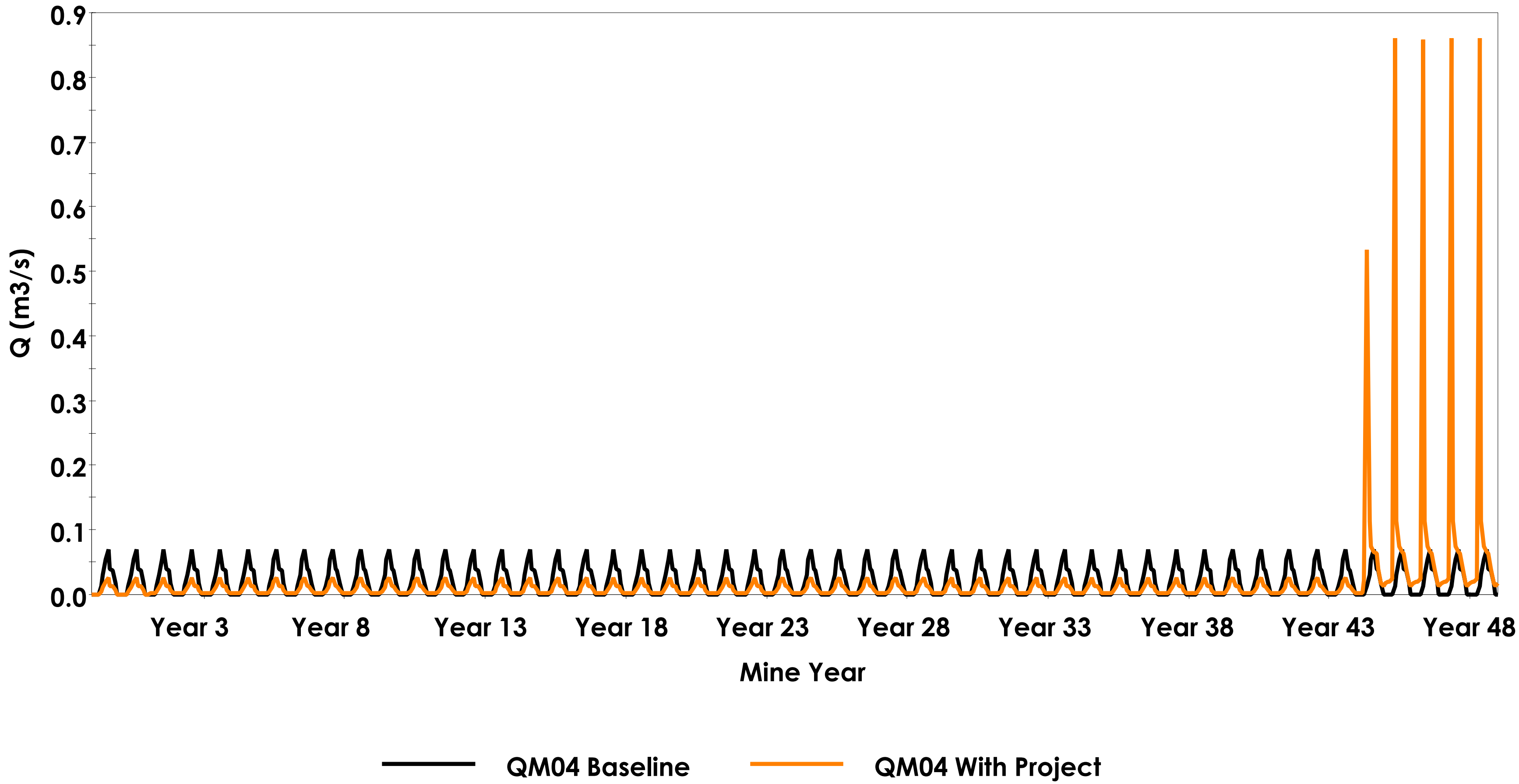
Predicted Streamflow for QM02 – 1:25 YR Dry Climate Scenario



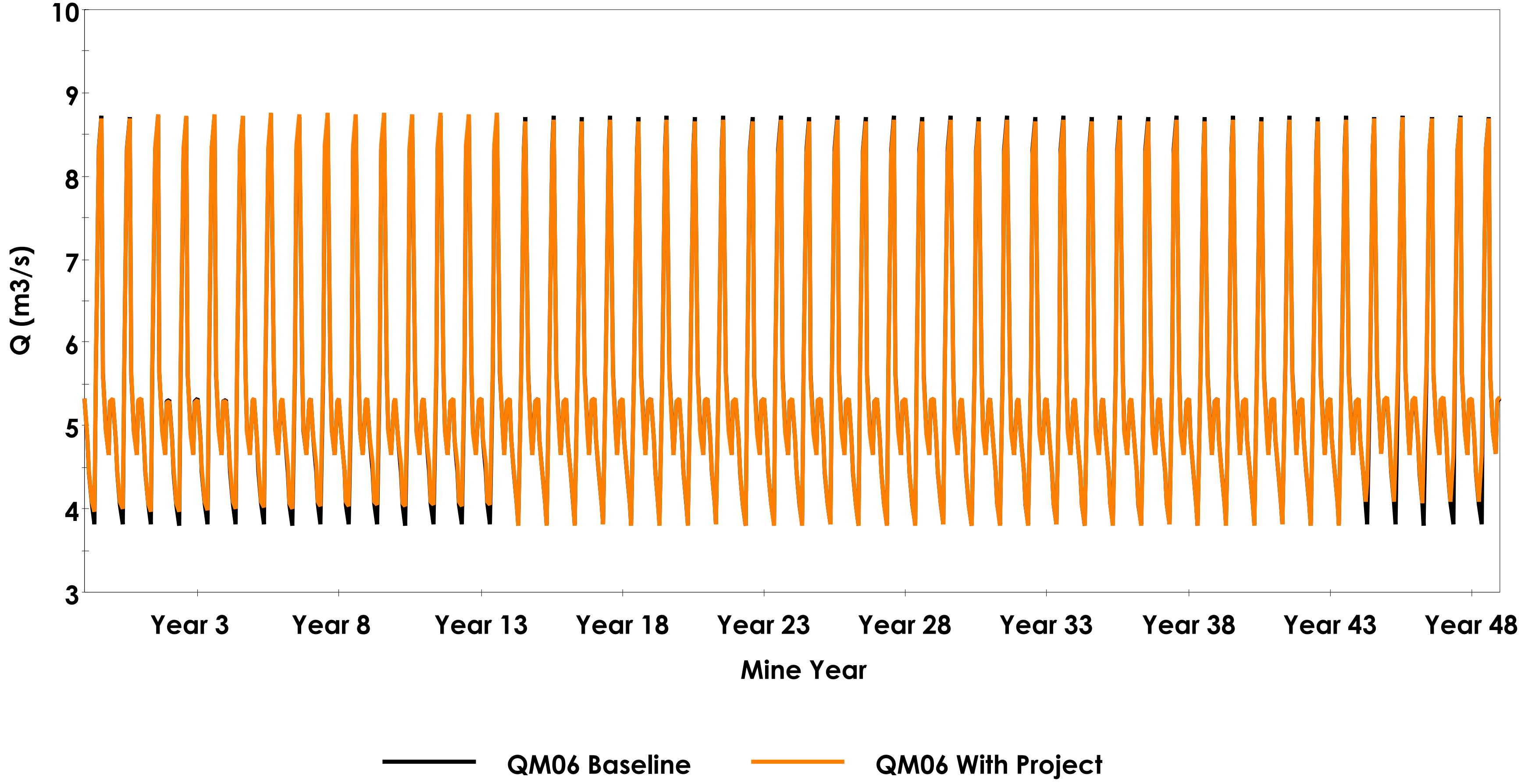
Predicted Streamflow for QM09 – 1:25 YR Dry Climate Scenario



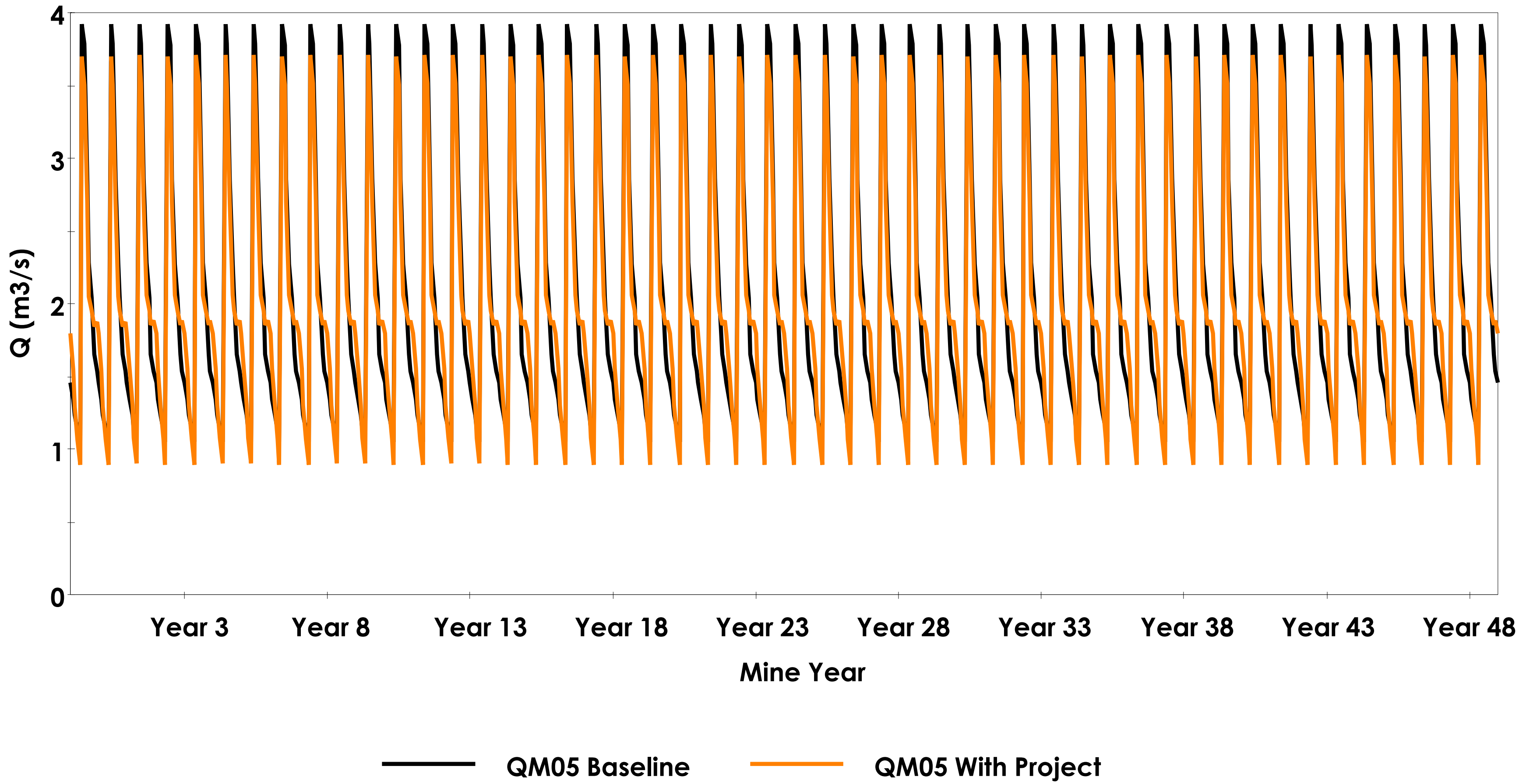
Predicted Streamflow for QM03 – 1:25 YR Dry Climate Scenario



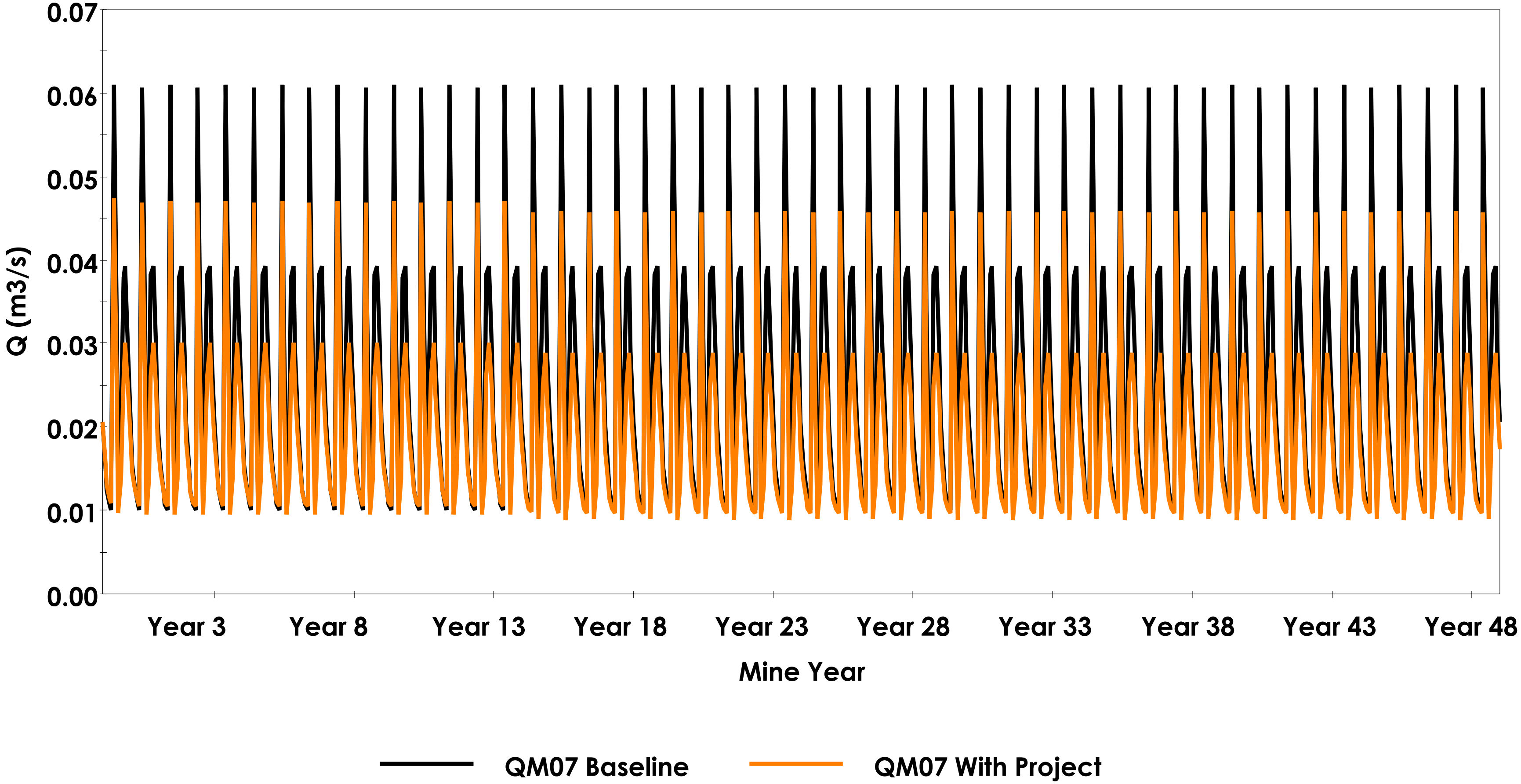
Predicted Streamflow for QM04 – 1:25 YR Dry Climate Scenario



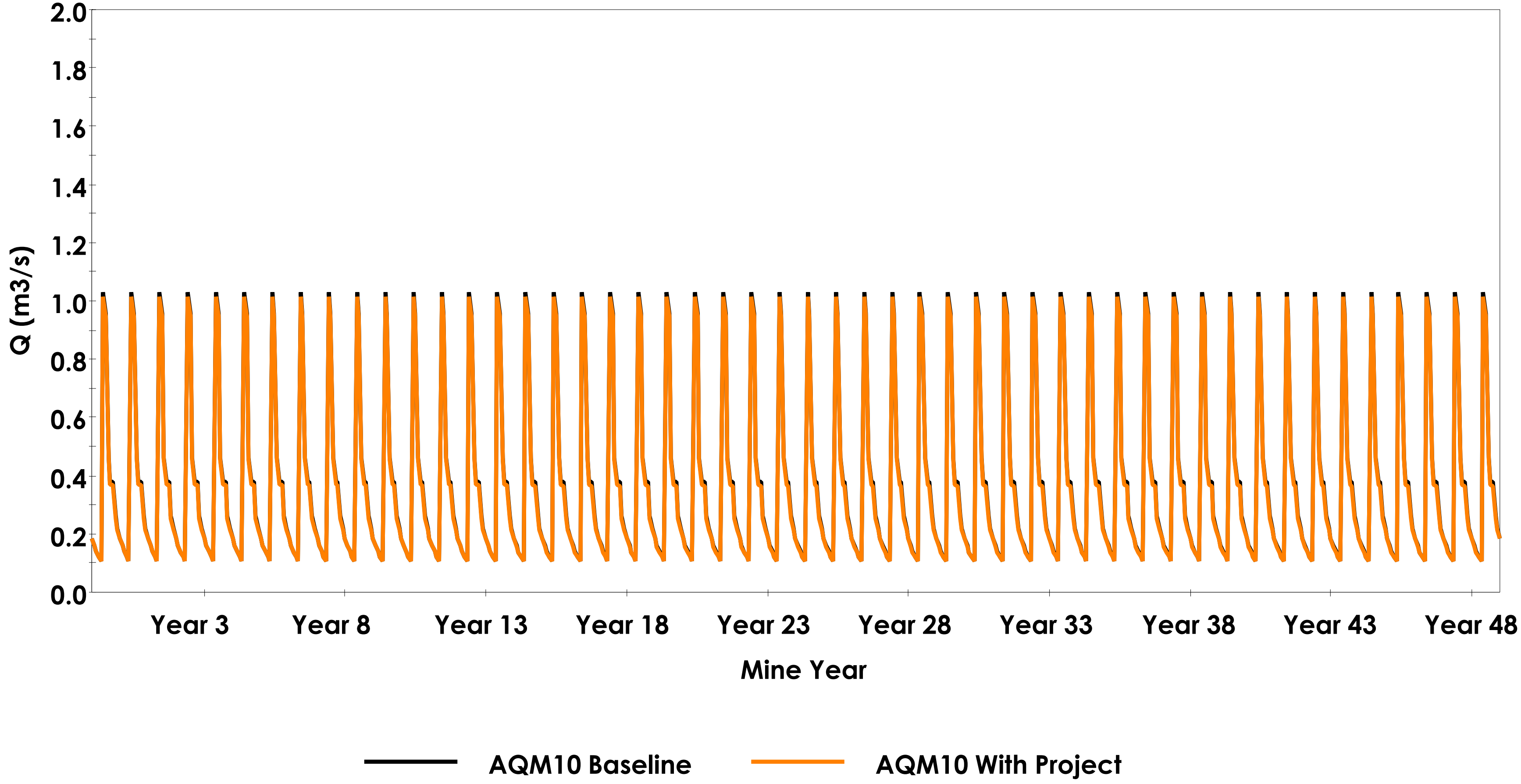
Predicted Streamflow for QM06 – 1:25 YR Dry Climate Scenario



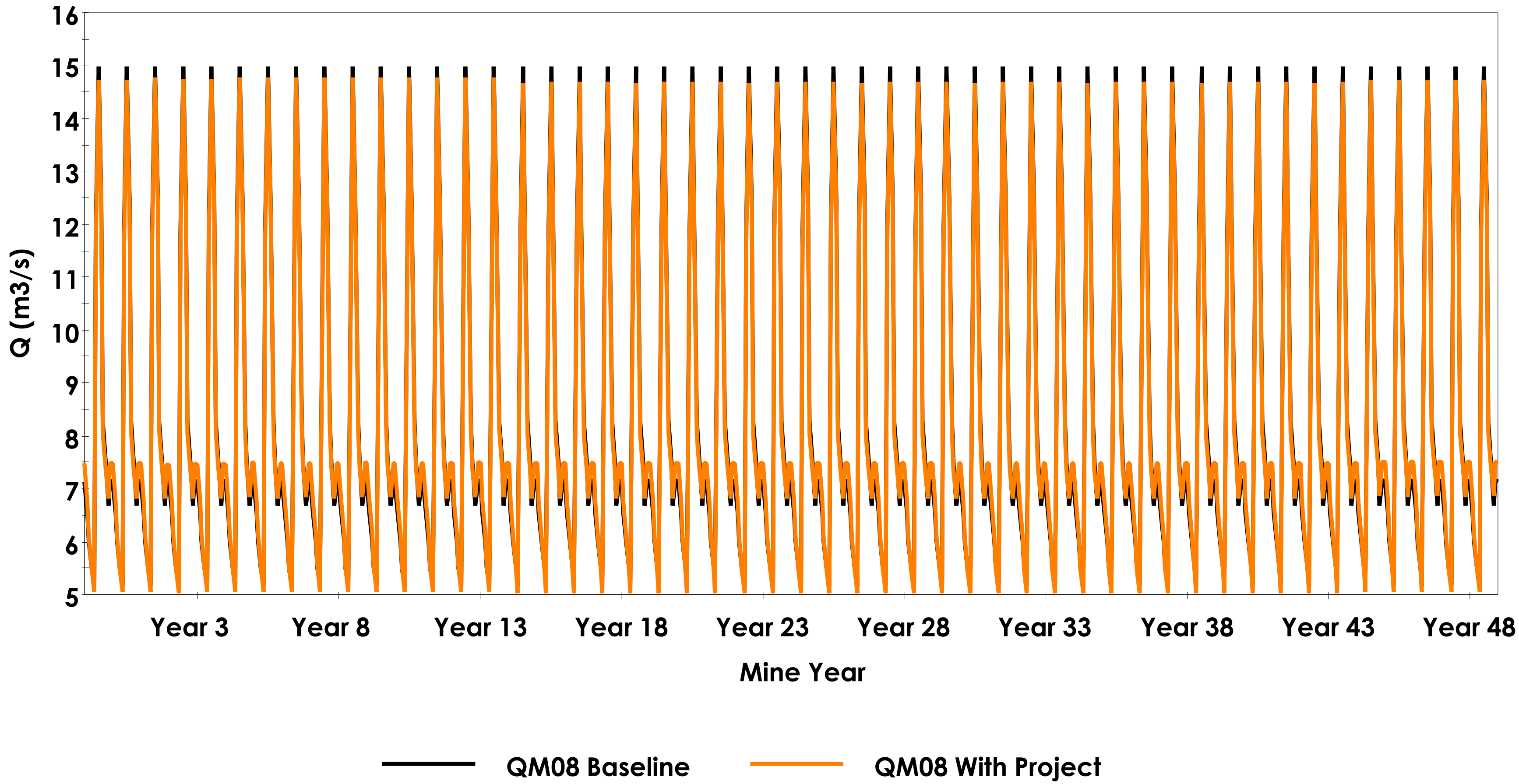
Predicted Streamflow for QM05 – 1:25 YR Dry Climate Scenario



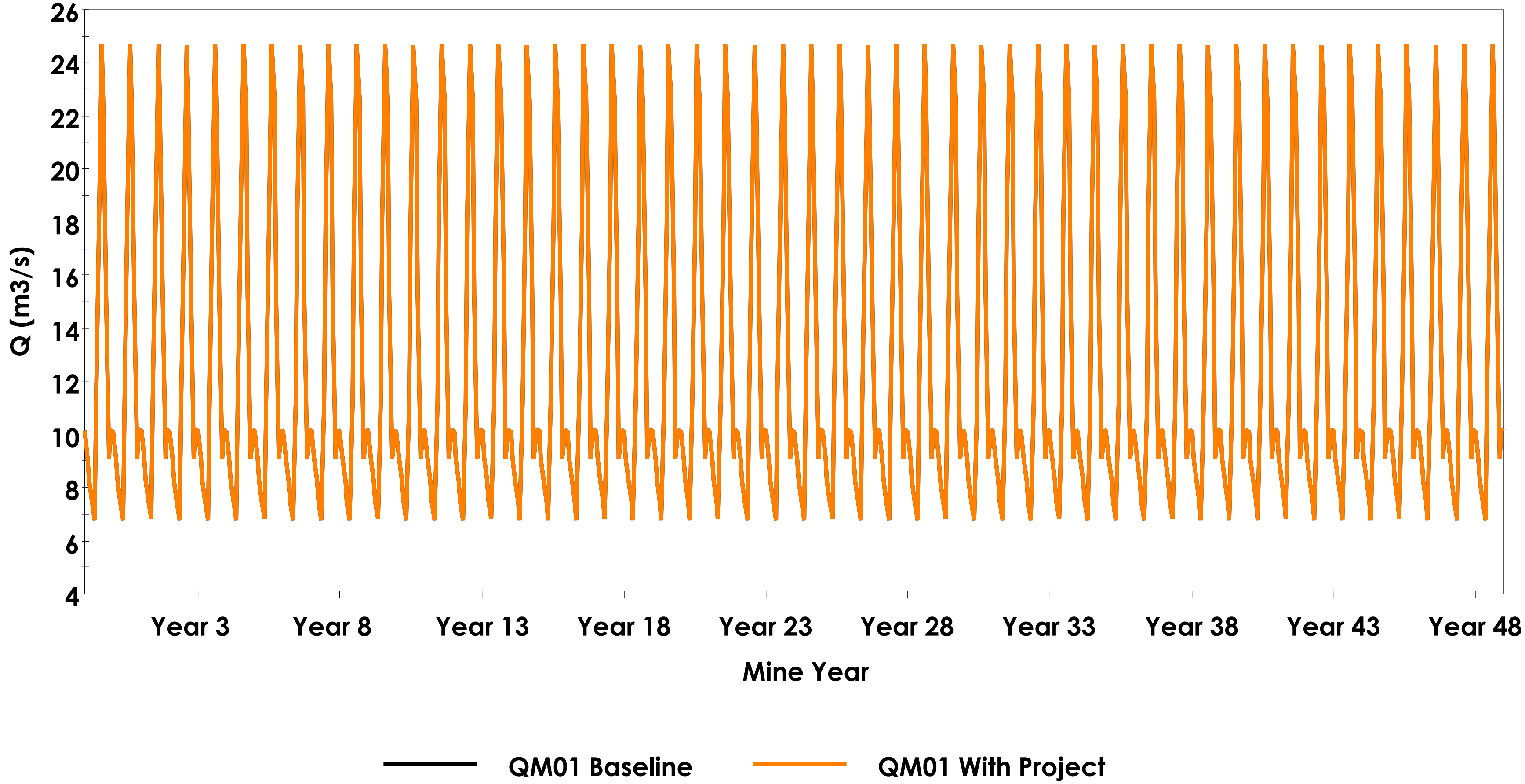
Predicted Streamflow for QM07 – 1:25 YR Dry Climate Scenario



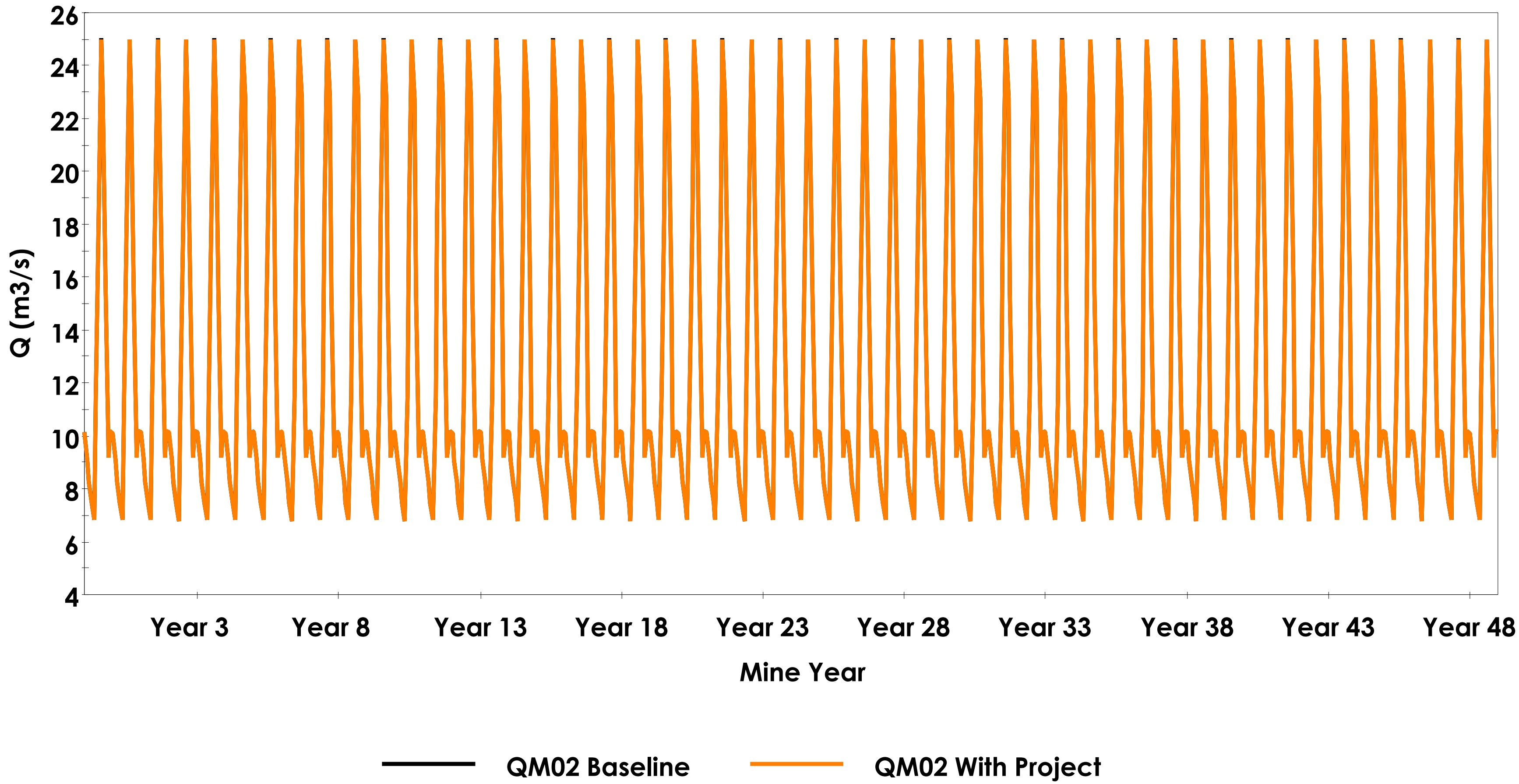
Predicted Streamflow for AQM10 (QM11) – 1:25 YR Dry Climate Scenario



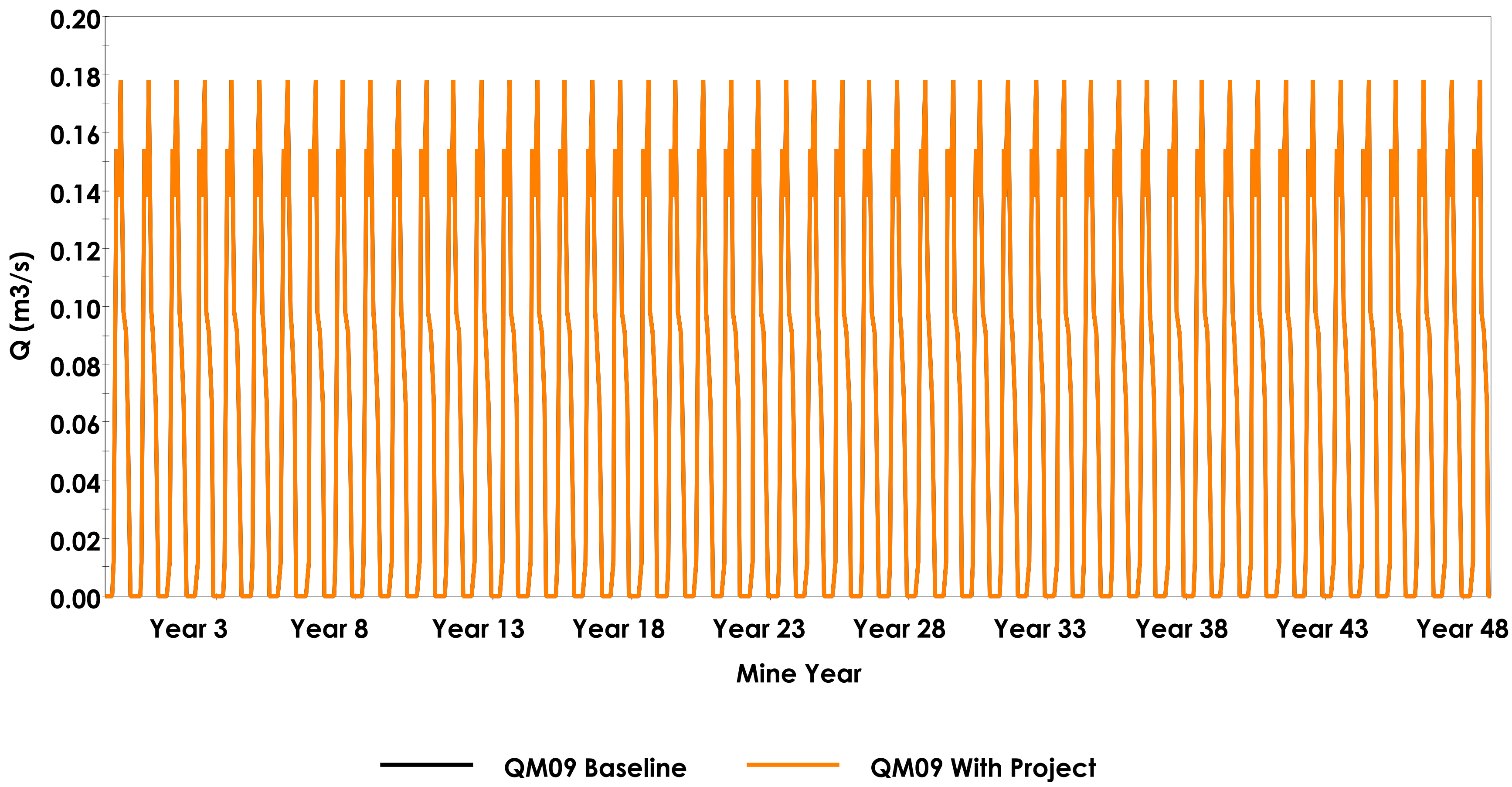
Predicted Streamflow for QM08 – 1:25 YR Dry Climate Scenario



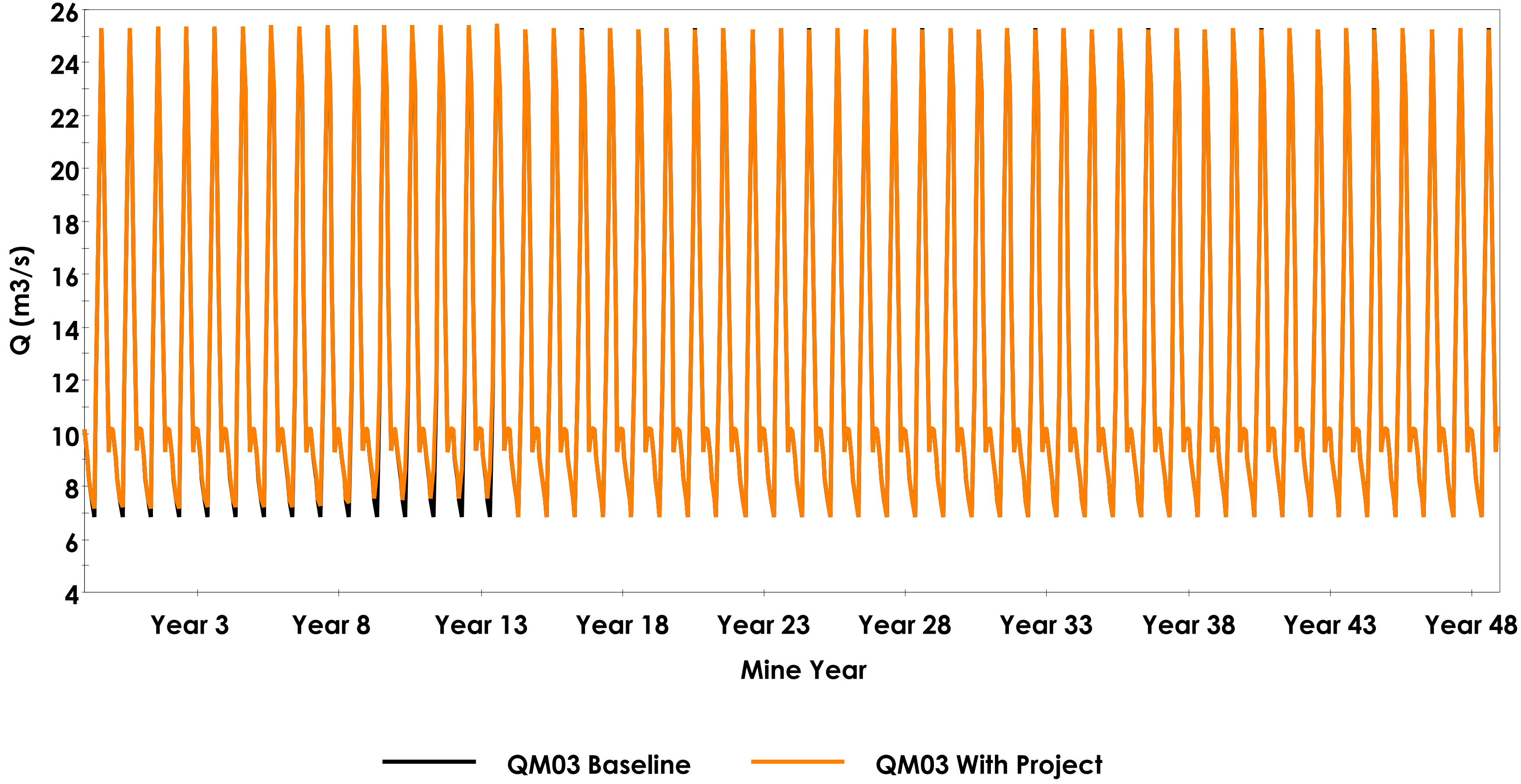
Predicted Streamflow for QM01 – 1:25 YR Wet Climate Scenario



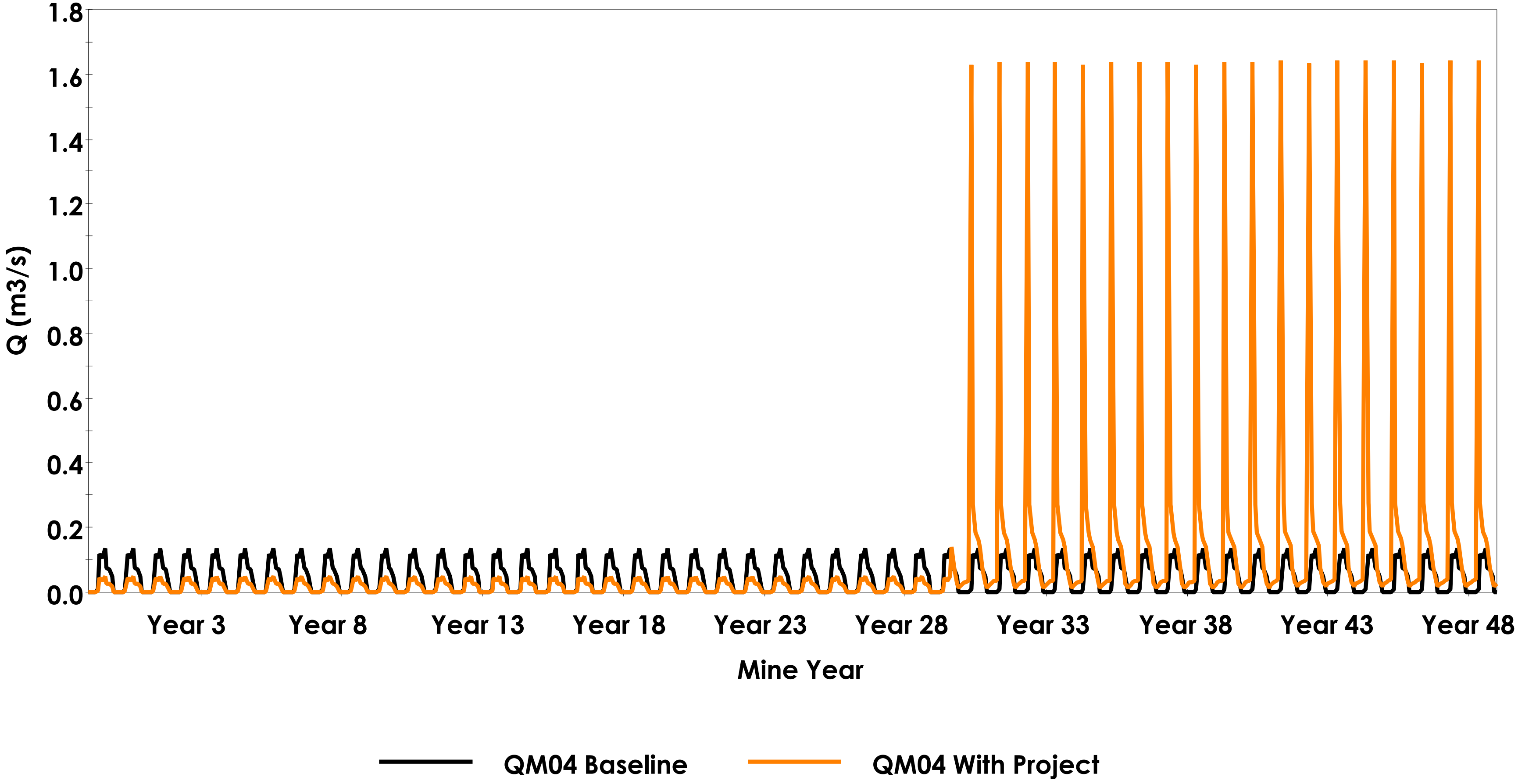
Predicted Streamflow for QM02 – 1:25 YR Wet Climate Scenario



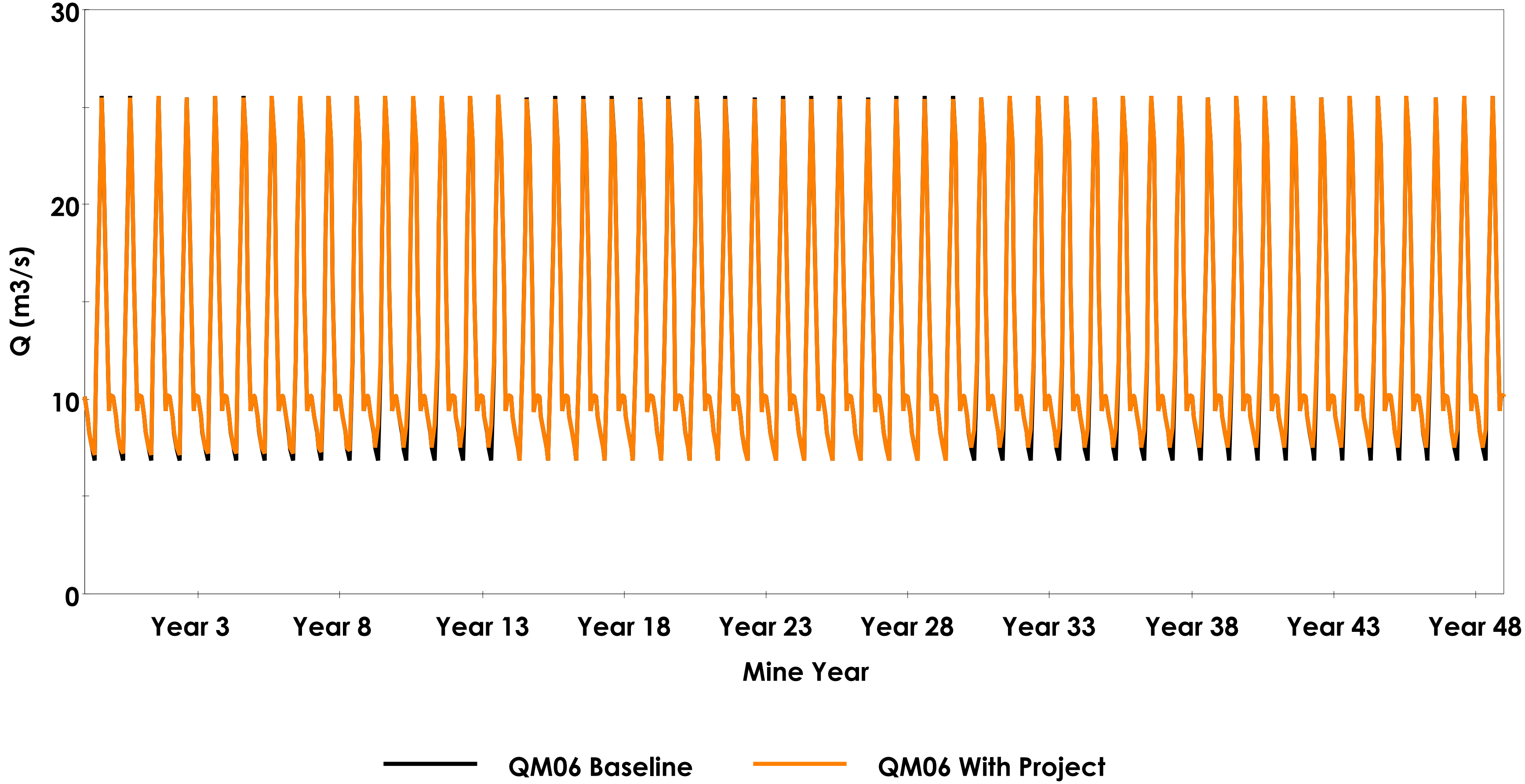
Predicted Streamflow for QM09 – 1:25 YR Wet Climate Scenario



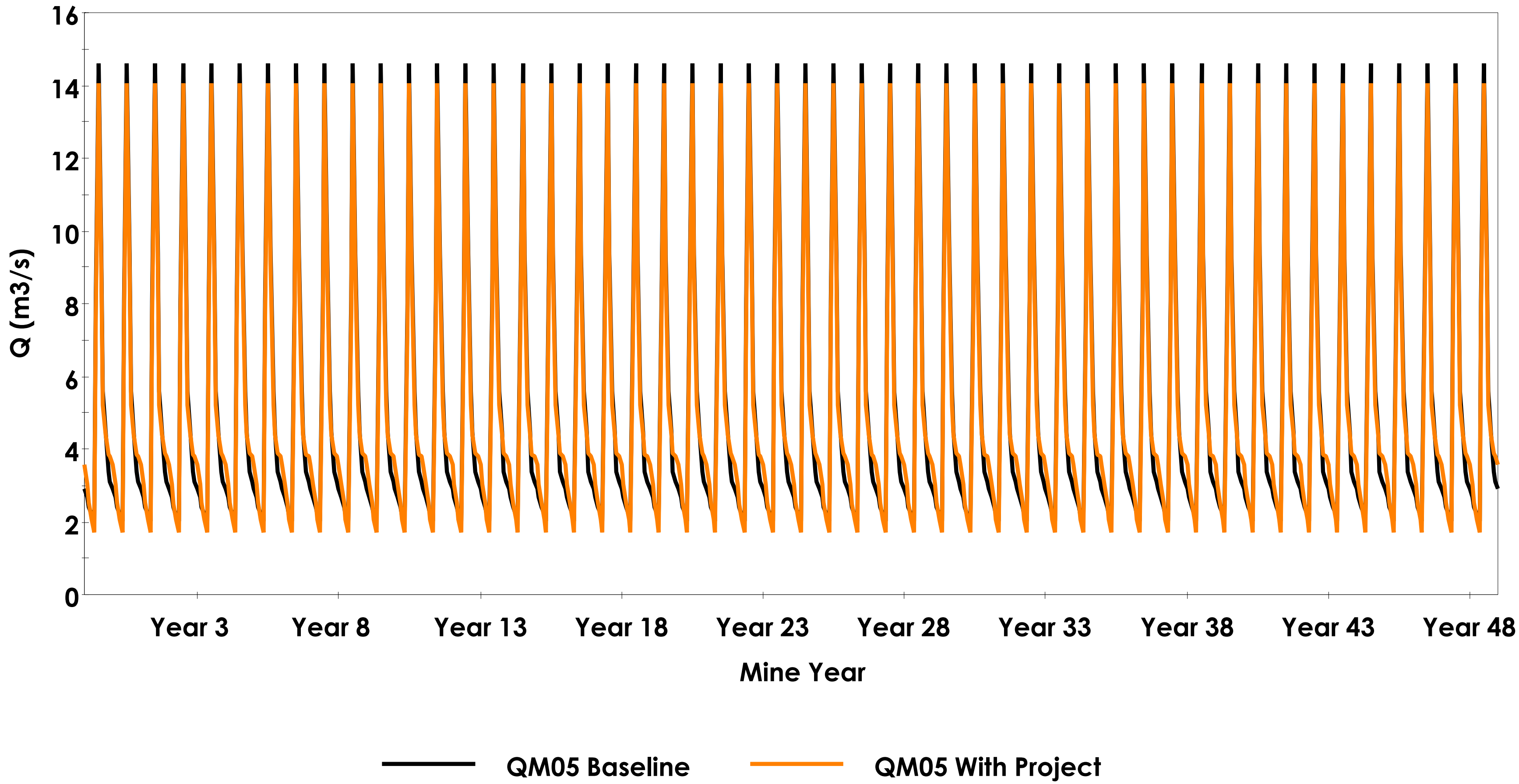
Predicted Streamflow for QM03 – 1:25 YR Wet Climate Scenario



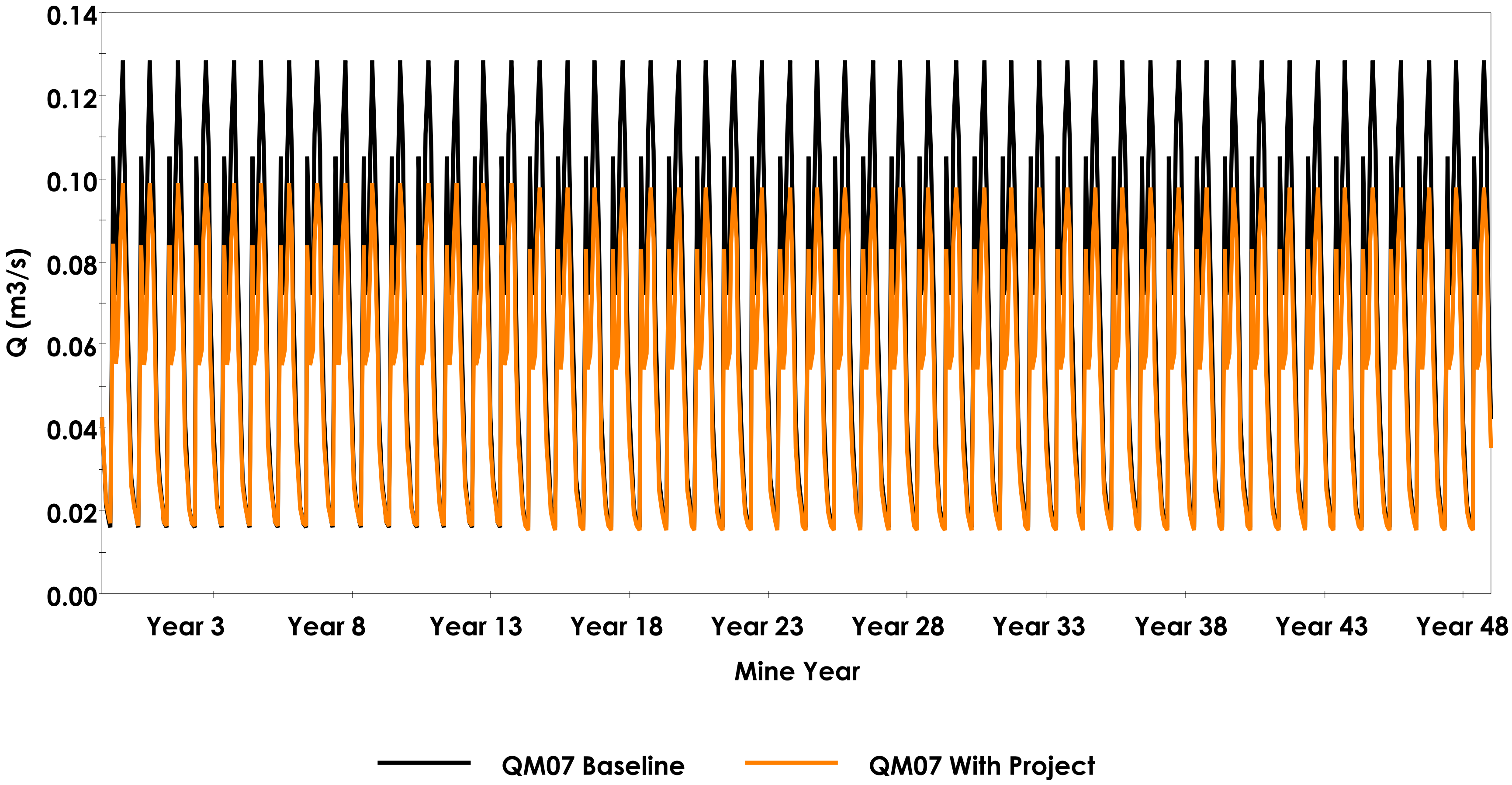
Predicted Streamflow for QM04 – 1:25 YR Wet Climate Scenario



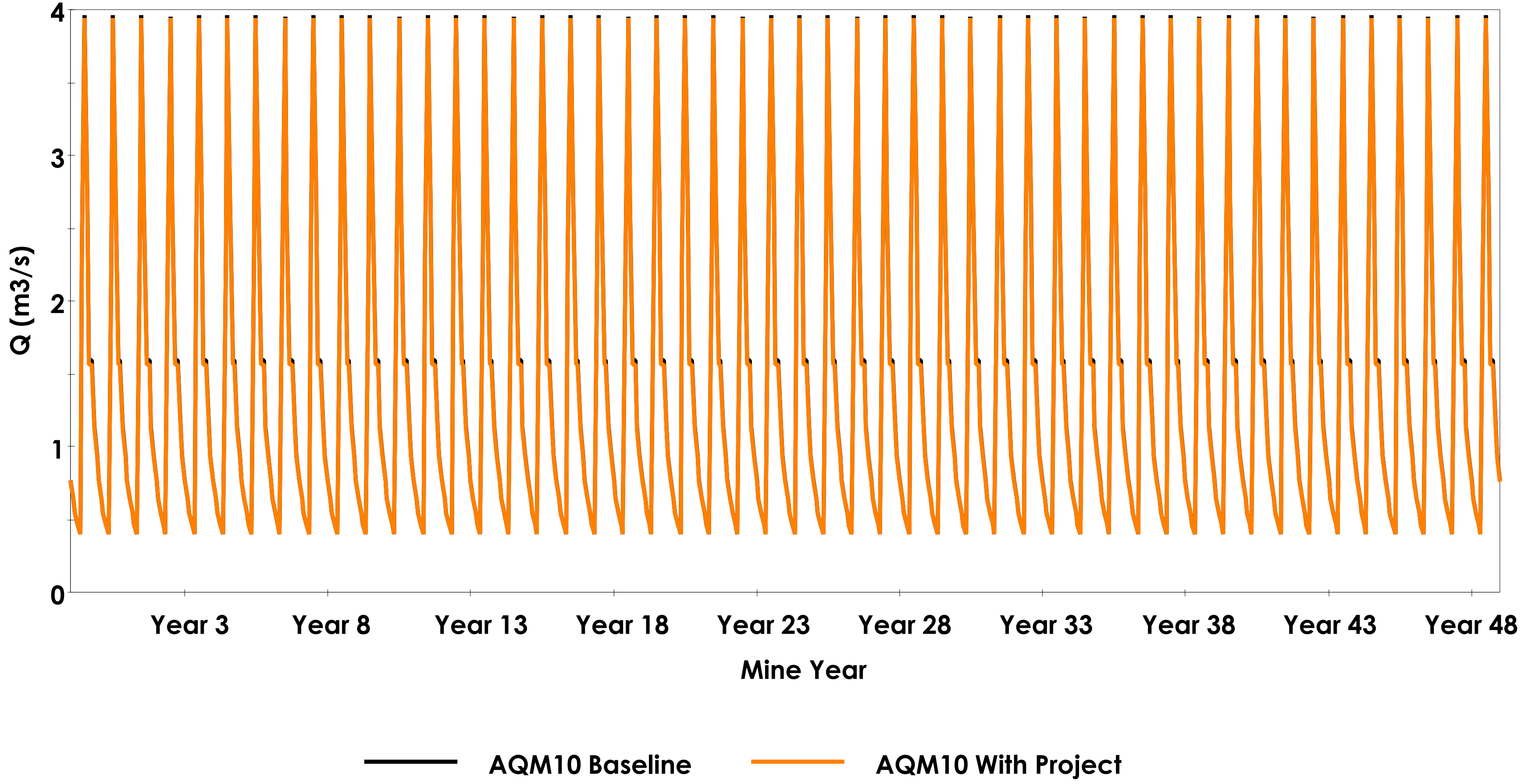
Predicted Streamflow for QM06 – 1:25 YR Wet Climate Scenario



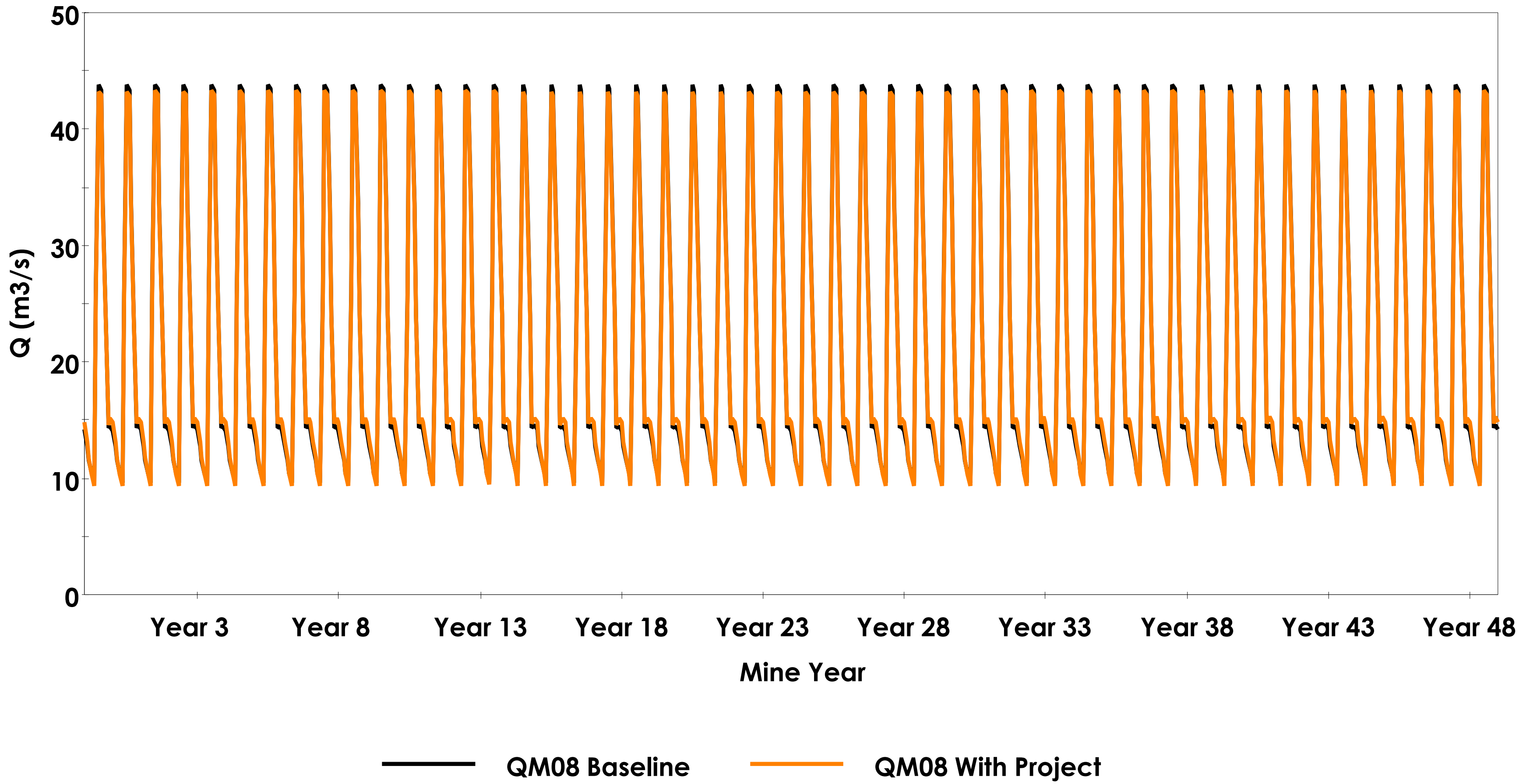
Predicted Streamflow for QM05 – 1:25 YR Wet Climate Scenario



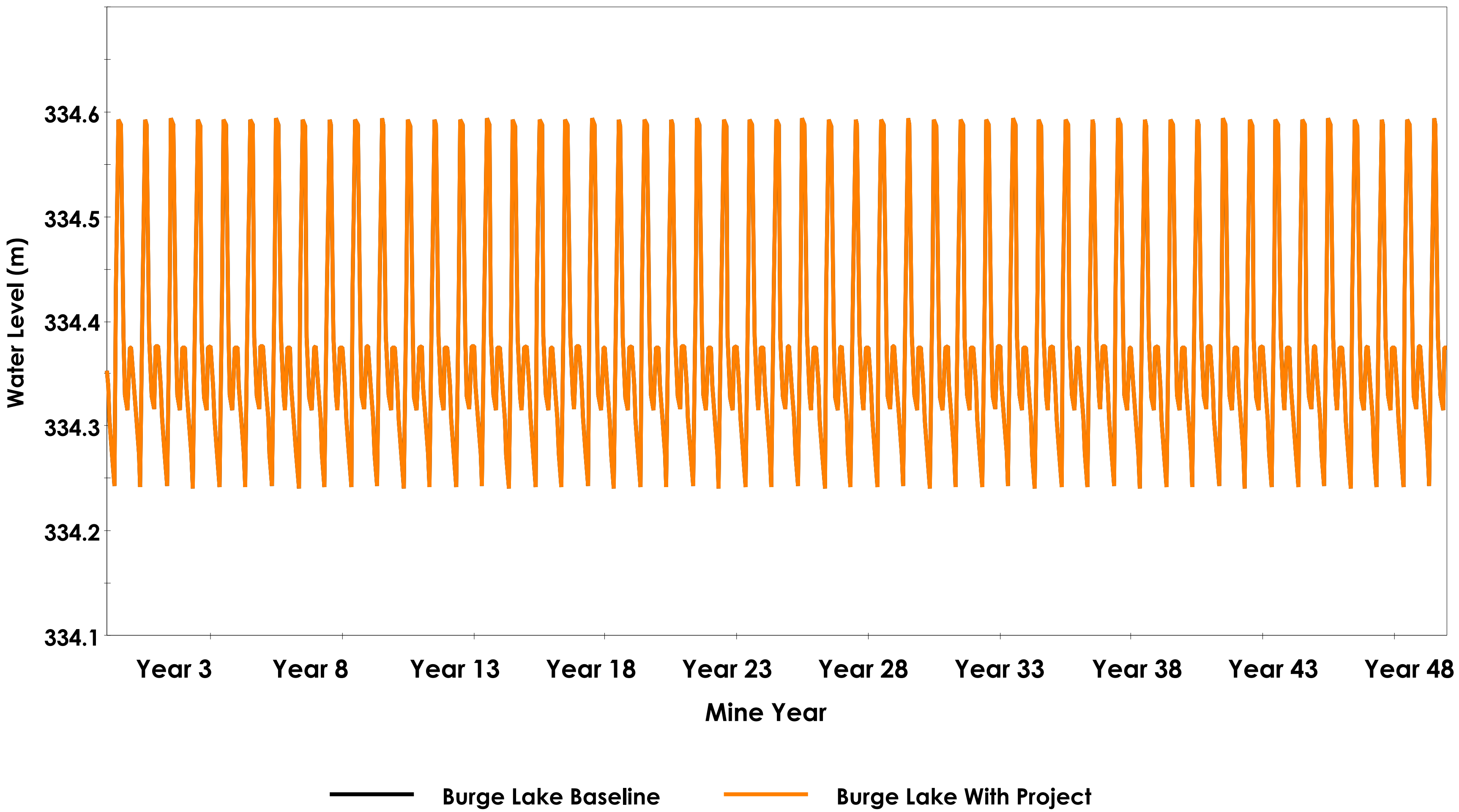
Predicted Streamflow for QM07 – 1:25 YR Wet Climate Scenario



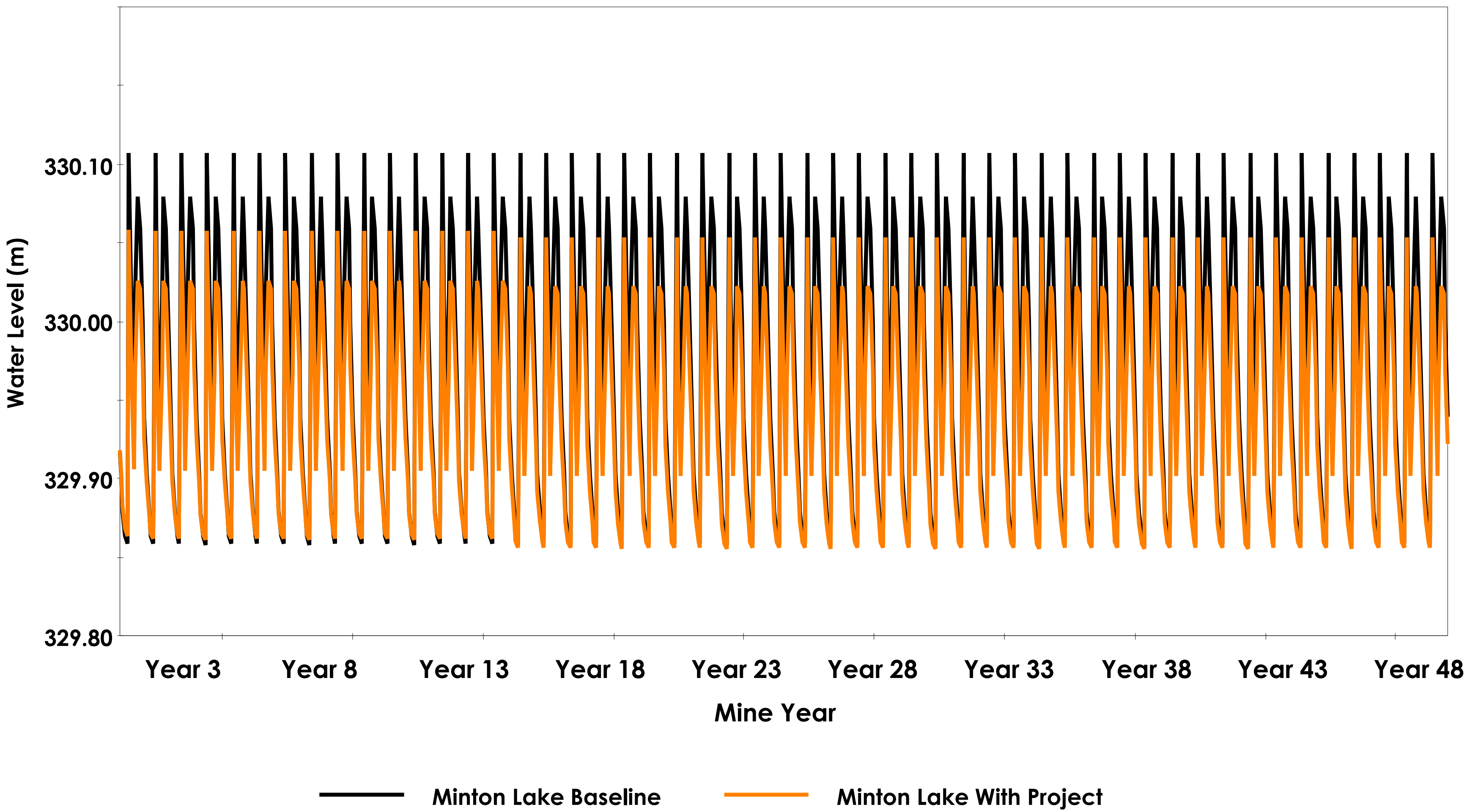
Predicted Streamflow for AQM10 (QM11) – 1:25 YR Wet Climate Scenario



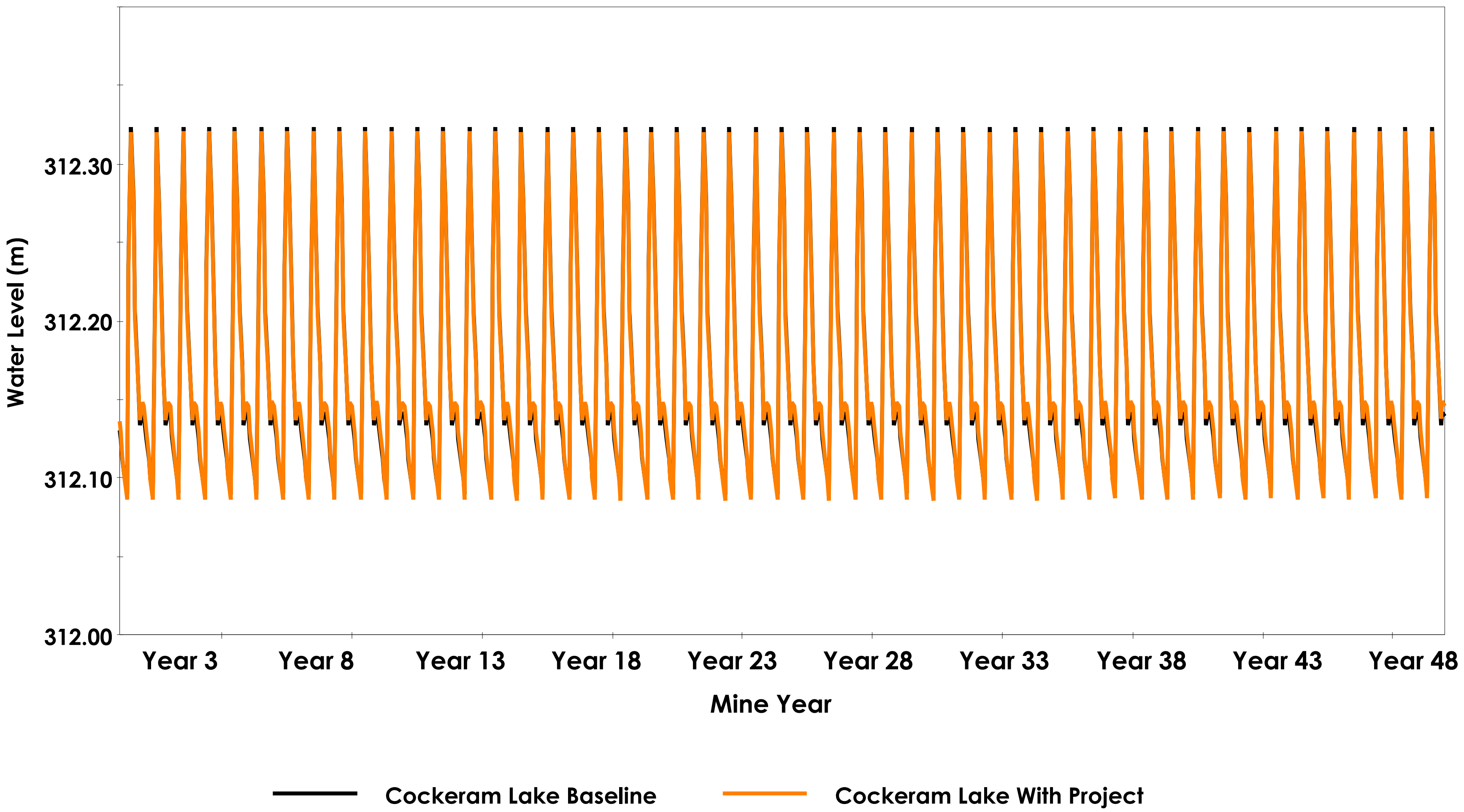
Predicted Streamflow for QM08 – 1:25 YR Wet Climate Scenario



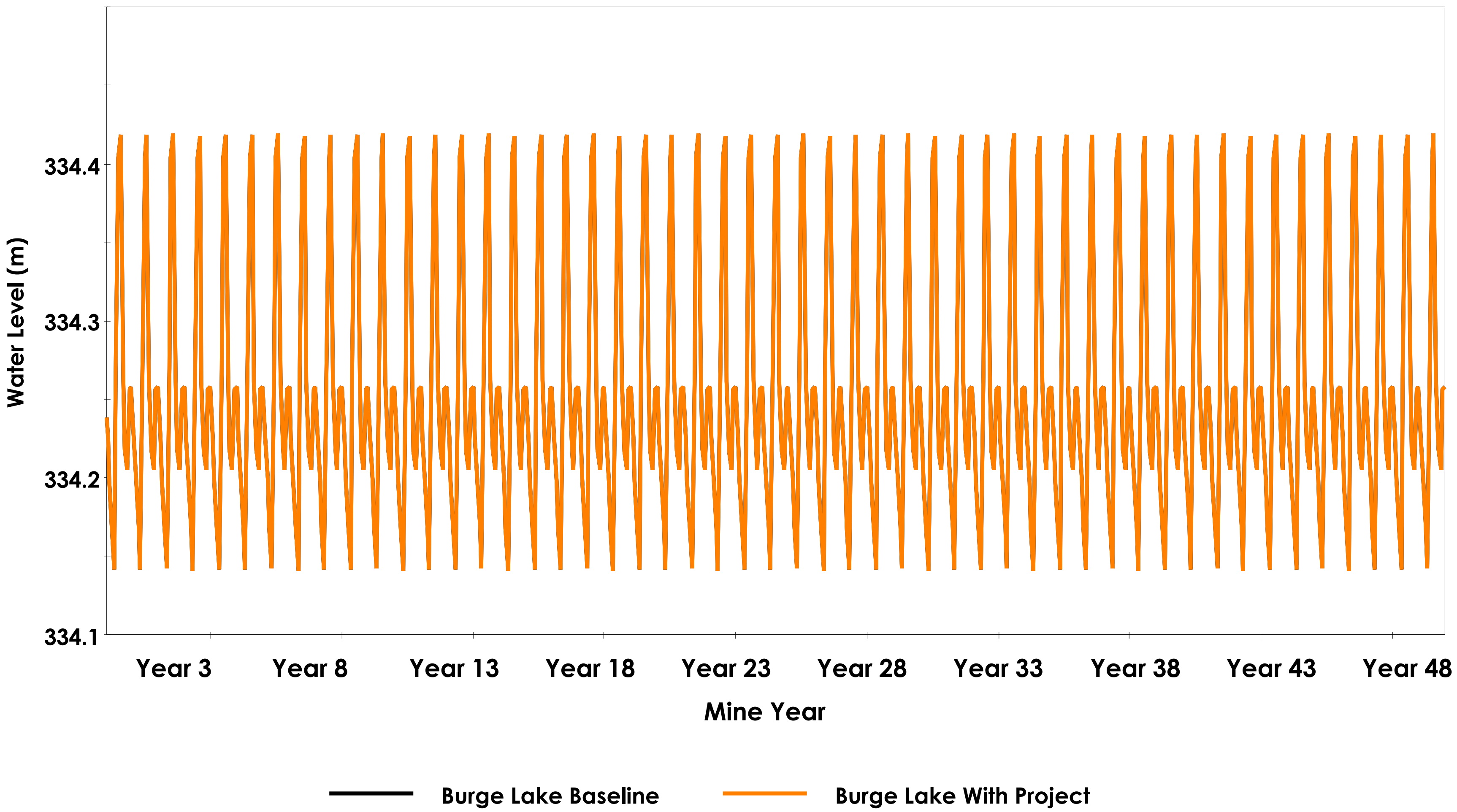
Predicted Lake Level for Burge Lake – Average Climate Scenario



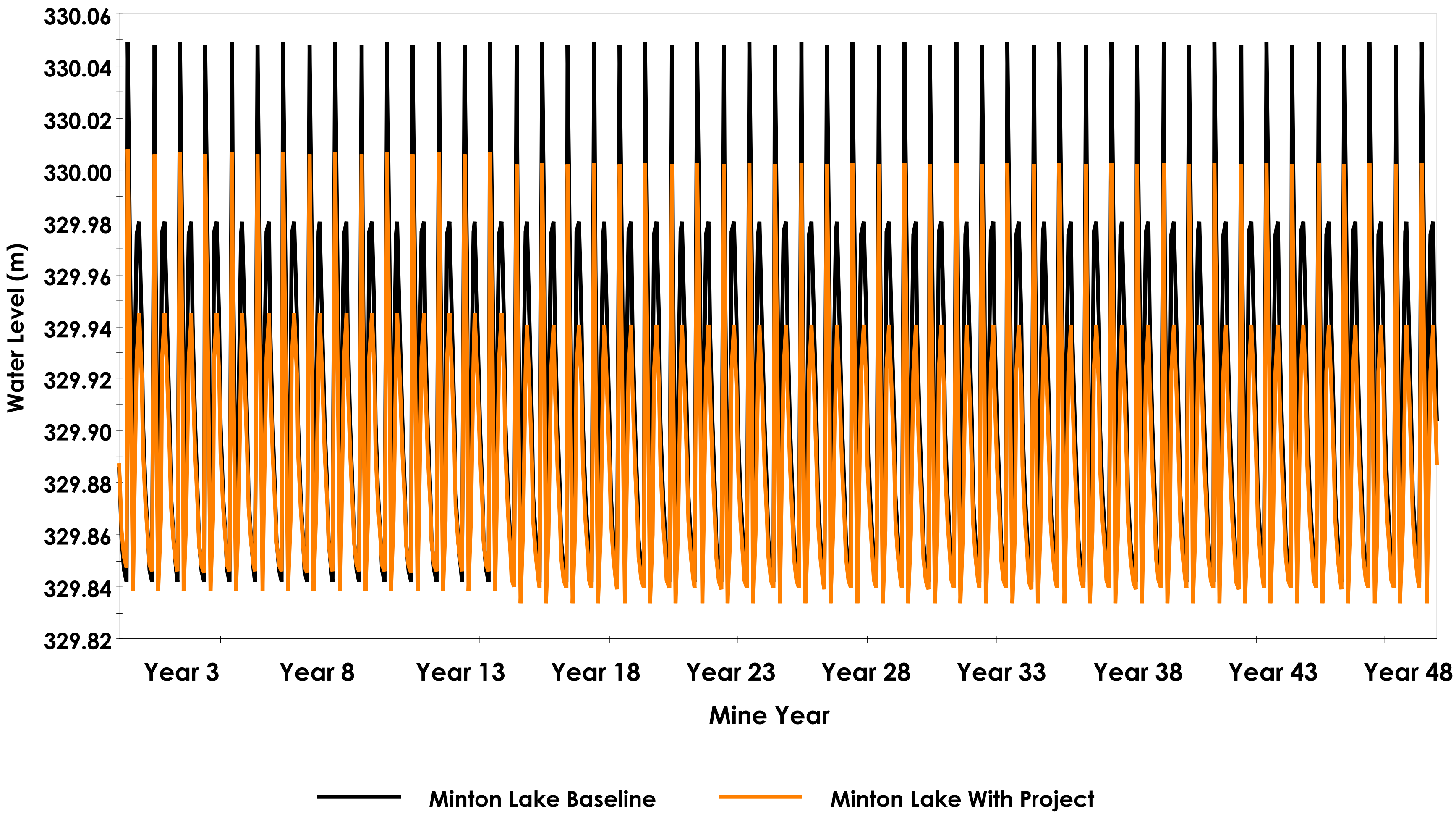
Predicted Lake Level for Minton Lake – Average Climate Scenario



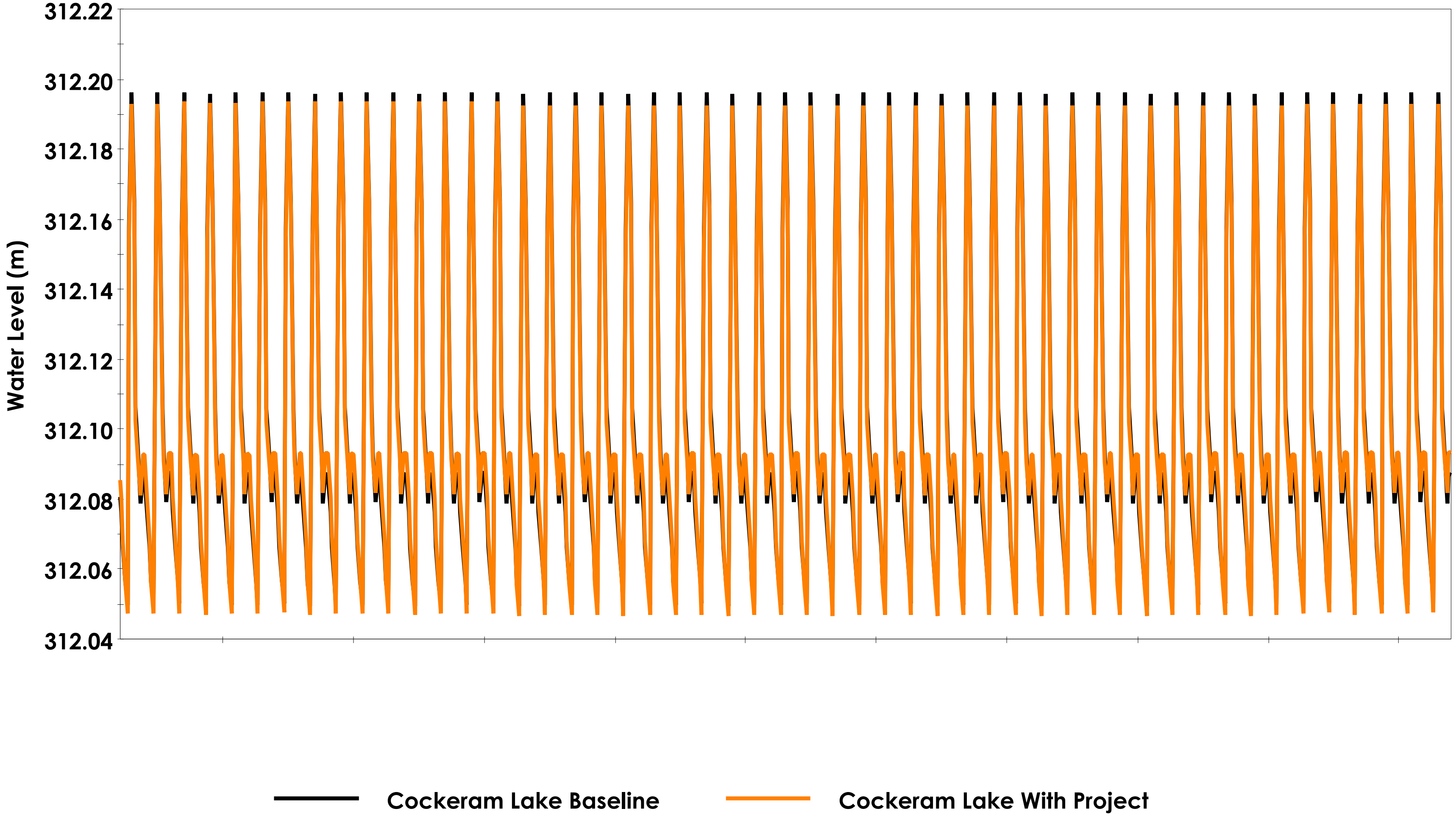
Predicted Lake Level for Cockeram Lake – Average Climate Scenario



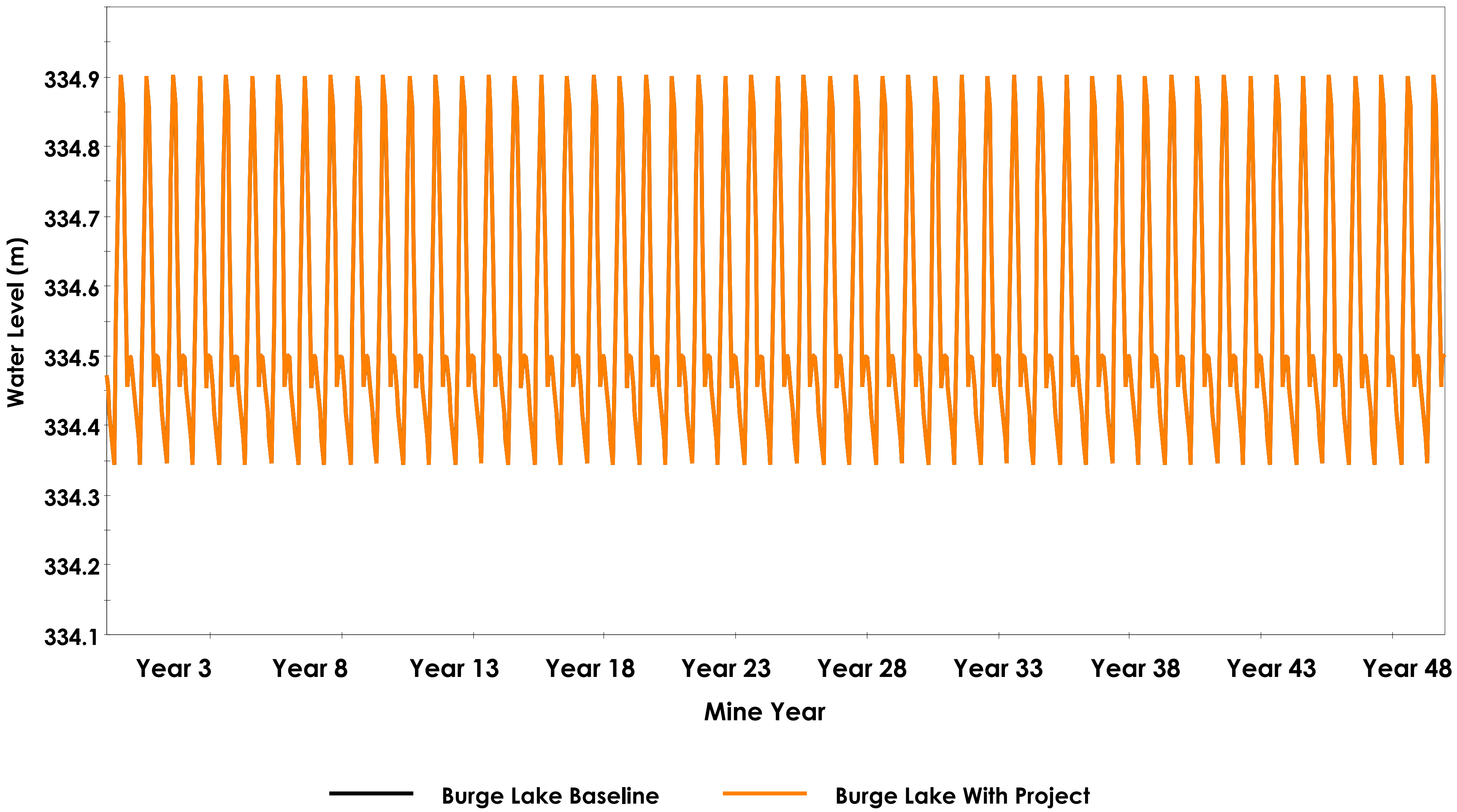
Predicted Lake Level for Burge Lake – 1:25 YR Dry Climate Scenario



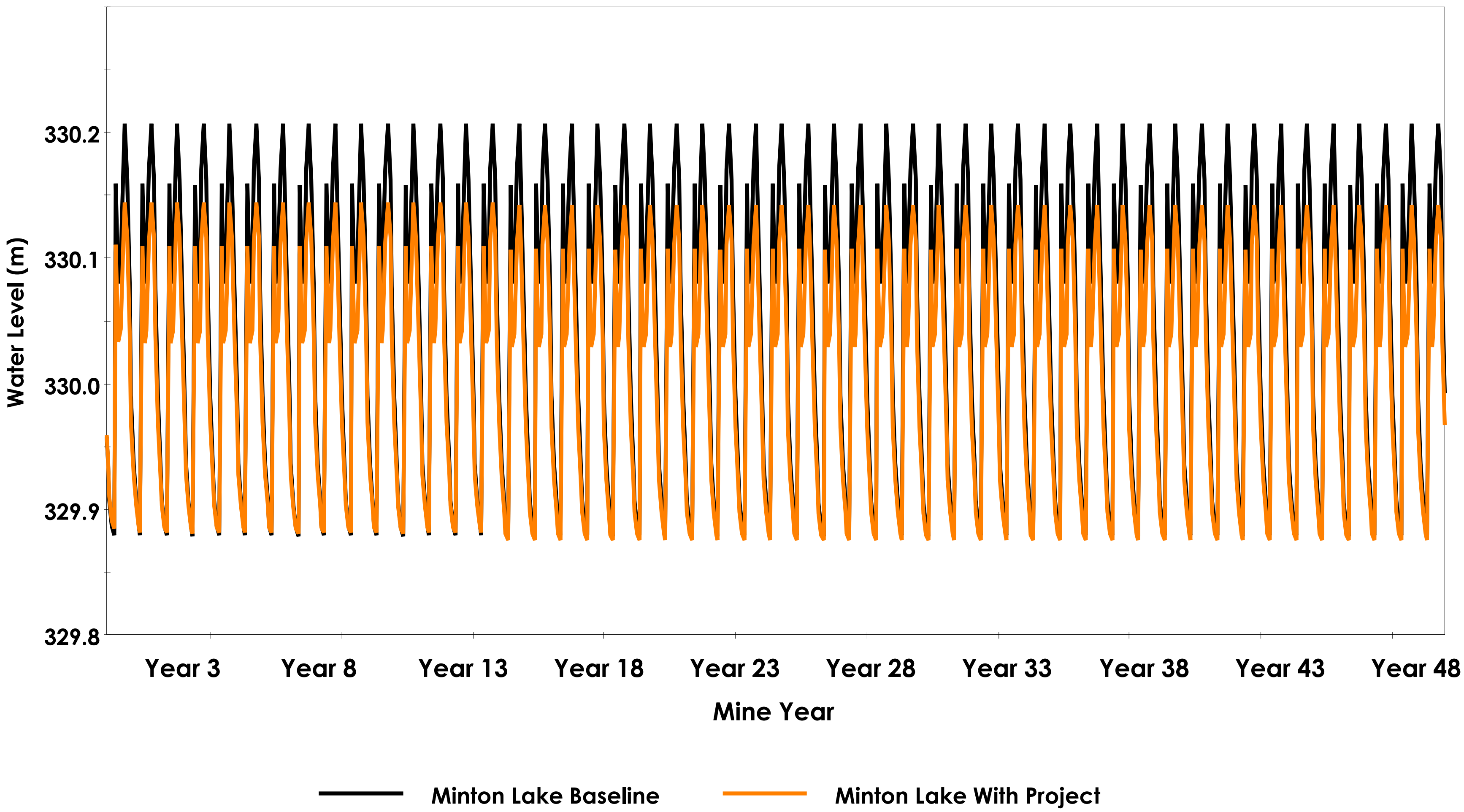
Predicted Lake Level for Minton Lake – 1:25 YR Dry Climate Scenario



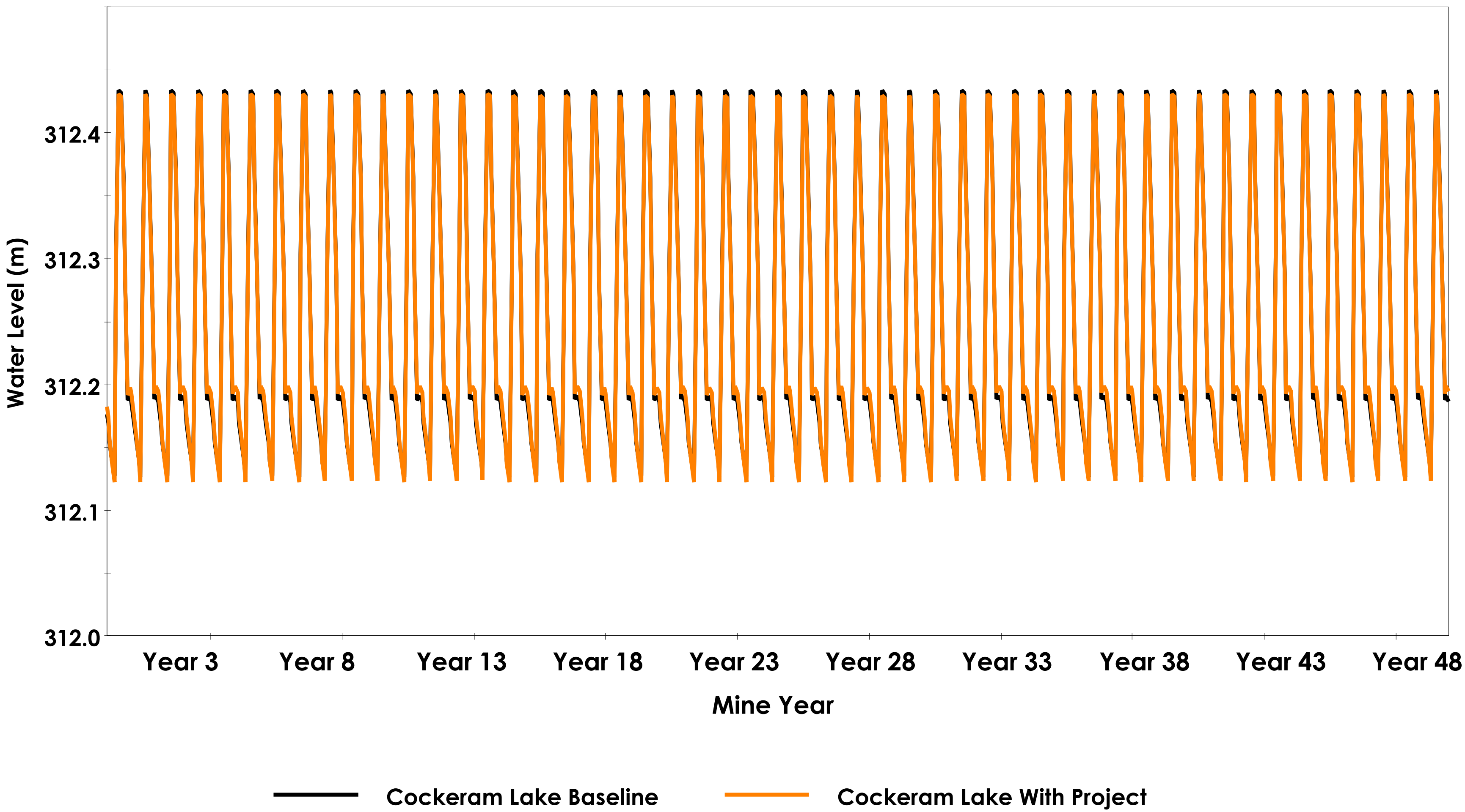
Predicted Lake Level for Cockeram Lake – 1:25 YR Dry Climate Scenario



Predicted Lake Level for Burge Lake – 1:25 YR Wet Climate Scenario



Predicted Lake Level for Minton Lake – 1:25 YR Wet Climate Scenario



Predicted Lake Level for Cockeram Lake – 1:25 YR Wet Climate Scenario

Appendix E TABLES FOR WATER QUALITY MODEL INPUTS

Table E-1: Parameters selected for water quality model

Parameter name	Parameter Symbol	Name in model	Parameter group	Units	Guidelines/Limits		
					CWQG	MSOG	MDMER
pH	pH	pH	General chemistry	pH Unit	6.5-9.0	6.5-9.0	6.0-9.5
Proton	H+	Proton	General chemistry	mg/L	n/v	n/v	n/v
Acidity Total	Acid	Acidity_T	General chemistry	mg/L	n/v	n/v	n/v
Alkalinity Total	Alk	Alkalinity_T	General chemistry	mg/L	n/v	n/v	n/v
Bromide	Br	Bromide	General chemistry	mg/L	n/v	n/v	n/v
Chloride	Cl	Chloride	General chemistry	mg/L	120	n/v	n/v
Fluoride	F	Fluoride	General chemistry	mg/L	0.12	0.12	n/v
Sulfate	SO_4	Sulfate	General chemistry	mg/L	n/v	n/v	n/v
Phosphorus Total	P(T)	Phosphorus_T	Nutrients	mg/L	Narrative	0.025	n/v
Ammonia Nitrogen Total	$N\text{-}NH_3(T)$	N_Ammonia	Nutrients	N mg/L	Table 2	Equation*	n/v
Nitrite Nitrogen	$N\text{-}NO_2$	N_Nitrite	Nutrients	N mg/L	0.06	0.06	n/v
Nitrate and Nitrite Nitrogen	$N\ \text{-}NO_3\text{+}NO_2$	N_Nitrate_Nitrite	Nutrients	N mg/L	13	n/v	n/v
Cyanide Total	CN(T)	Cyanide_T	General chemistry	mg/L	n/v	n/v	0.5
Cyanide Free	CN(F)	Cyanide_F	General chemistry	mg/L	0.005	0.0052	n/v
WAD** Cyanide	CN(WAD)	Cyanide_WAD	General chemistry	mg/L	n/v	n/v	n/v
Hardness	Hard	Hardness	General chemistry	mg/L	n/v	n/v	n/v
Radium 226	Ra-226	Radium_226	Radioactivity	Bq/L	n/v	n/v	0.37
Total Suspended Solids	TSS	TSS	Supporting	mg/L	n/v	n/v	15
Aluminum Dissolved	Al(D)	Aluminum_D	Trace elements	mg/L	n/v	n/v	n/v
Aluminum Total	Al(T)	Aluminum_T	Trace elements	mg/L	0.005/0.1	0.005/0.1	n/v
Antimony Dissolved	Sb(D)	Antimony_D	Trace elements	mg/L	n/v	n/v	n/v
Antimony Total	Sb(T)	Antimony_T	Trace elements	mg/L	n/v	n/v	n/v
Arsenic Dissolved	As(D)	Arsenic_D	Trace elements	mg/L	n/v	0.15	0.3
Arsenic Total	As(T)	Arsenic_T	Trace elements	mg/L	0.005	n/v	0.3
Barium Dissolved	Ba(D)	Barium_D	Trace elements	mg/L	n/v	n/v	n/v
Barium Total	Ba(T)	Barium_T	Trace elements	mg/L	n/v	n/v	n/v
Beryllium Total	Be(T)	Beryllium_T	Trace elements	mg/L	n/v	n/v	n/v
Boron Dissolved	Be(D)	Boron_D	Trace elements	mg/L	n/v	n/v	n/v
Boron Total	B(T)	Boron_T	Trace elements	mg/L	1.5	1.5	n/v
Cadmium Dissolved	Cd(D)	Cadmium_D	Trace elements	mg/L	n/v	Equation*	n/v
Cadmium Total	Cd(T)	Cadmium_T	Trace elements	mg/L	Equation**	n/v	n/v
Calcium Dissolved	Cd(D)	Calcium_D	General chemistry	mg/L	n/v	n/v	n/v
Chromium Dissolved	Cr(D)	Chromium_D	Trace elements	mg/L	n/v	Equation*	n/v
Chromium Hexavalent Dissolved	Cr(VI)	Chromium_D_Hex	Trace elements	mg/L	0.001	0.001	n/v
Chromium Total	Cr(T)	Chromium_T	Trace elements	mg/L	0.0089	n/v	n/v

See Notes on next page

Parameter name	Parameter Symbol	Name in model	Parameter group	Units	Guidelines/Limits		
					CWQG	MSOG	MMER
Cobalt Dissolved	Co(D)	Cobalt_D	Trace elements	mg/L	n/v	n/v	n/v
Cobalt Total	Co(T)	Cobalt_T	Trace elements	mg/L	n/v	n/v	n/v
Copper Dissolved	Cu(D)	Copper_D	Trace elements	mg/L	n/v	Equation*	0.3
Copper Total	Cu(T)	Copper_T	Trace elements	mg/L	Equation**	n/v	0.3
Iron Dissolved	Fe(D)	Iron_D	Trace elements	mg/L	n/v	n/v	n/v
Iron Total	Fe(T)	Iron_T	Trace elements	mg/L	0.3	0.3	n/v
Lead Dissolved	Pb(D)	Lead_D	Trace elements	mg/L	n/v	Equation*	0.1
Lead Total	Pb(T)	Lead_T	Trace elements	mg/L	Equation**	n/v	0.1
Magnesium Dissolved	Mg(D)	Magnesium_D	General chemistry	mg/L	n/v	n/v	n/v
Manganese Dissolved	Mn(D)	Manganese_D	General chemistry	mg/L	Table 5	n/v	n/v
Manganese Total	Mn(T)	Manganese_T	General chemistry	mg/L	Table 5	n/v	n/v
Mercury Dissolved	Hg(D)	Mercury_D	Trace elements	mg/L	n/v	n/v	n/v
Mercury Total	Hg(T)	Mercury_T	Trace elements	mg/L	0.000026	0.000026	n/v
Molybdenum Dissolved	Mo(D)	Molybdenum_D	Trace elements	mg/L	n/v	n/v	n/v
Molybdenum Total	Mo(T)	Molybdenum_T	Trace elements	mg/L	0.073	0.073	n/v
Nickel Dissolved	Ni(D)	Nickel_D	Trace elements	mg/L	n/v	Equation*	0.5
Nickel Total	Ni(T)	Nickel_T	Trace elements	mg/L	Equation**	n/v	0.5
Potassium Dissolved	K(D)	Potassium_D	General chemistry	mg/L	n/v	n/v	n/v
Selenium Dissolved	Se(D)	Selenium_D	Trace elements	mg/L	n/v	n/v	n/v
Selenium Total	Se(T)	Selenium_T	Trace elements	mg/L	0.001	0.001	n/v
Silicon Dissolved	Si(D)	Silicon_D	General chemistry	mg/L	n/v	n/v	n/v
Silicon Total	Si(T)	Silicon_T	Trace elements	mg/L	n/v	n/v	n/v
Silver Dissolved	Ag(D)	Silver_D	Trace elements	mg/L	n/v	n/v	n/v
Silver Total	Ag(T)	Silver_T	Trace elements	mg/L	0.00025	0.0001	n/v
Sodium Dissolved	Na(D)	Sodium_D	General chemistry	mg/L	n/v	n/v	n/v
Sodium Total	Na(T)	Sodium_T	General chemistry	mg/L	n/v	n/v	n/v
Strontium Dissolved	Sr(D)	Strontium_D	Trace elements	mg/L	n/v	n/v	n/v
Strontium Total	Sr(T)	Strontium_T	Trace elements	mg/L	n/v	n/v	n/v
Thallium Dissolved	Tl(D)	Thallium_D	Trace elements	mg/L	n/v	n/v	n/v
Thallium Total	Tl(T)	Thallium_T	Trace elements	mg/L	0.0008	0.0008	n/v
Uranium Dissolved	U(D)	Uranium_D	Trace elements	mg/L	n/v	n/v	n/v
Uranium Total	U(T)	Uranium_T	Trace elements	mg/L	0.015	0.015	n/v
Vanadium Total	V(T)	Vanadium_T	Trace elements	mg/L	n/v	n/v	n/v
Zinc Dissolved	Zn(D)	Zinc_D	Trace elements	mg/L	Equation**	Equation*	0.5
Zinc Total	Zn(T)	Zinc_T	Trace elements	mg/L	n/v	n/v	0.5

Table E-1: Parameters selected for water quality model

Notes:

The most stringent guideline was selected when two or more guidelines are established for the same parameter under the same jurisdiction (CCME, MWS, or Government of Canada).

CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).

MSOG - Manitoba Water Quality Standards Objectives and Guidelines for Freshwater Aquatic Life - Manitoba (MWS 2011).

MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Schedule 4 - Authorized Limits of Deleterious Substances, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).

ᵞ Guidelines are for pH; pH = - Lg[H^+] where [H^+] is a molar concentration of protons.

Equations were used to calculate hardness, pH, temperature, and DOC-dependent guidelines for these parameters as per MWS (Equation*) and CCME (Equation**):

- Total cadmium CWQG-FAL: at hardness > 280 mg/L the guideline is 0.00037 mg/L, at hardness between 17 and 280 mg/L the guideline (in mg/L) is 0.001*[10^(1.016*(log10(Hardness))-1.71)], at hardness < 17 mg/L the guideline is 0.00011 mg/L.
- Total copper CWQG: When the water hardness is 0 to < 82 mg/L the CWQG is 0.002 mg/L, at hardness ≥82 to ≤180 mg/L the CWQG is calculated as CWQG (µg/L) = 0.2 * $e^{\{0.8545[\ln(hardness)]-1.465\},\ a}$t hardness >180 mg/L the CWQG is 0.004 mg/L, if the hardness was unknown the CWQG was 0.002 mg/L.
- Total lead CWQG: When the hardness is 0 to ≤ 60 mg/L the CWQG is 0.001 mg/L, at hardness >60 to ≤ 180 mg/L the CWQG is calculated as CWQG (µg/L)= $e^{\{1.273[\ln(hardness)]-4.705\},}$ at hardness >180 mg/L the CWQG is 0.007 mg/L, if the hardness was unknown the CWQG was 0.001 mg/L.
- Dissolved manganese CWQG-FAL (mg/L): pH and hardness-dependent guideline calculated based on the CWQG and benchmark calculator in Appendix B or Table 5 of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese (Dissolved) 2019 (CCME 2019).
- Total nickel CWQG: When the water hardness is 0 to ≤ 60 mg/L the CWQG is 0.025 mg/L, at hardness > 60 to ≤ 180 mg/L the CWQG is calculated as CWQG (µg/L) = $e^{\{0.76[\ln(hardness)]+1.06\}}$.
- Dissolved zinc CWQG-FAL: exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625). The value for DOC was set at 0.3 mg/L (i.e., the lowest and most conservative value to calculate the guideline).
- Ammonia MSOG: [(0.0577/1+$10^{7.688-pH}$)+(2.487/1+$10^{pH-7.688}$)]*a, where a=2.85 or a=1.45*$10^{0.028*(25-Temperature)}$, whichever is less and pH ≥6.5 and ≤9.0.
- Dissolved cadmium MSOG (µg/L): [$e^{\{0.7409[\ln(Hardness)-4.719\}}$]*[1.101672-{ln(Hardness)(0.041838}].
- Dissolved chromium MSOG (µg/L): [($e^{(0.819*(\ln(Hardness)) + 0.6848)}$)]*[0.86]
- Dissolved copper MSOG (µg/L): [$e^{\{0.8545[\ln(Hardness)]-1.702\}}$]*[0.960].
- Dissolved lead MSOG (µg/L): [$e^{\{1.273[\ln(Harness)-4.705\}}$]*[1.46203-{ln(Hardness)(0.145712)}].
- Dissolved nickel MSOG (µg/L): [$e^{\{0.8460[\ln(Hardness)]+0.0584\}}$]*[0.997].
- Dissolved zinc MSOG (µg/L): [$e^{\{0.8473\{\ln(Hardness)]+0.884\}}$]*[0.986].

Manitoba Tier II guidelines for dissolved metals are based on exceedance once in three years, but not more frequent, being acceptable during periods of infrequent and extreme low stream flows.

- CWQG for total phosphorus: Canadian Guidance Frameworks is used for total phosphorus (CCME 2014): ultra-oligotrophic <4 µg/L, oligotrophic 4-10 µg/L, mesotrophic 10-20 µg/L, meso-eutrophic 20-35 µg/L, eutrophic 35-100 µg/L, hyper-eutrophic >100 µg/L.
- Ammonia CWQG: pH and temperature-dependent guideline for total ammonia as N presented in Table 2 of the CWQG guidelines for the protection of aquatic life: Ammonia (CCME 2010). The values from Table 2 are multiplied by 0.8224 to convert them into total ammonia (as N).
- Ammonia MSOG-FAL: pH and temperature-dependent guideline, see Equation 1 values from Table 1 in MWS (2011).
- Nitrate and Nitrite Nitrogen: CWQG for nitrate is applied.
- Aluminum CWQG: 0.1 mg/L if pH>6.5, otherwise 0.005 mg/L.

Table E-2: Chemistry inputs to model cells

Source/Mixing cell (Station ID used for initial cell concentration*)	Description of local Subcatchment/Source Cell with Constant Concentration	Subcatchment/Cell ID in the water quality model	Water Quality Station ID Used for Source Cell Input
Keewatin River Upstream of Mine Discharge/QM02_CT (AQM4)	Burge Lake Outflow	QM01_CT	AQM4
	Keewatin watershed between Burge and Dot lakes	WS_QM2_CT	AQM4
	Payne Lake tributary	Kee3_Pay1_CT	AQM31
	Keewatin watershed south of Payne Lake tributary	Kee3_4_CT	AQM4
	Tributary West of waste rock pile	Kee3_C1_CT	AQM4
Keewatin River at Collection Pond and Open Pit Discharge/QM03_CT (AQM7)	Dot Lake Outflow	QM09_CT	AQM5
	Keewatin watershed south of Dot lake	WS_QM3_CT	AQM7
	Watershed on eastern bank of Keewatin downstream of the bridge	Kee3_1_3	AQM7
Keewatin River Upstream of the Confluence with Lynn River/QM06_CT (AQM8)	East Pond tributary	Kee3_B1_CT	AQM18
	Watershed on western bank of Keewatin upstream of PHWY391	WS_QM06_CT	AQM8
	Watershed between Keewatin and Minton lake	Kee3_A1_CT	AQM8
Keewatin River at Confluence with Lynn River/QM05_CT (AQM29)	Lynn River Inflow to Keewatin	WS_QM05_CT	AQM28
Minton Lake/Minton_Lake_CT (AQM16)	Tributary draining watershed North of Minton Lake	MIN5_CT	AQM16
	Minton Lake Watershed	MIN4_CT	AQM16
Cockeram River/QM10_CT (AQM10)	Combined Lobster and Huet Lake Watersheds	WS_QM10_CT	AQM10
Cockeram Lake/Cockeram_Lake_CT (AQM11)	Cockeram Lake Watershed minus QM10 watershed	WS_QM08_CT	AQM11
NA	Site runoff to the TMF	Overland_Runoff_TMF_CT	
NA	Site runoff to the collection pond	Overland_Runoff_CP_CT	AQM18
NA	Site runoff to the Open Pit	Overland_Runoff_OP_CT	
NA	Overburden Aquifer Inflow to the Open Pit	OP_Bedrock_Inflow_CT	Overburden
NA	Bedrock Aquifer Inflow to the Open Pit	OP_Overburden_Inflow_CT	Bedrock
NA	Overburden Aquifer Inflow to Minton Lake	Groundwater_CT	Overburden
NA	Bedrock Aquifer Inflow to Minton Lake	Groundwater_CT	Bedrock

Table E-3-1: Observed water quality - mean

Site/Season	Unit	AQM1 Fall	AQM1 Spring	AQM1 Summer	AQM1 Winter	AQM10 Fall	AQM10 Spring	AQM10 Summer	AQM10 Winter	AQM11 Fall	AQM11 Spring	AQM11 Summer	AQM11 Winter	AQM12 Spring	AQM13 Fall	AQM13 Spring	AQM13 Summer	AQM13 Winter	AQM14 Fall	AQM14 Spring	AQM14 Summer	AQM14 Winter	AQM15 Fall	AQM15 Spring	AQM15 Summer	AQM15 Winter	AQM16 Fall
Statistics		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Parameter																											
Acidity as $CaCO_3$	mg/L	2.3	1.9	1.8	4.7	4.4	4.6	5.1	10.6	2.4	3.1	1.8	4.9	1.4	3.6	3	4	14.3	3.5	9	2.1	14.3	2.9	2.9	2.4	7.5	3.2
Alkalinity, Total (as $CaCO_3$)	mg/L	8.3	7.1	8.1	11.3	17.7	13.1	20.8	30.5	9.9	9.1	10.1	11.8	8.6	10.5	9.4	10.5	25	8.1	13	7.8	23.7	18.1	16.2	18	29.9	12.9
Aluminum, Dissolved	mg/L	0.02	0.012	0.0077	0.0095	0.065	0.063	0.054	0.067	0.028	0.05	0.02	0.038	0.036	0.031	0.03	0.023	0.055	0.034	0.055	0.029	0.11	0.025	0.042	0.025	0.032	0.034
Aluminum, Total	mg/L	0.083	0.044	0.04	0.013	0.1	0.13	0.087	0.13	0.069	0.083	0.047	0.052	0.07	0.056	0.057	0.056	0.069	0.12	0.12	0.11	0.16	0.059	0.07	0.061	0.032	0.084
Ammonia (as N)	mg/L	0.005	0.005	0.005	0.038	0.0094	0.012	0.008	0.11	0.005	0.005	0.005	0.035	0.005	0.008	0.013	0.011	0.16	0.042	0.005	0.005	0.17	0.015	0.019	0.019	0.24	0.019
Antimony, Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.00008	0.000093	0.00008	0.000092	0.00008	0.000093	0.00008	0.000092	0.0001	0.00008	0.000093	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00008	0.000083	0.000075	0.000075	0.00008
Antimony, Total	mg/L	0.0001	0.0001	0.0001	0.00016	0.00008	0.000093	0.00008	0.000092	0.00008	0.000093	0.00008	0.000092	0.0001	0.00008	0.000093	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00008	0.000083	0.00008	0.000075	0.00008
Arsenic, Dissolved	mg/L	0.00012	0.000075	0.00012	0.00014	0.00029	0.00027	0.00041	0.00037	0.00018	0.00014	0.00019	0.00017	0.0001	0.0002	0.00013	0.00024	0.00027	0.00019	0.00019	0.00019	0.00035	0.0002	0.00019	0.00022	0.00026	0.00048
Arsenic, Total	mg/L	0.00012	0.00009	0.00012	0.00014	0.00035	0.00029	0.00043	0.00038	0.0002	0.00015	0.0002	0.00022	0.0001	0.00025	0.00015	0.00024	0.00027	0.00025	0.00024	0.00024	0.00035	0.00022	0.00022	0.00024	0.00029	0.00052
Barium, Dissolved	mg/L	0.005	0.0046	0.0048	0.008	0.0067	0.0069	0.008	0.012	0.005	0.0055	0.0056	0.0078	0.0052	0.0042	0.0043	0.0059	0.014	0.0015	0.0045	0.0015	0.012	0.0079	0.007	0.0068	0.016	0.005
Barium, Total	mg/L	0.006	0.0049	0.0052	0.0082	0.007	0.0078	0.0083	0.013	0.0055	0.0057	0.006	0.008	0.0054	0.0066	0.0058	0.0078	0.015	0.0084	0.0066	0.006	0.018	0.0083	0.0078	0.0079	0.016	0.0056
Beryllium, Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.00008	0.000093	0.00008	0.000092	0.00008	0.000093	0.00008	0.000092	0.0001	0.00008	0.000093	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00008	0.000083	0.00008	0.000075	0.00008
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.015	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron, Total	mg/L	0.005	0.005	0.005	0.016	0.005	0.005	0.005	0.012	0.005	0.005	0.005	0.0098	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.0000052	0.000005	0.0000038	0.0000045	0.0000044	0.000011	0.000007	0.0000081	0.0000085	0.000004	0.0000046	0.0000038	0.0000045	0.000005	0.000005	0.000005	0.000005	0.0000049	0.0000042	0.000004	0.0000038	0.000004
Cadmium, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.0000061	0.0000064	0.0000038	0.0000052	0.0000091	0.000012	0.000007	0.0000095	0.000012	0.000004	0.0000046	0.0000038	0.0000045	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.0000052	0.0000054	0.000004
Calcium, Dissolved	mg/L	2.2	1.8	2.3	2.9	5.5	4.8	6.3	9	4.5	3.8	4.2	3.9	3.4	4	3.1	4.2	7.8	2.9	4	2.9	7	5.6	5.7	5.6	8.7	5.1
Chloride	mg/L	0.25	0.25	0.25	0.25	0.25	0.25	0.58	0.56	0.55	0.45	0.48	0.61	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Chromium (Hexavalent)	mg/L	0.000093	0.00005	0.00005	0.00005	0.0002	0.00015	0.00021	0.00022	0.00005	0.000074	0.00005	0.00005	0.0005	0.00011	0.00007	0.0001	0.0002	0.00005	0.000077	0.00005	0.00023	0.000074	0.00005	0.00005	0.00012	0.00013
Chromium, Dissolved	mg/L	0.000093	0.00005	0.00005	0.00005	0.0002	0.00015	0.00022	0.00022	0.00005	0.000074	0.00005	0.00005	0.0005	0.00011	0.00007	0.0001	0.0002	0.00005	0.000077	0.00005	0.00023	0.000074	0.00005	0.00005	0.00012	0.00013
Chromium, Total	mg/L	0.00022	0.00022	0.0001	0.000094	0.00027	0.00035	0.00029	0.00034	0.00019	0.0018	0.0016	0.00011	0.0005	0.00016	0.00015	0.00024	0.00023	0.00024	0.00033	0.00021	0.00036	0.00013	0.0002	0.00016	0.00014	0.00022
Cobalt, Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.000098	0.000092	0.00014	0.00024	0.00011	0.00019	0.00008	0.00019	0.0001	0.00008	0.000093	0.00008	0.00026	0.0001	0.0001	0.0001	0.00024	0.00008	0.000083	0.00008	0.00011	0.00008
Cobalt, Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.00011	0.0001	0.00015	0.00028	0.00017	0.00038	0.00013	0.00021	0.00024	0.0001	0.00013	0.00012	0.0003	0.0001	0.0001	0.0001	0.00025	0.00008	0.000083	0.00008	0.00011	0.00008
Copper, Dissolved	mg/L	0.00028	0.00016	0.00022	0.00032	0.00068	0.00079	0.0011	0.00062	0.0028	0.0031	0.0025	0.0012	0.0032	0.00015	0.00013	0.00019	0.00018	0.00035	0.00037	0.00038	0.0001	0.00061	0.00057	0.00058	0.00068	0.00039
Copper, Total	mg/L	0.0004	0.00023	0.00042	0.00039	0.0007	0.0009	0.0013	0.00094	0.0033	0.0034	0.0031	0.0013	0.0036	0.00023	0.00023	0.00029	0.00026	0.00043	0.00048	0.00042	0.00055	0.00068	0.00064	0.0007	0.00068	0.00052
Cyanide (Free)	mg/L	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable	mg/L	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00062	0.0005	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.061	0.046	0.056	0.078	0.048	0.043	0.052	0.053	0.056	0.047	0.053	0.065		0.048	0.034	0.044	0.062	0.045	0.029	0.038	0.059	0.041	0.035	0.042	0.047	0.037
Hardness (as $CaCO_3$)	mg/L	7.5	6.7	8.5	10.9	19.6	16.7	21.8	31	15.6	13.6	14.5	14.1	11.7	13.3	10.3	13.8	25	10.4	12.8	10.4	23.8	18.8	18.6	19.2	28.8	16.8
Iron, Dissolved	mg/L	0.19	0.066	0.048	0.054	0.39	0.54	0.59	0.92	0.079	0.21	0.076	0.13	0.08	0.32	0.6	0.29	1.7	0.088	0.53	0.045	2	0.045	0.49	0.071	0.69	0.088
Iron, Total	mg/L	0.42	0.13	0.17	0.088	0.75	0.82	1	1.3	0.23	0.34	0.19	0.23	0.2	1	1.4	1.6	2.3	0.64	0.99	0.67	2.2	0.12	0.64	0.17	0.69	0.26
Lead, Dissolved	mg/L	0.000045	0.000045	0.000045	0.000045	0.000042	0.000048	0.000042	0.000041	0.000037	0.000042	0.000037	0.000041	0.000045	0.000037	0.000042	0.000037	0.000045	0.000045	0.000045	0.000045	0.000045	0.000037	0.000065	0.000037	0.000035	0.000035
Lead, Total	mg/L	0.000045	0.000045	0.000045	0.000045	0.00008	0.000066	0.00012	0.00011	0.000037	0.000042	0.000049	0.000041	0.000045	0.000084	0.000083	0.00018	0.000045	0.00018	0.00008	0.0002	0.00016	0.000042	0.0002	0.000054	0.000035	0.00009
Magnesium, Dissolved	mg/L	0.59	0.49	0.63	0.83	1.3	1.1	1.4	1.9	1.1	0.92	0.98	1	0.86	0.75	0.57	0.74	1.3	0.76	0.84	0.69	1.6	1.1	1.1	1.1	1.6	0.94
Manganese, Dissolved	mg/L	0.0041	0.0061	0.00061	0.0016	0.033	0.044	0.062	0.12	0.004	0.011	0.0062	0.013	0.0085	0.0096	0.0068	0.016	0.19	0.0077	0.017	0.0047	0.22	0.0033	0.025	0.0054	0.27	0.0057
Manganese, Total	mg/L	0.011	0.0098	0.012	0.0031	0.044	0.064	0.073	0.13	0.016	0.029	0.017	0.017	0.017	0.05	0.044	0.079	0.2	0.038	0.057	0.05	0.22	0.0079	0.044	0.023	0.27	0.018
Mercury, Dissolved	mg/L	0.0000012	7.3E-07	6.5E-07	4.3E-07	0.0000015	0.0000023	0.0000022	0.0000015	5.7E-07	0.0000011	0.000001	5.7E-07	0.00001	0.0000014	0.0000017	0.0000017	0.0000016	0.000002	0.0000025	0.0000012	0.0000015	0.0000015	0.0000017	0.0000014	0.0000011	0.0000019
Mercury, Total	mg/L	0.0000012	7.7E-07	7.8E-07	8.2E-07	0.0000018	0.0000026	0.0000022	0.000002	5.7E-07	0.0000015	0.0000011	7.8E-07	0.000055	0.0000016	0.000002	0.0000021	0.000002	0.0000026	0.0000036	0.0000023	0.0000022	0.0000016	0.0000025	0.0000017	0.0000011	0.0000019
Molybdenum, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.00016	0.00012	0.000053	0.000046	0.00004	0.00005	0.00005	0.00004	0.000046	0.00004	0.00005	0.00005	0.00009	0.00005	0.0001	0.000079	0.000089	0.00012	0.00015	0.000047
Molybdenum, Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00017	0.00012	0.000089	0.000099	0.000082	0.000095	0.00016	0.00007	0.000089	0.000085	0.000095	0.0001	0.0001	0.0001	0.0001	0.00011	0.0001	0.00012	0.00015	0.000082
Nickel, Dissolved	mg/L	0.0002	0.0002	0.0002	0.0002	0.00067	0.00038	0.001	0.00062	0.029	0.032	0.023	0.022	0.028	0.0002	0.00021	0.0002	0.00021	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00022	0.00022
Nickel, Total	mg/L	0.0002	0.00045	0.0002	0.0002	0.00078	0.00059	0.0013	0.00075	0.031	0.034	0.025	0.022	0.031	0.00021	0.00021	0.00022	0.00036	0.0002	0.00029	0.0002	0.00041	0.00021	0.0002	0.00021	0.00022	0.00044
Nitrate + Nitrite (as N)	mg/L	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.21	0.025	0.025	0.025	0.073	0.025	0.031	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.17	0.025
Nitrite, Field	mg/L	0.0033	0.0027	0.0005	0.0098	0.001	0.013	0.012	0.013	0.006	0.0005	0.005	0.0054	0.001	0.022	0.0093	0.0078	0.019	0.007	0.004	0.0057	0.012	0.021	0.021	0.009	0.022	0.016
pH, Field	ph Unit	7.2	6.9	7.1	6.5	6.7	6.6	6.7	6.5	6.9	6.9	7.2	6.4	7.2	6.8	6.6	6.7	6	6.8	6.6	6.9	5.8	6.9	6.8	7	6.1	6.6
Phosphorus, Total	mg/L	0.023	0.0092	0.016	0.016	0.024	0.03	0.03	0.039	0.016	0.013	0.015	0.015	0.014	0.037	0.025	0.042	0.028	0.072	0.027	0.065	0.069	0.027	0.018	0.024	0.02	0.027
Potassium, Dissolved	mg/L	0.54	0.48	0.56	0.82	0.59	0.69	0.41	1	0.62	0.63	0.64	0.74	0.61	0.4	0.5	0.47	0.62	0.46	0.53	0.43	0.92	0.7	0.69	0.73	0.98	0.49
Radium-226	Bq/L	0.005	0.005	0.005	0.005	0.0049	0.0057	0.0046	0.0046	0.0048	0.0048	0.005	0.0046	0.005	0.0048	0.0048	0.0066	0.0049	0.005	0.0051	0.005	0.005	0.0044	0.0058	0.0047	0.0044	0.0048
Selenium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00004	0.000045	0.000046	0.00005	0.00004	0.000045	0.00004	0.00005	0.00005	0.000046	0.000045	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.000051	0.000042	0.000046	0.000058	0.000048
Selenium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.000047	0.00005	0.00005	0.00005	0.00004	0.000045	0.000046	0.00005	0.00005	0.000053	0.000045	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.000052	0.000042	0.000046	0.000058	0.000057
Silicon, Dissolved	mg/L	2.3	1.7	2.4	3.4	2	1	1.3	2.2	1.6	1.7	1.5	3.4	1.3	1.7	0.99	0.91	3.9	0.91	0.64	0.67	1.7	0.51	0.5	0.39	0.9	0.63
Silicon, Total	mg/L	2.6	1.8	2.6	3.5	2.1	1.2	1.3	2.2	1.8	1.9	1.7	3.5	1.5	1.8	1	0.91	4.1	0.97	0.83	0.8	1.7	0.6	0.55	0.45	0.92	0.72
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1.1	0.8	1.1	1.6	1.3	1.1	1.2	2.3	1.3	1.1	1.1	1.5	1	0.99	0.71	0.89	1.6	0.96	0.92	0.9	1.6	1.1	0.91	1	1.4	0.84
Sodium, Total	mg/L	1.1	0.81	1.1	1.6	1.3	1.1	1.3	2.3	1.3	1.1	1.2	1.5	1	1.1	0.72	0.94	1.6	0.96	0.97	1	1.6	1.1	0.94	1.1	1.4	0.84
Strontium, Dissolved	mg/L	0.01	0.0093	0.011	0.016	0.014	0.013	0.018	0.022	0.015	0.013	0.015	0.017	0.012	0.011	0.008	0.012	0.02	0.0062	0.0097	0.007	0.017	0.014	0.013	0.013	0.022	0.011
Strontium, Total	mg/L	0.012	0.01	0.012	0.016	0.015	0.014	0.019	0.023	0.017	0.014	0.015	0.018	0.013	0.012	0.0091	0.013	0.021	0.0076	0.011	0.0086	0.018	0.014	0.013	0.015	0.022	0.011
Sulfate,	mg/L	1.1	0.78	1	1.8	0.52	0.52	0.38	0.92	6.4	3.8	3.9	3.4	3.2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.82	0.69	0.83	0.81	0.35
Temperature, Field	Deg. C	10.1	9	18	0.22	7.3	8.7	18.9	-0.05	9.3	11.1	18.8	0.2	16.8	8.6	9.3	17.9	0.38	9.7	12	18.3	0.2	8.7	10.3	19.1	0.2	8.4
Thallium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.000032	0.000044	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042	0.00005	0.000032	0.000044	0.000032	0.000042	0.00005	0.00005	0.00005	0.00005	0.000032	0.000035	0.000032	0.000028	0.000032
Thallium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.000032	0.000044	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042	0.00005	0.000032	0.000044	0.000032	0.000042	0.00005	0.00005	0.00005	0.00005	0.000032	0.000035	0.000032	0.000028	0.000032
Total Suspended Solids,	mg/L	7	1	1	1	3	4	1	3.8	3	1.4	2.4	1	2.5	12.8	7.3	10.2	5	29	5.3	33	30	3.6	2.8	2.5	1	6
Uranium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.000038	0.000046	0.00004	0.000046	0.000038	0.000046	0.000038	0.000045	0.00005	0.000032	0.000044	0.000033	0.000044	0.00005	0.00005	0.00005	0.00005	0.000037	0.000038	0.000038	0.000037	0.000037
Uranium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00004	0.000047	0.000043	0.000048	0.000041	0.000046	0.00004	0.000046	0.00005	0.000034	0.000044	0.000037	0.000044	0.00005	0.00005	0.00005	0.00005	0.000039	0.000039	0.000039	0.000038	0.000039
Vanadium, Total	mg/L	0.00027	0.0001	0.0001	0.0001	0.00028	0.00048	0.00031	0.00043	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.00025	0.0001	0.00051	0.00044	0.00055	0.00052	0.00018	0.00026	0.00021	0.00018	0.00028
Zinc, Dissolved	mg/L	0.0005	0.00092	0.0005	0.0018	0.0024	0.0019	0.0042	0.0023	0.0031	0.0062	0.0031	0.0085	0.004	0.0005	0.0017	0.0019	0.0027	0.0005	0.00062	0.0018	0.0027	0.00082	0.001	0.0005	0.0011	0.0012
Zinc, Total	mg/L	0.0012	0.00092	0.0013	0.0018	0.0027	0.002	0.0046	0.003	0.0041	0.0064	0.004	0.0088	0.011	0.0015	0.0029	0.002	0.0027	0.0017	0.0017	0.0037	0.0027	0.0016	0.001	0.0012	0.0014	0.0016

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-1: Observed water quality - mean

Site/Season	Unit	AQM16 Spring	AQM16 Summer	AQM16 Winter	AQM17 Fall	AQM17 Spring	AQM17 Summer	AQM17 Winter	AQM18 Fall	AQM18 Spring	AQM18 Summer	AQM18 Winter	AQM2 Fall	AQM2 Spring	AQM2 Summer	AQM2 Winter	AQM21 Fall	AQM21 Spring	AQM21 Summer	AQM21 Winter	AQM22 Fall	AQM22 Spring	AQM22 Summer	AQM22 Winter	AQM28 Fall	AQM28 Spring	AQM28 Summer
Statistics		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Parameter																											
Acidity as $CaCO_3$	mg/L	2.5	3.7	8	2.9	4.2	1.8	6.8	4.2	8.6	3.1	20.8	2.9	2.7	2	3.9	3.4	4.5	2.8	11.9	3.9	5.7	2.6	23.9	3	3.9	2.3
Alkalinity, Total (as $CaCO_3$)	mg/L	11.5	13.1	28.7	9.2	8.6	9.8	19.2	82.4	82.6	85.7	136	7.6	6.9	7.5	8.6	12.3	12.3	13.1	26.6	15.3	18	15.5	56	9	8.8	9.5
Aluminum, Dissolved	mg/L	0.036	0.038	0.05	0.1	0.11	0.072	0.066	0.0037	0.0062	0.0029	0.011	0.013	0.02	0.0074	0.0034	0.048	0.042	0.034	0.061	0.017	0.017	0.015	0.03	0.13	0.17	0.11
Aluminum, Total	mg/L	0.079	0.11	0.055	0.19	0.19	0.14	0.092	0.0063	0.0093	0.0086	0.015	0.021	0.041	0.016	0.0085	0.082	0.054	0.054	0.071	0.026	0.027	0.026	0.038	0.25	0.35	0.21
Ammonia (as N)	mg/L	0.005	0.0082	0.14	0.0098	0.011	0.0076	0.084	0.029	0.26	0.026	0.24	0.005	0.005	0.005	0.022	0.013	0.005	0.015	0.14	0.027	0.038	0.01	0.48	0.013	0.01	0.005
Antimony, Dissolved	mg/L	0.000092	0.00008	0.000092	0.00008	0.000092	0.00008	0.00009	0.00008	0.000093	0.00008	0.00009	0.0001	0.0001	0.0001	0.0001	0.00008	0.00009	0.000075	0.000092	0.0001	0.0001	0.0001	0.0001	0.00005	0.000088	0.00008
Antimony, Total	mg/L	0.000092	0.00008	0.000092	0.00008	0.000092	0.00008	0.00009	0.00008	0.000093	0.00011	0.00009	0.0001	0.0001	0.0001	0.0001	0.00008	0.00009	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00005	0.000088	0.00008
Arsenic, Dissolved	mg/L	0.00046	0.00053	0.00071	0.0002	0.00016	0.00021	0.00024	0.00081	0.00094	0.00098	0.0011	0.00009	0.000098	0.00011	0.00005	0.00034	0.00035	0.00043	0.0006	0.0002	0.00016	0.0002	0.00041	0.00019	0.0002	0.00022
Arsenic, Total	mg/L	0.00049	0.0006	0.00072	0.00025	0.00019	0.00023	0.00026	0.00081	0.00099	0.00098	0.0011	0.00009	0.00013	0.00011	0.00012	0.00039	0.0004	0.00047	0.0006	0.0002	0.00016	0.00021	0.00046	0.00027	0.00023	0.00022
Barium, Dissolved	mg/L	0.0045	0.0055	0.013	0.0084	0.0077	0.0075	0.011	0.043	0.048	0.048	0.07	0.0054	0.0055	0.0048	0.0061	0.0054	0.0042	0.0055	0.011	0.00099	0.0013	0.00053	0.0082	0.008	0.0078	0.0073
Barium, Total	mg/L	0.005	0.0065	0.013	0.0087	0.0082	0.008	0.011	0.044	0.05	0.048	0.071	0.0058	0.0058	0.0048	0.0064	0.0057	0.0046	0.0061	0.012	0.0012	0.0018	0.001	0.012	0.0084	0.008	0.0079
Beryllium, Total	mg/L	0.000092	0.00008	0.000092	0.00008	0.000093	0.00008	0.000092	0.00008	0.000093	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00008	0.00009	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00005	0.000088	0.00008
Boron, Dissolved	mg/L	0.005	0.005	0.0082	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.012	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron, Total	mg/L	0.005	0.005	0.014	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.014	0.005	0.005	0.005	0.008	0.005	0.005	0.005	0.0092	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.0000046	0.0000044	0.0000052	0.000033	0.000033	0.000022	0.000011	0.000004	0.0000046	0.000004	0.0000045	0.000005	0.000005	0.000005	0.000005	0.0000038	0.0000045	0.000004	0.0000045	0.000005	0.000005	0.000005	0.000005	0.000025	0.000049	0.000026
Cadmium, Total	mg/L	0.0000046	0.0000044	0.0000053	0.000039	0.000038	0.000025	0.000014	0.000004	0.0000046	0.000004	0.0000045	0.000005	0.000005	0.000005	0.000005	0.0000038	0.0000045	0.0000044	0.0000045	0.0000093	0.000005	0.000005	0.000005	0.000029	0.000054	0.000032
Calcium, Dissolved	mg/L	4.8	5.1	9.2	6.6	5.7	5.5	6.7	86.3	77.2	82.5	112	2	2	2.1	2.2	4.6	4.6	4.9	8.5	5	5.5	5.2	16.3	9.2	6.7	6.4
Chloride	mg/L	0.25	0.25	0.25	1.2	1.1	0.99	1.5	5.7	4.7	5.6	7.1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.2	1.1	1.1
Chromium (Hexavalent)	mg/L	0.000088	0.000098	0.00016	0.000088	0.00012	0.0001	0.00018	0.00005	0.00005	0.00005	0.00009	0.00005	0.000073	0.00005	0.00009	0.00012	0.00005	0.000086	0.00017	0.00005	0.00005	0.00005	0.0001	0.00016	0.00011	0.00012
Chromium, Dissolved	mg/L	0.000088	0.000098	0.00016	0.000088	0.00012	0.0001	0.00018	0.00005	0.00005	0.00005	0.00009	0.00005	0.000073	0.00005	0.00009	0.00012	0.00005	0.000086	0.00017	0.00005	0.00005	0.00005	0.0001	0.00016	0.00011	0.00012
Chromium, Total	mg/L	0.00022	0.00024	0.00022	0.00022	0.00018	0.00019	0.00024	0.00005	0.00011	0.00005	0.00014	0.00005	0.000097	0.00005	0.00009	0.0002	0.00014	0.00019	0.00021	0.00005	0.00005	0.00005	0.00022	0.00031	0.00033	0.00026
Cobalt, Dissolved	mg/L	0.000092	0.00008	0.000092	0.0016	0.0012	0.00016	0.00048	0.00008	0.000093	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00008	0.00009	0.00008	0.00017	0.0001	0.0001	0.0001	0.0001	0.0012	0.0045	0.001
Cobalt, Total	mg/L	0.000092	0.000096	0.000092	0.0018	0.0017	0.00064	0.00052	0.00008	0.000093	0.00008	0.000092	0.0001	0.0001	0.0001	0.0001	0.00008	0.00009	0.000092	0.00018	0.0001	0.0001	0.0001	0.00015	0.0016	0.005	0.0014
Copper, Dissolved	mg/L	0.00044	0.00051	0.0006	0.0038	0.0037	0.0032	0.0022	0.0001	0.0002	0.00018	0.00034	0.00018	0.00018	0.00019	0.00026	0.00035	0.00035	0.00039	0.00053	0.0001	0.0001	0.0001	0.0001	0.0059	0.017	0.0055
Copper, Total	mg/L	0.00044	0.00051	0.00096	0.0044	0.0042	0.0041	0.0024	0.00025	0.00027	0.00024	0.00034	0.00028	0.00023	0.00023	0.00034	0.00047	0.00036	0.00042	0.0006	0.0001	0.0001	0.00029	0.0003	0.0076	0.02	0.0068
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00058	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00058	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.00072	0.0005	0.0005	0.00058	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0018	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.025	0.037	0.051	0.062	0.048	0.054	0.061	0.042	0.029	0.039	0.044	0.06	0.053	0.056	0.062	0.036	0.026	0.037	0.044	0.051	0.038	0.046	0.099	0.062	0.05	0.058
Hardness (as $CaCO_3$)	mg/L	15.4	17	29.6	26.8	19.7	19.3	21.7	259	237	255	336	7.4	7.4	7.7	8.1	15.4	14.9	16.2	27.5	17.3	17.9	18.1	53.4	30.4	23.5	22.6
Iron, Dissolved	mg/L	0.39	0.16	0.45	0.33	0.43	0.27	0.7	0.037	0.16	0.053	0.22	0.16	0.32	0.13	0.042	0.11	0.4	0.12	0.56	0.066	0.29	0.043	2.1	0.43	0.35	0.31
Iron, Total	mg/L	0.55	0.37	0.5	0.62	0.81	0.58	0.94	0.061	0.23	0.11	0.26	0.26	0.54	0.23	0.077	0.2	0.6	0.24	0.73	0.16	0.56	0.17	2.2	0.78	0.73	0.56
Lead, Dissolved	mg/L	0.000096	0.000046	0.000042	0.00005	0.000045	0.000046	0.000045	0.000037	0.000042	0.000037	0.000042	0.000045	0.000045	0.000045	0.000045	0.000037	0.00004	0.000037	0.000041	0.000045	0.000045	0.000045	0.000045	0.00004	0.00004	0.000037
Lead, Total	mg/L	0.00012	0.00012	0.000053	0.000078	0.000082	0.000061	0.000045	0.000037	0.000084	0.000042	0.000042	0.000045	0.000045	0.000045	0.000045	0.000081	0.00008	0.000082	0.000058	0.000045	0.000045	0.000045	0.00021	0.000075	0.000045	0.00014
Magnesium, Dissolved	mg/L	0.78	0.89	1.6	1.6	1.3	1.2	1.3	10.4	8.9	9.9	13.6	0.54	0.56	0.56	0.62	0.88	0.8	0.89	1.5	1.1	1	1.1	2.9	1.8	1.6	1.5
Manganese, Dissolved	mg/L	0.0028	0.0047	0.11	0.043	0.068	0.01	0.043	0.044	0.45	0.15	0.9	0.0042	0.013	0.005	0.0022	0.0035	0.01	0.0023	0.14	0.0054	0.025	0.0041	0.54	0.035	0.084	0.035
Manganese, Total	mg/L	0.021	0.03	0.11	0.052	0.088	0.032	0.047	0.076	0.54	0.19	0.95	0.0078	0.017	0.01	0.0041	0.013	0.021	0.029	0.15	0.016	0.042	0.028	0.57	0.051	0.099	0.05
Mercury, Dissolved	mg/L	0.000002	0.000002	0.0000016	8.8E-07	0.0000014	0.0000012	0.0000012	8.7E-07	0.0000014	0.0000012	0.0000012	4.2E-07	9.6E-07	0.0000005	2.5E-07	0.000002	0.0000021	0.0000017	0.0000016	0.0000012	0.0000012	0.0000014	0.0000014	0.0000008	0.0000015	0.0000013
Mercury, Total	mg/L	0.0000025	0.0000023	0.0000018	8.8E-07	0.0000018	0.0000015	0.0000014	0.0000011	0.0000021	0.0000014	0.0000024	4.2E-07	0.0000014	0.0000005	4.2E-07	0.000002	0.0000024	0.000002	0.0000018	0.0000013	0.0000022	0.0000017	0.0000016	0.000001	0.0000022	0.0000015
Molybdenum, Dissolved	mg/L	0.000046	0.000053	0.00005	0.000058	0.000053	0.000047	0.000058	0.000045	0.00005	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000045	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.000066	0.00005	0.000048
Molybdenum, Total	mg/L	0.000088	0.000091	0.000099	0.0001	0.000095	0.000089	0.0001	0.000076	0.000098	0.00007	0.0001	0.0001	0.0001	0.0001	0.0001	0.000084	0.000085	0.000088	0.000095	0.0001	0.0001	0.0001	0.0001	0.000088	0.000089	0.000087
Nickel, Dissolved	mg/L	0.00021	0.0002	0.00038	0.12	0.084	0.072	0.018	0.00041	0.00058	0.00053	0.00054	0.0002	0.0002	0.0002	0.0002	0.00022	0.0002	0.0002	0.00039	0.0002	0.0002	0.0002	0.0002	0.12	0.18	0.11
Nickel, Total	mg/L	0.00021	0.00041	0.00054	0.13	0.088	0.081	0.019	0.00043	0.00059	0.00065	0.00074	0.0002	0.00058	0.0002	0.0002	0.00041	0.0002	0.00021	0.00051	0.0002	0.0002	0.0002	0.0002	0.12	0.18	0.11
Nitrate + Nitrite (as N)	mg/L	0.025	0.025	0.044	0.025	0.025	0.025	0.098	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.032	0.025	0.025	0.12	0.025	0.025	0.025	0.025	0.025	0.041	0.025
Nitrite, Field	mg/L	0.0097	0.0075	0.028	0.0096	0.013	0.017	0.0072	0.007	0.008	0.007	0.016	0.002	0.0045	0.011	0.0088	0.019	0.017	0.0072	0.0067	0	0.006	0.002	0.013	0.012	0.017	0.013
pH, Field	ph Unit	6.7	6.8	6.3	7	6.6	6.9	7.2	7.1	7.3	7.2	6.7	7	7	7.1	6.9	6.6	6.3	6.9	6.1	6.8	6.6	6.4	6.4	6.9	6.6	7
Phosphorus, Total	mg/L	0.026	0.028	0.021	0.012	0.015	0.013	0.022	0.012	0.026	0.021	0.022	0.005	0.016	0.01	0.017	0.033	0.03	0.032	0.024	0.014	0.024	0.017	0.027	0.016	0.014	0.016
Potassium, Dissolved	mg/L	0.57	0.56	0.88	0.78	0.79	0.72	0.97	5	4.6	5.6	7	0.52	0.56	0.54	0.62	0.52	0.55	0.56	0.8	0.5	0.55	0.49	1.4	0.86	0.82	0.77
Radium-226	Bq/L	0.005	0.0047	0.0049	0.005	0.005	0.0044	0.0046	0.0048	0.0088	0.0063	0.0081	0.005	0.005	0.005	0.005	0.005	0.0049	0.0046	0.0047	0.005	0.005	0.005	0.0044	0.0042	0.005	0.0044
Selenium, Dissolved	mg/L	0.000045	0.000046	0.00005	0.00005	0.000046	0.000045	0.000046	0.00004	0.000045	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.00004	0.000045	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.000025	0.000044	0.000046
Selenium, Total	mg/L	0.000045	0.000046	0.00005	0.000054	0.000046	0.000045	0.00005	0.00004	0.000045	0.00004	0.00005	0.00005	0.00005	0.00005	0.00005	0.000048	0.000045	0.000045	0.00005	0.00005	0.00005	0.00005	0.00005	0.000053	0.000044	0.000047
Silicon, Dissolved	mg/L	0.56	0.54	1.1	2.1	2.4	2.1	4.3	4.5	4.6	4.8	6.4	2.4	2.4	2.4	2.6	0.59	0.6	0.44	1.5	0.47	0.39	0.46	1.5	2.2	2.5	1.9
Silicon, Total	mg/L	0.71	0.69	1.1	2.2	2.5	2.2	4.5	4.7	4.6	4.9	6.7	2.5	2.5	2.6	2.7	0.68	0.7	0.51	1.6	0.5	0.39	0.48	1.6	2.3	2.7	2
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	0.66	0.76	1.3	1.7	1.4	1.4	2	6.9	5.5	6.7	8.5	1	1	1	1.2	0.8	0.66	0.72	1.2	1	0.92	0.94	2.4	1.8	1.5	1.5
Sodium, Total	mg/L	0.66	0.84	1.3	1.7	1.4	1.5	2.1	7	5.8	6.9	8.9	1	1	1.1	1.2	0.85	0.68	0.78	1.3	1	0.93	1	2.4	1.8	1.5	1.5
Strontium, Dissolved	mg/L	0.0094	0.011	0.02	0.021	0.018	0.017	0.022	0.13	0.12	0.14	0.18	0.011	0.01	0.011	0.012	0.01	0.0097	0.01	0.018	0.0024	0.0029	0.0022	0.0084	0.024	0.02	0.02
Strontium, Total	mg/L	0.0099	0.012	0.02	0.024	0.019	0.018	0.024	0.14	0.12	0.15	0.18	0.012	0.012	0.012	0.013	0.011	0.01	0.012	0.019	0.0025	0.0029	0.0026	0.011	0.026	0.021	0.021
Sulfate,	mg/L	0.32	0.43	0.54	18.1	10.4	9.1	4.6	183	147	179	214	1.1	1	1	1.4	0.44	0.15	0.41	0.46	0.15	0.15	0.15	0.15	20.6	14.4	13
Temperature, Field	Deg. C	10.6	18.9	0.35	10.3	10.9	19.3	0.52	8.9	12.1	19.6	0.18	9.3	9.5	18.2	0	8.8	10.3	17.3	0.72	9.5	12.6	19.2	0.32	8	7.3	19.2
Thallium, Dissolved	mg/L	0.000042	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042	0.00005	0.00005	0.00005	0.00005	0.000032	0.000041	0.000032	0.000042	0.00005	0.00005	0.00005	0.00005	0.000005	0.000039	0.000032
Thallium, Total	mg/L	0.000042	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042	0.00005	0.00005	0.00005	0.00005	0.000032	0.000041	0.000032	0.000042	0.00005	0.00005	0.00005	0.00005	0.000005	0.000039	0.000032
Total Suspended Solids,	mg/L	5.2	6.5	1	2.6	3.3	1	1	1	13.8	5.4	1	1	5.6	1	1	4.1	4.9	3.7	1	4	5.1	4.6	7.2	2.3	5.8	2
Uranium, Dissolved	mg/L	0.000044	0.000038	0.000047	0.000039	0.000045	0.000038	0.000045	0.000033	0.000045	0.000035	0.000044	0.00005	0.00005	0.00005	0.00005	0.000037	0.000043	0.000036	0.000046	0.00005	0.00005	0.00005	0.00005	0.000032	0.000043	0.000038
Uranium, Total	mg/L	0.000045	0.00004	0.000047	0.000043	0.000046	0.00004	0.000046	0.000033	0.000046	0.000035	0.000044	0.00005	0.00005	0.00005	0.00005	0.000038	0.000043	0.000038	0.000046	0.00005	0.00005	0.00005	0.00005	0.000037	0.000046	0.000042
Vanadium, Total	mg/L	0.00031	0.00038	0.00016	0.00018	0.00017	0.0002	0.0001	0.0001	0.00014	0.00025	0.0001	0.0001	0.00021	0.0001	0.0001	0.00022	0.00028	0.00022	0.00018	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001
Zinc, Dissolved	mg/L	0.0012	0.003	0.002	0.025	0.038	0.018	0.0073	0.00088	0.00095	0.00065	0.0011	0.0005	0.00095	0.0005	0.00092	0.00068	0.00096	0.001	0.0023	0.0005	0.0005	0.0005	0.0023	0.022	0.032	0.019
Zinc, Total	mg/L	0.0012	0.0036	0.002	0.027	0.039	0.022	0.0083	0.0011	0.0014	0.0015	0.0015	0.0005	0.00095	0.0005	0.00092	0.0014	0.0011	0.0042	0.0025	0.0011	0.0005	0.0031	0.0023	0.024	0.032	0.019

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-1: Observed water quality - mean

Site/Season	Unit	AQM28 Winter	AQM29 Fall	AQM29 Spring	AQM29 Summer	AQM29 Winter	AQM29B Fall	AQM29B Spring	AQM29B Summer	AQM29B Winter	AQM3 Fall	AQM3 Spring	AQM3 Summer	AQM3 Winter	AQM30 Fall	AQM30 Spring	AQM30 Summer	AQM30 Winter	AQM31 Fall	AQM31 Spring	AQM31 Summer	AQM31 Winter	AQM4 Fall	AQM4 Spring	AQM4 Summer	AQM4 Winter	AQM5 Fall
Statistics		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Parameter																											
Acidity as $CaCO_3$	mg/L	7.1	2.6	2.7	1.6	5.2	2.6	2.3	1	4.4	2.6	2.3	1.8	4.4	2.8	2.7	1.6	4.6	3.3	3.3	3	19.1	2.9	2.3	2.3	3.9	2.9
Alkalinity, Total (as $CaCO_3$)	mg/L	15.4	8.3	7.6	8.5	10.9	8.6	7.5	8.8	10.2	8.3	7.5	8.3	9.9	9.5	7.1	9.1	11.6	6.2	5.2	5.4	20.8	8.3	7.8	8.2	10	11.1
Aluminum, Dissolved	mg/L	0.13	0.013	0.02	0.013	0.013	0.019	0.034	0.014	0.016	0.005	0.0069	0.0039	0.0076	0.041	0.054	0.03	0.031	0.03	0.023	0.03	0.061	0.0092	0.013	0.0063	0.0081	0.041
Aluminum, Total	mg/L	0.2	0.034	0.073	0.047	0.024	0.041	0.092	0.043	0.028	0.036	0.019	0.02	0.012	0.087	0.086	0.058	0.047	0.046	0.035	0.074	0.073	0.028	0.035	0.032	0.013	0.077
Ammonia (as N)	mg/L	0.064	0.005	0.012	0.016	0.033	0.013	0.015	0.015	0.034	0.005	0.005	0.011	0.034	0.005	0.005	0.005	0.033	0.005	0.005	0.017	0.23	0.005	0.005	0.013	0.024	0.005
Antimony, Dissolved	mg/L	0.000092	0.00005	0.00009	0.000075	0.000092	0.00005	0.00005	0.00005	0.00005	0.00008	0.000092	0.00008	0.00009	0.00005	0.00009	0.000075	0.000092	0.00005	0.000083	0.000075	0.000088	0.00008	0.000093	0.00007	0.0001	0.00008
Antimony, Total	mg/L	0.000092	0.00005	0.00009	0.000075	0.000092	0.00005	0.00005	0.00005	0.00005	0.00008	0.000092	0.00008	0.00009	0.00005	0.00009	0.000075	0.000092	0.00005	0.000083	0.000075	0.000088	0.00008	0.000093	0.00007	0.0001	0.00008
Arsenic, Dissolved	mg/L	0.00022	0.00015	0.00013	0.00015	0.00014	0.00016	0.00012	0.00017	0.00016	0.00014	0.00008	0.00013	0.00016	0.00018	0.00014	0.00017	0.00016	0.00019	0.00012	0.00018	0.00031	0.00014	0.00012	0.00014	0.00014	0.00026
Arsenic, Total	mg/L	0.00024	0.00017	0.00016	0.00018	0.00015	0.00019	0.00018	0.00021	0.00019	0.00017	0.00013	0.00015	0.00016	0.00021	0.00015	0.0002	0.00017	0.00023	0.00017	0.00021	0.00032	0.00018	0.00012	0.00016	0.00014	0.00028
Barium, Dissolved	mg/L	0.01	0.0045	0.0055	0.0047	0.0072	0.0045	0.0052	0.0054	0.0071	0.0044	0.0047	0.0047	0.0067	0.0058	0.0049	0.005	0.0074	0.0059	0.0036	0.0054	0.017	0.005	0.0051	0.0047	0.0066	0.0055
Barium, Total	mg/L	0.01	0.0051	0.0061	0.0055	0.0073	0.0049	0.0061	0.0061	0.0073	0.0056	0.0048	0.005	0.0069	0.0063	0.0052	0.0057	0.0077	0.0062	0.004	0.0065	0.017	0.0056	0.0054	0.0055	0.01	0.0063
Beryllium, Total	mg/L	0.000092	0.00005	0.00009	0.000075	0.000092	0.00005	0.00005	0.00005	0.00005	0.00008	0.000092	0.00008	0.000092	0.00005	0.00009	0.000075	0.000092	0.00005	0.000083	0.000075	0.000088	0.00008	0.000093	0.000075	0.0001	0.00008
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0062	0.005	0.005	0.005	0.0073	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron, Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.012	0.005	0.005	0.005	0.0082	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.22	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.000031	0.0000025	0.0000045	0.0000038	0.0000046	0.0000025	0.000006	0.0000025	0.0000025	0.000004	0.0000046	0.000004	0.0000045	0.0000067	0.0000099	0.0000045	0.0000051	0.0000025	0.0000042	0.0000038	0.0000044	0.0000045	0.0000046	0.0000038	0.000005	0.000004
Cadmium, Total	mg/L	0.000032	0.0000025	0.0000045	0.0000066	0.000005	0.0000049	0.0000089	0.0000019	0.0000025	0.000004	0.0000046	0.0000044	0.0000045	0.0000089	0.00001	0.0000067	0.0000076	0.0000025	0.0000042	0.0000095	0.0000044	0.000005	0.0000046	0.0000038	0.000005	0.0000045
Calcium, Dissolved	mg/L	7.7	2.5	2.7	2.5	3.2	2.9	2.8	3	3.4	2.2	2	2.3	2.7	4.6	3.2	3.7	3.7	2.9	2.4	2.6	6.8	2.4	2.3	2.3	2.7	4.2
Chloride	mg/L	1.5	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.61	0.45	0.51	0.58	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.96
Chromium (Hexavalent)	mg/L	0.00014	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.000093	0.00011	0.00024	0.00005	0.00005	0.00005	0.00005	0.0001
Chromium, Dissolved	mg/L	0.00015	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.000093	0.00011	0.00024	0.00005	0.00005	0.00005	0.00005	0.0001
Chromium, Total	mg/L	0.00032	0.000093	0.00016	0.00012	0.00011	0.000095	0.00019	0.00023	0.00005	0.00011	0.00007	0.00015	0.000095	0.00021	0.00012	0.00012	0.00014	0.00018	0.00016	0.0003	0.00029	0.00011	0.000062	0.000087	0.00005	0.00015
Cobalt, Dissolved	mg/L	0.0015	0.00005	0.000088	0.000075	0.00009	0.0001	0.00029	0.00005	0.00005	0.00008	0.000092	0.00008	0.000092	0.00017	0.00031	0.000075	0.00019	0.00005	0.000083	0.000075	0.00045	0.00008	0.000093	0.000075	0.0001	0.00008
Cobalt, Total	mg/L	0.0016	0.00005	0.00013	0.000075	0.0001	0.00012	0.00042	0.00015	0.00011	0.00008	0.000092	0.00008	0.000092	0.00033	0.00056	0.0002	0.00021	0.00005	0.000083	0.000075	0.00049	0.00008	0.000093	0.000075	0.0001	0.00008
Copper, Dissolved	mg/L	0.0042	0.00043	0.00066	0.00059	0.0005	0.00068	0.0017	0.00091	0.00025	0.00032	0.00017	0.00033	0.00031	0.0024	0.0031	0.0022	0.00099	0.0001	0.00025	0.00034	0.00019	0.00042	0.00036	0.00028	0.00033	0.00051
Copper, Total	mg/L	0.0045	0.00047	0.0009	0.00072	0.00058	0.00084	0.0017	0.00093	0.00025	0.00033	0.00021	0.00033	0.0004	0.0029	0.0035	0.0029	0.0011	0.00029	0.00025	0.00058	0.00027	0.00046	0.00037	0.00028	0.0005	0.00059
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.059	0.053	0.05	0.056	0.065	0.055	0.049	0.056	0.059	0.066	0.048	0.054	0.065	0.057	0.044	0.055	0.063	0.033	0.02	0.029	0.042	0.057	0.052	0.055	0.064	0.075
Hardness (as $CaCO_3$)	mg/L	26.7	9.1	9.7	9.4	11.8	10.4	10	10.6	12.3	8.1	7.4	8.7	10	15.6	11.5	13.1	13.5	9.6	7.6	8.6	20.6	8.9	8.4	8.6	10.3	14.7
Iron, Dissolved	mg/L	0.52	0.077	0.13	0.094	0.12	0.096	0.17	0.086	0.16	0.029	0.054	0.027	0.027	0.13	0.2	0.077	0.14	0.38	0.5	0.28	4.3	0.057	0.1	0.047	0.059	0.045
Iron, Total	mg/L	0.84	0.24	0.32	0.26	0.22	0.25	0.38	0.24	0.3	0.29	0.14	0.14	0.051	0.33	0.35	0.2	0.26	0.73	1	0.8	5.2	0.18	0.21	0.19	0.11	0.21
Lead, Dissolved	mg/L	0.000045	0.000025	0.000041	0.000042	0.000042	0.000025	0.000025	0.000025	0.000025	0.000037	0.000041	0.000037	0.000041	0.000025	0.00004	0.000035	0.000042	0.000025	0.000038	0.000035	0.000045	0.000037	0.000042	0.000035	0.000045	0.000037
Lead, Total	mg/L	0.000045	0.000025	0.000041	0.000044	0.000042	0.000025	0.000025	0.00028	0.000025	0.000037	0.000042	0.00004	0.000041	0.000025	0.00004	0.000042	0.000042	0.00011	0.000045	0.00013	0.000045	0.000037	0.000042	0.000037	0.000045	0.000037
Magnesium, Dissolved	mg/L	1.6	0.71	0.7	0.7	0.86	0.75	0.74	0.75	0.92	0.62	0.57	0.65	0.78	1	0.8	0.96	0.96	0.54	0.4	0.46	1	0.67	0.62	0.66	0.79	0.9
Manganese, Dissolved	mg/L	0.057	0.0045	0.01	0.0094	0.011	0.0042	0.017	0.0078	0.011	0.0012	0.0041	0.0013	0.0016	0.0069	0.023	0.002	0.013	0.0035	0.0043	0.0049	0.21	0.0028	0.0055	0.0028	0.011	0.0016
Manganese, Total	mg/L	0.065	0.019	0.025	0.029	0.015	0.017	0.028	0.036	0.015	0.022	0.01	0.019	0.004	0.022	0.035	0.015	0.016	0.012	0.015	0.024	0.22	0.019	0.015	0.023	0.014	0.029
Mercury, Dissolved	mg/L	8.1E-07	6.3E-07	9.8E-07	0.0000008	6.5E-07	0.0000006	0.0000011	0.000001	0.0000006	5.8E-07	7.8E-07	6.5E-07	0.0000005	0.0000006	0.0000012	8.2E-07	5.6E-07	0.0000012	0.0000017	0.0000016	0.0000014	6.1E-07	9.9E-07	8.2E-07	0.0000006	0.0000012
Mercury, Total	mg/L	0.0000012	0.0000007	0.0000015	0.000001	8.5E-07	0.0000007	0.0000013	0.000001	0.0000006	5.8E-07	0.0000008	0.0000007	0.0000006	0.0000008	0.0000017	0.0000014	7.5E-07	0.0000012	0.000002	0.000002	0.000002	7.4E-07	9.9E-07	0.000001	6.9E-07	0.0000012
Molybdenum, Dissolved	mg/L	0.00005	0.000056	0.00005	0.000025	0.000046	0.000041	0.000025	0.000052	0.00005	0.000047	0.000046	0.00004	0.00005	0.000055	0.00005	0.000038	0.000046	0.000025	0.000042	0.000025	0.000072	0.000052	0.000046	0.000042	0.00005	0.000047
Molybdenum, Total	mg/L	0.0001	0.000064	0.000085	0.000025	0.000094	0.000061	0.000025	0.000085	0.00005	0.000082	0.000088	0.000079	0.000088	0.000076	0.000092	0.00007	0.000096	0.000025	0.000075	0.000025	0.000081	0.000086	0.000089	0.000072	0.0001	0.000083
Nickel, Dissolved	mg/L	0.093	0.0019	0.0035	0.0036	0.0059	0.0071	0.015	0.0066	0.0059	0.0002	0.00021	0.0002	0.0002	0.028	0.032	0.026	0.016	0.00023	0.0002	0.0002	0.00033	0.00021	0.0002	0.0002	0.0002	0.00068
Nickel, Total	mg/L	0.096	0.0021	0.0038	0.0041	0.006	0.0078	0.017	0.0076	0.0063	0.0005	0.00021	0.00021	0.0002	0.031	0.034	0.029	0.016	0.00036	0.0002	0.0002	0.00042	0.00021	0.00021	0.00022	0.0002	0.00073
Nitrate + Nitrite (as N)	mg/L	0.088	0.025	0.025	0.025	0.087	0.038	0.05	0.05	0.087	0.025	0.025	0.025	0.069	0.025	0.025	0.025	0.078	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.087	0.025
Nitrite, Field	mg/L	0.0044	0.0097	0.0046	0.006	0.0054	0.028	0.004	0.014	0.013	0.0012	0.0073	0.0082	0.012	0.0097	0	0.0015	0.012	0.014	0.022	0.013	0.017	0.011	0.0065	0.013	0.015	0.008
pH, Field	ph Unit	6.5	7	6.7	7	6.8	6.8	7.1	6.6	7	6.9	6.7	7	6.3	6.9	6.7	7.1	6.5	6.4	6.6	6.4	5.8	7.1	6.7	6.7	6.2	7.1
Phosphorus, Total	mg/L	0.019	0.018	0.017	0.021	0.014	0.019	0.01	0.01	0.017	0.017	0.011	0.014	0.019	0.017	0.012	0.011	0.014	0.017	0.02	0.021	0.028	0.016	0.013	0.02	0.022	0.019
Potassium, Dissolved	mg/L	0.93	0.56	0.57	0.55	0.68	0.57	0.57	0.56	0.7	0.52	0.47	0.55	0.67	0.62	0.55	0.61	0.71	0.38	0.38	0.37	0.6	0.56	0.52	0.56	0.65	0.57
Radium-226	Bq/L	0.0046	0.0046	0.005	0.004	0.005	0.0038			0.003	0.0044	0.0046	0.0047	0.0046	0.0049	0.0047	0.005	0.0047	0.0044	0.0052	0.0044	0.0055	0.0073	0.0047	0.0045	0.005	0.0047
Selenium, Dissolved	mg/L	0.00005	0.000025	0.000045	0.000038	0.00005	0.000025	0.000025	0.000025	0.000025	0.00004	0.000045	0.000045	0.000046	0.000025	0.000045	0.000038	0.000046	0.000025	0.000042	0.000045	0.00005	0.000047	0.000045	0.000038	0.00005	0.000048
Selenium, Total	mg/L	0.00005	0.000025	0.000045	0.000038	0.00005	0.000025	0.000025	0.00007	0.000062	0.00004	0.000045	0.000046	0.000046	0.000025	0.000045	0.000047	0.000046	0.000042	0.000042	0.000045	0.00005	0.000055	0.000045	0.000038	0.00005	0.000048
Silicon, Dissolved	mg/L	3.9	2.4	2.1	2.1	3.2	2.2	1.9	2	3	2.2	1.9	2.3	3	2.1	1.6	1.7	3.3	1.1	0.76	0.56	4.3	2.4	1.8	2.2	3.1	0.9
Silicon, Total	mg/L	4.1	2.5	2.2	2.2	3.3	2.4	2.1	2.1	3.1	2.5	2	2.3	3.1	2.3	1.7	1.8	3.4	1.1	0.8	0.65	4.6	2.4	2	2.4	3.1	0.92
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1.9	1	1	1.1	1.3	1.1	1	1	1.4	1	0.88	0.98	1.3	1.3	0.93	1.2	1.4	0.65	0.47	0.56	1.1	1.1	0.96	1	1.2	1.1
Sodium, Total	mg/L	2	1.1	1.1	1.1	1.4	1.2	1.1	1.2	1.4	1	0.9	1	1.3	1.4	1.1	1.2	1.4	0.67	0.62	0.59	1.2	1.1	0.99	1.1	1.3	1.2
Strontium, Dissolved	mg/L	0.024	0.011	0.012	0.012	0.015	0.012	0.012	0.014	0.016	0.011	0.0099	0.012	0.014	0.016	0.011	0.014	0.016	0.0083	0.0061	0.0075	0.019	0.012	0.011	0.011	0.014	0.013
Strontium, Total	mg/L	0.025	0.013	0.013	0.013	0.016	0.013	0.012	0.015	0.016	0.012	0.011	0.012	0.015	0.016	0.012	0.015	0.017	0.0087	0.0067	0.0087	0.02	0.012	0.011	0.013	0.015	0.015
Sulfate,	mg/L	11.1	1.4	1.6	1.3	1.7	2.7	2.4	1.7	1.6	0.88	0.94	0.93	1.3	6.6	3.7	4.2	2.8	0.15	0.15	0.15	0.24	1	0.96	0.92	1.5	0.9
Temperature, Field	Deg. C	-0.1	7.7	10.2	19.6	-0.1	6.8	10	19.7	-0.1	8.7	4.2	18.6	0.37	8.4	9.8	19.2	0	7.3	12.8	18.7	0.3	8.7	11.3	19.2	0.1	9.3
Thallium, Dissolved	mg/L	0.000042	0.000005	0.000041	0.000005	0.000042	0.000005	0.000005	0.000005	0.000005	0.000032	0.000042	0.000032	0.000042	0.000005	0.000041	0.000005	0.000042	0.000005	0.000035	0.000005	0.000039	0.000032	0.000044	0.000005	0.00005	0.000032
Thallium, Total	mg/L	0.000042	0.000005	0.000041	0.000005	0.000042	0.000005	0.000005	0.000005	0.000005	0.000032	0.000042	0.000032	0.000042	0.000005	0.000041	0.000005	0.000042	0.000005	0.000035	0.000005	0.000039	0.000032	0.000044	0.000005	0.00005	0.000032
Total Suspended Solids,	mg/L	1	1	4.4	2.5	1	2.6	3.1	1	1	4.3	1.8	2.2	1	2.5	1	1.6	1	4.4	4	2.4	10.2	2.6	3.2	3.3	1	3.4
Uranium, Dissolved	mg/L	0.000046	0.000028	0.000043	0.000033	0.000045	0.000019	0.000016	0.000017	0.000016	0.000036	0.000044	0.000037	0.000045	0.000032	0.000044	0.000033	0.000045	0.000005	0.000035	0.000005	0.000041	0.000036	0.000045	0.000034	0.00005	0.000033
Uranium, Total	mg/L	0.000046	0.000032	0.000044	0.000037	0.000045	0.000022	0.000024	0.000027	0.000021	0.000038	0.000044	0.000038	0.000045	0.000033	0.000045	0.000037	0.000046	0.000022	0.000035	0.000029	0.000042	0.000039	0.000046	0.000036	0.00005	0.000035
Vanadium, Total	mg/L	0.0001	0.0002	0.00019	0.0001	0.0001	0.00025	0.00025	0.00025	0.00025	0.00018	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.00023	0.0002	0.0001	0.0001	0.0001	0.0001	0.00018
Zinc, Dissolved	mg/L	0.03	0.0012	0.0013	0.0022	0.0028	0.0023	0.0043	0.0022	0.0015	0.00088	0.0008	0.001	0.0016	0.0056	0.0072	0.0044	0.0062	0.0012	0.0012	0.0011	0.0032	0.0011	0.00096	0.0011	0.0009	0.0005
Zinc, Total	mg/L	0.03	0.0015	0.0027	0.0029	0.0028	0.0024	0.0065	0.0036	0.0015	0.0013	0.00083	0.0021	0.0016	0.0084	0.0073	0.0057	0.0064	0.0016	0.0026	0.0034	0.0032	0.0011	0.00096	0.0011	0.0009	0.0005

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-1: Observed water quality - mean

Site/Season	Unit	AQM5 Spring	AQM5 Summer	AQM5 Winter	AQM66 Fall	AQM66 Spring	AQM66 Summer	AQM66 Winter	AQM67 Fall	AQM67 Spring	AQM67 Summer	AQM67 Winter	AQM68 Fall	AQM68 Spring	AQM68 Summer	AQM68 Winter	AQM69 Summer	AQM69B Fall	AQM69B Spring	AQM69B Summer	AQM69B Winter	AQM7 Fall	AQM7 Spring	AQM7 Summer	AQM7 Winter	AQM70 Fall	AQM70 Spring
Statistics		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Parameter																											
Acidity as $CaCO_3$	mg/L	4.6	2.6	10.7	6.3	2.8	5.6	8.1	3	2.6	1.8	4.5	3.1	2.8	1.8	4.2	2.3	2.5	1	1	3.4	2.4	2.4	2.1	4.1	1.6	3
Alkalinity, Total (as $CaCO_3$)	mg/L	11.1	10	21.4	39.1	22	28.4	35.3	9.5	8.4	9.4	12.7	12.8	12.5	13	13.5	30.7	38.1	30.9	42.6	17.5	8.2	7.9	8.9	10.3	44	37.1
Aluminum, Dissolved	mg/L	0.062	0.041	0.079	0.022	0.028	0.024	0.017	0.041	0.062	0.022	0.043	0.02	0.045	0.025	0.059	0.019	0.039	0.0098	0.013	0.015	0.0092	0.014	0.0084	0.0086	0.011	0.02
Aluminum, Total	mg/L	0.099	0.083	0.09	0.1	0.07	0.044	0.049	0.077	0.09	0.067	0.064	0.039	0.078	0.044	0.064	0.27	0.24	0.077	0.12	0.049	0.032	0.061	0.04	0.023	0.34	0.23
Ammonia (as N)	mg/L	0.013	0.023	0.092	0.005	0.023	0.02	0.12	0.005	0.014	0.0075	0.048	0.005	0.005	0.0085	0.044	0.005	0.005	0.005	0.016	0.005	0.012	0.005	0.005	0.044	0.005	0.005
Antimony, Dissolved	mg/L	0.000093	0.00008	0.000092	0.00005	0.000075	0.00005	0.00005	0.00005	0.000075	0.00005	0.00005	0.00005	0.000075	0.00005	0.00028	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.0001	0.00008	0.00009	0.00005	0.0001
Antimony, Total	mg/L	0.000093	0.00008	0.000092	0.00005	0.000075	0.00005	0.00005	0.00005	0.000075	0.00005	0.00005	0.00005	0.000075	0.00005	0.00028	0.00005	0.00005	0.00005	0.00005	0.00024	0.00008	0.0001	0.00008	0.00009	0.00005	0.0001
Arsenic, Dissolved	mg/L	0.0002	0.00025	0.00031	0.00028	0.00027	0.0004	0.0003	0.00018	0.00016	0.00018	0.00018	0.00018	0.00018	0.00016	0.00023	0.00028	0.00032	0.00023	0.00029	0.0002	0.00016	0.00013	0.00015	0.00017	0.00036	0.00024
Arsenic, Total	mg/L	0.00021	0.00026	0.00033	0.00038	0.0004	0.00042	0.00042	0.00023	0.0002	0.00022	0.00024	0.00023	0.0002	0.00018	0.00025	0.00031	0.00034	0.00029	0.00033	0.00029	0.00018	0.00013	0.00016	0.00022	0.0004	0.00029
Barium, Dissolved	mg/L	0.0052	0.0052	0.012	0.012	0.01	0.013	0.016	0.0065	0.0057	0.0061	0.0082	0.0058	0.0063	0.0061	0.0086	0.009	0.011	0.0092	0.012	0.0074	0.0048	0.005	0.005	0.007	0.012	0.0095
Barium, Total	mg/L	0.0058	0.006	0.012	0.015	0.011	0.014	0.017	0.0069	0.0067	0.0062	0.0087	0.0062	0.0068	0.0064	0.0086	0.012	0.013	0.01	0.013	0.008	0.0052	0.0058	0.0055	0.0073	0.015	0.012
Beryllium, Total	mg/L	0.000093	0.00008	0.000092	0.00005	0.000075	0.00005	0.00005	0.00005	0.000075	0.00005	0.00005	0.00005	0.000075	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.0001	0.00008	0.00009	0.00005	0.0001
Boron, Dissolved	mg/L	0.005	0.005	0.007	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.008	0.005
Boron, Total	mg/L	0.005	0.005	0.007	0.005	0.0085	0.005	0.013	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.013	0.005	0.0075	0.005	0.005	0.005	0.005	0.005	0.005	0.017	0.025	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.0000046	0.000004	0.0000045	0.0000025	0.0000038	0.0000025	0.0000025	0.0000071	0.0000085	0.0000074	0.0000095	0.0000025	0.0000038	0.0000042	0.000011	0.0000025	0.0000025	0.0000025	0.0000065	0.0000025	0.000004	0.000005	0.0000038	0.0000045	0.0000025	0.000005
Cadmium, Total	mg/L	0.0000046	0.000004	0.0000053	0.0000025	0.0000053	0.0000063	0.0000025	0.0000097	0.0000095	0.000011	0.0000095	0.000004	0.0000057	0.0000072	0.000011	0.0000025	0.0000025	0.0000025	0.0000078	0.0000025	0.000004	0.0000097	0.000004	0.0000045	0.0000084	0.000005
Calcium, Dissolved	mg/L	4.1	3.9	7.5	11.8	7.3	9.2	11.2	4.9	3.7	3.7	4.4	4.5	4.6	4.6	5	6.9	8.4	8	9.9	5.5	2.3	2.3	2.4	2.8	9.3	7.7
Chloride	mg/L	0.82	0.94	1.6	0.25	0.25	0.25	0.25	0.61	0.25	0.41	0.6	0.4	0.52	0.25	0.7	0.66	0.94	0.75	0.88	0.25	0.25	0.25	0.25	0.25	1.1	0.8
Chromium (Hexavalent)	mg/L	0.00012	0.000098	0.00018	0.0001	0.00008	0.00014	0.00005	0.00012	0.000075	0.000075	0.00012	0.00005	0.00005	0.00005	0.00018	0.00014	0.00008	0.00005		0.00011	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium, Dissolved	mg/L	0.00012	0.000098	0.00018	0.0001	0.00008	0.00014	0.00005	0.00012	0.000075	0.000075	0.00012	0.00005	0.00005	0.00005	0.00018	0.00014	0.00008	0.00005	0.00005	0.00011	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium, Total	mg/L	0.00017	0.00018	0.00025	0.00038	0.00037	0.00028	0.00022	0.00021	0.00021	0.00021	0.00021	0.00018	0.00018	0.00015	0.00018	0.00051	0.00047	0.00023	0.00036	0.00031	0.000086	0.00031	0.000094	0.00014	0.00076	0.00045
Cobalt, Dissolved	mg/L	0.000093	0.00008	0.00011	0.00005	0.000075	0.00005	0.00005	0.00011	0.000075	0.00005	0.00024	0.00005	0.000075	0.00005	0.00016	0.00005	0.00005	0.00005	0.00005	0.00005	0.00008	0.0001	0.00008	0.00009	0.00005	0.0001
Cobalt, Total	mg/L	0.000093	0.00008	0.00011	0.00013	0.000075	0.00014	0.00005	0.0002	0.0003	0.0002	0.00033	0.00005	0.00018	0.00005	0.00017	0.0001	0.000095	0.00005	0.00005	0.00015	0.00008	0.0001	0.00008	0.00009	0.00017	0.0001
Copper, Dissolved	mg/L	0.00059	0.00061	0.00073	0.0005	0.00086	0.00054	0.00078	0.0025	0.0032	0.0024	0.0016	0.0018	0.0018	0.0018	0.0031	0.00079	0.00071	0.00097	0.0007	0.00066	0.0004	0.00035	0.00033	0.00029	0.00053	0.00062
Copper, Total	mg/L	0.00071	0.00073	0.0008	0.00092	0.0011	0.0007	0.001	0.0031	0.0038	0.003	0.0018	0.0022	0.0021	0.0021	0.0031	0.00085	0.0009	0.001	0.00081	0.001	0.0004	0.00035	0.00036	0.00079	0.00096	0.00087
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.00075	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.0005	0.0017	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.057	0.069	0.093	0.047	0.034	0.039	0.034	0.054	0.042	0.052	0.052	0.052	0.047	0.045	0.053	0.071	0.083	0.069	0.075	0.055	0.055	0.052	0.064	0.064	0.09	0.08
Hardness (as $CaCO_3$)	mg/L	14.1	13.4	24.5	40	23.2	29.4	35.6	16.6	12.8	12.7	15.6	15.8	16.2	15.6	17.4	27.9	34.7	31.9	39.4	20.3	8.7	8.3	8.8	10.3	39.4	32
Iron, Dissolved	mg/L	0.3	0.054	0.42	0.16	0.12	0.12	0.38	0.11	0.22	0.076	0.24	0.054	0.17	0.054	0.26	0.053	0.029	0.036	0.018	0.066	0.07	0.12	0.075	0.081	0.018	0.068
Iron, Total	mg/L	0.47	0.23	0.49	0.57	0.23	0.34	0.53	0.24	0.36	0.21	0.39	0.1	0.33	0.1	0.3	0.29	0.24	0.1	0.13	0.12	0.23	0.27	0.21	0.19	0.38	0.3
Lead, Dissolved	mg/L	0.000042	0.000037	0.000041	0.000025	0.000035	0.000025	0.000025	0.000039	0.000035	0.000025	0.000025	0.000025	0.000035	0.000025	0.00007	0.000025	0.000025	0.000025	0.000025	0.000025	0.000037	0.000045	0.000037	0.000041	0.000025	0.000045
Lead, Total	mg/L	0.000084	0.000053	0.000041	0.000078	0.000051	0.00016	0.000025	0.000039	0.000035	0.00016	0.000025	0.000025	0.000035	0.00012	0.00007	0.00011	0.0001	0.000025	0.00024	0.000051	0.000037	0.000063	0.000037	0.000041	0.00017	0.00013
Magnesium, Dissolved	mg/L	0.8	0.83	1.4	2.5	1.2	1.5	1.9	1	0.88	0.87	1.1	1.1	1.1	1	1.2	2.6	3.3	2.9	3.6	1.6	0.66	0.61	0.64	0.8	3.8	3.1
Manganese, Dissolved	mg/L	0.015	0.0024	0.097	0.0097	0.024	0.019	0.056	0.0058	0.015	0.0047	0.038	0.0022	0.021	0.0019	0.029	0.00084	0.00061	0.0013	0.00072	0.0052	0.0061	0.007	0.011	0.011	0.00082	0.0017
Manganese, Total	mg/L	0.031	0.038	0.1	0.062	0.033	0.098	0.069	0.016	0.043	0.028	0.044	0.014	0.041	0.01	0.029	0.012	0.013	0.0051	0.009	0.0076	0.019	0.021	0.026	0.014	0.019	0.014
Mercury, Dissolved	mg/L	0.0000017	0.0000014	0.0000014	0.000001	0.0000017	0.000002	0.0000007	6.5E-07	0.000002	9.5E-07	0.0000006	6.5E-07	0.0000017	9.5E-07	0.0000008	0.0000009	7.5E-07	0.0000008	0.0000007	0.0000006	0.0000006	0.000001	7.8E-07	5.8E-07	0.0000007	0.0000014
Mercury, Total	mg/L	0.0000022	0.0000018	0.0000017	0.0000023	0.000002	0.0000042	0.0000008	6.5E-07	0.000002	0.0000012	0.0000006	6.5E-07	0.0000019	0.0000011	0.0000014	0.000003	7.5E-07	0.0000009	0.0000007	0.0000006	0.0000006	0.0000014	9.8E-07	0.0000008	0.000001	0.0000018
Molybdenum, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00012	0.00013	0.0001	0.0001	0.000042	0.000056	0.00004	0.000061	0.000084	0.000068	0.000074	0.000064	0.000079	0.00013	0.0001	0.00015	0.000059	0.000045	0.00005	0.000046	0.000052	0.00016	0.0001
Molybdenum, Total	mg/L	0.000095	0.000083	0.0001	0.00013	0.00014	0.00014	0.00011	0.00006	0.00009	0.00004	0.00014	0.000088	0.000094	0.000094	0.000064	0.0001	0.00014	0.0001	0.00018	0.000073	0.000078	0.0001	0.00007	0.000091	0.00017	0.0001
Nickel, Dissolved	mg/L	0.00059	0.00059	0.0011	0.0004	0.00022	0.0004	0.00051	0.028	0.026	0.02	0.022	0.015	0.015	0.015	0.028	0.00025	0.0019	0.0038	0.0019	0.00025	0.0002	0.0002	0.0002	0.0002	0.00038	0.00049
Nickel, Total	mg/L	0.00069	0.00078	0.0011	0.00076	0.00046	0.00057	0.00051	0.03	0.026	0.023	0.024	0.016	0.017	0.016	0.028	0.00069	0.0022	0.0042	0.0024	0.00025	0.0002	0.0002	0.00022	0.00021	0.0012	0.00075
Nitrate + Nitrite (as N)	mg/L	0.025	0.025	0.025	0.038	0.038	0.038	0.1	0.038	0.038	0.038	0.087	0.038	0.082	0.038	0.077	0.025	0.038	0.05	0.05	0.081	0.025	0.025	0.025	0.07	0.038	0.025
Nitrite, Field	mg/L	0.0028	0.0082	0.015	0.005	0.012	0.002	0.021	0.03	0.026	0.022	0.03	0.019	0.046	0.022	0.016	0.01	0.028	0.038	0.029	0	0.014	0.005	0.0042	0.009	0.015	0.021
pH, Field	ph Unit	6.8	7.1	6.5	5.9	6.3	6.2	6	6.6	6.5	7	6	6.7	6.6	7.1	6.5	7.5	7.5	7.3	7.4	6.6	7.1	6.9	6.8	6.6	7.1	
Phosphorus, Total	mg/L	0.023	0.025	0.018	0.052	0.012	0.064	0.02	0.019	0.011	0.011	0.017	0.012	0.012	0.011	0.021	0.024	0.022	0.0066	0.0087	0.012	0.018	0.018	0.019	0.016	0.025	0.02
Potassium, Dissolved	mg/L	0.53	0.57	0.78	0.97	1	0.58	1.2	0.63	0.65	0.64	0.78	0.64	0.69	0.68	0.79	1	1.2	1	1.2	0.91	0.55	0.54	0.53	0.65	1.2	0.99
Radium-226	Bq/L	0.0044	0.005	0.0046	0.0044	0.0044	0.0081	0.0028	0.0038	0.0057	0.0036	0.0073	0.0038	0.0037	0.0038	0.015	0.0034	0.0046			0.0028	0.0048	0.005	0.0049	0.0047	0.0038	0.0038
Selenium, Dissolved	mg/L	0.000045	0.00004	0.00005	0.000042	0.000038	0.000041	0.000025	0.000025	0.000038	0.000025	0.000054	0.000025	0.000038	0.000025	0.000069	0.000025	0.000039	0.000025	0.000025	0.000025	0.00004	0.00005	0.00004	0.000045	0.000038	0.00005
Selenium, Total	mg/L	0.000045	0.00004	0.00005	0.000058	0.000054	0.000066	0.000064	0.000042	0.000052	0.000047	0.000054	0.000025	0.000038	0.000025	0.000077	0.000061	0.00004	0.000055	0.000068	0.000066	0.00004	0.00005	0.00004	0.000045	0.00004	0.00005
Silicon, Dissolved	mg/L	0.84	0.74	2.3	2.7	1.2	1.2	2.3	2.3	1.9	1.7	2.9	1.9	2.2	1.7	3	1.3	1.2	1.4	0.98	1.4	2.3	1.9	2.2	3.2	1.2	1.1
Silicon, Total	mg/L	0.91	0.81	2.3	3	1.3	1.3	2.5	2.4	2.4	1.9	3.3	2	2.3	1.8	3.2	2	1.6	1.6	1.3	1.6	2.4	2.1	2.4	3.3	1.9	1.6
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.0000078	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1	1	1.8	1.2	0.79	0.8	1.2	1.3	0.96	1.1	1.5	1.1	1.1	1	1.5	2	2.7	2.2	2.8	1.4	1	0.96	0.98	1.3	3.2	2.5
Sodium, Total	mg/L	1	1.1	1.8	1.4	0.85	0.87	1.3	1.4	1.1	1.2	1.6	1.2	1.2	1.1	1.6	2.2	2.8	2.2	3	2.6	1.1	0.98	1.1	1.4	3.5	2.5
Strontium, Dissolved	mg/L	0.013	0.014	0.024	0.023	0.015	0.02	0.024	0.015	0.012	0.014	0.018	0.014	0.014	0.014	0.019	0.026	0.03	0.027	0.036	0.02	0.011	0.011	0.012	0.014	0.036	0.028
Strontium, Total	mg/L	0.014	0.015	0.025	0.027	0.016	0.022	0.024	0.016	0.014	0.014	0.018	0.015	0.015	0.016	0.019	0.027	0.032	0.027	0.04	0.021	0.012	0.012	0.012	0.015	0.036	0.03
Sulfate,	mg/L	0.92	0.91	1.5	2.8	1.6	1.6	1.2	7.6	3.4	3.2	3	3	2.4	2.3	3.6	2.1	2.3	2.5	2	3.4	0.98	1	0.99	1.3	2.2	2
Temperature, Field	Deg. C	11.3	19.9	0.42	5	11.1	17.8	-0.1	7	8.4	19	0	11	4.7	18.1	0	18.6	11.6	4.7	18.6	0.8	9.8	10.7	20.2	-0.04	6	5.2
Thallium, Dissolved	mg/L	0.000044	0.000032	0.000042	0.000005	0.000028	0.000005	0.000005	0.000005	0.000028	0.000005	0.000005	0.000005	0.000028	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000032	0.00005	0.000032	0.000041	0.000005	0.00005
Thallium, Total	mg/L	0.000044	0.000032	0.000042	0.000005	0.000028	0.000005	0.000005	0.000005	0.000028	0.000005	0.000005	0.000005	0.000028	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000032	0.00005	0.000032	0.000041	0.000005	0.00005
Total Suspended Solids,	mg/L	3.8	4.1	3.3	35.3	1	7.2	1	1.9	2.2	1.8	1	1	1.5	1	1	2.2	3.4	1	1	1	2.3	3.4	3.8	1	6.2	6.6
Uranium, Dissolved	mg/L	0.000045	0.000032	0.000044	0.000014	0.000034	0.0000085	0.000017	0.000018	0.000036	0.000019	0.000021	0.000022	0.000036	0.000026	0.000023	0.000083	0.000077	0.000075	0.000086	0.000059	0.000037	0.00005	0.000036	0.000043	0.000078	0.00005
Uranium, Total	mg/L	0.000045	0.000034	0.000044	0.000028	0.000038	0.000018	0.000021	0.000026	0.000038	0.000019	0.000023	0.000024	0.000038	0.000034	0.000025	0.00011	0.0001	0.000091	0.0001	0.000068	0.000039	0.00005	0.000039	0.000044	0.000098	0.00012
Vanadium, Total	mg/L	0.00026	0.00025	0.00013	0.00038	0.00024	0.00025	0.00025	0.00025	0.00018	0.00025	0.00025	0.00025	0.00018	0.00025	0.00025	0.00066	0.00054	0.00025	0.00025	0.00025	0.0001	0.00014	0.00018	0.0001	0.00089	0.0005
Zinc, Dissolved	mg/L	0.0011	0.0012	0.0021	0.0008	0.0012	0.0005	0.0005	0.0063	0.0058	0.0034	0.0071	0.0022	0.0042	0.0015	0.0091	0.0005	0.0015	0.001	0.0005	0.0005	0.00098	0.0007	0.0012	0.0017	0.0005	0.001
Zinc, Total	mg/L	0.0012	0.0012	0.0024	0.0024	0.0012	0.0023	0.0015	0.0074	0.006	0.0046	0.0084	0.0026	0.0044	0.0015	0.0097	0.0015	0.0015	0.0015	0.0015	0.0015	0.00098	0.0007	0.0012	0.0017	0.004	0.001

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-1: Observed water quality - mean

Site/Season	Unit	AQM70 Summer	AQM8 Fall	AQM8 Spring	AQM8 Summer	AQM8 Winter	AQM9 Fall	AQM9 Spring	AQM9 Summer	AQM9 Winter
Statistics		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Parameter										
Acidity as $CaCO_3$	mg/L	1.6	2.8	2.2	1	4.5	2.5	4	1.5	4.8
Alkalinity, Total (as $CaCO_3$)	mg/L	22.1	8.2	7.4	8.1	10.5	9.7	8.7	9.3	13.4
Aluminum, Dissolved	mg/L	0.011	0.013	0.017	0.0096	0.0075	0.036	0.054	0.024	0.045
Aluminum, Total	mg/L	0.31	0.036	0.061	0.042	0.02	0.071	0.072	0.048	0.057
Ammonia (as N)	mg/L	0.011	0.005	0.015	0.013	0.034	0.011	0.005	0.005	0.048
Antimony, Dissolved	mg/L	0.00005	0.00008	0.000093	0.00008	0.00009	0.000075	0.000093	0.000088	0.00009
Antimony, Total	mg/L	0.00005	0.00008	0.000093	0.00008	0.00009	0.00008	0.000093	0.000088	0.00009
Arsenic, Dissolved	mg/L	0.00031	0.00015	0.00012	0.00015	0.00014	0.0002	0.00015	0.00017	0.0002
Arsenic, Total	mg/L	0.00036	0.00018	0.00014	0.00017	0.00015	0.0002	0.00017	0.00018	0.00023
Barium, Dissolved	mg/L	0.011	0.0047	0.0051	0.0044	0.0071	0.0051	0.0051	0.0051	0.0086
Barium, Total	mg/L	0.014	0.0052	0.0058	0.0053	0.0072	0.0054	0.0056	0.0055	0.0087
Beryllium, Total	mg/L	0.00005	0.00008	0.000093	0.00008	0.000092	0.00008	0.000093	0.00008	0.000092
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0096
Boron, Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.02
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.0000025	0.000004	0.0000046	0.000004	0.0000046	0.0000073	0.000015	0.0000052	0.0000079
Cadmium, Total	mg/L	0.0000038	0.000004	0.0000046	0.000004	0.0000046	0.0000074	0.000015	0.0000057	0.000011
Calcium, Dissolved	mg/L	8.7	2.5	2.4	2.4	2.9	4.4	3.3	3.8	4.5
Chloride	mg/L	0.55	0.25	0.25	0.25	0.25	0.64	0.58	0.63	0.73
Chromium (Hexavalent)	mg/L	0.00008	0.00005	0.00005	0.00005	0.000062	0.00005	0.000078	0.00005	0.0001
Chromium, Dissolved	mg/L	0.00008	0.00005	0.00005	0.00005	0.000062	0.00005	0.000078	0.00005	0.0001
Chromium, Total	mg/L	0.00062	0.00009	0.00013	0.00018	0.000095	0.00017	0.00017	0.00013	0.00016
Cobalt, Dissolved	mg/L	0.00005	0.00008	0.000093	0.00008	0.000092	0.000088	0.00021	0.00008	0.00021
Cobalt, Total	mg/L	0.00012	0.00008	0.000093	0.00008	0.000092	0.0002	0.00029	0.000098	0.00023
Copper, Dissolved	mg/L	0.00074	0.0004	0.00044	0.00045	0.00031	0.0028	0.0033	0.0027	0.0016
Copper, Total	mg/L	0.0009	0.00043	0.00056	0.00055	0.00037	0.0033	0.0035	0.0032	0.0018
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.066	0.055	0.049	0.056	0.065	0.055	0.041	0.054	0.076
Hardness (as $CaCO_3$)	mg/L	36	9.2	8.9	8.9	10.8	15.8	11.6	13.6	16.4
Iron, Dissolved	mg/L	0.024	0.087	0.1	0.085	0.086	0.096	0.21	0.078	0.12
Iron, Total	mg/L	0.34	0.24	0.26	0.24	0.18	0.23	0.36	0.15	0.17
Lead, Dissolved	mg/L	0.000025	0.000037	0.000042	0.000037	0.000042	0.000035	0.000045	0.000037	0.000042
Lead, Total	mg/L	0.00014	0.000037	0.000045	0.000037	0.000042	0.000037	0.000046	0.000043	0.000042
Magnesium, Dissolved	mg/L	3.5	0.69	0.63	0.66	0.83	1.1	0.82	0.96	1.2
Manganese, Dissolved	mg/L	0.0011	0.0065	0.0054	0.0074	0.0086	0.0045	0.022	0.0023	0.01
Manganese, Total	mg/L	0.021	0.019	0.02	0.028	0.012	0.015	0.035	0.011	0.013
Mercury, Dissolved	mg/L	0.000001	5.6E-07	9.3E-07	0.000001	5.1E-07	7.2E-07	0.000002	0.0000009	7.1E-07
Mercury, Total	mg/L	0.0000011	6.6E-07	0.0000016	0.0000011	7.4E-07	7.2E-07	0.0000028	0.0000011	9.9E-07
Molybdenum, Dissolved	mg/L	0.00013	0.00005	0.00005	0.000048	0.000046	0.000053	0.00005	0.00004	0.000055
Molybdenum, Total	mg/L	0.00014	0.000078	0.000099	0.000085	0.000088	0.000089	0.000096	0.000078	0.000097
Nickel, Dissolved	mg/L	0.00067	0.00035	0.00035	0.00038	0.0002	0.031	0.024	0.023	0.028
Nickel, Total	mg/L	0.0011	0.00051	0.00042	0.00054	0.00021	0.033	0.025	0.025	0.028
Nitrate + Nitrite (as N)	mg/L	0.038	0.025	0.025	0.025	0.078	0.025	0.025	0.025	0.058
Nitrite, Field	mg/L	0.012	0.011	0.01	0.0042	0.013	0.0062	0.013	0.0085	0.0068
pH, Field	ph Unit	7.3	7.1	6.8	7.1	6.6	7	6.5	7	6.4
Phosphorus, Total	mg/L	0.021	0.017	0.018	0.02	0.014	0.012	0.017	0.014	0.015
Potassium, Dissolved	mg/L	1.2	0.55	0.54	0.52	0.67	0.61	0.61	0.6	0.86
Radium-226	Bq/L	0.0035	0.0046	0.005	0.0046	0.0046	0.0048	0.005	0.005	0.0047
Selenium, Dissolved	mg/L	0.000044	0.00004	0.000045	0.00004	0.000046	0.000045	0.000045	0.00004	0.000046
Selenium, Total	mg/L	0.000044	0.000045	0.000045	0.00004	0.00005	0.000047	0.000051	0.000046	0.00005
Silicon, Dissolved	mg/L	1.2	2.3	1.8	2	3.2	1.7	1.4	1.5	3.6
Silicon, Total	mg/L	1.8	2.4	2	2.2	3.3	1.8	1.5	1.6	3.8
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	2.8	1	0.96	0.99	1.3	1.3	0.99	1.2	1.7
Sodium, Total	mg/L	3	1.1	0.97	1	1.3	1.4	1	1.2	1.8
Strontium, Dissolved	mg/L	0.033	0.012	0.011	0.012	0.015	0.016	0.011	0.014	0.019
Strontium, Total	mg/L	0.037	0.012	0.012	0.012	0.015	0.017	0.012	0.015	0.02
Sulfate,	mg/L	1.4	1.1	1	0.98	1.3	6.4	2.6	3.9	4.4
Temperature, Field	Deg. C	18.6	9	7.6	19.1	-0.05	9.4	11.5	19.3	0.27
Thallium, Dissolved	mg/L	0.000005	0.000032	0.000044	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042
Thallium, Total	mg/L	0.000005	0.000032	0.000044	0.000032	0.000042	0.000032	0.000044	0.000032	0.000042
Total Suspended Solids,	mg/L	2.9	2.3	3.6	2.2	1	2.2	1.7	2.1	1
Uranium, Dissolved	mg/L	0.000079	0.000037	0.000045	0.000036	0.000045	0.000038	0.000046	0.000038	0.000046
Uranium, Total	mg/L	0.00011	0.00004	0.000046	0.000039	0.000045	0.00004	0.000047	0.00004	0.000047
Vanadium, Total	mg/L	0.00078	0.0001	0.00017	0.0001	0.0001	0.00018	0.00015	0.0001	0.0001
Zinc, Dissolved	mg/L	0.0015	0.001	0.001	0.0011	0.00082	0.0053	0.008	0.0036	0.0095
Zinc, Total	mg/L	0.0015	0.0014	0.001	0.0012	0.00088	0.0065	0.0082	0.0047	0.0097

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved C
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-2: Observed water quality - 95th percentile

Site/Season	Unit	AQM1 Fall	AQM1 Spring	AQM1 Summer	AQM1 Winter	AQM10 Fall	AQM10 Spring	AQM10 Summer	AQM10 Winter	AQM11 Fall	AQM11 Spring	AQM11 Summer	AQM11 Winter	AQM12 Spring	AQM13 Fall	AQM13 Spring	AQM13 Summer	AQM13 Winter	AQM14 Fall	AQM14 Spring	AQM14 Summer	AQM14 Winter	AQM15 Fall	AQM15 Spring
Statistics		P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95	P95
Parameter																								
Acidity as $CaCO_3$	mg/L	2.3	2.7	2.3	5.7	6.1	7.1	7.4	13.7	2.7	4.5	2.6	5.8	1.4	3.9	4.7	8.2	18.8	3.7	15.1	2.1	14.3	3.4	4.8
Alkalinity, Total (as $CaCO_3$)	mg/L	8.8	7.9	8.3	11.8	24.4	15.7	22.6	41.1	10.7	11.6	12.3	12.9	8.6	11.5	11	13.2	29	8.4	15.4	8.6	23.7	21.1	16.5
Aluminum, Dissolved	mg/L	0.042	0.026	0.015	0.012	0.082	0.076	0.067	0.076	0.053	0.074	0.028	0.048	0.042	0.057	0.041	0.031	0.069	0.046	0.085	0.033	0.11	0.031	0.043
Aluminum, Total	mg/L	0.13	0.081	0.062	0.019	0.12	0.19	0.1	0.17	0.1	0.12	0.051	0.065	0.07	0.071	0.088	0.071	0.087	0.13	0.2	0.14	0.16	0.074	0.075
Ammonia (as N)	mg/L	0.005	0.005	0.005	0.043	0.017	0.027	0.011	0.19	0.005	0.005	0.005	0.05	0.005	0.013	0.03	0.017	0.31	0.076	0.005	0.005	0.17	0.019	0.036
Antimony, Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Antimony, Total	mg/L	0.0001	0.0001	0.0001	0.00026	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic, Dissolved	mg/L	0.00012	0.0001	0.00013	0.00016	0.0003	0.00032	0.00043	0.00042	0.00019	0.00018	0.00021	0.00018	0.0001	0.00021	0.00018	0.00025	0.00029	0.00021	0.00025	0.00022	0.00035	0.0002	0.00022
Arsenic, Total	mg/L	0.00012	0.00012	0.00013	0.00016	0.00039	0.00035	0.00046	0.00043	0.00021	0.00019	0.00021	0.00028	0.0001	0.00029	0.0002	0.00025	0.00029	0.00026	0.00033	0.00027	0.00035	0.00025	0.00023
Barium, Dissolved	mg/L	0.0059	0.0052	0.0048	0.0088	0.0075	0.0072	0.0084	0.018	0.0051	0.0066	0.0061	0.0081	0.0055	0.0048	0.005	0.007	0.018	0.0018	0.007	0.0017	0.012	0.0089	0.0073
Barium, Total	mg/L	0.0067	0.0052	0.0055	0.0092	0.008	0.0083	0.0084	0.018	0.0058	0.0066	0.0063	0.0086	0.0058	0.0088	0.0078	0.0083	0.02	0.011	0.0094	0.0084	0.018	0.0095	0.0084
Beryllium, Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.034	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron, Total	mg/L	0.005	0.005	0.005	0.036	0.005	0.005	0.005	0.028	0.005	0.005	0.005	0.022	0.005	0.005	0.005	0.005	0.021	0.005	0.005	0.005	0.005	0.005	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.0000079	0.000005	0.000005	0.000005	0.000005	0.000014	0.000011	0.000014	0.000012	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.0000064	0.000005
Cadmium, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.0000083	0.00001	0.000005	0.0000056	0.000015	0.000015	0.000011	0.000016	0.000012	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000009	0.000005
Calcium, Dissolved	mg/L	2.6	2.4	2.3	3.1	6.7	5.9	6.7	12.1	6	4.8	5.2	4.3	3.7	4.2	3.8	5.5	8.5	3	5.2	3.1	7	6.1	6.4
Chloride	mg/L	0.25	0.25	0.25	0.25	0.25	0.25	1.3	1.2	0.68	0.61	0.58	0.66	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Chromium (Hexavalent)	mg/L	0.00012	0.00005	0.00005	0.00005	0.00025	0.00017	0.00021	0.00028	0.00005	0.00011	0.00005	0.00005	0.0005	0.00015	0.0001	0.00013	0.00024	0.00005	0.00012	0.00005	0.00023	0.00012	0.00005
Chromium, Dissolved	mg/L	0.00012	0.00005	0.00005	0.00005	0.00025	0.00017	0.00023	0.00028	0.00005	0.00011	0.00005	0.00005	0.0005	0.00015	0.0001	0.00013	0.00024	0.00005	0.00012	0.00005	0.00023	0.00012	0.00005
Chromium, Total	mg/L	0.00033	0.00046	0.00013	0.00013	0.0003	0.00053	0.00033	0.00041	0.00026	0.00036	0.00026	0.00017	0.0005	0.00024	0.00022	0.00042	0.00027	0.00031	0.0005	0.00027	0.00036	0.00023	0.0003
Cobalt, Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.00013	0.0001	0.00021	0.00041	0.00017	0.00041	0.0001	0.00037	0.0001	0.0001	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.00024	0.0001	0.0001
Cobalt, Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.00018	0.00012	0.00021	0.00046	0.00031	0.0006	0.00019	0.00039	0.00025	0.00012	0.0001	0.00015	0.00053	0.0001	0.0001	0.0001	0.00025	0.0001	0.0001
Copper, Dissolved	mg/L	0.00032	0.00023	0.0003	0.00047	0.00098	0.0012	0.0023	0.00079	0.003	0.004	0.0025	0.0015	0.0035	0.00023	0.00023	0.00035	0.00031	0.0004	0.00053	0.00042	0.0001	0.00074	0.00062
Copper, Total	mg/L	0.00042	0.00024	0.00059	0.00061	0.001	0.0014	0.0025	0.0015	0.0035	0.0044	0.0034	0.0017	0.0039	0.00025	0.00032	0.00049	0.00035	0.00049	0.00069	0.00049	0.00055	0.00076	0.00067
Cyanide (Free)	mg/L	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable)	mg/L	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.061	0.054	0.056	0.082	0.052	0.049	0.056	0.066	0.058	0.051	0.056	0.069		0.05	0.044	0.047	0.065	0.045	0.029	0.04	0.059	0.044	0.041
Hardness (as $CaCO_3$)	mg/L	7.6	8.6	8.7	11.7	23.4	21.3	23.3	41.1	19.9	16.6	17.9	15.1	11.7	13.9	12.3	17.7	27	10.5	16.2	10.8	23.8	20.2	21
Iron, Dissolved	mg/L	0.38	0.08	0.089	0.067	0.43	0.8	0.68	1.2	0.13	0.3	0.098	0.18	0.11	0.59	0.87	0.39	3.8	0.13	0.78	0.061	2	0.056	0.61
Iron, Total	mg/L	0.7	0.18	0.24	0.11	1.1	1.1	1.1	1.6	0.31	0.51	0.28	0.3	0.24	1.4	2.2	2.9	4.9	0.71	1.3	0.83	2.2	0.16	0.81
Lead, Dissolved	mg/L	0.000045	0.000045	0.000045	0.000045	0.000049	0.00006	0.000054	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000092
Lead, Total	mg/L	0.000045	0.000045	0.000045	0.000045	0.00014	0.000098	0.00024	0.00021	0.000045	0.000045	0.000059	0.000045	0.000045	0.00011	0.00017	0.00037	0.000045	0.00023	0.00011	0.00021	0.00016	0.000051	0.00042
Magnesium, Dissolved	mg/L	0.59	0.64	0.64	0.9	1.5	1.4	1.5	2.5	1.2	1.1	1.2	1.1	0.9	0.8	0.68	0.91	1.4	0.79	1.1	0.76	1.6	1.2	1.2
Manganese, Dissolved	mg/L	0.0063	0.01	0.00062	0.002	0.056	0.1	0.077	0.18	0.008	0.023	0.014	0.017	0.01	0.017	0.011	0.042	0.32	0.01	0.036	0.0068	0.22	0.006	0.055
Manganese, Total	mg/L	0.014	0.015	0.013	0.0049	0.071	0.12	0.09	0.19	0.021	0.054	0.021	0.022	0.018	0.077	0.072	0.11	0.34	0.044	0.094	0.066	0.22	0.011	0.081
Mercury, Dissolved	mg/L	0.0000018	0.00000084	0.0000007	0.00000059	0.0000019	0.0000028	0.000003	0.0000015	0.00000068	0.0000016	0.0000016	0.00000062	0.00001	0.0000022	0.000002	0.0000022	0.0000023	0.0000033	0.0000042	0.0000015	0.0000015	0.0000025	0.0000021
Mercury, Total	mg/L	0.0000018	0.00000084	0.0000013	0.0000012	0.0000025	0.0000032	0.0000033	0.0000027	0.00000068	0.0000022	0.0000017	0.00000095	0.000096	0.0000023	0.0000021	0.0000024	0.0000023	0.0000034	0.0000071	0.0000027	0.0000022	0.0000025	0.0000031
Molybdenum, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00011	0.0001	0.00021	0.00017	0.00006	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.00005	0.0001	0.00011	0.0001
Molybdenum, Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.00011	0.0001	0.00025	0.00019	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00012	0.0001
Nickel, Dissolved	mg/L	0.0002	0.0002	0.0002	0.0002	0.00097	0.00052	0.0018	0.00089	0.04	0.04	0.027	0.03	0.031	0.0002	0.00024	0.0002	0.00024	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel, Total	mg/L	0.0002	0.00091	0.0002	0.0002	0.001	0.00082	0.0022	0.00097	0.041	0.043	0.029	0.03	0.034	0.00024	0.00024	0.00025	0.00054	0.0002	0.00044	0.0002	0.00041	0.00024	0.0002
Nitrate + Nitrite (as N)	mg/L	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.39	0.025	0.025	0.025	0.11	0.025	0.046	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Nitrite, Field	mg/L	0.0057	0.0039	0.00095	0.017	0.0019	0.025	0.024	0.027	0.014	0.0023	0.0094	0.016	0.0019	0.046	0.018	0.013	0.025	0.011	0.0091	0.011	0.012	0.025	0.025
pH, Field	ph Unit	7.4	7.3	7.3	6.9	6.8	6.8	7.2	6.9	7.2	7.7	7.7	7.2	7.4	7.5	6.8	7.4	6.3	7.2	7	7.2	5.8	7.2	6.9
Phosphorus, Total	mg/L	0.039	0.015	0.02	0.019	0.036	0.036	0.034	0.046	0.024	0.018	0.022	0.017	0.014	0.055	0.034	0.058	0.034	0.089	0.03	0.077	0.069	0.036	0.022
Potassium, Dissolved	mg/L	0.55	0.57	0.58	0.91	0.7	0.9	0.44	1.4	0.64	0.7	0.68	0.79	0.62	0.46	0.59	0.47	0.73	0.49	0.77	0.47	0.92	0.76	0.73
Radium-226	Bq/L	0.005	0.005	0.005	0.005	0.005	0.0075	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.013	0.0061	0.005	0.0067	0.005	0.005	0.005	0.0064
Selenium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000051	0.00005	0.00005	0.00005	0.00005	0.00005	0.0005	0.000052	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000054	0.00005
Selenium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.000058	0.00005	0.000051	0.00005	0.00005	0.00005	0.000052	0.00005	0.0005	0.000061	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000056	0.00005
Silicon, Dissolved	mg/L	2.4	2.4	2.6	3.7	2.3	1.3	1.5	2.5	2.3	2.1	2	3.8	1.5	2.7	1.5	1.2	5	1.3	0.81	1.1	1.7	0.73	0.6
Silicon, Total	mg/L	2.6	2.5	2.8	3.8	2.4	1.6	1.5	2.5	2.5	2.3	2.3	3.9	1.5	2.8	1.5	1.2	5.5	1.3	0.95	1.3	1.7	0.9	0.66
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.00005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.00005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1.1	1.1	1.1	1.8	1.5	1.3	1.4	4.1	1.3	1.2	1.2	1.6	1.1	1.1	0.89	1	1.7	1	1.2	0.97	1.6	1.2	1
Sodium, Total	mg/L	1.2	1.1	1.1	1.8	1.5	1.3	1.5	4.2	1.5	1.2	1.3	1.6	1.1	1.3	0.89	1.1	1.8	1	1.2	1.1	1.6	1.2	1
Strontium, Dissolved	mg/L	0.01	0.012	0.012	0.016	0.017	0.016	0.02	0.03	0.018	0.016	0.017	0.018	0.013	0.011	0.0094	0.016	0.023	0.0072	0.014	0.0072	0.017	0.015	0.014
Strontium, Total	mg/L	0.013	0.013	0.012	0.018	0.019	0.016	0.02	0.031	0.019	0.017	0.017	0.019	0.014	0.012	0.011	0.016	0.024	0.0087	0.015	0.0095	0.018	0.015	0.014
Sulfate,	mg/L	1.2	1.2	1.1	1.9	0.73	0.72	0.49	1.3	11.5	4.9	4.5	4.3	3.2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.9	0.83
Temperature, Field	Deg. C	14	14.7	19.5	0.54	13.2	11.7	21.3	0.075	15.7	20	20.4	0.3	21.4	16.4	15.1	19.4	0.95	16	16.6	19.3	0.2	15.9	17
Thallium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Thallium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Total Suspended Solids,	mg/L	14.2	1	1	1	6.8	5	1	5.3	4	2.2	3.6	1	2.5	23.6	12	15.3	13.5	35.4	8.1	42.7	30	4.9	3.3
Uranium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Uranium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Vanadium, Total	mg/L	0.00043	0.0001	0.0001	0.0001	0.00035	0.00067	0.00035	0.00053	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00036	0.0005	0.0001	0.00063	0.00082	0.00065	0.00052	0.00025	0.0003
Zinc, Dissolved	mg/L	0.0005	0.0016	0.0005	0.0033	0.0039	0.0025	0.0065	0.0037	0.004	0.008	0.0035	0.012	0.005	0.0005	0.0024	0.0022	0.0037	0.0005	0.00092	0.002	0.0027	0.0015	0.001
Zinc, Total	mg/L	0.0013	0.0016	0.0021	0.0035	0.0041	0.003	0.009	0.0038	0.005	0.008	0.0051	0.012	0.017	0.0016	0.0075	0.0031	0.0043	0.0021	0.0034	0.0065	0.0027	0.0031	0.0014

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-2: Observed water quality - 95th percentile

Site/Season	Unit	AQM15 Summer	AQM15 Winter	AQM16 Fall	AQM16 Spring	AQM16 Summer	AQM16 Winter	AQM17 Fall	AQM17 Spring	AQM17 Summer	AQM17 Winter	AQM18 Fall	AQM18 Spring	AQM18 Summer	AQM18 Winter	AQM2 Fall	AQM2 Spring	AQM2 Summer	AQM2 Winter	AQM21 Fall	AQM21 Spring	AQM21 Summer	AQM21 Winter	AQM22 Fall
Statistics		**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**
Parameter																								
Acidity as $CaCO_3$	mg/L	3.5	8	3.7	3.5	6	10.1	3.1	6.3	2.5	9	5	14.8	4.6	26.5	3.5	5.1	2.6	4.8	3.8	7.8	3.6	15	4.4
Alkalinity, Total (as $CaCO_3$)	mg/L	21.3	30.2	15.1	11.9	14.9	32.8	11.6	10.5	10.9	21.2	88.9	96.6	91.5	147	8.2	8.1	7.7	9	13.5	16.3	14.6	28.4	15.8
Aluminum, Dissolved	mg/L	0.034	0.036	0.044	0.041	0.052	0.055	0.14	0.14	0.086	0.089	0.0071	0.012	0.0038	0.017	0.022	0.03	0.0083	0.0045	0.072	0.051	0.036	0.072	0.021
Aluminum, Total	mg/L	0.081	0.036	0.14	0.13	0.22	0.057	0.29	0.25	0.16	0.12	0.0086	0.012	0.013	0.022	0.03	0.058	0.019	0.011	0.16	0.065	0.062	0.076	0.03
Ammonia (as N)	mg/L	0.047	0.35	0.049	0.005	0.014	0.27	0.019	0.022	0.012	0.095	0.047	0.61	0.045	0.33	0.005	0.005	0.005	0.03	0.02	0.005	0.025	0.29	0.037
Antimony, Dissolved	mg/L	0.0001	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Antimony, Total	mg/L	0.0001	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00016	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic, Dissolved	mg/L	0.00022	0.00027	0.00056	0.00061	0.00057	0.00077	0.00028	0.0002	0.00024	0.00027	0.0011	0.0011	0.001	0.0013	0.00012	0.00013	0.00011	0.00005	0.00036	0.00035	0.00045	0.00067	0.00021
Arsenic, Total	mg/L	0.00025	0.00032	0.00059	0.00064	0.00071	0.00078	0.00029	0.00024	0.00026	0.00032	0.0011	0.0012	0.001	0.0014	0.00012	0.00017	0.00011	0.00013	0.00046	0.00045	0.00056	0.00067	0.00022
Barium, Dissolved	mg/L	0.007	0.017	0.006	0.0058	0.0065	0.016	0.0095	0.0082	0.0079	0.011	0.057	0.058	0.049	0.08	0.0058	0.0062	0.0053	0.0067	0.0057	0.0043	0.0061	0.013	0.0014
Barium, Total	mg/L	0.0089	0.017	0.0062	0.0061	0.0086	0.016	0.0096	0.009	0.009	0.012	0.057	0.059	0.049	0.081	0.0061	0.0063	0.0053	0.0071	0.0059	0.0048	0.0065	0.013	0.0014
Beryllium, Total	mg/L	0.0001	0.000098	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.016	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.023	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron, Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.027	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.023	0.005	0.005	0.005	0.013	0.005	0.005	0.005	0.015	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.000005	0.0000049	0.000005	0.000005	0.000005	0.0000056	0.000054	0.000045	0.00003	0.000021	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Cadmium, Total	mg/L	0.0000056	0.0000059	0.000005	0.000005	0.000005	0.0000064	0.000065	0.000054	0.000035	0.000027	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000012
Calcium, Dissolved	mg/L	6.4	9.3	5.6	5.5	5.9	10	7.4	6.4	6.2	7	97.3	94.5	87.8	131	2.1	2.1	2.1	2.3	5	5.2	5.6	9.3	5.2
Chloride	mg/L	0.25	0.25	0.25	0.25	0.25	0.25	1.5	1.7	1.1	1.9	6.7	6.2	6.5	8.7	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Chromium (Hexavalent)	mg/L	0.00005	0.00014	0.00024	0.00017	0.00015	0.0002	0.00017	0.00014	0.00021	0.00021	0.00005	0.00005	0.00005	0.00016	0.00005	0.00011	0.00005	0.00017	0.00019	0.00005	0.00016	0.00019	0.00005
Chromium, Dissolved	mg/L	0.00005	0.00014	0.00024	0.00017	0.00015	0.0002	0.00017	0.00014	0.00021	0.00021	0.00005	0.00005	0.00005	0.00016	0.00005	0.00011	0.00005	0.00017	0.00019	0.00005	0.00016	0.00019	0.00005
Chromium, Total	mg/L	0.00027	0.00016	0.0003	0.00046	0.00037	0.00028	0.00029	0.00022	0.00024	0.00031	0.00005	0.00016	0.00005	0.00023	0.00005	0.00012	0.00005	0.00017	0.00033	0.00021	0.00026	0.00023	0.00005
Cobalt, Dissolved	mg/L	0.0001	0.00012	0.0001	0.0001	0.0001	0.0001	0.004	0.0026	0.00029	0.0008	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00024	0.0001
Cobalt, Total	mg/L	0.0001	0.00012	0.0001	0.0001	0.00012	0.0001	0.004	0.0029	0.00081	0.00081	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00011	0.00025	0.0001
Copper, Dissolved	mg/L	0.00069	0.00077	0.0005	0.00062	0.00073	0.00082	0.0046	0.0042	0.0036	0.0035	0.0001	0.0003	0.00025	0.00066	0.00024	0.00027	0.00026	0.00039	0.00039	0.00048	0.00053	0.00075	0.0001
Copper, Total	mg/L	0.00081	0.00077	0.001	0.00062	0.00073	0.0018	0.0057	0.005	0.0044	0.0035	0.00032	0.00048	0.00026	0.00066	0.00038	0.00034	0.00032	0.00048	0.00085	0.00049	0.00055	0.00079	0.0001
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00088	0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0025
Cyanide (Weak Acid Dissociable)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00088	0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0025
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0011	0.0005	0.0005	0.00088	0.0005	0.0005	0.0025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0025
Fluoride	mg/L	0.045	0.051	0.039	0.037	0.042	0.055	0.07	0.054	0.057	0.065	0.042	0.038	0.042	0.053	0.06	0.053	0.057	0.064	0.039	0.037	0.039	0.046	0.051
Hardness (as $CaCO_3$)	mg/L	21.7	30.2	18.3	17.4	19	33.1	37.4	22.4	22.6	22.5	291	283	264	392	8.1	8.3	7.9	8.6	16.6	17	18.8	29.7	18.2
Iron, Dissolved	mg/L	0.092	0.88	0.12	0.64	0.22	0.58	0.52	0.5	0.31	0.94	0.051	0.22	0.1	0.35	0.21	0.51	0.13	0.058	0.16	0.54	0.14	0.59	0.08
Iron, Total	mg/L	0.21	0.88	0.42	0.84	0.61	0.66	0.78	0.98	0.74	1	0.069	0.31	0.16	0.42	0.29	0.83	0.26	0.1	0.3	0.97	0.31	0.86	0.18
Lead, Dissolved	mg/L	0.000045	0.000044	0.000045	0.00023	0.000064	0.000045	0.000082	0.000045	0.000063	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045
Lead, Total	mg/L	0.000074	0.000044	0.00012	0.00024	0.00023	0.000094	0.0001	0.00013	0.000094	0.000045	0.000045	0.0002	0.00005	0.000045	0.000045	0.000045	0.000045	0.000045	0.00016	0.00015	0.00015	0.000085	0.000045
Magnesium, Dissolved	mg/L	1.2	1.7	0.99	0.88	0.9	1.8	1.9	1.5	1.4	1.3	11.6	11.3	10.7	16	0.55	0.61	0.6	0.68	0.9	0.92	0.97	1.6	1.1
Manganese, Dissolved	mg/L	0.011	0.3	0.012	0.0053	0.0074	0.14	0.078	0.14	0.014	0.049	0.1	0.72	0.27	1.1	0.0048	0.02	0.0063	0.0027	0.0061	0.025	0.0025	0.19	0.0067
Manganese, Total	mg/L	0.034	0.3	0.025	0.041	0.05	0.15	0.079	0.15	0.034	0.052	0.13	0.84	0.28	1.2	0.0081	0.026	0.011	0.0045	0.022	0.036	0.042	0.2	0.021
Mercury, Dissolved	mg/L	0.0000017	0.0000012	0.000003	0.0000026	0.0000028	0.000002	0.0000012	0.0000019	0.0000015	0.0000015	0.0000018	0.0000018	0.0000014	0.0000018	0.0000005	0.0000013	0.0000005	0.00000025	0.0000034	0.0000026	0.0000021	0.0000018	0.0000017
Mercury, Total	mg/L	0.0000018	0.0000012	0.000003	0.0000033	0.0000032	0.0000021	0.0000012	0.0000022	0.0000021	0.0000016	0.0000018	0.0000029	0.0000019	0.0000033	0.0000005	0.0000018	0.0000005	0.00000058	0.0000034	0.0000028	0.0000024	0.000002	0.0000017
Molybdenum, Dissolved	mg/L	0.00015	0.00019	0.000056	0.00005	0.000083	0.00005	0.000072	0.000062	0.000057	0.000084	0.000051	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000051	0.00005	0.00005	0.00005	0.00005
Molybdenum, Total	mg/L	0.00015	0.00019	0.0001	0.0001	0.0001	0.0001	0.00011	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Nickel, Dissolved	mg/L	0.0002	0.00025	0.00025	0.00024	0.0002	0.00052	0.22	0.12	0.093	0.031	0.00055	0.00061	0.00069	0.0008	0.0002	0.0002	0.0002	0.0002	0.00025	0.0002	0.0002	0.00051	0.0002
Nickel, Total	mg/L	0.00024	0.00025	0.00082	0.00024	0.00057	0.00061	0.23	0.12	0.096	0.032	0.00061	0.00064	0.00075	0.00091	0.0002	0.00099	0.0002	0.0002	0.0007	0.0002	0.00024	0.00051	0.0002
Nitrate + Nitrite (as N)	mg/L	0.025	0.24	0.025	0.025	0.025	0.075	0.025	0.025	0.025	0.14	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.048	0.025	0.025	0.23	0.025
Nitrite, Field	mg/L	0.019	0.033	0.025	0.023	0.021	0.066	0.022	0.025	0.025	0.011	0.017	0.015	0.0096	0.025	0.0046	0.0094	0.015	0.016	0.033	0.025	0.018	0.011	0
pH, Field	ph Unit	7.4	6.1	7.1	7.1	7.3	6.3	7.3	7.6	7.1	8.6	7.6	7.7	7.9	6.9	7.1	7.5	7.5	7.4	6.7	6.7	7.1	6.4	7.2
Phosphorus, Total	mg/L	0.027	0.024	0.041	0.033	0.034	0.03	0.021	0.02	0.017	0.027	0.015	0.04	0.031	0.026	0.005	0.03	0.014	0.026	0.046	0.038	0.033	0.032	0.016
Potassium, Dissolved	mg/L	0.79	1.1	0.65	0.61	0.59	0.94	0.87	0.86	0.76	1	5.2	5.8	6	8.1	0.55	0.62	0.56	0.67	0.53	0.59	0.59	0.82	0.52
Radium-226	Bq/L	0.005	0.0049	0.005	0.005	0.005	0.0058	0.005	0.005	0.005	0.005	0.005	0.015	0.011	0.013	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Selenium, Dissolved	mg/L	0.000052	0.000065	0.000063	0.00005	0.000052	0.00005	0.000052	0.00005	0.000052	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Selenium, Total	mg/L	0.000056	0.000065	0.000068	0.00005	0.000055	0.00005	0.000061	0.00005	0.000052	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000062	0.00005	0.000051	0.00005	0.00005
Silicon, Dissolved	mg/L	0.5	0.95	0.82	1.1	0.85	1.5	2.7	2.7	2.2	4.8	6.4	5.4	7.2	8.9	2.5	2.5	2.6	2.8	0.96	1	0.69	2.1	0.54
Silicon, Total	mg/L	0.61	0.96	0.95	1.3	1.2	1.7	2.7	2.8	2.4	4.9	6.8	5.4	7.2	9.2	2.8	2.7	2.6	2.8	1.1	1.3	0.76	2.2	0.55
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1.1	1.4	0.91	0.8	0.81	1.4	1.8	1.6	1.5	2.2	8.1	7.4	7.8	10.3	1	1.1	1.1	1.3	0.84	0.77	0.77	1.3	1
Sodium, Total	mg/L	1.2	1.5	0.92	0.8	0.88	1.4	1.9	1.6	1.5	2.3	8.4	7.7	8	10.6	1	1.1	1.1	1.4	0.97	0.81	0.84	1.3	1
Strontium, Dissolved	mg/L	0.015	0.023	0.012	0.011	0.014	0.022	0.027	0.02	0.019	0.025	0.14	0.15	0.15	0.21	0.012	0.01	0.011	0.013	0.011	0.012	0.012	0.02	0.0027
Strontium, Total	mg/L	0.017	0.023	0.012	0.011	0.014	0.022	0.029	0.021	0.019	0.026	0.15	0.15	0.17	0.22	0.013	0.012	0.012	0.014	0.011	0.012	0.013	0.021	0.0027
Sulfate,	mg/L	0.93	0.82	0.59	0.48	0.61	0.63	29	16.1	10.9	6	207	185	191	255	1.2	1.1	1.1	1.4	0.61	0.15	0.68	0.56	0.15
Temperature, Field	Deg. C	22.6	0.29	16.3	15.4	20.1	0.55	16.6	16.9	20.8	1.2	15.7	20	22.7	0.36	13.1	15.1	20.9	0.085	15.5	15.9	20.1	1.2	15.7
Thallium, Dissolved	mg/L	0.00005	0.000048	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Thallium, Total	mg/L	0.00005	0.000048	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Total Suspended Solids,	mg/L	4.1	1	11	11.2	11.1	1	2.8	4.6	1	1	1	39.6	12.3	1	1	8.9	1	1	6	8.7	4	1	6.7
Uranium, Dissolved	mg/L	0.00005	0.000049	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Uranium, Total	mg/L	0.00005	0.000049	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Vanadium, Total	mg/L	0.00025	0.00024	0.00038	0.00054	0.0006	0.00024	0.00025	0.00024	0.00025	0.0001	0.0001	0.00024	0.00027	0.0001	0.0001	0.00029	0.0001	0.0001	0.00035	0.00034	0.00028	0.00029	0.0001
Zinc, Dissolved	mg/L	0.0005	0.0011	0.0021	0.0015	0.0062	0.0029	0.033	0.07	0.025	0.014	0.0013	0.0015	0.001	0.0015	0.0005	0.0013	0.0005	0.0014	0.0011	0.0014	0.0021	0.0026	0.0005
Zinc, Total	mg/L	0.0015	0.0015	0.0021	0.0015	0.0072	0.0033	0.036	0.07	0.028	0.015	0.0015	0.0018	0.0023	0.0017	0.0005	0.0013	0.0005	0.0014	0.0016	0.0014	0.0088	0.0042	0.0011

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-2: Observed water quality - 95th percentile

Site/Season	Unit	AQM22 Spring	AQM22 Summer	AQM22 Winter	AQM28 Fall	AQM28 Spring	AQM28 Summer	AQM28 Winter	AQM29 Fall	AQM29 Spring	AQM29 Summer	AQM29 Winter	AQM29B Fall	AQM29B Spring	AQM29B Summer	AQM29B Winter	AQM3 Fall	AQM3 Spring	AQM3 Summer	AQM3 Winter	AQM30 Fall	AQM30 Spring	AQM30 Summer	AQM30 Winter
Statistics		**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**
Parameter																								
Acidity as $CaCO_3$	mg/L	7.9	3.6	29.7	3.2	5.2	3.2	9.4	2.9	4.2	2.2	7.2	2.6	2.3	1	4.4	2.8	3.1	2.4	5.9	3	4.2	2.3	5.3
Alkalinity, Total (as $CaCO_3$)	mg/L	21.8	16.6	68.1	9	10.8	10.6	17.1	8.5	7.8	8.8	11.9	8.7	7.5	8.8	10.2	8.9	8.8	8.7	10.5	9.8	9.4	10	13.7
Aluminum, Dissolved	mg/L	0.019	0.019	0.043	0.15	0.21	0.13	0.15	0.017	0.022	0.018	0.017	0.026	0.034	0.014	0.016	0.0071	0.01	0.0042	0.0088	0.063	0.086	0.044	0.04
Aluminum, Total	mg/L	0.036	0.029	0.053	0.31	0.45	0.25	0.22	0.042	0.13	0.061	0.03	0.045	0.092	0.043	0.028	0.069	0.03	0.025	0.015	0.1	0.14	0.073	0.058
Ammonia (as N)	mg/L	0.071	0.015	0.78	0.022	0.019	0.005	0.082	0.005	0.028	0.023	0.05	0.02	0.015	0.015	0.034	0.005	0.005	0.026	0.046	0.005	0.005	0.005	0.049
Antimony, Dissolved	mg/L	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001
Antimony, Total	mg/L	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.00041	0.00005	0.0001	0.0001	0.0001
Arsenic, Dissolved	mg/L	0.00016	0.00021	0.00046	0.00027	0.00023	0.00023	0.00022	0.00017	0.00014	0.00015	0.00017	0.00018	0.00012	0.00017	0.00016	0.00016	0.00012	0.00014	0.0002	0.00018	0.00018	0.0002	0.00018
Arsenic, Total	mg/L	0.00016	0.00022	0.00055	0.00029	0.00024	0.00023	0.00028	0.00018	0.00017	0.00018	0.00018	0.0002	0.00018	0.00021	0.00019	0.00021	0.00016	0.00017	0.0002	0.00023	0.00018	0.00021	0.00021
Barium, Dissolved	mg/L	0.0015	0.00071	0.011	0.0089	0.0084	0.0075	0.01	0.0051	0.0061	0.005	0.0075	0.005	0.0052	0.0054	0.0071	0.0048	0.005	0.0049	0.0071	0.0069	0.0059	0.0051	0.0076
Barium, Total	mg/L	0.0021	0.0014	0.013	0.0093	0.0087	0.0083	0.011	0.0059	0.0062	0.0063	0.0078	0.0053	0.0061	0.0061	0.0073	0.0064	0.005	0.0053	0.0072	0.0072	0.0064	0.0059	0.008
Beryllium, Total	mg/L	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.0001	0.0001
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0098	0.005	0.005	0.005	0.012
Boron, Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.021	0.005	0.005	0.005	0.016
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.22	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000032	0.000073	0.000031	0.000042	0.0000025	0.000005	0.000005	0.000005	0.0000025	0.000006	0.0000025	0.0000025	0.000005	0.000005	0.000005	0.000005	0.000012	0.000015	0.0000055	0.0000054
Cadmium, Total	mg/L	0.000005	0.000005	0.000005	0.000035	0.000074	0.000038	0.000042	0.0000025	0.000005	0.000012	0.000005	0.0000071	0.0000089	0.000019	0.0000025	0.000005	0.000005	0.000005	0.000005	0.000012	0.000016	0.000011	0.000013
Calcium, Dissolved	mg/L	5.8	5.6	18.9	12.4	8.4	7.4	8.1	2.6	3.2	3	3.6	3.3	2.8	3	3.4	2.3	2.3	2.5	2.7	6.3	3.9	4.4	4
Chloride	mg/L	0.25	0.25	0.25	1.3	1.3	1.3	1.6	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.66	0.63	0.63	0.64
Chromium (Hexavalent)	mg/L	0.00005	0.00005	0.00015	0.0002	0.00015	0.00015	0.00017	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005		0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium, Dissolved	mg/L	0.00005	0.00005	0.00015	0.0002	0.00015	0.00015	0.00018	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Chromium, Total	mg/L	0.00005	0.00005	0.0003	0.00038	0.00048	0.00041	0.00053	0.00013	0.0002	0.00014	0.00014	0.00014	0.00019	0.00023	0.00005	0.00013	0.0001	0.00027	0.00016	0.00023	0.00018	0.00016	0.00023
Cobalt, Dissolved	mg/L	0.0001	0.0001	0.0001	0.0019	0.0091	0.0017	0.0019	0.00005	0.0001	0.0001	0.0001	0.00014	0.00029	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.00033	0.00061	0.0001	0.00024
Cobalt, Total	mg/L	0.0001	0.0001	0.00025	0.0021	0.0091	0.002	0.002	0.00005	0.00021	0.0001	0.00012	0.00017	0.00042	0.00015	0.00011	0.0001	0.0001	0.0001	0.0001	0.0004	0.00086	0.0003	0.00024
Copper, Dissolved	mg/L	0.0001	0.0001	0.0001	0.0074	0.034	0.0063	0.0049	0.00048	0.0008	0.00073	0.0008	0.00072	0.0017	0.00091	0.00025	0.00039	0.00028	0.0005	0.00041	0.0029	0.0042	0.0022	0.0012
Copper, Total	mg/L	0.0001	0.00048	0.00072	0.0093	0.037	0.0077	0.005	0.0006	0.0011	0.00098	0.00097	0.00085	0.0017	0.00093	0.00025	0.00042	0.00028	0.0005	0.00059	0.0034	0.0047	0.0036	0.0014
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.041	0.047	0.11	0.064	0.059	0.065	0.061	0.053	0.051	0.058	0.069	0.057	0.049	0.056	0.059	0.082	0.051	0.055	0.07	0.058	0.053	0.059	0.068
Hardness (as $CaCO_3$)	mg/L	18.6	19.6	60.4	38.3	30.7	26.2	30.2	9.4	11.3	10.8	13	11.3	10	10.6	12.3	8.5	8.3	9.2	10.5	20	14.1	15.6	14.4
Iron, Dissolved	mg/L	0.48	0.048	2.3	0.48	0.48	0.4	0.72	0.089	0.22	0.12	0.18	0.11	0.17	0.086	0.16	0.036	0.059	0.039	0.028	0.19	0.29	0.08	0.18
Iron, Total	mg/L	0.87	0.21	2.3	0.85	1	0.75	1.1	0.3	0.44	0.29	0.29	0.27	0.38	0.24	0.3	0.55	0.23	0.18	0.061	0.35	0.53	0.26	0.34
Lead, Dissolved	mg/L	0.000045	0.000045	0.000045	0.00005	0.000045	0.000045	0.000045	0.000025	0.000045	0.000051	0.000045	0.000025	0.000025	0.000025	0.000025	0.000045	0.000045	0.000045	0.000045	0.000025	0.000045	0.000045	0.000045
Lead, Total	mg/L	0.000045	0.000045	0.00051	0.000093	0.000045	0.00032	0.000045	0.000025	0.000045	0.000057	0.000045	0.000025	0.000025	0.00028	0.000025	0.000045	0.000045	0.000045	0.000045	0.000025	0.000045	0.000051	0.000045
Magnesium, Dissolved	mg/L	1.1	1.2	3.2	2	2.1	1.7	1.7	0.71	0.77	0.78	0.97	0.75	0.74	0.75	0.92	0.66	0.64	0.67	0.82	1.1	0.98	1.1	1
Manganese, Dissolved	mg/L	0.05	0.005	0.75	0.046	0.12	0.044	0.064	0.0078	0.022	0.011	0.015	0.0073	0.017	0.0078	0.011	0.0018	0.0066	0.0024	0.0023	0.014	0.038	0.0026	0.015
Manganese, Total	mg/L	0.062	0.033	0.81	0.054	0.12	0.069	0.071	0.026	0.036	0.032	0.02	0.018	0.028	0.036	0.015	0.035	0.012	0.028	0.0053	0.023	0.054	0.018	0.019
Mercury, Dissolved	mg/L	0.0000016	0.0000018	0.000002	9.8E-07	0.0000019	0.0000018	0.00000088	0.0000007	0.0000011	0.0000008	0.0000011	0.0000006	0.0000011	0.000001	0.0000006	0.00000068	0.00000089	0.00000078	0.0000007	0.0000006	0.0000018	0.0000009	0.0000006
Mercury, Total	mg/L	0.0000032	0.0000023	0.000002	0.000001	0.0000028	0.0000022	0.0000014	0.0000008	0.0000019	0.0000013	0.0000012	0.00000079	0.0000013	0.000001	0.0000006	0.00000068	0.00000089	0.00000088	0.00000086	0.0000008	0.0000023	0.0000027	0.00000088
Molybdenum, Dissolved	mg/L	0.00005	0.00005	0.00005	0.000075	0.00005	0.000064	0.00005	0.000065	0.00005	0.000025	0.00005	0.000055	0.000025	0.000052	0.00005	0.000058	0.00005	0.00005	0.00005	0.000058	0.00005	0.00005	0.00005
Molybdenum, Total	mg/L	0.0001	0.0001	0.0001	0.000099	0.0001	0.0001	0.0001	0.000097	0.0001	0.000025	0.0001	0.000067	0.000025	0.000085	0.00005	0.0001	0.0001	0.0001	0.0001	0.000097	0.0001	0.0001	0.0001
Nickel, Dissolved	mg/L	0.0002	0.0002	0.0002	0.16	0.3	0.14	0.12	0.0022	0.0064	0.0088	0.014	0.0094	0.015	0.0066	0.0059	0.0002	0.00024	0.0002	0.0002	0.039	0.041	0.039	0.023
Nickel, Total	mg/L	0.0002	0.0002	0.0002	0.17	0.3	0.15	0.12	0.0025	0.0068	0.0096	0.014	0.01	0.017	0.0076	0.0063	0.0012	0.00024	0.00024	0.0002	0.041	0.042	0.042	0.023
Nitrate + Nitrite (as N)	mg/L	0.025	0.025	0.025	0.025	0.063	0.025	0.12	0.025	0.025	0.025	0.11	0.049	0.05	0.05	0.087	0.025	0.025	0.025	0.085	0.025	0.025	0.025	0.098
Nitrite, Field	mg/L	0.0098	0.0038	0.025	0.025	0.023	0.023	0.0082	0.013	0.013	0.015	0.0094	0.036	0.004	0.014	0.013	0.002	0.012	0.015	0.023	0.02	0	0.0037	0.024
pH, Field	ph Unit	6.6	6.4	6.8	7	7.1	7.3	6.6	7.1	6.7	7.6	7.1	6.9	7.1	6.6	7	7.2	7.1	7.3	6.7	7.3	7.6	7.7	7.5
Phosphorus, Total	mg/L	0.034	0.024	0.036	0.02	0.02	0.023	0.024	0.022	0.02	0.024	0.016	0.022	0.01	0.01	0.017	0.02	0.016	0.018	0.026	0.022	0.018	0.015	0.017
Potassium, Dissolved	mg/L	0.63	0.54	1.6	0.89	0.88	0.79	0.98	0.58	0.63	0.63	0.73	0.59	0.57	0.56	0.7	0.54	0.54	0.58	0.7	0.63	0.66	0.62	0.75
Radium-226	Bq/L	0.005	0.005	0.005	0.0049	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0038			0.003	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Selenium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.000025	0.00005	0.000056	0.00005	0.000025	0.00005	0.00005	0.00005	0.000025	0.000025	0.000025	0.000025	0.00005	0.00005	0.00005	0.00005	0.000025	0.00005	0.00005	0.00005
Selenium, Total	mg/L	0.00005	0.00005	0.00005	0.000057	0.00005	0.000058	0.00005	0.000025	0.00005	0.00005	0.00005	0.000025	0.000025	0.00007	0.000062	0.00005	0.00005	0.000053	0.00005	0.000025	0.00005	0.000061	0.00005
Silicon, Dissolved	mg/L	0.63	0.54	2.3	2.8	2.6	2	4.3	2.6	2.3	2.2	3.6	2.3	1.9	2	3	2.4	2.3	2.3	3.3	2.2	2	2	3.7
Silicon, Total	mg/L	0.63	0.59	2.3	2.9	2.9	2.2	4.6	2.7	2.6	2.4	3.8	2.4	2.1	2.1	3.1	2.7	2.3	2.3	3.5	2.5	2.1	2.2	3.8
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1	1	2.6	1.9	1.7	1.6	2	1	1.1	1.2	1.5	1.1	1	1	1.4	1.1	1	1	1.4	1.4	1.1	1.3	1.5
Sodium, Total	mg/L	1	1.1	2.8	1.9	1.8	1.7	2.1	1.1	1.1	1.2	1.6	1.2	1.1	1.2	1.4	1.1	1	1.1	1.4	1.5	1.9	1.3	1.5
Strontium, Dissolved	mg/L	0.0038	0.0026	0.013	0.027	0.024	0.023	0.024	0.012	0.013	0.012	0.016	0.013	0.012	0.014	0.016	0.011	0.011	0.013	0.015	0.019	0.014	0.015	0.017
Strontium, Total	mg/L	0.0038	0.0029	0.014	0.03	0.026	0.024	0.026	0.013	0.014	0.014	0.017	0.014	0.012	0.015	0.016	0.012	0.012	0.013	0.016	0.02	0.014	0.017	0.017
Sulfate,	mg/L	0.15	0.15	0.15	29.4	21.6	16.2	13.2	1.9	2.6	1.9	1.9	3.7	2.4	1.7	1.6	1.2	1	0.97	1.4	11.7	4.6	5.7	3.7
Temperature, Field	Deg. C	16.6	20.7	0.58	11.5	9.5	20.1	-0.1	11.8	16.5	21.7	-0.1	11	10	19.7	-0.1	14	6.9	20.3	0.78	12.4	16.8	20.3	0.1
Thallium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.000005	0.00005	0.00005	0.00005	0.000005	0.00005	0.000005	0.00005	0.000005	0.000005	0.000005	0.000005	0.00005	0.00005	0.00005	0.00005	0.000005	0.00005	0.000005	0.00005
Thallium, Total	mg/L	0.00005	0.00005	0.00005	0.000005	0.00005	0.00005	0.00005	0.000005	0.00005	0.000005	0.00005	0.000005	0.000005	0.000005	0.000005	0.00005	0.00005	0.00005	0.00005	0.000005	0.00005	0.000005	0.00005
Total Suspended Solids,	mg/L	7.2	8.4	10.2	2.6	10.9	3.8	1	1	6.2	3.5	1	3.9	3.1	1	1	7.8	2.9	3.5	1	3.5	1	2.5	1
Uranium, Dissolved	mg/L	0.00005	0.00005	0.00005	0.000047	0.00005	0.00005	0.00005	0.000047	0.00005	0.00005	0.00005	0.00002	0.000016	0.000017	0.000016	0.00005	0.00005	0.00005	0.00005	0.000048	0.00005	0.00005	0.00005
Uranium, Total	mg/L	0.00005	0.00005	0.00005	0.000048	0.00005	0.00005	0.00005	0.000047	0.00005	0.00005	0.00005	0.000023	0.000024	0.000027	0.000021	0.00005	0.00005	0.00005	0.00005	0.000048	0.00005	0.00005	0.00005
Vanadium, Total	mg/L	0.0001	0.0001	0.0001	0.00025	0.0001	0.0001	0.0001	0.00025	0.00027	0.0001	0.0001	0.00025	0.00025	0.00025	0.00025	0.00025	0.0001	0.0001	0.0001	0.00025	0.0001	0.0001	0.0001
Zinc, Dissolved	mg/L	0.0005	0.0005	0.005	0.03	0.041	0.021	0.039	0.0014	0.0017	0.0034	0.0047	0.0028	0.0043	0.0022	0.0015	0.0012	0.0012	0.0022	0.0021	0.0093	0.01	0.0055	0.009
Zinc, Total	mg/L	0.0005	0.0062	0.005	0.031	0.041	0.021	0.039	0.0015	0.0043	0.0043	0.0047	0.0033	0.0065	0.0036	0.0015	0.0015	0.0014	0.0043	0.0021	0.011	0.01	0.0073	0.009

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-2: Observed water quality - 95th percentile

Site/Season	Unit	AQM31 Fall	AQM31 Spring	AQM31 Summer	AQM31 Winter	AQM4 Fall	AQM4 Spring	AQM4 Summer	AQM4 Winter	AQM5 Fall	AQM5 Spring	AQM5 Summer	AQM5 Winter	AQM66 Fall	AQM66 Spring	AQM66 Summer	AQM66 Winter	AQM67 Fall	AQM67 Spring	AQM67 Summer	AQM67 Winter	AQM68 Fall	AQM68 Spring	AQM68 Summer
Statistics		**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**
Parameter																								
Acidity as $CaCO_3$	mg/L	3.4	4.5	4.6	23.8	5	3.2	2.9	4.4	3.2	8.2	3.4	15	7.4	3.1	7.9	8.1	3.2	2.8	2.4	4.5	3.5	3	2.5
Alkalinity, Total (as $CaCO_3$)	mg/L	7.1	5.8	6	24	8.6	9.5	8.6	10.1	11.9	16	11.8	25	43.8	24	30.7	35.3	9.5	9	10	12.7	13.3	13.4	13.2
Aluminum, Dissolved	mg/L	0.03	0.025	0.041	0.071	0.014	0.022	0.0087	0.0098	0.056	0.09	0.052	0.09	0.03	0.032	0.034	0.017	0.059	0.066	0.025	0.043	0.021	0.055	0.03
Aluminum, Total	mg/L	0.057	0.036	0.1	0.083	0.029	0.044	0.047	0.017	0.083	0.11	0.098	0.1	0.15	0.075	0.052	0.049	0.095	0.12	0.075	0.064	0.04	0.098	0.05
Ammonia (as N)	mg/L	0.005	0.005	0.029	0.3	0.005	0.005	0.033	0.039	0.005	0.031	0.061	0.13	0.005	0.039	0.025	0.12	0.005	0.016	0.0098	0.048	0.005	0.005	0.012
Antimony, Dissolved	mg/L	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.000098	0.00005	0.00005	0.00005	0.000098	0.00005	0.00005	0.00005	0.000098	0.00005
Antimony, Total	mg/L	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.000098	0.00005	0.00005	0.00005	0.000098	0.00005	0.00005	0.00005	0.000098	0.00005
Arsenic, Dissolved	mg/L	0.00019	0.00012	0.0002	0.00034	0.00015	0.00014	0.00016	0.00015	0.00029	0.00022	0.00028	0.00033	0.00032	0.00028	0.00043	0.0003	0.00018	0.00016	0.0002	0.00018	0.00019	0.00018	0.00017
Arsenic, Total	mg/L	0.00026	0.0002	0.00022	0.00035	0.00023	0.00014	0.00018	0.00015	0.00032	0.00026	0.00028	0.00039	0.00044	0.00044	0.00043	0.00042	0.00024	0.00023	0.00025	0.00024	0.00024	0.00021	0.00019
Barium, Dissolved	mg/L	0.0061	0.0043	0.0057	0.018	0.0056	0.0056	0.0051	0.0067	0.0063	0.0063	0.0056	0.015	0.013	0.011	0.014	0.016	0.0076	0.0057	0.0061	0.0082	0.0059	0.0064	0.0064
Barium, Total	mg/L	0.0063	0.0044	0.0068	0.019	0.0059	0.0061	0.006	0.016	0.0071	0.0066	0.0064	0.015	0.016	0.013	0.017	0.017	0.0077	0.007	0.0064	0.0087	0.0065	0.0069	0.0064
Beryllium, Total	mg/L	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005	0.000098	0.00005	0.00005	0.00005	0.000098	0.00005	0.00005	0.00005	0.000098	0.00005
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.013	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron, Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.013	0.005	0.012	0.005	0.013	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.0000025	0.000005	0.000005	0.000005	0.0000051	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.0000025	0.0000049	0.0000025	0.0000025	0.000011	0.000011	0.0000095	0.0000095	0.0000025	0.0000049	0.0000058
Cadmium, Total	mg/L	0.0000025	0.000005	0.000017	0.000005	0.0000051	0.000005	0.000005	0.000005	0.0000051	0.000005	0.000005	0.0000061	0.0000025	0.0000055	0.0000097	0.0000025	0.000012	0.000013	0.000012	0.0000095	0.0000054	0.0000063	0.0000083
Calcium, Dissolved	mg/L	3.2	2.7	3	7.6	2.6	2.7	2.6	2.8	4.5	5.3	4.4	8.6	13.5	7.8	10.6	11.2	6.3	3.9	4.1	4.4	4.7	4.8	4.9
Chloride	mg/L	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.1	1	1.1	2.1	0.25	0.25	0.25	0.25	0.7	0.25	0.55	0.6	0.54	0.52	0.25
Chromium (Hexavalent)	mg/L	0.00011	0.00012	0.00019	0.00029	0.00005	0.00005	0.00005	0.00005	0.00017	0.00014	0.00015	0.00022	0.00014	0.00011	0.00023	0.00005	0.00018	0.000098	0.000098	0.00012	0.00005	0.00005	0.00005
Chromium, Dissolved	mg/L	0.00011	0.00012	0.00019	0.00029	0.00005	0.00005	0.00005	0.00005	0.00017	0.00014	0.00015	0.00022	0.00014	0.00011	0.00023	0.00005	0.00018	0.000098	0.000098	0.00012	0.00005	0.00005	0.00005
Chromium, Total	mg/L	0.00026	0.0002	0.00054	0.0003	0.00014	0.000098	0.00014	0.00005	0.00025	0.00023	0.00024	0.00034	0.00044	0.00042	0.00042	0.00022	0.00023	0.00023	0.00024	0.00021	0.00018	0.00018	0.00016
Cobalt, Dissolved	mg/L	0.00005	0.0001	0.0001	0.00059	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00013	0.00005	0.000098	0.00005	0.00005	0.00016	0.000098	0.00005	0.00024	0.00005	0.000098	0.00005
Cobalt, Total	mg/L	0.00005	0.0001	0.0001	0.00066	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00015	0.00014	0.000098	0.00023	0.00005	0.00025	0.00047	0.0002	0.00033	0.00005	0.00024	0.00005
Copper, Dissolved	mg/L	0.0001	0.00027	0.00041	0.00032	0.00063	0.00051	0.00033	0.00037	0.00057	0.00086	0.00074	0.00092	0.0006	0.00091	0.00063	0.00078	0.0026	0.0037	0.0025	0.0016	0.0018	0.002	0.0018
Copper, Total	mg/L	0.00033	0.00027	0.001	0.00034	0.00065	0.00054	0.00033	0.00078	0.00065	0.001	0.00086	0.00093	0.0012	0.0011	0.00074	0.001	0.0031	0.0042	0.0032	0.0018	0.0023	0.0022	0.0022
Cyanide (Free)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.00098	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.034	0.027	0.031	0.046	0.059	0.056	0.056	0.065	0.079	0.064	0.073	0.1	0.051	0.037	0.041	0.034	0.055	0.044	0.054	0.052	0.055	0.049	0.046
Hardness (as $CaCO_3$)	mg/L	10.4	8.6	9.9	20.8	9.5	9.8	9.4	10.4	16.1	17.4	15	27.6	47	24.9	33.7	35.6	20.7	13.5	14.1	15.6	16.5	16.7	16.5
Iron, Dissolved	mg/L	0.44	0.67	0.48	6.7	0.095	0.14	0.057	0.07	0.067	0.47	0.075	0.69	0.24	0.15	0.13	0.38	0.15	0.24	0.088	0.24	0.059	0.18	0.054
Iron, Total	mg/L	0.8	1.3	0.93	7.6	0.22	0.29	0.26	0.12	0.25	0.72	0.29	0.77	0.62	0.3	0.42	0.53	0.29	0.43	0.24	0.39	0.13	0.37	0.1
Lead, Dissolved	mg/L	0.000025	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000025	0.000044	0.000025	0.000025	0.000052	0.000044	0.000025	0.000025	0.000025	0.000044	0.000025
Lead, Total	mg/L	0.00018	0.000045	0.00022	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.00012	0.000068	0.000045	0.000085	0.000056	0.00028	0.000025	0.000052	0.000044	0.00025	0.000025	0.000025	0.000044	0.0002
Magnesium, Dissolved	mg/L	0.57	0.45	0.51	1	0.68	0.7	0.69	0.81	0.95	0.9	0.88	1.5	3.2	1.3	1.7	1.9	1.2	0.94	0.93	1.1	1.2	1.1	1.1
Manganese, Dissolved	mg/L	0.0048	0.007	0.006	0.28	0.003	0.012	0.0044	0.013	0.0027	0.03	0.0041	0.18	0.018	0.041	0.027	0.056	0.0092	0.017	0.0067	0.038	0.0024	0.022	0.0021
Manganese, Total	mg/L	0.014	0.024	0.031	0.3	0.025	0.019	0.03	0.015	0.038	0.041	0.04	0.18	0.062	0.057	0.15	0.069	0.017	0.051	0.028	0.044	0.02	0.041	0.011
Mercury, Dissolved	mg/L	0.0000012	0.0000017	0.000002	0.000002	0.00000094	0.0000011	0.00000097	0.00000073	0.0000016	0.0000024	0.0000017	0.0000018	0.0000013	0.0000019	0.0000028	0.0000007	0.0000007	0.0000023	0.000001	0.0000006	0.0000007	0.0000021	0.000001
Mercury, Total	mg/L	0.0000012	0.0000022	0.0000022	0.0000024	0.00000096	0.0000011	0.0000012	0.00000097	0.0000016	0.0000033	0.0000023	0.0000018	0.0000024	0.000002	0.0000061	0.0000008	0.0000007	0.0000024	0.0000013	0.0000006	0.0000007	0.0000022	0.0000011
Molybdenum, Dissolved	mg/L	0.000025	0.00005	0.000025	0.0001	0.000055	0.00005	0.000052	0.00005	0.000058	0.00005	0.000051	0.00005	0.00015	0.00014	0.00012	0.0001	0.000057	0.00006	0.000054	0.000061	0.000094	0.000085	0.000078
Molybdenum, Total	mg/L	0.000025	0.0001	0.000025	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00017	0.00019	0.00014	0.00011	0.000062	0.000099	0.000054	0.00014	0.000094	0.000099	0.00011
Nickel, Dissolved	mg/L	0.00025	0.0002	0.0002	0.00044	0.00024	0.0002	0.0002	0.0002	0.00078	0.00073	0.00066	0.0012	0.00054	0.00025	0.00054	0.00051	0.038	0.026	0.021	0.022	0.015	0.017	0.016
Nickel, Total	mg/L	0.00059	0.0002	0.0002	0.00052	0.00024	0.00024	0.00025	0.0002	0.00083	0.00081	0.00097	0.0012	0.00093	0.00052	0.00086	0.00051	0.04	0.026	0.024	0.024	0.016	0.018	0.016
Nitrate + Nitrite (as N)	mg/L	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.097	0.025	0.025	0.025	0.025	0.049	0.049	0.049	0.1	0.049	0.049	0.049	0.087	0.049	0.13	0.049
Nitrite, Field	mg/L	0.024	0.025	0.018	0.022	0.025	0.02	0.025	0.038	0.02	0.0065	0.024	0.025	0.0095	0.02	0.002	0.021	0.048	0.031	0.022	0.03	0.02	0.058	0.024
pH, Field	ph Unit	6.7	6.7	6.8	6.2	7.8	7.2	7	6.7	7.7	7.4	7.4	6.9	6.5	6.4	6.5	6	7	6.5	7	6	7.2	6.6	7.1
Phosphorus, Total	mg/L	0.02	0.022	0.04	0.036	0.019	0.021	0.032	0.033	0.021	0.037	0.029	0.023	0.071	0.016	0.1	0.02	0.02	0.016	0.011	0.017	0.013	0.018	0.016
Potassium, Dissolved	mg/L	0.42	0.42	0.48	0.68	0.59	0.58	0.6	0.66	0.61	0.6	0.64	0.85	1.1	1.1	0.63	1.2	0.66	0.68	0.68	0.78	0.66	0.71	0.7
Radium-226	Bq/L	0.0049	0.0054	0.005	0.0084	0.011	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0044	0.0044	0.0081	0.0028	0.0038	0.0057	0.0036	0.0073	0.0038	0.0037	0.0038
Selenium, Dissolved	mg/L	0.000025	0.00005	0.000055	0.00005	0.00006	0.00005	0.00005	0.00005	0.000061	0.00005	0.00005	0.00005	0.000057	0.000049	0.000055	0.000025	0.000025	0.000049	0.000025	0.000054	0.000025	0.000049	0.000025
Selenium, Total	mg/L	0.000051	0.00005	0.000055	0.00005	0.000067	0.00005	0.00005	0.00005	0.000061	0.00005	0.00005	0.00005	0.000059	0.000057	0.000074	0.000064	0.000056	0.000055	0.000067	0.000054	0.000025	0.000049	0.000025
Silicon, Dissolved	mg/L	1.7	0.86	0.73	4.8	2.7	2.2	2.6	3.4	1.3	1.3	1.1	2.5	3.4	1.3	1.6	2.3	2.4	2	1.9	2.9	2	2.3	1.8
Silicon, Total	mg/L	1.7	0.93	0.88	5.3	2.7	2.3	2.8	3.4	1.3	1.4	1.2	2.5	3.7	1.4	1.7	2.5	2.5	2.5	2.2	3.3	2.2	2.4	1.9
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000016	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	0.67	0.59	0.58	1.2	1.1	1.1	1	1.3	1.3	1.2	1.1	2	1.3	0.9	0.84	1.2	1.4	1.1	1.1	1.5	1.1	1.2	1.1
Sodium, Total	mg/L	0.71	0.89	0.64	1.3	1.1	1.1	1.1	1.3	1.3	1.3	1.3	2	1.6	1	0.96	1.3	1.5	1.3	1.3	1.6	1.3	1.4	1.2
Strontium, Dissolved	mg/L	0.0089	0.0071	0.0084	0.021	0.013	0.013	0.013	0.015	0.014	0.016	0.015	0.028	0.025	0.017	0.023	0.024	0.018	0.014	0.015	0.018	0.015	0.015	0.015
Strontium, Total	mg/L	0.0096	0.0075	0.0095	0.022	0.013	0.013	0.014	0.016	0.017	0.017	0.016	0.029	0.031	0.017	0.026	0.024	0.02	0.016	0.016	0.018	0.015	0.016	0.019
Sulfate,	mg/L	0.15	0.15	0.15	0.34	1.1	1.1	1	1.8	1.1	1.3	1.1	2.2	4.7	1.7	2.2	1.2	11.9	3.8	3.6	3	3.6	2.6	2.3
Temperature, Field	Deg. C	11.6	16.5	19.9	0.47	15.2	16.1	20.2	0.1	15.4	19.6	21.2	0.82	8.1	15.2	20.2	-0.1	11.6	10.9	20.1	0	14.1	4.9	18.5
Thallium, Dissolved	mg/L	0.000005	0.00005	0.000005	0.00005	0.00005	0.00005	0.000005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000005	0.000048	0.000005	0.000005	0.000005	0.000048	0.000005	0.000005	0.000005	0.000048	0.000005
Thallium, Total	mg/L	0.000005	0.00005	0.000005	0.00005	0.00005	0.00005	0.000005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000005	0.000048	0.000005	0.000005	0.000005	0.000048	0.000005	0.000005	0.000005	0.000048	0.000005
Total Suspended Solids,	mg/L	5.4	5	3.5	17	3.4	6.1	5.8	1	4.4	6.4	5.9	8.1	48.5	1	10.9	1	2.7	2.4	2.5	1	1	2	1
Uranium, Dissolved	mg/L	0.000005	0.00005	0.000005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000016	0.000048	0.000012	0.000017	0.000018	0.000049	0.000019	0.000021	0.000023	0.000049	0.000027
Uranium, Total	mg/L	0.000046	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000033	0.000049	0.000019	0.000021	0.000027	0.000049	0.000029	0.000023	0.000027	0.000049	0.000039
Vanadium, Total	mg/L	0.00025	0.0001	0.00025	0.00032	0.0001	0.0001	0.0001	0.0001	0.00025	0.00032	0.00028	0.00021	0.00051	0.00025	0.00025	0.00025	0.00025	0.00024	0.00025	0.00025	0.00025	0.00024	0.00025
Zinc, Dissolved	mg/L	0.0016	0.0021	0.0012	0.0042	0.0015	0.0014	0.0015	0.0012	0.0005	0.0019	0.0015	0.0024	0.0011	0.0013	0.0005	0.0005	0.0089	0.0072	0.0044	0.0071	0.0022	0.0051	0.0015
Zinc, Total	mg/L	0.0017	0.0047	0.0039	0.0042	0.0015	0.0014	0.0015	0.0012	0.0005	0.0021	0.0015	0.0032	0.0032	0.0015	0.003	0.0015	0.0097	0.0074	0.0048	0.0084	0.0037	0.0051	0.0015

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-3-2: Observed water quality - 95th percentile

Site/Season	Unit	AQM68 Winter	AQM69 Summer	AQM69B Fall	AQM69B Spring	AQM69B Summer	AQM69B Winter	AQM7 Fall	AQM7 Spring	AQM7 Summer	AQM7 Winter	AQM70 Fall	AQM70 Spring	AQM70 Summer	AQM8 Fall	AQM8 Spring	AQM8 Summer	AQM8 Winter	AQM9 Fall	AQM9 Spring	AQM9 Summer	AQM9 Winter
Statistics		**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**	**P95**
Parameter																						
Acidity as $CaCO_3$	mg/L	4.2	2.3	2.7	1	1	3.4	3	3.8	2.8	4.3	2.2	3	2.2	3.5	3.3	1	5.9	3.1	10.5	2.3	5.4
Alkalinity, Total (as $CaCO_3$)	mg/L	13.5	30.7	41	30.9	42.6	17.5	8.5	8.9	10.9	10.8	44.7	37.1	34.9	8.6	7.6	8.7	11.5	10.3	11	10.1	14.3
Aluminum, Dissolved	mg/L	0.059	0.019	0.057	0.0098	0.013	0.015	0.013	0.021	0.011	0.0099	0.014	0.02	0.012	0.018	0.028	0.011	0.0082	0.061	0.092	0.032	0.062
Aluminum, Total	mg/L	0.064	0.27	0.28	0.077	0.12	0.049	0.043	0.097	0.046	0.027	0.43	0.23	0.4	0.046	0.087	0.051	0.026	0.096	0.092	0.057	0.08
Ammonia (as N)	mg/L	0.044	0.005	0.005	0.005	0.016	0.005	0.02	0.005	0.005	0.078	0.005	0.005	0.016	0.005	0.042	0.024	0.045	0.022	0.005	0.005	0.065
Antimony, Dissolved	mg/L	0.00028	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Antimony, Total	mg/L	0.00028	0.00005	0.00005	0.00005	0.00005	0.00024	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic, Dissolved	mg/L	0.00023	0.00028	0.00033	0.00023	0.00029	0.0002	0.00018	0.00015	0.00015	0.00021	0.00042	0.00024	0.00033	0.00017	0.00014	0.00017	0.00016	0.00023	0.00019	0.00019	0.00021
Arsenic, Total	mg/L	0.00025	0.00031	0.00035	0.00029	0.00033	0.00029	0.00019	0.00015	0.00017	0.00029	0.00044	0.00029	0.00036	0.00022	0.00019	0.0002	0.00018	0.00023	0.00023	0.00021	0.0003
Barium, Dissolved	mg/L	0.0086	0.009	0.011	0.0092	0.012	0.0074	0.0051	0.0057	0.0057	0.0079	0.013	0.0095	0.012	0.0051	0.0059	0.005	0.0078	0.0053	0.0056	0.0056	0.0091
Barium, Total	mg/L	0.0086	0.012	0.014	0.01	0.013	0.008	0.0057	0.0065	0.0062	0.008	0.016	0.012	0.015	0.0058	0.0066	0.006	0.0078	0.0058	0.0071	0.0057	0.0093
Beryllium, Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Boron, Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.011	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.019
Boron, Total	mg/L	0.013	0.005	0.0098	0.005	0.005	0.005	0.005	0.005	0.005	0.033	0.038	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.05
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cadmium, Dissolved	mg/L	0.000011	0.0000025	0.0000025	0.0000025	0.0000065	0.0000025	0.000005	0.000005	0.000005	0.000005	0.0000025	0.000005	0.0000025	0.000005	0.000005	0.000005	0.000005	0.000011	0.000022	0.0000057	0.000011
Cadmium, Total	mg/L	0.000011	0.0000025	0.0000025	0.0000025	0.0000078	0.0000025	0.000005	0.000021	0.000005	0.000005	0.000011	0.000005	0.0000049	0.000005	0.000005	0.000005	0.000005	0.000011	0.000022	0.0000096	0.000023
Calcium, Dissolved	mg/L	5	6.9	8.9	8	9.9	5.5	2.5	2.5	2.6	2.9	9.6	7.7	9	2.6	2.8	2.6	3.2	5.6	4	4.4	5.3
Chloride	mg/L	0.7	0.66	0.97	0.75	0.88	0.25	0.25	0.25	0.25	0.25	1.2	0.8	0.83	0.25	0.25	0.25	0.25	0.71	0.71	0.76	0.88
Chromium (Hexavalent)	mg/L	0.00018	0.00014	0.00011	0.00005		0.00011	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00005	0.00005	0.00005	0.000098	0.00005	0.00013	0.00005	0.00014
Chromium, Dissolved	mg/L	0.00018	0.00014	0.00011	0.00005	0.00005	0.00011	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00011	0.00005	0.00005	0.00005	0.000098	0.00005	0.00013	0.00005	0.00014
Chromium, Total	mg/L	0.00018	0.00051	0.0006	0.00023	0.00036	0.00031	0.00012	0.0005	0.00013	0.00021	0.00099	0.00045	0.00078	0.00013	0.00018	0.00034	0.0002	0.0002	0.0003	0.00019	0.00021
Cobalt, Dissolved	mg/L	0.00016	0.00005	0.00005	0.00005	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.00005	0.0001	0.00005	0.0001	0.0001	0.0001	0.0001	0.0001	0.00055	0.0001	0.00038
Cobalt, Total	mg/L	0.00017	0.0001	0.00014	0.00005	0.00005	0.00015	0.0001	0.0001	0.0001	0.0001	0.00023	0.0001	0.00015	0.0001	0.0001	0.0001	0.0001	0.00031	0.00067	0.00013	0.00043
Copper, Dissolved	mg/L	0.0031	0.00079	0.00074	0.00097	0.0007	0.00066	0.00055	0.00042	0.00036	0.00038	0.00054	0.00062	0.00077	0.00051	0.00047	0.00053	0.00035	0.0032	0.004	0.0033	0.0023
Copper, Total	mg/L	0.0031	0.00085	0.00093	0.001	0.00081	0.001	0.00057	0.00042	0.00047	0.0016	0.001	0.00087	0.0011	0.00062	0.00074	0.00076	0.00045	0.0036	0.0043	0.0035	0.0026
Cyanide (Free)	mg/L	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide (Weak Acid Dissociable)	mg/L	0.0005	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cyanide	mg/L	0.0005	0.001	0.0005	0.0005	0.0005	0.0017	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Fluoride	mg/L	0.053	0.071	0.088	0.069	0.075	0.055	0.058	0.056	0.083	0.069	0.093	0.08	0.077	0.057	0.05	0.058	0.07	0.057	0.052	0.057	0.081
Hardness (as $CaCO_3$)	mg/L	17.4	27.9	36.5	31.9	39.4	20.3	9.1	9.2	9.4	10.6	40.9	32	38.2	10.3	10	9.5	11.8	18.8	14.4	15.8	18.9
Iron, Dissolved	mg/L	0.26	0.053	0.039	0.036	0.018	0.066	0.091	0.18	0.079	0.1	0.02	0.068	0.033	0.13	0.19	0.12	0.12	0.17	0.32	0.11	0.14
Iron, Total	mg/L	0.3	0.29	0.3	0.1	0.13	0.12	0.31	0.37	0.23	0.25	0.49	0.3	0.44	0.31	0.4	0.3	0.23	0.31	0.55	0.19	0.2
Lead, Dissolved	mg/L	0.00007	0.000025	0.000025	0.000025	0.000025	0.000025	0.000045	0.000045	0.000045	0.000045	0.000025	0.000045	0.000025	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045	0.000045
Lead, Total	mg/L	0.00007	0.00011	0.00015	0.000025	0.00024	0.000051	0.000045	0.00012	0.000045	0.000045	0.0002	0.00013	0.00017	0.000045	0.000045	0.000045	0.000045	0.000045	0.000051	0.000054	0.000045
Magnesium, Dissolved	mg/L	1.2	2.6	3.5	2.9	3.6	1.6	0.68	0.66	0.68	0.83	4	3.1	3.8	0.69	0.71	0.69	0.91	1.2	0.98	1.1	1.4
Manganese, Dissolved	mg/L	0.029	0.00084	0.00068	0.0013	0.00072	0.0052	0.011	0.015	0.021	0.013	0.00092	0.0017	0.0011	0.01	0.0077	0.0094	0.011	0.0096	0.06	0.0035	0.014
Manganese, Total	mg/L	0.029	0.012	0.014	0.0051	0.009	0.0076	0.026	0.029	0.032	0.014	0.033	0.014	0.021	0.026	0.028	0.033	0.015	0.016	0.071	0.015	0.016
Mercury, Dissolved	mg/L	0.0000008	0.0000009	0.00000079	0.0000008	0.0000007	0.0000006	0.00000078	0.0000011	0.0000011	0.0000006	0.00000079	0.0000014	0.0000011	0.00000068	0.0000013	0.0000014	0.0000007	0.0000009	0.0000032	0.0000012	0.00000094
Mercury, Total	mg/L	0.0000014	0.000003	0.00000079	0.0000009	0.0000007	0.0000006	0.00000078	0.0000019	0.0000012	0.00000096	0.000001	0.0000018	0.0000013	0.00000088	0.0000026	0.0000014	0.00000091	0.0000009	0.0000041	0.0000017	0.0000013
Molybdenum, Dissolved	mg/L	0.000064	0.000079	0.00013	0.0001	0.00015	0.000059	0.000051	0.00005	0.000055	0.000056	0.00016	0.0001	0.00014	0.000051	0.00005	0.000064	0.00005	0.000059	0.00005	0.00005	0.000069
Molybdenum, Total	mg/L	0.000064	0.0001	0.00014	0.0001	0.00018	0.000073	0.0001	0.0001	0.0001	0.0001	0.00018	0.0001	0.00015	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Nickel, Dissolved	mg/L	0.028	0.00025	0.0023	0.0038	0.0019	0.00025	0.0002	0.0002	0.0002	0.0002	0.0005	0.00049	0.00072	0.00059	0.0006	0.00052	0.0002	0.043	0.034	0.027	0.045
Nickel, Total	mg/L	0.028	0.00069	0.0026	0.0042	0.0024	0.00025	0.0002	0.0002	0.00025	0.00024	0.0015	0.00075	0.0012	0.00071	0.00065	0.00073	0.00024	0.044	0.035	0.028	0.046
Nitrate + Nitrite (as N)	mg/L	0.077	0.025	0.049	0.05	0.05	0.081	0.025	0.025	0.025	0.073	0.049	0.025	0.049	0.025	0.025	0.025	0.11	0.025	0.025	0.025	0.1
Nitrite, Field	mg/L	0.016	0.01	0.049	0.038	0.029	0	0.025	0.013	0.0092	0.014	0.015	0.021	0.012	0.025	0.02	0.0084	0.028	0.013	0.025	0.013	0.01
pH, Field	ph Unit	6.5	7.5	7.5	7.3	7.4	6.6	7.3	7.3	7.6	7	7.1		7.5	7.7	7.3	7.5	7	7.6	7	7.3	7.1
Phosphorus, Total	mg/L	0.021	0.024	0.023	0.0066	0.0087	0.012	0.024	0.021	0.023	0.019	0.026	0.02	0.028	0.022	0.027	0.027	0.02	0.021	0.023	0.021	0.021
Potassium, Dissolved	mg/L	0.79	1	1.2	1	1.2	0.91	0.59	0.59	0.56	0.66	1.2	0.99	1.3	0.59	0.6	0.54	0.75	0.62	0.69	0.61	0.94
Radium-226	Bq/L	0.015	0.0034	0.0046			0.0028	0.005	0.005	0.005	0.005	0.0038	0.0038	0.0035	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Selenium, Dissolved	mg/L	0.000069	0.000025	0.000052	0.000025	0.000025	0.000025	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00006	0.00005	0.00005	0.00005	0.00005	0.000053	0.00005	0.00005	0.00005
Selenium, Total	mg/L	0.000077	0.000061	0.000054	0.000055	0.000068	0.000066	0.00005	0.00005	0.00005	0.00005	0.000054	0.00005	0.00006	0.00005	0.00005	0.00005	0.00005	0.000059	0.000054	0.000054	0.00005
Silicon, Dissolved	mg/L	3	1.3	1.7	1.4	0.98	1.4	2.6	2.4	2.5	3.5	1.5	1.1	1.4	2.6	2.4	2.3	3.6	2.1	1.8	1.9	4.1
Silicon, Total	mg/L	3.2	2	1.9	1.6	1.3	1.6	2.7	2.5	2.8	3.8	2	1.6	2.2	2.7	2.5	2.4	3.8	2.3	1.8	2	4.6
Silver, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Silver, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005
Sodium, Dissolved	mg/L	1.5	2	2.9	2.2	2.8	1.4	1.1	1	0.99	1.4	3.2	2.5	3	1.1	1	1	1.4	1.3	1.2	1.3	1.9
Sodium, Total	mg/L	1.6	2.2	2.9	2.2	3	2.6	1.1	1.1	1.1	1.5	3.8	2.5	3.1	1.1	1	1.1	1.5	1.5	1.2	1.4	2
Strontium, Dissolved	mg/L	0.019	0.026	0.031	0.027	0.036	0.02	0.012	0.012	0.013	0.015	0.036	0.028	0.035	0.013	0.013	0.012	0.016	0.018	0.014	0.016	0.02
Strontium, Total	mg/L	0.019	0.027	0.033	0.027	0.04	0.021	0.012	0.013	0.013	0.016	0.037	0.03	0.04	0.013	0.013	0.013	0.016	0.019	0.014	0.017	0.023
Sulfate,	mg/L	3.6	2.1	2.4	2.5	2	3.4	1.1	1.1	1	1.4	2.2	2	1.9	1.3	1.1	1.1	1.4	10.7	4.7	4.6	6.4
Temperature, Field	Deg. C	0	18.6	15.5	4.7	18.6	0.8	16.8	18.2	21.6	0.08	6	5.2	19.2	14	8.8	20.2	0.075	15.3	19.5	20.4	0.57
Thallium, Dissolved	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.00005	0.00005	0.00005	0.00005	0.000005	0.00005	0.000005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Thallium, Total	mg/L	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.00005	0.00005	0.00005	0.00005	0.000005	0.00005	0.000005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Total Suspended Solids,	mg/L	1	2.2	4.2	1	1	1	3.9	4.4	7.3	1	7.2	6.6	4.6	3.4	5.1	3.5	1	3	2.4	3	1
Uranium, Dissolved	mg/L	0.000023	0.000083	0.000079	0.000075	0.000086	0.000059	0.00005	0.00005	0.00005	0.00005	0.000082	0.00005	0.000081	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Uranium, Total	mg/L	0.000025	0.00011	0.00011	0.000091	0.0001	0.000068	0.00005	0.00005	0.00005	0.00005	0.00011	0.00012	0.00012	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Vanadium, Total	mg/L	0.00025	0.00066	0.00081	0.00025	0.00025	0.00025	0.0001	0.00024	0.00025	0.0001	0.001	0.0005	0.00091	0.0001	0.00024	0.0001	0.0001	0.00025	0.00024	0.0001	0.0001
Zinc, Dissolved	mg/L	0.0091	0.0005	0.0015	0.001	0.0005	0.0005	0.0015	0.001	0.0015	0.0024	0.0005	0.001	0.0015	0.0016	0.0014	0.0017	0.0012	0.0087	0.013	0.0042	0.017
Zinc, Total	mg/L	0.0097	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.001	0.0015	0.0024	0.0062	0.001	0.0015	0.0017	0.0014	0.0017	0.0015	0.01	0.013	0.0063	0.017

Note:

- Yellow indicates that the values were manipulated according to the following prescriptions:
  - If dissolved fraction > total, then dissolved fraction = total fraction;
  - If dissolved Cr VI (hexavalent) > dissolved Cr, then dissolved Cr VI (hexavalent) = dissolved Cr;
  - If free cyanide > WAD cyanide, then free cyanide = WAD cyanide;
  - If WAD cyanide > total cyanide, then WAD cyanide = total cyanide;
  - If nitrite (as N) > nitrate + nitrite (as N), then nitrite (as N) = nitrate + nitrite (as N).

Table E-4-1: Groundwater inputs for expected case

Name in model	Units	Background - Overburden	Background - Bedrock	MRSA	Historical Operations - Overburden	Historical Operations - Bedrock
Statistics		**Geomean**	**Geomean**	**Geomean**	**Geomean**	**Geomean**
Parameter						
T, Field	deg C	3.1	2.4	2.6	3.7	2.6
pH, Field	S.U.	6.9	7.1	6.4	6.4	6.9
Acidity_T	mg/L	11	5.6	15	18	11
Alkalinity_T	mg/L	60	87	53	38	86
Bromide	mg/L	0.05	0.061	0.15	0.061	0.056
Chloride	mg/L	0.35	0.51	0.76	0.87	0.64
Fluoride	mg/L	0.080	0.082	0.030	0.074	0.067
Sulfate	mg/L	3.5	9.3	820	21	35
Phosphorus_T	mg/L	0.012	0.013	0.0091	0.018	0.0058
N_Ammonia	N mg/L	0.10	0.048	0.065	0.12	0.043
Ammonia	mg/L	0.12	0.058	0.079	0.15	0.052
N_Nitrite	N mg/L	0.0086	0.012	0.015	0.0076	0.0089
Nitrite	mg/L	0.028	0.039	0.049	0.025	0.029
N_Nitrate_Nitrite	N mg/L	0.061	0.093	0.23	0.17	0.12
Nitrate+Nitrite	mg/L	0.47	0.72	1.8	1.3	0.93
Cyanide_T	mg/L	0.00060	0.00052	0.00050	0.00079	0.00063
Cyanide_F	mg/L	0.00094	0.00056	0.00050	0.00081	0.00062
Cyanide_WAD	mg/L	0.00060	0.00052	0.00050	0.00079	0.00057
Hardness	mg/L	58	99	868	68	146
Radium_226	Bq/L	0.039	0.018	0.014	0.052	0.006
TSS	mg/L	1280	277	1546	1849	115
Aluminum_D	mg/L	0.029	0.017	0.073	0.066	0.013
Aluminum_T	mg/L	0.029	0.017	0.073	0.066	0.013
Antimony_D	mg/L	0.000067	0.000065	0.00046	0.000070	0.000061
Antimony_T	mg/L	0.000067	0.000065	0.00046	0.000070	0.000061
Arsenic_D	mg/L	0.00030	0.00043	0.012	0.00056	0.00046
Arsenic_T	mg/L	0.00030	0.00043	0.012	0.00056	0.00046
Barium_D	mg/L	0.023	0.016	0.027	0.049	0.026
Barium_T	mg/L	0.023	0.016	0.027	0.049	0.026
Beryllium_T	mg/L	0.000059	0.000058	0.000050	0.000061	0.000056
Beryllium_T	mg/L	0.000059	0.000058	0.000050	0.000061	0.000056
Boron_D	mg/L	0.0062	0.0081	0.030	0.0089	0.0084
Boron_T	mg/L	0.0062	0.0081	0.030	0.0089	0.0084
Cadmium_D	mg/L	0.000011	0.0000067	0.0020	0.000011	0.0000086
Cadmium_T	mg/L	0.000011	0.00001	0.0020	0.00001	0.00001
Calcium_D	mg/L	15	33	265	17	48
Chromium_D	mg/L	0.00021	0.00015	0.00067	0.00036	0.00013
Chromium_D_	mg/L	0.00021	0.00015	0.00067	0.00036	0.00013
Chromium_T	mg/L	0.00021	0.00015	0.00067	0.00036	0.00013
Cobalt_D	mg/L	0.00050	0.00015	0.026	0.00064	0.00020
Cobalt_T	mg/L	0.00050	0.00015	0.026	0.00064	0.00020
Copper_D	mg/L	0.0011	0.0017	0.0078	0.0027	0.0014
Copper_T	mg/L	0.0011	0.0017	0.0078	0.0027	0.0014
Iron_D	mg/L	0.24	0.077	0.26	0.31	0.15
Iron_T	mg/L	0.24	0.077	0.26	0.31	0.15
Lead_D	mg/L	0.000084	0.000080	0.00088	0.00014	0.00021
Lead_T	mg/L	0.000084	0.000080	0.00088	0.00014	0.00021
Magnesium_D	mg/L	2.2	2.9	50	2.3	3.9
Manganese_D	mg/L	0.14	0.063	0.86	0.068	0.034
Manganese_T	mg/L	0.14	0.063	0.86	0.068	0.034
Mercury_D	ng/L	1.8	1.6	0.62	3.5	2.1
Mercury_D	mg/L	0.0000018	0.0000016	0.00000062	0.000020	0.0000021
Mercury_T	mg/L	0.0000018	0.0000016	0.00000062	0.000020	0.0000021
Molybdenum_D	mg/L	0.00095	0.00081	0.00042	0.00045	0.00051
Molybdenum_T	mg/L	0.00095	0.00081	0.00042	0.00045	0.00051
Nickel_D	mg/L	0.0012	0.00058	0.089	0.0024	0.00056
Nickel_T	mg/L	0.0012	0.00058	0.089	0.0024	0.00056
Potassium_D	mg/L	1.8	1.9	20	2.0	2.4
Selenium_D	mg/L	0.000038	0.000090	0.00014	0.000084	0.00010
Selenium_T	mg/L	0.000038	0.000090	0.00014	0.00008	0.00010
Silicon_D	mg/L	6.6	6.2	8.9	8.2	6.8
Silicon_T	mg/L	6.6	6.2	8.9	8.2	6.8
Silver_D	mg/L	0.0000056	0.0000062	0.000019	0.0000083	0.0000057
Silver_T	mg/L	0.0000056	0.0000062	0.000019	0.0000083	0.0000057
Sodium_D	mg/L	3.9	6.2	9.8	6.4	4.3
Sodium_T	mg/L	3.9	6.2	9.8	6.4	4.3
Strontium_D	mg/L	0.040	0.073	0.28	0.057	0.069
Strontium_T	mg/L	0.040	0.073	0.28	0.057	0.069
Thallium_D	mg/L	0.000026	0.000024	0.000050	0.000036	0.000036
Thallium_T	mg/L	0.000026	0.000024	0.000050	0.000036	0.000036
Uranium_D	mg/L	0.00018	0.00054	0.00080	0.00023	0.00021
Uranium_T	mg/L	0.00018	0.00054	0.00080	0.00023	0.00021
Vanadium_T	mg/L	0.00041	0.00035	0.00049	0.00067	0.00039
Vanadium_T	mg/L	0.00041	0.00035	0.00049	0.00067	0.00039
Zinc_D	mg/L	0.0036	0.0037	0.059	0.0075	0.0054
Zinc_T	mg/L	0.004	0.0037	0.059	0.0075	0.0054

Note: total metals are not analyed in groundwater and assumed to be equal to dissolved metals; dissolved chromium (VI) is not analyzed and assumed to be equal to dissolved chromium (III); ammonia, nitrite, nitrate plus nitrite are calculated.

Table E-4-2: Groundwater inputs -for upper case (Log-Transformed 95th percentile)

Name in model	Units	Background - Overburden	Background - Bedrock	MRSA	Historical Operations - Overburden	Historical Operations - Bedrock
Statistics		**Geo 95th %ile**	**Geo 95th %ile**	**Geo 95th %ile**	**Geo 95th %ile**	**Geo 95th %ile**
Parameter						
T, Field	deg C	8.9	5.8	3.6	9.5	6.2
pH, Field	S.U.	8.7	8.0	6.5	7.2	7.7
Acidity_T	mg/L	140	37	15	60	48
Alkalinity_T	mg/L	239	174	66	166	241
Bromide	mg/L	0.050	0.196	0.222	0.137	0.100
Chloride	mg/L	0.64	5.60	1.11	18.65	4.39
Fluoride	mg/L	0.28	0.24	0.04	0.24	0.17
Sulfate	mg/L	8.2	198.7	911.1	172.8	422.9
Phosphorus_T	mg/L	0.092	0.098	0.025	0.068	0.043
N_Ammonia	N mg/L	1.2	0.8	0.1	0.7	1.6
Ammonia	mg/L	1.5	1.0	0.1	0.9	1.9
N_Nitrite	N mg/L	0.017	0.051	0.020	0.016	0.023
Nitrite	mg/L	0.055	0.166	0.067	0.052	0.076
N_Nitrate_Nitrite	N mg/L	0.21	1.22	0.50	1.37	0.52
Nitrate+Nitrite	mg/L	1.7	9.4	3.9	10.5	4.0
Cyanide_T	mg/L	0.0010	0.0006	0.0005	0.0020	0.0022
Cyanide_F	mg/L	0.0021	0.0012	0.0005	0.0020	0.0018
Cyanide_WAD	mg/L	0.0010	0.0006	0.0005	0.0020	0.0010
Hardness	mg/L	363	457	943	257	556
Radium_226	Bq/L	0.070	0.083	0.021	0.161	0.030
TSS	mg/L	3521	1596	5196	4479	706
Aluminum_D	mg/L	0.23	0.22	0.19	1.13	0.11
Aluminum_T	mg/L	0.23	0.22	0.19	1.13	0.11
Antimony_D	mg/L	0.00011	0.00017	0.00054	0.00020	0.00012
Antimony_T	mg/L	0.00011	0.00017	0.00054	0.00020	0.00012
Arsenic_D	mg/L	0.0011	0.0040	0.0173	0.0052	0.0085
Arsenic_T	mg/L	0.0011	0.0040	0.0173	0.0052	0.0085
Barium_D	mg/L	0.12	0.052	0.027	0.19	0.13
Barium_T	mg/L	0.12	0.052	0.027	0.19	0.13
Beryllium_T	mg/L	0.00010	0.00010	0.000050	0.00010	0.00010
Beryllium_T	mg/L	0.00010	0.00010	0.000050	0.00010	0.00010
Boron_D	mg/L	0.015	0.024	0.032	0.029	0.028
Boron_T	mg/L	0.015	0.024	0.032	0.029	0.028
Cadmium_D	mg/L	0.000044	0.000053	0.002499	0.000022	0.000054
Cadmium_T	mg/L	0.000044	0.000053	0.002499	0.000022	0.000054
Calcium_D	mg/L	68	138	286	74	185
Chromium_D	mg/L	0.00064	0.00050	0.0020	0.0021	0.00051
Chromium_D_ Hex	mg/L	0.00064	0.00050	0.0020	0.0021	0.00051
Chromium_T	mg/L	0.00064	0.00050	0.0020	0.0021	0.00051
Cobalt_D	mg/L	0.0073	0.0014	0.030	0.0024	0.0016
Cobalt_T	mg/L	0.0073	0.0014	0.030	0.0024	0.0016
Copper_D	mg/L	0.033	0.011	0.010	0.008	0.014
Copper_T	mg/L	0.033	0.011	0.010	0.008	0.014
Iron_D	mg/L	5.4	2.5	0.3	17.6	13.6
Iron_T	mg/L	5.4	2.5	0.3	17.6	13.6
Lead_D	mg/L	0.00032	0.00036	0.0017	0.00086	0.00069
Lead_T	mg/L	0.00032	0.00036	0.0017	0.00086	0.00069
Magnesium_D	mg/L	13	26	55	8	20
Manganese_D	mg/L	0.74	0.67	0.90	0.48	1.16
Manganese_T	mg/L	0.74	0.67	0.90	0.48	1.16
Mercury_D	ng/L	8.4	10	1.4	10	10
Mercury_D	mg/L	0.0000084	0.000010	0.0000014	0.000010	0.000010
Mercury_T	mg/L	0.0000084	0.000010	0.0000014	0.000010	0.000010
Molybdenum_D	mg/L	0.011	0.0048	0.0006	0.0060	0.0017
Molybdenum_T	mg/L	0.011	0.0048	0.0006	0.0060	0.0017
Nickel_D	mg/L	0.0087	0.0031	0.11	0.0055	0.0036
Nickel_T	mg/L	0.0087	0.0031	0.11	0.0055	0.0036
Potassium_D	mg/L	4.0	5.8	21	4.4	6.2
Selenium_D	mg/L	0.000070	0.00089	0.00018	0.00057	0.00026
Selenium_T	mg/L	0.000070	0.00089	0.00018	0.00057	0.00026
Silicon_D	mg/L	13	11	9.2	16	11
Silicon_T	mg/L	13	11	9.2	16	11
Silver_D	mg/L	0.0000090	0.000024	0.000062	0.000040	0.000010
Silver_T	mg/L	0.0000090	0.000024	0.000062	0.000040	0.000010
Sodium_D	mg/L	9.3	86	11	77	28
Sodium_T	mg/L	9.3	86	11	77	28
Strontium_D	mg/L	0.18	0.41	0.31	0.20	0.30
Strontium_T	mg/L	0.18	0.41	0.31	0.20	0.30
Thallium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050
Thallium_T	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050
Uranium_D	mg/L	0.0018	0.012	0.00083	0.0055	0.0032
Uranium_T	mg/L	0.0018	0.012	0.00083	0.0055	0.0032
Vanadium_T	mg/L	0.0015	0.00081	0.00081	0.0042	0.0018
Vanadium_T	mg/L	0.0015	0.00081	0.00081	0.0042	0.0018
Zinc_D	mg/L	0.088	0.033	0.069	0.012	0.020
Zinc_T	mg/L	0.088	0.033	0.069	0.012	0.020

Note: total metals are not analyed in groundwater and assumed to be equal to dissolved metals; dissolved chromium (VI) is not analyzed and assumed to be equal to dissolved chromium (III); ammonia, nitrite, nitrate plus nitrite are calculated.

Table E-5-1: Predicted Water Quality at QMO2_CT and Relative Percent Difference to Observed Mean Water Quality

Statistics		2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source	Units	AQM4	AQM4	AQM4	AQM4	Baseline							
Season		winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summe	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0%	0%	0%	0%
Chloride	mg/L	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0%	0%	0%	0%
Fluoride	mg/L	0.064	0.052	0.055	0.057	0.064	0.051	0.055	0.057	0%	-2%	0%	0%
Sulfate	mg/L	1.5	1.0	0.9	1.0	1.5	0.9	0.9	1.0	0%	-2%	-1%	-1%
Phosphorus_T	mg/L	0.022	0.013	0.020	0.016	0.022	0.014	0.020	0.016	0%	6%	0%	0%
N_Ammonia	mg/L	0.024	0.005	0.013	0.005	0.024	0.007	0.013	0.005	0%	31%	0%	0%
N_Nitrite	mg/L	0.015	0.007	0.013	0.011	0.015	0.008	0.013	0.011	0%	18%	0%	0%
N_Nitrate_Nitrite	mg/L	0.087	0.025	0.025	0.025	0.087	0.028	0.025	0.025	0%	11%	0%	0%
Cyanide_T	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Hardness	mg/L	10	8	9	9	10	8	9	9	0%	1%	0%	0%
Radium_226	Bq/L	0.0050	0.0047	0.0045	0.0073	0.0050	0.0047	0.0045	0.0073	0%	1%	0%	0%
Aluminum_D	mg/L	0.008	0.013	0.006	0.009	0.008	0.013	0.006	0.009	0%	3%	2%	2%
Aluminum_T	mg/L	0.013	0.035	0.032	0.028	0.013	0.034	0.032	0.028	0%	-3%	1%	1%
Antimony_D	mg/L	0.000100	0.000093	0.000070	0.000080	0.000100	0.000093	0.000070	0.000080	0%	0%	0%	0%
Antimony_T	mg/L	0.000100	0.000093	0.000070	0.000080	0.000100	0.000093	0.000070	0.000080	0%	0%	0%	0%
Arsenic_D	mg/L	0.000140	0.000120	0.000140	0.000140	0.000140	0.000122	0.000140	0.000140	0%	1%	0%	0%
Arsenic_T	mg/L	0.000140	0.000120	0.000160	0.000180	0.000140	0.000124	0.000160	0.000180	0%	3%	0%	0%
Barium_D	mg/L	0.0066	0.0051	0.0047	0.0050	0.0066	0.0051	0.0047	0.0050	0%	1%	0%	0%
Barium_T	mg/L	0.0100	0.0054	0.0055	0.0056	0.0100	0.0056	0.0055	0.0056	0%	3%	0%	0%
Beryllium_T	mg/L	0.000100	0.000093	0.000075	0.000080	0.000100	0.000093	0.000075	0.000080	0%	0%	0%	0%
Boron_D	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0%	0%	0%	0%
Boron_T	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0%	0%	0%	0%
Cadmium_D	mg/L	0.0000050	0.0000046	0.0000038	0.0000045	0.0000050	0.0000046	0.0000038	0.0000045	0%	0%	0%	0%
Cadmium_T	mg/L	0.0000050	0.0000046	0.0000038	0.0000050	0.0000050	0.0000046	0.0000038	0.0000050	0%	0%	1%	0%
Calcium_D	mg/L	2.7	2.3	2.3	2.4	2.7	2.3	2.3	2.4	0%	2%	0%	0%
Chromium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000053	0.000050	0.000051	0%	5%	1%	1%
Chromium_D_Hex	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000053	0.000050	0.000051	0%	5%	1%	1%
Chromium_T	mg/L	0.000050	0.000062	0.000087	0.000110	0.000050	0.000067	0.000088	0.000111	0%	8%	2%	1%
Cobalt_D	mg/L	0.000100	0.000093	0.000075	0.000080	0.000100	0.000094	0.000075	0.000080	0%	1%	0%	0%
Cobalt_T	mg/L	0.000100	0.000093	0.000075	0.000080	0.000100	0.000094	0.000075	0.000080	0%	1%	0%	0%
Copper_D	mg/L	0.000330	0.000360	0.000280	0.000420	0.000330	0.000353	0.000280	0.000417	0%	-2%	0%	-1%
Copper_T	mg/L	0.000500	0.000370	0.000280	0.000460	0.000500	0.000370	0.000282	0.000458	0%	0%	1%	0%
Iron_D	mg/L	0.059	0.100	0.047	0.057	0.060	0.128	0.048	0.060	2%	28%	3%	5%
Iron_T	mg/L	0.110	0.210	0.190	0.180	0.112	0.200	0.200	0.198	2%	-5%	5%	10%
Lead_D	mg/L	0.000045	0.000042	0.000035	0.000037	0.000045	0.000042	0.000035	0.000037	0%	0%	0%	0%
Lead_T	mg/L	0.000045	0.000042	0.000037	0.000037	0.000045	0.000042	0.000038	0.000038	0%	1%	2%	2%
Magnesium_D	mg/L	0.790	0.620	0.660	0.670	0.790	0.618	0.659	0.669	0%	0%	0%	0%
Manganese_D	mg/L	0.0110	0.0055	0.0028	0.0028	0.0111	0.0063	0.0028	0.0028	1%	14%	0%	0%
Manganese_T	mg/L	0.0140	0.0150	0.0230	0.0190	0.0141	0.0155	0.0230	0.0189	1%	4%	0%	0%
Mercury_D	mg/L	0.0000006	0.0000010	0.0000008	0.0000006	0.0000006	0.0000010	0.0000008	0.0000006	0%	2%	1%	1%
Mercury_T	mg/L	0.0000007	0.0000010	0.0000010	0.0000007	0.0000007	0.0000010	0.0000010	0.0000007	0%	4%	1%	1%
Molybdenum_D	mg/L	0.000050	0.000046	0.000042	0.000052	0.000050	0.000046	0.000042	0.000052	0%	0%	0%	0%
Molybdenum_T	mg/L	0.000100	0.000089	0.000072	0.000086	0.000100	0.000089	0.000072	0.000085	0%	0%	0%	-1%
Nickel_D	mg/L	0.00020	0.00020	0.00020	0.00021	0.00020	0.00020	0.00020	0.00021	0%	0%	0%	0%
Nickel_T	mg/L	0.00020	0.00021	0.00022	0.00021	0.00020	0.00021	0.00022	0.00021	0%	0%	0%	1%
Potassium_D	mg/L	0.650	0.520	0.560	0.560	0.650	0.519	0.559	0.558	0%	0%	0%	0%
Selenium_D	mg/L	0.000050	0.000045	0.000038	0.000047	0.000050	0.000045	0.000038	0.000047	0%	0%	0%	0%
Selenium_T	mg/L	0.000050	0.000045	0.000038	0.000055	0.000050	0.000045	0.000038	0.000055	0%	0%	0%	0%
Silicon_D	mg/L	3.1	1.8	2.2	2.4	3.1	1.8	2.2	2.4	0%	1%	0%	0%
Silicon_T	mg/L	3.1	2.0	2.4	2.4	3.1	2.0	2.4	2.4	0%	0%	0%	0%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Sodium_D	mg/L	1.20	0.96	1.00	1.10	1.20	0.95	1.00	1.10	0%	-1%	0%	0%
Sodium_T	mg/L	1.30	0.99	1.10	1.10	1.30	0.99	1.10	1.10	0%	0%	0%	0%
Strontium_D	mg/L	0.0140	0.0110	0.0110	0.0120	0.0140	0.0109	0.0110	0.0120	0%	-1%	0%	0%
Strontium_T	mg/L	0.0150	0.0110	0.0130	0.0120	0.0150	0.0110	0.0130	0.0120	0%	0%	0%	0%
Thallium_D	mg/L	0.000050	0.000044	0.000005	0.000032	0.000050	0.000044	0.000005	0.000032	0%	0%	0%	-1%
Thallium_T	mg/L	0.000050	0.000044	0.000005	0.000032	0.000050	0.000044	0.000005	0.000032	0%	0%	0%	-1%
Uranium_D	mg/L	0.000050	0.000045	0.000034	0.000036	0.000050	0.000045	0.000034	0.000036	0%	-1%	-1%	-1%
Uranium_T	mg/L	0.000050	0.000046	0.000036	0.000039	0.000050	0.000046	0.000036	0.000039	0%	-1%	0%	0%
Vanadium_T	mg/L	0.000100	0.000100	0.000100	0.000100	0.000100	0.000100	0.000101	0.000101	0%	0%	1%	1%
Zinc_D	mg/L	0.0009	0.0010	0.0011	0.0011	0.0009	0.0010	0.0011	0.0011	0%	2%	0%	0%
Zinc_T	mg/L	0.0009	0.0010	0.0011	0.0011	0.0009	0.0010	0.0011	0.0011	0%	9%	1%	0%

Notes:
Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.
Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-5-2: Predicted Water Quality at QMO3_CT and Relative Percent Difference to Observed Mean Water Quality

Statistics	Units	2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source		AQM7	AQM7	AQM7	AQM7	Baseline							
Season		winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0%	0%	0%	0%
Chloride	mg/L	0.250	0.250	0.250	0.250	0.250	0.275	0.254	0.256	0%	10%	2%	2%
Fluoride	mg/L	0.064	0.052	0.064	0.055	0.064	0.052	0.055	0.057	0%	0%	-14%	4%
Sulfate	mg/L	1.3	1.0	1.0	1.0	1.5	1.0	0.9	1.0	15%	-4%	-8%	1%
Phosphorus_T	mg/L	0.016	0.018	0.019	0.018	0.022	0.014	0.020	0.016	37%	-20%	5%	-11%
N_Ammonia	mg/L	0.044	0.005	0.005	0.012	0.024	0.008	0.013	0.005	-45%	52%	161%	-58%
N_Nitrite	mg/L	0.009	0.005	0.004	0.014	0.015	0.007	0.013	0.011	67%	49%	208%	-21%
N_Nitrate_Nitrite	mg/L	0.070	0.025	0.025	0.025	0.087	0.029	0.025	0.025	24%	16%	0%	0%
Cyanide_T	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Hardness	mg/L	10	8	9	9	10	9	9	9	0%	6%	-2%	3%
Radium_226	Bq/L	0.0047	0.0050	0.0049	0.0048	0.0050	0.0047	0.0045	0.0072	6%	-5%	-8%	51%
Aluminum_D	mg/L	0.009	0.014	0.008	0.009	0.008	0.015	0.007	0.010	-5%	9%	-21%	5%
Aluminum_T	mg/L	0.023	0.061	0.040	0.032	0.013	0.037	0.033	0.029	-43%	-40%	-19%	-11%
Antimony_D	mg/L	0.000090	0.000100	0.000080	0.000080	0.000100	0.000093	0.000070	0.000080	11%	-7%	-12%	0%
Antimony_T	mg/L	0.000090	0.000100	0.000080	0.000080	0.000100	0.000093	0.000070	0.000080	11%	-7%	-12%	0%
Arsenic_D	mg/L	0.000170	0.000130	0.000150	0.000160	0.000140	0.000126	0.000141	0.000142	-18%	-3%	-6%	-12%
Arsenic_T	mg/L	0.000220	0.000130	0.000160	0.000180	0.000140	0.000128	0.000161	0.000181	-36%	-1%	1%	1%
Barium_D	mg/L	0.0070	0.0050	0.0050	0.0048	0.0066	0.0052	0.0047	0.0050	-6%	4%	-6%	4%
Barium_T	mg/L	0.0073	0.0058	0.0055	0.0052	0.0100	0.0057	0.0055	0.0056	37%	-1%	0%	8%
Beryllium_T	mg/L	0.000090	0.000100	0.000080	0.000080	0.000100	0.000093	0.000075	0.000080	11%	-7%	-6%	0%
Boron_D	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0%	0%	0%	0%
Boron_T	mg/L	0.0170	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	-71%	0%	0%	0%
Cadmium_D	mg/L	0.0000045	0.0000050	0.0000038	0.0000040	0.0000050	0.0000046	0.0000038	0.0000045	11%	-8%	0%	12%
Cadmium_T	mg/L	0.0000045	0.0000097	0.0000040	0.0000040	0.0000050	0.0000047	0.0000038	0.0000050	11%	-51%	-4%	24%
Calcium_D	mg/L	2.8	2.3	2.4	2.3	2.7	2.4	2.3	2.4	-3%	6%	-4%	5%
Chromium_D	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000055	0.000051	0.000051	0%	10%	1%	2%
Chromium_D_Hex	mg/L	0.000050	0.000050	0.000050	0.000050	0.000050	0.000055	0.000051	0.000051	0%	10%	1%	2%
Chromium_T	mg/L	0.000140	0.000310	0.000094	0.000086	0.000050	0.000076	0.000089	0.000111	-64%	-75%	-5%	29%
Cobalt_D	mg/L	0.000090	0.000100	0.000080	0.000080	0.000100	0.000095	0.000075	0.000080	11%	-5%	-6%	0%
Cobalt_T	mg/L	0.000090	0.000100	0.000080	0.000080	0.000100	0.000095	0.000075	0.000080	11%	-5%	-6%	0%
Copper_D	mg/L	0.000290	0.000350	0.000330	0.000400	0.000330	0.000363	0.000282	0.000418	14%	4%	-14%	4%
Copper_T	mg/L	0.000790	0.000350	0.000360	0.000400	0.000500	0.000388	0.000285	0.000459	-37%	11%	-21%	15%
Iron_D	mg/L	0.081	0.120	0.075	0.070	0.061	0.131	0.049	0.060	-25%	9%	-35%	-15%
Iron_T	mg/L	0.190	0.270	0.210	0.230	0.116	0.200	0.200	0.200	-39%	-26%	-5%	-13%
Lead_D	mg/L	0.000041	0.000045	0.000037	0.000037	0.000045	0.000042	0.000035	0.000037	10%	-6%	-5%	0%
Lead_T	mg/L	0.000041	0.000063	0.000037	0.000037	0.000045	0.000044	0.000038	0.000038	10%	-30%	2%	2%
Magnesium_D	mg/L	0.800	0.610	0.640	0.660	0.790	0.633	0.660	0.671	-1%	4%	3%	2%
Manganese_D	mg/L	0.0110	0.0070	0.0110	0.0061	0.0111	0.0072	0.0028	0.0028	1%	3%	-74%	-54%
Manganese_T	mg/L	0.0140	0.0210	0.0260	0.0190	0.0141	0.0167	0.0231	0.0190	1%	-21%	-11%	0%
Mercury_D	mg/L	0.0000006	0.0000010	0.0000008	0.0000006	0.0000006	0.0000010	0.0000008	0.0000006	4%	2%	6%	3%
Mercury_T	mg/L	0.0000008	0.0000014	0.0000010	0.0000006	0.0000007	0.0000011	0.0000010	0.0000007	-14%	-24%	3%	25%
Molybdenum_D	mg/L	0.000052	0.000050	0.000046	0.000045	0.000050	0.000046	0.000042	0.000052	-4%	-7%	-9%	15%
Molybdenum_T	mg/L	0.000091	0.000100	0.000070	0.000078	0.000100	0.000090	0.000072	0.000085	10%	-10%	3%	9%
Nickel_D	mg/L	0.00020	0.00020	0.00020	0.00020	0.00020	0.00022	0.00020	0.00021	0%	9%	1%	7%
Nickel_T	mg/L	0.00021	0.00020	0.00022	0.00020	0.00020	0.00023	0.00022	0.00022	-5%	15%	1%	8%
Potassium_D	mg/L	0.650	0.540	0.530	0.550	0.650	0.525	0.559	0.558	0%	-3%	5%	2%
Selenium_D	mg/L	0.000045	0.000050	0.000040	0.000040	0.000050	0.000045	0.000038	0.000047	11%	-9%	-5%	17%
Selenium_T	mg/L	0.000045	0.000050	0.000040	0.000040	0.000050	0.000045	0.000038	0.000055	11%	-9%	-5%	37%
Silicon_D	mg/L	3.2	1.9	2.2	2.3	3.1	1.8	2.2	2.4	-3%	-4%	-1%	3%
Silicon_T	mg/L	3.3	2.1	2.4	2.4	3.1	2.0	2.4	2.4	-6%	-5%	-1%	-1%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Sodium_D	mg/L	1.30	0.96	0.98	1.00	1.20	0.96	1.00	1.10	-8%	0%	2%	10%
Sodium_T	mg/L	1.40	0.98	1.10	1.10	1.30	1.00	1.10	1.10	-7%	2%	0%	0%
Strontium_D	mg/L	0.0140	0.0110	0.0120	0.0110	0.0140	0.0112	0.0110	0.0120	0%	1%	-8%	9%
Strontium_T	mg/L	0.0150	0.0120	0.0120	0.0120	0.0150	0.0113	0.0130	0.0120	0%	-6%	8%	0%
Thallium_D	mg/L	0.000041	0.000050	0.000032	0.000032	0.000050	0.000044	0.000005	0.000032	22%	-12%	-84%	-1%
Thallium_T	mg/L	0.000041	0.000050	0.000032	0.000032	0.000050	0.000044	0.000005	0.000032	22%	-12%	-84%	-1%
Uranium_D	mg/L	0.000043	0.000050	0.000036	0.000037	0.000050	0.000045	0.000034	0.000036	16%	-10%	-6%	-3%
Uranium_T	mg/L	0.000044	0.000050	0.000039	0.000039	0.000050	0.000046	0.000036	0.000039	14%	-8%	-8%	0%
Vanadium_T	mg/L	0.000100	0.000140	0.000180	0.000100	0.000100	0.000107	0.000102	0.000102	0%	-23%	-43%	2%
Zinc_D	mg/L	0.0017	0.0007	0.0012	0.0010	0.0009	0.0010	0.0011	0.0011	-47%	39%	-8%	12%
Zinc_T	mg/L	0.0017	0.0007	0.0012	0.0010	0.0009	0.0010	0.0011	0.0011	-47%	47%	-7%	12%

Notes:
Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.
Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-5-3: Predicted Water Quality at KEE3_B1_CT and Relative Percent Difference to Observed Mean Water Quality

Statistics	Units	2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source		AQM18	AQM18	AQM18	AQM18	Baseline							
Season		winter	spring	summer	fall	winter	spring	summer	fall	winte	spring	summe	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0%	0%	0%	0%
Chloride	mg/L	7.100	4.700	5.600	5.700	7.100	4.700	5.600	5.700	0%	0%	0%	0%
Fluoride	mg/L	0.044	0.029	0.039	0.042	0.044	0.029	0.039	0.042	0%	0%	0%	0%
Sulfate	mg/L	214	147	179	183	214	147	179	183	0%	0%	0%	0%
Phosphorus_T	mg/L	0.022	0.026	0.021	0.012	0.022	0.026	0.021	0.012	0%	0%	0%	0%
N_Ammonia	mg/L	0.240	0.260	0.026	0.029	0.240	0.260	0.026	0.029	0%	0%	0%	0%
N_Nitrite	mg/L	0.016	0.008	0.007	0.007	0.016	0.008	0.007	0.007	0%	0%	0%	0%
N_Nitrate_Nitrite	mg/L	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0%	0%	0%	0%
Cyanide_T	mg/L	0.00050	0.00058	0.00050	0.00050	0.00050	0.00058	0.00050	0.00050	0%	0%	0%	0%
Cyanide_F	mg/L	0.00050	0.00058	0.00050	0.00050	0.00050	0.00058	0.00050	0.00050	0%	0%	0%	0%
Cyanide_WAD	mg/L	0.00050	0.00058	0.00050	0.00050	0.00050	0.00058	0.00050	0.00050	0%	0%	0%	0%
Hardness	mg/L	336	237	255	259	336	237	255	259	0%	0%	0%	0%
Radium_226	Bq/L	0.0081	0.0088	0.0063	0.0048	0.0081	0.0088	0.0063	0.0048	0%	0%	0%	0%
Aluminum_D	mg/L	0.011	0.006	0.003	0.004	0.011	0.006	0.003	0.004	0%	0%	0%	0%
Aluminum_T	mg/L	0.015	0.009	0.009	0.006	0.015	0.009	0.009	0.006	0%	0%	0%	0%
Antimony_D	mg/L	0.000090	0.000093	0.000080	0.000080	0.000090	0.000093	0.000080	0.000080	0%	0%	0%	0%
Antimony_T	mg/L	0.000090	0.000093	0.000110	0.000080	0.000090	0.000093	0.000110	0.000080	0%	0%	0%	0%
Arsenic_D	mg/L	0.001100	0.000940	0.000980	0.000810	0.001100	0.000940	0.000980	0.000810	0%	0%	0%	0%
Arsenic_T	mg/L	0.001100	0.000990	0.000980	0.000810	0.001100	0.000990	0.000980	0.000810	0%	0%	0%	0%
Barium_D	mg/L	0.0700	0.0480	0.0480	0.0430	0.0700	0.0480	0.0480	0.0430	0%	0%	0%	0%
Barium_T	mg/L	0.0710	0.0500	0.0480	0.0440	0.0710	0.0500	0.0480	0.0440	0%	0%	0%	0%
Beryllium_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080	0%	0%	0%	0%
Boron_D	mg/L	0.0120	0.0050	0.0050	0.0050	0.0120	0.0050	0.0050	0.0050	0%	0%	0%	0%
Boron_T	mg/L	0.0140	0.0050	0.0050	0.0050	0.0140	0.0050	0.0050	0.0050	0%	0%	0%	0%
Cadmium_D	mg/L	0.0000045	0.0000046	0.0000040	0.0000040	0.0000045	0.0000046	0.0000040	0.0000040	0%	0%	0%	0%
Cadmium_T	mg/L	0.0000045	0.0000046	0.0000040	0.0000040	0.0000045	0.0000046	0.0000040	0.0000040	0%	0%	0%	0%
Calcium_D	mg/L	112.0	77.2	82.5	86.3	112.0	77.2	82.5	86.3	0%	0%	0%	0%
Chromium_D	mg/L	0.000090	0.000050	0.000050	0.000050	0.000090	0.000050	0.000050	0.000050	0%	0%	0%	0%
Chromium_D_Hex	mg/L	0.000090	0.000050	0.000050	0.000050	0.000090	0.000050	0.000050	0.000050	0%	0%	0%	0%
Chromium_T	mg/L	0.000140	0.000110	0.000050	0.000050	0.000140	0.000110	0.000050	0.000050	0%	0%	0%	0%
Cobalt_D	mg/L	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080	0%	0%	0%	0%
Cobalt_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080	0%	0%	0%	0%
Copper_D	mg/L	0.000340	0.000200	0.000180	0.000100	0.000340	0.000200	0.000180	0.000100	0%	0%	0%	0%
Copper_T	mg/L	0.000340	0.000270	0.000240	0.000250	0.000340	0.000270	0.000240	0.000250	0%	0%	0%	0%
Iron_D	mg/L	0.220	0.160	0.053	0.037	0.220	0.160	0.053	0.037	0%	0%	0%	0%
Iron_T	mg/L	0.260	0.230	0.110	0.061	0.260	0.230	0.110	0.061	0%	0%	0%	0%
Lead_D	mg/L	0.000042	0.000042	0.000037	0.000037	0.000042	0.000042	0.000037	0.000037	0%	0%	0%	0%
Lead_T	mg/L	0.000042	0.000084	0.000042	0.000037	0.000042	0.000084	0.000042	0.000037	0%	0%	0%	0%
Magnesium_D	mg/L	13.600	8.900	9.900	10.400	13.600	8.900	9.900	10.400	0%	0%	0%	0%
Manganese_D	mg/L	0.9000	0.4500	0.1500	0.0440	0.9000	0.4500	0.1500	0.0440	0%	0%	0%	0%
Manganese_T	mg/L	0.9500	0.5400	0.1900	0.0760	0.9500	0.5400	0.1900	0.0760	0%	0%	0%	0%
Mercury_D	mg/L	0.0000012	0.0000014	0.0000012	0.0000009	0.0000012	0.0000014	0.0000012	0.0000009	0%	0%	0%	0%
Mercury_T	mg/L	0.0000024	0.0000021	0.0000014	0.0000011	0.0000024	0.0000021	0.0000014	0.0000011	0%	0%	0%	0%
Molybdenum_D	mg/L	0.000050	0.000050	0.000040	0.000045	0.000050	0.000050	0.000040	0.000045	0%	0%	0%	0%
Molybdenum_T	mg/L	0.000100	0.000098	0.000070	0.000076	0.000100	0.000098	0.000070	0.000076	0%	0%	0%	0%
Nickel_D	mg/L	0.00054	0.00058	0.00053	0.00041	0.00054	0.00058	0.00053	0.00041	0%	0%	0%	0%
Nickel_T	mg/L	0.00074	0.00059	0.00065	0.00043	0.00074	0.00059	0.00065	0.00043	0%	0%	0%	0%
Potassium_D	mg/L	7.000	4.600	5.600	5.000	7.000	4.600	5.600	5.000	0%	0%	0%	0%
Selenium_D	mg/L	0.000050	0.000045	0.000040	0.000040	0.000050	0.000045	0.000040	0.000040	0%	0%	0%	0%
Selenium_T	mg/L	0.000050	0.000045	0.000040	0.000040	0.000050	0.000045	0.000040	0.000040	0%	0%	0%	0%
Silicon_D	mg/L	6.4	4.6	4.8	4.5	6.4	4.6	4.8	4.5	0%	0%	0%	0%
Silicon_T	mg/L	6.7	4.6	4.9	4.7	6.7	4.6	4.9	4.7	0%	0%	0%	0%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Sodium_D	mg/L	8.50	5.50	6.70	6.90	8.50	5.50	6.70	6.90	0%	0%	0%	0%
Sodium_T	mg/L	8.90	5.80	6.90	7.00	8.90	5.80	6.90	7.00	0%	0%	0%	0%
Strontium_D	mg/L	0.1800	0.1200	0.1400	0.1300	0.1800	0.1200	0.1400	0.1300	0%	0%	0%	0%
Strontium_T	mg/L	0.1800	0.1200	0.1500	0.1400	0.1800	0.1200	0.1500	0.1400	0%	0%	0%	0%
Thallium_D	mg/L	0.000042	0.000044	0.000032	0.000032	0.000042	0.000044	0.000032	0.000032	0%	0%	0%	0%
Thallium_T	mg/L	0.000042	0.000044	0.000032	0.000032	0.000042	0.000044	0.000032	0.000032	0%	0%	0%	0%
Uranium_D	mg/L	0.000044	0.000045	0.000035	0.000033	0.000044	0.000045	0.000035	0.000033	0%	0%	0%	0%
Uranium_T	mg/L	0.000044	0.000046	0.000035	0.000033	0.000044	0.000046	0.000035	0.000033	0%	0%	0%	0%
Vanadium_T	mg/L	0.000100	0.000140	0.000250	0.000100	0.000100	0.000140	0.000250	0.000100	0%	0%	0%	0%
Zinc_D	mg/L	0.0011	0.0010	0.0007	0.0009	0.0011	0.0010	0.0007	0.0009	0%	0%	0%	0%
Zinc_T	mg/L	0.0015	0.0014	0.0015	0.0011	0.0015	0.0014	0.0015	0.0011	0%	0%	0%	0%

Notes:

Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.

Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-5-4: Predicted Water Quality at QMO6_CT and Relative Percent Difference to Observed Mean Water Quality

Location		2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source	Units	AQM8	AQM8	AQM8	AQM8	Baseline							
Statistic		winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0%	0%	0%	0%
Chloride	mg/L	0.250	0.250	0.250	0.250	0.252	0.391	0.277	0.290	1%	56%	11%	16%
Fluoride	mg/L	0.065	0.049	0.056	0.055	0.064	0.052	0.055	0.057	-2%	5%	-2%	3%
Sulfate	mg/L	1.3	1.0	1.0	1.1	1.5	4.9	1.7	2.1	19%	390%	73%	94%
Phosphorus_T	mg/L	0.014	0.018	0.020	0.017	0.022	0.015	0.020	0.016	57%	-18%	0%	-6%
N_Ammonia	mg/L	0.034	0.015	0.013	0.005	0.024	0.015	0.013	0.005	-29%	-2%	1%	4%
N_Nitrite	mg/L	0.013	0.010	0.004	0.011	0.015	0.008	0.013	0.011	15%	-24%	207%	0%
N_Nitrate_Nitrite	mg/L	0.078	0.025	0.025	0.025	0.087	0.030	0.025	0.025	11%	18%	0%	0%
Cyanide_T	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Hardness	mg/L	11	9	9	9	10	15	10	11	-4%	68%	9%	14%
Radium_226	Bq/L	0.0046	0.0050	0.0046	0.0046	0.0050	0.0048	0.0045	0.0072	9%	-3%	-2%	57%
Aluminum_D	mg/L	0.008	0.017	0.010	0.013	0.008	0.015	0.007	0.010	9%	-14%	-31%	-26%
Aluminum_T	mg/L	0.020	0.061	0.042	0.036	0.013	0.036	0.033	0.028	-34%	-41%	-23%	-21%
Antimony_D	mg/L	0.000090	0.000093	0.000080	0.000080	0.000100	0.000093	0.000070	0.000080	11%	0%	-12%	0%
Antimony_T	mg/L	0.000090	0.000093	0.000080	0.000080	0.000100	0.000093	0.000070	0.000080	11%	0%	-12%	0%
Arsenic_D	mg/L	0.000140	0.000120	0.000150	0.000150	0.000140	0.000147	0.000145	0.000146	0%	23%	-4%	-3%
Arsenic_T	mg/L	0.000150	0.000140	0.000170	0.000180	0.000141	0.000151	0.000164	0.000185	-6%	8%	-3%	3%
Barium_D	mg/L	0.0071	0.0051	0.0044	0.0047	0.0066	0.0064	0.0049	0.0052	-7%	25%	11%	12%
Barium_T	mg/L	0.0072	0.0058	0.0053	0.0052	0.0100	0.0070	0.0057	0.0058	39%	20%	7%	12%
Beryllium_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000100	0.000093	0.000075	0.000080	9%	0%	-6%	0%
Boron_D	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0%	0%	0%	0%
Boron_T	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0%	1%	0%	0%
Cadmium_D	mg/L	0.0000046	0.0000046	0.0000040	0.0000040	0.0000050	0.0000046	0.0000038	0.0000045	9%	0%	-5%	12%
Cadmium_T	mg/L	0.0000046	0.0000046	0.0000040	0.0000040	0.0000050	0.0000047	0.0000038	0.0000050	9%	3%	-4%	24%
Calcium_D	mg/L	2.9	2.4	2.4	2.5	2.7	4.4	2.7	2.9	-6%	85%	11%	18%
Chromium_D	mg/L	0.000062	0.000050	0.000050	0.000050	0.000050	0.000055	0.000051	0.000051	-19%	9%	1%	2%
Chromium_D_Hex	mg/L	0.000062	0.000050	0.000050	0.000050	0.000050	0.000055	0.000051	0.000051	-19%	9%	1%	2%
Chromium_T	mg/L	0.000095	0.000130	0.000180	0.000090	0.000050	0.000076	0.000089	0.000110	-47%	-41%	-51%	23%
Cobalt_D	mg/L	0.000092	0.000093	0.000080	0.000080	0.000100	0.000095	0.000075	0.000080	9%	2%	-6%	0%
Cobalt_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000100	0.000095	0.000075	0.000080	9%	2%	-6%	0%
Copper_D	mg/L	0.000310	0.000440	0.000450	0.000400	0.000330	0.000359	0.000283	0.000416	7%	-18%	-37%	4%
Copper_T	mg/L	0.000370	0.000560	0.000550	0.000430	0.000500	0.000389	0.000286	0.000458	35%	-31%	-48%	6%
Iron_D	mg/L	0.086	0.100	0.085	0.087	0.061	0.129	0.049	0.060	-30%	29%	-43%	-31%
Iron_T	mg/L	0.180	0.260	0.240	0.240	0.116	0.200	0.200	0.200	-35%	-23%	-17%	-17%
Lead_D	mg/L	0.000042	0.000042	0.000037	0.000037	0.000045	0.000042	0.000035	0.000037	7%	0%	-5%	0%
Lead_T	mg/L	0.000042	0.000045	0.000037	0.000037	0.000045	0.000045	0.000038	0.000038	7%	0%	2%	2%
Magnesium_D	mg/L	0.830	0.630	0.660	0.690	0.793	0.859	0.700	0.732	-4%	36%	6%	6%
Manganese_D	mg/L	0.0086	0.0054	0.0074	0.0065	0.0113	0.0196	0.0035	0.0031	31%	262%	-53%	-52%
Manganese_T	mg/L	0.0120	0.0200	0.0280	0.0190	0.0143	0.0310	0.0239	0.0194	19%	55%	-15%	2%
Mercury_D	mg/L	0.0000005	0.0000009	0.0000010	0.0000006	0.0000006	0.0000010	0.0000008	0.0000006	18%	9%	-17%	11%
Mercury_T	mg/L	0.0000007	0.0000016	0.0000011	0.0000007	0.0000007	0.0000011	0.0000010	0.0000007	-7%	-32%	-8%	13%
Molybdenum_D	mg/L	0.000046	0.000050	0.000048	0.000050	0.000050	0.000047	0.000042	0.000052	9%	-7%	-13%	3%
Molybdenum_T	mg/L	0.000088	0.000099	0.000085	0.000078	0.000100	0.000090	0.000072	0.000085	14%	-9%	-16%	9%
Nickel_D	mg/L	0.00020	0.00035	0.00038	0.00035	0.00020	0.00023	0.00020	0.00022	0%	-35%	-46%	-38%
Nickel_T	mg/L	0.00021	0.00042	0.00054	0.00051	0.00020	0.00024	0.00023	0.00022	-5%	-43%	-58%	-57%
Potassium_D	mg/L	0.670	0.540	0.520	0.550	0.651	0.638	0.581	0.586	-3%	18%	12%	7%
Selenium_D	mg/L	0.000046	0.000045	0.000040	0.000040	0.000050	0.000045	0.000038	0.000047	9%	1%	-5%	17%
Selenium_T	mg/L	0.000050	0.000045	0.000040	0.000045	0.000050	0.000045	0.000038	0.000055	0%	1%	-5%	21%
Silicon_D	mg/L	3.2	1.8	2.0	2.3	3.1	1.9	2.2	2.4	-3%	7%	10%	4%
Silicon_T	mg/L	3.3	2.0	2.2	2.4	3.1	2.1	2.4	2.4	-6%	5%	9%	0%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Sodium_D	mg/L	1.30	0.96	0.99	1.00	1.20	1.09	1.02	1.13	-8%	14%	3%	13%
Sodium_T	mg/L	1.30	0.97	1.00	1.10	1.30	1.14	1.12	1.13	0%	17%	12%	3%
Strontium_D	mg/L	0.0150	0.0110	0.0120	0.0120	0.0140	0.0142	0.0116	0.0127	-6%	29%	-4%	6%
Strontium_T	mg/L	0.0150	0.0120	0.0120	0.0120	0.0150	0.0143	0.0136	0.0128	0%	19%	13%	7%
Thallium_D	mg/L	0.000042	0.000044	0.000032	0.000032	0.000050	0.000044	0.000005	0.000032	19%	1%	-83%	-1%
Thallium_T	mg/L	0.000042	0.000044	0.000032	0.000032	0.000050	0.000044	0.000005	0.000032	19%	1%	-83%	-1%
Uranium_D	mg/L	0.000045	0.000045	0.000036	0.000037	0.000050	0.000045	0.000034	0.000036	11%	0%	-6%	-4%
Uranium_T	mg/L	0.000045	0.000046	0.000039	0.000040	0.000050	0.000046	0.000036	0.000039	11%	0%	-8%	-3%
Vanadium_T	mg/L	0.000100	0.000170	0.000100	0.000100	0.000100	0.000108	0.000103	0.000102	0%	-36%	3%	2%
Zinc_D	mg/L	0.0008	0.0010	0.0011	0.0010	0.0009	0.0010	0.0011	0.0011	10%	-2%	0%	9%
Zinc_T	mg/L	0.0009	0.0010	0.0012	0.0014	0.0009	0.0010	0.0011	0.0011	3%	3%	-7%	-21%

Notes:
Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.
Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-5-5: Predicted Water Quality at Minton_Lake_CT and Relative Percent Difference to Observed Mean Water Quality

Statistics	Units	2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source		AQM16	AQM16	AQM16	AQM16	Baseline							
Season		winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1%	-1%	3%	5%
Chloride	mg/L	0.250	0.250	0.250	0.250	0.267	0.262	0.272	0.275	7%	5%	9%	10%
Fluoride	mg/L	0.051	0.025	0.037	0.037	0.037	0.035	0.036	0.037	-28%	41%	-2%	1%
Sulfate	mg/L	0.54	0.32	0.43	0.35	0.94	0.93	0.95	0.93	74%	191%	122%	165%
Phosphorus_T	mg/L	0.021	0.026	0.028	0.027	0.025	0.025	0.026	0.027	21%	-4%	-7%	-2%
N_Ammonia	mg/L	0.140	0.005	0.008	0.019	0.021	0.020	0.019	0.019	-85%	293%	134%	0%
N_Nitrite	mg/L	0.028	0.010	0.008	0.016	0.012	0.012	0.012	0.012	-56%	21%	58%	-24%
N_Nitrate_Nitrite	mg/L	0.044	0.025	0.025	0.025	0.031	0.030	0.031	0.031	-31%	20%	24%	24%
Cyanide_T	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00049	0.00051	0.00052	1%	-1%	3%	4%
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00051	0.00050	0.00052	0.00053	2%	0%	4%	6%
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00049	0.00051	0.00052	1%	-1%	3%	4%
Hardness	mg/L	30	15	17	17	22	22	23	23	-24%	43%	33%	35%
Radium_226	Bq/L	0.0049	0.0050	0.0047	0.0048	0.0061	0.0061	0.0063	0.0062	25%	21%	33%	30%
Aluminum_D	mg/L	0.050	0.036	0.038	0.034	0.035	0.035	0.036	0.037	-29%	-4%	-5%	8%
Aluminum_T	mg/L	0.055	0.079	0.110	0.084	0.082	0.079	0.083	0.086	49%	0%	-25%	2%
Antimony_D	mg/L	0.000092	0.000092	0.000080	0.000080	0.000084	0.000083	0.000086	0.000087	-9%	-10%	8%	9%
Antimony_T	mg/L	0.000092	0.000092	0.000080	0.000080	0.000084	0.000083	0.000086	0.000087	-9%	-10%	8%	9%
Arsenic_D	mg/L	0.000710	0.000460	0.000530	0.000480	0.000492	0.000477	0.000496	0.000506	-31%	4%	-6%	5%
Arsenic_T	mg/L	0.000720	0.000490	0.000600	0.000520	0.000530	0.000513	0.000534	0.000547	-26%	5%	-11%	5%
Barium_D	mg/L	0.0130	0.0045	0.0055	0.0050	0.0063	0.0061	0.0062	0.0063	-52%	35%	14%	25%
Barium_T	mg/L	0.0130	0.0050	0.0065	0.0056	0.0068	0.0066	0.0068	0.0069	-47%	32%	5%	23%
Beryllium_T	mg/L	0.000092	0.000092	0.000080	0.000080	0.000083	0.000082	0.000086	0.000086	-10%	-10%	7%	8%
Boron_D	mg/L	0.0082	0.0050	0.0050	0.0050	0.0054	0.0053	0.0054	0.0055	-34%	5%	9%	10%
Boron_T	mg/L	0.0140	0.0050	0.0050	0.0050	0.0057	0.0055	0.0057	0.0057	-59%	11%	14%	14%
Cadmium_D	mg/L	0.0000052	0.0000046	0.0000044	0.0000040	0.0000046	0.0000046	0.0000048	0.0000048	-11%	-1%	8%	19%
Cadmium_T	mg/L	0.0000053	0.0000046	0.0000044	0.0000040	0.0000046	0.0000046	0.0000048	0.0000048	-13%	-1%	8%	19%
Calcium_D	mg/L	9.2	4.8	5.1	5.1	7.0	6.9	7.1	7.0	-24%	43%	38%	38%
Chromium_D	mg/L	0.000160	0.000088	0.000098	0.000130	0.000113	0.000108	0.000111	0.000114	-30%	23%	13%	-12%
Chromium_D_Hex	mg/L	0.000160	0.000088	0.000098	0.000130	0.000113	0.000108	0.000111	0.000114	-30%	23%	13%	-12%
Chromium_T	mg/L	0.000220	0.000220	0.000240	0.000220	0.000220	0.000215	0.000224	0.000229	0%	-2%	-7%	4%
Cobalt_D	mg/L	0.000092	0.000092	0.000080	0.000080	0.000095	0.000094	0.000098	0.000098	3%	2%	22%	22%
Cobalt_T	mg/L	0.000092	0.000092	0.000096	0.000080	0.000098	0.000097	0.000101	0.000102	7%	6%	6%	27%
Copper_D	mg/L	0.000600	0.000440	0.000510	0.000390	0.000531	0.000523	0.000543	0.000545	-11%	19%	7%	40%
Copper_T	mg/L	0.000960	0.000440	0.000510	0.000520	0.000591	0.000574	0.000591	0.000596	-38%	30%	16%	15%
Iron_D	mg/L	0.450	0.390	0.160	0.088	0.200	0.200	0.200	0.200	-56%	-49%	25%	127%
Iron_T	mg/L	0.500	0.550	0.370	0.260	0.200	0.200	0.200	0.200	-60%	-64%	-46%	-23%
Lead_D	mg/L	0.000042	0.000096	0.000046	0.000035	0.000062	0.000065	0.000069	0.000066	48%	-32%	51%	89%
Lead_T	mg/L	0.000053	0.000120	0.000120	0.000090	0.000104	0.000104	0.000109	0.000110	97%	-14%	-9%	23%
Magnesium_D	mg/L	1.600	0.780	0.890	0.940	1.042	1.012	1.041	1.052	-35%	30%	17%	12%
Manganese_D	mg/L	0.1100	0.0028	0.0047	0.0057	0.0156	0.0148	0.0146	0.0138	-86%	428%	210%	142%
Manganese_T	mg/L	0.1100	0.0210	0.0300	0.0180	0.0312	0.0302	0.0310	0.0307	-72%	44%	3%	71%
Mercury_D	mg/L	0.0000016	0.0000020	0.0000020	0.0000019	0.0000019	0.0000019	0.0000020	0.0000020	20%	-6%	-2%	5%
Mercury_T	mg/L	0.0000018	0.0000025	0.0000023	0.0000019	0.0000022	0.0000022	0.0000023	0.0000023	20%	-14%	-1%	20%
Molybdenum_D	mg/L	0.000050	0.000046	0.000053	0.000047	0.000106	0.000105	0.000108	0.000105	111%	129%	104%	124%
Molybdenum_T	mg/L	0.000099	0.000088	0.000091	0.000082	0.000142	0.000141	0.000145	0.000143	43%	60%	60%	75%
Nickel_D	mg/L	0.00038	0.00021	0.00020	0.00022	0.00026	0.00025	0.00026	0.00026	-32%	20%	30%	18%
Nickel_T	mg/L	0.00054	0.00021	0.00041	0.00044	0.00038	0.00035	0.00036	0.00038	-30%	69%	-11%	-13%
Potassium_D	mg/L	0.880	0.570	0.560	0.490	0.654	0.646	0.670	0.667	-26%	13%	20%	36%
Selenium_D	mg/L	0.000050	0.000045	0.000046	0.000048	0.000049	0.000048	0.000050	0.000050	-2%	6%	8%	5%
Selenium_T	mg/L	0.000050	0.000045	0.000046	0.000057	0.000052	0.000050	0.000052	0.000053	3%	12%	13%	-7%
Silicon_D	mg/L	1.1	0.6	0.5	0.6	1.0	1.0	1.0	1.0	-7%	80%	91%	61%
Silicon_T	mg/L	1.1	0.7	0.7	0.7	1.1	1.1	1.2	1.1	3%	58%	67%	58%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000051	0.0000050	0.0000052	0.0000053	2%	0%	4%	5%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000051	0.0000050	0.0000052	0.0000053	2%	0%	4%	5%
Sodium_D	mg/L	1.30	0.66	0.76	0.84	1.14	1.12	1.15	1.14	-12%	70%	51%	36%
Sodium_T	mg/L	1.30	0.66	0.84	0.84	1.16	1.13	1.16	1.16	-11%	72%	38%	38%
Strontium_D	mg/L	0.0200	0.0094	0.0110	0.0110	0.0150	0.0146	0.0150	0.0150	-25%	56%	37%	36%
Strontium_T	mg/L	0.0200	0.0099	0.0120	0.0110	0.0154	0.0150	0.0155	0.0154	-23%	52%	29%	40%
Thallium_D	mg/L	0.000042	0.000042	0.000032	0.000032	0.000035	0.000035	0.000037	0.000037	-16%	-16%	16%	15%
Thallium_T	mg/L	0.000042	0.000042	0.000032	0.000032	0.000035	0.000035	0.000037	0.000037	-16%	-16%	16%	15%
Uranium_D	mg/L	0.000047	0.000044	0.000038	0.000037	0.000072	0.000072	0.000074	0.000072	53%	63%	94%	95%
Uranium_T	mg/L	0.000047	0.000045	0.000040	0.000039	0.000073	0.000073	0.000075	0.000074	56%	62%	88%	89%
Vanadium_T	mg/L	0.000160	0.000310	0.000380	0.000280	0.000312	0.000305	0.000321	0.000328	95%	-2%	-16%	17%
Zinc_D	mg/L	0.0020	0.0012	0.0030	0.0012	0.0018	0.0017	0.0018	0.0019	-9%	44%	-39%	58%
Zinc_T	mg/L	0.0020	0.0012	0.0036	0.0016	0.0021	0.0019	0.0020	0.0022	4%	62%	-43%	35%

Notes:

Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.

Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-5-6: Predicted Water Quality at QM10_CT and Relative Percent Difference to Observed Mean Water Quality

Statistics	Units	2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source		AQM19	AQM19	AQM19	AQM19	Baseline							
Season		winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summe	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0%	0%	0%	0%
Chloride	mg/L	0.560	0.250	0.580	0.250	0.547	0.263	0.571	0.254	-2%	5%	-2%	2%
Fluoride	mg/L	0.053	0.043	0.052	0.048	0.052	0.043	0.052	0.047	-1%	0%	-1%	-1%
Sulfate	mg/L	0.92	0.52	0.38	0.52	0.92	0.55	0.39	0.54	0%	6%	4%	4%
Phosphorus_T	mg/L	0.039	0.030	0.030	0.024	0.038	0.030	0.030	0.024	-2%	0%	0%	1%
N_Ammonia	mg/L	0.110	0.012	0.008	0.009	0.106	0.016	0.008	0.010	-4%	35%	4%	5%
N_Nitrite	mg/L	0.013	0.013	0.012	0.001	0.013	0.013	0.012	0.002	-1%	0%	0%	66%
N_Nitrate_Nitrite	mg/L	0.210	0.025	0.025	0.025	0.202	0.033	0.025	0.025	-4%	30%	1%	1%
Cyanide_T	mg/L	0.00062	0.00050	0.00050	0.00050	0.00061	0.00050	0.00050	0.00050	-1%	1%	0%	0%
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0%	0%	0%	0%
Hardness	mg/L	31	17	22	20	31	17	22	20	-1%	5%	0%	1%
Radium_226	Bq/L	0.0046	0.0057	0.0046	0.0049	0.0047	0.0057	0.0046	0.0050	1%	-1%	1%	1%
Aluminum_D	mg/L	0.067	0.063	0.054	0.065	0.066	0.062	0.054	0.063	-2%	-2%	-1%	-2%
Aluminum_T	mg/L	0.130	0.130	0.087	0.100	0.128	0.128	0.087	0.099	-2%	-2%	0%	-1%
Antimony_D	mg/L	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080	0%	-1%	0%	0%
Antimony_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080	0%	-1%	0%	0%
Arsenic_D	mg/L	0.000370	0.000270	0.000410	0.000290	0.000374	0.000283	0.000412	0.000302	1%	5%	0%	4%
Arsenic_T	mg/L	0.000380	0.000290	0.000430	0.000350	0.000386	0.000303	0.000432	0.000361	2%	4%	1%	3%
Barium_D	mg/L	0.0120	0.0069	0.0080	0.0067	0.0118	0.0071	0.0080	0.0067	-2%	2%	-1%	0%
Barium_T	mg/L	0.0130	0.0078	0.0083	0.0070	0.0127	0.0080	0.0083	0.0070	-2%	2%	0%	0%
Beryllium_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000092	0.000093	0.000080	0.000080	0%	-1%	0%	0%
Boron_D	mg/L	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0%	0%	0%	0%
Boron_T	mg/L	0.0120	0.0050	0.0050	0.0050	0.0117	0.0053	0.0050	0.0050	-2%	6%	0%	1%
Cadmium_D	mg/L	0.0000045	0.0000050	0.0000038	0.0000052	0.0000045	0.0000050	0.0000038	0.0000052	0%	-1%	1%	-1%
Cadmium_T	mg/L	0.0000052	0.0000064	0.0000038	0.0000061	0.0000052	0.0000063	0.0000038	0.0000060	0%	-2%	1%	-1%
Calcium_D	mg/L	9.0	4.8	6.3	5.5	8.9	5.1	6.3	5.6	-1%	5%	0%	2%
Chromium_D	mg/L	0.000220	0.000150	0.000220	0.000200	0.000216	0.000151	0.000217	0.000196	-2%	1%	-1%	-2%
Chromium_D_Hex	mg/L	0.000220	0.000150	0.000210	0.000200	0.000216	0.000151	0.000207	0.000196	-2%	1%	-1%	-2%
Chromium_T	mg/L	0.000340	0.000350	0.000290	0.000270	0.000335	0.000344	0.000289	0.000268	-1%	-2%	-1%	-1%
Cobalt_D	mg/L	0.000240	0.000092	0.000140	0.000098	0.000234	0.000098	0.000139	0.000098	-3%	6%	-1%	0%
Cobalt_T	mg/L	0.000280	0.000100	0.000150	0.000110	0.000272	0.000107	0.000149	0.000110	-3%	7%	-1%	0%
Copper_D	mg/L	0.000620	0.000790	0.001100	0.000680	0.000617	0.000772	0.001085	0.000677	-1%	-2%	-1%	-1%
Copper_T	mg/L	0.000940	0.000900	0.001300	0.000700	0.000925	0.000888	0.001281	0.000700	-2%	-1%	-1%	0%
Iron_D	mg/L	0.920	0.540	0.590	0.390	0.200	0.200	0.200	0.200	-78%	-63%	-66%	-49%
Iron_T	mg/L	1.300	0.820	1.000	0.750	0.200	0.200	0.200	0.200	-85%	-76%	-80%	-73%
Lead_D	mg/L	0.000041	0.000048	0.000042	0.000042	0.000042	0.000048	0.000043	0.000043	2%	1%	2%	3%
Lead_T	mg/L	0.000110	0.000066	0.000120	0.000080	0.000110	0.000069	0.000120	0.000082	0%	5%	0%	2%
Magnesium_D	mg/L	1.900	1.100	1.400	1.300	1.864	1.128	1.390	1.288	-2%	3%	-1%	-1%
Manganese_D	mg/L	0.1200	0.0440	0.0620	0.0330	0.1155	0.0458	0.0607	0.0323	-4%	4%	-2%	-2%
Manganese_T	mg/L	0.1300	0.0640	0.0730	0.0440	0.1257	0.0652	0.0719	0.0436	-3%	2%	-1%	-1%
Mercury_D	mg/L	0.0000015	0.0000023	0.0000022	0.0000015	0.0000015	0.0000023	0.0000022	0.0000015	1%	-2%	0%	2%
Mercury_T	mg/L	0.0000020	0.0000026	0.0000022	0.0000018	0.0000020	0.0000026	0.0000022	0.0000018	0%	-2%	0%	2%
Molybdenum_D	mg/L	0.000120	0.000100	0.000160	0.000100	0.000119	0.000101	0.000158	0.000101	-1%	1%	-1%	1%
Molybdenum_T	mg/L	0.000120	0.000100	0.000170	0.000100	0.000121	0.000103	0.000169	0.000103	1%	2%	-1%	3%
Nickel_D	mg/L	0.00062	0.00038	0.00100	0.00067	0.00061	0.00038	0.00098	0.00065	-2%	1%	-2%	-3%
Nickel_T	mg/L	0.00075	0.00059	0.00130	0.00078	0.00074	0.00059	0.00127	0.00076	-2%	-1%	-2%	-2%
Potassium_D	mg/L	1.000	0.690	0.410	0.590	0.985	0.700	0.418	0.592	-2%	2%	2%	0%
Selenium_D	mg/L	0.000050	0.000045	0.000046	0.000040	0.000050	0.000045	0.000046	0.000041	0%	1%	0%	1%
Selenium_T	mg/L	0.000050	0.000050	0.000050	0.000047	0.000050	0.000050	0.000050	0.000047	0%	0%	0%	1%
Silicon_D	mg/L	2.2	1.0	1.3	2.0	2.2	1.0	1.3	1.9	-2%	5%	-1%	-3%
Silicon_T	mg/L	2.2	1.2	1.3	2.1	2.2	1.2	1.3	2.0	-2%	3%	0%	-3%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0.0000050	0%	0%	0%	0%
Sodium_D	mg/L	2.30	1.10	1.20	1.30	2.25	1.15	1.20	1.29	-2%	4%	0%	-1%
Sodium_T	mg/L	2.30	1.10	1.30	1.30	2.25	1.15	1.30	1.29	-2%	4%	0%	-1%
Strontium_D	mg/L	0.0220	0.0130	0.0180	0.0140	0.0217	0.0134	0.0179	0.0141	-1%	3%	0%	1%
Strontium_T	mg/L	0.0230	0.0140	0.0190	0.0150	0.0227	0.0144	0.0189	0.0151	-1%	3%	-1%	0%
Thallium_D	mg/L	0.000042	0.000044	0.000032	0.000032	0.000042	0.000044	0.000032	0.000032	-1%	-1%	1%	1%
Thallium_T	mg/L	0.000042	0.000044	0.000032	0.000032	0.000042	0.000044	0.000032	0.000032	-1%	-1%	1%	1%
Uranium_D	mg/L	0.000046	0.000046	0.000040	0.000038	0.000047	0.000047	0.000041	0.000040	2%	2%	2%	5%
Uranium_T	mg/L	0.000048	0.000047	0.000043	0.000040	0.000049	0.000048	0.000044	0.000042	2%	2%	2%	4%
Vanadium_T	mg/L	0.000430	0.000480	0.000310	0.000280	0.000425	0.000471	0.000311	0.000283	-1%	-2%	0%	1%
Zinc_D	mg/L	0.0023	0.0019	0.0042	0.0024	0.0023	0.0019	0.0041	0.0024	-1%	0%	-2%	0%
Zinc_T	mg/L	0.0030	0.0020	0.0046	0.0027	0.0030	0.0020	0.0045	0.0027	-1%	2%	-2%	0%

Notes:
Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.
Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-5-7: Predicted Water Quality at QMO8_CT and Relative Percent Difference to Observed Mean Water Quality

Statistics		2015-2018 Observed Mean (Expected Case)				Model Mean by Season				RPD from Baseline			
Source	Units	AQM11	AQM11	AQM11	AQM11	Baseline							
Season		winter	spring	summer	fall	winter	spring	summer	fall	winter	spring	summer	fall
Parameter													
Temperature, Field	deg C	8.4	4.8	0.5	12.0	0.0	0.0	0.0	0.0	-	-	-	-
Bromide	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-1%	-2%	1%	1%
Chloride	mg/L	0.610	0.450	0.480	0.550	0.538	0.537	0.486	0.482	-12%	19%	1%	-12%
Fluoride	mg/L	0.065	0.047	0.053	0.056	0.056	0.054	0.054	0.056	-13%	14%	2%	0%
Sulfate	mg/L	3.4	3.8	3.9	6.4	5.0	5.0	4.3	4.9	46%	30%	10%	-24%
Phosphorus_T	mg/L	0.015	0.013	0.015	0.016	0.020	0.019	0.018	0.018	31%	46%	22%	13%
N_Ammonia	mg/L	0.035	0.005	0.005	0.005	0.023	0.023	0.011	0.009	-36%	365%	127%	86%
N_Nitrite	mg/L	0.005	0.001	0.005	0.006	0.009	0.009	0.009	0.009	74%	1625%	84%	57%
N_Nitrate_Nitrite	mg/L	0.073	0.025	0.025	0.025	0.053	0.055	0.030	0.026	-28%	121%	21%	5%
Cyanide_T	mg/L	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00051	0.00050	0%	0%	1%	1%
Cyanide_F	mg/L	0.00050	0.00050	0.00050	0.00050	0.00049	0.00049	0.00050	0.00050	-1%	-2%	1%	1%
Cyanide_WAD	mg/L	0.00050	0.00050	0.00050	0.00050	0.00049	0.00049	0.00050	0.00050	-2%	-2%	1%	1%
Hardness	mg/L	14	14	15	16	16	17	14	15	16%	21%	-3%	-7%
Radium_226	Bq/L	0.0046	0.0048	0.0050	0.0048	0.0052	0.0050	0.0048	0.0053	14%	4%	-5%	10%
Aluminum_D	mg/L	0.038	0.050	0.020	0.028	0.038	0.044	0.035	0.031	-1%	-11%	74%	12%
Aluminum_T	mg/L	0.052	0.083	0.047	0.069	0.084	0.099	0.087	0.078	61%	19%	85%	14%
Antimony_D	mg/L	0.000092	0.000093	0.000080	0.000080	0.000080	0.000086	0.000081	0.000076	-13%	-8%	1%	-5%
Antimony_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000080	0.000086	0.000081	0.000076	-13%	-8%	1%	-5%
Arsenic_D	mg/L	0.000170	0.000140	0.000190	0.000180	0.000185	0.000183	0.000176	0.000177	9%	31%	-7%	-2%
Arsenic_T	mg/L	0.000220	0.000150	0.000200	0.000200	0.000212	0.000201	0.000190	0.000206	-4%	34%	-5%	3%
Barium_D	mg/L	0.0078	0.0055	0.0056	0.0050	0.0067	0.0068	0.0059	0.0058	-14%	24%	6%	16%
Barium_T	mg/L	0.0080	0.0057	0.0060	0.0055	0.0077	0.0078	0.0066	0.0064	-4%	36%	9%	17%
Beryllium_T	mg/L	0.000092	0.000093	0.000080	0.000080	0.000081	0.000086	0.000083	0.000077	-12%	-7%	4%	-3%
Boron_D	mg/L	0.0050	0.0050	0.0050	0.0050	0.0049	0.0049	0.0050	0.0050	-1%	-2%	1%	1%
Boron_T	mg/L	0.0098	0.0050	0.0050	0.0050	0.0054	0.0055	0.0051	0.0051	-45%	9%	2%	1%
Cadmium_D	mg/L	0.0000081	0.0000110	0.0000070	0.0000044	0.0000061	0.0000072	0.0000066	0.0000058	-25%	-34%	-5%	31%
Cadmium_T	mg/L	0.0000095	0.0000120	0.0000070	0.0000091	0.0000067	0.0000078	0.0000072	0.0000065	-29%	-35%	3%	-28%
Calcium_D	mg/L	3.9	3.8	4.2	4.5	4.7	4.7	3.9	4.2	19%	24%	-6%	-8%
Chromium_D	mg/L	0.000050	0.000074	0.000050	0.000050	0.000072	0.000073	0.000062	0.000064	45%	-1%	25%	28%
Chromium_D_Hex	mg/L	0.000050	0.000074	0.000050	0.000050	0.000072	0.000073	0.000062	0.000064	44%	-1%	24%	27%
Chromium_T	mg/L	0.000110	0.000180	0.000160	0.000190	0.000169	0.000174	0.000153	0.000157	54%	-3%	-4%	-17%
Cobalt_D	mg/L	0.000190	0.000190	0.000080	0.000110	0.000201	0.000320	0.000253	0.000171	6%	68%	216%	56%
Cobalt_T	mg/L	0.000210	0.000380	0.000130	0.000170	0.000234	0.000368	0.000301	0.000211	11%	-3%	131%	24%
Copper_D	mg/L	0.001200	0.003100	0.002500	0.002800	0.001687	0.002742	0.002498	0.001830	41%	-12%	0%	-35%
Copper_T	mg/L	0.001300	0.003400	0.003100	0.003300	0.002037	0.003233	0.002954	0.002217	57%	-5%	-5%	-33%
Iron_D	mg/L	0.130	0.210	0.076	0.079	0.160	0.178	0.138	0.131	23%	-15%	82%	65%
Iron_T	mg/L	0.230	0.340	0.190	0.230	0.200	0.200	0.200	0.200	-13%	-41%	5%	-13%
Lead_D	mg/L	0.000041	0.000042	0.000037	0.000037	0.000034	0.000035	0.000034	0.000033	-18%	-17%	-8%	-10%
Lead_T	mg/L	0.000041	0.000042	0.000049	0.000037	0.000045	0.000045	0.000045	0.000044	10%	7%	-8%	20%
Magnesium_D	mg/L	1.000	0.920	0.980	1.100	1.069	1.076	0.956	0.978	7%	17%	-2%	-11%
Manganese_D	mg/L	0.0130	0.0110	0.0062	0.0040	0.0180	0.0235	0.0129	0.0096	39%	114%	109%	139%
Manganese_T	mg/L	0.0170	0.0290	0.0170	0.0160	0.0236	0.0270	0.0218	0.0202	39%	-7%	28%	26%
Mercury_D	mg/L	0.0000006	0.0000011	0.0000010	0.0000006	0.0000008	0.0000010	0.0000011	0.0000009	48%	-9%	8%	62%
Mercury_T	mg/L	0.0000008	0.0000015	0.0000011	0.0000006	0.0000010	0.0000012	0.0000013	0.0000011	33%	-18%	16%	91%
Molybdenum_D	mg/L	0.000050	0.000046	0.000040	0.000053	0.000058	0.000058	0.000051	0.000054	17%	25%	29%	3%
Molybdenum_T	mg/L	0.000095	0.000099	0.000082	0.000089	0.000091	0.000093	0.000086	0.000086	-5%	-6%	5%	-4%
Nickel_D	mg/L	0.02200	0.03200	0.02300	0.02900	0.02646	0.03296	0.03024	0.02573	20%	3%	31%	-11%
Nickel_T	mg/L	0.02200	0.03400	0.02500	0.03100	0.02687	0.03338	0.03057	0.02601	22%	-2%	22%	-16%
Potassium_D	mg/L	0.740	0.630	0.640	0.620	0.680	0.687	0.634	0.633	-8%	9%	-1%	2%
Selenium_D	mg/L	0.000050	0.000045	0.000040	0.000040	0.000043	0.000044	0.000042	0.000041	-14%	-2%	6%	3%
Selenium_T	mg/L	0.000050	0.000045	0.000046	0.000040	0.000048	0.000047	0.000044	0.000047	-3%	4%	-5%	16%
Silicon_D	mg/L	3.4	1.7	1.5	1.6	2.4	2.3	2.0	2.1	-29%	35%	35%	32%
Silicon_T	mg/L	3.5	1.9	1.7	1.8	2.5	2.4	2.2	2.2	-28%	27%	29%	24%
Silver_D	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000049	0.0000049	0.0000050	0.0000050	-1%	-2%	1%	1%
Silver_T	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.0000049	0.0000049	0.0000050	0.0000050	-1%	-2%	1%	1%
Sodium_D	mg/L	1.50	1.10	1.10	1.30	1.34	1.32	1.16	1.21	-10%	20%	6%	-7%
Sodium_T	mg/L	1.50	1.10	1.20	1.30	1.39	1.35	1.23	1.26	-7%	23%	2%	-3%
Strontium_D	mg/L	0.0170	0.0130	0.0150	0.0150	0.0158	0.0156	0.0142	0.0146	-7%	20%	-5%	-3%
Strontium_T	mg/L	0.0180	0.0140	0.0150	0.0170	0.0168	0.0164	0.0154	0.0157	-7%	17%	3%	-7%
Thallium_D	mg/L	0.000042	0.000044	0.000032	0.000032	0.000030	0.000037	0.000025	0.000022	-28%	-16%	-21%	-31%
Thallium_T	mg/L	0.000042	0.000044	0.000032	0.000032	0.000030	0.000037	0.000025	0.000022	-28%	-16%	-21%	-31%
Uranium_D	mg/L	0.000045	0.000046	0.000038	0.000038	0.000039	0.000042	0.000039	0.000037	-13%	-8%	3%	-4%
Uranium_T	mg/L	0.000046	0.000046	0.000040	0.000041	0.000041	0.000044	0.000041	0.000039	-10%	-5%	3%	-4%
Vanadium_T	mg/L	0.000100	0.000100	0.000100	0.000100	0.000143	0.000149	0.000124	0.000127	43%	49%	24%	27%
Zinc_D	mg/L	0.0085	0.0062	0.0031	0.0031	0.0067	0.0076	0.0062	0.0053	-21%	23%	100%	72%
Zinc_T	mg/L	0.0088	0.0064	0.0040	0.0041	0.0071	0.0078	0.0063	0.0056	-20%	22%	58%	38%

Notes:

Relative Percent Difference (RPD) values below -50% are highlited pink with dark red font colour.

Relative Percent Difference (RPD) values above 100% are highlited yellow with dark orange font colour.

Table E-6: Geochemical leaching rates and concentrations used for mass input to the water quality models

Site		Inputs											Subaqueous Column				Ageing Tests									
Sample ID	Units	ML WR AVG	ML WR S>1%	ML ORE	Units	Averages from humidity cells CND 3P, CND4P, CND 6, and CND 5. Operation - first month stat, Closure and Postclosure last month stat.				Units	Removal Rate from TMF pond based on ageing tests	Unit	Average First Month		Average Last Month		Day 0	Day 7	Day 14	Day 28	Day 56	Day 0	Day 7	Day 14	Day 28	Day 56
Material or lithology/ Model case		Mine Rock/ Expected Case	Mine Rock/ Upper Case	Ore/Both		Tailings Operation/ Expected	Tailings Operation/ Upper Case	Tailings Post Operation/ Expected Case	Tailings Post Operation/ Upper Case				CND 2P Column	CND 7 Column	CND 2P Column	CND 7 Column	CND-1 Ageing					CND-2 Ageing				
% of material	%	100%	100%	100%	%	100%	100%	100%	100%	-	N/A															
Surface area	m^2/kg	12.4	35.2	49.0	m^2/kg	N/A	N/A	N/A	N/A	-	N/A															
pH measured	pH Unit	N/A	N/A	N/A	pH Unit	N/A	N/A	N/A	N/A	-	N/A															
Acidity_T	µg/kg/week	0	0	0	mg/kg/week	1.0	1.0	1.0	1.0	mg/L/day	0	mg/L	8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alkalinity_T	µg/kg/week	745	846	1876	mg/kg/week	15	20	12	16	mg/L/day	0	mg/L	102	83	83	67	57	65	67	71	69	47	57	61	72	74
Bromide	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	2.6	1.9	0.3	0.5	18	18	17	19	20	21	23	21	23	22
Fluoride	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	0.48	0.46	0.11	0.10	0.16	0.16	0.19	0.25	0.23	0.36	0.43	0.41	0.47	0.48
Sulfate	µg/kg/week	4276	5751	6630	mg/kg/week	44	61	18	28	mg/L/day	0	mg/L	119	104	25	27	1600	1600	1600	1800	1700	1300	1500	1300	1400	1500
Phosphorus_T	µg/kg/week	0.24	0.27	0.67	mg/kg/week	0.0015	0.0015	0.0033	0.0057	mg/L/day	0	mg/L	0.010	0.012	0.007	0.005	0	0	0	0	0	0	0	0	0	0
N_Ammonia	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	0.20	0.36	0.10	0.20	3.9	5.2	5.6	8.2	8.5	2.6	3.5	4.4	5.5	5.9
N_Nitrite	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
N_Nitrate_Nitrite	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Cyanide_T	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0.018	mg/L	8.7	2.4	1.8	0.8	2.0	1.2	0.47	0.040	0.0050	3.1	2.8	2.0	0.27	0.044
Cyanide_F	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Cyanide_WAD	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0.017	mg/L	0.020	0.0090	0.050	0.028	0.28	0.75	0.0025	0.030	0.012	0.0050	0.0025	0.0025	0.0080	0.027
Hardness	µg/kg/week	4325	6097	7353	mg/kg/week	0	0	0	0	mg/L/day	0	mg/L	40	40	40	40	0	0	0	0	0	0	0	0	0	0
Radium_226	µg/kg/week	0	0	0	mg/kg/week	0	0	0	0	mg/L/day	0	Bq/L	0	0	0	0	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
TSS	µg/kg/week	7552	9670	12448	mg/kg/week	0	0	0	0	mg/L/day	0.016	mg/L	0	0	0	0	10	2.0	1.0	3.0	1.0	12	1.0	1.0	3.0	1.0
Aluminum_D	µg/kg/week	0.47	0.51	1.35	mg/kg/week	0.021	0.033	0.019	0.032	mg/L/day	0.015	mg/L	0.026	0.048	0.0090	0.0065	0.054	0.032	0.035	0.035	0.030	0.15	0.041	0.030	0.025	0.024
Aluminum_T	µg/kg/week	0.47	0.51	1.35	mg/kg/week	0.021	0.033	0.019	0.032	mg/L/day	0.016	mg/L	0.026	0.048	0.0090	0.0065	0.15	0.041	0.035	0.046	0.035	0.33	0.048	0.036	0.027	0.040
Antimony_D	µg/kg/week	0.10	0.12	2.07	mg/kg/week	0.00072	0.0015	0.00032	0.00047	mg/L/day	0.012	mg/L	0.0045	0.019	0.000050	0.000050	0.045	0.039	0.034	0.032	0.014	0.000050	0.0037	0.0019	0.000050	0.000050
Antimony_T	µg/kg/week	0.10	0.12	2.07	mg/kg/week	0.00072	0.0015	0.00032	0.00047	mg/L/day	0.010	mg/L	0.0045	0.019	0.000050	0.000050	0.040	0.023	0.030	0.020	0.020	0.0013	0.0018	0.0013	0.00050	0.00060
Arsenic_D	µg/kg/week	0.80	0.34	3.33	mg/kg/week	0.0040	0.0092	0.0047	0.0098	mg/L/day	0	mg/L	0.019	0.060	0.047	0.076	0.012	0.018	0.021	0.035	0.037	0.00030	0.0017	0.00020	0.00030	0.00030
Arsenic_T	µg/kg/week	0.80	0.34	3.33	mg/kg/week	0.0040	0.0092	0.0047	0.0098	mg/L/day	0	mg/L	0.019	0.060	0.047	0.076	0.013	0.021	0.020	0.036	0.033	0.00040	0.0021	0.00030	0.00040	0.00030
Barium_D	µg/kg/week	0.58	0.64	1.55	mg/kg/week	0.0041	0.0054	0.0032	0.0042	mg/L/day	0.0044	mg/L	0.031	0.016	0.030	0.016	0.085	0.088	0.085	0.090	0.064	0.081	0.093	0.082	0.087	0.081
Barium_T	µg/kg/week	0.58	0.64	1.55	mg/kg/week	0.0041	0.0054	0.0032	0.0042	mg/L/day	0.0054	mg/L	0.031	0.016	0.030	0.016	0.089	0.088	0.082	0.093	0.062	0.083	0.087	0.084	0.089	0.078
Beryllium_T	µg/kg/week	0.001	0.002	0.004	mg/kg/week	0.000048	0.000049	0.000028	0.000040	mg/L/day	0.012	mg/L	0.0000035	0.0000035	0.0000035	0.0000035	0.0000035	0.0000035	0.0000035	0.0000035	0.0000035	0.000010	0.00012	0.0000035	0.0000035	0.0000035
Boron_D	µg/kg/week	0.84	0.60	0.89	mg/kg/week	0.0023	0.0032	0.0010	0.0010	mg/L/day	0	mg/L	0.036	0.033	0.010	0.0090	0.022	0.021	0.024	0.028	0.028	0.061	0.067	0.053	0.067	0.061
Boron_T	µg/kg/week	0.84	0.60	0.89	mg/kg/week	0.0023	0.0032	0.0010	0.0010	mg/L/day	0	mg/L	0.036	0.033	0.010	0.0090	0.030	0.018	0.025	0.030	0.028	0.059	0.062	0.047	0.070	0.063
Cadmium_D	µg/kg/week	0.0002	0.0019	0.006	mg/kg/week	0.000009	0.000019	0.000018	0.000049	mg/L/day	0	mg/L	0.000034	0.000048	0.0000033	0.000013	0.00013	0.00024	0.00041	0.00090	0.00098	0.0000090	0.00012	0.000028	0.000018	0.000021
Cadmium_T	µg/kg/week	0.0002	0.0019	0.006	mg/kg/week	0.000009	0.000019	0.000018	0.000049	mg/L/day	0	mg/L	0.000034	0.000048	0.0000033	0.000013	0.000092	0.000243	0.000442	0.000845	0.00102	0.0000015	0.000075	0.000016	0.000015	0.000013
Calcium_D	µg/kg/week	1219	1905	2401	mg/kg/week	12	15	7.6	9.1	mg/L/day	0	mg/L	34	26	31	27	295	259	271	259	231	208	214	253	202	192
Chromium_D	µg/kg/week	0.0009	0.0009	0.0022	mg/kg/week	0.000016	0.000018	0.000031	0.000059	mg/L/day	0.016	mg/L	0.00025	0.000029	0.000015	0.000028	0.000050	0.000030	0.000015	0.000040	0.000050	0.00012	0.00014	0.000040	0.000015	0.000015
Chromium_D_Hex	µg/kg/week	0.0009	0.0009	0.0022	mg/kg/week	0.000016	0.000018	0.000031	0.000059	mg/L/day	0.016	mg/L	0.00025	0.000029	0.000015	0.000028	0.000050	0.000030	0.000015	0.000040	0.000050	0.00012	0.00014	0.000040	0.000015	0.000015
Chromium_T	µg/kg/week	0.0009	0.0009	0.0022	mg/kg/week	0.000016	0.000018	0.000031	0.000059	mg/L/day	0.016	mg/L	0.00025	0.000029	0.000015	0.000028	0.0010	0.00010	0.000050	0.00011	0.000090	0.00040	0.00020	0.000030	0.000040	0.000050
Cobalt_D	µg/kg/week	0.006	0.010	0.018	mg/kg/week	0.00083	0.0017	0.00018	0.00041	mg/L/day	0.0022	mg/L	0.015	0.027	0.0043	0.0039	0.161	0.181	0.167	0.179	0.154	0.0129	0.0157	0.0155	0.0153	0.0113
Cobalt_T	µg/kg/week	0.006	0.010	0.018	mg/kg/week	0.00083	0.0017	0.00018	0.00041	mg/L/day	0.0014	mg/L	0.015	0.027	0.0043	0.0039	0.148	0.179	0.151	0.178	0.156	0.0125	0.0145	0.0158	0.0157	0.0115
Copper_D	µg/kg/week	0.016	0.016	0.044	mg/kg/week	0.0012	0.0014	0.00060	0.00070	mg/L/day	0.013	mg/L	0.012	0.038	0.00021	0.00038	0.0725	0.630	0.301	0.0576	0.0177	0.0335	0.898	0.595	0.529	0.0229
Copper_T	µg/kg/week	0.016	0.016	0.044	mg/kg/week	0.0012	0.0014	0.00060	0.00070	mg/L/day	0.013	mg/L	0.012	0.038	0.00021	0.00038	0.226	0.683	0.331	0.0624	0.0181	0.244	0.861	0.652	0.587	0.0227
Iron_D	µg/kg/week	0.08	0.09	0.26	mg/kg/week	0.017	0.023	0.010	0.016	mg/L/day	0.018	mg/L	3.4	1.0	0.89	0.48	0.532	0.132	0.0035	0.018	0.0035	1.07	0.802	0.764	0.176	0.017
Iron_T	µg/kg/week	0.08	0.09	0.26	mg/kg/week	0.017	0.023	0.010	0.016	mg/L/day	0.017	mg/L	3.4	1.0	0.89	0.48	0.665	0.247	0.097	0.043	0.014	1.66	0.874	0.892	0.280	0.057
Lead_D	µg/kg/week	0.001	0.001	0.022	mg/kg/week	0.00004	0.00012	0.00019	0.00055	mg/L/day	0.016	mg/L	0.00013	0.00029	0.000090	0.00015	0.00094	0.000070	0.00010	0.00020	0.00010	0.00002	0.00001	0.00014	0.00001	0.000005
Lead_T	µg/kg/week	0.001	0.001	0.022	mg/kg/week	0.00004	0.00012	0.00019	0.00055	mg/L/day	0.015	mg/L	0.00013	0.00029	0.000090	0.00015	0.00249	0.00029	0.00028	0.00044	0.00033	0.00007	0.00011	0.00008	0.00003	0.00005
Magnesium_D	µg/kg/week	310.8	325.2	329.7	mg/kg/week	1.5	1.8	0.95	1.3	mg/L/day	0	mg/L	7.4	4.3	3.5	3.3	9.29	10.6	12.1	15.1	17.5	6.4	8.24	9.60	13.0	14.9
Manganese_D	µg/kg/week	0.17	0.79	2.5	mg/kg/week	0.033	0.041	0.024	0.032	mg/L/day	0	mg/L	0.039	0.050	0.031	0.054	0.059	0.061	0.077	0.102	0.129	0.0233	0.0493	0.0740	0.114	0.164
Manganese_T	µg/kg/week	0.17	0.79	2.5	mg/kg/week	0.033	0.041	0.024	0.032	mg/L/day	0	mg/L	0.039	0.050	0.031	0.054	0.055	0.062	0.071	0.105	0.131	0.0306	0.0449	0.0750	0.116	0.161
Mercury_D	µg/kg/week	9.2E-12	9.3E-12	3.2E-11	mg/kg/week	5.0E-06	5.3E-06	4.9E-06	5.0E-06	mg/L/day	0	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.000005	0.000005	0.000010	0.000020	0.000030	0.000005	0.000005	0.000005	0.000010	0.000010
Mercury_T	µg/kg/week	9.2E-12	9.3E-12	3.2E-11	mg/kg/week	5.0E-06	5.3E-06	4.9E-06	5.0E-06	mg/L/day	0	mg/L	0.0000050	0.0000050	0.0000050	0.0000050	0.000005	0.000005	0.000005	0.00003	0.00007	0.000005	0.000005	0.000005	0.000005	0.00003
Molybdenum_D	µg/kg/week	0.459	0.192	0.266	mg/kg/week	0.00065	0.0012	0.00048	0.0011	mg/L/day	0	mg/L	0.0057	0.0053	0.0020	0.0020	0.0125	0.0125	0.0148	0.0171	0.0202	0.0158	0.0179	0.0181	0.0182	0.0180
Molybdenum_T	µg/kg/week	0.459	0.192	0.266	mg/kg/week	0.00065	0.0012	0.00048	0.0011	mg/L/day	0	mg/L	0.0057	0.0053	0.0020	0.0020	0.0140	0.0118	0.0143	0.0178	0.0213	0.0168	0.0186	0.0187	0.0190	0.0179
Nickel_D	µg/kg/week	0.169	0.164	0.260	mg/kg/week	0.0022	0.0055	0.00040	0.00087	mg/L/day	0	mg/L	0.0051	0.0034	0.00040	0.0012	0.0114	0.0957	0.0551	0.0200	0.0159	0.0005	0.0010	0.0022	0.0013	0.0005
Nickel_T	µg/kg/week	0.169	0.164	0.260	mg/kg/week	0.0022	0.0055	0.00040	0.00087	mg/L/day	0.0055	mg/L	0.0051	0.0034	0.00040	0.0012	0.0228	0.0967	0.0520	0.0215	0.0158	0.0008	0.0011	0.0012	0.0013	0.0011
Potassium_D	µg/kg/week	478	556	918	mg/kg/week	6.0	7.1	3.1	3.6	mg/L/day	0.00083	mg/L	38	31	19	18	64	65	66	72	66	93	96	90	106	89
Selenium_D	µg/kg/week	0.007	0.013	0.010	mg/kg/week	0.00010	0.00014	0.000060	0.000091	mg/L/day	0.013	mg/L	0.00044	0.00033	0.000075	0.000050	0.00244	0.00304	0.00164	0.00138	0.00066	0.00117	0.00130	0.00139	0.00131	0.00037
Selenium_T	µg/kg/week	0.007	0.013	0.010	mg/kg/week	0.00010	0.00014	0.000060	0.000091	mg/L/day	0.013	mg/L	0.00044	0.00033	0.000075	0.000050	0.00225	0.00265	0.00217	0.00135	0.00050	0.00144	0.00127	0.00129	0.00125	0.00053
Silicon_D	µg/kg/week	32.2	36.3	65.0	mg/kg/week	0.20	0.28	0.14	0.18	mg/L/day	0	mg/L	2.0	2.3	3.1	2.4	0	0	0	0	0	0	0	0	0	0
Silicon_T	µg/kg/week	32.2	36.3	65.0	mg/kg/week	0.20	0.28	0.14	0.18	mg/L/day	0	mg/L	2.0	2.3	3.1	2.4	0	0	0	0	0	0	0	0	0	0
Silver_D	µg/kg/week	7.5E-05	9.3E-05	4.0E-04	mg/kg/week	4.7E-06	6.0E-06	1.4E-06	1.6E-06	mg/L/day	0	mg/L	0.000016	0.000039	0.0000010	0.0000010	0.000025	0.000382	0.00127	0.00360	0.00414	0.000016	0.000001	0.000092	0.000151	0.000156
Silver_T	µg/kg/week	7.5E-05	9.3E-05	4.0E-04	mg/kg/week	4.7E-06	6.0E-06	1.4E-06	1.6E-06	mg/L/day	0	mg/L	0.000016	0.000039	0.0000010	0.0000010	0.000014	0.000278	0.00120	0.00383	0.00435	0.000005	0.000001	0.000071	0.000146	0.000114
Sodium_D	µg/kg/week	195	109	133	mg/kg/week	8.0	10	0.15	0.20	mg/L/day	0.0011	mg/L	79	57	2.3	2.3	576	590	562	613	591	569	543	548	531	533
Sodium_T	µg/kg/week	195	109	133	mg/kg/week	8.0	10	0.15	0.20	mg/L/day	0.0023	mg/L	79	57	2.3	2.3	572	557	512	634	602	580	510	680	573	505
Strontium_D	µg/kg/week	4.8	5.2	6.9	mg/kg/week	0.028	0.038	0.015	0.027	mg/L/day	0	mg/L	0.12	0.084	0.095	0.091	0.544	0.596	0.540	0.562	0.608	0.403	0.443	0.474	0.483	0.545
Strontium_T	µg/kg/week	4.8	5.2	6.9	mg/kg/week	0.028	0.038	0.015	0.027	mg/L/day	0	mg/L	0.12	0.084	0.095	0.091	0.550	0.610	0.519	0.590	0.623	0.418	0.431	0.478	0.507	0.534
Thallium_D	µg/kg/week	0.00065	0.00090	0.0022	mg/kg/week	2.5E-06	2.8E-06	3.7E-06	6.1E-06	mg/L/day	0	mg/L	0.0000060	0.0000050	0.0000025	0.0000025	0.0000025	0.000010	0.000010	0.000014	0.000011	0.000008	0.000081	0.000022	0.000014	0.000014
Thallium_T	µg/kg/week	0.00065	0.00090	0.0022	mg/kg/week	2.5E-06	2.8E-06	3.7E-06	6.1E-06	mg/L/day	0	mg/L	0.0000060	0.0000050	0.0000025	0.0000025	0.000009	0.000011	0.000008	0.000013	0.000010	0.000013	0.000066	0.000019	0.000018	0.000014
Uranium_D	µg/kg/week	0.050	0.029	0.015	mg/kg/week	0.00011	0.00021	0.00010	0.00023	mg/L/day	0	mg/L	0.0022	0.0016	0.00034	0.00005	0.000524	0.000407	0.000421	0.000545	0.000568	0.00257	0.00308	0.00408	0.00638	0.00730
Uranium_T	µg/kg/week	0.050	0.029	0.015	mg/kg/week	0.00011	0.00021	0.00010	0.00023	mg/L/day	0	mg/L	0.0022	0.0016	0.00034	0.00005	0.000726	0.000449	0.000396	0.000599	0.000572	0.00264	0.00291	0.00437	0.00655	0.00701
Vanadium_T	µg/kg/week	0.023	0.011	0.022	mg/kg/week	0.000064	0.000083	0.00016	0.00041	mg/L/day	0.016	mg/L	0.000080	0.00015	0.000015	0.00026	0.00030	0.00007	0.00008	0.00019	0.00015	0.00070	0.00003	0.00004	0.00007	0.00006
Zinc_D	µg/kg/week	0.010	0.045	0.171	mg/kg/week	0.0010	0.0010	0.0010	0.0010	mg/L/day	0	mg/L	0.0042	0.0086	0.0035	0.0090	0.0010	0.0040	0.011	0.024	0.024	0.0010	0.0010	0.0090	0.0010	0.0010
Zinc_T	µg/kg/week	0.010	0.045	0.171	mg/kg/week	0.0010	0.0010	0.0010	0.0010	mg/L/day	0	mg/L	0.0042	0.0086	0.0035	0.0090	0.0030	0.0050	0.012	0.025	0.023	0.0010	0.0010	0.0060	0.0010	0.0010

Table E-7: Mined Rock and Ore and Mass of Ore Pile per Year

Year	Mined Waste Rock (ktonne/yr)	Mined Ore (Ktonne/yr)	Mass of Ore Piles (ktonne)
2021	3099	-	-
2022	6502	720	-
2023	13750	1778	405
2024	17164	1534	458
2025	17970	1063	755
2026	21999	767	580
2027	24501	1266	110
2028	28025	3303	138
2029	28024	3551	1695
2030	27011	2889	2509
2031	24501	1091	2661
2032	22800	1993	1014
2033	17699	2740	270
2034	11106	3095	272
2035	1838	1031	630

Table E-8: Temperature Scaling Factors

TMF beaches *		TMF pond degradation **	
T, °C	SF_t		
-40	0	0	0
-5	0	4	0.303
0	0.11	10	0.482
10	0.33	15	0.698
20	1	20	1
25	1.3	25	1.415

Notes:
*Based on Kempton 2012
**Based on Simovic 1984

Appendix F OXYGEN DIFFUSION MODEL IN TMF

Memo

To:	LLGP Project Team	From:	Mark Steinepreis Waterloo, Ontario
File:	By email	Date:	September 12, 2017

Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF

Unsaturated seepage analyses have been carried out to determine the relative infiltration of precipitative water and oxygen gas that could be expected through the crest of the MacLellan TMF before and after a soil cover is placed. The software SEEP/W from the Geo-studio suite of software has been used for this task.

It is notable that the majority of the material available on site is till, but contains little clay. The overburden material seems to be particularly sandy within the footprint of the pit, the stockpile of which will be the source for cover material. Little resistance to infiltration would be through the coarser cover material, and therefore percolation through the underlying tailings would be unchanged or potentially even increase. A possible explanation for the latter is if precipitation on exposed fine tailings runs off instantaneously during the event, but the tailings receives a steady supply of infiltration after the placement of the cover and has a greater ability to accept it.

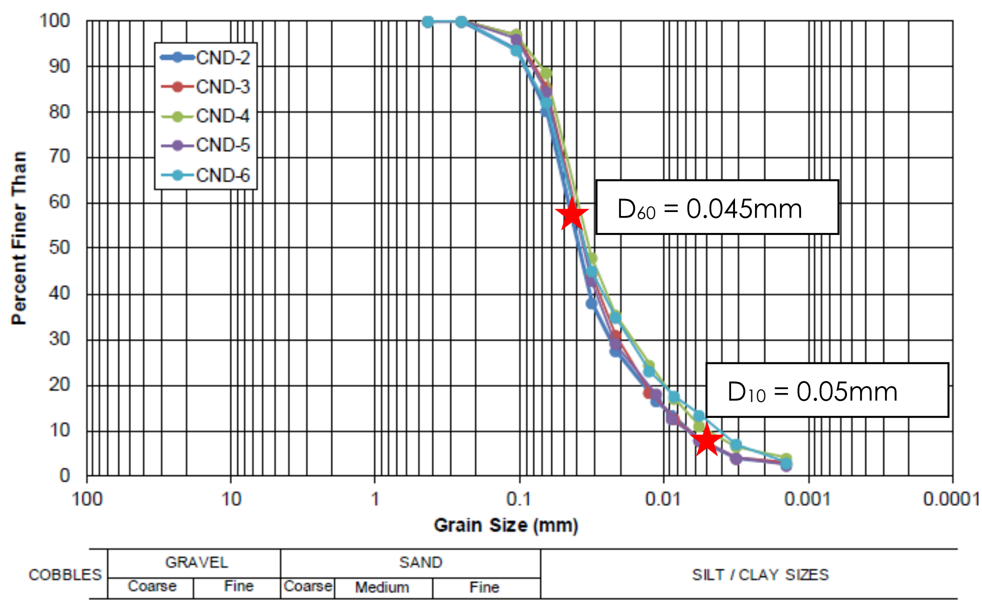
MATERIAL PARAMETERS

Volumetric water content (VMC) and unsaturated hydraulic conductivity functions are required for all materials for the unsaturated flow analysis. The software has internal capability to estimate the VMC function based on data from particle size distribution (PSD) tests, and uses a Van Genuchten fit for the unsaturated-k function.

WATER FLOW PROPERTIES - TAILINGS

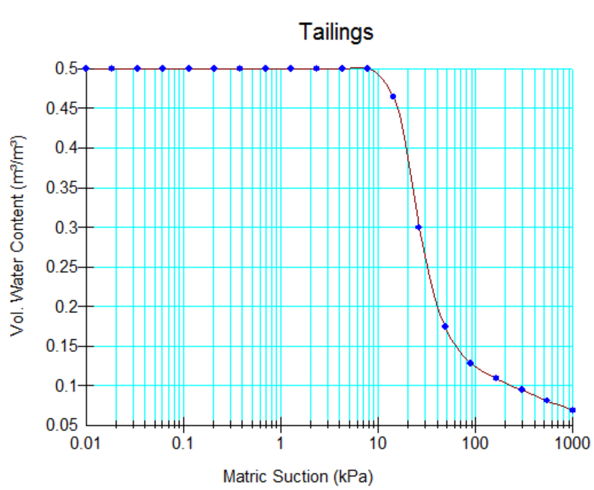
Golder (2016) was used to obtain PSD inputs for function estimations. The D_{60} and D_{10} are required, and the approximate values for the tailings are shown in the Figure below:

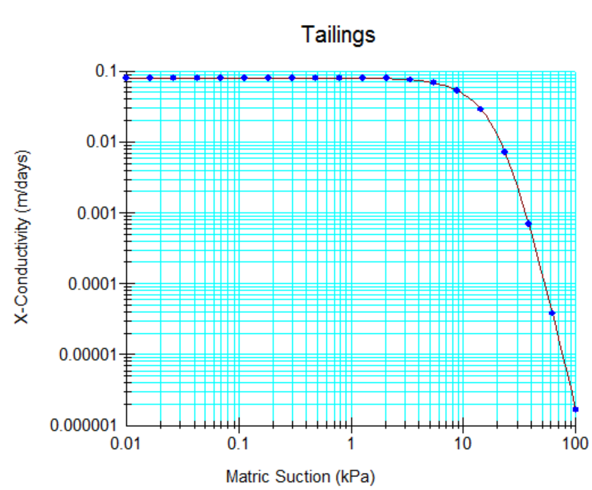
Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF



The hydraulic conductivity of the tailings material was estimated from the Rowe Cell data. The noted value for hydraulic conductivity at a confining pressure of 10kPa represents the figure for half (0.5) metres below the surface, which is a reasonable value to apply to the tailings material in the model. The sample was tested at 85% saturation, so the saturated hydraulic conductivity was input such that the value at 85% saturation matched the value from the Rowe cell data. The saturated MC of the material is approximately 0.5, again from the Rowe Cell data, which is a typical value for tailings. Analysis was considered with a variable hydraulic conductivity with depth, however numerical issues with the oxygen gas modelling were observed.

The resulting VMC and hydraulic-k functions that were formulated by the software are shown below:



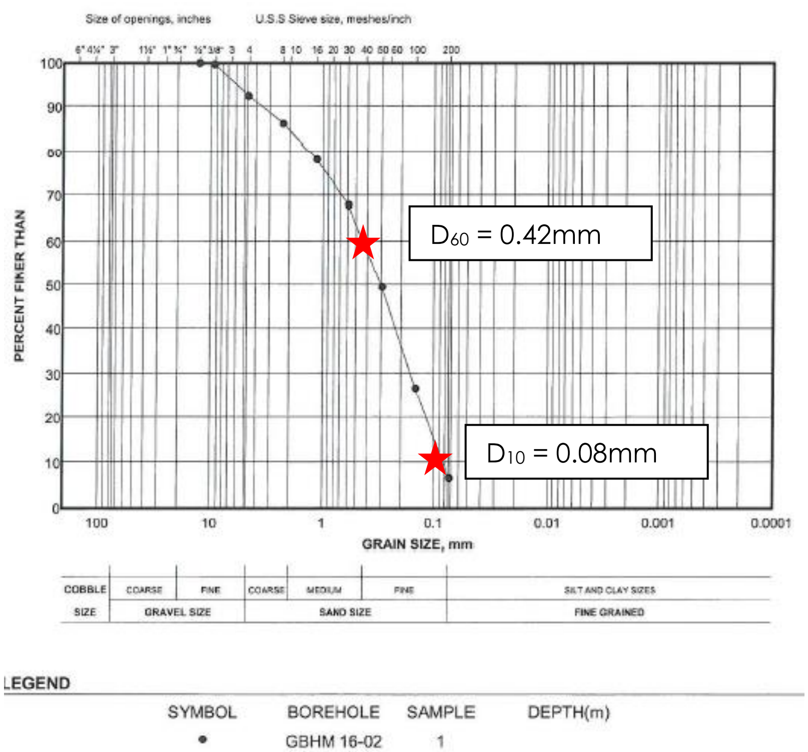


Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF

WATER FLOW PROPERTIES - COVER MATERIAL

The cover material will come from the overburden stockpile, which contains the excavated surficial material from within the pit footprint. Boreholes from with the pit indicate that the material is sandy and has a very small fines content, potentially less than 10%. This is not ideal for a cover, however the material should at least provide some means for revegetation.

The PSD of the overburden at borehole GBHM 16-02 is shown below, along with the D_{60} and D_{10} that were used as model inputs. This borehole is within the footprint of the pit.

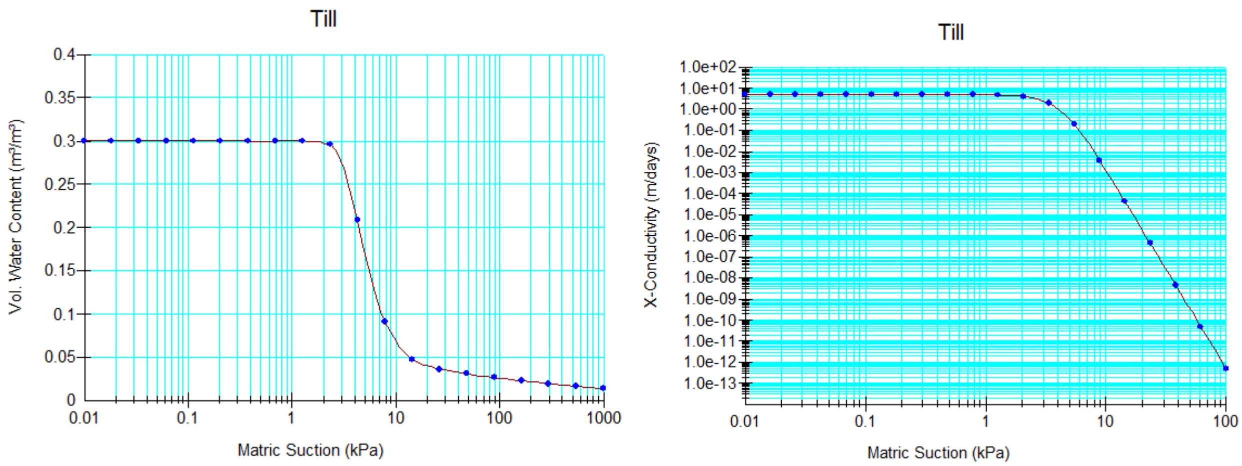


Falling and rising head permeability tests were carried out within this strata in GBHM16-01 and 02. An average result of 6×10^{-6} m/s (0.5 m/day) is indicated in the Golder report. Moisture content results of samples from those holes indicate the material was at approximately 15% (Geotech water content, i.e. M_w/M_s, which is approximately equal to M_w/M_t). Assuming a reasonable value of n = 0.3 for most soils, the material was at 50% saturation.

Similar to the tailings, the saturated hydraulic conductivity was varied until the value at 50% saturation was 0.5 m/day.

The VMC function and hydraulic-k function that were prepared by the software are shown below:

Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF



OXYGEN CONSUMPTION / DIFFUSION PROPERTIES - TAILINGS

The assumption in the software is that the supply of oxygen in tailings is diffusion dominated. This is reasonable in this situation due to the fine nature of the material.

The bulk diffusion coefficient of oxygen was estimated according to Aachib et al., (2004):

$$D^{*}\theta_a = \frac{1}{n^2}(D_a^0 \theta_a^x)$$

Where:

D^* = bulk diffusion coefficient (m^2/s)

θ_a = air content (m^3/m^3)

n = porosity

x = $1.201\theta_a^3 - 1.515\theta_a^2 + 0.987\theta_a + 3.119$

D_a^0 = $1.8x10^{-5}$ (m^2/s)

An expression for K_r is shown in Mbonimpa (2003):

$$Kr = K' \frac{6}{D_H}(1-n)C_P$$

$$D_H = [1 + 1.17 log(Cu)]D_{10}$$

where:

K' = the reactivity of pyrite with oxygen (15.8×10^{-3} m^3 O_2 m^{-2} pyrite.$year^{-1}$)

C_p = Pyrite content of dry tailings (kg/kg)

Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF

C_U = Coefficient of conformity (D_{60}/D_{10})

D_{10} – diameters corresponding to 10% passing on the cumulative grain-size distribution curve.

It is notable that the expression assumes that the sulfide mineral is pyrite. It is not known how the presence of other sulfides might affect the results. A review of the geochemistry results for the ore and synthetic tailings indicates that a sulfide content for the tailings of 3% is a reasonable assumption. The other parameters are available, and the input Kr value for the tailings was 0.44 days^{-1} .

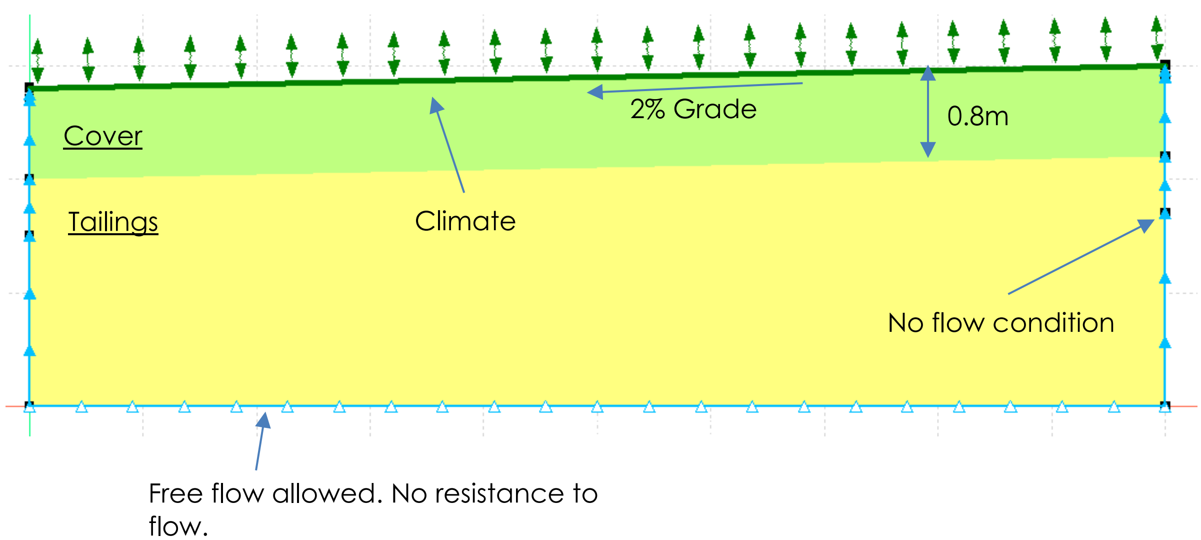
GEOMETRY AND BOUNDARY CONDITIONS

The purpose of the analysis was to answer the question 'how much does infiltration decrease through the tailings when a cover is placed on top…?'. To answer this, it is not necessary to do an analysis for freeze/thaw conditions because those types of conditions can be taken care of separately within the water balance.

A simplified climate was considered as a boundary condition applied at the crest of the tailings/cover, with alternating days of average precipitation and no precipitation (to allow evaporation to occur). Evaporation was considered by the software using average summertime temperature and relative humidity as inputs.

Model geometry was for a 0.8m thick layer of cover material over tailings. A grade of 2% was applied to the crest to make allowance for some runoff. The model geometry and boundary conditions are shown below.

The model geometry and boundary conditions are shown on the Figure below. The model was run with the bare tailings, and then with the cover placed above.



Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF

INITIAL CONDITIONS

The water table was assumed to be initially at 0.5m below the surface of the tailings. The cover is assumed to be placed instantaneously at approximately w=15% by weight, approximately equal to the measured w at the time of the fieldwork. The latter is applied as a pressure head, i.e. the suction that corresponds with the proposed w is obtained from the VMC and applied as an initial condition in the software.

RESULTS – INFILTRATION

The high permeability / low precipitation nature of this scenario results in little difference in infiltration into the tailings before and after the cover is placed (Figure 1 and Figure 2; the output flux is for a 10m wide simulated tailings model and is provided for comparative purposes only). A point of 2.0m below the crest of the tailings has been selected as the comparison point, as the results at the crest of the tailings are complicated by evaporative and precipitative effects.

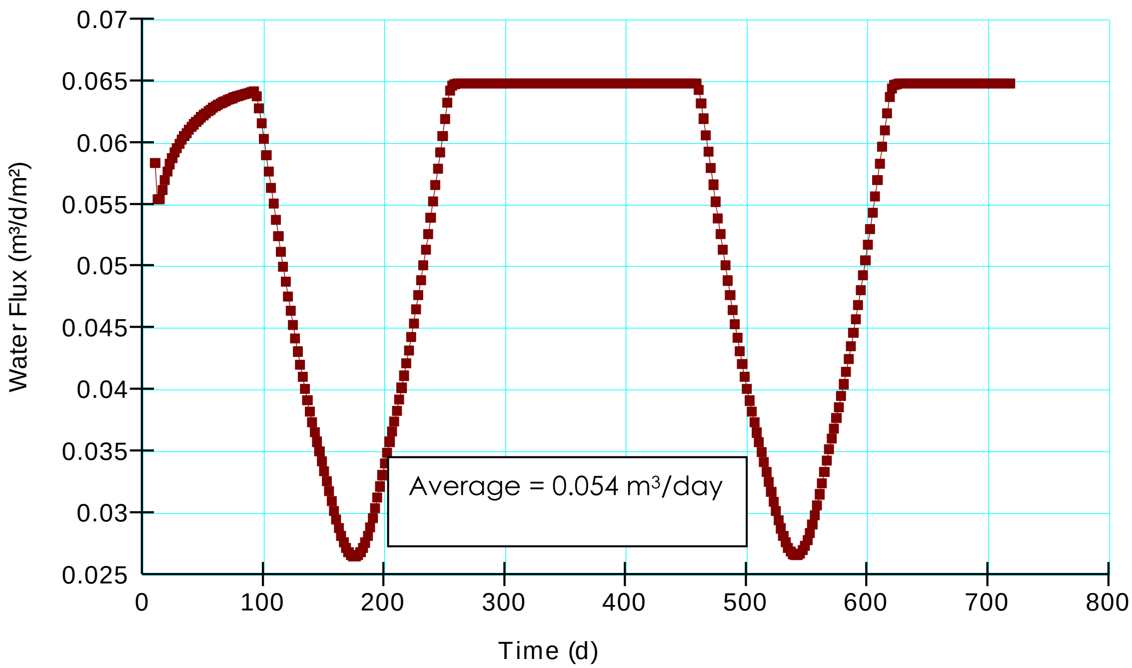


Figure 1 – Water flux at 2m below the tailings, before placement of cover

Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF

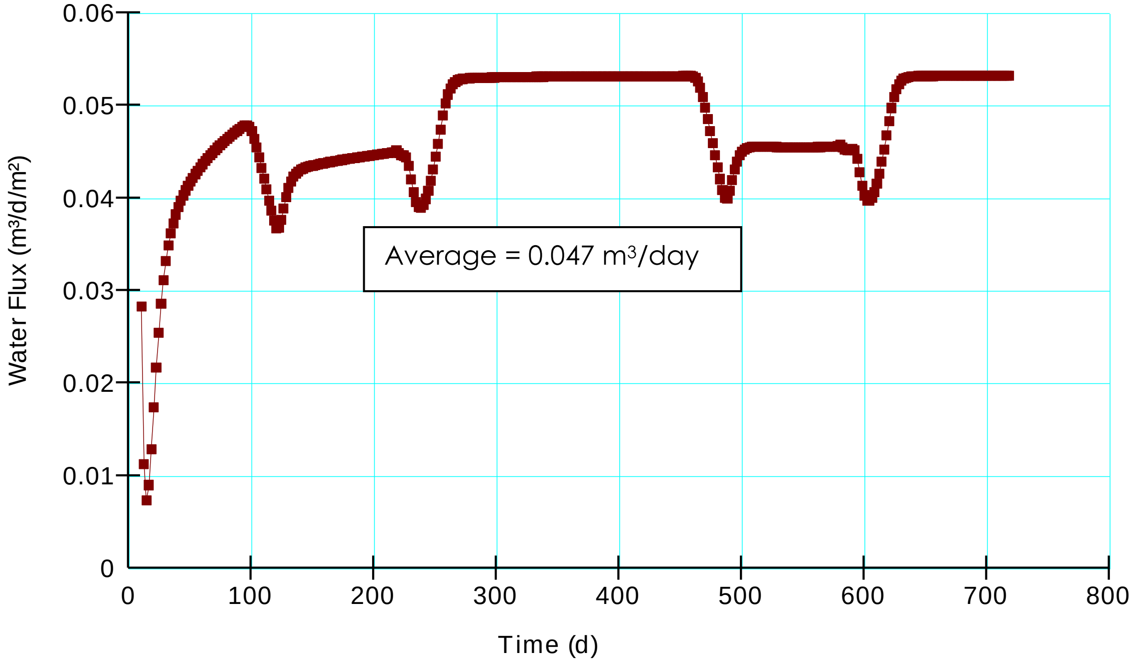


Figure 2 – Water flux at 2m below the tailings, after placement of cover

RESULTS – O_2 DIFFUSION

A steady state between the consumption of O_2 and the diffusion coefficient of the materials is reached quickly. The high sulfide content will remove the oxygen out of the system and the tailings are likely to be poorly oxygenated within 1.0m of the crest of the tailings whether or not the cover is in place. Figure 3 presents a typical oxygen profile with depth before and after the cover is placed.

Reference: Infiltration of precipitation and oxygen gas through the proposed MacLellan TMF

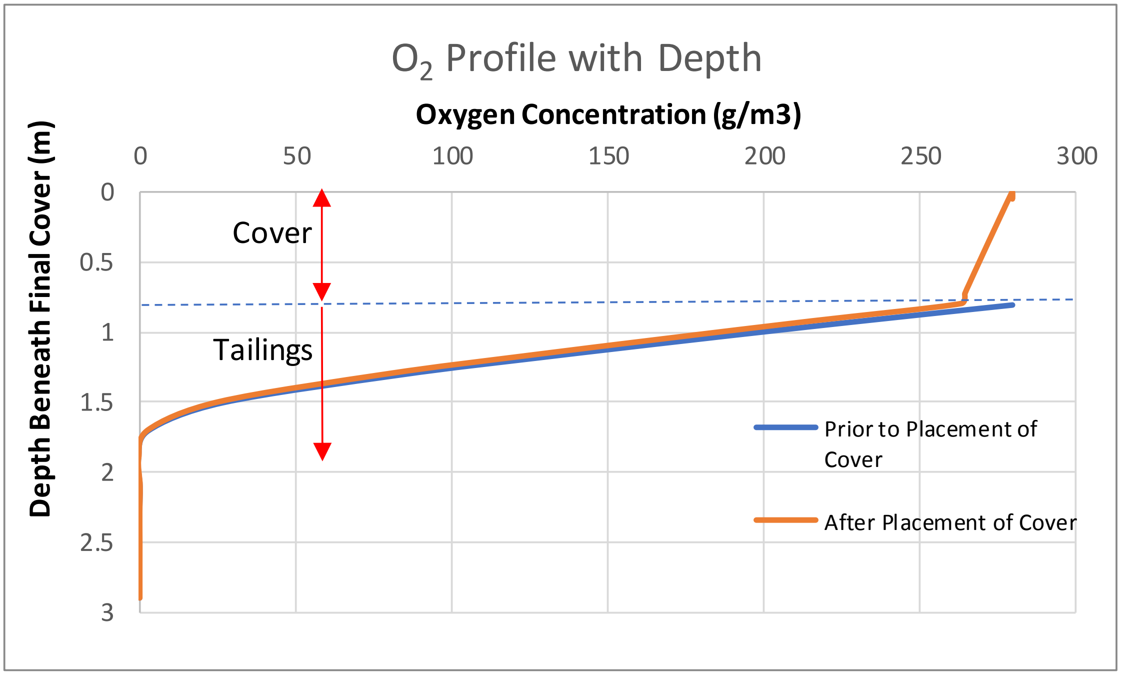


Figure 3 – Oxygen profile with depth before and after a cover is placed

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References:

Aachib, M., Mbonimpa, M., Aubertin, M. 2004. Measurement and Prediction of the Oxygen Diffusion Coefficient in Unsaturated Media, with Applications to Soil Covers. Water Air Soil Pollut, 156: 163-193.

Golder Associates. 2016. Factual Summary of Geotechnical Testing of Tailings, Lynn Lake Project, Manitoba. 12 April 2016

Mbonimpa, M., Aubertin, M., Aachib, M., and Bussière, B. 2003. Diffusion and consumption of oxygen in unsaturated cover materials. Canadian Geotechnical Journal, 40(5): 916-932.

Appendix G SUMMARY OF WATER QUALITY MODEL PREDICTIONS

Summary Table

Appendix Title and Model Scenario	Notes	Nodes Included
MacLellan Site Receiving Environment Predicted Water Quality for the Expected Case	Monthly mean, median and maximums for each project phase; percent increase from baseline; Indicate parameters that exceed water quality guidelines CCME short: **Bold** CCME long: *Italic* MWQG short: Single Underline	QM02_CT, QM03_CT, QM06_CT, QM05_CT, Kee3_Pay1_CT, Kee3_B1_CT, Minton_Lake_CT, QM10_CT, QM08_CT
MacLellan Site Receiving Environment Predicted Water Quality for the Upper Case		QM02_CT, QM03_CT, QM06_CT, QM05_CT, Kee3_Pay1_CT, Kee3_B1_CT, Minton_Lake_CT, QM10_CT, QM08_CT
MacLellan Site Contact Water Quality for the Expected Case	Monthly mean, median and maximums for each project phase; Indicate parameters that exceed water quality guidelines CCME short: Bold MWQG short: Italic MDMER: Single Underline	Collection_Pond, OP_CT, TMF_cell_CT
MacLellan Site Contact Water Quality for the Upper Case		Collection_Pond, OP_CT, TMF_cell_CT

Notes for contact water discharges:

Dashed lines represent "not applicable".
Bold font indicates the monthly average concentration exceeds the short-term CWQG.
Italic font indicates the monthly average concentration exceeds the short-term MSOG.
Underline indicates monthly average concentration exceeds the metal and diamond mine effluent regulations.
CWQG-FAL = Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life by Canadian Council of Ministers of the Environment (CCME 2017).
MSOG-FAL = Manitoba Water Quality Standards Objectives and Guidelines for Freshwater Aquatic Life - Manitoba (MWS 2011).
[a] Manitoba Tier II guidelines for dissolved metals are based on exceedance once in three years, but not more frequent, being acceptable during periods of infrequent and extreme low stream flows.
* Equations were used to calculate hardness (as CaCO3), pH, DOC, and temperature-dependent guidelines for these parameters as per MWS (2011) and CCME (2017).
- Ammonia MSOG-FAL: pH and temperature-dependent guideline. Values used for screening are based on Equation 1 values from Table 1 in MWS (2011)
- Ammonia CWQG-FAL: pH and temperature-dependent guideline. Values used for screening are based on Table 1 in CCME (2010) and converted to ammonia (as N) by multiplying the unionized ammonia (NH_3) guidelines by 0.8224.
- Dissolved cadmium MSOG-FAL (mg/L): 0.001*[(exp(0.7409*(ln(Hardness))-4.719))*(1.101672-(ln(Hardness)*0.041838))]
- Dissolved chromium MSOG-FAL (mg/L): 0.001*[(exp(0.819*(ln(Hardness)) + 0.6848))*(0.86)]
- Dissolved copper MSOG-FAL (mg/L): 0.001*[exp(0.8545[ln(Hardness)]-1.702]*[0.960]
- Dissolved lead MSOG-FAL (mg/L): 0.001*[(exp(1.273*(ln(Hardness)) - 4.705))*((1.46203-(ln(Hardness))*0.145712))]
- Dissolved nickel MSOG-FAL (mg/L): 0.001*[(exp(0.846*(ln(Hardness))+0.0584))*(0.997)]
- Dissolved manganese CWQG-FAL (mg/L): pH and hardness-dependent guideline. Values used for screening are based on Table 5 in CCME (2019).
- Dissolved zinc MSOG-FAL (mg/L): 0.001*[(exp(0.8473*(ln(Hardness))+0.884))*(0.986)]
- Dissolved zinc CWQG-FAL: exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625). The value for DOC was set at 0.3 mg/L (i.e., the lowest and most conservative value to calculate the guideline)
- Total cadmium CWQG-FAL: at hardness > 280 mg/L the guideline is 0.00037 mg/L; at hardness between 17 and 280 mg/L the guideline (in mg/L) is 0.001*[10^(1.016*(log10(Hardness))-1.71)]; at hardness < 17 mg/L the guideline is 0.00011 mg/L.
- Total copper CWQG-FAL: at hardness > 180 mg/L the guideline is 0.004 mg/L; at hardness between 82 and 180 mg/L the guideline (in mg/L) is 0.001*0.2*[exp(0.8545*(ln(Hardness]))-1.465)]; at hardness < 82 mg/L the guideline is 0.002 mg/L.
- Total lead CWQG-FAL: at hardness > 180 mg/L the guideline is 0.007 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(1.273*(ln(Hardness]))-4.705)]; at hardness < 60 mg/L the guideline is 0.001 mg/L.
- Total nickel CWQG-FAL: at hardness > 180 mg/L the guideline is 0.15 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(0.76*(ln(Hardness]))+1.06))]; at hardness < 60 mg/L the guideline is 0.025 mg/L.

Notes for receiving environment:

Dashed lines represent "not applicable".
Bold font indicates the monthly average concentration exceeds the short-term CWQG.
Italic font indicates the monthly average concentration exceeds the long-term CWQG.
Underline indicates monthly average concentration exceeds the short-term MSOG.
Shaded background indicates the monthly average concentration exceeds the long-term MSOG.
CWQG-FAL = Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life by Canadian Council of Ministers of the Environment (CCME 2017).
MSOG-FAL = Manitoba Water Quality Standards Objectives and Guidelines for Freshwater Aquatic Life - Manitoba (MWS 2011).
[a] Manitoba Tier II guidelines for dissolved metals are based on exceedance once in three years, but not more frequent, being acceptable during periods of infrequent and extreme low stream flows.
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- Dissolved chromium MSOG-FAL (mg/L): 0.001*[(exp(0.819*(ln(Hardness)) + 0.6848))*(0.86)]
- Dissolved copper MSOG-FAL (mg/L): 0.001*[exp(0.8545[ln(Hardness)]-1.702]*[0.960]
- Dissolved lead MSOG-FAL (mg/L): 0.001*[(exp(1.273*(ln(Hardness)) - 4.705))*((1.46203-(ln(Hardness))*0.145712))]
- Dissolved nickel MSOG-FAL (mg/L): 0.001*[(exp(0.846*(ln(Hardness))+0.0584))*(0.997)]
- Dissolved manganese CWQG-FAL (mg/L): pH and hardness-dependent guideline. Values used for screening are based on Table 5 in CCME (2019).
- Dissolved zinc MSOG-FAL (mg/L): 0.001*[(exp(0.8473*(ln(Hardness))+0.884))*(0.986)]
- Dissolved zinc CWQG-FAL: exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625). The value for DOC was set at 0.3 mg/L (i.e., the lowest and most conservative value to calculate the guideline)
- Total cadmium CWQG-FAL: at hardness > 280 mg/L the guideline is 0.00037 mg/L; at hardness between 17 and 280 mg/L the guideline (in mg/L) is 0.001*[10^(1.016*(log10(Hardness))-1.71)]; at hardness < 17 mg/L the guideline is 0.00011 mg/L.
- Total copper CWQG-FAL: at hardness > 180 mg/L the guideline is 0.004 mg/L; at hardness between 82 and 180 mg/L the guideline (in mg/L) is 0.001*0.2*[exp(0.8545*(ln(Hardness]))-1.465)]; at hardness < 82 mg/L the guideline is 0.002 mg/L.
- Total lead CWQG-FAL: at hardness > 180 mg/L the guideline is 0.007 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(1.273*(ln(Hardness]))-4.705)]; at hardness < 60 mg/L the guideline is 0.001 mg/L.
- Total nickel CWQG-FAL: at hardness > 180 mg/L the guideline is 0.15 mg/L; at hardness between 60 and 180 mg/L the guideline (in mg/L) is 0.001*[exp(0.76*(ln(Hardness]))+1.06))]; at hardness < 60 mg/L the guideline is 0.025 mg/L.

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cl	Construction	Jan	2	4.505	4.505	4.985	-	-	-	-	-	-
Cl	Construction	Feb	2	3.958	3.958	4.151	-	-	-	-	-	-
Cl	Construction	Mar	2	3.115	3.115	3.152	-	-	-	0.299	0.299	0.364
Cl	Construction	Apr	2	2.694	2.694	2.745	-	-	-	-	-	-
Cl	Construction	May	2	2.283	2.283	2.475	-	-	-	0.105	0.105	0.109
Cl	Construction	Jun	2	2.061	2.061	2.089	-	-	-	0.101	0.101	0.101
Cl	Construction	Jul	2	2.629	2.629	2.769	-	-	-	4.209	4.209	4.804
Cl	Construction	Aug	2	2.733	2.733	2.799	-	-	-	2.380	2.380	4.406
Cl	Construction	Sep	2	3.368	3.368	3.809	-	-	-	14.570	14.570	14.570
Cl	Construction	Oct	2	3.244	3.244	3.301	-	-	-	14.100	14.100	14.100
Cl	Construction	Nov	2	3.501	3.501	3.618	-	-	-	14.340	14.340	14.340
Cl	Construction	Dec	2	3.746	3.746	3.884	-	-	-	15.080	15.080	15.080
Cl	Operations	Jan	13	2.054	2.323	3.608	-	-	-	48.370	53.387	101.700
Cl	Operations	Feb	13	1.394	1.599	3.218	-	-	-	50.250	56.746	115.800
Cl	Operations	Mar	13	0.934	1.133	2.558	-	-	-	48.050	50.078	73.390
Cl	Operations	Apr	13	1.383	1.605	2.962	-	-	-	45.240	43.452	47.210
Cl	Operations	May	13	1.355	1.563	2.605	-	-	-	40.660	39.114	43.050
Cl	Operations	Jun	13	0.970	1.045	1.299	-	-	-	40.100	39.402	42.500
Cl	Operations	Jul	13	1.125	1.191	1.432	-	-	-	41.340	42.112	50.160
Cl	Operations	Aug	13	1.081	1.172	1.498	-	-	-	42.090	44.526	61.770
Cl	Operations	Sep	13	1.196	1.307	1.896	-	-	-	43.120	46.089	68.700
Cl	Operations	Oct	13	1.532	1.637	2.251	-	-	-	43.400	46.575	69.900
Cl	Operations	Nov	13	1.570	1.817	2.556	-	-	-	44.020	49.186	82.040
Cl	Operations	Dec	13	1.824	2.044	2.755	-	-	-	46.090	54.941	114.400
Cl	Closure	Jan	6	-	-	-	0.951	1.069	1.781	27.650	28.378	36.930
Cl	Closure	Feb	6	-	-	-	0.947	1.081	1.795	27.500	28.215	36.680
Cl	Closure	Mar	6	-	-	-	0.951	1.155	1.901	27.020	27.698	35.890
Cl	Closure	Apr	6	-	-	-	0.955	1.219	2.012	26.515	27.153	35.070
Cl	Closure	May	6	-	-	-	0.956	1.246	2.070	26.195	26.807	34.550
Cl	Closure	Jun	6	-	-	-	0.955	1.249	2.078	26.050	26.655	34.320
Cl	Closure	Jul	6	-	-	-	0.958	1.247	2.060	25.995	26.588	34.210
Cl	Closure	Aug	6	-	-	-	0.963	1.251	2.046	25.930	26.518	34.100
Cl	Closure	Sep	6	-	-	-	0.970	1.260	2.054	25.775	26.352	33.850
Cl	Closure	Oct	6	-	-	-	0.997	1.290	2.104	25.465	26.017	33.350
Cl	Closure	Nov	6	-	-	-	1.038	1.317	2.138	25.220	25.748	32.960
Cl	Closure	Dec	6	-	-	-	1.047	1.319	2.141	25.100	25.620	32.770
Cl	Post-Closure	Jan	109	-	-	-	3.178	3.256	3.640	1.200	2.757	19.720
Cl	Post-Closure	Feb	109	-	-	-	3.177	3.255	3.640	1.199	2.749	19.650
Cl	Post-Closure	Mar	109	-	-	-	3.185	3.257	3.640	1.195	2.726	19.410
Cl	Post-Closure	Apr	109	-	-	-	3.184	3.260	3.642	1.191	2.701	19.150
Cl	Post-Closure	May	109	-	-	-	3.184	3.261	3.642	1.190	2.684	18.970
Cl	Post-Closure	Jun	109	-	-	-	3.182	3.261	3.641	1.191	2.671	18.800
Cl	Post-Closure	Jul	109	-	-	-	3.181	3.262	3.640	1.195	2.659	18.610
Cl	Post-Closure	Aug	109	-	-	-	3.181	3.264	3.641	1.201	2.647	18.400
Cl	Post-Closure	Sep	109	-	-	-	3.181	3.266	3.641	1.203	2.632	18.200
Cl	Post-Closure	Oct	109	-	-	-	3.180	3.267	3.641	1.201	2.613	17.990
Cl	Post-Closure	Nov	109	-	-	-	3.184	3.266	3.641	1.198	2.599	17.860
Cl	Post-Closure	Dec	109	-	-	-	3.180	3.265	3.640	1.197	2.592	17.800
F	Construction	Jan	2	0.0456	0.0456	0.0494	-	-	-	-	-	-
F	Construction	Feb	2	0.0522	0.0522	0.0528	-	-	-	-	-	-
F	Construction	Mar	2	0.0600	0.0600	0.0605	-	-	-	0.0023	0.0023	0.0032
F	Construction	Apr	2	0.0638	0.0638	0.0647	-	-	-	-	-	-
F	Construction	May	2	0.0649	0.0649	0.0650	-	-	-	0.0007	0.0007	0.0007
F	Construction	Jun	2	0.0595	0.0595	0.0600	-	-	-	0.0006	0.0006	0.0006
F	Construction	Jul	2	0.0578	0.0578	0.0601	-	-	-	0.0378	0.0378	0.0421
F	Construction	Aug	2	0.0599	0.0599	0.0630	-	-	-	0.0205	0.0205	0.0326
F	Construction	Sep	2	0.0711	0.0711	0.0856	-	-	-	0.2568	0.2568	0.2568
F	Construction	Oct	2	0.0580	0.0580	0.0631	-	-	-	0.2350	0.2350	0.2350
F	Construction	Nov	2	0.0547	0.0547	0.0590	-	-	-	0.2212	0.2212	0.2212
F	Construction	Dec	2	0.0537	0.0537	0.0579	-	-	-	0.2211	0.2211	0.2211
F	Operations	Jan	13	0.0881	0.0879	0.1132	-	-	-	0.8418	0.8718	1.4270
F	Operations	Feb	13	0.0850	0.0848	0.0989	-	-	-	0.8463	0.9053	1.5770
F	Operations	Mar	13	0.0834	0.0829	0.0905	-	-	-	0.8268	0.7955	0.9706
F	Operations	Apr	13	0.0836	0.0833	0.0970	-	-	-	0.7487	0.6966	0.7906
F	Operations	May	13	0.0823	0.0820	0.0998	-	-	-	0.6700	0.6423	0.7559
F	Operations	Jun	13	0.0845	0.0845	0.0967	-	-	-	0.6703	0.6681	0.7533
F	Operations	Jul	13	0.0871	0.0871	0.1000	-	-	-	0.7407	0.7442	0.8238
F	Operations	Aug	13	0.0873	0.0874	0.0996	-	-	-	0.7882	0.8165	1.0510
F	Operations	Sep	13	0.0880	0.0884	0.1024	-	-	-	0.8027	0.8502	1.1470
F	Operations	Oct	13	0.0904	0.0912	0.1129	-	-	-	0.8010	0.8417	1.0980
F	Operations	Nov	13	0.0934	0.0907	0.1102	-	-	-	0.8044	0.8596	1.1990
F	Operations	Dec	13	0.0946	0.0918	0.1122	-	-	-	0.8189	0.9219	1.5670
F	Closure	Jan	6	-	-	-	0.1143	0.1139	0.1336	0.6467	0.6523	0.7175
F	Closure	Feb	6	-	-	-	0.1140	0.1140	0.1338	0.6431	0.6485	0.7125
F	Closure	Mar	6	-	-	-	0.1139	0.1165	0.1362	0.6317	0.6366	0.6971
F	Closure	Apr	6	-	-	-	0.1139	0.1184	0.1388	0.6200	0.6243	0.6813
F	Closure	May	6	-	-	-	0.1139	0.1193	0.1401	0.6148	0.6187	0.6739
F	Closure	Jun	6	-	-	-	0.1140	0.1199	0.1404	0.6179	0.6219	0.6772
F	Closure	Jul	6	-	-	-	0.1145	0.1207	0.1402	0.6273	0.6317	0.6886
F	Closure	Aug	6	-	-	-	0.1151	0.1215	0.1402	0.6379	0.6428	0.7014
F	Closure	Sep	6	-	-	-	0.1157	0.1221	0.1406	0.6422	0.6472	0.7060
F	Closure	Oct	6	-	-	-	0.1164	0.1230	0.1420	0.6375	0.6422	0.6993
F	Closure	Nov	6	-	-	-	0.1170	0.1234	0.1428	0.6321	0.6365	0.6920
F	Closure	Dec	6	-	-	-	0.1170	0.1232	0.1428	0.6291	0.6333	0.6880
F	Post-Closure	Jan	109	-	-	-	0.1415	0.1452	0.1619	0.1384	0.1761	0.5869
F	Post-Closure	Feb	109	-	-	-	0.1415	0.1451	0.1617	0.1378	0.1754	0.5846
F	Post-Closure	Mar	109	-	-	-	0.1414	0.1452	0.1619	0.1362	0.1732	0.5773

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
F	Post-Closure	Apr	109	-	-	-	0.1414	0.1452	0.1621	0.1345	0.1710	0.5695
F	Post-Closure	May	109	-	-	-	0.1414	0.1452	0.1621	0.1339	0.1701	0.5644
F	Post-Closure	Jun	109	-	-	-	0.1414	0.1452	0.1621	0.1348	0.1707	0.5613
F	Post-Closure	Jul	109	-	-	-	0.1413	0.1452	0.1621	0.1369	0.1724	0.5586
F	Post-Closure	Aug	109	-	-	-	0.1413	0.1452	0.1621	0.1394	0.1744	0.5560
F	Post-Closure	Sep	109	-	-	-	0.1413	0.1452	0.1621	0.1405	0.1751	0.5521
F	Post-Closure	Oct	109	-	-	-	0.1413	0.1452	0.1622	0.1399	0.1741	0.5466
F	Post-Closure	Nov	109	-	-	-	0.1413	0.1452	0.1622	0.1392	0.1731	0.5427
F	Post-Closure	Dec	109	-	-	-	0.1412	0.1452	0.1621	0.1387	0.1725	0.5407
P, Tot	Construction	Jan	2	0.0154	0.0154	0.0170	-	-	-	-	-	-
P, Tot	Construction	Feb	2	0.0154	0.0154	0.0165	-	-	-	-	-	-
P, Tot	Construction	Mar	2	0.0155	0.0155	0.0155	-	-	-	0.0009	0.0009	0.0010
P, Tot	Construction	Apr	2	0.0149	0.0149	0.0149	-	-	-	-	-	-
P, Tot	Construction	May	2	0.0156	0.0156	0.0158	-	-	-	0.0003	0.0003	0.0003
P, Tot	Construction	Jun	2	0.0167	0.0167	0.0168	-	-	-	0.0004	0.0004	0.0004
P, Tot	Construction	Jul	2	0.0162	0.0162	0.0164	-	-	-	0.0184	0.0184	0.0210
P, Tot	Construction	Aug	2	0.0156	0.0156	0.0157	-	-	-	0.0088	0.0088	0.0173
P, Tot	Construction	Sep	2	0.0133	0.0133	0.0133	-	-	-	0.0074	0.0074	0.0074
P, Tot	Construction	Oct	2	0.0116	0.0116	0.0117	-	-	-	0.0054	0.0054	0.0054
P, Tot	Construction	Nov	2	0.0120	0.0120	0.0120	-	-	-	0.0039	0.0039	0.0039
P, Tot	Construction	Dec	2	0.0131	0.0131	0.0132	-	-	-	0.0030	0.0030	0.0030
P, Tot	Operations	Jan	13	0.0126	0.0130	0.0142	-	-	-	0.0149	0.0134	0.0162
P, Tot	Operations	Feb	13	0.0127	0.0130	0.0142	-	-	-	0.0146	0.0128	0.0150
P, Tot	Operations	Mar	13	0.0127	0.0129	0.0144	-	-	-	0.0136	0.0114	0.0142
P, Tot	Operations	Apr	13	0.0128	0.0131	0.0150	-	-	-	0.0125	0.0111	0.0137
P, Tot	Operations	May	13	0.0135	0.0140	0.0160	-	-	-	0.0123	0.0117	0.0136
P, Tot	Operations	Jun	13	0.0134	0.0137	0.0147	-	-	-	0.0134	0.0133	0.0152
P, Tot	Operations	Jul	13	0.0129	0.0132	0.0139	-	-	-	0.0146	0.0158	0.0216
P, Tot	Operations	Aug	13	0.0129	0.0131	0.0138	-	-	-	0.0164	0.0181	0.0266
P, Tot	Operations	Sep	13	0.0117	0.0118	0.0122	-	-	-	0.0171	0.0187	0.0267
P, Tot	Operations	Oct	13	0.0112	0.0111	0.0117	-	-	-	0.0167	0.0173	0.0227
P, Tot	Operations	Nov	13	0.0116	0.0117	0.0121	-	-	-	0.0155	0.0160	0.0195
P, Tot	Operations	Dec	13	0.0123	0.0125	0.0133	-	-	-	0.0152	0.0152	0.0176
P, Tot	Closure	Jan	6	-	-	-	0.0116	0.0118	0.0124	0.0181	0.0179	0.0200
P, Tot	Closure	Feb	6	-	-	-	0.0117	0.0118	0.0123	0.0180	0.0178	0.0199
P, Tot	Closure	Mar	6	-	-	-	0.0117	0.0118	0.0120	0.0177	0.0175	0.0196
P, Tot	Closure	Apr	6	-	-	-	0.0117	0.0117	0.0120	0.0174	0.0172	0.0193
P, Tot	Closure	May	6	-	-	-	0.0117	0.0118	0.0121	0.0174	0.0171	0.0192
P, Tot	Closure	Jun	6	-	-	-	0.0118	0.0118	0.0121	0.0177	0.0174	0.0195
P, Tot	Closure	Jul	6	-	-	-	0.0118	0.0118	0.0121	0.0183	0.0181	0.0201
P, Tot	Closure	Aug	6	-	-	-	0.0117	0.0118	0.0121	0.0189	0.0187	0.0207
P, Tot	Closure	Sep	6	-	-	-	0.0117	0.0118	0.0121	0.0193	0.0191	0.0210
P, Tot	Closure	Oct	6	-	-	-	0.0116	0.0117	0.0121	0.0192	0.0191	0.0210
P, Tot	Closure	Nov	6	-	-	-	0.0116	0.0117	0.0121	0.0191	0.0189	0.0208
P, Tot	Closure	Dec	6	-	-	-	0.0116	0.0117	0.0121	0.0190	0.0188	0.0207
P, Tot	Post-Closure	Jan	109	-	-	-	0.0166	0.0162	0.0168	0.0106	0.0114	0.0206
P, Tot	Post-Closure	Feb	109	-	-	-	0.0166	0.0162	0.0168	0.0106	0.0114	0.0206
P, Tot	Post-Closure	Mar	109	-	-	-	0.0165	0.0162	0.0168	0.0105	0.0113	0.0203
P, Tot	Post-Closure	Apr	109	-	-	-	0.0165	0.0162	0.0168	0.0104	0.0112	0.0201
P, Tot	Post-Closure	May	109	-	-	-	0.0165	0.0162	0.0168	0.0103	0.0111	0.0200
P, Tot	Post-Closure	Jun	109	-	-	-	0.0166	0.0163	0.0168	0.0104	0.0112	0.0199
P, Tot	Post-Closure	Jul	109	-	-	-	0.0166	0.0163	0.0168	0.0105	0.0113	0.0200
P, Tot	Post-Closure	Aug	109	-	-	-	0.0166	0.0163	0.0168	0.0107	0.0115	0.0200
P, Tot	Post-Closure	Sep	109	-	-	-	0.0166	0.0163	0.0168	0.0107	0.0115	0.0200
P, Tot	Post-Closure	Oct	109	-	-	-	0.0166	0.0163	0.0168	0.0107	0.0115	0.0198
P, Tot	Post-Closure	Nov	109	-	-	-	0.0166	0.0163	0.0168	0.0106	0.0114	0.0197
P, Tot	Post-Closure	Dec	109	-	-	-	0.0166	0.0163	0.0168	0.0106	0.0114	0.0196
NH3 (as N)	Construction	Jan	2	0.2194	0.2194	0.2643	-	-	-	-	-	-
NH3 (as N)	Construction	Feb	2	0.2382	0.2382	0.3221	-	-	-	-	-	-
NH3 (as N)	Construction	Mar	2	0.1828	0.1828	0.2374	-	-	-	0.0206	0.0206	0.0333
NH3 (as N)	Construction	Apr	2	0.1586	0.1586	0.1997	-	-	-	-	-	-
NH3 (as N)	Construction	May	2	0.1668	0.1668	0.2044	-	-	-	0.0073	0.0073	0.0094
NH3 (as N)	Construction	Jun	2	0.1706	0.1706	0.1992	-	-	-	0.0081	0.0081	0.0081
NH3 (as N)	Construction	Jul	2	0.1191	0.1191	0.1235	-	-	-	0.3063	0.3063	0.3695
NH3 (as N)	Construction	Aug	2	0.0919	0.0919	0.1110	-	-	-	0.1151	0.1151	0.1688
NH3 (as N)	Construction	Sep	2	0.1995	0.1995	0.3274	-	-	-	2.3750	2.3750	2.3750
NH3 (as N)	Construction	Oct	2	0.1299	0.1299	0.1762	-	-	-	2.2930	2.2930	2.2930
NH3 (as N)	Construction	Nov	2	0.1768	0.1768	0.2308	-	-	-	2.3350	2.3350	2.3350
NH3 (as N)	Construction	Dec	2	0.2571	0.2571	0.3315	-	-	-	2.4630	2.4630	2.4630
NH3 (as N)	Operations	Jan	13	0.7554	0.7465	1.0010	-	-	-	8.3080	9.0562	16.8800
NH3 (as N)	Operations	Feb	13	0.4652	0.4743	0.9289	-	-	-	8.6160	9.6022	19.2000
NH3 (as N)	Operations	Mar	13	0.1330	0.1533	0.3183	-	-	-	8.2290	8.4454	12.0500
NH3 (as N)	Operations	Apr	13	0.1995	0.1953	0.3084	-	-	-	7.7030	7.3224	7.9170
NH3 (as N)	Operations	May	13	0.2440	0.2360	0.3146	-	-	-	6.8520	6.6057	7.3400
NH3 (as N)	Operations	Jun	13	0.1575	0.1513	0.1724	-	-	-	6.8380	6.6871	7.2520
NH3 (as N)	Operations	Jul	13	0.1062	0.1036	0.1239	-	-	-	7.1040	7.1882	8.3770
NH3 (as N)	Operations	Aug	13	0.1064	0.1051	0.1247	-	-	-	7.2650	7.6305	10.3500
NH3 (as N)	Operations	Sep	13	0.1232	0.1206	0.1603	-	-	-	7.4650	7.8975	11.4600
NH3 (as N)	Operations	Oct	13	0.2064	0.1913	0.2519	-	-	-	7.4640	7.9564	*11.5900*
NH3 (as N)	Operations	Nov	13	0.3475	0.3479	0.4782	-	-	-	7.5680	8.3752	13.5800
NH3 (as N)	Operations	Dec	13	0.5741	0.5663	0.7830	-	-	-	7.9050	9.3269	18.9800
NH3 (as N)	Closure	Jan	6	-	-	-	0.0624	0.0871	0.2045	4.8860	5.0003	6.3410
NH3 (as N)	Closure	Feb	6	-	-	-	0.0610	0.0882	0.2075	4.8580	4.9703	6.2960
NH3 (as N)	Closure	Mar	6	-	-	-	0.0610	0.0967	0.2273	4.7725	4.8782	6.1590
NH3 (as N)	Closure	Apr	6	-	-	-	0.0607	0.1054	0.2481	4.6815	4.7808	6.0160
NH3 (as N)	Closure	May	6	-	-	-	0.0606	0.1102	0.2591	4.6275	4.7223	5.9290
NH3 (as N)	Closure	Jun	6	-	-	-	0.0611	0.1116	0.2610	4.6120	4.7052	5.9010

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
NH3 (as N)	Closure	Jul	6	-	-	-	0.0600	0.1102	0.2574	4.6175	4.7105	5.9030
NH3 (as N)	Closure	Aug	6	-	-	-	0.0568	0.1080	0.2538	4.6240	4.7167	5.9060
NH3 (as N)	Closure	Sep	6	-	-	-	0.0546	0.1078	0.2548	4.6070	4.6983	5.8760
NH3 (as N)	Closure	Oct	6	-	-	-	0.0582	0.1129	0.2641	4.5550	4.6418	5.7930
NH3 (as N)	Closure	Nov	6	-	-	-	0.0664	0.1184	0.2709	4.5110	4.5943	5.7240
NH3 (as N)	Closure	Dec	6	-	-	-	0.0688	0.1197	0.2718	4.4895	4.5712	5.6910
NH3 (as N)	Post-Closure	Jan	109	-	-	-	0.2158	0.2520	0.4294	0.2499	0.5352	3.6450
NH3 (as N)	Post-Closure	Feb	109	-	-	-	0.2157	0.2518	0.4288	0.2490	0.5332	3.6300
NH3 (as N)	Post-Closure	Mar	109	-	-	-	0.2156	0.2521	0.4298	0.2461	0.5268	3.5850
NH3 (as N)	Post-Closure	Apr	109	-	-	-	0.2155	0.2525	0.4310	0.2433	0.5200	3.5360
NH3 (as N)	Post-Closure	May	109	-	-	-	0.2154	0.2526	0.4317	0.2424	0.5163	3.5010
NH3 (as N)	Post-Closure	Jun	109	-	-	-	0.2153	0.2527	0.4318	0.2442	0.5155	3.4720
NH3 (as N)	Post-Closure	Jul	109	-	-	-	0.2150	0.2525	0.4318	0.2480	0.5162	3.4390
NH3 (as N)	Post-Closure	Aug	109	-	-	-	0.2143	0.2520	0.4313	0.2519	0.5169	3.4050
NH3 (as N)	Post-Closure	Sep	109	-	-	-	0.2138	0.2516	0.4310	0.2534	0.5153	3.3690
NH3 (as N)	Post-Closure	Oct	109	-	-	-	0.2134	0.2515	0.4313	0.2521	0.5108	3.3300
NH3 (as N)	Post-Closure	Nov	109	-	-	-	0.2131	0.2513	0.4311	0.2507	0.5074	3.3050
NH3 (as N)	Post-Closure	Dec	109	-	-	-	0.2130	0.2511	0.4303	0.2498	0.5056	3.2930
NO2 (as N)	Construction	Jan	2	0.0270	0.0270	0.0414	-	-	-	-	-	-
NO2 (as N)	Construction	Feb	2	0.0315	0.0315	0.0503	-	-	-	-	-	-
NO2 (as N)	Construction	Mar	2	0.0258	0.0258	0.0393	-	-	-	0.0029	0.0029	0.0053
NO2 (as N)	Construction	Apr	2	0.0204	0.0204	0.0286	-	-	-	-	-	-
NO2 (as N)	Construction	May	2	0.0222	0.0222	0.0298	-	-	-	0.0009	0.0009	0.0014
NO2 (as N)	Construction	Jun	2	0.0189	0.0189	0.0229	-	-	-	0.0009	0.0009	0.0009
NO2 (as N)	Construction	Jul	2	0.0172	0.0172	0.0192	-	-	-	0.0410	0.0410	0.0539
NO2 (as N)	Construction	Aug	2	0.0167	0.0167	0.0195	-	-	-	0.0142	0.0142	0.0279
NO2 (as N)	Construction	Sep	2	0.0205	0.0205	0.0269	-	-	-	0.0195	0.0195	0.0195
NO2 (as N)	Construction	Oct	2	0.0216	0.0216	0.0268	-	-	-	0.0176	0.0176	0.0176
NO2 (as N)	Construction	Nov	2	0.0296	0.0296	0.0377	-	-	-	0.0172	0.0172	0.0172
NO2 (as N)	Construction	Dec	2	0.0411	0.0411	0.0531	-	-	-	0.0177	0.0177	0.0177
NO2 (as N)	Operations	Jan	13	0.1322	0.1297	0.1767	-	-	-	0.0695	0.0725	0.1238
NO2 (as N)	Operations	Feb	13	0.0806	0.0824	0.1631	-	-	-	0.0728	0.0751	0.1290
NO2 (as N)	Operations	Mar	13	0.0221	0.0256	0.0518	-	-	-	0.0690	0.0657	0.0854
NO2 (as N)	Operations	Apr	13	0.0309	0.0310	0.0458	-	-	-	0.0617	0.0585	0.0662
NO2 (as N)	Operations	May	13	0.0351	0.0348	0.0440	-	-	-	0.0557	0.0543	0.0617
NO2 (as N)	Operations	Jun	13	0.0234	0.0224	0.0269	-	-	-	0.0549	0.0548	0.0609
NO2 (as N)	Operations	Jul	13	0.0194	0.0191	0.0229	-	-	-	0.0587	0.0574	0.0649
NO2 (as N)	Operations	Aug	13	0.0202	0.0199	0.0235	-	-	-	0.0598	0.0596	0.0766
NO2 (as N)	Operations	Sep	13	0.0231	0.0227	0.0300	-	-	-	0.0603	0.0609	0.0827
NO2 (as N)	Operations	Oct	13	0.0382	0.0355	0.0466	-	-	-	0.0606	0.0610	0.0823
NO2 (as N)	Operations	Nov	13	0.0621	0.0620	0.0857	-	-	-	0.0614	0.0637	0.0948
NO2 (as N)	Operations	Dec	13	0.1007	0.0989	0.1383	-	-	-	0.0660	0.0706	0.1356
NO2 (as N)	Closure	Jan	6	-	-	-	0.0086	0.0093	0.0129	0.0332	0.0340	0.0441
NO2 (as N)	Closure	Feb	6	-	-	-	0.0086	0.0092	0.0121	0.0330	0.0338	0.0438
NO2 (as N)	Closure	Mar	6	-	-	-	0.0087	0.0091	0.0111	0.0324	0.0332	0.0429
NO2 (as N)	Closure	Apr	6	-	-	-	0.0088	0.0090	0.0104	0.0319	0.0326	0.0419
NO2 (as N)	Closure	May	6	-	-	-	0.0088	0.0090	0.0100	0.0315	0.0322	0.0413
NO2 (as N)	Closure	Jun	6	-	-	-	0.0088	0.0089	0.0096	0.0313	0.0320	0.0411
NO2 (as N)	Closure	Jul	6	-	-	-	0.0088	0.0088	0.0093	0.0313	0.0320	0.0409
NO2 (as N)	Closure	Aug	6	-	-	-	0.0086	0.0087	0.0093	0.0312	0.0319	0.0408
NO2 (as N)	Closure	Sep	6	-	-	-	0.0084	0.0086	0.0093	0.0310	0.0317	0.0405
NO2 (as N)	Closure	Oct	6	-	-	-	0.0084	0.0086	0.0093	0.0306	0.0313	0.0399
NO2 (as N)	Closure	Nov	6	-	-	-	0.0084	0.0087	0.0094	0.0303	0.0310	0.0394
NO2 (as N)	Closure	Dec	6	-	-	-	0.0085	0.0087	0.0094	0.0302	0.0308	0.0392
NO2 (as N)	Post-Closure	Jan	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0038	0.0238
NO2 (as N)	Post-Closure	Feb	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0038	0.0238
NO2 (as N)	Post-Closure	Mar	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0038	0.0235
NO2 (as N)	Post-Closure	Apr	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0037	0.0232
NO2 (as N)	Post-Closure	May	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0037	0.0230
NO2 (as N)	Post-Closure	Jun	109	-	-	-	0.0086	0.0090	0.0109	0.0020	0.0037	0.0228
NO2 (as N)	Post-Closure	Jul	109	-	-	-	0.0086	0.0090	0.0109	0.0020	0.0037	0.0225
NO2 (as N)	Post-Closure	Aug	109	-	-	-	0.0086	0.0090	0.0109	0.0020	0.0037	0.0223
NO2 (as N)	Post-Closure	Sep	109	-	-	-	0.0086	0.0090	0.0109	0.0020	0.0036	0.0221
NO2 (as N)	Post-Closure	Oct	109	-	-	-	0.0086	0.0090	0.0109	0.0020	0.0036	0.0218
NO2 (as N)	Post-Closure	Nov	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0036	0.0217
NO2 (as N)	Post-Closure	Dec	109	-	-	-	0.0086	0.0090	0.0109	0.0019	0.0036	0.0216
N_NO3_NO2	Construction	Jan	2	0.7207	0.7207	1.4120	-	-	-	-	-	-
N_NO3_NO2	Construction	Feb	2	0.9067	0.9067	1.7710	-	-	-	-	-	-
N_NO3_NO2	Construction	Mar	2	0.5357	0.5357	1.0170	-	-	-	0.1030	0.1030	0.2051
N_NO3_NO2	Construction	Apr	2	0.4006	0.4006	0.7419	-	-	-	-	-	-
N_NO3_NO2	Construction	May	2	0.5382	0.5382	0.8860	-	-	-	0.0312	0.0312	0.0513
N_NO3_NO2	Construction	Jun	2	0.4554	0.4554	0.6337	-	-	-	0.0297	0.0297	0.0297
N_NO3_NO2	Construction	Jul	2	0.4015	0.4015	0.4839	-	-	-	1.5192	1.5192	2.1060
N_NO3_NO2	Construction	Aug	2	0.3889	0.3889	0.5021	-	-	-	0.4956	0.4956	0.9802
N_NO3_NO2	Construction	Sep	2	0.5022	0.5022	0.7058	-	-	-	0.3744	0.3744	0.3744
N_NO3_NO2	Construction	Oct	2	0.6224	0.6224	0.8310	-	-	-	0.3105	0.3105	0.3105
N_NO3_NO2	Construction	Nov	2	0.9585	0.9585	1.2960	-	-	-	0.2874	0.2874	0.2874
N_NO3_NO2	Construction	Dec	2	1.4176	1.4176	1.9270	-	-	-	0.2904	0.2904	0.2904
N_NO3_NO2	Operations	Jan	13	5.3930	5.2644	7.3160	-	-	-	1.3680	1.4021	3.2500
N_NO3_NO2	Operations	Feb	13	3.0970	3.1886	6.7250	-	-	-	1.4530	1.4094	2.2130
N_NO3_NO2	Operations	Mar	13	0.5501	0.7076	1.8680	-	-	-	1.3340	1.2128	1.4730
N_NO3_NO2	Operations	Apr	13	0.9232	0.9444	1.5270	-	-	-	1.1770	1.0780	1.3620
N_NO3_NO2	Operations	May	13	1.1870	1.1693	1.5630	-	-	-	1.0220	0.9982	1.2630
N_NO3_NO2	Operations	Jun	13	0.6424	0.6161	0.8118	-	-	-	0.9993	1.0038	1.2440
N_NO3_NO2	Operations	Jul	13	0.4961	0.4790	0.6439	-	-	-	1.0390	1.0481	1.2650
N_NO3_NO2	Operations	Aug	13	0.5300	0.5126	0.6747	-	-	-	1.0940	1.0849	1.2820
N_NO3_NO2	Operations	Sep	13	0.6731	0.6442	0.9821	-	-	-	1.0900	1.1056	1.3200

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
N_NO3_NO2	Operations	Oct	13	1.3410	1.2339	1.7280	-	-	-	1.0880	1.1045	1.3090
N_NO3_NO2	Operations	Nov	13	2.3750	2.3668	3.4030	-	-	-	1.1380	1.1474	1.4980
N_NO3_NO2	Operations	Dec	13	4.0320	3.9402	5.6680	-	-	-	1.2450	1.2694	2.2610
N_NO3_NO2	Closure	Jan	6	-	-	-	0.0652	0.0828	0.1692	0.5082	0.5211	0.6724
N_NO3_NO2	Closure	Feb	6	-	-	-	0.0657	0.0782	0.1403	0.5053	0.5180	0.6677
N_NO3_NO2	Closure	Mar	6	-	-	-	0.0667	0.0753	0.1192	0.4964	0.5084	0.6532
N_NO3_NO2	Closure	Apr	6	-	-	-	0.0677	0.0727	0.0999	0.4869	0.4982	0.6380
N_NO3_NO2	Closure	May	6	-	-	-	0.0683	0.0713	0.0902	0.4811	0.4918	0.6285
N_NO3_NO2	Closure	Jun	6	-	-	-	0.0681	0.0699	0.0823	0.4789	0.4894	0.6248
N_NO3_NO2	Closure	Jul	6	-	-	-	0.0674	0.0683	0.0777	0.4785	0.4890	0.6238
N_NO3_NO2	Closure	Aug	6	-	-	-	0.0666	0.0670	0.0773	0.4781	0.4885	0.6227
N_NO3_NO2	Closure	Sep	6	-	-	-	0.0649	0.0664	0.0773	0.4757	0.4859	0.6186
N_NO3_NO2	Closure	Oct	6	-	-	-	0.0641	0.0666	0.0780	0.4700	0.4798	0.6096
N_NO3_NO2	Closure	Nov	6	-	-	-	0.0643	0.0671	0.0787	0.4654	0.4748	0.6024
N_NO3_NO2	Closure	Dec	6	-	-	-	0.0648	0.0674	0.0789	0.4633	0.4725	0.5989
N_NO3_NO2	Post-Closure	Jan	109	-	-	-	0.0864	0.0901	0.1058	0.0166	0.0461	0.3679
N_NO3_NO2	Post-Closure	Feb	109	-	-	-	0.0864	0.0901	0.1058	0.0165	0.0459	0.3665
N_NO3_NO2	Post-Closure	Mar	109	-	-	-	0.0863	0.0901	0.1058	0.0164	0.0454	0.3619
N_NO3_NO2	Post-Closure	Apr	109	-	-	-	0.0862	0.0901	0.1059	0.0162	0.0448	0.3569
N_NO3_NO2	Post-Closure	May	109	-	-	-	0.0862	0.0901	0.1059	0.0161	0.0445	0.3534
N_NO3_NO2	Post-Closure	Jun	109	-	-	-	0.0862	0.0901	0.1059	0.0162	0.0443	0.3503
N_NO3_NO2	Post-Closure	Jul	109	-	-	-	0.0862	0.0901	0.1058	0.0164	0.0442	0.3467
N_NO3_NO2	Post-Closure	Aug	109	-	-	-	0.0862	0.0901	0.1059	0.0166	0.0441	0.3429
N_NO3_NO2	Post-Closure	Sep	109	-	-	-	0.0863	0.0902	0.1059	0.0167	0.0438	0.3392
N_NO3_NO2	Post-Closure	Oct	109	-	-	-	0.0864	0.0902	0.1059	0.0167	0.0434	0.3352
N_NO3_NO2	Post-Closure	Nov	109	-	-	-	0.0864	0.0902	0.1059	0.0166	0.0432	0.3327
N_NO3_NO2	Post-Closure	Dec	109	-	-	-	0.0864	0.0902	0.1058	0.0165	0.0430	0.3315
CN, Tot	Construction	Jan	2	0.00044	0.00044	0.00045	-	-	-	-	-	-
CN, Tot	Construction	Feb	2	0.00046	0.00046	0.00046	-	-	-	-	-	-
CN, Tot	Construction	Mar	2	0.00049	0.00049	0.00050	-	-	-	0.00002	0.00002	0.00003
CN, Tot	Construction	Apr	2	0.00049	0.00049	0.00049	-	-	-	-	-	-
CN, Tot	Construction	May	2	0.00052	0.00052	0.00053	-	-	-	0.00001	0.00001	0.00001
CN, Tot	Construction	Jun	2	0.00052	0.00052	0.00053	-	-	-	0.00001	0.00001	0.00001
CN, Tot	Construction	Jul	2	0.00050	0.00050	0.00050	-	-	-	0.00042	0.00042	0.00048
CN, Tot	Construction	Aug	2	0.00388	0.00388	0.00727	-	-	-	0.02176	0.02176	0.04311
CN, Tot	Construction	Sep	2	0.06864	0.06864	0.13680	-	-	-	1.69500	1.69500	1.69500
CN, Tot	Construction	Oct	2	0.01316	0.01316	0.02586	-	-	-	1.64100	1.64100	1.64100
CN, Tot	Construction	Nov	2	0.00684	0.00684	0.01323	-	-	-	1.72900	1.72900	1.72900
CN, Tot	Construction	Dec	2	0.00530	0.00530	0.01015	-	-	-	1.85200	1.85200	1.85200
CN, Tot	Operations	Jan	13	0.00041	0.00098	0.00767	-	-	-	3.27000	4.51908	11.25000
CN, Tot	Operations	Feb	13	0.00047	0.00080	0.00477	-	-	-	3.76800	5.08069	13.60000
CN, Tot	Operations	Mar	13	0.00050	0.00056	0.00129	-	-	-	4.13500	4.46223	8.94900
CN, Tot	Operations	Apr	13	0.00047	0.00047	0.00058	-	-	-	3.68800	3.87715	5.56100
CN, Tot	Operations	May	13	0.00046	0.00046	0.00052	-	-	-	3.21000	3.32454	4.84300
CN, Tot	Operations	Jun	13	0.00049	0.00050	0.00053	-	-	-	2.97700	2.98062	4.39200
CN, Tot	Operations	Jul	13	0.00048	0.00049	0.00052	-	-	-	2.55100	2.75246	4.74400
CN, Tot	Operations	Aug	13	0.00049	0.00049	0.00052	-	-	-	2.20700	2.57500	5.43700
CN, Tot	Operations	Sep	13	0.00047	0.00048	0.00051	-	-	-	2.07900	2.57641	6.16100
CN, Tot	Operations	Oct	13	0.00045	0.00045	0.00049	-	-	-	2.20800	2.81635	7.02900
CN, Tot	Operations	Nov	13	0.00043	0.00044	0.00048	-	-	-	2.52300	3.38822	9.29000
CN, Tot	Operations	Dec	13	0.00041	0.00043	0.00047	-	-	-	2.89000	4.27160	13.98000
CN, Tot	Closure	Jan	6	-	-	-	0.00046	0.00440	0.01978	0.60735	0.62028	0.77160
CN, Tot	Closure	Feb	6	-	-	-	0.00045	0.00458	0.02016	0.60395	0.61658	0.76610
CN, Tot	Closure	Mar	6	-	-	-	0.00043	0.00564	0.02269	0.59325	0.60513	0.74940
CN, Tot	Closure	Apr	6	-	-	-	0.00042	0.00674	0.02535	0.58195	0.59305	0.73200
CN, Tot	Closure	May	6	-	-	-	0.00042	0.00734	0.02675	0.57545	0.58607	0.72180
CN, Tot	Closure	Jun	6	-	-	-	0.00041	0.00747	0.02697	0.57420	0.58465	0.71920
CN, Tot	Closure	Jul	6	-	-	-	0.00041	0.00733	0.02649	0.57610	0.58658	0.72100
CN, Tot	Closure	Aug	6	-	-	-	0.00040	0.00721	0.02607	0.57830	0.58883	0.72320
CN, Tot	Closure	Sep	6	-	-	-	0.00040	0.00732	0.02624	0.57715	0.58752	0.72060
CN, Tot	Closure	Oct	6	-	-	-	0.00102	0.00805	0.02747	0.57100	0.58085	0.71090
CN, Tot	Closure	Nov	6	-	-	-	0.00211	0.00879	0.02837	0.56555	0.57503	0.70270
CN, Tot	Closure	Dec	6	-	-	-	0.00242	0.00896	0.02850	0.56285	0.57213	0.69860
CN, Tot	Post-Closure	Jan	109	-	-	-	0.02117	0.02686	0.04799	0.04299	0.07866	0.46740
CN, Tot	Post-Closure	Feb	109	-	-	-	0.02115	0.02685	0.04791	0.04282	0.07835	0.46550
CN, Tot	Post-Closure	Mar	109	-	-	-	0.02113	0.02688	0.04802	0.04228	0.07736	0.45960
CN, Tot	Post-Closure	Apr	109	-	-	-	0.02111	0.02692	0.04817	0.04173	0.07633	0.45330
CN, Tot	Post-Closure	May	109	-	-	-	0.02109	0.02693	0.04823	0.04155	0.07578	0.44890
CN, Tot	Post-Closure	Jun	109	-	-	-	0.02105	0.02691	0.04821	0.04183	0.07575	0.44530
CN, Tot	Post-Closure	Jul	109	-	-	-	0.02099	0.02687	0.04817	0.04250	0.07603	0.44140
CN, Tot	Post-Closure	Aug	109	-	-	-	0.02093	0.02684	0.04814	0.04327	0.07640	0.43740
CN, Tot	Post-Closure	Sep	109	-	-	-	0.02089	0.02682	0.04814	0.04361	0.07635	0.43310
CN, Tot	Post-Closure	Oct	109	-	-	-	0.02086	0.02682	0.04821	0.04343	0.07577	0.42820
CN, Tot	Post-Closure	Nov	109	-	-	-	0.02084	0.02682	0.04821	0.04318	0.07527	0.42500
CN, Tot	Post-Closure	Dec	109	-	-	-	0.02082	0.02681	0.04811	0.04303	0.07500	0.42340
CN, Free	Construction	Jan	2	0.00046	0.00046	0.00048	-	-	-	-	-	-
CN, Free	Construction	Feb	2	0.00049	0.00049	0.00050	-	-	-	-	-	-
CN, Free	Construction	Mar	2	0.00054	0.00054	0.00055	-	-	-	0.00002	0.00002	0.00003
CN, Free	Construction	Apr	2	0.00055	0.00055	0.00056	-	-	-	-	-	-
CN, Free	Construction	May	2	0.00059	0.00059	0.00060	-	-	-	0.00001	0.00001	0.00001
CN, Free	Construction	Jun	2	0.00058	0.00058	0.00058	-	-	-	0.00001	0.00001	0.00001
CN, Free	Construction	Jul	2	0.00056	0.00056	0.00056	-	-	-	0.00042	0.00042	0.00048
CN, Free	Construction	Aug	2	0.00057	0.00057	0.00061	-	-	-	0.00039	0.00039	0.00041
CN, Free	Construction	Sep	2	0.00112	0.00112	0.00171	-	-	-	0.00783	0.00783	0.00783
CN, Free	Construction	Oct	2	0.00062	0.00062	0.00074	-	-	-	0.00639	0.00639	0.00639
CN, Free	Construction	Nov	2	0.00055	0.00055	0.00062	-	-	-	0.00493	0.00493	0.00493
CN, Free	Construction	Dec	2	0.00053	0.00053	0.00059	-	-	-	0.00417	0.00417	0.00417

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CN, Free	Operations	Jan	13	0.00046	0.00048	0.00056	-	-	-	0.02024	0.01886	*0.02465*
CN, Free	Operations	Feb	13	0.00054	0.00054	0.00059	-	-	-	0.02005	0.01845	*0.02279*
CN, Free	Operations	Mar	13	0.00059	0.00058	0.00060	-	-	-	0.01877	0.01589	0.01911
CN, Free	Operations	Apr	13	0.00054	0.00054	0.00057	-	-	-	0.01608	0.01362	0.01791
CN, Free	Operations	May	13	0.00052	0.00052	0.00057	-	-	-	0.01420	0.01279	0.01702
CN, Free	Operations	Jun	13	0.00057	0.00058	0.00061	-	-	-	0.01490	0.01451	0.01719
CN, Free	Operations	Jul	13	0.00056	0.00056	0.00060	-	-	-	0.01813	0.01830	*0.02410*
CN, Free	Operations	Aug	13	0.00056	0.00057	0.00060	-	-	-	0.01998	*0.02203*	*0.03268*
CN, Free	Operations	Sep	13	0.00054	0.00055	0.00059	-	-	-	0.02166	*0.02338*	*0.03422*
CN, Free	Operations	Oct	13	0.00052	0.00051	0.00057	-	-	-	0.02141	*0.02230*	*0.03008*
CN, Free	Operations	Nov	13	0.00049	0.00050	0.00053	-	-	-	0.02064	0.02137	*0.02707*
CN, Free	Operations	Dec	13	0.00047	0.00048	0.00053	-	-	-	0.02042	0.02111	*0.02579*
CN, Free	Closure	Jan	6	-	-	-	0.00054	0.00068	0.00140	*0.02354*	*0.02318*	*0.02651*
CN, Free	Closure	Feb	6	-	-	-	0.00053	0.00069	0.00142	*0.02341*	*0.02305*	*0.02638*
CN, Free	Closure	Mar	6	-	-	-	0.00051	0.00073	0.00155	*0.02300*	*0.02263*	*0.02595*
CN, Free	Closure	Apr	6	-	-	-	0.00049	0.00078	0.00169	*0.02258*	*0.02222*	*0.02551*
CN, Free	Closure	May	6	-	-	-	0.00049	0.00081	0.00177	*0.02250*	*0.02214*	*0.02540*
CN, Free	Closure	Jun	6	-	-	-	0.00048	0.00081	0.00178	*0.02292*	*0.02258*	*0.02579*
CN, Free	Closure	Jul	6	-	-	-	0.00047	0.00080	0.00175	*0.02379*	*0.02349*	*0.02660*
CN, Free	Closure	Aug	6	-	-	-	0.00047	0.00080	0.00173	*0.02475*	*0.02450*	*0.02752*
CN, Free	Closure	Sep	6	-	-	-	0.00047	0.00080	0.00175	*0.02529*	*0.02505*	*0.02801*
CN, Free	Closure	Oct	6	-	-	-	0.00049	0.00084	0.00182	*0.02524*	*0.02501*	*0.02793*
CN, Free	Closure	Nov	6	-	-	-	0.00055	0.00088	0.00188	*0.02507*	*0.02484*	*0.02774*
CN, Free	Closure	Dec	6	-	-	-	0.00056	0.00089	0.00189	*0.02495*	*0.02472*	*0.02761*
CN, Free	Post-Closure	Jan	109	-	-	-	0.00331	0.00333	0.00360	0.01094	0.01233	*0.02751*
CN, Free	Post-Closure	Feb	109	-	-	-	0.00331	0.00333	0.00360	0.01090	0.01228	*0.02740*
CN, Free	Post-Closure	Mar	109	-	-	-	0.00331	0.00334	0.00360	0.01076	0.01213	*0.02705*
CN, Free	Post-Closure	Apr	109	-	-	-	0.00331	0.00334	0.00361	0.01062	0.01197	*0.02669*
CN, Free	Post-Closure	May	109	-	-	-	0.00331	0.00335	0.00361	0.01058	0.01191	*0.02648*
CN, Free	Post-Closure	Jun	109	-	-	-	0.00331	0.00335	0.00361	0.01065	0.01198	*0.02640*
CN, Free	Post-Closure	Jul	109	-	-	-	0.00331	0.00334	0.00361	0.01083	0.01214	*0.02640*
CN, Free	Post-Closure	Aug	109	-	-	-	0.00331	0.00334	0.00360	0.01103	0.01232	*0.02642*
CN, Free	Post-Closure	Sep	109	-	-	-	0.00331	0.00334	0.00360	0.01112	0.01240	*0.02632*
CN, Free	Post-Closure	Oct	109	-	-	-	0.00331	0.00335	0.00360	0.01107	0.01234	*0.02609*
CN, Free	Post-Closure	Nov	109	-	-	-	0.00331	0.00335	0.00360	0.01101	0.01227	*0.02592*
CN, Free	Post-Closure	Dec	109	-	-	-	0.00331	0.00335	0.00360	0.01097	0.01222	*0.02582*
Al, Tot	Construction	Jan	2	0.472	0.472	0.500	-	-	-	-	-	-
Al, Tot	Construction	Feb	2	0.404	0.404	0.411	-	-	-	-	-	-
Al, Tot	Construction	Mar	2	0.296	0.296	0.300	-	-	-	0.001	0.001	0.001
Al, Tot	Construction	Apr	2	0.251	0.251	0.260	-	-	-	-	-	-
Al, Tot	Construction	May	2	0.223	0.223	0.228	-	-	-	0.000	0.000	0.000
Al, Tot	Construction	Jun	2	0.263	0.263	0.268	-	-	-	0.000	0.000	0.000
Al, Tot	Construction	Jul	2	0.308	0.308	0.321	-	-	-	0.012	0.012	0.015
Al, Tot	Construction	Aug	2	0.310	0.310	0.325	-	-	-	0.007	0.007	0.008
Al, Tot	Construction	Sep	2	0.314	0.314	0.347	-	-	-	0.215	0.215	0.215
Al, Tot	Construction	Oct	2	0.366	0.366	0.397	-	-	-	0.199	0.199	0.199
Al, Tot	Construction	Nov	2	0.396	0.396	0.428	-	-	-	0.191	0.191	0.191
Al, Tot	Construction	Dec	2	0.409	0.409	0.443	-	-	-	0.194	0.194	0.194
Al, Tot	Operations	Jan	13	0.275	0.281	0.366	-	-	-	0.223	0.220	0.225
Al, Tot	Operations	Feb	13	0.159	0.176	0.316	-	-	-	0.220	0.219	0.222
Al, Tot	Operations	Mar	13	0.092	0.108	0.236	-	-	-	0.205	0.198	0.215
Al, Tot	Operations	Apr	13	0.170	0.173	0.275	-	-	-	0.188	0.181	0.204
Al, Tot	Operations	May	13	0.226	0.223	0.286	-	-	-	0.178	0.176	0.196
Al, Tot	Operations	Jun	13	0.151	0.145	0.158	-	-	-	0.197	0.194	0.217
Al, Tot	Operations	Jul	13	0.156	0.152	0.163	-	-	-	0.211	0.224	0.272
Al, Tot	Operations	Aug	13	0.149	0.146	0.175	-	-	-	0.233	0.243	0.296
Al, Tot	Operations	Sep	13	0.173	0.168	0.232	-	-	-	0.239	0.242	0.271
Al, Tot	Operations	Oct	13	0.248	0.226	0.258	-	-	-	0.230	0.229	0.239
Al, Tot	Operations	Nov	13	0.230	0.239	0.284	-	-	-	0.225	0.223	0.229
Al, Tot	Operations	Dec	13	0.255	0.258	0.289	-	-	-	0.224	0.223	0.226
Al, Tot	Closure	Jan	6	-	-	-	0.201	0.178	0.208	0.241	0.239	0.259
Al, Tot	Closure	Feb	6	-	-	-	0.200	0.179	0.207	0.240	0.237	0.257
Al, Tot	Closure	Mar	6	-	-	-	0.199	0.187	0.207	0.235	0.233	0.253
Al, Tot	Closure	Apr	6	-	-	-	0.200	0.192	0.208	0.231	0.229	0.249
Al, Tot	Closure	May	6	-	-	-	0.199	0.194	0.208	0.230	0.228	0.247
Al, Tot	Closure	Jun	6	-	-	-	0.200	0.197	0.208	0.233	0.231	0.251
Al, Tot	Closure	Jul	6	-	-	-	0.203	0.202	0.210	0.241	0.239	0.258
Al, Tot	Closure	Aug	6	-	-	-	0.206	0.206	0.211	0.249	0.248	0.266
Al, Tot	Closure	Sep	6	-	-	-	0.208	0.209	0.212	0.253	0.252	0.270
Al, Tot	Closure	Oct	6	-	-	-	0.209	0.209	0.212	0.253	0.251	0.269
Al, Tot	Closure	Nov	6	-	-	-	0.207	0.208	0.212	0.251	0.250	0.267
Al, Tot	Closure	Dec	6	-	-	-	0.206	0.206	0.211	0.250	0.248	0.265
Al, Tot	Post-Closure	Jan	109	-	-	-	0.346	0.327	0.369	0.096	0.110	0.264
Al, Tot	Post-Closure	Feb	109	-	-	-	0.346	0.327	0.369	0.095	0.110	0.263
Al, Tot	Post-Closure	Mar	109	-	-	-	0.346	0.327	0.369	0.094	0.108	0.260
Al, Tot	Post-Closure	Apr	109	-	-	-	0.346	0.327	0.369	0.093	0.107	0.257
Al, Tot	Post-Closure	May	109	-	-	-	0.346	0.327	0.369	0.093	0.106	0.255
Al, Tot	Post-Closure	Jun	109	-	-	-	0.346	0.327	0.369	0.093	0.107	0.254
Al, Tot	Post-Closure	Jul	109	-	-	-	0.347	0.328	0.369	0.095	0.108	0.253
Al, Tot	Post-Closure	Aug	109	-	-	-	0.347	0.328	0.370	0.097	0.110	0.253
Al, Tot	Post-Closure	Sep	109	-	-	-	0.347	0.328	0.370	0.097	0.110	0.252
Al, Tot	Post-Closure	Oct	109	-	-	-	0.347	0.329	0.370	0.097	0.110	0.250
Al, Tot	Post-Closure	Nov	109	-	-	-	0.347	0.329	0.370	0.096	0.109	0.248
Al, Tot	Post-Closure	Dec	109	-	-	-	0.347	0.329	0.370	0.096	0.109	0.247
Sb, Diss	Construction	Jan	2	0.000101	0.000101	0.000130	-	-	-	-	-	-
Sb, Diss	Construction	Feb	2	0.000101	0.000101	0.000129	-	-	-	-	-	-
Sb, Diss	Construction	Mar	2	0.000111	0.000111	0.000153	-	-	-	0.000024	0.000024	0.000045

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sb, Diss	Construction	Apr	2	0.000103	0.000103	0.000136	-	-	-	-	-	-
Sb, Diss	Construction	May	2	0.000117	0.000117	0.000161	-	-	-	0.000004	0.000004	0.000007
Sb, Diss	Construction	Jun	2	0.000122	0.000122	0.000167	-	-	-	0.000002	0.000002	0.000002
Sb, Diss	Construction	Jul	2	0.000142	0.000142	0.000192	-	-	-	0.000640	0.000640	0.001095
Sb, Diss	Construction	Aug	2	0.000187	0.000187	0.000282	-	-	-	0.000328	0.000328	0.000458
Sb, Diss	Construction	Sep	2	0.000911	0.000911	0.001724	-	-	-	0.016610	0.016610	0.016610
Sb, Diss	Construction	Oct	2	0.000320	0.000320	0.000530	-	-	-	0.015880	0.015880	0.015880
Sb, Diss	Construction	Nov	2	0.000266	0.000266	0.000415	-	-	-	0.015920	0.015920	0.015920
Sb, Diss	Construction	Dec	2	0.000259	0.000259	0.000394	-	-	-	0.016620	0.016620	0.016620
Sb, Diss	Operations	Jan	13	0.002117	0.002775	0.005153	-	-	-	0.058200	0.062618	0.112900
Sb, Diss	Operations	Feb	13	0.001423	0.001794	0.004423	-	-	-	0.060120	0.066097	0.127700
Sb, Diss	Operations	Mar	13	0.000844	0.000919	0.002529	-	-	-	0.057710	0.058220	0.079620
Sb, Diss	Operations	Apr	13	0.001434	0.001361	0.002202	-	-	-	0.053700	0.050501	0.055000
Sb, Diss	Operations	May	13	0.001980	0.001830	0.003030	-	-	-	0.047180	0.045623	0.052420
Sb, Diss	Operations	Jun	13	0.001331	0.001227	0.001950	-	-	-	0.046830	0.046452	0.051910
Sb, Diss	Operations	Jul	13	0.001364	0.001268	0.002064	-	-	-	0.049900	0.050478	0.057050
Sb, Diss	Operations	Aug	13	0.001284	0.001226	0.001969	-	-	-	0.052480	0.054160	0.071530
Sb, Diss	Operations	Sep	13	0.001441	0.001450	0.002311	-	-	-	0.053600	0.056253	0.079300
Sb, Diss	Operations	Oct	13	0.002095	0.002098	0.003502	-	-	-	0.053770	0.056505	0.079400
Sb, Diss	Operations	Nov	13	0.002851	0.002274	0.003399	-	-	-	0.054360	0.059054	0.091740
Sb, Diss	Operations	Dec	13	0.003259	0.002649	0.004214	-	-	-	0.055770	0.065120	0.126300
Sb, Diss	Closure	Jan	6	-	-	-	0.003288	0.003103	0.004442	0.037625	0.038363	0.047040
Sb, Diss	Closure	Feb	6	-	-	-	0.003255	0.003116	0.004447	0.037410	0.038137	0.046710
Sb, Diss	Closure	Mar	6	-	-	-	0.003250	0.003323	0.004586	0.036750	0.037428	0.045690
Sb, Diss	Closure	Apr	6	-	-	-	0.003253	0.003469	0.004736	0.036050	0.036683	0.044630
Sb, Diss	Closure	May	6	-	-	-	0.003250	0.003528	0.004812	0.035655	0.036262	0.044020
Sb, Diss	Closure	Jun	6	-	-	-	0.003265	0.003589	0.004831	0.035615	0.036210	0.043910
Sb, Diss	Closure	Jul	6	-	-	-	0.003307	0.003670	0.004827	0.035785	0.036387	0.044090
Sb, Diss	Closure	Aug	6	-	-	-	0.003353	0.003740	0.004828	0.035980	0.036590	0.044300
Sb, Diss	Closure	Sep	6	-	-	-	0.003417	0.003787	0.004854	0.035950	0.036548	0.044190
Sb, Diss	Closure	Oct	6	-	-	-	0.003464	0.003838	0.004929	0.035585	0.036153	0.043620
Sb, Diss	Closure	Nov	6	-	-	-	0.003484	0.003855	0.004971	0.035250	0.035797	0.043120
Sb, Diss	Closure	Dec	6	-	-	-	0.003461	0.003825	0.004963	0.035080	0.035615	0.042870
Sb, Diss	Post-Closure	Jan	109	-	-	-	0.003177	0.003531	0.005338	0.003305	0.005515	0.029600
Sb, Diss	Post-Closure	Feb	109	-	-	-	0.003175	0.003529	0.005325	0.003292	0.005494	0.029480
Sb, Diss	Post-Closure	Mar	109	-	-	-	0.003173	0.003529	0.005341	0.003251	0.005424	0.029110
Sb, Diss	Post-Closure	Apr	109	-	-	-	0.003171	0.003529	0.005359	0.003209	0.005352	0.028710
Sb, Diss	Post-Closure	May	109	-	-	-	0.003170	0.003528	0.005364	0.003195	0.005316	0.028430
Sb, Diss	Post-Closure	Jun	109	-	-	-	0.003168	0.003526	0.005361	0.003217	0.005318	0.028220
Sb, Diss	Post-Closure	Jul	109	-	-	-	0.003165	0.003523	0.005359	0.003269	0.005346	0.027980
Sb, Diss	Post-Closure	Aug	109	-	-	-	0.003162	0.003520	0.005358	0.003328	0.005381	0.027750
Sb, Diss	Post-Closure	Sep	109	-	-	-	0.003160	0.003518	0.005360	0.003354	0.005383	0.027490
Sb, Diss	Post-Closure	Oct	109	-	-	-	0.003158	0.003518	0.005371	0.003340	0.005344	0.027180
Sb, Diss	Post-Closure	Nov	109	-	-	-	0.003157	0.003516	0.005370	0.003322	0.005310	0.026980
Sb, Diss	Post-Closure	Dec	109	-	-	-	0.003156	0.003514	0.005355	0.003310	0.005291	0.026880
Sb, Tot	Construction	Jan	2	0.000243	0.000243	0.000262	-	-	-	-	-	-
Sb, Tot	Construction	Feb	2	0.000218	0.000218	0.000241	-	-	-	-	-	-
Sb, Tot	Construction	Mar	2	0.000181	0.000181	0.000204	-	-	-	0.000024	0.000024	0.000045
Sb, Tot	Construction	Apr	2	0.000167	0.000167	0.000189	-	-	-	-	-	-
Sb, Tot	Construction	May	2	0.000169	0.000169	0.000195	-	-	-	0.000004	0.000004	0.000007
Sb, Tot	Construction	Jun	2	0.000191	0.000191	0.000225	-	-	-	0.000002	0.000002	0.000002
Sb, Tot	Construction	Jul	2	0.000233	0.000233	0.000271	-	-	-	0.000651	0.000651	0.001102
Sb, Tot	Construction	Aug	2	0.000282	0.000282	0.000361	-	-	-	0.000330	0.000330	0.000442
Sb, Tot	Construction	Sep	2	0.000976	0.000976	0.001743	-	-	-	0.015950	0.015950	0.015950
Sb, Tot	Construction	Oct	2	0.000416	0.000416	0.000600	-	-	-	0.015230	0.015230	0.015230
Sb, Tot	Construction	Nov	2	0.000373	0.000373	0.000497	-	-	-	0.015250	0.015250	0.015250
Sb, Tot	Construction	Dec	2	0.000369	0.000369	0.000479	-	-	-	0.015900	0.015900	0.015900
Sb, Tot	Operations	Jan	13	0.002129	0.002796	0.005162	-	-	-	0.055830	0.060007	0.107900
Sb, Tot	Operations	Feb	13	0.001429	0.001806	0.004433	-	-	-	0.057660	0.063315	0.122000
Sb, Tot	Operations	Mar	13	0.000847	0.000926	0.002535	-	-	-	0.055370	0.055773	0.076050
Sb, Tot	Operations	Apr	13	0.001440	0.001373	0.002208	-	-	-	0.051400	0.048382	0.052790
Sb, Tot	Operations	May	13	0.001988	0.001844	0.003039	-	-	-	0.045210	0.043715	0.050310
Sb, Tot	Operations	Jun	13	0.001336	0.001235	0.001955	-	-	-	0.044760	0.044531	0.049830
Sb, Tot	Operations	Jul	13	0.001373	0.001281	0.002073	-	-	-	0.047890	0.048432	0.054650
Sb, Tot	Operations	Aug	13	0.001293	0.001238	0.001977	-	-	-	0.050390	0.051998	0.068580
Sb, Tot	Operations	Sep	13	0.001448	0.001460	0.002317	-	-	-	0.051530	0.054018	0.076020
Sb, Tot	Operations	Oct	13	0.002104	0.002112	0.003511	-	-	-	0.051640	0.054245	0.076040
Sb, Tot	Operations	Nov	13	0.002861	0.002289	0.003407	-	-	-	0.052200	0.056661	0.087750
Sb, Tot	Operations	Dec	13	0.003267	0.002665	0.004223	-	-	-	0.053570	0.062440	0.120700
Sb, Tot	Closure	Jan	6	-	-	-	0.003292	0.003097	0.004405	0.036290	0.036993	0.045240
Sb, Tot	Closure	Feb	6	-	-	-	0.003258	0.003110	0.004409	0.036085	0.036775	0.044920
Sb, Tot	Closure	Mar	6	-	-	-	0.003253	0.003315	0.004543	0.035445	0.036092	0.043940
Sb, Tot	Closure	Apr	6	-	-	-	0.003256	0.003459	0.004687	0.034775	0.035375	0.042920
Sb, Tot	Closure	May	6	-	-	-	0.003253	0.003516	0.004760	0.034400	0.034975	0.042340
Sb, Tot	Closure	Jun	6	-	-	-	0.003268	0.003577	0.004779	0.034360	0.034928	0.042240
Sb, Tot	Closure	Jul	6	-	-	-	0.003310	0.003659	0.004775	0.034540	0.035108	0.042420
Sb, Tot	Closure	Aug	6	-	-	-	0.003356	0.003729	0.004778	0.034735	0.035313	0.042640
Sb, Tot	Closure	Sep	6	-	-	-	0.003421	0.003776	0.004803	0.034715	0.035283	0.042550
Sb, Tot	Closure	Oct	6	-	-	-	0.003466	0.003825	0.004876	0.034360	0.034903	0.042000
Sb, Tot	Closure	Nov	6	-	-	-	0.003484	0.003841	0.004916	0.034045	0.034562	0.041520
Sb, Tot	Closure	Dec	6	-	-	-	0.003460	0.003810	0.004908	0.033875	0.034383	0.041280
Sb, Tot	Post-Closure	Jan	109	-	-	-	0.003164	0.003506	0.005255	0.003305	0.005437	0.028670
Sb, Tot	Post-Closure	Feb	109	-	-	-	0.003163	0.003504	0.005242	0.003292	0.005416	0.028550
Sb, Tot	Post-Closure	Mar	109	-	-	-	0.003161	0.003504	0.005257	0.003251	0.005347	0.028190
Sb, Tot	Post-Closure	Apr	109	-	-	-	0.003159	0.003504	0.005274	0.003209	0.005276	0.027810
Sb, Tot	Post-Closure	May	109	-	-	-	0.003158	0.003503	0.005279	0.003195	0.005241	0.027540
Sb, Tot	Post-Closure	Jun	109	-	-	-	0.003156	0.003501	0.005276	0.003217	0.005244	0.027330

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sb, Tot	Post-Closure	Jul	109	-	-	-	0.003153	0.003498	0.005274	0.003268	0.005272	0.027110
Sb, Tot	Post-Closure	Aug	109	-	-	-	0.003151	0.003496	0.005273	0.003328	0.005308	0.026880
Sb, Tot	Post-Closure	Sep	109	-	-	-	0.003149	0.003494	0.005276	0.003354	0.005311	0.026630
Sb, Tot	Post-Closure	Oct	109	-	-	-	0.003147	0.003493	0.005287	0.003340	0.005273	0.026340
Sb, Tot	Post-Closure	Nov	109	-	-	-	0.003146	0.003491	0.005286	0.003322	0.005240	0.026140
Sb, Tot	Post-Closure	Dec	109	-	-	-	0.003144	0.003489	0.005271	0.003310	0.005221	0.026040
As, Diss	Construction	Jan	2	0.000989	0.000989	0.001159	-	-	-	-	-	-
As, Diss	Construction	Feb	2	0.000949	0.000949	0.001146	-	-	-	-	-	-
As, Diss	Construction	Mar	2	0.001059	0.001059	0.001461	-	-	-	0.000203	0.000203	0.000370
As, Diss	Construction	Apr	2	0.000890	0.000890	0.001160	-	-	-	-	-	-
As, Diss	Construction	May	2	0.000907	0.000907	0.001188	-	-	-	0.000038	0.000038	0.000059
As, Diss	Construction	Jun	2	0.000979	0.000979	0.001311	-	-	-	0.000022	0.000022	0.000022
As, Diss	Construction	Jul	2	0.001194	0.001194	0.001572	-	-	-	0.005226	0.005226	0.008735
As, Diss	Construction	Aug	2	0.001337	0.001337	0.001841	-	-	-	0.001246	0.001246	0.001817
As, Diss	Construction	Sep	2	0.002611	0.002611	0.004376	-	-	-	0.014910	0.014910	0.014910
As, Diss	Construction	Oct	2	0.001705	0.001705	0.002482	-	-	-	0.012350	0.012350	0.012350
As, Diss	Construction	Nov	2	0.001738	0.001738	0.002457	-	-	-	0.009866	0.009866	0.009866
As, Diss	Construction	Dec	2	0.001814	0.001814	0.002530	-	-	-	0.008600	0.008600	0.008600
As, Diss	Operations	Jan	13	0.015040	0.016395	0.027630	-	-	-	0.051420	0.047024	0.058980
As, Diss	Operations	Feb	13	0.008771	0.009948	0.020610	-	-	-	0.050110	0.046491	0.058680
As, Diss	Operations	Mar	13	0.004841	0.005493	0.012320	-	-	-	0.045990	0.041739	0.057410
As, Diss	Operations	Apr	13	0.008434	0.008898	0.015360	-	-	-	0.040410	0.036758	0.054830
As, Diss	Operations	May	13	0.011360	0.011854	0.020530	-	-	-	0.035890	0.034250	0.052360
As, Diss	Operations	Jun	13	0.008275	0.008364	0.014380	-	-	-	0.037230	0.037416	0.052590
As, Diss	Operations	Jul	13	0.009203	0.009105	0.015550	-	-	-	0.045590	0.045122	0.055110
As, Diss	Operations	Aug	13	0.008705	0.008823	0.014840	-	-	-	0.054180	0.052703	0.063200
As, Diss	Operations	Sep	13	0.009600	0.010330	0.017340	-	-	-	0.056880	0.055858	0.066560
As, Diss	Operations	Oct	13	0.013480	0.014693	0.026070	-	-	-	0.055250	0.054312	0.059770
As, Diss	Operations	Nov	13	0.017470	0.015334	0.023870	-	-	-	0.052790	0.052895	0.059190
As, Diss	Operations	Dec	13	0.019520	0.016974	0.026020	-	-	-	0.052630	0.052826	0.059070
As, Diss	Closure	Jan	6	-	-	-	0.025595	0.022587	0.027290	0.058455	0.058428	0.058750
As, Diss	Closure	Feb	6	-	-	-	0.025335	0.022624	0.027190	0.058125	0.058083	0.058440
As, Diss	Closure	Mar	6	-	-	-	0.025300	0.023857	0.027330	0.057100	0.057025	0.057490
As, Diss	Closure	Apr	6	-	-	-	0.025320	0.024592	0.027500	0.056055	0.055948	0.056510
As, Diss	Closure	May	6	-	-	-	0.025300	0.024832	0.027570	0.055680	0.055565	0.056160
As, Diss	Closure	Jun	6	-	-	-	0.025420	0.025267	0.027650	0.056255	0.056162	0.056700
As, Diss	Closure	Jul	6	-	-	-	0.025745	0.025958	0.027790	0.057610	0.057573	0.057990
As, Diss	Closure	Aug	6	-	-	-	0.026100	0.026547	0.027960	0.059130	0.059158	0.059440
As, Diss	Closure	Sep	6	-	-	-	0.026590	0.026880	0.028110	0.059875	0.059932	0.060150
As, Diss	Closure	Oct	6	-	-	-	0.026725	0.027007	0.028240	0.059575	0.059617	0.059850
As, Diss	Closure	Nov	6	-	-	-	0.026475	0.026863	0.028240	0.059100	0.059123	0.059390
As, Diss	Closure	Dec	6	-	-	-	0.026190	0.026565	0.028130	0.058815	0.058827	0.059120
As, Diss	Post-Closure	Jan	109	-	-	-	0.015510	0.016716	0.028030	0.017900	0.021349	0.058900
As, Diss	Post-Closure	Feb	109	-	-	-	0.015500	0.016704	0.027950	0.017830	0.021264	0.058670
As, Diss	Post-Closure	Mar	109	-	-	-	0.015500	0.016696	0.027900	0.017610	0.020998	0.057930
As, Diss	Post-Closure	Apr	109	-	-	-	0.015490	0.016689	0.027830	0.017380	0.020723	0.057140
As, Diss	Post-Closure	May	109	-	-	-	0.015490	0.016679	0.027730	0.017310	0.020615	0.056660
As, Diss	Post-Closure	Jun	109	-	-	-	0.015490	0.016668	0.027590	0.017430	0.020706	0.056410
As, Diss	Post-Closure	Jul	109	-	-	-	0.015480	0.016655	0.027430	0.017720	0.020955	0.056250
As, Diss	Post-Closure	Aug	109	-	-	-	0.015480	0.016643	0.027280	0.018040	0.021245	0.056120
As, Diss	Post-Closure	Sep	109	-	-	-	0.015480	0.016633	0.027150	0.018190	0.021353	0.055820
As, Diss	Post-Closure	Oct	109	-	-	-	0.015470	0.016625	0.027050	0.018110	0.021239	0.055290
As, Diss	Post-Closure	Nov	109	-	-	-	0.015470	0.016617	0.026960	0.018010	0.021114	0.054900
As, Diss	Post-Closure	Dec	109	-	-	-	0.015470	0.016606	0.026840	0.017950	0.021040	0.054700
As, Tot	Construction	Jan	2	0.019350	0.019350	0.020490	-	-	-	-	-	-
As, Tot	Construction	Feb	2	0.016160	0.016160	0.016730	-	-	-	-	-	-
As, Tot	Construction	Mar	2	0.011415	0.011415	0.012100	-	-	-	0.000203	0.000203	0.000370
As, Tot	Construction	Apr	2	0.009425	0.009425	0.010440	-	-	-	-	-	-
As, Tot	Construction	May	2	0.008372	0.008372	0.009113	-	-	-	0.000038	0.000038	0.000059
As, Tot	Construction	Jun	2	0.009984	0.009984	0.010820	-	-	-	0.000023	0.000023	0.000023
As, Tot	Construction	Jul	2	0.011880	0.011880	0.013220	-	-	-	0.005243	0.005243	0.008749
As, Tot	Construction	Aug	2	0.012075	0.012075	0.013420	-	-	-	0.001249	0.001249	0.001822
As, Tot	Construction	Sep	2	0.013135	0.013135	0.014360	-	-	-	0.014980	0.014980	0.014980
As, Tot	Construction	Oct	2	0.014585	0.014585	0.016520	-	-	-	0.012420	0.012420	0.012420
As, Tot	Construction	Nov	2	0.015735	0.015735	0.017850	-	-	-	0.009934	0.009934	0.009934
As, Tot	Construction	Dec	2	0.016285	0.016285	0.018510	-	-	-	0.008672	0.008672	0.008672
As, Tot	Operations	Jan	13	0.016900	0.019525	0.029210	-	-	-	0.051710	0.047425	0.059210
As, Tot	Operations	Feb	13	0.010920	0.011817	0.022340	-	-	-	0.050420	0.046824	0.058910
As, Tot	Operations	Mar	13	0.007209	0.006515	0.013340	-	-	-	0.046240	0.041988	0.057630
As, Tot	Operations	Apr	13	0.009411	0.010525	0.016330	-	-	-	0.040630	0.036972	0.055040
As, Tot	Operations	May	13	0.012710	0.013940	0.021880	-	-	-	0.036090	0.034444	0.052560
As, Tot	Operations	Jun	13	0.009161	0.009582	0.015230	-	-	-	0.037430	0.037610	0.052780
As, Tot	Operations	Jul	13	0.010160	0.010377	0.016440	-	-	-	0.045790	0.045331	0.055310
As, Tot	Operations	Aug	13	0.009583	0.010039	0.015680	-	-	-	0.054390	0.052922	0.063400
As, Tot	Operations	Sep	13	0.011100	0.011764	0.018320	-	-	-	0.057090	0.056083	0.066780
As, Tot	Operations	Oct	13	0.014790	0.016751	0.027530	-	-	-	0.055460	0.054540	0.059990
As, Tot	Operations	Nov	13	0.019100	0.017571	0.025170	-	-	-	0.053010	0.053136	0.059410
As, Tot	Operations	Dec	13	0.021300	0.019359	0.027450	-	-	-	0.052850	0.053111	0.059290
As, Tot	Closure	Jan	6	-	-	-	0.026160	0.023084	0.027840	0.058595	0.058567	0.058850
As, Tot	Closure	Feb	6	-	-	-	0.025885	0.023119	0.027740	0.058260	0.058225	0.058550
As, Tot	Closure	Mar	6	-	-	-	0.025855	0.024375	0.027880	0.057230	0.057163	0.057600
As, Tot	Closure	Apr	6	-	-	-	0.025875	0.025120	0.028050	0.056180	0.056080	0.056610
As, Tot	Closure	May	6	-	-	-	0.025850	0.025363	0.028120	0.055810	0.055697	0.056260
As, Tot	Closure	Jun	6	-	-	-	0.025970	0.025803	0.028190	0.056380	0.056292	0.056800
As, Tot	Closure	Jul	6	-	-	-	0.026310	0.026513	0.028340	0.057740	0.057705	0.058090
As, Tot	Closure	Aug	6	-	-	-	0.026675	0.027113	0.028520	0.059255	0.059288	0.059540
As, Tot	Closure	Sep	6	-	-	-	0.027175	0.027453	0.028660	0.060000	0.060057	0.060240

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
As, Tot	Closure	Oct	6	-	-	-	0.027305	0.027578	0.028790	0.059695	0.059742	0.059950
As, Tot	Closure	Nov	6	-	-	-	0.027045	0.027428	0.028790	0.059220	0.059247	0.059490
As, Tot	Closure	Dec	6	-	-	-	0.026755	0.027125	0.028680	0.058940	0.058953	0.059210
As, Tot	Post-Closure	Jan	109	-	-	-	0.016990	0.018075	0.028580	0.017900	0.021359	0.059000
As, Tot	Post-Closure	Feb	109	-	-	-	0.016980	0.018063	0.028490	0.017830	0.021274	0.058760
As, Tot	Post-Closure	Mar	109	-	-	-	0.016980	0.018055	0.028460	0.017610	0.021007	0.058020
As, Tot	Post-Closure	Apr	109	-	-	-	0.016980	0.018048	0.028390	0.017380	0.020733	0.057230
As, Tot	Post-Closure	May	109	-	-	-	0.016970	0.018039	0.028290	0.017310	0.020625	0.056750
As, Tot	Post-Closure	Jun	109	-	-	-	0.016970	0.018029	0.028160	0.017430	0.020715	0.056500
As, Tot	Post-Closure	Jul	109	-	-	-	0.016970	0.018019	0.028020	0.017720	0.020964	0.056340
As, Tot	Post-Closure	Aug	109	-	-	-	0.016970	0.018010	0.027880	0.018050	0.021254	0.056210
As, Tot	Post-Closure	Sep	109	-	-	-	0.016960	0.018001	0.027770	0.018190	0.021363	0.055910
As, Tot	Post-Closure	Oct	109	-	-	-	0.016960	0.017994	0.027680	0.018120	0.021248	0.055370
As, Tot	Post-Closure	Nov	109	-	-	-	0.016960	0.017986	0.027580	0.018020	0.021124	0.054980
As, Tot	Post-Closure	Dec	109	-	-	-	0.016950	0.017975	0.027470	0.017950	0.021049	0.054790
Ba, Tot	Construction	Jan	2	0.0468	0.0468	0.0528	-	-	-	-	-	-
Ba, Tot	Construction	Feb	2	0.0435	0.0435	0.0465	-	-	-	-	-	-
Ba, Tot	Construction	Mar	2	0.0394	0.0394	0.0403	-	-	-	0.0030	0.0030	0.0037
Ba, Tot	Construction	Apr	2	0.0353	0.0353	0.0354	-	-	-	-	-	-
Ba, Tot	Construction	May	2	0.0316	0.0316	0.0328	-	-	-	0.0011	0.0011	0.0011
Ba, Tot	Construction	Jun	2	0.0299	0.0299	0.0302	-	-	-	0.0010	0.0010	0.0010
Ba, Tot	Construction	Jul	2	0.0322	0.0322	0.0330	-	-	-	0.0465	0.0465	0.0468
Ba, Tot	Construction	Aug	2	0.0316	0.0316	0.0318	-	-	-	0.0213	0.0213	0.0404
Ba, Tot	Construction	Sep	2	0.0340	0.0340	0.0371	-	-	-	0.0792	0.0792	0.0792
Ba, Tot	Construction	Oct	2	0.0325	0.0325	0.0330	-	-	-	0.0734	0.0734	0.0734
Ba, Tot	Construction	Nov	2	0.0352	0.0352	0.0356	-	-	-	0.0708	0.0708	0.0708
Ba, Tot	Construction	Dec	2	0.0388	0.0388	0.0392	-	-	-	0.0720	0.0720	0.0720
Ba, Tot	Operations	Jan	13	0.0486	0.0510	0.0637	-	-	-	0.0816	0.0810	0.0844
Ba, Tot	Operations	Feb	13	0.0390	0.0376	0.0535	-	-	-	0.0808	0.0807	0.0840
Ba, Tot	Operations	Mar	13	0.0284	0.0288	0.0391	-	-	-	0.0762	0.0752	0.0823
Ba, Tot	Operations	Apr	13	0.0362	0.0369	0.0437	-	-	-	0.0714	0.0701	0.0793
Ba, Tot	Operations	May	13	0.0372	0.0401	0.0501	-	-	-	0.0683	0.0680	0.0766
Ba, Tot	Operations	Jun	13	0.0310	0.0319	0.0394	-	-	-	0.0739	0.0730	0.0772
Ba, Tot	Operations	Jul	13	0.0325	0.0329	0.0411	-	-	-	0.0802	0.0814	0.0905
Ba, Tot	Operations	Aug	13	0.0315	0.0324	0.0399	-	-	-	0.0844	0.0870	0.0965
Ba, Tot	Operations	Sep	13	0.0349	0.0344	0.0432	-	-	-	0.0863	0.0870	0.0906
Ba, Tot	Operations	Oct	13	0.0389	0.0416	0.0563	-	-	-	0.0841	0.0835	0.0861
Ba, Tot	Operations	Nov	13	0.0463	0.0445	0.0544	-	-	-	0.0827	0.0820	0.0853
Ba, Tot	Operations	Dec	13	0.0516	0.0495	0.0597	-	-	-	0.0823	0.0821	0.0848
Ba, Tot	Closure	Jan	6	-	-	-	0.0536	0.0492	0.0554	0.0811	0.0813	0.0836
Ba, Tot	Closure	Feb	6	-	-	-	0.0533	0.0493	0.0552	0.0807	0.0809	0.0831
Ba, Tot	Closure	Mar	6	-	-	-	0.0533	0.0511	0.0554	0.0794	0.0795	0.0814
Ba, Tot	Closure	Apr	6	-	-	-	0.0533	0.0522	0.0555	0.0781	0.0781	0.0797
Ba, Tot	Closure	May	6	-	-	-	0.0533	0.0526	0.0556	0.0775	0.0776	0.0791
Ba, Tot	Closure	Jun	6	-	-	-	0.0535	0.0531	0.0557	0.0782	0.0782	0.0798
Ba, Tot	Closure	Jul	6	-	-	-	0.0540	0.0541	0.0559	0.0797	0.0799	0.0817
Ba, Tot	Closure	Aug	6	-	-	-	0.0545	0.0549	0.0562	0.0814	0.0816	0.0838
Ba, Tot	Closure	Sep	6	-	-	-	0.0552	0.0553	0.0564	0.0822	0.0825	0.0847
Ba, Tot	Closure	Oct	6	-	-	-	0.0553	0.0554	0.0565	0.0817	0.0820	0.0841
Ba, Tot	Closure	Nov	6	-	-	-	0.0548	0.0552	0.0564	0.0811	0.0813	0.0833
Ba, Tot	Closure	Dec	6	-	-	-	0.0545	0.0547	0.0563	0.0807	0.0809	0.0829
Ba, Tot	Post-Closure	Jan	109	-	-	-	0.0628	0.0618	0.0650	0.0292	0.0334	0.0791
Ba, Tot	Post-Closure	Feb	109	-	-	-	0.0628	0.0618	0.0650	0.0291	0.0333	0.0788
Ba, Tot	Post-Closure	Mar	109	-	-	-	0.0628	0.0618	0.0649	0.0288	0.0330	0.0780
Ba, Tot	Post-Closure	Apr	109	-	-	-	0.0628	0.0618	0.0649	0.0286	0.0326	0.0770
Ba, Tot	Post-Closure	May	109	-	-	-	0.0628	0.0618	0.0650	0.0285	0.0325	0.0764
Ba, Tot	Post-Closure	Jun	109	-	-	-	0.0629	0.0618	0.0650	0.0287	0.0326	0.0762
Ba, Tot	Post-Closure	Jul	109	-	-	-	0.0629	0.0619	0.0650	0.0290	0.0330	0.0760
Ba, Tot	Post-Closure	Aug	109	-	-	-	0.0629	0.0619	0.0650	0.0294	0.0333	0.0758
Ba, Tot	Post-Closure	Sep	109	-	-	-	0.0629	0.0619	0.0650	0.0296	0.0334	0.0754
Ba, Tot	Post-Closure	Oct	109	-	-	-	0.0629	0.0619	0.0650	0.0295	0.0333	0.0747
Ba, Tot	Post-Closure	Nov	109	-	-	-	0.0629	0.0619	0.0650	0.0293	0.0331	0.0743
Ba, Tot	Post-Closure	Dec	109	-	-	-	0.0629	0.0619	0.0650	0.0292	0.0330	0.0740
B, Tot	Construction	Jan	2	0.0094	0.0094	0.0108	-	-	-	-	-	-
B, Tot	Construction	Feb	2	0.0096	0.0096	0.0104	-	-	-	-	-	-
B, Tot	Construction	Mar	2	0.0098	0.0098	0.0100	-	-	-	0.0007	0.0007	0.0009
B, Tot	Construction	Apr	2	0.0096	0.0096	0.0098	-	-	-	-	-	-
B, Tot	Construction	May	2	0.0083	0.0083	0.0085	-	-	-	0.0002	0.0002	0.0002
B, Tot	Construction	Jun	2	0.0072	0.0072	0.0073	-	-	-	0.0002	0.0002	0.0002
B, Tot	Construction	Jul	2	0.0068	0.0068	0.0072	-	-	-	0.0098	0.0098	0.0135
B, Tot	Construction	Aug	2	0.0069	0.0069	0.0076	-	-	-	0.0032	0.0032	0.0053
B, Tot	Construction	Sep	2	0.0087	0.0087	0.0112	-	-	-	0.0380	0.0380	0.0380
B, Tot	Construction	Oct	2	0.0070	0.0070	0.0081	-	-	-	0.0357	0.0357	0.0357
B, Tot	Construction	Nov	2	0.0074	0.0074	0.0084	-	-	-	0.0349	0.0349	0.0349
B, Tot	Construction	Dec	2	0.0084	0.0084	0.0095	-	-	-	0.0358	0.0358	0.0358
B, Tot	Operations	Jan	13	0.0238	0.0247	0.0379	-	-	-	0.0428	0.0431	0.0467
B, Tot	Operations	Feb	13	0.0167	0.0178	0.0278	-	-	-	0.0424	0.0429	0.0464
B, Tot	Operations	Mar	13	0.0125	0.0133	0.0198	-	-	-	0.0404	0.0398	0.0456
B, Tot	Operations	Apr	13	0.0163	0.0173	0.0244	-	-	-	0.0370	0.0371	0.0440
B, Tot	Operations	May	13	0.0181	0.0191	0.0288	-	-	-	0.0354	0.0360	0.0425
B, Tot	Operations	Jun	13	0.0153	0.0156	0.0224	-	-	-	0.0382	0.0387	0.0429
B, Tot	Operations	Jul	13	0.0164	0.0164	0.0237	-	-	-	0.0435	0.0433	0.0466
B, Tot	Operations	Aug	13	0.0160	0.0162	0.0230	-	-	-	0.0463	0.0465	0.0499
B, Tot	Operations	Sep	13	0.0168	0.0177	0.0256	-	-	-	0.0468	0.0467	0.0483
B, Tot	Operations	Oct	13	0.0206	0.0220	0.0348	-	-	-	0.0458	0.0450	0.0483
B, Tot	Operations	Nov	13	0.0249	0.0230	0.0329	-	-	-	0.0447	0.0442	0.0480
B, Tot	Operations	Dec	13	0.0274	0.0253	0.0357	-	-	-	0.0442	0.0442	0.0478

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt			Phase	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
B, Tot	Closure	Jan	6	-	-	-	0.0349	0.0315	0.0357	0.0448	0.0450	0.0476
B, Tot	Closure	Feb	6	-	-	-	0.0346	0.0315	0.0356	0.0445	0.0447	0.0473
B, Tot	Closure	Mar	6	-	-	-	0.0346	0.0328	0.0356	0.0437	0.0439	0.0463
B, Tot	Closure	Apr	6	-	-	-	0.0346	0.0336	0.0357	0.0430	0.0431	0.0453
B, Tot	Closure	May	6	-	-	-	0.0346	0.0338	0.0357	0.0426	0.0428	0.0448
B, Tot	Closure	Jun	6	-	-	-	0.0347	0.0342	0.0357	0.0429	0.0431	0.0452
B, Tot	Closure	Jul	6	-	-	-	0.0351	0.0350	0.0359	0.0437	0.0439	0.0462
B, Tot	Closure	Aug	6	-	-	-	0.0355	0.0356	0.0361	0.0446	0.0448	0.0472
B, Tot	Closure	Sep	6	-	-	-	0.0359	0.0359	0.0363	0.0450	0.0452	0.0477
B, Tot	Closure	Oct	6	-	-	-	0.0360	0.0360	0.0363	0.0447	0.0449	0.0473
B, Tot	Closure	Nov	6	-	-	-	0.0357	0.0358	0.0363	0.0443	0.0445	0.0468
B, Tot	Closure	Dec	6	-	-	-	0.0354	0.0355	0.0362	0.0441	0.0443	0.0465
B, Tot	Post-Closure	Jan	109	-	-	-	0.0225	0.0237	0.0360	0.0119	0.0145	0.0424
B, Tot	Post-Closure	Feb	109	-	-	-	0.0225	0.0237	0.0360	0.0119	0.0144	0.0422
B, Tot	Post-Closure	Mar	109	-	-	-	0.0225	0.0237	0.0359	0.0117	0.0142	0.0417
B, Tot	Post-Closure	Apr	109	-	-	-	0.0225	0.0237	0.0357	0.0116	0.0141	0.0412
B, Tot	Post-Closure	May	109	-	-	-	0.0225	0.0237	0.0356	0.0116	0.0140	0.0408
B, Tot	Post-Closure	Jun	109	-	-	-	0.0225	0.0237	0.0354	0.0116	0.0141	0.0406
B, Tot	Post-Closure	Jul	109	-	-	-	0.0225	0.0236	0.0352	0.0118	0.0142	0.0405
B, Tot	Post-Closure	Aug	109	-	-	-	0.0225	0.0236	0.0351	0.0120	0.0144	0.0403
B, Tot	Post-Closure	Sep	109	-	-	-	0.0225	0.0236	0.0349	0.0121	0.0144	0.0401
B, Tot	Post-Closure	Oct	109	-	-	-	0.0225	0.0236	0.0347	0.0120	0.0144	0.0397
B, Tot	Post-Closure	Nov	109	-	-	-	0.0225	0.0236	0.0346	0.0120	0.0143	0.0394
B, Tot	Post-Closure	Dec	109	-	-	-	0.0225	0.0236	0.0345	0.0119	0.0142	0.0393
Cd, Diss	Construction	Jan	2	0.0000045	0.0000045	0.0000049	-	-	-	-	-	-
Cd, Diss	Construction	Feb	2	0.0000051	0.0000051	0.0000052	-	-	-	-	-	-
Cd, Diss	Construction	Mar	2	0.0000059	0.0000059	0.0000062	-	-	-	0.0000003	0.0000003	0.0000004
Cd, Diss	Construction	Apr	2	0.0000061	0.0000061	0.0000063	-	-	-	-	-	-
Cd, Diss	Construction	May	2	0.0000064	0.0000064	0.0000065	-	-	-	0.0000001	0.0000001	0.0000001
Cd, Diss	Construction	Jun	2	0.0000062	0.0000062	0.0000064	-	-	-	0.0000001	0.0000001	0.0000001
Cd, Diss	Construction	Jul	2	0.0000059	0.0000059	0.0000061	-	-	-	0.0000054	0.0000054	0.0000066
Cd, Diss	Construction	Aug	2	0.0000060	0.0000060	0.0000065	-	-	-	0.0000031	0.0000031	0.0000037
Cd, Diss	Construction	Sep	2	0.0000093	0.0000093	0.0000131	-	-	-	0.0000686	0.0000686	0.0000686
Cd, Diss	Construction	Oct	2	0.0000061	0.0000061	0.0000072	-	-	-	0.0000623	0.0000623	0.0000623
Cd, Diss	Construction	Nov	2	0.0000056	0.0000056	0.0000064	-	-	-	0.0000581	0.0000581	0.0000581
Cd, Diss	Construction	Dec	2	0.0000055	0.0000055	0.0000063	-	-	-	0.0000576	0.0000576	0.0000576
Cd, Diss	Operations	Jan	13	0.0000184	0.0000217	0.0000426	-	-	-	0.0000676	0.0000658	0.0000697
Cd, Diss	Operations	Feb	13	0.0000145	0.0000175	0.0000388	-	-	-	0.0000656	0.0000646	0.0000688
Cd, Diss	Operations	Mar	13	0.0000108	0.0000119	0.0000245	-	-	-	0.0000604	0.0000582	0.0000665
Cd, Diss	Operations	Apr	13	0.0000132	0.0000130	0.0000199	-	-	-	0.0000536	0.0000534	0.0000631
Cd, Diss	Operations	May	13	0.0000151	0.0000151	0.0000251	-	-	-	0.0000531	0.0000527	0.0000606
Cd, Diss	Operations	Jun	13	0.0000127	0.0000121	0.0000173	-	-	-	0.0000597	0.0000600	0.0000697
Cd, Diss	Operations	Jul	13	0.0000128	0.0000117	0.0000155	-	-	-	0.0000664	0.0000713	0.0000917
Cd, Diss	Operations	Aug	13	0.0000125	0.0000115	0.0000151	-	-	-	0.0000758	0.0000793	0.0001013
Cd, Diss	Operations	Sep	13	0.0000133	0.0000124	0.0000171	-	-	-	0.0000766	0.0000786	0.0000906
Cd, Diss	Operations	Oct	13	0.0000167	0.0000150	0.0000239	-	-	-	0.0000736	0.0000730	0.0000772
Cd, Diss	Operations	Nov	13	0.0000166	0.0000165	0.0000257	-	-	-	0.0000716	0.0000696	0.0000727
Cd, Diss	Operations	Dec	13	0.0000180	0.0000194	0.0000335	-	-	-	0.0000702	0.0000681	0.0000713
Cd, Diss	Closure	Jan	6	-	-	-	0.0000170	0.0000165	0.0000201	0.0000881	0.0000868	0.0000994
Cd, Diss	Closure	Feb	6	-	-	-	0.0000169	0.0000165	0.0000201	0.0000876	0.0000863	0.0000989
Cd, Diss	Closure	Mar	6	-	-	-	0.0000169	0.0000171	0.0000205	0.0000861	0.0000847	0.0000973
Cd, Diss	Closure	Apr	6	-	-	-	0.0000169	0.0000174	0.0000210	0.0000846	0.0000832	0.0000956
Cd, Diss	Closure	May	6	-	-	-	0.0000169	0.0000176	0.0000212	0.0000843	0.0000829	0.0000952
Cd, Diss	Closure	Jun	6	-	-	-	0.0000169	0.0000178	0.0000213	0.0000858	0.0000846	0.0000967
Cd, Diss	Closure	Jul	6	-	-	-	0.0000170	0.0000180	0.0000213	0.0000891	0.0000880	0.0000997
Cd, Diss	Closure	Aug	6	-	-	-	0.0000172	0.0000182	0.0000213	0.0000927	0.0000918	0.0001032
Cd, Diss	Closure	Sep	6	-	-	-	0.0000174	0.0000184	0.0000214	0.0000947	0.0000938	0.0001050
Cd, Diss	Closure	Oct	6	-	-	-	0.0000175	0.0000185	0.0000216	0.0000946	0.0000937	0.0001047
Cd, Diss	Closure	Nov	6	-	-	-	0.0000175	0.0000186	0.0000218	0.0000939	0.0000930	0.0001040
Cd, Diss	Closure	Dec	6	-	-	-	0.0000175	0.0000185	0.0000218	0.0000934	0.0000926	0.0001035
Cd, Diss	Post-Closure	Jan	109	-	-	-	0.0002069	0.0001874	0.0002354	0.0000414	0.0000466	0.0001031
Cd, Diss	Post-Closure	Feb	109	-	-	-	0.0002069	0.0001874	0.0002353	0.0000412	0.0000464	0.0001027
Cd, Diss	Post-Closure	Mar	109	-	-	-	0.0002069	0.0001874	0.0002352	0.0000407	0.0000458	0.0001014
Cd, Diss	Post-Closure	Apr	109	-	-	-	0.0002069	0.0001875	0.0002351	0.0000402	0.0000452	0.0001001
Cd, Diss	Post-Closure	May	109	-	-	-	0.0002070	0.0001877	0.0002351	0.0000400	0.0000450	0.0000993
Cd, Diss	Post-Closure	Jun	109	-	-	-	0.0002071	0.0001879	0.0002352	0.0000403	0.0000453	0.0000990
Cd, Diss	Post-Closure	Jul	109	-	-	-	0.0002074	0.0001883	0.0002353	0.0000410	0.0000459	0.0000990
Cd, Diss	Post-Closure	Aug	109	-	-	-	0.0002076	0.0001887	0.0002355	0.0000417	0.0000466	0.0000991
Cd, Diss	Post-Closure	Sep	109	-	-	-	0.0002078	0.0001891	0.0002356	0.0000421	0.0000468	0.0000987
Cd, Diss	Post-Closure	Oct	109	-	-	-	0.0002079	0.0001893	0.0002356	0.0000419	0.0000466	0.0000979
Cd, Diss	Post-Closure	Nov	109	-	-	-	0.0002079	0.0001893	0.0002355	0.0000417	0.0000463	0.0000972
Cd, Diss	Post-Closure	Dec	109	-	-	-	0.0002079	0.0001893	0.0002355	0.0000415	0.0000462	0.0000969
Cd, Tot	Construction	Jan	2	0.0001732	0.0001732	0.0001848	-	-	-	-	-	-
Cd, Tot	Construction	Feb	2	0.0001449	0.0001449	0.0001517	-	-	-	-	-	-
Cd, Tot	Construction	Mar	2	0.0001019	0.0001019	0.0001108	-	-	-	0.0000003	0.0000003	0.0000004
Cd, Tot	Construction	Apr	2	0.0000848	0.0000848	0.0000961	-	-	-	-	-	-
Cd, Tot	Construction	May	2	0.0000753	0.0000753	0.0000842	-	-	-	0.0000001	0.0000001	0.0000001
Cd, Tot	Construction	Jun	2	0.0000892	0.0000892	0.0000996	-	-	-	0.0000001	0.0000001	0.0000001
Cd, Tot	Construction	Jul	2	0.0001044	0.0001044	0.0001197	-	-	-	0.0000054	0.0000054	0.0000066
Cd, Tot	Construction	Aug	2	0.0001051	0.0001051	0.0001211	-	-	-	0.0000029	0.0000029	0.0000037
Cd, Tot	Construction	Sep	2	0.0001074	0.0001074	0.0001295	-	-	-	0.0000553	0.0000553	0.0000553
Cd, Tot	Construction	Oct	2	0.0001249	0.0001249	0.0001482	-	-	-	0.0000492	0.0000492	0.0000492
Cd, Tot	Construction	Nov	2	0.0001346	0.0001346	0.0001594	-	-	-	0.0000445	0.0000445	0.0000445
Cd, Tot	Construction	Dec	2	0.0001389	0.0001389	0.0001647	-	-	-	0.0000432	0.0000432	0.0000432
Cd, Tot	Operations	Jan	13	0.0000491	0.0000521	0.0001064	-	-	-	0.0000519	0.0000497	0.0000550
Cd, Tot	Operations	Feb	13	0.0000264	0.0000356	0.0000865	-	-	-	0.0000495	0.0000483	0.0000541
Cd, Tot	Operations	Mar	13	0.0000175	0.0000218	0.0000581	-	-	-	0.0000450	0.0000434	0.0000521

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cd, Tot	Operations	Apr	13	0.0000255	0.0000289	0.0000639	-	-	-	0.0000398	0.0000399	0.0000493
Cd, Tot	Operations	May	13	0.0000322	0.0000356	0.0000666	-	-	-	0.0000386	0.0000401	0.0000475
Cd, Tot	Operations	Jun	13	0.0000230	0.0000241	0.0000305	-	-	-	0.0000465	0.0000469	0.0000566
Cd, Tot	Operations	Jul	13	0.0000232	0.0000242	0.0000315	-	-	-	0.0000533	0.0000575	0.0000775
Cd, Tot	Operations	Aug	13	0.0000223	0.0000235	0.0000302	-	-	-	0.0000623	0.0000651	0.0000867
Cd, Tot	Operations	Sep	13	0.0000251	0.0000265	0.0000342	-	-	-	0.0000619	0.0000644	0.0000761
Cd, Tot	Operations	Oct	13	0.0000341	0.0000352	0.0000559	-	-	-	0.0000602	0.0000588	0.0000632
Cd, Tot	Operations	Nov	13	0.0000364	0.0000385	0.0000637	-	-	-	0.0000575	0.0000549	0.0000598
Cd, Tot	Operations	Dec	13	0.0000398	0.0000429	0.0000666	-	-	-	0.0000556	0.0000527	0.0000593
Cd, Tot	Closure	Jan	6	-	-	-	0.0000235	0.0000221	0.0000262	0.0000794	0.0000778	0.0000926
Cd, Tot	Closure	Feb	6	-	-	-	0.0000233	0.0000221	0.0000262	0.0000789	0.0000773	0.0000921
Cd, Tot	Closure	Mar	6	-	-	-	0.0000233	0.0000230	0.0000265	0.0000775	0.0000759	0.0000906
Cd, Tot	Closure	Apr	6	-	-	-	0.0000233	0.0000235	0.0000269	0.0000762	0.0000746	0.0000891
Cd, Tot	Closure	May	6	-	-	-	0.0000233	0.0000236	0.0000271	0.0000760	0.0000744	0.0000888
Cd, Tot	Closure	Jun	6	-	-	-	0.0000233	0.0000239	0.0000272	0.0000776	0.0000761	0.0000903
Cd, Tot	Closure	Jul	6	-	-	-	0.0000236	0.0000243	0.0000272	0.0000809	0.0000795	0.0000934
Cd, Tot	Closure	Aug	6	-	-	-	0.0000238	0.0000247	0.0000273	0.0000845	0.0000833	0.0000968
Cd, Tot	Closure	Sep	6	-	-	-	0.0000241	0.0000249	0.0000274	0.0000866	0.0000855	0.0000987
Cd, Tot	Closure	Oct	6	-	-	-	0.0000243	0.0000251	0.0000277	0.0000865	0.0000855	0.0000985
Cd, Tot	Closure	Nov	6	-	-	-	0.0000242	0.0000250	0.0000278	0.0000859	0.0000849	0.0000978
Cd, Tot	Closure	Dec	6	-	-	-	0.0000240	0.0000249	0.0000277	0.0000855	0.0000845	0.0000974
Cd, Tot	Post-Closure	Jan	109	-	-	-	0.0002225	0.0002016	0.0002524	0.0000414	0.0000461	0.0000970
Cd, Tot	Post-Closure	Feb	109	-	-	-	0.0002225	0.0002016	0.0002524	0.0000412	0.0000459	0.0000966
Cd, Tot	Post-Closure	Mar	109	-	-	-	0.0002225	0.0002016	0.0002523	0.0000407	0.0000453	0.0000954
Cd, Tot	Post-Closure	Apr	109	-	-	-	0.0002225	0.0002017	0.0002522	0.0000402	0.0000447	0.0000941
Cd, Tot	Post-Closure	May	109	-	-	-	0.0002225	0.0002019	0.0002522	0.0000400	0.0000445	0.0000934
Cd, Tot	Post-Closure	Jun	109	-	-	-	0.0002227	0.0002021	0.0002522	0.0000403	0.0000448	0.0000932
Cd, Tot	Post-Closure	Jul	109	-	-	-	0.0002229	0.0002025	0.0002524	0.0000410	0.0000454	0.0000932
Cd, Tot	Post-Closure	Aug	109	-	-	-	0.0002232	0.0002030	0.0002525	0.0000417	0.0000461	0.0000934
Cd, Tot	Post-Closure	Sep	109	-	-	-	0.0002234	0.0002033	0.0002527	0.0000421	0.0000464	0.0000931
Cd, Tot	Post-Closure	Oct	109	-	-	-	0.0002235	0.0002035	0.0002527	0.0000419	0.0000461	0.0000923
Cd, Tot	Post-Closure	Nov	109	-	-	-	0.0002235	0.0002036	0.0002526	0.0000417	0.0000459	0.0000917
Cd, Tot	Post-Closure	Dec	109	-	-	-	0.0002235	0.0002036	0.0002526	0.0000415	0.0000457	0.0000914
Cr, Diss	Construction	Jan	2	0.0000859	0.0000859	0.0000867	-	-	-	-	-	-
Cr, Diss	Construction	Feb	2	0.0001008	0.0001008	0.0001040	-	-	-	-	-	-
Cr, Diss	Construction	Mar	2	0.0001194	0.0001194	0.0001197	-	-	-	0.0000039	0.0000039	0.0000048
Cr, Diss	Construction	Apr	2	0.0001275	0.0001275	0.0001287	-	-	-	-	-	-
Cr, Diss	Construction	May	2	0.0001298	0.0001298	0.0001318	-	-	-	0.0000013	0.0000013	0.0000014
Cr, Diss	Construction	Jun	2	0.0001149	0.0001149	0.0001158	-	-	-	0.0000012	0.0000012	0.0000012
Cr, Diss	Construction	Jul	2	0.0001050	0.0001050	0.0001091	-	-	-	0.0000539	0.0000539	0.0000579
Cr, Diss	Construction	Aug	2	0.0001053	0.0001053	0.0001098	-	-	-	0.0000236	0.0000236	0.0000432
Cr, Diss	Construction	Sep	2	0.0001041	0.0001041	0.0001108	-	-	-	0.0001097	0.0001097	0.0001097
Cr, Diss	Construction	Oct	2	0.0000928	0.0000928	0.0000989	-	-	-	0.0000971	0.0000971	0.0000971
Cr, Diss	Construction	Nov	2	0.0000891	0.0000891	0.0000957	-	-	-	0.0000870	0.0000870	0.0000870
Cr, Diss	Construction	Dec	2	0.0000911	0.0000911	0.0000983	-	-	-	0.0000837	0.0000837	0.0000837
Cr, Diss	Operations	Jan	13	0.0001468	0.0001449	0.0001722	-	-	-	0.0001044	0.0001009	0.0001217
Cr, Diss	Operations	Feb	13	0.0001541	0.0001522	0.0001682	-	-	-	0.0000986	0.0000974	0.0001193
Cr, Diss	Operations	Mar	13	0.0001573	0.0001566	0.0001656	-	-	-	0.0000906	0.0000900	0.0001156
Cr, Diss	Operations	Apr	13	0.0001530	0.0001510	0.0001649	-	-	-	0.0000960	0.0000951	0.0001138
Cr, Diss	Operations	May	13	0.0001440	0.0001415	0.0001592	-	-	-	0.0001038	0.0001047	0.0001157
Cr, Diss	Operations	Jun	13	0.0001533	0.0001525	0.0001647	-	-	-	0.0001146	0.0001158	0.0001307
Cr, Diss	Operations	Jul	13	0.0001536	0.0001533	0.0001664	-	-	-	0.0001263	0.0001294	0.0001548
Cr, Diss	Operations	Aug	13	0.0001551	0.0001542	0.0001668	-	-	-	0.0001364	0.0001404	0.0001669
Cr, Diss	Operations	Sep	13	0.0001537	0.0001518	0.0001663	-	-	-	0.0001395	0.0001372	0.0001486
Cr, Diss	Operations	Oct	13	0.0001526	0.0001468	0.0001678	-	-	-	0.0001330	0.0001252	0.0001437
Cr, Diss	Operations	Nov	13	0.0001501	0.0001469	0.0001697	-	-	-	0.0001246	0.0001158	0.0001429
Cr, Diss	Operations	Dec	13	0.0001526	0.0001496	0.0001726	-	-	-	0.0001168	0.0001101	0.0001422
Cr, Diss	Closure	Jan	6	-	-	-	0.0001759	0.0001745	0.0001772	0.0001703	0.0001681	0.0001890
Cr, Diss	Closure	Feb	6	-	-	-	0.0001758	0.0001744	0.0001771	0.0001694	0.0001671	0.0001881
Cr, Diss	Closure	Mar	6	-	-	-	0.0001757	0.0001751	0.0001771	0.0001665	0.0001643	0.0001852
Cr, Diss	Closure	Apr	6	-	-	-	0.0001758	0.0001756	0.0001772	0.0001637	0.0001614	0.0001822
Cr, Diss	Closure	May	6	-	-	-	0.0001758	0.0001757	0.0001772	0.0001631	0.0001608	0.0001814
Cr, Diss	Closure	Jun	6	-	-	-	0.0001759	0.0001759	0.0001773	0.0001659	0.0001638	0.0001840
Cr, Diss	Closure	Jul	6	-	-	-	0.0001761	0.0001763	0.0001775	0.0001718	0.0001699	0.0001895
Cr, Diss	Closure	Aug	6	-	-	-	0.0001765	0.0001767	0.0001778	0.0001782	0.0001766	0.0001956
Cr, Diss	Closure	Sep	6	-	-	-	0.0001767	0.0001769	0.0001779	0.0001817	0.0001803	0.0001988
Cr, Diss	Closure	Oct	6	-	-	-	0.0001767	0.0001769	0.0001780	0.0001813	0.0001799	0.0001983
Cr, Diss	Closure	Nov	6	-	-	-	0.0001767	0.0001768	0.0001780	0.0001801	0.0001787	0.0001969
Cr, Diss	Closure	Dec	6	-	-	-	0.0001766	0.0001766	0.0001779	0.0001793	0.0001778	0.0001960
Cr, Diss	Post-Closure	Jan	109	-	-	-	0.0003325	0.0003169	0.0003583	0.0000830	0.0000924	0.0001953
Cr, Diss	Post-Closure	Feb	109	-	-	-	0.0003325	0.0003169	0.0003583	0.0000827	0.0000921	0.0001946
Cr, Diss	Post-Closure	Mar	109	-	-	-	0.0003324	0.0003169	0.0003581	0.0000818	0.0000911	0.0001922
Cr, Diss	Post-Closure	Apr	109	-	-	-	0.0003324	0.0003170	0.0003580	0.0000809	0.0000900	0.0001898
Cr, Diss	Post-Closure	May	109	-	-	-	0.0003324	0.0003171	0.0003580	0.0000806	0.0000896	0.0001884
Cr, Diss	Post-Closure	Jun	109	-	-	-	0.0003326	0.0003173	0.0003581	0.0000811	0.0000901	0.0001879
Cr, Diss	Post-Closure	Jul	109	-	-	-	0.0003328	0.0003177	0.0003582	0.0000823	0.0000912	0.0001879
Cr, Diss	Post-Closure	Aug	109	-	-	-	0.0003331	0.0003181	0.0003584	0.0000836	0.0000924	0.0001880
Cr, Diss	Post-Closure	Sep	109	-	-	-	0.0003332	0.0003183	0.0003585	0.0000842	0.0000929	0.0001873
Cr, Diss	Post-Closure	Oct	109	-	-	-	0.0003333	0.0003185	0.0003585	0.0000839	0.0000925	0.0001857
Cr, Diss	Post-Closure	Nov	109	-	-	-	0.0003333	0.0003185	0.0003584	0.0000835	0.0000920	0.0001845
Cr, Diss	Post-Closure	Dec	109	-	-	-	0.0003333	0.0003185	0.0003584	0.0000832	0.0000917	0.0001839
Cr (VI), Diss	Construction	Jan	2	0.0000859	0.0000859	0.0000867	-	-	-	-	-	-
Cr (VI), Diss	Construction	Feb	2	0.0001008	0.0001008	0.0001040	-	-	-	-	-	-
Cr (VI), Diss	Construction	Mar	2	0.0001194	0.0001194	0.0001197	-	-	-	0.0000039	0.0000039	0.0000048
Cr (VI), Diss	Construction	Apr	2	0.0001275	0.0001275	0.0001287	-	-	-	-	-	-
Cr (VI), Diss	Construction	May	2	0.0001286	0.0001286	0.0001305	-	-	-	0.0000013	0.0000013	0.0000014
Cr (VI), Diss	Construction	Jun	2	0.0001148	0.0001148	0.0001157	-	-	-	0.0000012	0.0000012	0.0000012

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cr (VI), Diss	Construction	Jul	2	0.0001059	0.0001059	0.0001091	-	-	-	0.0000539	0.0000539	0.0000579
Cr (VI), Diss	Construction	Aug	2	0.0001055	0.0001055	0.0001100	-	-	-	0.0000236	0.0000236	0.0000432
Cr (VI), Diss	Construction	Sep	2	0.0001051	0.0001051	0.0001126	-	-	-	0.0001097	0.0001097	0.0001097
Cr (VI), Diss	Construction	Oct	2	0.0000929	0.0000929	0.0000992	-	-	-	0.0000971	0.0000971	0.0000971
Cr (VI), Diss	Construction	Nov	2	0.0000892	0.0000892	0.0000959	-	-	-	0.0000870	0.0000870	0.0000870
Cr (VI), Diss	Construction	Dec	2	0.0000912	0.0000912	0.0000984	-	-	-	0.0000837	0.0000837	0.0000837
Cr (VI), Diss	Operations	Jan	13	0.0001468	0.0001449	0.0001722	-	-	-	0.0001044	0.0001009	0.0001217
Cr (VI), Diss	Operations	Feb	13	0.0001541	0.0001522	0.0001682	-	-	-	0.0000986	0.0000974	0.0001193
Cr (VI), Diss	Operations	Mar	13	0.0001573	0.0001566	0.0001656	-	-	-	0.0000906	0.0000900	0.0001156
Cr (VI), Diss	Operations	Apr	13	0.0001530	0.0001510	0.0001649	-	-	-	0.0000960	0.0000951	0.0001138
Cr (VI), Diss	Operations	May	13	0.0001440	0.0001415	0.0001592	-	-	-	0.0001038	0.0001047	0.0001157
Cr (VI), Diss	Operations	Jun	13	0.0001533	0.0001525	0.0001647	-	-	-	0.0001146	0.0001158	0.0001307
Cr (VI), Diss	Operations	Jul	13	0.0001536	0.0001533	0.0001664	-	-	-	0.0001263	0.0001294	0.0001548
Cr (VI), Diss	Operations	Aug	13	0.0001551	0.0001542	0.0001668	-	-	-	0.0001364	0.0001404	0.0001669
Cr (VI), Diss	Operations	Sep	13	0.0001537	0.0001518	0.0001663	-	-	-	0.0001395	0.0001372	0.0001486
Cr (VI), Diss	Operations	Oct	13	0.0001526	0.0001468	0.0001678	-	-	-	0.0001330	0.0001252	0.0001437
Cr (VI), Diss	Operations	Nov	13	0.0001501	0.0001469	0.0001697	-	-	-	0.0001246	0.0001158	0.0001429
Cr (VI), Diss	Operations	Dec	13	0.0001526	0.0001496	0.0001726	-	-	-	0.0001168	0.0001101	0.0001422
Cr (VI), Diss	Closure	Jan	6	-	-	-	0.0001759	0.0001745	0.0001772	0.0001703	0.0001681	0.0001890
Cr (VI), Diss	Closure	Feb	6	-	-	-	0.0001758	0.0001744	0.0001771	0.0001694	0.0001671	0.0001881
Cr (VI), Diss	Closure	Mar	6	-	-	-	0.0001757	0.0001751	0.0001771	0.0001665	0.0001643	0.0001852
Cr (VI), Diss	Closure	Apr	6	-	-	-	0.0001758	0.0001756	0.0001772	0.0001637	0.0001614	0.0001822
Cr (VI), Diss	Closure	May	6	-	-	-	0.0001758	0.0001757	0.0001772	0.0001631	0.0001608	0.0001814
Cr (VI), Diss	Closure	Jun	6	-	-	-	0.0001759	0.0001759	0.0001773	0.0001659	0.0001638	0.0001840
Cr (VI), Diss	Closure	Jul	6	-	-	-	0.0001761	0.0001763	0.0001775	0.0001718	0.0001699	0.0001895
Cr (VI), Diss	Closure	Aug	6	-	-	-	0.0001765	0.0001767	0.0001778	0.0001782	0.0001766	0.0001956
Cr (VI), Diss	Closure	Sep	6	-	-	-	0.0001767	0.0001769	0.0001779	0.0001817	0.0001803	0.0001988
Cr (VI), Diss	Closure	Oct	6	-	-	-	0.0001767	0.0001769	0.0001780	0.0001813	0.0001799	0.0001983
Cr (VI), Diss	Closure	Nov	6	-	-	-	0.0001767	0.0001768	0.0001780	0.0001801	0.0001787	0.0001969
Cr (VI), Diss	Closure	Dec	6	-	-	-	0.0001766	0.0001766	0.0001779	0.0001793	0.0001778	0.0001960
Cr (VI), Diss	Post-Closure	Jan	109	-	-	-	0.0003325	0.0003169	0.0003583	0.0000830	0.0000924	0.0001953
Cr (VI), Diss	Post-Closure	Feb	109	-	-	-	0.0003325	0.0003169	0.0003583	0.0000827	0.0000921	0.0001946
Cr (VI), Diss	Post-Closure	Mar	109	-	-	-	0.0003324	0.0003169	0.0003581	0.0000818	0.0000911	0.0001922
Cr (VI), Diss	Post-Closure	Apr	109	-	-	-	0.0003324	0.0003170	0.0003580	0.0000809	0.0000900	0.0001898
Cr (VI), Diss	Post-Closure	May	109	-	-	-	0.0003324	0.0003171	0.0003580	0.0000806	0.0000896	0.0001884
Cr (VI), Diss	Post-Closure	Jun	109	-	-	-	0.0003326	0.0003173	0.0003581	0.0000811	0.0000901	0.0001879
Cr (VI), Diss	Post-Closure	Jul	109	-	-	-	0.0003328	0.0003177	0.0003582	0.0000823	0.0000912	0.0001879
Cr (VI), Diss	Post-Closure	Aug	109	-	-	-	0.0003331	0.0003181	0.0003584	0.0000836	0.0000924	0.0001880
Cr (VI), Diss	Post-Closure	Sep	109	-	-	-	0.0003332	0.0003183	0.0003585	0.0000842	0.0000929	0.0001873
Cr (VI), Diss	Post-Closure	Oct	109	-	-	-	0.0003333	0.0003185	0.0003585	0.0000839	0.0000925	0.0001857
Cr (VI), Diss	Post-Closure	Nov	109	-	-	-	0.0003333	0.0003185	0.0003584	0.0000835	0.0000920	0.0001845
Cr (VI), Diss	Post-Closure	Dec	109	-	-	-	0.0003333	0.0003185	0.0003584	0.0000832	0.0000917	0.0001839
Cr, Tot	Construction	Jan	2	0.0031185	0.0031185	0.0033060	-	-	-	-	-	-
Cr, Tot	Construction	Feb	2	0.0026775	0.0026775	0.0027200	-	-	-	-	-	-
Cr, Tot	Construction	Mar	2	0.0019850	0.0019850	0.0019940	-	-	-	0.0000054	0.0000054	0.0000062
Cr, Tot	Construction	Apr	2	0.0016850	0.0016850	0.0017330	-	-	-	-	-	-
Cr, Tot	Construction	May	2	0.0015055	0.0015055	0.0015260	-	-	-	0.0000021	0.0000021	0.0000022
Cr, Tot	Construction	Jun	2	0.0017735	0.0017735	0.0017870	-	-	-	0.0000022	0.0000022	0.0000022
Cr, Tot	Construction	Jul	2	0.0020490	0.0020490	0.0021220	-	-	-	0.0000782	0.0000782	0.0000800
Cr, Tot	Construction	Aug	2	0.0020520	0.0020520	0.0021400	-	-	-	0.0000319	0.0000319	0.0000500
Cr, Tot	Construction	Sep	2	0.0020350	0.0020350	0.0022870	-	-	-	0.0005208	0.0005208	0.0005208
Cr, Tot	Construction	Oct	2	0.0024205	0.0024205	0.0026120	-	-	-	0.0004995	0.0004995	0.0004995
Cr, Tot	Construction	Nov	2	0.0026180	0.0026180	0.0028120	-	-	-	0.0005034	0.0005034	0.0005034
Cr, Tot	Construction	Dec	2	0.0027100	0.0027100	0.0029140	-	-	-	0.0005274	0.0005274	0.0005274
Cr, Tot	Operations	Jan	13	0.0018490	0.0019037	0.0024570	-	-	-	0.0005866	0.0005955	0.0006533
Cr, Tot	Operations	Feb	13	0.0010820	0.0012052	0.0021380	-	-	-	0.0005947	0.0005996	0.0006439
Cr, Tot	Operations	Mar	13	0.0006369	0.0007518	0.0016200	-	-	-	0.0005647	0.0005487	0.0005759
Cr, Tot	Operations	Apr	13	0.0011730	0.0011950	0.0018900	-	-	-	0.0005265	0.0005123	0.0005523
Cr, Tot	Operations	May	13	0.0015550	0.0015298	0.0019690	-	-	-	0.0004989	0.0004962	0.0005395
Cr, Tot	Operations	Jun	13	0.0010380	0.0010021	0.0011080	-	-	-	0.0005173	0.0005198	0.0005603
Cr, Tot	Operations	Jul	13	0.0010780	0.0010400	0.0010940	-	-	-	0.0005411	0.0005556	0.0006312
Cr, Tot	Operations	Aug	13	0.0010190	0.0009982	0.0012080	-	-	-	0.0005582	0.0005775	0.0006543
Cr, Tot	Operations	Sep	13	0.0011740	0.0011441	0.0015980	-	-	-	0.0005646	0.0005763	0.0006413
Cr, Tot	Operations	Oct	13	0.0016610	0.0015333	0.0017680	-	-	-	0.0005612	0.0005628	0.0006084
Cr, Tot	Operations	Nov	13	0.0015470	0.0016209	0.0019380	-	-	-	0.0005624	0.0005685	0.0006225
Cr, Tot	Operations	Dec	13	0.0017290	0.0017452	0.0019790	-	-	-	0.0005746	0.0005845	0.0006614
Cr, Tot	Closure	Jan	6	-	-	-	0.0013190	0.0011651	0.0013390	0.0004427	0.0004478	0.0005078
Cr, Tot	Closure	Feb	6	-	-	-	0.0013080	0.0011696	0.0013300	0.0004402	0.0004452	0.0005043
Cr, Tot	Closure	Mar	6	-	-	-	0.0013060	0.0012219	0.0013240	0.0004326	0.0004372	0.0004936
Cr, Tot	Closure	Apr	6	-	-	-	0.0013040	0.0012500	0.0013240	0.0004248	0.0004289	0.0004826
Cr, Tot	Closure	May	6	-	-	-	0.0013020	0.0012587	0.0013240	0.0004210	0.0004249	0.0004771
Cr, Tot	Closure	Jun	6	-	-	-	0.0013070	0.0012787	0.0013290	0.0004224	0.0004263	0.0004784
Cr, Tot	Closure	Jul	6	-	-	-	0.0013200	0.0013122	0.0013430	0.0004276	0.0004318	0.0004846
Cr, Tot	Closure	Aug	6	-	-	-	0.0013385	0.0013398	0.0013570	0.0004333	0.0004376	0.0004913
Cr, Tot	Closure	Sep	6	-	-	-	0.0013585	0.0013548	0.0013710	0.0004352	0.0004395	0.0004931
Cr, Tot	Closure	Oct	6	-	-	-	0.0013625	0.0013568	0.0013770	0.0004316	0.0004357	0.0004879
Cr, Tot	Closure	Nov	6	-	-	-	0.0013520	0.0013465	0.0013580	0.0004278	0.0004317	0.0004826
Cr, Tot	Closure	Dec	6	-	-	-	0.0013310	0.0013322	0.0013490	0.0004258	0.0004296	0.0004799
Cr, Tot	Post-Closure	Jan	109	-	-	-	0.0022630	0.0021246	0.0024350	0.0000885	0.0001136	0.0003874
Cr, Tot	Post-Closure	Feb	109	-	-	-	0.0022630	0.0021246	0.0024350	0.0000882	0.0001132	0.0003859
Cr, Tot	Post-Closure	Mar	109	-	-	-	0.0022630	0.0021243	0.0024340	0.0000873	0.0001120	0.0003812
Cr, Tot	Post-Closure	Apr	109	-	-	-	0.0022620	0.0021241	0.0024330	0.0000864	0.0001107	0.0003763
Cr, Tot	Post-Closure	May	109	-	-	-	0.0022620	0.0021245	0.0024320	0.0000861	0.0001102	0.0003730
Cr, Tot	Post-Closure	Jun	109	-	-	-	0.0022640	0.0021262	0.0024330	0.0000867	0.0001106	0.0003709
Cr, Tot	Post-Closure	Jul	109	-	-	-	0.0022660	0.0021292	0.0024340	0.0000880	0.0001116	0.0003690
Cr, Tot	Post-Closure	Aug	109	-	-	-	0.0022680	0.0021323	0.0024360	0.0000893	0.0001126	0.0003669
Cr, Tot	Post-Closure	Sep	109	-	-	-	0.0022700	0.0021345	0.0024370	0.0000898	0.0001129	0.0003642

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond Predicted Water Quality			Open Pit Predicted Water Quality			TMF Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cr, Tot	Post-Closure	Oct	109	-	-	-	0.0022700	0.0021351	0.0024360	0.0000894	0.0001122	0.0003605
Cr, Tot	Post-Closure	Nov	109	-	-	-	0.0022700	0.0021350	0.0024360	0.0000890	0.0001116	0.0003579
Cr, Tot	Post-Closure	Dec	109	-	-	-	0.0022700	0.0021349	0.0024360	0.0000887	0.0001112	0.0003566
Cu, Diss	Construction	Jan	2	0.00051	0.00051	0.00057	-	-	-	-	-	-
Cu, Diss	Construction	Feb	2	0.00070	0.00070	0.00071	-	-	-	-	-	-
Cu, Diss	Construction	Mar	2	0.00095	0.00095	0.00096	-	-	-	0.00002	0.00002	0.00003
Cu, Diss	Construction	Apr	2	0.00106	0.00106	0.00108	-	-	-	-	-	-
Cu, Diss	Construction	May	2	0.00111	0.00111	0.00112	-	-	-	0.00001	0.00001	0.00001
Cu, Diss	Construction	Jun	2	0.00101	0.00101	0.00102	-	-	-	0.00000	0.00000	0.00000
Cu, Diss	Construction	Jul	2	0.00089	0.00089	0.00094	-	-	-	0.00037	0.00037	0.00051
Cu, Diss	Construction	Aug	2	0.00097	0.00097	0.00110	-	-	-	0.00059	0.00059	0.00098
Cu, Diss	Construction	Sep	2	0.00237	0.00237	0.00395	-	-	-	0.03648	0.03648	0.03648
Cu, Diss	Construction	Oct	2	0.00100	0.00100	0.00136	-	-	-	0.03510	0.03510	0.03510
Cu, Diss	Construction	Nov	2	0.00080	0.00080	0.00102	-	-	-	0.03549	0.03549	0.03549
Cu, Diss	Construction	Dec	2	0.00076	0.00076	0.00096	-	-	-	0.03725	0.03725	0.03725
Cu, Diss	Operations	Jan	13	0.00160	0.00159	0.00212	-	-	-	0.04091	0.04172	0.04648
Cu, Diss	Operations	Feb	13	0.00159	0.00158	0.00188	-	-	-	0.04181	0.04206	0.04573
Cu, Diss	Operations	Mar	13	0.00159	0.00156	0.00173	-	-	-	0.03929	0.03823	0.04066
Cu, Diss	Operations	Apr	13	0.00157	0.00154	0.00183	-	-	-	0.03615	0.03487	0.03856
Cu, Diss	Operations	May	13	0.00155	0.00152	0.00190	-	-	-	0.03352	0.03310	0.03692
Cu, Diss	Operations	Jun	13	0.00161	0.00160	0.00185	-	-	-	0.03482	0.03484	0.03805
Cu, Diss	Operations	Jul	13	0.00163	0.00162	0.00189	-	-	-	0.03657	0.03779	0.04380
Cu, Diss	Operations	Aug	13	0.00163	0.00162	0.00188	-	-	-	0.03780	0.03963	0.04604
Cu, Diss	Operations	Sep	13	0.00163	0.00161	0.00191	-	-	-	0.03854	0.03970	0.04529
Cu, Diss	Operations	Oct	13	0.00165	0.00163	0.00208	-	-	-	0.03833	0.03887	0.04309
Cu, Diss	Operations	Nov	13	0.00171	0.00162	0.00206	-	-	-	0.03886	0.03941	0.04423
Cu, Diss	Operations	Dec	13	0.00175	0.00166	0.00211	-	-	-	0.04002	0.04067	0.04706
Cu, Diss	Closure	Jan	6	-	-	-	0.00219	0.00231	0.00316	0.02975	0.03007	0.03372
Cu, Diss	Closure	Feb	6	-	-	-	0.00219	0.00232	0.00317	0.02959	0.02989	0.03348
Cu, Diss	Closure	Mar	6	-	-	-	0.00219	0.00240	0.00330	0.02906	0.02933	0.03275
Cu, Diss	Closure	Apr	6	-	-	-	0.00219	0.00247	0.00343	0.02852	0.02876	0.03200
Cu, Diss	Closure	May	6	-	-	-	0.00219	0.00250	0.00350	0.02826	0.02850	0.03164
Cu, Diss	Closure	Jun	6	-	-	-	0.00219	0.00252	0.00351	0.02838	0.02861	0.03175
Cu, Diss	Closure	Jul	6	-	-	-	0.00220	0.00253	0.00349	0.02877	0.02901	0.03221
Cu, Diss	Closure	Aug	6	-	-	-	0.00221	0.00254	0.00348	0.02920	0.02947	0.03273
Cu, Diss	Closure	Sep	6	-	-	-	0.00222	0.00256	0.00350	0.02936	0.02963	0.03290
Cu, Diss	Closure	Oct	6	-	-	-	0.00225	0.00260	0.00356	0.02913	0.02939	0.03257
Cu, Diss	Closure	Nov	6	-	-	-	0.00230	0.00263	0.00361	0.02888	0.02912	0.03222
Cu, Diss	Closure	Dec	6	-	-	-	0.00231	0.00263	0.00361	0.02874	0.02897	0.03203
Cu, Diss	Post-Closure	Jan	109	-	-	-	0.00426	0.00438	0.00492	0.00556	0.00731	0.02639
Cu, Diss	Post-Closure	Feb	109	-	-	-	0.00426	0.00438	0.00492	0.00554	0.00729	0.02629
Cu, Diss	Post-Closure	Mar	109	-	-	-	0.00426	0.00439	0.00492	0.00547	0.00719	0.02596
Cu, Diss	Post-Closure	Apr	109	-	-	-	0.00426	0.00439	0.00493	0.00540	0.00710	0.02560
Cu, Diss	Post-Closure	May	109	-	-	-	0.00426	0.00439	0.00493	0.00538	0.00706	0.02537
Cu, Diss	Post-Closure	Jun	109	-	-	-	0.00425	0.00439	0.00493	0.00542	0.00708	0.02522
Cu, Diss	Post-Closure	Jul	109	-	-	-	0.00426	0.00439	0.00493	0.00550	0.00715	0.02509
Cu, Diss	Post-Closure	Aug	109	-	-	-	0.00426	0.00439	0.00493	0.00561	0.00723	0.02495
Cu, Diss	Post-Closure	Sep	109	-	-	-	0.00426	0.00439	0.00493	0.00565	0.00726	0.02477
Cu, Diss	Post-Closure	Oct	109	-	-	-	0.00426	0.00439	0.00494	0.00563	0.00721	0.02451
Cu, Diss	Post-Closure	Nov	109	-	-	-	0.00426	0.00439	0.00494	0.00560	0.00717	0.02434
Cu, Diss	Post-Closure	Dec	109	-	-	-	0.00426	0.00439	0.00493	0.00558	0.00715	0.02425
Cu, Tot	Construction	Jan	2	0.00278	0.00278	0.00283	-	-	-	-	-	-
Cu, Tot	Construction	Feb	2	0.00261	0.00261	0.00264	-	-	-	-	-	-
Cu, Tot	Construction	Mar	2	0.00233	0.00233	0.00233	-	-	-	0.00002	0.00002	0.00003
Cu, Tot	Construction	Apr	2	0.00219	0.00219	0.00222	-	-	-	-	-	-
Cu, Tot	Construction	May	2	0.00213	0.00213	0.00215	-	-	-	0.00001	0.00001	0.00001
Cu, Tot	Construction	Jun	2	0.00224	0.00224	0.00227	-	-	-	0.00001	0.00001	0.00001
Cu, Tot	Construction	Jul	2	0.00234	0.00234	0.00237	-	-	-	0.00041	0.00041	0.00055
Cu, Tot	Construction	Aug	2	0.00266	0.00266	0.00294	-	-	-	0.00214	0.00214	0.00403
Cu, Tot	Construction	Sep	2	0.00864	0.00864	0.01482	-	-	-	0.16320	0.16320	0.16320
Cu, Tot	Construction	Oct	2	0.00368	0.00368	0.00475	-	-	-	0.15930	0.15930	0.15930
Cu, Tot	Construction	Nov	2	0.00317	0.00317	0.00367	-	-	-	0.16410	0.16410	0.16410
Cu, Tot	Construction	Dec	2	0.00307	0.00307	0.00342	-	-	-	0.17420	0.17420	0.17420
Cu, Tot	Operations	Jan	13	0.00288	0.00280	0.00319	-	-	-	0.18960	0.19431	0.22290
Cu, Tot	Operations	Feb	13	0.00236	0.00230	0.00285	-	-	-	0.19490	0.19697	0.21940
Cu, Tot	Operations	Mar	13	0.00196	0.00196	0.00233	-	-	-	0.18220	0.17940	0.19440
Cu, Tot	Operations	Apr	13	0.00223	0.00222	0.00248	-	-	-	0.16710	0.16325	0.18420
Cu, Tot	Operations	May	13	0.00235	0.00244	0.00281	-	-	-	0.15570	0.15352	0.17470
Cu, Tot	Operations	Jun	13	0.00213	0.00216	0.00243	-	-	-	0.15970	0.15890	0.17710
Cu, Tot	Operations	Jul	13	0.00219	0.00221	0.00250	-	-	-	0.16510	0.16860	0.19810
Cu, Tot	Operations	Aug	13	0.00215	0.00218	0.00245	-	-	-	0.16810	0.17416	0.20730
Cu, Tot	Operations	Sep	13	0.00231	0.00228	0.00259	-	-	-	0.16990	0.17502	0.20700
Cu, Tot	Operations	Oct	13	0.00246	0.00257	0.00310	-	-	-	0.17020	0.17381	0.20090
Cu, Tot	Operations	Nov	13	0.00269	0.00262	0.00295	-	-	-	0.17430	0.17905	0.21140
Cu, Tot	Operations	Dec	13	0.00281	0.00272	0.00308	-	-	-	0.18180	0.18702	0.22580
Cu, Tot	Closure	Jan	6	-	-	-	0.00293	0.00347	0.00643	0.11310	0.11574	0.14650
Cu, Tot	Closure	Feb	6	-	-	-	0.00292	0.00350	0.00649	0.11250	0.11506	0.14540
Cu, Tot	Closure	Mar	6	-	-	-	0.00292	0.00375	0.00693	0.11050	0.11293	0.14230
Cu, Tot	Closure	Apr	6	-	-	-	0.00292	0.00398	0.00740	0.10840	0.11066	0.13890
Cu, Tot	Closure	May	6	-	-	-	0.00292	0.00410	0.00765	0.10710	0.10928	0.13690
Cu, Tot	Closure	Jun	6	-	-	-	0.00292	0.00415	0.00769	0.10675	0.10890	0.13630
Cu, Tot	Closure	Jul	6	-	-	-	0.00294	0.00416	0.00761	0.10695	0.10906	0.13640
Cu, Tot	Closure	Aug	6	-	-	-	0.00297	0.00418	0.00755	0.10715	0.10926	0.13650
Cu, Tot	Closure	Sep	6	-	-	-	0.00299	0.00422	0.00759	0.10680	0.10886	0.13580
Cu, Tot	Closure	Oct	6	-	-	-	0.00310	0.00435	0.00781	0.10555	0.10754	0.13390
Cu, Tot	Closure	Nov	6	-	-	-	0.00328	0.00447	0.00796	0.10455	0.10646	0.13240
Cu, Tot	Closure	Dec	6	-	-	-	0.00332	0.00448	0.00797	0.10404	0.10592	0.13160

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cu, Tot	Post-Closure	Jan	109	-	-	-	0.00706	0.00779	0.01158	0.00571	0.01235	0.08468
Cu, Tot	Post-Closure	Feb	109	-	-	-	0.00705	0.00779	0.01156	0.00569	0.01230	0.08434
Cu, Tot	Post-Closure	Mar	109	-	-	-	0.00705	0.00779	0.01158	0.00562	0.01214	0.08328
Cu, Tot	Post-Closure	Apr	109	-	-	-	0.00704	0.00779	0.01160	0.00554	0.01198	0.08213
Cu, Tot	Post-Closure	May	109	-	-	-	0.00704	0.00779	0.01161	0.00552	0.01189	0.08131
Cu, Tot	Post-Closure	Jun	109	-	-	-	0.00703	0.00779	0.01161	0.00556	0.01187	0.08064
Cu, Tot	Post-Closure	Jul	109	-	-	-	0.00702	0.00779	0.01161	0.00564	0.01188	0.07988
Cu, Tot	Post-Closure	Aug	109	-	-	-	0.00702	0.00778	0.01161	0.00574	0.01191	0.07909
Cu, Tot	Post-Closure	Sep	109	-	-	-	0.00701	0.00778	0.01161	0.00579	0.01188	0.07826
Cu, Tot	Post-Closure	Oct	109	-	-	-	0.00701	0.00778	0.01162	0.00576	0.01178	0.07736
Cu, Tot	Post-Closure	Nov	109	-	-	-	0.00700	0.00778	0.01162	0.00573	0.01170	0.07677
Cu, Tot	Post-Closure	Dec	109	-	-	-	0.00700	0.00777	0.01160	0.00571	0.01166	0.07650
Fe, Tot	Construction	Jan	2	0.197	0.197	0.200	-	-	-	-	-	-
Fe, Tot	Construction	Feb	2	0.200	0.200	0.200	-	-	-	-	-	-
Fe, Tot	Construction	Mar	2	0.200	0.200	0.200	-	-	-	0.009	0.009	0.009
Fe, Tot	Construction	Apr	2	0.200	0.200	0.200	-	-	-	-	-	-
Fe, Tot	Construction	May	2	0.200	0.200	0.200	-	-	-	0.003	0.003	0.004
Fe, Tot	Construction	Jun	2	0.200	0.200	0.200	-	-	-	0.004	0.004	0.004
Fe, Tot	Construction	Jul	2	0.200	0.200	0.200	-	-	-	0.153	0.153	0.174
Fe, Tot	Construction	Aug	2	0.200	0.200	0.200	-	-	-	0.068	0.068	0.114
Fe, Tot	Construction	Sep	2	0.200	0.200	0.200	-	-	-	0.187	0.187	0.187
Fe, Tot	Construction	Oct	2	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Construction	Nov	2	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Construction	Dec	2	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Jan	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Feb	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Mar	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Apr	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	May	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Jun	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Jul	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Aug	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Sep	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Oct	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Nov	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Dec	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Closure	Jan	6	-	-	-	0.140	0.137	0.143	0.200	0.200	0.200
Fe, Tot	Closure	Feb	6	-	-	-	0.139	0.137	0.143	0.200	0.200	0.200
Fe, Tot	Closure	Mar	6	-	-	-	0.139	0.138	0.144	0.200	0.200	0.200
Fe, Tot	Closure	Apr	6	-	-	-	0.139	0.139	0.144	0.200	0.200	0.200
Fe, Tot	Closure	May	6	-	-	-	0.139	0.139	0.144	0.200	0.200	0.200
Fe, Tot	Closure	Jun	6	-	-	-	0.140	0.140	0.144	0.200	0.200	0.200
Fe, Tot	Closure	Jul	6	-	-	-	0.140	0.141	0.145	0.200	0.200	0.200
Fe, Tot	Closure	Aug	6	-	-	-	0.141	0.142	0.145	0.200	0.200	0.200
Fe, Tot	Closure	Sep	6	-	-	-	0.141	0.142	0.145	0.200	0.200	0.200
Fe, Tot	Closure	Oct	6	-	-	-	0.141	0.142	0.145	0.200	0.200	0.200
Fe, Tot	Closure	Nov	6	-	-	-	0.141	0.142	0.145	0.200	0.200	0.200
Fe, Tot	Closure	Dec	6	-	-	-	0.141	0.142	0.145	0.200	0.200	0.200
Fe, Tot	Post-Closure	Jan	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Feb	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Mar	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Apr	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	May	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Jun	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Jul	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Aug	109	-	-	-	0.177	0.172	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Sep	109	-	-	-	0.177	0.173	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Oct	109	-	-	-	0.177	0.173	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Nov	109	-	-	-	0.177	0.173	0.188	0.200	0.200	0.200
Fe, Tot	Post-Closure	Dec	109	-	-	-	0.177	0.173	0.188	0.200	0.200	0.200
Pb, Diss	Construction	Jan	2	0.000044	0.000044	0.000047	-	-	-	-	-	-
Pb, Diss	Construction	Feb	2	0.000051	0.000051	0.000051	-	-	-	-	-	-
Pb, Diss	Construction	Mar	2	0.000059	0.000059	0.000060	-	-	-	0.000002	0.000002	0.000003
Pb, Diss	Construction	Apr	2	0.000063	0.000063	0.000064	-	-	-	-	-	-
Pb, Diss	Construction	May	2	0.000067	0.000067	0.000068	-	-	-	0.000001	0.000001	0.000001
Pb, Diss	Construction	Jun	2	0.000063	0.000063	0.000064	-	-	-	0.000001	0.000001	0.000001
Pb, Diss	Construction	Jul	2	0.000059	0.000059	0.000061	-	-	-	0.000043	0.000043	0.000047
Pb, Diss	Construction	Aug	2	0.000060	0.000060	0.000064	-	-	-	0.000023	0.000023	0.000033
Pb, Diss	Construction	Sep	2	0.000080	0.000080	0.000105	-	-	-	0.000436	0.000436	0.000436
Pb, Diss	Construction	Oct	2	0.000058	0.000058	0.000065	-	-	-	0.000404	0.000404	0.000404
Pb, Diss	Construction	Nov	2	0.000053	0.000053	0.000059	-	-	-	0.000387	0.000387	0.000387
Pb, Diss	Construction	Dec	2	0.000052	0.000052	0.000058	-	-	-	0.000392	0.000392	0.000392
Pb, Diss	Operations	Jan	13	0.000094	0.000101	0.000137	-	-	-	0.000450	0.000445	0.000454
Pb, Diss	Operations	Feb	13	0.000091	0.000094	0.000124	-	-	-	0.000444	0.000441	0.000451
Pb, Diss	Operations	Mar	13	0.000087	0.000087	0.000105	-	-	-	0.000413	0.000399	0.000437
Pb, Diss	Operations	Apr	13	0.000090	0.000088	0.000103	-	-	-	0.000379	0.000369	0.000416
Pb, Diss	Operations	May	13	0.000094	0.000091	0.000110	-	-	-	0.000364	0.000362	0.000400
Pb, Diss	Operations	Jun	13	0.000092	0.000090	0.000103	-	-	-	0.000403	0.000398	0.000443
Pb, Diss	Operations	Jul	13	0.000092	0.000091	0.000105	-	-	-	0.000432	0.000456	0.000552
Pb, Diss	Operations	Aug	13	0.000091	0.000090	0.000104	-	-	-	0.000475	0.000495	0.000599
Pb, Diss	Operations	Sep	13	0.000093	0.000092	0.000107	-	-	-	0.000483	0.000492	0.000548
Pb, Diss	Operations	Oct	13	0.000098	0.000097	0.000121	-	-	-	0.000467	0.000465	0.000483
Pb, Diss	Operations	Nov	13	0.000106	0.000098	0.000119	-	-	-	0.000458	0.000452	0.000465
Pb, Diss	Operations	Dec	13	0.000113	0.000102	0.000126	-	-	-	0.000454	0.000451	0.000459
Pb, Diss	Closure	Jan	6	-	-	-	0.000121	0.000119	0.000137	0.000493	0.000488	0.000527
Pb, Diss	Closure	Feb	6	-	-	-	0.000121	0.000119	0.000137	0.000490	0.000486	0.000524
Pb, Diss	Closure	Mar	6	-	-	-	0.000121	0.000122	0.000139	0.000481	0.000477	0.000516

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Pb, Diss	Closure	Apr	6	-	-	-	0.000121	0.000124	0.000141	0.000473	0.000468	0.000507
Pb, Diss	Closure	May	6	-	-	-	0.000121	0.000124	0.000142	0.000470	0.000466	0.000505
Pb, Diss	Closure	Jun	6	-	-	-	0.000121	0.000125	0.000143	0.000477	0.000473	0.000511
Pb, Diss	Closure	Jul	6	-	-	-	0.000121	0.000126	0.000143	0.000492	0.000489	0.000525
Pb, Diss	Closure	Aug	6	-	-	-	0.000122	0.000127	0.000143	0.000509	0.000506	0.000541
Pb, Diss	Closure	Sep	6	-	-	-	0.000123	0.000128	0.000143	0.000518	0.000515	0.000549
Pb, Diss	Closure	Oct	6	-	-	-	0.000124	0.000129	0.000144	0.000516	0.000514	0.000547
Pb, Diss	Closure	Nov	6	-	-	-	0.000124	0.000129	0.000145	0.000512	0.000510	0.000543
Pb, Diss	Closure	Dec	6	-	-	-	0.000124	0.000129	0.000145	0.000510	0.000507	0.000541
Pb, Diss	Post-Closure	Jan	109	-	-	-	0.000312	0.000296	0.000335	0.000197	0.000225	0.000539
Pb, Diss	Post-Closure	Feb	109	-	-	-	0.000312	0.000296	0.000335	0.000196	0.000225	0.000537
Pb, Diss	Post-Closure	Mar	109	-	-	-	0.000312	0.000296	0.000335	0.000194	0.000222	0.000530
Pb, Diss	Post-Closure	Apr	109	-	-	-	0.000312	0.000296	0.000335	0.000191	0.000219	0.000523
Pb, Diss	Post-Closure	May	109	-	-	-	0.000312	0.000296	0.000335	0.000190	0.000218	0.000519
Pb, Diss	Post-Closure	Jun	109	-	-	-	0.000312	0.000297	0.000335	0.000192	0.000219	0.000517
Pb, Diss	Post-Closure	Jul	109	-	-	-	0.000312	0.000297	0.000335	0.000195	0.000222	0.000516
Pb, Diss	Post-Closure	Aug	109	-	-	-	0.000312	0.000297	0.000336	0.000198	0.000225	0.000516
Pb, Diss	Post-Closure	Sep	109	-	-	-	0.000312	0.000298	0.000336	0.000200	0.000226	0.000514
Pb, Diss	Post-Closure	Oct	109	-	-	-	0.000313	0.000298	0.000336	0.000199	0.000225	0.000509
Pb, Diss	Post-Closure	Nov	109	-	-	-	0.000313	0.000298	0.000336	0.000198	0.000224	0.000506
Pb, Diss	Post-Closure	Dec	109	-	-	-	0.000312	0.000298	0.000336	0.000197	0.000223	0.000504
Pb, Tot	Construction	Jan	2	0.003600	0.003600	0.003848	-	-	-	-	-	-
Pb, Tot	Construction	Feb	2	0.002999	0.002999	0.003142	-	-	-	-	-	-
Pb, Tot	Construction	Mar	2	0.002089	0.002089	0.002274	-	-	-	0.000002	0.000002	0.000003
Pb, Tot	Construction	Apr	2	0.001726	0.001726	0.001962	-	-	-	-	-	-
Pb, Tot	Construction	May	2	0.001532	0.001532	0.001720	-	-	-	0.000001	0.000001	0.000001
Pb, Tot	Construction	Jun	2	0.001830	0.001830	0.002047	-	-	-	0.000001	0.000001	0.000001
Pb, Tot	Construction	Jul	2	0.002147	0.002147	0.002468	-	-	-	0.000058	0.000058	0.000061
Pb, Tot	Construction	Aug	2	0.002157	0.002157	0.002495	-	-	-	0.000034	0.000034	0.000040
Pb, Tot	Construction	Sep	2	0.002184	0.002184	0.002672	-	-	-	0.000984	0.000984	0.000984
Pb, Tot	Construction	Oct	2	0.002575	0.002575	0.003069	-	-	-	0.000940	0.000940	0.000940
Pb, Tot	Construction	Nov	2	0.002782	0.002782	0.003306	-	-	-	0.000942	0.000942	0.000942
Pb, Tot	Construction	Dec	2	0.002872	0.002872	0.003418	-	-	-	0.000983	0.000983	0.000983
Pb, Tot	Operations	Jan	13	0.000555	0.000776	0.002182	-	-	-	0.001089	0.001104	0.001210
Pb, Tot	Operations	Feb	13	0.000365	0.000497	0.001735	-	-	-	0.001105	0.001109	0.001190
Pb, Tot	Operations	Mar	13	0.000209	0.000308	0.001111	-	-	-	0.001044	0.001009	0.001061
Pb, Tot	Operations	Apr	13	0.000339	0.000446	0.001232	-	-	-	0.000958	0.000923	0.001008
Pb, Tot	Operations	May	13	0.000441	0.000558	0.001291	-	-	-	0.000892	0.000882	0.000971
Pb, Tot	Operations	Jun	13	0.000313	0.000366	0.000551	-	-	-	0.000932	0.000935	0.001010
Pb, Tot	Operations	Jul	13	0.000322	0.000376	0.000583	-	-	-	0.000985	0.001022	0.001176
Pb, Tot	Operations	Aug	13	0.000307	0.000362	0.000555	-	-	-	0.001027	0.001077	0.001236
Pb, Tot	Operations	Sep	13	0.000347	0.000411	0.000634	-	-	-	0.001051	0.001077	0.001206
Pb, Tot	Operations	Oct	13	0.000474	0.000553	0.001076	-	-	-	0.001039	0.001048	0.001137
Pb, Tot	Operations	Nov	13	0.000451	0.000593	0.001222	-	-	-	0.001045	0.001055	0.001154
Pb, Tot	Operations	Dec	13	0.000504	0.000631	0.001258	-	-	-	0.001071	0.001083	0.001225
Pb, Tot	Closure	Jan	6	-	-	-	0.000289	0.000268	0.000313	0.000853	0.000859	0.000927
Pb, Tot	Closure	Feb	6	-	-	-	0.000286	0.000269	0.000313	0.000849	0.000854	0.000920
Pb, Tot	Closure	Mar	6	-	-	-	0.000286	0.000279	0.000315	0.000834	0.000838	0.000900
Pb, Tot	Closure	Apr	6	-	-	-	0.000286	0.000284	0.000318	0.000818	0.000822	0.000880
Pb, Tot	Closure	May	6	-	-	-	0.000286	0.000286	0.000319	0.000812	0.000815	0.000871
Pb, Tot	Closure	Jun	6	-	-	-	0.000287	0.000290	0.000320	0.000817	0.000821	0.000877
Pb, Tot	Closure	Jul	6	-	-	-	0.000290	0.000296	0.000321	0.000831	0.000835	0.000893
Pb, Tot	Closure	Aug	6	-	-	-	0.000294	0.000301	0.000322	0.000846	0.000851	0.000912
Pb, Tot	Closure	Sep	6	-	-	-	0.000298	0.000303	0.000324	0.000853	0.000858	0.000920
Pb, Tot	Closure	Oct	6	-	-	-	0.000299	0.000305	0.000325	0.000847	0.000852	0.000912
Pb, Tot	Closure	Nov	6	-	-	-	0.000297	0.000304	0.000326	0.000840	0.000845	0.000902
Pb, Tot	Closure	Dec	6	-	-	-	0.000295	0.000301	0.000325	0.000836	0.000840	0.000897
Pb, Tot	Post-Closure	Jan	109	-	-	-	0.000701	0.000659	0.000755	0.000199	0.000249	0.000792
Pb, Tot	Post-Closure	Feb	109	-	-	-	0.000701	0.000659	0.000754	0.000199	0.000248	0.000789
Pb, Tot	Post-Closure	Mar	109	-	-	-	0.000701	0.000659	0.000754	0.000196	0.000245	0.000779
Pb, Tot	Post-Closure	Apr	109	-	-	-	0.000701	0.000659	0.000754	0.000194	0.000242	0.000768
Pb, Tot	Post-Closure	May	109	-	-	-	0.000701	0.000659	0.000754	0.000193	0.000241	0.000762
Pb, Tot	Post-Closure	Jun	109	-	-	-	0.000701	0.000660	0.000754	0.000194	0.000242	0.000758
Pb, Tot	Post-Closure	Jul	109	-	-	-	0.000702	0.000661	0.000754	0.000197	0.000244	0.000754
Pb, Tot	Post-Closure	Aug	109	-	-	-	0.000703	0.000662	0.000755	0.000201	0.000247	0.000751
Pb, Tot	Post-Closure	Sep	109	-	-	-	0.000703	0.000662	0.000755	0.000203	0.000248	0.000746
Pb, Tot	Post-Closure	Oct	109	-	-	-	0.000703	0.000663	0.000755	0.000202	0.000247	0.000739
Pb, Tot	Post-Closure	Nov	109	-	-	-	0.000703	0.000663	0.000755	0.000201	0.000245	0.000734
Pb, Tot	Post-Closure	Dec	109	-	-	-	0.000703	0.000663	0.000755	0.000200	0.000245	0.000731
Mn, Diss	Construction	Jan	2	0.459	0.459	0.635	-	-	-	-	-	-
Mn, Diss	Construction	Feb	2	0.430	0.430	0.533	-	-	-	-	-	-
Mn, Diss	Construction	Mar	2	0.387	0.387	0.409	-	-	-	0.028	0.028	0.030
Mn, Diss	Construction	Apr	2	0.351	0.351	0.359	-	-	-	-	-	-
Mn, Diss	Construction	May	2	0.264	0.264	0.274	-	-	-	0.012	0.012	0.014
Mn, Diss	Construction	Jun	2	0.221	0.221	0.222	-	-	-	0.011	0.011	0.011
Mn, Diss	Construction	Jul	2	0.160	0.160	0.180	-	-	-	0.283	0.283	0.301
Mn, Diss	Construction	Aug	2	0.113	0.113	0.116	-	-	-	0.085	0.085	0.163
Mn, Diss	Construction	Sep	2	0.091	0.091	0.100	-	-	-	0.138	0.138	0.138
Mn, Diss	Construction	Oct	2	0.063	0.063	0.065	-	-	-	0.105	0.105	0.105
Mn, Diss	Construction	Nov	2	0.119	0.119	0.124	-	-	-	0.082	0.082	0.082
Mn, Diss	Construction	Dec	2	0.219	0.219	0.228	-	-	-	0.073	0.073	0.073
Mn, Diss	Operations	Jan	13	0.256	0.266	0.329	-	-	-	0.096	0.087	0.114
Mn, Diss	Operations	Feb	13	0.188	0.206	0.314	-	-	-	0.085	0.082	0.110
Mn, Diss	Operations	Mar	13	0.139	0.163	0.319	-	-	-	0.091	0.089	0.107
Mn, Diss	Operations	Apr	13	0.201	0.226	0.386	-	-	-	0.089	0.088	0.104
Mn, Diss	Operations	May	13	0.179	0.198	0.314	-	-	-	0.094	0.095	0.113
Mn, Diss	Operations	Jun	13	0.131	0.135	0.155	-	-	-	0.113	0.118	0.167

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Mn, Diss	Operations	Jul	13	0.097	0.097	0.101	-	-	-	0.135	0.150	0.229
Mn, Diss	Operations	Aug	13	0.092	0.092	0.095	-	-	-	0.153	0.167	0.244
Mn, Diss	Operations	Sep	13	0.078	0.078	0.082	-	-	-	0.153	0.158	0.200
Mn, Diss	Operations	Oct	13	0.076	0.074	0.081	-	-	-	0.142	0.133	0.155
Mn, Diss	Operations	Nov	13	0.132	0.132	0.135	-	-	-	0.128	0.113	0.154
Mn, Diss	Operations	Dec	13	0.214	0.215	0.236	-	-	-	0.115	0.101	0.153
Mn, Diss	Closure	Jan	6	-	-	-	0.120	0.119	0.129	0.263	0.254	0.335
Mn, Diss	Closure	Feb	6	-	-	-	0.120	0.120	0.129	0.262	0.253	0.333
Mn, Diss	Closure	Mar	6	-	-	-	0.124	0.126	0.135	0.258	0.250	0.329
Mn, Diss	Closure	Apr	6	-	-	-	0.127	0.130	0.149	0.255	0.247	0.325
Mn, Diss	Closure	May	6	-	-	-	0.128	0.132	0.150	0.256	0.248	0.325
Mn, Diss	Closure	Jun	6	-	-	-	0.129	0.132	0.148	0.264	0.256	0.331
Mn, Diss	Closure	Jul	6	-	-	-	0.129	0.131	0.143	0.277	0.270	0.344
Mn, Diss	Closure	Aug	6	-	-	-	0.128	0.129	0.135	0.291	0.284	0.357
Mn, Diss	Closure	Sep	6	-	-	-	0.127	0.127	0.134	0.299	0.293	0.364
Mn, Diss	Closure	Oct	6	-	-	-	0.123	0.126	0.134	0.299	0.293	0.363
Mn, Diss	Closure	Nov	6	-	-	-	0.122	0.125	0.134	0.297	0.291	0.361
Mn, Diss	Closure	Dec	6	-	-	-	0.122	0.124	0.134	0.296	0.290	0.359
Mn, Diss	Post-Closure	Jan	109	-	-	-	0.315	0.296	0.336	0.222	0.233	0.358
Mn, Diss	Post-Closure	Feb	109	-	-	-	0.315	0.296	0.336	0.221	0.233	0.357
Mn, Diss	Post-Closure	Mar	109	-	-	-	0.315	0.296	0.337	0.220	0.231	0.354
Mn, Diss	Post-Closure	Apr	109	-	-	-	0.316	0.297	0.337	0.218	0.229	0.350
Mn, Diss	Post-Closure	May	109	-	-	-	0.317	0.298	0.338	0.218	0.229	0.349
Mn, Diss	Post-Closure	Jun	109	-	-	-	0.317	0.298	0.338	0.220	0.231	0.349
Mn, Diss	Post-Closure	Jul	109	-	-	-	0.317	0.298	0.338	0.223	0.233	0.351
Mn, Diss	Post-Closure	Aug	109	-	-	-	0.317	0.298	0.337	0.225	0.236	0.352
Mn, Diss	Post-Closure	Sep	109	-	-	-	0.316	0.298	0.337	0.226	0.236	0.351
Mn, Diss	Post-Closure	Oct	109	-	-	-	0.316	0.298	0.336	0.225	0.235	0.348
Mn, Diss	Post-Closure	Nov	109	-	-	-	0.316	0.297	0.336	0.223	0.233	0.346
Mn, Diss	Post-Closure	Dec	109	-	-	-	0.316	0.297	0.336	0.222	0.233	0.345
Hg, Diss	Construction	Jan	2	0.0000011	0.0000011	0.0000011	-	-	-	-	-	-
Hg, Diss	Construction	Feb	2	0.0000012	0.0000012	0.0000012	-	-	-	-	-	-
Hg, Diss	Construction	Mar	2	0.0000013	0.0000013	0.0000013	-	-	-	0.0000001	0.0000001	0.0000001
Hg, Diss	Construction	Apr	2	0.0000014	0.0000014	0.0000014	-	-	-	-	-	-
Hg, Diss	Construction	May	2	0.0000014	0.0000014	0.0000015	-	-	-	0.00000002	0.00000002	0.00000002
Hg, Diss	Construction	Jun	2	0.0000015	0.0000015	0.0000015	-	-	-	0.00000002	0.00000002	0.00000002
Hg, Diss	Construction	Jul	2	0.0000014	0.0000014	0.0000014	-	-	-	0.0000011	0.0000011	0.0000012
Hg, Diss	Construction	Aug	2	0.0000014	0.0000014	0.0000015	-	-	-	0.0000009	0.0000009	0.0000010
Hg, Diss	Construction	Sep	2	0.0000024	0.0000024	0.0000036	-	-	-	0.0000160	0.0000160	0.0000160
Hg, Diss	Construction	Oct	2	0.0000013	0.0000013	0.0000016	-	-	-	0.0000130	0.0000130	0.0000130
Hg, Diss	Construction	Nov	2	0.0000012	0.0000012	0.0000013	-	-	-	0.0000100	0.0000100	0.0000100
Hg, Diss	Construction	Dec	2	0.0000012	0.0000012	0.0000013	-	-	-	0.0000085	0.0000085	0.0000085
Hg, Diss	Operations	Jan	13	0.0000014	0.0000014	0.0000015	-	-	-	0.0000113	0.0000097	0.0000130
Hg, Diss	Operations	Feb	13	0.0000015	0.0000015	0.0000015	-	-	-	0.0000097	0.0000087	0.0000124
Hg, Diss	Operations	Mar	13	0.0000015	0.0000015	0.0000016	-	-	-	0.0000079	0.0000074	0.0000116
Hg, Diss	Operations	Apr	13	0.0000015	0.0000015	0.0000015	-	-	-	0.0000065	0.0000067	0.0000107
Hg, Diss	Operations	May	13	0.0000014	0.0000014	0.0000015	-	-	-	0.0000074	0.0000075	0.0000104
Hg, Diss	Operations	Jun	13	0.0000015	0.0000015	0.0000016	-	-	-	0.0000102	0.0000108	0.0000167
Hg, Diss	Operations	Jul	13	0.0000015	0.0000015	0.0000016	-	-	-	0.0000140	0.0000158	0.0000269
Hg, Diss	Operations	Aug	13	0.0000015	0.0000015	0.0000016	-	-	-	0.0000173	0.0000194	0.0000315
Hg, Diss	Operations	Sep	13	0.0000015	0.0000015	0.0000015	-	-	-	0.0000175	0.0000189	0.0000258
Hg, Diss	Operations	Oct	13	0.0000014	0.0000014	0.0000015	-	-	-	0.0000166	0.0000159	0.0000191
Hg, Diss	Operations	Nov	13	0.0000014	0.0000014	0.0000015	-	-	-	0.0000149	0.0000134	0.0000172
Hg, Diss	Operations	Dec	13	0.0000014	0.0000014	0.0000015	-	-	-	0.0000137	0.0000116	0.0000170
Hg, Diss	Closure	Jan	6	-	-	-	0.0000016	0.0000018	0.0000029	0.0000320	0.0000308	0.0000418
Hg, Diss	Closure	Feb	6	-	-	-	0.0000015	0.0000018	0.0000029	0.0000318	0.0000307	0.0000416
Hg, Diss	Closure	Mar	6	-	-	-	0.0000015	0.0000019	0.0000032	0.0000313	0.0000301	0.0000409
Hg, Diss	Closure	Apr	6	-	-	-	0.0000015	0.0000020	0.0000034	0.0000307	0.0000296	0.0000402
Hg, Diss	Closure	May	6	-	-	-	0.0000015	0.0000020	0.0000035	0.0000308	0.0000297	0.0000402
Hg, Diss	Closure	Jun	6	-	-	-	0.0000015	0.0000020	0.0000035	0.0000317	0.0000307	0.0000410
Hg, Diss	Closure	Jul	6	-	-	-	0.0000015	0.0000020	0.0000035	0.0000335	0.0000326	0.0000427
Hg, Diss	Closure	Aug	6	-	-	-	0.0000015	0.0000020	0.0000034	0.0000356	0.0000347	0.0000446
Hg, Diss	Closure	Sep	6	-	-	-	0.0000015	0.0000020	0.0000035	0.0000368	0.0000359	0.0000457
Hg, Diss	Closure	Oct	6	-	-	-	0.0000016	0.0000021	0.0000036	0.0000369	0.0000361	0.0000457
Hg, Diss	Closure	Nov	6	-	-	-	0.0000016	0.0000021	0.0000037	0.0000366	0.0000358	0.0000454
Hg, Diss	Closure	Dec	6	-	-	-	0.0000017	0.0000022	0.0000037	0.0000365	0.0000357	0.0000452
Hg, Diss	Post-Closure	Jan	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000224	0.0000243	0.0000450
Hg, Diss	Post-Closure	Feb	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000223	0.0000242	0.0000449
Hg, Diss	Post-Closure	Mar	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000221	0.0000239	0.0000443
Hg, Diss	Post-Closure	Apr	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000218	0.0000236	0.0000437
Hg, Diss	Post-Closure	May	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000217	0.0000235	0.0000434
Hg, Diss	Post-Closure	Jun	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000218	0.0000236	0.0000433
Hg, Diss	Post-Closure	Jul	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000222	0.0000240	0.0000434
Hg, Diss	Post-Closure	Aug	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000226	0.0000244	0.0000436
Hg, Diss	Post-Closure	Sep	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000228	0.0000245	0.0000435
Hg, Diss	Post-Closure	Oct	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000227	0.0000244	0.0000432
Hg, Diss	Post-Closure	Nov	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000226	0.0000243	0.0000429
Hg, Diss	Post-Closure	Dec	109	-	-	-	0.0000068	0.0000067	0.0000069	0.0000225	0.0000242	0.0000428
Hg, Tot	Construction	Jan	2	0.0000019	0.0000019	0.0000021	-	-	-	-	-	-
Hg, Tot	Construction	Feb	2	0.0000019	0.0000019	0.0000021	-	-	-	-	-	-
Hg, Tot	Construction	Mar	2	0.0000019	0.0000019	0.0000019	-	-	-	0.0000001	0.0000001	0.0000001
Hg, Tot	Construction	Apr	2	0.0000019	0.0000019	0.0000019	-	-	-	-	-	-
Hg, Tot	Construction	May	2	0.0000019	0.0000019	0.0000020	-	-	-	0.00000004	0.00000004	0.00000004
Hg, Tot	Construction	Jun	2	0.0000018	0.0000018	0.0000018	-	-	-	0.00000004	0.00000004	0.00000004
Hg, Tot	Construction	Jul	2	0.0000017	0.0000017	0.0000017	-	-	-	0.0000015	0.0000015	0.0000016
Hg, Tot	Construction	Aug	2	0.0000016	0.0000016	0.0000017	-	-	-	0.0000010	0.0000010	0.0000012
Hg, Tot	Construction	Sep	2	0.0000027	0.0000027	0.0000039	-	-	-	0.0000160	0.0000160	0.0000160

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Hg, Tot	Construction	Oct	2	0.0000016	0.0000016	0.0000018	-	-	-	0.0000130	0.0000130	0.0000130
Hg, Tot	Construction	Nov	2	0.0000016	0.0000016	0.0000017	-	-	-	0.0000101	0.0000101	0.0000101
Hg, Tot	Construction	Dec	2	0.0000017	0.0000017	0.0000018	-	-	-	0.0000085	0.0000085	0.0000085
Hg, Tot	Operations	Jan	13	0.0000017	0.0000017	0.0000018	-	-	-	0.0000113	0.0000097	0.0000130
Hg, Tot	Operations	Feb	13	0.0000017	0.0000017	0.0000018	-	-	-	0.0000097	0.0000087	0.0000124
Hg, Tot	Operations	Mar	13	0.0000017	0.0000017	0.0000018	-	-	-	0.0000079	0.0000074	0.0000116
Hg, Tot	Operations	Apr	13	0.0000017	0.0000017	0.0000019	-	-	-	0.0000065	0.0000067	0.0000107
Hg, Tot	Operations	May	13	0.0000017	0.0000017	0.0000018	-	-	-	0.0000074	0.0000076	0.0000104
Hg, Tot	Operations	Jun	13	0.0000017	0.0000017	0.0000017	-	-	-	0.0000102	0.0000108	0.0000167
Hg, Tot	Operations	Jul	13	0.0000016	0.0000016	0.0000016	-	-	-	0.0000140	0.0000158	0.0000270
Hg, Tot	Operations	Aug	13	0.0000016	0.0000016	0.0000016	-	-	-	0.0000173	0.0000194	0.0000315
Hg, Tot	Operations	Sep	13	0.0000015	0.0000015	0.0000016	-	-	-	0.0000176	0.0000189	0.0000258
Hg, Tot	Operations	Oct	13	0.0000015	0.0000015	0.0000015	-	-	-	0.0000166	0.0000160	0.0000192
Hg, Tot	Operations	Nov	13	0.0000015	0.0000016	0.0000016	-	-	-	0.0000149	0.0000134	0.0000172
Hg, Tot	Operations	Dec	13	0.0000017	0.0000017	0.0000017	-	-	-	0.0000137	0.0000117	0.0000171
Hg, Tot	Closure	Jan	6	-	-	-	0.0000016	0.0000019	0.0000030	0.0000321	0.0000309	0.0000419
Hg, Tot	Closure	Feb	6	-	-	-	0.0000016	0.0000019	0.0000030	0.0000319	0.0000307	0.0000417
Hg, Tot	Closure	Mar	6	-	-	-	0.0000016	0.0000020	0.0000032	0.0000313	0.0000302	0.0000410
Hg, Tot	Closure	Apr	6	-	-	-	0.0000016	0.0000021	0.0000035	0.0000308	0.0000297	0.0000403
Hg, Tot	Closure	May	6	-	-	-	0.0000016	0.0000021	0.0000036	0.0000308	0.0000297	0.0000402
Hg, Tot	Closure	Jun	6	-	-	-	0.0000016	0.0000021	0.0000036	0.0000318	0.0000307	0.0000411
Hg, Tot	Closure	Jul	6	-	-	-	0.0000016	0.0000021	0.0000036	0.0000336	0.0000326	0.0000428
Hg, Tot	Closure	Aug	6	-	-	-	0.0000016	0.0000021	0.0000035	0.0000356	0.0000347	0.0000447
Hg, Tot	Closure	Sep	6	-	-	-	0.0000016	0.0000021	0.0000036	0.0000368	0.0000360	0.0000458
Hg, Tot	Closure	Oct	6	-	-	-	0.0000017	0.0000022	0.0000037	0.0000369	0.0000361	0.0000458
Hg, Tot	Closure	Nov	6	-	-	-	0.0000017	0.0000022	0.0000038	0.0000367	0.0000359	0.0000455
Hg, Tot	Closure	Dec	6	-	-	-	0.0000018	0.0000022	0.0000038	0.0000365	0.0000357	0.0000453
Hg, Tot	Post-Closure	Jan	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000225	0.0000244	0.0000451
Hg, Tot	Post-Closure	Feb	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000224	0.0000243	0.0000449
Hg, Tot	Post-Closure	Mar	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000222	0.0000240	0.0000444
Hg, Tot	Post-Closure	Apr	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000219	0.0000237	0.0000438
Hg, Tot	Post-Closure	May	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000218	0.0000236	0.0000435
Hg, Tot	Post-Closure	Jun	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000219	0.0000237	0.0000434
Hg, Tot	Post-Closure	Jul	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000223	0.0000241	0.0000435
Hg, Tot	Post-Closure	Aug	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000227	0.0000245	0.0000437
Hg, Tot	Post-Closure	Sep	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000229	0.0000246	0.0000436
Hg, Tot	Post-Closure	Oct	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000228	0.0000245	0.0000433
Hg, Tot	Post-Closure	Nov	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000227	0.0000244	0.0000430
Hg, Tot	Post-Closure	Dec	109	-	-	-	0.0000071	0.0000070	0.0000072	0.0000226	0.0000243	0.0000428
Mo, Tot	Construction	Jan	2	0.000370	0.000370	0.000527	-	-	-	-	-	-
Mo, Tot	Construction	Feb	2	0.000466	0.000466	0.000580	-	-	-	-	-	-
Mo, Tot	Construction	Mar	2	0.000598	0.000598	0.000713	-	-	-	0.000080	0.000080	0.000157
Mo, Tot	Construction	Apr	2	0.000661	0.000661	0.000786	-	-	-	-	-	-
Mo, Tot	Construction	May	2	0.000755	0.000755	0.000928	-	-	-	0.000012	0.000012	0.000022
Mo, Tot	Construction	Jun	2	0.000728	0.000728	0.000894	-	-	-	0.000004	0.000004	0.000004
Mo, Tot	Construction	Jul	2	0.000721	0.000721	0.000929	-	-	-	0.002219	0.002219	0.003956
Mo, Tot	Construction	Aug	2	0.000805	0.000805	0.001074	-	-	-	0.000451	0.000451	0.000559
Mo, Tot	Construction	Sep	2	0.001455	0.001455	0.002367	-	-	-	0.012080	0.012080	0.012080
Mo, Tot	Construction	Oct	2	0.000933	0.000933	0.001346	-	-	-	0.011420	0.011420	0.011420
Mo, Tot	Construction	Nov	2	0.000893	0.000893	0.001276	-	-	-	0.011290	0.011290	0.011290
Mo, Tot	Construction	Dec	2	0.000896	0.000896	0.001279	-	-	-	0.011670	0.011670	0.011670
Mo, Tot	Operations	Jan	13	0.007360	0.007605	0.013390	-	-	-	0.047690	0.048156	0.078650
Mo, Tot	Operations	Feb	13	0.004434	0.004791	0.008849	-	-	-	0.048140	0.050406	0.088490
Mo, Tot	Operations	Mar	13	0.002703	0.002982	0.005632	-	-	-	0.047200	0.044918	0.055590
Mo, Tot	Operations	Apr	13	0.004224	0.004501	0.007693	-	-	-	0.041110	0.039378	0.046480
Mo, Tot	Operations	May	13	0.005439	0.005788	0.010050	-	-	-	0.036650	0.035825	0.044370
Mo, Tot	Operations	Jun	13	0.004253	0.004367	0.007299	-	-	-	0.036350	0.036652	0.044110
Mo, Tot	Operations	Jul	13	0.004743	0.004747	0.007876	-	-	-	0.040220	0.040091	0.045200
Mo, Tot	Operations	Aug	13	0.004531	0.004626	0.007551	-	-	-	0.043460	0.043296	0.052710
Mo, Tot	Operations	Sep	13	0.004922	0.005304	0.008709	-	-	-	0.044390	0.045089	0.058380
Mo, Tot	Operations	Oct	13	0.006604	0.007249	0.012760	-	-	-	0.043730	0.045231	0.057870
Mo, Tot	Operations	Nov	13	0.008270	0.007459	0.011710	-	-	-	0.044790	0.046813	0.065580
Mo, Tot	Operations	Dec	13	0.008958	0.008074	0.012590	-	-	-	0.046770	0.050813	0.088510
Mo, Tot	Closure	Jan	6	-	-	-	0.012710	0.011298	0.013570	0.034055	0.034725	0.042610
Mo, Tot	Closure	Feb	6	-	-	-	0.012585	0.011315	0.013520	0.033860	0.034518	0.042310
Mo, Tot	Closure	Mar	6	-	-	-	0.012575	0.011902	0.013590	0.033260	0.033878	0.041390
Mo, Tot	Closure	Apr	6	-	-	-	0.012580	0.012252	0.013670	0.032630	0.033205	0.040430
Mo, Tot	Closure	May	6	-	-	-	0.012570	0.012366	0.013700	0.032275	0.032825	0.039880
Mo, Tot	Closure	Jun	6	-	-	-	0.012625	0.012572	0.013740	0.032235	0.032777	0.039770
Mo, Tot	Closure	Jul	6	-	-	-	0.012780	0.012898	0.013800	0.032385	0.032932	0.039930
Mo, Tot	Closure	Aug	6	-	-	-	0.012950	0.013177	0.013880	0.032560	0.033112	0.040120
Mo, Tot	Closure	Sep	6	-	-	-	0.013175	0.013333	0.013950	0.032530	0.033075	0.040020
Mo, Tot	Closure	Oct	6	-	-	-	0.013240	0.013392	0.014000	0.032195	0.032712	0.039500
Mo, Tot	Closure	Nov	6	-	-	-	0.013125	0.013325	0.014000	0.031895	0.032392	0.039050
Mo, Tot	Closure	Dec	6	-	-	-	0.013000	0.013188	0.013950	0.031745	0.032228	0.038820
Mo, Tot	Post-Closure	Jan	109	-	-	-	0.004398	0.005381	0.013900	0.002961	0.004961	0.026760
Mo, Tot	Post-Closure	Feb	109	-	-	-	0.004396	0.005375	0.013850	0.002949	0.004942	0.026650
Mo, Tot	Post-Closure	Mar	109	-	-	-	0.004392	0.005368	0.013810	0.002912	0.004879	0.026310
Mo, Tot	Post-Closure	Apr	109	-	-	-	0.004387	0.005360	0.013750	0.002875	0.004814	0.025950
Mo, Tot	Post-Closure	May	109	-	-	-	0.004384	0.005352	0.013680	0.002862	0.004782	0.025700
Mo, Tot	Post-Closure	Jun	109	-	-	-	0.004380	0.005343	0.013580	0.002882	0.004783	0.025510
Mo, Tot	Post-Closure	Jul	109	-	-	-	0.004375	0.005331	0.013470	0.002928	0.004809	0.025300
Mo, Tot	Post-Closure	Aug	109	-	-	-	0.004370	0.005319	0.013350	0.002981	0.004839	0.025080
Mo, Tot	Post-Closure	Sep	109	-	-	-	0.004365	0.005309	0.013250	0.003005	0.004841	0.024850
Mo, Tot	Post-Closure	Oct	109	-	-	-	0.004361	0.005301	0.013180	0.002992	0.004806	0.024570
Mo, Tot	Post-Closure	Nov	109	-	-	-	0.004358	0.005295	0.013120	0.002975	0.004775	0.024380
Mo, Tot	Post-Closure	Dec	109	-	-	-	0.004357	0.005290	0.013060	0.002965	0.004758	0.024300

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond Predicted Water Quality			Open Pit Predicted Water Quality			TMF Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ni, Diss	Construction	Jan	2	0.000603	0.000603	0.000731	-	-	-	-	-	-
Ni, Diss	Construction	Feb	2	0.000649	0.000649	0.000762	-	-	-	-	-	-
Ni, Diss	Construction	Mar	2	0.000751	0.000751	0.000919	-	-	-	0.000106	0.000106	0.000195
Ni, Diss	Construction	Apr	2	0.000744	0.000744	0.000885	-	-	-	-	-	-
Ni, Diss	Construction	May	2	0.000806	0.000806	0.000956	-	-	-	0.000020	0.000020	0.000031
Ni, Diss	Construction	Jun	2	0.000833	0.000833	0.001013	-	-	-	0.000012	0.000012	0.000012
Ni, Diss	Construction	Jul	2	0.000879	0.000879	0.001089	-	-	-	0.002801	0.002801	0.004657
Ni, Diss	Construction	Aug	2	0.000968	0.000968	0.001255	-	-	-	0.000733	0.000733	0.000979
Ni, Diss	Construction	Sep	2	0.001778	0.001778	0.002889	-	-	-	0.012830	0.012830	0.012830
Ni, Diss	Construction	Oct	2	0.001123	0.001123	0.001584	-	-	-	0.011300	0.011300	0.011300
Ni, Diss	Construction	Nov	2	0.001096	0.001096	0.001513	-	-	-	0.010060	0.010060	0.010060
Ni, Diss	Construction	Dec	2	0.001118	0.001118	0.001532	-	-	-	0.009640	0.009640	0.009640
Ni, Diss	Operations	Jan	13	0.008133	0.008540	0.014770	-	-	-	0.012780	0.012355	0.015530
Ni, Diss	Operations	Feb	13	0.004846	0.005317	0.010140	-	-	-	0.012020	0.011873	0.015220
Ni, Diss	Operations	Mar	13	0.002870	0.003199	0.006327	-	-	-	0.011090	0.010931	0.014820
Ni, Diss	Operations	Apr	13	0.004632	0.004933	0.008413	-	-	-	0.009902	0.010089	0.014190
Ni, Diss	Operations	May	13	0.006055	0.006421	0.011080	-	-	-	0.009404	0.010084	0.013730
Ni, Diss	Operations	Jun	13	0.004635	0.004745	0.007957	-	-	-	0.012060	0.011914	0.014250
Ni, Diss	Operations	Jul	13	0.005161	0.005155	0.008587	-	-	-	0.014660	0.014899	0.018850
Ni, Diss	Operations	Aug	13	0.004916	0.005015	0.008221	-	-	-	0.016460	0.017066	0.021270
Ni, Diss	Operations	Sep	13	0.005350	0.005770	0.009505	-	-	-	0.017280	0.017036	0.018880
Ni, Diss	Operations	Oct	13	0.007271	0.007975	0.014030	-	-	-	0.016530	0.015638	0.018470
Ni, Diss	Operations	Nov	13	0.009202	0.008246	0.012870	-	-	-	0.015400	0.014441	0.018450
Ni, Diss	Operations	Dec	13	0.010060	0.008985	0.013890	-	-	-	0.014400	0.013656	0.018400
Ni, Diss	Closure	Jan	6	-	-	-	0.013905	0.012272	0.014540	0.022300	0.021992	0.024900
Ni, Diss	Closure	Feb	6	-	-	-	0.013765	0.012286	0.014480	0.022180	0.021867	0.024770
Ni, Diss	Closure	Mar	6	-	-	-	0.013745	0.012917	0.014520	0.021785	0.021470	0.024370
Ni, Diss	Closure	Apr	6	-	-	-	0.013760	0.013290	0.014580	0.021395	0.021078	0.023960
Ni, Diss	Closure	May	6	-	-	-	0.013750	0.013410	0.014600	0.021315	0.021000	0.023850
Ni, Diss	Closure	Jun	6	-	-	-	0.013810	0.013633	0.014630	0.021695	0.021400	0.024200
Ni, Diss	Closure	Jul	6	-	-	-	0.013980	0.014002	0.014720	0.022490	0.022230	0.024950
Ni, Diss	Closure	Aug	6	-	-	-	0.014170	0.014312	0.014810	0.023380	0.023157	0.025790
Ni, Diss	Closure	Sep	6	-	-	-	0.014425	0.014487	0.014880	0.023865	0.023667	0.026240
Ni, Diss	Closure	Oct	6	-	-	-	0.014485	0.014542	0.014940	0.023820	0.023623	0.026170
Ni, Diss	Closure	Nov	6	-	-	-	0.014340	0.014458	0.014930	0.023650	0.023450	0.025980
Ni, Diss	Closure	Dec	6	-	-	-	0.014185	0.014298	0.014870	0.023535	0.023333	0.025860
Ni, Diss	Post-Closure	Jan	109	-	-	-	0.020690	0.019919	0.022320	0.010080	0.011395	0.025760
Ni, Diss	Post-Closure	Feb	109	-	-	-	0.020690	0.019914	0.022310	0.010040	0.011350	0.025660
Ni, Diss	Post-Closure	Mar	109	-	-	-	0.020690	0.019912	0.022300	0.009911	0.011208	0.025340
Ni, Diss	Post-Closure	Apr	109	-	-	-	0.020690	0.019914	0.022300	0.009784	0.011062	0.025000
Ni, Diss	Post-Closure	May	109	-	-	-	0.020690	0.019917	0.022300	0.009742	0.011007	0.024800
Ni, Diss	Post-Closure	Jun	109	-	-	-	0.020700	0.019928	0.022300	0.009811	0.011065	0.024730
Ni, Diss	Post-Closure	Jul	109	-	-	-	0.020710	0.019948	0.022310	0.009973	0.011212	0.024720
Ni, Diss	Post-Closure	Aug	109	-	-	-	0.020730	0.019971	0.022320	0.010160	0.011383	0.024730
Ni, Diss	Post-Closure	Sep	109	-	-	-	0.020740	0.019987	0.022330	0.010240	0.011452	0.024640
Ni, Diss	Post-Closure	Oct	109	-	-	-	0.020750	0.019996	0.022330	0.010200	0.011395	0.024420
Ni, Diss	Post-Closure	Nov	109	-	-	-	0.020750	0.019996	0.022330	0.010140	0.011328	0.024250
Ni, Diss	Post-Closure	Dec	109	-	-	-	0.020750	0.019992	0.022330	0.010110	0.011287	0.024170
Ni, Tot	Construction	Jan	2	0.004607	0.004607	0.004753	-	-	-	-	-	-
Ni, Tot	Construction	Feb	2	0.004044	0.004044	0.004076	-	-	-	-	-	-
Ni, Tot	Construction	Mar	2	0.003199	0.003199	0.003323	-	-	-	0.000113	0.000113	0.000201
Ni, Tot	Construction	Apr	2	0.002786	0.002786	0.002833	-	-	-	-	-	-
Ni, Tot	Construction	May	2	0.002564	0.002564	0.002661	-	-	-	0.000022	0.000022	0.000033
Ni, Tot	Construction	Jun	2	0.002930	0.002930	0.003064	-	-	-	0.000014	0.000014	0.000014
Ni, Tot	Construction	Jul	2	0.003404	0.003404	0.003470	-	-	-	0.002863	0.002863	0.004711
Ni, Tot	Construction	Aug	2	0.003527	0.003527	0.003668	-	-	-	0.000776	0.000776	0.001065
Ni, Tot	Construction	Sep	2	0.004386	0.004386	0.005229	-	-	-	0.012840	0.012840	0.012840
Ni, Tot	Construction	Oct	2	0.004141	0.004141	0.004321	-	-	-	0.011310	0.011310	0.011310
Ni, Tot	Construction	Nov	2	0.004370	0.004370	0.004491	-	-	-	0.010060	0.010060	0.010060
Ni, Tot	Construction	Dec	2	0.004518	0.004518	0.004618	-	-	-	0.009645	0.009645	0.009645
Ni, Tot	Operations	Jan	13	0.009968	0.010641	0.016710	-	-	-	0.012780	0.012356	0.015530
Ni, Tot	Operations	Feb	13	0.005863	0.006577	0.012060	-	-	-	0.012030	0.011876	0.015220
Ni, Tot	Operations	Mar	13	0.003389	0.003912	0.007499	-	-	-	0.011100	0.010938	0.014830
Ni, Tot	Operations	Apr	13	0.005672	0.006178	0.009600	-	-	-	0.009907	0.010095	0.014200
Ni, Tot	Operations	May	13	0.007457	0.008041	0.012690	-	-	-	0.009408	0.010090	0.013730
Ni, Tot	Operations	Jun	13	0.005549	0.005727	0.008972	-	-	-	0.012070	0.011919	0.014250
Ni, Tot	Operations	Jul	13	0.006171	0.006204	0.009669	-	-	-	0.014660	0.014905	0.018860
Ni, Tot	Operations	Aug	13	0.005841	0.006015	0.009237	-	-	-	0.016460	0.017071	0.021280
Ni, Tot	Operations	Sep	13	0.006603	0.006933	0.010690	-	-	-	0.017280	0.017044	0.018890
Ni, Tot	Operations	Oct	13	0.008708	0.009597	0.015780	-	-	-	0.016530	0.015642	0.018470
Ni, Tot	Operations	Nov	13	0.010910	0.009981	0.014450	-	-	-	0.015410	0.014448	0.018460
Ni, Tot	Operations	Dec	13	0.011940	0.010873	0.015630	-	-	-	0.014400	0.013659	0.018400
Ni, Tot	Closure	Jan	6	-	-	-	0.015220	0.013403	0.015840	0.022310	0.021998	0.024910
Ni, Tot	Closure	Feb	6	-	-	-	0.015065	0.013424	0.015770	0.022185	0.021873	0.024780
Ni, Tot	Closure	Mar	6	-	-	-	0.015050	0.014116	0.015810	0.021795	0.021480	0.024380
Ni, Tot	Closure	Apr	6	-	-	-	0.015065	0.014520	0.015860	0.021405	0.021088	0.023970
Ni, Tot	Closure	May	6	-	-	-	0.015050	0.014647	0.015870	0.021325	0.021008	0.023860
Ni, Tot	Closure	Jun	6	-	-	-	0.015120	0.014895	0.015910	0.021705	0.021410	0.024210
Ni, Tot	Closure	Jul	6	-	-	-	0.015310	0.015298	0.016010	0.022505	0.022242	0.024960
Ni, Tot	Closure	Aug	6	-	-	-	0.015515	0.015638	0.016110	0.023390	0.023168	0.025800
Ni, Tot	Closure	Sep	6	-	-	-	0.015790	0.015832	0.016190	0.023875	0.023677	0.026250
Ni, Tot	Closure	Oct	6	-	-	-	0.015850	0.015888	0.016240	0.023830	0.023633	0.026180
Ni, Tot	Closure	Nov	6	-	-	-	0.015690	0.015793	0.016230	0.023665	0.023462	0.025990
Ni, Tot	Closure	Dec	6	-	-	-	0.015525	0.015618	0.016170	0.023545	0.023342	0.025870
Ni, Tot	Post-Closure	Jan	109	-	-	-	0.022930	0.022010	0.024730	0.010100	0.011414	0.025780
Ni, Tot	Post-Closure	Feb	109	-	-	-	0.022930	0.022004	0.024720	0.010060	0.011369	0.025680
Ni, Tot	Post-Closure	Mar	109	-	-	-	0.022930	0.022002	0.024710	0.009930	0.011227	0.025350

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ni, Tot	Post-Closure	Apr	109	-	-	-	0.022920	0.022004	0.024710	0.009803	0.011081	0.025010
Ni, Tot	Post-Closure	May	109	-	-	-	0.022930	0.022007	0.024710	0.009761	0.011026	0.024810
Ni, Tot	Post-Closure	Jun	109	-	-	-	0.022940	0.022019	0.024710	0.009830	0.011084	0.024740
Ni, Tot	Post-Closure	Jul	109	-	-	-	0.022950	0.022043	0.024720	0.009992	0.011231	0.024730
Ni, Tot	Post-Closure	Aug	109	-	-	-	0.022970	0.022069	0.024740	0.010180	0.011401	0.024740
Ni, Tot	Post-Closure	Sep	109	-	-	-	0.022990	0.022088	0.024740	0.010260	0.011471	0.024650
Ni, Tot	Post-Closure	Oct	109	-	-	-	0.022990	0.022097	0.024740	0.010220	0.011414	0.024430
Ni, Tot	Post-Closure	Nov	109	-	-	-	0.022990	0.022096	0.024740	0.010160	0.011347	0.024270
Ni, Tot	Post-Closure	Dec	109	-	-	-	0.022990	0.022093	0.024740	0.010120	0.011306	0.024180
Se, Tot	Construction	Jan	2	0.000163	0.000163	0.000166	-	-	-	-	-	-
Se, Tot	Construction	Feb	2	0.000149	0.000149	0.000152	-	-	-	-	-	-
Se, Tot	Construction	Mar	2	0.000129	0.000129	0.000131	-	-	-	0.000004	0.000004	0.000007
Se, Tot	Construction	Apr	2	0.000120	0.000120	0.000124	-	-	-	-	-	-
Se, Tot	Construction	May	2	0.000119	0.000119	0.000121	-	-	-	0.000001	0.000001	0.000001
Se, Tot	Construction	Jun	2	0.000123	0.000123	0.000126	-	-	-	0.000001	0.000001	0.000001
Se, Tot	Construction	Jul	2	0.000131	0.000131	0.000137	-	-	-	0.000091	0.000091	0.000133
Se, Tot	Construction	Aug	2	0.000135	0.000135	0.000136	-	-	-	0.000045	0.000045	0.000046
Se, Tot	Construction	Sep	2	0.000202	0.000202	0.000264	-	-	-	0.001474	0.001474	0.001474
Se, Tot	Construction	Oct	2	0.000156	0.000156	0.000161	-	-	-	0.001389	0.001389	0.001389
Se, Tot	Construction	Nov	2	0.000155	0.000155	0.000156	-	-	-	0.001364	0.001364	0.001364
Se, Tot	Construction	Dec	2	0.000158	0.000158	0.000160	-	-	-	0.001405	0.001405	0.001405
Se, Tot	Operations	Jan	13	0.000251	0.000268	0.000408	-	-	-	0.005068	0.005380	0.009409
Se, Tot	Operations	Feb	13	0.000175	0.000191	0.000298	-	-	-	0.005128	0.005649	0.010570
Se, Tot	Operations	Mar	13	0.000130	0.000139	0.000209	-	-	-	0.005009	0.004974	0.006564
Se, Tot	Operations	Apr	13	0.000170	0.000180	0.000259	-	-	-	0.004632	0.004320	0.004780
Se, Tot	Operations	May	13	0.000202	0.000214	0.000320	-	-	-	0.004066	0.003919	0.004557
Se, Tot	Operations	Jun	13	0.000171	0.000175	0.000249	-	-	-	0.004024	0.004019	0.004522
Se, Tot	Operations	Jul	13	0.000183	0.000184	0.000263	-	-	-	0.004379	0.004410	0.004929
Se, Tot	Operations	Aug	13	0.000177	0.000181	0.000255	-	-	-	0.004631	0.004773	0.006234
Se, Tot	Operations	Sep	13	0.000187	0.000199	0.000285	-	-	-	0.004729	0.004965	0.006884
Se, Tot	Operations	Oct	13	0.000231	0.000251	0.000390	-	-	-	0.004728	0.004964	0.006797
Se, Tot	Operations	Nov	13	0.000276	0.000257	0.000363	-	-	-	0.004770	0.005149	0.007720
Se, Tot	Operations	Dec	13	0.000297	0.000275	0.000387	-	-	-	0.004882	0.005627	0.010470
Se, Tot	Closure	Jan	6	-	-	-	0.000383	0.000365	0.000491	0.003487	0.003541	0.004174
Se, Tot	Closure	Feb	6	-	-	-	0.000380	0.000366	0.000492	0.003467	0.003520	0.004145
Se, Tot	Closure	Mar	6	-	-	-	0.000380	0.000386	0.000505	0.003406	0.003455	0.004054
Se, Tot	Closure	Apr	6	-	-	-	0.000380	0.000400	0.000519	0.003341	0.003387	0.003961
Se, Tot	Closure	May	6	-	-	-	0.000380	0.000405	0.000526	0.003308	0.003351	0.003911
Se, Tot	Closure	Jun	6	-	-	-	0.000381	0.000411	0.000528	0.003312	0.003354	0.003911
Se, Tot	Closure	Jul	6	-	-	-	0.000385	0.000419	0.000528	0.003341	0.003385	0.003945
Se, Tot	Closure	Aug	6	-	-	-	0.000390	0.000426	0.000528	0.003374	0.003419	0.003983
Se, Tot	Closure	Sep	6	-	-	-	0.000396	0.000430	0.000531	0.003381	0.003426	0.003986
Se, Tot	Closure	Oct	6	-	-	-	0.000400	0.000435	0.000538	0.003350	0.003392	0.003940
Se, Tot	Closure	Nov	6	-	-	-	0.000402	0.000437	0.000542	0.003320	0.003360	0.003896
Se, Tot	Closure	Dec	6	-	-	-	0.000400	0.000434	0.000541	0.003304	0.003343	0.003873
Se, Tot	Post-Closure	Jan	109	-	-	-	0.000455	0.000479	0.000600	0.000467	0.000671	0.002902
Se, Tot	Post-Closure	Feb	109	-	-	-	0.000454	0.000479	0.000599	0.000465	0.000669	0.002890
Se, Tot	Post-Closure	Mar	109	-	-	-	0.000454	0.000479	0.000600	0.000459	0.000660	0.002854
Se, Tot	Post-Closure	Apr	109	-	-	-	0.000454	0.000479	0.000601	0.000453	0.000652	0.002815
Se, Tot	Post-Closure	May	109	-	-	-	0.000454	0.000479	0.000602	0.000451	0.000648	0.002788
Se, Tot	Post-Closure	Jun	109	-	-	-	0.000454	0.000479	0.000602	0.000455	0.000649	0.002770
Se, Tot	Post-Closure	Jul	109	-	-	-	0.000454	0.000479	0.000602	0.000462	0.000654	0.002751
Se, Tot	Post-Closure	Aug	109	-	-	-	0.000453	0.000479	0.000602	0.000470	0.000660	0.002732
Se, Tot	Post-Closure	Sep	109	-	-	-	0.000453	0.000479	0.000602	0.000474	0.000662	0.002709
Se, Tot	Post-Closure	Oct	109	-	-	-	0.000453	0.000479	0.000603	0.000472	0.000658	0.002680
Se, Tot	Post-Closure	Nov	109	-	-	-	0.000453	0.000479	0.000602	0.000469	0.000654	0.002660
Se, Tot	Post-Closure	Dec	109	-	-	-	0.000453	0.000478	0.000601	0.000468	0.000651	0.002650
Ag, Tot	Construction	Jan	2	0.000072	0.000072	0.000077	-	-	-	-	-	-
Ag, Tot	Construction	Feb	2	0.000061	0.000061	0.000064	-	-	-	-	-	-
Ag, Tot	Construction	Mar	2	0.000044	0.000044	0.000047	-	-	-	0.00000026	0.00000026	0.00000035
Ag, Tot	Construction	Apr	2	0.000037	0.000037	0.000041	-	-	-	-	-	-
Ag, Tot	Construction	May	2	0.000033	0.000033	0.000037	-	-	-	0.00000008	0.00000008	0.00000008
Ag, Tot	Construction	Jun	2	0.000039	0.000039	0.000043	-	-	-	0.00000009	0.00000009	0.00000009
Ag, Tot	Construction	Jul	2	0.000045	0.000045	0.000051	-	-	-	0.000005	0.000005	0.000005
Ag, Tot	Construction	Aug	2	0.000045	0.000045	0.000052	-	-	-	0.000003	0.000003	0.000004
Ag, Tot	Construction	Sep	2	0.000046	0.000046	0.000055	-	-	-	0.000020	0.000020	0.000020
Ag, Tot	Construction	Oct	2	0.000053	0.000053	0.000062	-	-	-	0.000017	0.000017	0.000017
Ag, Tot	Construction	Nov	2	0.000057	0.000057	0.000067	-	-	-	0.000014	0.000014	0.000014
Ag, Tot	Construction	Dec	2	0.000059	0.000059	0.000069	-	-	-	0.000012	0.000012	0.000012
Ag, Tot	Operations	Jan	13	0.000018	0.000021	0.000046	-	-	-	0.000016	0.000014	0.000018
Ag, Tot	Operations	Feb	13	0.000012	0.000015	0.000038	-	-	-	0.000014	0.000013	0.000017
Ag, Tot	Operations	Mar	13	0.000009	0.000011	0.000026	-	-	-	0.000012	0.000012	0.000017
Ag, Tot	Operations	Apr	13	0.000013	0.000014	0.000028	-	-	-	0.000011	0.000011	0.000016
Ag, Tot	Operations	May	13	0.000015	0.000016	0.000029	-	-	-	0.000012	0.000012	0.000015
Ag, Tot	Operations	Jun	13	0.000012	0.000012	0.000015	-	-	-	0.000015	0.000015	0.000020
Ag, Tot	Operations	Jul	13	0.000013	0.000013	0.000016	-	-	-	0.000018	0.000020	0.000030
Ag, Tot	Operations	Aug	13	0.000012	0.000013	0.000015	-	-	-	0.000022	0.000024	0.000035
Ag, Tot	Operations	Sep	13	0.000013	0.000014	0.000017	-	-	-	0.000022	0.000023	0.000029
Ag, Tot	Operations	Oct	13	0.000017	0.000017	0.000025	-	-	-	0.000021	0.000020	0.000023
Ag, Tot	Operations	Nov	13	0.000016	0.000018	0.000028	-	-	-	0.000020	0.000018	0.000022
Ag, Tot	Operations	Dec	13	0.000017	0.000019	0.000029	-	-	-	0.000018	0.000016	0.000022
Ag, Tot	Closure	Jan	6	-	-	-	0.000013	0.000013	0.000014	0.000035	0.000034	0.000043
Ag, Tot	Closure	Feb	6	-	-	-	0.000013	0.000013	0.000014	0.000035	0.000034	0.000043
Ag, Tot	Closure	Mar	6	-	-	-	0.000013	0.000013	0.000015	0.000034	0.000033	0.000042
Ag, Tot	Closure	Apr	6	-	-	-	0.000013	0.000013	0.000015	0.000033	0.000033	0.000042
Ag, Tot	Closure	May	6	-	-	-	0.000013	0.000013	0.000015	0.000033	0.000033	0.000042
Ag, Tot	Closure	Jun	6	-	-	-	0.000013	0.000013	0.000015	0.000034	0.000033	0.000042

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ag, Tot	Closure	Jul	6	-	-	-	0.000013	0.000014	0.000015	0.000036	0.000035	0.000044
Ag, Tot	Closure	Aug	6	-	-	-	0.000013	0.000014	0.000015	0.000038	0.000037	0.000046
Ag, Tot	Closure	Sep	6	-	-	-	0.000013	0.000014	0.000015	0.000039	0.000038	0.000047
Ag, Tot	Closure	Oct	6	-	-	-	0.000014	0.000014	0.000015	0.000039	0.000038	0.000047
Ag, Tot	Closure	Nov	6	-	-	-	0.000013	0.000014	0.000015	0.000039	0.000038	0.000047
Ag, Tot	Closure	Dec	6	-	-	-	0.000013	0.000014	0.000015	0.000039	0.000038	0.000046
Ag, Tot	Post-Closure	Jan	109	-	-	-	0.000027	0.000026	0.000029	0.000022	0.000024	0.000046
Ag, Tot	Post-Closure	Feb	109	-	-	-	0.000027	0.000026	0.000029	0.000022	0.000024	0.000046
Ag, Tot	Post-Closure	Mar	109	-	-	-	0.000027	0.000026	0.000029	0.000022	0.000024	0.000045
Ag, Tot	Post-Closure	Apr	109	-	-	-	0.000027	0.000026	0.000029	0.000021	0.000023	0.000045
Ag, Tot	Post-Closure	May	109	-	-	-	0.000027	0.000026	0.000029	0.000021	0.000023	0.000044
Ag, Tot	Post-Closure	Jun	109	-	-	-	0.000027	0.000026	0.000029	0.000021	0.000023	0.000044
Ag, Tot	Post-Closure	Jul	109	-	-	-	0.000027	0.000026	0.000029	0.000022	0.000024	0.000044
Ag, Tot	Post-Closure	Aug	109	-	-	-	0.000028	0.000026	0.000029	0.000022	0.000024	0.000045
Ag, Tot	Post-Closure	Sep	109	-	-	-	0.000028	0.000026	0.000029	0.000022	0.000024	0.000045
Ag, Tot	Post-Closure	Oct	109	-	-	-	0.000028	0.000026	0.000029	0.000022	0.000024	0.000044
Ag, Tot	Post-Closure	Nov	109	-	-	-	0.000028	0.000026	0.000029	0.000022	0.000024	0.000044
Ag, Tot	Post-Closure	Dec	109	-	-	-	0.000028	0.000026	0.000029	0.000022	0.000024	0.000044
Tl, Tot	Construction	Jan	2	0.000134	0.000134	0.000142	-	-	-	-	-	-
Tl, Tot	Construction	Feb	2	0.000116	0.000116	0.000121	-	-	-	-	-	-
Tl, Tot	Construction	Mar	2	0.000088	0.000088	0.000094	-	-	-	0.000002	0.000002	0.000002
Tl, Tot	Construction	Apr	2	0.000077	0.000077	0.000084	-	-	-	-	-	-
Tl, Tot	Construction	May	2	0.000072	0.000072	0.000078	-	-	-	0.0000007	0.0000007	0.0000007
Tl, Tot	Construction	Jun	2	0.000081	0.000081	0.000088	-	-	-	0.0000008	0.0000008	0.0000008
Tl, Tot	Construction	Jul	2	0.000089	0.000089	0.000099	-	-	-	0.000035	0.000035	0.000035
Tl, Tot	Construction	Aug	2	0.000087	0.000087	0.000097	-	-	-	0.000014	0.000014	0.000028
Tl, Tot	Construction	Sep	2	0.000088	0.000088	0.000102	-	-	-	0.000022	0.000022	0.000022
Tl, Tot	Construction	Oct	2	0.000099	0.000099	0.000114	-	-	-	0.000019	0.000019	0.000019
Tl, Tot	Construction	Nov	2	0.000106	0.000106	0.000122	-	-	-	0.000016	0.000016	0.000016
Tl, Tot	Construction	Dec	2	0.000110	0.000110	0.000126	-	-	-	0.000015	0.000015	0.000015
Tl, Tot	Operations	Jan	13	0.000054	0.000056	0.000090	-	-	-	0.000018	0.000017	0.000023
Tl, Tot	Operations	Feb	13	0.000040	0.000043	0.000077	-	-	-	0.000016	0.000016	0.000023
Tl, Tot	Operations	Mar	13	0.000033	0.000035	0.000058	-	-	-	0.000015	0.000016	0.000022
Tl, Tot	Operations	Apr	13	0.000040	0.000041	0.000062	-	-	-	0.000016	0.000017	0.000022
Tl, Tot	Operations	May	13	0.000046	0.000047	0.000064	-	-	-	0.000018	0.000018	0.000022
Tl, Tot	Operations	Jun	13	0.000040	0.000039	0.000042	-	-	-	0.000020	0.000021	0.000024
Tl, Tot	Operations	Jul	13	0.000039	0.000039	0.000042	-	-	-	0.000023	0.000024	0.000028
Tl, Tot	Operations	Aug	13	0.000038	0.000038	0.000041	-	-	-	0.000026	0.000026	0.000030
Tl, Tot	Operations	Sep	13	0.000041	0.000040	0.000044	-	-	-	0.000026	0.000026	0.000029
Tl, Tot	Operations	Oct	13	0.000049	0.000047	0.000055	-	-	-	0.000025	0.000023	0.000030
Tl, Tot	Operations	Nov	13	0.000048	0.000049	0.000060	-	-	-	0.000023	0.000021	0.000030
Tl, Tot	Operations	Dec	13	0.000051	0.000052	0.000062	-	-	-	0.000021	0.000020	0.000030
Tl, Tot	Closure	Jan	6	-	-	-	0.000047	0.000044	0.000047	0.000034	0.000034	0.000037
Tl, Tot	Closure	Feb	6	-	-	-	0.000047	0.000044	0.000047	0.000034	0.000034	0.000037
Tl, Tot	Closure	Mar	6	-	-	-	0.000047	0.000045	0.000047	0.000033	0.000033	0.000036
Tl, Tot	Closure	Apr	6	-	-	-	0.000047	0.000046	0.000047	0.000033	0.000032	0.000036
Tl, Tot	Closure	May	6	-	-	-	0.000047	0.000046	0.000047	0.000033	0.000032	0.000035
Tl, Tot	Closure	Jun	6	-	-	-	0.000047	0.000046	0.000047	0.000033	0.000033	0.000036
Tl, Tot	Closure	Jul	6	-	-	-	0.000047	0.000047	0.000048	0.000034	0.000034	0.000037
Tl, Tot	Closure	Aug	6	-	-	-	0.000048	0.000048	0.000048	0.000035	0.000035	0.000038
Tl, Tot	Closure	Sep	6	-	-	-	0.000048	0.000048	0.000048	0.000036	0.000036	0.000038
Tl, Tot	Closure	Oct	6	-	-	-	0.000048	0.000048	0.000048	0.000036	0.000036	0.000038
Tl, Tot	Closure	Nov	6	-	-	-	0.000048	0.000048	0.000048	0.000036	0.000035	0.000038
Tl, Tot	Closure	Dec	6	-	-	-	0.000047	0.000047	0.000048	0.000035	0.000035	0.000038
Tl, Tot	Post-Closure	Jan	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000038
Tl, Tot	Post-Closure	Feb	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000038
Tl, Tot	Post-Closure	Mar	109	-	-	-	0.000057	0.000056	0.000060	0.000018	0.000020	0.000037
Tl, Tot	Post-Closure	Apr	109	-	-	-	0.000057	0.000056	0.000059	0.000018	0.000020	0.000037
Tl, Tot	Post-Closure	May	109	-	-	-	0.000057	0.000056	0.000059	0.000018	0.000020	0.000037
Tl, Tot	Post-Closure	Jun	109	-	-	-	0.000057	0.000056	0.000060	0.000018	0.000020	0.000037
Tl, Tot	Post-Closure	Jul	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000037
Tl, Tot	Post-Closure	Aug	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000037
Tl, Tot	Post-Closure	Sep	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000036
Tl, Tot	Post-Closure	Oct	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000036
Tl, Tot	Post-Closure	Nov	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000036
Tl, Tot	Post-Closure	Dec	109	-	-	-	0.000057	0.000056	0.000060	0.000019	0.000020	0.000036
U, Tot	Construction	Jan	2	0.000246	0.000246	0.000286	-	-	-	-	-	-
U, Tot	Construction	Feb	2	0.000286	0.000286	0.000304	-	-	-	-	-	-
U, Tot	Construction	Mar	2	0.000342	0.000342	0.000362	-	-	-	0.000016	0.000016	0.000030
U, Tot	Construction	Apr	2	0.000363	0.000363	0.000382	-	-	-	-	-	-
U, Tot	Construction	May	2	0.000390	0.000390	0.000417	-	-	-	0.000003	0.000003	0.000005
U, Tot	Construction	Jun	2	0.000375	0.000375	0.000399	-	-	-	0.0000012	0.0000012	0.0000012
U, Tot	Construction	Jul	2	0.000360	0.000360	0.000397	-	-	-	0.000432	0.000432	0.000753
U, Tot	Construction	Aug	2	0.000370	0.000370	0.000414	-	-	-	0.000084	0.000084	0.000122
U, Tot	Construction	Sep	2	0.000438	0.000438	0.000552	-	-	-	0.001493	0.001493	0.001493
U, Tot	Construction	Oct	2	0.000366	0.000366	0.000429	-	-	-	0.001391	0.001391	0.001391
U, Tot	Construction	Nov	2	0.000353	0.000353	0.000415	-	-	-	0.001349	0.001349	0.001349
U, Tot	Construction	Dec	2	0.000351	0.000351	0.000414	-	-	-	0.001375	0.001375	0.001375
U, Tot	Operations	Jan	13	0.001550	0.001580	0.002659	-	-	-	0.001785	0.001804	0.002158
U, Tot	Operations	Feb	13	0.001062	0.001115	0.001796	-	-	-	0.001746	0.001778	0.002134
U, Tot	Operations	Mar	13	0.000776	0.000818	0.001263	-	-	-	0.001672	0.001666	0.002105
U, Tot	Operations	Apr	13	0.001020	0.001064	0.001656	-	-	-	0.001552	0.001577	0.002047
U, Tot	Operations	May	13	0.001217	0.001276	0.002063	-	-	-	0.001479	0.001548	0.001992
U, Tot	Operations	Jun	13	0.001039	0.001060	0.001599	-	-	-	0.001611	0.001682	0.002032
U, Tot	Operations	Jul	13	0.001126	0.001128	0.001704	-	-	-	0.001879	0.001906	0.002158
U, Tot	Operations	Aug	13	0.001093	0.001109	0.001648	-	-	-	0.002070	0.002070	0.002287
U, Tot	Operations	Sep	13	0.001157	0.001221	0.001848	-	-	-	0.002104	0.002088	0.002374

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
U, Tot	Operations	Oct	13	0.001439	0.001548	0.002557	-	-	-	0.002060	0.002005	0.002407
U, Tot	Operations	Nov	13	0.001719	0.001577	0.002372	-	-	-	0.001985	0.001944	0.002407
U, Tot	Operations	Dec	13	0.001831	0.001679	0.002523	-	-	-	0.001926	0.001913	0.002404
U, Tot	Closure	Jan	6	-	-	-	0.002571	0.002294	0.002597	0.002195	0.002211	0.002395
U, Tot	Closure	Feb	6	-	-	-	0.002548	0.002296	0.002584	0.002183	0.002198	0.002378
U, Tot	Closure	Mar	6	-	-	-	0.002545	0.002392	0.002579	0.002145	0.002158	0.002326
U, Tot	Closure	Apr	6	-	-	-	0.002547	0.002446	0.002575	0.002105	0.002116	0.002274
U, Tot	Closure	May	6	-	-	-	0.002545	0.002463	0.002572	0.002088	0.002098	0.002250
U, Tot	Closure	Jun	6	-	-	-	0.002555	0.002498	0.002577	0.002100	0.002111	0.002264
U, Tot	Closure	Jul	6	-	-	-	0.002582	0.002558	0.002595	0.002135	0.002147	0.002306
U, Tot	Closure	Aug	6	-	-	-	0.002609	0.002608	0.002619	0.002175	0.002189	0.002354
U, Tot	Closure	Sep	6	-	-	-	0.002630	0.002636	0.002671	0.002191	0.002206	0.002373
U, Tot	Closure	Oct	6	-	-	-	0.002637	0.002641	0.002682	0.002176	0.002190	0.002352
U, Tot	Closure	Nov	6	-	-	-	0.002623	0.002624	0.002637	0.002157	0.002170	0.002327
U, Tot	Closure	Dec	6	-	-	-	0.002605	0.002599	0.002613	0.002148	0.002160	0.002314
U, Tot	Post-Closure	Jan	109	-	-	-	0.001595	0.001675	0.002597	0.000492	0.000621	0.002027
U, Tot	Post-Closure	Feb	109	-	-	-	0.001594	0.001674	0.002590	0.000490	0.000618	0.002019
U, Tot	Post-Closure	Mar	109	-	-	-	0.001593	0.001673	0.002579	0.000484	0.000611	0.001994
U, Tot	Post-Closure	Apr	109	-	-	-	0.001593	0.001671	0.002565	0.000478	0.000603	0.001967
U, Tot	Post-Closure	May	109	-	-	-	0.001592	0.001670	0.002552	0.000476	0.000599	0.001949
U, Tot	Post-Closure	Jun	109	-	-	-	0.001592	0.001670	0.002538	0.000479	0.000602	0.001939
U, Tot	Post-Closure	Jul	109	-	-	-	0.001593	0.001669	0.002523	0.000487	0.000608	0.001930
U, Tot	Post-Closure	Aug	109	-	-	-	0.001593	0.001669	0.002509	0.000496	0.000616	0.001922
U, Tot	Post-Closure	Sep	109	-	-	-	0.001593	0.001669	0.002495	0.000500	0.000618	0.001909
U, Tot	Post-Closure	Oct	109	-	-	-	0.001593	0.001668	0.002483	0.000498	0.000615	0.001890
U, Tot	Post-Closure	Nov	109	-	-	-	0.001593	0.001667	0.002473	0.000495	0.000611	0.001876
U, Tot	Post-Closure	Dec	109	-	-	-	0.001593	0.001666	0.002464	0.000493	0.000609	0.001870
Zn, Diss	Construction	Jan	2	0.00144	0.00144	0.00160	-	-	-	-	-	-
Zn, Diss	Construction	Feb	2	0.00183	0.00183	0.00183	-	-	-	-	-	-
Zn, Diss	Construction	Mar	2	0.00235	0.00235	0.00237	-	-	-	0.00005	0.00005	0.00007
Zn, Diss	Construction	Apr	2	0.00256	0.00256	0.00259	-	-	-	-	-	-
Zn, Diss	Construction	May	2	0.00270	0.00270	0.00271	-	-	-	0.00002	0.00002	0.00002
Zn, Diss	Construction	Jun	2	0.00252	0.00252	0.00253	-	-	-	0.00002	0.00002	0.00002
Zn, Diss	Construction	Jul	2	0.00220	0.00220	0.00227	-	-	-	0.00079	0.00079	0.00082
Zn, Diss	Construction	Aug	2	0.00216	0.00216	0.00227	-	-	-	0.00037	0.00037	0.00059
Zn, Diss	Construction	Sep	2	0.00233	0.00233	0.00262	-	-	-	0.00329	0.00329	0.00329
Zn, Diss	Construction	Oct	2	0.00196	0.00196	0.00212	-	-	-	0.00269	0.00269	0.00269
Zn, Diss	Construction	Nov	2	0.00180	0.00180	0.00195	-	-	-	0.00208	0.00208	0.00208
Zn, Diss	Construction	Dec	2	0.00176	0.00176	0.00192	-	-	-	0.00176	0.00176	0.00176
Zn, Diss	Operations	Jan	13	0.00277	0.00283	0.00347	-	-	-	0.00242	0.00211	0.00297
Zn, Diss	Operations	Feb	13	0.00329	0.00320	0.00360	-	-	-	0.00207	0.00190	0.00284
Zn, Diss	Operations	Mar	13	0.00340	0.00337	0.00356	-	-	-	0.00172	0.00166	0.00268
Zn, Diss	Operations	Apr	13	0.00317	0.00309	0.00329	-	-	-	0.00167	0.00178	0.00257
Zn, Diss	Operations	May	13	0.00296	0.00289	0.00314	-	-	-	0.00215	0.00215	0.00262
Zn, Diss	Operations	Jun	13	0.00330	0.00325	0.00337	-	-	-	0.00262	0.00277	0.00389
Zn, Diss	Operations	Jul	13	0.00324	0.00319	0.00331	-	-	-	0.00327	0.00361	0.00558
Zn, Diss	Operations	Aug	13	0.00327	0.00322	0.00334	-	-	-	0.00382	0.00425	0.00636
Zn, Diss	Operations	Sep	13	0.00323	0.00315	0.00328	-	-	-	0.00398	0.00411	0.00523
Zn, Diss	Operations	Oct	13	0.00301	0.00293	0.00325	-	-	-	0.00372	0.00349	0.00405
Zn, Diss	Operations	Nov	13	0.00302	0.00290	0.00325	-	-	-	0.00336	0.00295	0.00403
Zn, Diss	Operations	Dec	13	0.00305	0.00290	0.00336	-	-	-	0.00301	0.00257	0.00400
Zn, Diss	Closure	Jan	6	-	-	-	0.00326	0.00334	0.00360	0.00679	0.00657	0.00861
Zn, Diss	Closure	Feb	6	-	-	-	0.00327	0.00333	0.00355	0.00675	0.00653	0.00857
Zn, Diss	Closure	Mar	6	-	-	-	0.00328	0.00332	0.00346	0.00663	0.00642	0.00843
Zn, Diss	Closure	Apr	6	-	-	-	0.00330	0.00332	0.00348	0.00652	0.00631	0.00829
Zn, Diss	Closure	May	6	-	-	-	0.00329	0.00332	0.00350	0.00652	0.00631	0.00827
Zn, Diss	Closure	Jun	6	-	-	-	0.00327	0.00331	0.00350	0.00670	0.00650	0.00844
Zn, Diss	Closure	Jul	6	-	-	-	0.00325	0.00330	0.00350	0.00706	0.00688	0.00877
Zn, Diss	Closure	Aug	6	-	-	-	0.00323	0.00330	0.00349	0.00746	0.00729	0.00915
Zn, Diss	Closure	Sep	6	-	-	-	0.00323	0.00329	0.00350	0.00769	0.00753	0.00935
Zn, Diss	Closure	Oct	6	-	-	-	0.00323	0.00330	0.00351	0.00770	0.00755	0.00935
Zn, Diss	Closure	Nov	6	-	-	-	0.00325	0.00331	0.00353	0.00766	0.00751	0.00929
Zn, Diss	Closure	Dec	6	-	-	-	0.00325	0.00332	0.00353	0.00762	0.00747	0.00925
Zn, Diss	Post-Closure	Jan	109	-	-	-	0.00893	0.00842	0.00971	0.00451	0.00490	0.00921
Zn, Diss	Post-Closure	Feb	109	-	-	-	0.00893	0.00842	0.00971	0.00449	0.00488	0.00918
Zn, Diss	Post-Closure	Mar	109	-	-	-	0.00893	0.00842	0.00970	0.00443	0.00482	0.00906
Zn, Diss	Post-Closure	Apr	109	-	-	-	0.00893	0.00842	0.00970	0.00438	0.00476	0.00894
Zn, Diss	Post-Closure	May	109	-	-	-	0.00893	0.00842	0.00970	0.00436	0.00474	0.00888
Zn, Diss	Post-Closure	Jun	109	-	-	-	0.00893	0.00843	0.00970	0.00439	0.00477	0.00886
Zn, Diss	Post-Closure	Jul	109	-	-	-	0.00894	0.00844	0.00971	0.00446	0.00483	0.00889
Zn, Diss	Post-Closure	Aug	109	-	-	-	0.00895	0.00845	0.00971	0.00454	0.00491	0.00891
Zn, Diss	Post-Closure	Sep	109	-	-	-	0.00895	0.00846	0.00971	0.00458	0.00494	0.00890
Zn, Diss	Post-Closure	Oct	109	-	-	-	0.00895	0.00847	0.00971	0.00456	0.00492	0.00883
Zn, Diss	Post-Closure	Nov	109	-	-	-	0.00895	0.00847	0.00971	0.00453	0.00489	0.00877
Zn, Diss	Post-Closure	Dec	109	-	-	-	0.00895	0.00847	0.00971	0.00452	0.00487	0.00874
Zn, Tot	Construction	Jan	2	0.01228	0.01228	0.01290	-	-	-	-	-	-
Zn, Tot	Construction	Feb	2	0.01083	0.01083	0.01126	-	-	-	-	-	-
Zn, Tot	Construction	Mar	2	0.00859	0.00859	0.00909	-	-	-	0.00007	0.00007	0.00009
Zn, Tot	Construction	Apr	2	0.00767	0.00767	0.00833	-	-	-	-	-	-
Zn, Tot	Construction	May	2	0.00722	0.00722	0.00779	-	-	-	0.00002	0.00002	0.00002
Zn, Tot	Construction	Jun	2	0.00791	0.00791	0.00853	-	-	-	0.00003	0.00003	0.00003
Zn, Tot	Construction	Jul	2	0.00875	0.00875	0.00963	-	-	-	0.00128	0.00128	0.00134
Zn, Tot	Construction	Aug	2	0.00879	0.00879	0.00970	-	-	-	0.00070	0.00070	0.00122
Zn, Tot	Construction	Sep	2	0.00877	0.00877	0.01006	-	-	-	0.00407	0.00407	0.00407
Zn, Tot	Construction	Oct	2	0.00961	0.00961	0.01095	-	-	-	0.00341	0.00341	0.00341
Zn, Tot	Construction	Nov	2	0.01011	0.01011	0.01152	-	-	-	0.00281	0.00281	0.00281
Zn, Tot	Construction	Dec	2	0.01036	0.01036	0.01183	-	-	-	0.00252	0.00252	0.00252

Appendix G-2: Summary of water quality model predictions for contact water discharges - expected case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Zn, Tot	Operations	Jan	13	0.00470	0.00509	0.00852	-	-	-	0.00323	0.00293	0.00372
Zn, Tot	Operations	Feb	13	0.00426	0.00455	0.00744	-	-	-	0.00290	0.00273	0.00360
Zn, Tot	Operations	Mar	13	0.00392	0.00412	0.00595	-	-	-	0.00251	0.00242	0.00342
Zn, Tot	Operations	Apr	13	0.00408	0.00431	0.00618	-	-	-	0.00237	0.00247	0.00328
Zn, Tot	Operations	May	13	0.00423	0.00448	0.00628	-	-	-	0.00278	0.00281	0.00329
Zn, Tot	Operations	Jun	13	0.00409	0.00419	0.00465	-	-	-	0.00327	0.00345	0.00457
Zn, Tot	Operations	Jul	13	0.00413	0.00424	0.00480	-	-	-	0.00394	0.00434	0.00636
Zn, Tot	Operations	Aug	13	0.00411	0.00422	0.00475	-	-	-	0.00462	0.00501	0.00719
Zn, Tot	Operations	Sep	13	0.00411	0.00424	0.00485	-	-	-	0.00467	0.00487	0.00602
Zn, Tot	Operations	Oct	13	0.00429	0.00447	0.00575	-	-	-	0.00444	0.00423	0.00479
Zn, Tot	Operations	Nov	13	0.00436	0.00457	0.00608	-	-	-	0.00409	0.00371	0.00466
Zn, Tot	Operations	Dec	13	0.00454	0.00470	0.00622	-	-	-	0.00378	0.00336	0.00463
Zn, Tot	Closure	Jan	6	-	-	-	0.00391	0.00393	0.00410	0.00728	0.00707	0.00902
Zn, Tot	Closure	Feb	6	-	-	-	0.00391	0.00392	0.00411	0.00724	0.00703	0.00897
Zn, Tot	Closure	Mar	6	-	-	-	0.00390	0.00394	0.00413	0.00711	0.00691	0.00883
Zn, Tot	Closure	Apr	6	-	-	-	0.00390	0.00395	0.00416	0.00699	0.00679	0.00868
Zn, Tot	Closure	May	6	-	-	-	0.00390	0.00396	0.00417	0.00699	0.00679	0.00866
Zn, Tot	Closure	Jun	6	-	-	-	0.00390	0.00396	0.00418	0.00717	0.00698	0.00882
Zn, Tot	Closure	Jul	6	-	-	-	0.00391	0.00397	0.00418	0.00753	0.00735	0.00916
Zn, Tot	Closure	Aug	6	-	-	-	0.00392	0.00398	0.00418	0.00792	0.00777	0.00953
Zn, Tot	Closure	Sep	6	-	-	-	0.00393	0.00399	0.00419	0.00815	0.00801	0.00974
Zn, Tot	Closure	Oct	6	-	-	-	0.00393	0.00400	0.00420	0.00816	0.00802	0.00973
Zn, Tot	Closure	Nov	6	-	-	-	0.00394	0.00400	0.00421	0.00811	0.00797	0.00967
Zn, Tot	Closure	Dec	6	-	-	-	0.00394	0.00400	0.00422	0.00808	0.00793	0.00963
Zn, Tot	Post-Closure	Jan	109	-	-	-	0.01048	0.00985	0.01139	0.00461	0.00503	0.00959
Zn, Tot	Post-Closure	Feb	109	-	-	-	0.01048	0.00985	0.01139	0.00459	0.00501	0.00955
Zn, Tot	Post-Closure	Mar	109	-	-	-	0.01048	0.00986	0.01138	0.00454	0.00495	0.00943
Zn, Tot	Post-Closure	Apr	109	-	-	-	0.01048	0.00986	0.01138	0.00448	0.00489	0.00931
Zn, Tot	Post-Closure	May	109	-	-	-	0.01048	0.00986	0.01138	0.00446	0.00486	0.00924
Zn, Tot	Post-Closure	Jun	109	-	-	-	0.01049	0.00987	0.01138	0.00449	0.00489	0.00923
Zn, Tot	Post-Closure	Jul	109	-	-	-	0.01050	0.00988	0.01139	0.00456	0.00496	0.00925
Zn, Tot	Post-Closure	Aug	109	-	-	-	0.01050	0.00990	0.01139	0.00465	0.00504	0.00927
Zn, Tot	Post-Closure	Sep	109	-	-	-	0.01051	0.00991	0.01140	0.00468	0.00507	0.00925
Zn, Tot	Post-Closure	Oct	109	-	-	-	0.01051	0.00992	0.01140	0.00467	0.00504	0.00918
Zn, Tot	Post-Closure	Nov	109	-	-	-	0.01051	0.00992	0.01140	0.00464	0.00502	0.00912
Zn, Tot	Post-Closure	Dec	109	-	-	-	0.01051	0.00992	0.01139	0.00462	0.00500	0.00909

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cl	Construction	Jan	2	6.284	6.284	6.664	-	-	-	-	-	-
Cl	Construction	Feb	2	6.156	6.156	6.401	-	-	-	-	-	-
Cl	Construction	Mar	2	6.016	6.016	6.123	-	-	-	0.362	0.362	0.438
Cl	Construction	Apr	2	5.699	5.699	5.709	-	-	-	-	-	-
Cl	Construction	May	2	5.064	5.064	5.264	-	-	-	0.129	0.129	0.134
Cl	Construction	Jun	2	4.952	4.952	4.977	-	-	-	0.128	0.128	0.128
Cl	Construction	Jul	2	5.157	5.157	5.220	-	-	-	5.175	5.175	5.894
Cl	Construction	Aug	2	5.182	5.182	5.182	-	-	-	2.786	2.786	5.196
Cl	Construction	Sep	2	5.632	5.632	6.032	-	-	-	15.450	15.450	15.450
Cl	Construction	Oct	2	5.347	5.347	5.373	-	-	-	14.940	14.940	14.940
Cl	Construction	Nov	2	5.479	5.479	5.490	-	-	-	15.160	15.160	15.160
Cl	Construction	Dec	2	5.720	5.720	5.738	-	-	-	15.920	15.920	15.920
Cl	Operations	Jan	13	3.883	4.085	5.524	-	-	-	48.780	55.200	98.270
Cl	Operations	Feb	13	4.238	4.314	5.098	-	-	-	50.260	58.434	101.500
Cl	Operations	Mar	13	4.559	4.620	5.156	-	-	-	49.480	52.620	81.840
Cl	Operations	Apr	13	4.482	4.585	5.281	-	-	-	46.350	46.338	55.490
Cl	Operations	May	13	4.099	4.177	4.827	-	-	-	42.690	42.242	44.530
Cl	Operations	Jun	13	4.303	4.337	4.620	-	-	-	42.680	42.190	44.150
Cl	Operations	Jul	13	4.348	4.397	4.713	-	-	-	43.320	44.198	52.380
Cl	Operations	Aug	13	4.367	4.407	4.707	-	-	-	44.230	45.957	59.950
Cl	Operations	Sep	13	4.333	4.364	4.718	-	-	-	44.630	47.118	64.820
Cl	Operations	Oct	13	4.135	4.170	4.656	-	-	-	44.750	47.476	66.280
Cl	Operations	Nov	13	3.981	4.118	4.597	-	-	-	45.220	49.264	72.520
Cl	Operations	Dec	13	3.903	4.042	4.565	-	-	-	46.950	52.850	85.860
Cl	Closure	Jan	6	-	-	-	4.815	4.851	5.941	30.325	30.785	38.850
Cl	Closure	Feb	6	-	-	-	4.818	4.851	5.944	30.170	30.623	38.620
Cl	Closure	Mar	6	-	-	-	5.073	4.925	6.009	29.695	30.122	37.930
Cl	Closure	Apr	6	-	-	-	5.331	5.027	6.078	29.180	29.587	37.200
Cl	Closure	May	6	-	-	-	5.460	5.078	6.108	28.845	29.242	36.740
Cl	Closure	Jun	6	-	-	-	5.466	5.060	6.093	28.700	29.092	36.530
Cl	Closure	Jul	6	-	-	-	5.402	5.004	6.049	28.640	29.030	36.440
Cl	Closure	Aug	6	-	-	-	5.346	4.958	6.008	28.580	28.965	36.350
Cl	Closure	Sep	6	-	-	-	5.345	4.949	5.991	28.420	28.798	36.120
Cl	Closure	Oct	6	-	-	-	5.439	5.030	6.012	28.085	28.458	35.670
Cl	Closure	Nov	6	-	-	-	5.511	5.101	6.030	27.825	28.187	35.310
Cl	Closure	Dec	6	-	-	-	5.523	5.120	6.028	27.695	28.057	35.140
Cl	Post-Closure	Jan	109	-	-	-	4.792	5.082	6.670	1.449	3.161	21.820
Cl	Post-Closure	Feb	109	-	-	-	4.791	5.082	6.668	1.447	3.152	21.730
Cl	Post-Closure	Mar	109	-	-	-	4.789	5.081	6.673	1.443	3.126	21.470
Cl	Post-Closure	Apr	109	-	-	-	4.787	5.082	6.682	1.438	3.099	21.190
Cl	Post-Closure	May	109	-	-	-	4.786	5.081	6.685	1.437	3.080	20.990
Cl	Post-Closure	Jun	109	-	-	-	4.783	5.078	6.683	1.440	3.067	20.810
Cl	Post-Closure	Jul	109	-	-	-	4.779	5.075	6.679	1.445	3.055	20.590
Cl	Post-Closure	Aug	109	-	-	-	4.776	5.072	6.676	1.451	3.042	20.370
Cl	Post-Closure	Sep	109	-	-	-	4.772	5.069	6.674	1.454	3.025	20.150
Cl	Post-Closure	Oct	109	-	-	-	4.769	5.067	6.675	1.451	3.003	19.920
Cl	Post-Closure	Nov	109	-	-	-	4.768	5.066	6.675	1.447	2.987	19.770
Cl	Post-Closure	Dec	109	-	-	-	4.768	5.065	6.673	1.445	2.980	19.700
F	Construction	Jan	2	0.0878	0.0878	0.1039	-	-	-	-	-	-
F	Construction	Feb	2	0.1159	0.1159	0.1202	-	-	-	-	-	-
F	Construction	Mar	2	0.1528	0.1528	0.1568	-	-	-	0.0049	0.0049	0.0081
F	Construction	Apr	2	0.1699	0.1699	0.1759	-	-	-	-	-	-
F	Construction	May	2	0.1804	0.1804	0.1849	-	-	-	0.0012	0.0012	0.0015
F	Construction	Jun	2	0.1667	0.1667	0.1720	-	-	-	0.0009	0.0009	0.0009
F	Construction	Jul	2	0.1523	0.1523	0.1646	-	-	-	0.1083	0.1083	0.1652
F	Construction	Aug	2	0.1546	0.1546	0.1683	-	-	-	0.0307	0.0307	0.0509
F	Construction	Sep	2	0.1616	0.1616	0.1872	-	-	-	0.3327	0.3327	0.3327
F	Construction	Oct	2	0.1372	0.1372	0.1563	-	-	-	0.3064	0.3064	0.3064
F	Construction	Nov	2	0.1274	0.1274	0.1471	-	-	-	0.2918	0.2918	0.2918
F	Construction	Dec	2	0.1245	0.1245	0.1451	-	-	-	0.2938	0.2938	0.2938
F	Operations	Jan	13	0.3779	0.3763	0.5829	-	-	-	1.2830	1.2831	1.8090
F	Operations	Feb	13	0.3209	0.3219	0.4347	-	-	-	1.3200	1.3236	1.8140
F	Operations	Mar	13	0.2910	0.2928	0.3583	-	-	-	1.2330	1.2037	1.4490
F	Operations	Apr	13	0.3214	0.3238	0.4394	-	-	-	1.1080	1.0850	1.2890
F	Operations	May	13	0.3446	0.3490	0.4991	-	-	-	1.0280	1.0169	1.2480
F	Operations	Jun	13	0.3279	0.3300	0.4311	-	-	-	1.0310	1.0409	1.2480
F	Operations	Jul	13	0.3424	0.3421	0.4494	-	-	-	1.1110	1.1219	1.2780
F	Operations	Aug	13	0.3394	0.3406	0.4417	-	-	-	1.1820	1.1992	1.3100
F	Operations	Sep	13	0.3481	0.3557	0.4730	-	-	-	1.2460	1.2395	1.4070
F	Operations	Oct	13	0.3894	0.4017	0.5873	-	-	-	1.2470	1.2365	1.3930
F	Operations	Nov	13	0.4286	0.4010	0.5571	-	-	-	1.2520	1.2520	1.4560
F	Operations	Dec	13	0.4355	0.4081	0.5725	-	-	-	1.2670	1.3004	1.6450
F	Closure	Jan	6	-	-	-	0.6175	0.5748	0.6437	1.0645	1.0744	1.2460
F	Closure	Feb	6	-	-	-	0.6146	0.5755	0.6419	1.0590	1.0688	1.2390
F	Closure	Mar	6	-	-	-	0.6177	0.5906	0.6421	1.0420	1.0510	1.2170
F	Closure	Apr	6	-	-	-	0.6222	0.6012	0.6430	1.0236	1.0321	1.1930
F	Closure	May	6	-	-	-	0.6240	0.6048	0.6432	1.0139	1.0220	1.1800
F	Closure	Jun	6	-	-	-	0.6258	0.6103	0.6437	1.0144	1.0227	1.1800
F	Closure	Jul	6	-	-	-	0.6291	0.6190	0.6454	1.0225	1.0308	1.1880
F	Closure	Aug	6	-	-	-	0.6331	0.6266	0.6475	1.0315	1.0399	1.1970
F	Closure	Sep	6	-	-	-	0.6362	0.6312	0.6491	1.0335	1.0417	1.1980
F	Closure	Oct	6	-	-	-	0.6389	0.6338	0.6500	1.0240	1.0320	1.1860
F	Closure	Nov	6	-	-	-	0.6389	0.6328	0.6496	1.0152	1.0231	1.1750
F	Closure	Dec	6	-	-	-	0.6365	0.6292	0.6481	1.0104	1.0181	1.1690
F	Post-Closure	Jan	109	-	-	-	0.6480	0.6441	0.6492	0.1412	0.2036	0.8840
F	Post-Closure	Feb	109	-	-	-	0.6479	0.6440	0.6489	0.1407	0.2028	0.8805
F	Post-Closure	Mar	109	-	-	-	0.6475	0.6437	0.6486	0.1390	0.2004	0.8694

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
F	Post-Closure	Apr	109	-	-	-	0.6473	0.6435	0.6483	0.1373	0.1978	0.8576
F	Post-Closure	May	109	-	-	-	0.6473	0.6434	0.6483	0.1367	0.1966	0.8496
F	Post-Closure	Jun	109	-	-	-	0.6474	0.6436	0.6485	0.1376	0.1970	0.8438
F	Post-Closure	Jul	109	-	-	-	0.6477	0.6438	0.6494	0.1397	0.1984	0.8379
F	Post-Closure	Aug	109	-	-	-	0.6480	0.6442	0.6505	0.1422	0.2002	0.8320
F	Post-Closure	Sep	109	-	-	-	0.6482	0.6444	0.6513	0.1433	0.2006	0.8250
F	Post-Closure	Oct	109	-	-	-	0.6482	0.6444	0.6517	0.1427	0.1993	0.8161
F	Post-Closure	Nov	109	-	-	-	0.6482	0.6443	0.6513	0.1419	0.1981	0.8101
F	Post-Closure	Dec	109	-	-	-	0.6482	0.6443	0.6503	0.1415	0.1974	0.8073
P, Tot	Construction	Jan	2	0.0351	0.0351	0.0388	-	-	-	-	-	-
P, Tot	Construction	Feb	2	0.0458	0.0458	0.0463	-	-	-	-	-	-
P, Tot	Construction	Mar	2	0.0604	0.0604	0.0610	-	-	-	0.0011	0.0011	0.0014
P, Tot	Construction	Apr	2	0.0662	0.0662	0.0670	-	-	-	-	-	-
P, Tot	Construction	May	2	0.0747	0.0747	0.0758	-	-	-	0.0004	0.0004	0.0004
P, Tot	Construction	Jun	2	0.0708	0.0708	0.0710	-	-	-	0.0006	0.0006	0.0006
P, Tot	Construction	Jul	2	0.0633	0.0633	0.0651	-	-	-	0.0289	0.0289	0.0315
P, Tot	Construction	Aug	2	0.0624	0.0624	0.0645	-	-	-	0.0135	0.0135	0.0260
P, Tot	Construction	Sep	2	0.0559	0.0559	0.0579	-	-	-	0.0199	0.0199	0.0199
P, Tot	Construction	Oct	2	0.0469	0.0469	0.0499	-	-	-	0.0148	0.0148	0.0148
P, Tot	Construction	Nov	2	0.0429	0.0429	0.0462	-	-	-	0.0103	0.0103	0.0103
P, Tot	Construction	Dec	2	0.0422	0.0422	0.0459	-	-	-	0.0078	0.0078	0.0078
P, Tot	Operations	Jan	13	0.0548	0.0537	0.0596	-	-	-	0.0610	0.0535	0.0653
P, Tot	Operations	Feb	13	0.0721	0.0701	0.0764	-	-	-	0.0590	0.0504	0.0646
P, Tot	Operations	Mar	13	0.0866	0.0837	0.0876	-	-	-	0.0544	0.0451	0.0628
P, Tot	Operations	Apr	13	0.0753	0.0736	0.0768	-	-	-	0.0531	0.0471	0.0618
P, Tot	Operations	May	13	0.0703	0.0691	0.0721	-	-	-	0.0563	0.0536	0.0624
P, Tot	Operations	Jun	13	0.0825	0.0824	0.0843	-	-	-	0.0614	0.0594	0.0648
P, Tot	Operations	Jul	13	0.0815	0.0813	0.0837	-	-	-	0.0646	0.0650	0.0792
P, Tot	Operations	Aug	13	0.0823	0.0819	0.0844	-	-	-	0.0683	0.0706	0.0915
P, Tot	Operations	Sep	13	0.0773	0.0763	0.0820	-	-	-	0.0697	0.0715	0.0905
P, Tot	Operations	Oct	13	0.0660	0.0664	0.0805	-	-	-	0.0677	0.0675	0.0779
P, Tot	Operations	Nov	13	0.0650	0.0627	0.0690	-	-	-	0.0661	0.0636	0.0678
P, Tot	Operations	Dec	13	0.0596	0.0584	0.0644	-	-	-	0.0649	0.0609	0.0672
P, Tot	Closure	Jan	6	-	-	-	0.0733	0.0757	0.0884	0.0581	0.0586	0.0669
P, Tot	Closure	Feb	6	-	-	-	0.0734	0.0753	0.0854	0.0578	0.0583	0.0665
P, Tot	Closure	Mar	6	-	-	-	0.0732	0.0742	0.0799	0.0569	0.0573	0.0653
P, Tot	Closure	Apr	6	-	-	-	0.0730	0.0737	0.0774	0.0559	0.0563	0.0641
P, Tot	Closure	May	6	-	-	-	0.0729	0.0735	0.0768	0.0554	0.0558	0.0634
P, Tot	Closure	Jun	6	-	-	-	0.0729	0.0734	0.0760	0.0555	0.0559	0.0635
P, Tot	Closure	Jul	6	-	-	-	0.0729	0.0732	0.0749	0.0560	0.0564	0.0640
P, Tot	Closure	Aug	6	-	-	-	0.0728	0.0730	0.0740	0.0566	0.0570	0.0646
P, Tot	Closure	Sep	6	-	-	-	0.0727	0.0728	0.0735	0.0567	0.0571	0.0647
P, Tot	Closure	Oct	6	-	-	-	0.0726	0.0727	0.0733	0.0562	0.0566	0.0641
P, Tot	Closure	Nov	6	-	-	-	0.0726	0.0727	0.0734	0.0557	0.0561	0.0635
P, Tot	Closure	Dec	6	-	-	-	0.0727	0.0729	0.0739	0.0555	0.0559	0.0632
P, Tot	Post-Closure	Jan	109	-	-	-	0.0447	0.0486	0.0721	0.0123	0.0154	0.0494
P, Tot	Post-Closure	Feb	109	-	-	-	0.0447	0.0486	0.0722	0.0122	0.0153	0.0492
P, Tot	Post-Closure	Mar	109	-	-	-	0.0447	0.0486	0.0720	0.0121	0.0152	0.0486
P, Tot	Post-Closure	Apr	109	-	-	-	0.0447	0.0485	0.0718	0.0120	0.0150	0.0480
P, Tot	Post-Closure	May	109	-	-	-	0.0446	0.0485	0.0717	0.0120	0.0150	0.0476
P, Tot	Post-Closure	Jun	109	-	-	-	0.0446	0.0485	0.0717	0.0120	0.0150	0.0473
P, Tot	Post-Closure	Jul	109	-	-	-	0.0446	0.0485	0.0715	0.0122	0.0151	0.0471
P, Tot	Post-Closure	Aug	109	-	-	-	0.0446	0.0484	0.0713	0.0124	0.0153	0.0468
P, Tot	Post-Closure	Sep	109	-	-	-	0.0446	0.0484	0.0711	0.0125	0.0153	0.0465
P, Tot	Post-Closure	Oct	109	-	-	-	0.0445	0.0483	0.0709	0.0124	0.0152	0.0460
P, Tot	Post-Closure	Nov	109	-	-	-	0.0445	0.0483	0.0708	0.0123	0.0151	0.0457
P, Tot	Post-Closure	Dec	109	-	-	-	0.0445	0.0483	0.0709	0.0123	0.0151	0.0455
NH3 (as N)	Construction	Jan	2	0.5113	0.5113	0.6663	-	-	-	-	-	-
NH3 (as N)	Construction	Feb	2	0.6554	0.6554	0.8264	-	-	-	-	-	-
NH3 (as N)	Construction	Mar	2	0.7023	0.7023	0.8058	-	-	-	0.0342	0.0342	0.0575
NH3 (as N)	Construction	Apr	2	0.7289	0.7289	0.8119	-	-	-	-	-	-
NH3 (as N)	Construction	May	2	0.8348	0.8348	0.8947	-	-	-	0.0120	0.0120	0.0160
NH3 (as N)	Construction	Jun	2	0.8417	0.8417	0.8767	-	-	-	0.0153	0.0153	0.0153
NH3 (as N)	Construction	Jul	2	0.6361	0.6361	0.6674	-	-	-	0.5935	0.5935	0.7000
NH3 (as N)	Construction	Aug	2	0.5671	0.5671	0.6192	-	-	-	0.1975	0.1975	0.3172
NH3 (as N)	Construction	Sep	2	0.6732	0.6732	0.8579	-	-	-	2.8790	2.8790	2.8790
NH3 (as N)	Construction	Oct	2	0.5376	0.5376	0.6379	-	-	-	2.7510	2.7510	2.7510
NH3 (as N)	Construction	Nov	2	0.5787	0.5787	0.7016	-	-	-	2.7700	2.7700	2.7700
NH3 (as N)	Construction	Dec	2	0.6957	0.6957	0.8595	-	-	-	2.9030	2.9030	2.9030
NH3 (as N)	Operations	Jan	13	1.7280	1.7065	2.2170	-	-	-	9.5820	10.6098	18.2600
NH3 (as N)	Operations	Feb	13	1.4120	1.3947	1.9990	-	-	-	9.8450	11.1885	18.8100
NH3 (as N)	Operations	Mar	13	0.9180	0.9283	1.0820	-	-	-	9.6600	10.0418	15.0400
NH3 (as N)	Operations	Apr	13	0.9172	0.8900	0.9855	-	-	-	9.0210	8.8352	10.1600
NH3 (as N)	Operations	May	13	0.9617	0.9180	1.0360	-	-	-	8.2710	8.0826	8.6450
NH3 (as N)	Operations	Jun	13	0.9272	0.9046	0.9629	-	-	-	8.1520	8.1326	8.5690
NH3 (as N)	Operations	Jul	13	0.8065	0.7951	0.8584	-	-	-	8.5130	8.6002	9.9000
NH3 (as N)	Operations	Aug	13	0.8123	0.8055	0.8726	-	-	-	8.7400	9.0088	11.3800
NH3 (as N)	Operations	Sep	13	0.8093	0.7946	0.8815	-	-	-	8.8170	9.2458	12.2700
NH3 (as N)	Operations	Oct	13	0.8456	0.8256	0.9624	-	-	-	8.8060	9.2768	*12.4400*
NH3 (as N)	Operations	Nov	13	1.1130	1.0975	1.3630	-	-	-	8.9040	9.5788	13.5400
NH3 (as N)	Operations	Dec	13	1.4760	1.4550	1.8970	-	-	-	9.2170	10.2250	15.9800
NH3 (as N)	Closure	Jan	6	-	-	-	0.8845	0.8635	1.0720	6.0620	6.1470	7.6260
NH3 (as N)	Closure	Feb	6	-	-	-	0.8645	0.8618	1.0730	6.0310	6.1142	7.5810
NH3 (as N)	Closure	Mar	6	-	-	-	0.8934	0.8713	1.0870	5.9330	6.0117	7.4430
NH3 (as N)	Closure	Apr	6	-	-	-	0.9452	0.8879	1.1010	5.8280	5.9027	7.2980
NH3 (as N)	Closure	May	6	-	-	-	0.9718	0.8981	1.1080	5.7635	5.8357	7.2080
NH3 (as N)	Closure	Jun	6	-	-	-	0.9745	0.8966	1.1050	5.7430	5.8143	7.1770

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
NH3 (as N)	Closure	Jul	6	-	-	-	0.9611	0.8845	1.0960	5.7460	5.8170	7.1760
NH3 (as N)	Closure	Aug	6	-	-	-	0.9478	0.8716	1.0870	5.7490	5.8202	7.1750
NH3 (as N)	Closure	Sep	6	-	-	-	0.9460	0.8671	1.0820	5.7265	5.7965	7.1410
NH3 (as N)	Closure	Oct	6	-	-	-	0.9650	0.8831	1.0870	5.6625	5.7310	7.0540
NH3 (as N)	Closure	Nov	6	-	-	-	0.9803	0.8981	1.0910	5.6095	5.6765	6.9840
NH3 (as N)	Closure	Dec	6	-	-	-	0.9832	0.9031	1.0910	5.5835	5.6498	6.9490
NH3 (as N)	Post-Closure	Jan	109	-	-	-	0.4665	0.5637	1.1070	0.2751	0.6305	4.5030
NH3 (as N)	Post-Closure	Feb	109	-	-	-	0.4664	0.5636	1.1060	0.2741	0.6281	4.4850
NH3 (as N)	Post-Closure	Mar	109	-	-	-	0.4659	0.5632	1.1080	0.2711	0.6206	4.4290
NH3 (as N)	Post-Closure	Apr	109	-	-	-	0.4654	0.5629	1.1120	0.2680	0.6127	4.3690
NH3 (as N)	Post-Closure	May	109	-	-	-	0.4651	0.5626	1.1140	0.2671	0.6082	4.3250
NH3 (as N)	Post-Closure	Jun	109	-	-	-	0.4650	0.5624	1.1140	0.2693	0.6072	4.2890
NH3 (as N)	Post-Closure	Jul	109	-	-	-	0.4643	0.5615	1.1130	0.2737	0.6078	4.2480
NH3 (as N)	Post-Closure	Aug	109	-	-	-	0.4629	0.5598	1.1110	0.2776	0.6077	4.2050
NH3 (as N)	Post-Closure	Sep	109	-	-	-	0.4616	0.5583	1.1090	0.2789	0.6051	4.1600
NH3 (as N)	Post-Closure	Oct	109	-	-	-	0.4606	0.5573	1.1100	0.2774	0.5997	4.1110
NH3 (as N)	Post-Closure	Nov	109	-	-	-	0.4602	0.5568	1.1100	0.2758	0.5956	4.0800
NH3 (as N)	Post-Closure	Dec	109	-	-	-	0.4601	0.5566	1.1080	0.2749	0.5934	4.0650
NO2 (as N)	Construction	Jan	2	0.0632	0.0632	0.1031	-	-	-	-	-	-
NO2 (as N)	Construction	Feb	2	0.0772	0.0772	0.1260	-	-	-	-	-	-
NO2 (as N)	Construction	Mar	2	0.0599	0.0599	0.0873	-	-	-	0.0068	0.0068	0.0129
NO2 (as N)	Construction	Apr	2	0.0539	0.0539	0.0736	-	-	-	-	-	-
NO2 (as N)	Construction	May	2	0.0575	0.0575	0.0729	-	-	-	0.0021	0.0021	0.0033
NO2 (as N)	Construction	Jun	2	0.0540	0.0540	0.0629	-	-	-	0.0020	0.0020	0.0020
NO2 (as N)	Construction	Jul	2	0.0469	0.0469	0.0520	-	-	-	0.0969	0.0969	0.1297
NO2 (as N)	Construction	Aug	2	0.0454	0.0454	0.0526	-	-	-	0.0323	0.0323	0.0636
NO2 (as N)	Construction	Sep	2	0.0525	0.0525	0.0645	-	-	-	0.0327	0.0327	0.0327
NO2 (as N)	Construction	Oct	2	0.0586	0.0586	0.0714	-	-	-	0.0288	0.0288	0.0288
NO2 (as N)	Construction	Nov	2	0.0772	0.0772	0.0976	-	-	-	0.0274	0.0274	0.0274
NO2 (as N)	Construction	Dec	2	0.1040	0.1040	0.1344	-	-	-	0.0279	0.0279	0.0279
NO2 (as N)	Operations	Jan	13	0.3411	0.3377	0.4600	-	-	-	0.1243	0.1236	0.2008
NO2 (as N)	Operations	Feb	13	0.2219	0.2226	0.4057	-	-	-	0.1308	0.1311	0.2098
NO2 (as N)	Operations	Mar	13	0.0686	0.0763	0.1360	-	-	-	0.1247	0.1189	0.1584
NO2 (as N)	Operations	Apr	13	0.0913	0.0883	0.1258	-	-	-	0.1156	0.1081	0.1225
NO2 (as N)	Operations	May	13	0.1013	0.0972	0.1233	-	-	-	0.1066	0.1029	0.1170
NO2 (as N)	Operations	Jun	13	0.0713	0.0678	0.0790	-	-	-	0.1055	0.1031	0.1158
NO2 (as N)	Operations	Jul	13	0.0597	0.0585	0.0679	-	-	-	0.1053	0.1051	0.1174
NO2 (as N)	Operations	Aug	13	0.0611	0.0609	0.0699	-	-	-	0.1089	0.1066	0.1266
NO2 (as N)	Operations	Sep	13	0.0687	0.0681	0.0847	-	-	-	0.1106	0.1073	0.1317
NO2 (as N)	Operations	Oct	13	0.1068	0.1001	0.1270	-	-	-	0.1098	0.1069	0.1320
NO2 (as N)	Operations	Nov	13	0.1751	0.1732	0.2328	-	-	-	0.1104	0.1103	0.1442
NO2 (as N)	Operations	Dec	13	0.2751	0.2685	0.3720	-	-	-	0.1167	0.1180	0.1725
NO2 (as N)	Closure	Jan	6	-	-	-	0.0308	0.0328	0.0455	0.0597	0.0606	0.0763
NO2 (as N)	Closure	Feb	6	-	-	-	0.0309	0.0322	0.0414	0.0594	0.0603	0.0759
NO2 (as N)	Closure	Mar	6	-	-	-	0.0310	0.0315	0.0364	0.0585	0.0593	0.0746
NO2 (as N)	Closure	Apr	6	-	-	-	0.0312	0.0312	0.0338	0.0575	0.0583	0.0731
NO2 (as N)	Closure	May	6	-	-	-	0.0312	0.0311	0.0327	0.0568	0.0576	0.0722
NO2 (as N)	Closure	Jun	6	-	-	-	0.0312	0.0308	0.0314	0.0566	0.0573	0.0719
NO2 (as N)	Closure	Jul	6	-	-	-	0.0307	0.0304	0.0312	0.0565	0.0572	0.0717
NO2 (as N)	Closure	Aug	6	-	-	-	0.0305	0.0301	0.0310	0.0563	0.0571	0.0715
NO2 (as N)	Closure	Sep	6	-	-	-	0.0304	0.0299	0.0310	0.0560	0.0567	0.0710
NO2 (as N)	Closure	Oct	6	-	-	-	0.0305	0.0299	0.0310	0.0554	0.0561	0.0702
NO2 (as N)	Closure	Nov	6	-	-	-	0.0306	0.0301	0.0310	0.0548	0.0556	0.0695
NO2 (as N)	Closure	Dec	6	-	-	-	0.0307	0.0302	0.0311	0.0546	0.0553	0.0691
NO2 (as N)	Post-Closure	Jan	109	-	-	-	0.0181	0.0203	0.0312	0.0033	0.0067	0.0431
NO2 (as N)	Post-Closure	Feb	109	-	-	-	0.0181	0.0203	0.0312	0.0033	0.0066	0.0430
NO2 (as N)	Post-Closure	Mar	109	-	-	-	0.0181	0.0203	0.0313	0.0033	0.0066	0.0425
NO2 (as N)	Post-Closure	Apr	109	-	-	-	0.0181	0.0203	0.0313	0.0033	0.0066	0.0419
NO2 (as N)	Post-Closure	May	109	-	-	-	0.0181	0.0203	0.0313	0.0033	0.0065	0.0415
NO2 (as N)	Post-Closure	Jun	109	-	-	-	0.0181	0.0203	0.0313	0.0033	0.0065	0.0412
NO2 (as N)	Post-Closure	Jul	109	-	-	-	0.0181	0.0202	0.0312	0.0033	0.0065	0.0408
NO2 (as N)	Post-Closure	Aug	109	-	-	-	0.0180	0.0202	0.0312	0.0033	0.0064	0.0403
NO2 (as N)	Post-Closure	Sep	109	-	-	-	0.0180	0.0201	0.0311	0.0033	0.0064	0.0399
NO2 (as N)	Post-Closure	Oct	109	-	-	-	0.0180	0.0201	0.0311	0.0033	0.0064	0.0394
NO2 (as N)	Post-Closure	Nov	109	-	-	-	0.0180	0.0201	0.0311	0.0033	0.0063	0.0391
NO2 (as N)	Post-Closure	Dec	109	-	-	-	0.0180	0.0201	0.0312	0.0033	0.0063	0.0390
N_NO3_NO2	Construction	Jan	2	3.9727	3.9727	7.7870	-	-	-	-	-	-
N_NO3_NO2	Construction	Feb	2	5.0686	5.0686	9.7900	-	-	-	-	-	-
N_NO3_NO2	Construction	Mar	2	3.8478	3.8478	7.1670	-	-	-	0.5569	0.5569	1.1130
N_NO3_NO2	Construction	Apr	2	2.5809	2.5809	4.5590	-	-	-	-	-	-
N_NO3_NO2	Construction	May	2	2.7380	2.7380	4.1170	-	-	-	0.1687	0.1687	0.2786
N_NO3_NO2	Construction	Jun	2	2.6930	2.6930	3.5930	-	-	-	0.1599	0.1599	0.1599
N_NO3_NO2	Construction	Jul	2	2.3945	2.3945	2.9050	-	-	-	8.2050	8.2050	11.4200
N_NO3_NO2	Construction	Aug	2	2.2835	2.2835	2.8610	-	-	-	2.6592	2.6592	5.2630
N_NO3_NO2	Construction	Sep	2	2.3985	2.3985	2.9770	-	-	-	1.9040	1.9040	1.9040
N_NO3_NO2	Construction	Oct	2	3.4500	3.4500	4.5080	-	-	-	1.5670	1.5670	1.5670
N_NO3_NO2	Construction	Nov	2	5.3015	5.3015	7.1150	-	-	-	1.4490	1.4490	1.4490
N_NO3_NO2	Construction	Dec	2	7.8095	7.8095	10.5800	-	-	-	1.4660	1.4660	1.4660
N_NO3_NO2	Operations	Jan	13	30.5000	30.2100	41.8100	-	-	-	7.7930	7.4697	12.0100
N_NO3_NO2	Operations	Feb	13	18.6700	18.7726	36.6600	-	-	-	8.2180	7.9912	12.7700
N_NO3_NO2	Operations	Mar	13	3.6520	4.4608	10.4400	-	-	-	7.9330	7.2474	9.1550
N_NO3_NO2	Operations	Apr	13	6.0180	5.8788	9.6200	-	-	-	6.6860	6.4753	7.8000
N_NO3_NO2	Operations	May	13	7.3010	7.0692	9.5950	-	-	-	6.3360	6.0335	7.3500
N_NO3_NO2	Operations	Jun	13	4.1690	3.8814	4.9230	-	-	-	6.1410	5.9955	7.2370
N_NO3_NO2	Operations	Jul	13	3.1560	3.0710	3.9560	-	-	-	6.2460	6.1219	7.2850
N_NO3_NO2	Operations	Aug	13	3.3360	3.2805	4.1840	-	-	-	6.2290	6.2183	7.3270
N_NO3_NO2	Operations	Sep	13	4.1210	3.9973	5.8410	-	-	-	6.2200	6.2714	7.3790

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
N_NO3_NO2	Operations	Oct	13	8.0190	7.3418	10.0500	-	-	-	6.2280	6.2687	7.3720
N_NO3_NO2	Operations	Nov	13	14.5800	14.3812	20.0900	-	-	-	6.7630	6.5135	8.1560
N_NO3_NO2	Operations	Dec	13	24.1600	23.5477	33.3200	-	-	-	7.0830	7.0295	10.0400
N_NO3_NO2	Closure	Jan	6	-	-	-	0.8200	0.8964	1.5050	3.0670	3.1158	3.9650
N_NO3_NO2	Closure	Feb	6	-	-	-	0.8230	0.8559	1.2380	3.0515	3.0993	3.9410
N_NO3_NO2	Closure	Mar	6	-	-	-	0.8344	0.8273	1.0100	3.0020	3.0470	3.8690
N_NO3_NO2	Closure	Apr	6	-	-	-	0.8459	0.8141	0.8759	2.9480	2.9912	3.7930
N_NO3_NO2	Closure	May	6	-	-	-	0.8302	0.8091	0.8651	2.9135	2.9552	3.7440
N_NO3_NO2	Closure	Jun	6	-	-	-	0.8185	0.7992	0.8633	2.8980	2.9390	3.7220
N_NO3_NO2	Closure	Jul	6	-	-	-	0.8100	0.7845	0.8583	2.8905	2.9315	3.7120
N_NO3_NO2	Closure	Aug	6	-	-	-	0.8020	0.7728	0.8533	2.8830	2.9237	3.7010
N_NO3_NO2	Closure	Sep	6	-	-	-	0.8000	0.7676	0.8508	2.8650	2.9052	3.6760
N_NO3_NO2	Closure	Oct	6	-	-	-	0.8076	0.7730	0.8521	2.8310	2.8702	3.6290
N_NO3_NO2	Closure	Nov	6	-	-	-	0.8149	0.7804	0.8540	2.8040	2.8422	3.5920
N_NO3_NO2	Closure	Dec	6	-	-	-	0.8177	0.7844	0.8547	2.7910	2.8290	3.5750
N_NO3_NO2	Post-Closure	Jan	109	-	-	-	0.3388	0.4208	0.8586	0.0208	0.2016	2.1720
N_NO3_NO2	Post-Closure	Feb	109	-	-	-	0.3389	0.4208	0.8593	0.0207	0.2008	2.1630
N_NO3_NO2	Post-Closure	Mar	109	-	-	-	0.3383	0.4203	0.8605	0.0205	0.1983	2.1360
N_NO3_NO2	Post-Closure	Apr	109	-	-	-	0.3377	0.4197	0.8617	0.0203	0.1957	2.1070
N_NO3_NO2	Post-Closure	May	109	-	-	-	0.3373	0.4193	0.8622	0.0202	0.1938	2.0850
N_NO3_NO2	Post-Closure	Jun	109	-	-	-	0.3368	0.4186	0.8613	0.0202	0.1922	2.0660
N_NO3_NO2	Post-Closure	Jul	109	-	-	-	0.3360	0.4176	0.8591	0.0204	0.1904	2.0430
N_NO3_NO2	Post-Closure	Aug	109	-	-	-	0.3351	0.4164	0.8570	0.0206	0.1885	2.0190
N_NO3_NO2	Post-Closure	Sep	109	-	-	-	0.3343	0.4155	0.8559	0.0206	0.1866	1.9950
N_NO3_NO2	Post-Closure	Oct	109	-	-	-	0.3337	0.4148	0.8563	0.0205	0.1845	1.9710
N_NO3_NO2	Post-Closure	Nov	109	-	-	-	0.3336	0.4146	0.8573	0.0204	0.1831	1.9560
N_NO3_NO2	Post-Closure	Dec	109	-	-	-	0.3337	0.4147	0.8580	0.0203	0.1824	1.9490
CN, Tot	Construction	Jan	2	0.00047	0.00047	0.00050	-	-	-	-	-	-
CN, Tot	Construction	Feb	2	0.00051	0.00051	0.00052	-	-	-	-	-	-
CN, Tot	Construction	Mar	2	0.00057	0.00057	0.00059	-	-	-	0.00002	0.00002	0.00003
CN, Tot	Construction	Apr	2	0.00059	0.00059	0.00059	-	-	-	-	-	-
CN, Tot	Construction	May	2	0.00069	0.00069	0.00069	-	-	-	0.00001	0.00001	0.00001
CN, Tot	Construction	Jun	2	0.00072	0.00072	0.00073	-	-	-	0.00001	0.00001	0.00001
CN, Tot	Construction	Jul	2	0.00062	0.00062	0.00062	-	-	-	0.00052	0.00052	0.00060
CN, Tot	Construction	Aug	2	0.00452	0.00452	0.00847	-	-	-	0.02532	0.02532	0.05020
CN, Tot	Construction	Sep	2	0.07988	0.07988	0.15920	-	-	-	1.96400	1.96400	1.96400
CN, Tot	Construction	Oct	2	0.01532	0.01532	0.03011	-	-	-	1.90000	1.90000	1.90000
CN, Tot	Construction	Nov	2	0.00795	0.00795	0.01539	-	-	-	1.99900	1.99900	1.99900
CN, Tot	Construction	Dec	2	0.00615	0.00615	0.01180	-	-	-	2.14000	2.14000	2.14000
CN, Tot	Operations	Jan	13	0.00041	0.00104	0.00850	-	-	-	3.25400	4.82638	12.46000
CN, Tot	Operations	Feb	13	0.00054	0.00086	0.00478	-	-	-	4.13700	5.45262	13.51000
CN, Tot	Operations	Mar	13	0.00064	0.00068	0.00128	-	-	-	4.27300	4.91046	10.51000
CN, Tot	Operations	Apr	13	0.00057	0.00057	0.00061	-	-	-	4.11900	4.28915	7.17900
CN, Tot	Operations	May	13	0.00059	0.00058	0.00064	-	-	-	3.64200	3.67323	5.39000
CN, Tot	Operations	Jun	13	0.00065	0.00065	0.00069	-	-	-	3.13300	3.23746	4.86600
CN, Tot	Operations	Jul	13	0.00060	0.00061	0.00064	-	-	-	2.66400	2.91654	4.96300
CN, Tot	Operations	Aug	13	0.00059	0.00060	0.00064	-	-	-	2.28500	2.66162	5.18700
CN, Tot	Operations	Sep	13	0.00058	0.00058	0.00063	-	-	-	2.13400	2.61506	5.60800
CN, Tot	Operations	Oct	13	0.00053	0.00052	0.00060	-	-	-	2.25400	2.83928	6.37300
CN, Tot	Operations	Nov	13	0.00049	0.00049	0.00052	-	-	-	2.55700	3.33764	7.90100
CN, Tot	Operations	Dec	13	0.00044	0.00045	0.00047	-	-	-	2.90000	3.98988	10.20000
CN, Tot	Closure	Jan	6	-	-	-	0.03866	0.03609	0.07186	0.65950	0.66633	0.78350
CN, Tot	Closure	Feb	6	-	-	-	0.04001	0.03687	0.07202	0.65610	0.66273	0.77880
CN, Tot	Closure	Mar	6	-	-	-	0.04635	0.03995	0.07391	0.64545	0.65163	0.76460
CN, Tot	Closure	Apr	6	-	-	-	0.05273	0.04307	0.07591	0.63405	0.63987	0.74970
CN, Tot	Closure	May	6	-	-	-	0.05599	0.04471	0.07682	0.62785	0.63343	0.74140
CN, Tot	Closure	Jun	6	-	-	-	0.05637	0.04490	0.07656	0.62775	0.63335	0.74070
CN, Tot	Closure	Jul	6	-	-	-	0.05503	0.04418	0.07549	0.63190	0.63752	0.74480
CN, Tot	Closure	Aug	6	-	-	-	0.05387	0.04352	0.07448	0.63660	0.64225	0.74950
CN, Tot	Closure	Sep	6	-	-	-	0.05407	0.04361	0.07412	0.63690	0.64253	0.74910
CN, Tot	Closure	Oct	6	-	-	-	0.05664	0.04586	0.07491	0.63100	0.63647	0.74130
CN, Tot	Closure	Nov	6	-	-	-	0.05859	0.04771	0.07554	0.62540	0.63073	0.73420
CN, Tot	Closure	Dec	6	-	-	-	0.05896	0.04814	0.07554	0.62250	0.62777	0.73060
CN, Tot	Post-Closure	Jan	109	-	-	-	0.04814	0.05287	0.08554	0.07283	0.11180	0.53650
CN, Tot	Post-Closure	Feb	109	-	-	-	0.04813	0.05286	0.08545	0.07253	0.11136	0.53440
CN, Tot	Post-Closure	Mar	109	-	-	-	0.04810	0.05287	0.08568	0.07162	0.10995	0.52760
CN, Tot	Post-Closure	Apr	109	-	-	-	0.04807	0.05288	0.08594	0.07069	0.10849	0.52040
CN, Tot	Post-Closure	May	109	-	-	-	0.04803	0.05287	0.08603	0.07039	0.10779	0.51540
CN, Tot	Post-Closure	Jun	109	-	-	-	0.04797	0.05281	0.08597	0.07087	0.10793	0.51170
CN, Tot	Post-Closure	Jul	109	-	-	-	0.04785	0.05271	0.08585	0.07203	0.10866	0.50790
CN, Tot	Post-Closure	Aug	109	-	-	-	0.04774	0.05260	0.08573	0.07335	0.10955	0.50400
CN, Tot	Post-Closure	Sep	109	-	-	-	0.04765	0.05252	0.08569	0.07394	0.10971	0.49950
CN, Tot	Post-Closure	Oct	109	-	-	-	0.04759	0.05250	0.08576	0.07363	0.10896	0.49400
CN, Tot	Post-Closure	Nov	109	-	-	-	0.04758	0.05249	0.08579	0.07321	0.10828	0.49040
CN, Tot	Post-Closure	Dec	109	-	-	-	0.04758	0.05248	0.08567	0.07295	0.10789	0.48860
CN, Free	Construction	Jan	2	0.00061	0.00061	0.00068	-	-	-	-	-	-
CN, Free	Construction	Feb	2	0.00074	0.00074	0.00075	-	-	-	-	-	-
CN, Free	Construction	Mar	2	0.00092	0.00092	0.00093	-	-	-	0.00002	0.00002	0.00003
CN, Free	Construction	Apr	2	0.00099	0.00099	0.00100	-	-	-	-	-	-
CN, Free	Construction	May	2	0.00112	0.00112	0.00112	-	-	-	0.00001	0.00001	0.00001
CN, Free	Construction	Jun	2	0.00112	0.00112	0.00112	-	-	-	0.00001	0.00001	0.00001
CN, Free	Construction	Jul	2	0.00097	0.00097	0.00098	-	-	-	0.00052	0.00052	0.00060
CN, Free	Construction	Aug	2	0.00095	0.00095	0.00101	-	-	-	0.00045	0.00045	0.00047
CN, Free	Construction	Sep	2	0.00161	0.00161	0.00235	-	-	-	0.00941	0.00941	0.00941
CN, Free	Construction	Oct	2	0.00094	0.00094	0.00111	-	-	-	0.00760	0.00760	0.00760
CN, Free	Construction	Nov	2	0.00082	0.00082	0.00092	-	-	-	0.00576	0.00576	0.00576
CN, Free	Construction	Dec	2	0.00078	0.00078	0.00087	-	-	-	0.00477	0.00477	0.00477

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
CN, Free	Operations	Jan	13	0.00071	0.00072	0.00082	-	-	-	*0.02277*	0.02181	*0.02732*
CN, Free	Operations	Feb	13	0.00100	0.00097	0.00102	-	-	-	*0.02253*	0.02113	*0.02526*
CN, Free	Operations	Mar	13	0.00121	0.00117	0.00122	-	-	-	0.02126	0.01849	0.02167
CN, Free	Operations	Apr	13	0.00102	0.00102	0.00106	-	-	-	0.01872	0.01605	0.02054
CN, Free	Operations	May	13	0.00097	0.00097	0.00105	-	-	-	0.01692	0.01513	0.01971
CN, Free	Operations	Jun	13	0.00116	0.00116	0.00124	-	-	-	0.01763	0.01683	0.01988
CN, Free	Operations	Jul	13	0.00111	0.00111	0.00118	-	-	-	0.02079	0.02064	*0.02627*
CN, Free	Operations	Aug	13	0.00110	0.00112	0.00118	-	-	-	*0.02277*	*0.02442*	*0.03570*
CN, Free	Operations	Sep	13	0.00104	0.00106	0.00115	-	-	-	*0.02448*	*0.02591*	*0.03781*
CN, Free	Operations	Oct	13	0.00091	0.00092	0.00113	-	-	-	*0.02366*	*0.02501*	*0.03385*
CN, Free	Operations	Nov	13	0.00086	0.00085	0.00093	-	-	-	*0.02312*	*0.02405*	*0.03059*
CN, Free	Operations	Dec	13	0.00078	0.00077	0.00081	-	-	-	*0.02293*	*0.02358*	*0.02887*
CN, Free	Closure	Jan	6	-	-	-	0.00191	0.00201	0.00322	*0.02524*	*0.02506*	*0.02788*
CN, Free	Closure	Feb	6	-	-	-	0.00195	0.00202	0.00323	*0.02510*	*0.02493*	*0.02774*
CN, Free	Closure	Mar	6	-	-	-	0.00217	0.00211	0.00333	*0.02470*	*0.02451*	*0.02728*
CN, Free	Closure	Apr	6	-	-	-	0.00240	0.00222	0.00343	*0.02428*	*0.02410*	*0.02682*
CN, Free	Closure	May	6	-	-	-	0.00252	0.00227	0.00348	*0.02419*	*0.02400*	*0.02670*
CN, Free	Closure	Jun	6	-	-	-	0.00253	0.00227	0.00347	*0.02458*	*0.02441*	*0.02708*
CN, Free	Closure	Jul	6	-	-	-	0.00248	0.00223	0.00343	*0.02541*	*0.02525*	*0.02790*
CN, Free	Closure	Aug	6	-	-	-	0.00243	0.00220	0.00339	*0.02634*	*0.02619*	*0.02882*
CN, Free	Closure	Sep	6	-	-	-	0.00244	0.00220	0.00338	*0.02685*	*0.02670*	*0.02931*
CN, Free	Closure	Oct	6	-	-	-	0.00254	0.00229	0.00343	*0.02679*	*0.02665*	*0.02922*
CN, Free	Closure	Nov	6	-	-	-	0.00262	0.00236	0.00347	*0.02660*	*0.02646*	*0.02901*
CN, Free	Closure	Dec	6	-	-	-	0.00263	0.00237	0.00347	*0.02648*	*0.02634*	*0.02888*
CN, Free	Post-Closure	Jan	109	-	-	-	0.00366	0.00375	0.00428	0.01105	0.01254	*0.02877*
CN, Free	Post-Closure	Feb	109	-	-	-	0.00366	0.00375	0.00427	0.01101	0.01249	*0.02866*
CN, Free	Post-Closure	Mar	109	-	-	-	0.00366	0.00375	0.00428	0.01087	0.01233	*0.02830*
CN, Free	Post-Closure	Apr	109	-	-	-	0.00366	0.00376	0.00429	0.01073	0.01217	*0.02792*
CN, Free	Post-Closure	May	109	-	-	-	0.00367	0.00376	0.00429	0.01068	0.01211	*0.02769*
CN, Free	Post-Closure	Jun	109	-	-	-	0.00366	0.00376	0.00429	0.01076	0.01218	*0.02761*
CN, Free	Post-Closure	Jul	109	-	-	-	0.00367	0.00375	0.00429	0.01094	0.01234	*0.02760*
CN, Free	Post-Closure	Aug	109	-	-	-	0.00367	0.00375	0.00429	0.01114	0.01252	*0.02760*
CN, Free	Post-Closure	Sep	109	-	-	-	0.00366	0.00375	0.00429	0.01123	0.01260	*0.02750*
CN, Free	Post-Closure	Oct	109	-	-	-	0.00366	0.00375	0.00429	0.01118	0.01254	*0.02725*
CN, Free	Post-Closure	Nov	109	-	-	-	0.00366	0.00375	0.00429	0.01112	0.01246	*0.02707*
CN, Free	Post-Closure	Dec	109	-	-	-	0.00366	0.00375	0.00429	0.01108	0.01242	*0.02697*
Al, Tot	Construction	Jan	2	0.518	0.518	0.533	-	-	-	-	-	-
Al, Tot	Construction	Feb	2	0.475	0.475	0.480	-	-	-	-	-	-
Al, Tot	Construction	Mar	2	0.403	0.403	0.405	-	-	-	0.002	0.002	0.003
Al, Tot	Construction	Apr	2	0.373	0.373	0.380	-	-	-	-	-	-
Al, Tot	Construction	May	2	0.355	0.355	0.358	-	-	-	0.000	0.000	0.001
Al, Tot	Construction	Jun	2	0.383	0.383	0.386	-	-	-	0.000	0.000	0.000
Al, Tot	Construction	Jul	2	0.412	0.412	0.419	-	-	-	0.035	0.035	0.054
Al, Tot	Construction	Aug	2	0.415	0.415	0.424	-	-	-	0.013	0.013	0.016
Al, Tot	Construction	Sep	2	0.415	0.415	0.440	-	-	-	0.303	0.303	0.303
Al, Tot	Construction	Oct	2	0.451	0.451	0.472	-	-	-	0.277	0.277	0.277
Al, Tot	Construction	Nov	2	0.470	0.470	0.492	-	-	-	0.264	0.264	0.264
Al, Tot	Construction	Dec	2	0.480	0.480	0.502	-	-	-	0.265	0.265	0.265
Al, Tot	Operations	Jan	13	0.466	0.471	0.522	-	-	-	0.321	0.316	0.345
Al, Tot	Operations	Feb	13	0.368	0.373	0.468	-	-	-	0.314	0.311	0.342
Al, Tot	Operations	Mar	13	0.293	0.301	0.373	-	-	-	0.296	0.288	0.334
Al, Tot	Operations	Apr	13	0.353	0.361	0.403	-	-	-	0.280	0.279	0.325
Al, Tot	Operations	May	13	0.404	0.405	0.451	-	-	-	0.278	0.284	0.320
Al, Tot	Operations	Jun	13	0.333	0.340	0.375	-	-	-	0.304	0.307	0.327
Al, Tot	Operations	Jul	13	0.344	0.347	0.385	-	-	-	0.335	0.340	0.391
Al, Tot	Operations	Aug	13	0.351	0.343	0.377	-	-	-	0.356	0.365	0.423
Al, Tot	Operations	Sep	13	0.361	0.363	0.402	-	-	-	0.362	0.364	0.392
Al, Tot	Operations	Oct	13	0.396	0.421	0.490	-	-	-	0.354	0.346	0.363
Al, Tot	Operations	Nov	13	0.443	0.436	0.470	-	-	-	0.344	0.333	0.361
Al, Tot	Operations	Dec	13	0.468	0.460	0.498	-	-	-	0.336	0.327	0.359
Al, Tot	Closure	Jan	6	-	-	-	0.410	0.391	0.414	0.388	0.387	0.412
Al, Tot	Closure	Feb	6	-	-	-	0.409	0.393	0.414	0.386	0.385	0.410
Al, Tot	Closure	Mar	6	-	-	-	0.408	0.400	0.413	0.380	0.378	0.404
Al, Tot	Closure	Apr	6	-	-	-	0.408	0.403	0.413	0.373	0.372	0.397
Al, Tot	Closure	May	6	-	-	-	0.407	0.404	0.413	0.372	0.370	0.395
Al, Tot	Closure	Jun	6	-	-	-	0.408	0.406	0.414	0.377	0.375	0.400
Al, Tot	Closure	Jul	6	-	-	-	0.411	0.410	0.415	0.388	0.386	0.411
Al, Tot	Closure	Aug	6	-	-	-	0.414	0.414	0.416	0.400	0.399	0.423
Al, Tot	Closure	Sep	6	-	-	-	0.416	0.416	0.419	0.406	0.405	0.429
Al, Tot	Closure	Oct	6	-	-	-	0.416	0.416	0.419	0.405	0.404	0.427
Al, Tot	Closure	Nov	6	-	-	-	0.415	0.415	0.417	0.402	0.401	0.424
Al, Tot	Closure	Dec	6	-	-	-	0.413	0.413	0.417	0.400	0.399	0.422
Al, Tot	Post-Closure	Jan	109	-	-	-	0.473	0.466	0.478	0.149	0.172	0.421
Al, Tot	Post-Closure	Feb	109	-	-	-	0.473	0.466	0.478	0.148	0.171	0.419
Al, Tot	Post-Closure	Mar	109	-	-	-	0.473	0.466	0.478	0.147	0.169	0.414
Al, Tot	Post-Closure	Apr	109	-	-	-	0.473	0.465	0.477	0.145	0.167	0.408
Al, Tot	Post-Closure	May	109	-	-	-	0.472	0.465	0.477	0.144	0.166	0.405
Al, Tot	Post-Closure	Jun	109	-	-	-	0.473	0.466	0.477	0.145	0.167	0.403
Al, Tot	Post-Closure	Jul	109	-	-	-	0.473	0.466	0.478	0.147	0.169	0.403
Al, Tot	Post-Closure	Aug	109	-	-	-	0.473	0.466	0.478	0.150	0.171	0.403
Al, Tot	Post-Closure	Sep	109	-	-	-	0.473	0.466	0.478	0.151	0.172	0.401
Al, Tot	Post-Closure	Oct	109	-	-	-	0.473	0.466	0.478	0.151	0.171	0.397
Al, Tot	Post-Closure	Nov	109	-	-	-	0.473	0.466	0.478	0.150	0.170	0.394
Al, Tot	Post-Closure	Dec	109	-	-	-	0.473	0.466	0.478	0.149	0.170	0.393
Sb, Diss	Construction	Jan	2	0.000318	0.000318	0.000546	-	-	-	-	-	-
Sb, Diss	Construction	Feb	2	0.000327	0.000327	0.000547	-	-	-	-	-	-
Sb, Diss	Construction	Mar	2	0.000391	0.000391	0.000661	-	-	-	0.000153	0.000153	0.000303

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sb, Diss	Construction	Apr	2	0.000368	0.000368	0.000611	-	-	-	-	-	-
Sb, Diss	Construction	May	2	0.000479	0.000479	0.000818	-	-	-	0.000022	0.000022	0.000043
Sb, Diss	Construction	Jun	2	0.000501	0.000501	0.000832	-	-	-	0.000006	0.000006	0.000006
Sb, Diss	Construction	Jul	2	0.000639	0.000639	0.001011	-	-	-	0.004302	0.004302	0.007718
Sb, Diss	Construction	Aug	2	0.000786	0.000786	0.001275	-	-	-	0.000913	0.000913	0.001061
Sb, Diss	Construction	Sep	2	0.002154	0.002154	0.003964	-	-	-	0.030060	0.030060	0.030060
Sb, Diss	Construction	Oct	2	0.001194	0.001194	0.001968	-	-	-	0.029070	0.029070	0.029070
Sb, Diss	Construction	Nov	2	0.001182	0.001182	0.001889	-	-	-	0.029600	0.029600	0.029600
Sb, Diss	Construction	Dec	2	0.001212	0.001212	0.001914	-	-	-	0.031190	0.031190	0.031190
Sb, Diss	Operations	Jan	13	0.014680	0.016034	0.026490	-	-	-	0.112000	0.120085	0.198300
Sb, Diss	Operations	Feb	13	0.008656	0.009885	0.020770	-	-	-	0.114100	0.126434	0.204500
Sb, Diss	Operations	Mar	13	0.004746	0.005350	0.012450	-	-	-	0.112500	0.114575	0.163200
Sb, Diss	Operations	Apr	13	0.008515	0.008838	0.015100	-	-	-	0.103200	0.100909	0.110400
Sb, Diss	Operations	May	13	0.011520	0.011789	0.020110	-	-	-	0.091930	0.091537	0.106200
Sb, Diss	Operations	Jun	13	0.008101	0.008081	0.013820	-	-	-	0.090640	0.091735	0.105500
Sb, Diss	Operations	Jul	13	0.008840	0.008672	0.014810	-	-	-	0.100400	0.097282	0.107100
Sb, Diss	Operations	Aug	13	0.008382	0.008433	0.014170	-	-	-	0.102900	0.102326	0.120400
Sb, Diss	Operations	Sep	13	0.009336	0.009968	0.016640	-	-	-	0.103600	0.105588	0.131500
Sb, Diss	Operations	Oct	13	0.013410	0.014402	0.025230	-	-	-	0.102000	0.106582	0.134700
Sb, Diss	Operations	Nov	13	0.017590	0.015208	0.023330	-	-	-	0.104300	0.110118	0.147200
Sb, Diss	Operations	Dec	13	0.019530	0.016774	0.025320	-	-	-	0.109800	0.117209	0.173800
Sb, Diss	Closure	Jan	6	-	-	-	0.027200	0.024223	0.030090	0.081605	0.082573	0.099270
Sb, Diss	Closure	Feb	6	-	-	-	0.027050	0.024336	0.029970	0.081185	0.082130	0.098680
Sb, Diss	Closure	Mar	6	-	-	-	0.027525	0.025518	0.030070	0.079865	0.080750	0.096880
Sb, Diss	Closure	Apr	6	-	-	-	0.028080	0.026352	0.030210	0.078450	0.079285	0.094980
Sb, Diss	Closure	May	6	-	-	-	0.028330	0.026653	0.030260	0.077640	0.078445	0.093880
Sb, Diss	Closure	Jun	6	-	-	-	0.028450	0.027018	0.030280	0.077525	0.078323	0.093660
Sb, Diss	Closure	Jul	6	-	-	-	0.028610	0.027563	0.030340	0.077845	0.078643	0.093960
Sb, Diss	Closure	Aug	6	-	-	-	0.028810	0.028025	0.030420	0.078205	0.079008	0.094300
Sb, Diss	Closure	Sep	6	-	-	-	0.029015	0.028315	0.030500	0.078110	0.078907	0.094090
Sb, Diss	Closure	Oct	6	-	-	-	0.029290	0.028572	0.030590	0.077325	0.078100	0.093040
Sb, Diss	Closure	Nov	6	-	-	-	0.029345	0.028565	0.030580	0.076630	0.077387	0.092140
Sb, Diss	Closure	Dec	6	-	-	-	0.029195	0.028333	0.030480	0.076270	0.077020	0.091680
Sb, Diss	Post-Closure	Jan	109	-	-	-	0.014850	0.016352	0.030380	0.006690	0.011511	0.064040
Sb, Diss	Post-Closure	Feb	109	-	-	-	0.014850	0.016341	0.030270	0.006663	0.011465	0.063790
Sb, Diss	Post-Closure	Mar	109	-	-	-	0.014840	0.016324	0.030200	0.006579	0.011320	0.062980
Sb, Diss	Post-Closure	Apr	109	-	-	-	0.014830	0.016308	0.030130	0.006494	0.011169	0.062120
Sb, Diss	Post-Closure	May	109	-	-	-	0.014820	0.016295	0.030020	0.006465	0.011092	0.061510
Sb, Diss	Post-Closure	Jun	109	-	-	-	0.014820	0.016282	0.029880	0.006510	0.011093	0.061040
Sb, Diss	Post-Closure	Jul	109	-	-	-	0.014810	0.016265	0.029730	0.006614	0.011146	0.060530
Sb, Diss	Post-Closure	Aug	109	-	-	-	0.014800	0.016250	0.029580	0.006735	0.011212	0.060000
Sb, Diss	Post-Closure	Sep	109	-	-	-	0.014800	0.016236	0.029450	0.006788	0.011213	0.059430
Sb, Diss	Post-Closure	Oct	109	-	-	-	0.014790	0.016222	0.029350	0.006759	0.011130	0.058760
Sb, Diss	Post-Closure	Nov	109	-	-	-	0.014780	0.016212	0.029250	0.006721	0.011059	0.058320
Sb, Diss	Post-Closure	Dec	109	-	-	-	0.014780	0.016202	0.029130	0.006697	0.011019	0.058110
Sb, Tot	Construction	Jan	2	0.000461	0.000461	0.000679	-	-	-	-	-	-
Sb, Tot	Construction	Feb	2	0.000445	0.000445	0.000660	-	-	-	-	-	-
Sb, Tot	Construction	Mar	2	0.000429	0.000429	0.000649	-	-	-	0.000153	0.000153	0.000304
Sb, Tot	Construction	Apr	2	0.000428	0.000428	0.000653	-	-	-	-	-	-
Sb, Tot	Construction	May	2	0.000537	0.000537	0.000865	-	-	-	0.000022	0.000022	0.000043
Sb, Tot	Construction	Jun	2	0.000570	0.000570	0.000891	-	-	-	0.000006	0.000006	0.000006
Sb, Tot	Construction	Jul	2	0.000747	0.000747	0.001115	-	-	-	0.004323	0.004323	0.007734
Sb, Tot	Construction	Aug	2	0.000916	0.000916	0.001412	-	-	-	0.000901	0.000901	0.001102
Sb, Tot	Construction	Sep	2	0.002382	0.002382	0.004303	-	-	-	0.027400	0.027400	0.027400
Sb, Tot	Construction	Oct	2	0.001321	0.001321	0.002099	-	-	-	0.026460	0.026460	0.026460
Sb, Tot	Construction	Nov	2	0.001304	0.001304	0.002001	-	-	-	0.026890	0.026890	0.026890
Sb, Tot	Construction	Dec	2	0.001334	0.001334	0.002022	-	-	-	0.028300	0.028300	0.028300
Sb, Tot	Operations	Jan	13	0.014700	0.016060	0.026500	-	-	-	0.103300	0.109955	0.180000
Sb, Tot	Operations	Feb	13	0.008663	0.009901	0.020790	-	-	-	0.104900	0.115678	0.185600
Sb, Tot	Operations	Mar	13	0.004749	0.005358	0.012460	-	-	-	0.103000	0.104903	0.148100
Sb, Tot	Operations	Apr	13	0.008522	0.008849	0.015110	-	-	-	0.094750	0.092462	0.101900
Sb, Tot	Operations	May	13	0.011530	0.011803	0.020120	-	-	-	0.084240	0.083920	0.098110
Sb, Tot	Operations	Jun	13	0.008107	0.008091	0.013830	-	-	-	0.083110	0.084155	0.097430
Sb, Tot	Operations	Jul	13	0.008853	0.008687	0.014820	-	-	-	0.091180	0.089326	0.099020
Sb, Tot	Operations	Aug	13	0.008395	0.008450	0.014190	-	-	-	0.094840	0.094042	0.109800
Sb, Tot	Operations	Sep	13	0.009343	0.009979	0.016650	-	-	-	0.096100	0.097087	0.119900
Sb, Tot	Operations	Oct	13	0.013420	0.014418	0.025240	-	-	-	0.094530	0.097975	0.122800
Sb, Tot	Operations	Nov	13	0.017600	0.015225	0.023340	-	-	-	0.095390	0.101172	0.134000
Sb, Tot	Operations	Dec	13	0.019550	0.016792	0.025330	-	-	-	0.101400	0.107556	0.157900
Sb, Tot	Closure	Jan	6	-	-	-	0.026955	0.023989	0.029600	0.076175	0.077052	0.092220
Sb, Tot	Closure	Feb	6	-	-	-	0.026800	0.024097	0.029490	0.075780	0.076637	0.091670
Sb, Tot	Closure	Mar	6	-	-	-	0.027220	0.025257	0.029570	0.074545	0.075350	0.090000
Sb, Tot	Closure	Apr	6	-	-	-	0.027720	0.026065	0.029700	0.073230	0.073985	0.088240
Sb, Tot	Closure	May	6	-	-	-	0.027945	0.026355	0.029740	0.072480	0.073210	0.087230
Sb, Tot	Closure	Jun	6	-	-	-	0.028065	0.026722	0.029770	0.072390	0.073117	0.087050
Sb, Tot	Closure	Jul	6	-	-	-	0.028235	0.027268	0.029830	0.072720	0.073448	0.087360
Sb, Tot	Closure	Aug	6	-	-	-	0.028440	0.027740	0.029930	0.073100	0.073832	0.087720
Sb, Tot	Closure	Sep	6	-	-	-	0.028650	0.028032	0.030010	0.073045	0.073768	0.087560
Sb, Tot	Closure	Oct	6	-	-	-	0.028900	0.028268	0.030090	0.072325	0.073027	0.086600
Sb, Tot	Closure	Nov	6	-	-	-	0.028950	0.028250	0.030080	0.071670	0.072357	0.085760
Sb, Tot	Closure	Dec	6	-	-	-	0.028795	0.028013	0.029980	0.071330	0.072015	0.085340
Sb, Tot	Post-Closure	Jan	109	-	-	-	0.014710	0.016152	0.029870	0.006685	0.011185	0.060220
Sb, Tot	Post-Closure	Feb	109	-	-	-	0.014710	0.016141	0.029770	0.006658	0.011140	0.059980
Sb, Tot	Post-Closure	Mar	109	-	-	-	0.014700	0.016124	0.029690	0.006574	0.011000	0.059220
Sb, Tot	Post-Closure	Apr	109	-	-	-	0.014690	0.016109	0.029610	0.006489	0.010853	0.058410
Sb, Tot	Post-Closure	May	109	-	-	-	0.014680	0.016096	0.029500	0.006461	0.010780	0.057840
Sb, Tot	Post-Closure	Jun	109	-	-	-	0.014680	0.016082	0.029360	0.006505	0.010783	0.057410

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sb, Tot	Post-Closure	Jul	109	-	-	-	0.014670	0.016067	0.029210	0.006610	0.010840	0.056930
Sb, Tot	Post-Closure	Aug	109	-	-	-	0.014670	0.016053	0.029050	0.006731	0.010910	0.056450
Sb, Tot	Post-Closure	Sep	109	-	-	-	0.014660	0.016039	0.028920	0.006784	0.010914	0.055920
Sb, Tot	Post-Closure	Oct	109	-	-	-	0.014650	0.016026	0.028820	0.006755	0.010835	0.055290
Sb, Tot	Post-Closure	Nov	109	-	-	-	0.014650	0.016014	0.028720	0.006717	0.010766	0.054880
Sb, Tot	Post-Closure	Dec	109	-	-	-	0.014640	0.016006	0.028610	0.006693	0.010727	0.054680
As, Diss	Construction	Jan	2	0.002102	0.002102	0.002827	-	-	-	-	-	-
As, Diss	Construction	Feb	2	0.002432	0.002432	0.003009	-	-	-	-	-	-
As, Diss	Construction	Mar	2	0.003048	0.003048	0.003817	-	-	-	0.000452	0.000452	0.000862
As, Diss	Construction	Apr	2	0.003124	0.003124	0.003793	-	-	-	-	-	-
As, Diss	Construction	May	2	0.003454	0.003454	0.004271	-	-	-	0.000075	0.000075	0.000129
As, Diss	Construction	Jun	2	0.003370	0.003370	0.004255	-	-	-	0.000033	0.000033	0.000033
As, Diss	Construction	Jul	2	0.003550	0.003550	0.004584	-	-	-	0.012106	0.012106	0.021130
As, Diss	Construction	Aug	2	0.003898	0.003898	0.005231	-	-	-	0.002519	0.002519	0.003429
As, Diss	Construction	Sep	2	0.006867	0.006867	0.011090	-	-	-	0.034340	0.034340	0.034340
As, Diss	Construction	Oct	2	0.004667	0.004667	0.006686	-	-	-	0.028100	0.028100	0.028100
As, Diss	Construction	Nov	2	0.004585	0.004585	0.006491	-	-	-	0.021890	0.021890	0.021890
As, Diss	Construction	Dec	2	0.004649	0.004649	0.006564	-	-	-	0.018610	0.018610	0.018610
As, Diss	Operations	Jan	13	0.040140	0.042231	0.071500	-	-	-	0.112500	0.107151	0.135000
As, Diss	Operations	Feb	13	0.024400	0.026822	0.051410	-	-	-	0.108600	0.105167	0.134400
As, Diss	Operations	Mar	13	0.014630	0.016197	0.032530	-	-	-	0.103200	0.095754	0.132000
As, Diss	Operations	Apr	13	0.023910	0.025100	0.042020	-	-	-	0.093080	0.085685	0.127200
As, Diss	Operations	May	13	0.031130	0.032410	0.054850	-	-	-	0.084640	0.080485	0.122600
As, Diss	Operations	Jun	13	0.023190	0.023479	0.038910	-	-	-	0.087380	0.086618	0.123200
As, Diss	Operations	Jul	13	0.025370	0.025174	0.041590	-	-	-	0.102300	0.101888	0.128500
As, Diss	Operations	Aug	13	0.024260	0.024586	0.039940	-	-	-	0.118100	0.117054	0.136400
As, Diss	Operations	Sep	13	0.026600	0.028469	0.046320	-	-	-	0.125400	0.123810	0.145200
As, Diss	Operations	Oct	13	0.036630	0.039578	0.068280	-	-	-	0.122200	0.121538	0.137300
As, Diss	Operations	Nov	13	0.046730	0.041323	0.063190	-	-	-	0.119700	0.118588	0.136400
As, Diss	Operations	Dec	13	0.050920	0.044948	0.068280	-	-	-	0.117000	0.117345	0.135700
As, Diss	Closure	Jan	6	-	-	-	0.070365	0.062872	0.074890	0.135800	0.135833	0.136600
As, Diss	Closure	Feb	6	-	-	-	0.069845	0.063113	0.074610	0.135100	0.135117	0.135900
As, Diss	Closure	Mar	6	-	-	-	0.070300	0.065887	0.074740	0.132900	0.132850	0.133700
As, Diss	Closure	Apr	6	-	-	-	0.070975	0.067745	0.074980	0.130650	0.130550	0.131400
As, Diss	Closure	May	6	-	-	-	0.071235	0.068370	0.075060	0.129850	0.129717	0.130600
As, Diss	Closure	Jun	6	-	-	-	0.071530	0.069342	0.075170	0.131050	0.130950	0.131800
As, Diss	Closure	Jul	6	-	-	-	0.072125	0.070868	0.075440	0.134050	0.134000	0.134800
As, Diss	Closure	Aug	6	-	-	-	0.072810	0.072177	0.075780	0.137450	0.137433	0.138200
As, Diss	Closure	Sep	6	-	-	-	0.073360	0.072960	0.076060	0.139050	0.139083	0.139800
As, Diss	Closure	Oct	6	-	-	-	0.073820	0.073400	0.076280	0.138450	0.138433	0.139100
As, Diss	Closure	Nov	6	-	-	-	0.073790	0.073195	0.076250	0.137350	0.137350	0.138100
As, Diss	Closure	Dec	6	-	-	-	0.073375	0.072550	0.076000	0.136750	0.136717	0.137400
As, Diss	Post-Closure	Jan	109	-	-	-	0.037070	0.040522	0.075740	0.041370	0.049405	0.136900
As, Diss	Post-Closure	Feb	109	-	-	-	0.037050	0.040492	0.075480	0.041210	0.049207	0.136400
As, Diss	Post-Closure	Mar	109	-	-	-	0.037040	0.040461	0.075200	0.040690	0.048589	0.134600
As, Diss	Post-Closure	Apr	109	-	-	-	0.037030	0.040434	0.074900	0.040170	0.047952	0.132800
As, Diss	Post-Closure	May	109	-	-	-	0.037020	0.040404	0.074550	0.039990	0.047700	0.131700
As, Diss	Post-Closure	Jun	109	-	-	-	0.037010	0.040367	0.074120	0.040280	0.047911	0.131100
As, Diss	Post-Closure	Jul	109	-	-	-	0.036990	0.040322	0.073620	0.040940	0.048488	0.130700
As, Diss	Post-Closure	Aug	109	-	-	-	0.036970	0.040277	0.073130	0.041700	0.049158	0.130400
As, Diss	Post-Closure	Sep	109	-	-	-	0.036960	0.040241	0.072700	0.042040	0.049410	0.129700
As, Diss	Post-Closure	Oct	109	-	-	-	0.036950	0.040213	0.072380	0.041870	0.049146	0.128500
As, Diss	Post-Closure	Nov	109	-	-	-	0.036940	0.040188	0.072090	0.041630	0.048858	0.127600
As, Diss	Post-Closure	Dec	109	-	-	-	0.036930	0.040163	0.071790	0.041480	0.048682	0.127100
As, Tot	Construction	Jan	2	0.020510	0.020510	0.021120	-	-	-	-	-	-
As, Tot	Construction	Feb	2	0.017685	0.017685	0.017890	-	-	-	-	-	-
As, Tot	Construction	Mar	2	0.013360	0.013360	0.013770	-	-	-	0.000455	0.000455	0.000865
As, Tot	Construction	Apr	2	0.011680	0.011680	0.012310	-	-	-	-	-	-
As, Tot	Construction	May	2	0.011095	0.011095	0.011180	-	-	-	0.000076	0.000076	0.000130
As, Tot	Construction	Jun	2	0.012435	0.012435	0.012720	-	-	-	0.000034	0.000034	0.000034
As, Tot	Construction	Jul	2	0.014285	0.014285	0.014930	-	-	-	0.012148	0.012148	0.021170
As, Tot	Construction	Aug	2	0.014660	0.014660	0.015150	-	-	-	0.002533	0.002533	0.003441
As, Tot	Construction	Sep	2	0.017575	0.017575	0.018990	-	-	-	0.035010	0.035010	0.035010
As, Tot	Construction	Oct	2	0.017585	0.017585	0.018240	-	-	-	0.028750	0.028750	0.028750
As, Tot	Construction	Nov	2	0.018610	0.018610	0.019520	-	-	-	0.022570	0.022570	0.022570
As, Tot	Construction	Dec	2	0.019155	0.019155	0.020170	-	-	-	0.019330	0.019330	0.019330
As, Tot	Operations	Jan	13	0.042390	0.045786	0.073350	-	-	-	0.115500	0.109698	0.137200
As, Tot	Operations	Feb	13	0.025590	0.029012	0.053400	-	-	-	0.111300	0.107867	0.136500
As, Tot	Operations	Mar	13	0.015160	0.017301	0.033630	-	-	-	0.105600	0.098180	0.134100
As, Tot	Operations	Apr	13	0.024980	0.026880	0.043070	-	-	-	0.095210	0.087802	0.129200
As, Tot	Operations	May	13	0.032590	0.034659	0.056280	-	-	-	0.086570	0.082386	0.124500
As, Tot	Operations	Jun	13	0.024130	0.024770	0.039800	-	-	-	0.089270	0.088524	0.125100
As, Tot	Operations	Jul	13	0.026370	0.026499	0.042510	-	-	-	0.104100	0.103892	0.130400
As, Tot	Operations	Aug	13	0.025170	0.025859	0.040810	-	-	-	0.120100	0.119119	0.138300
As, Tot	Operations	Sep	13	0.027610	0.029972	0.047350	-	-	-	0.127400	0.125948	0.147200
As, Tot	Operations	Oct	13	0.038020	0.041765	0.069810	-	-	-	0.124300	0.123701	0.139100
As, Tot	Operations	Nov	13	0.048540	0.043800	0.064620	-	-	-	0.121700	0.120817	0.138200
As, Tot	Operations	Dec	13	0.052980	0.047705	0.069930	-	-	-	0.119600	0.119768	0.137500
As, Tot	Closure	Jan	6	-	-	-	0.071020	0.063478	0.075590	0.137200	0.137233	0.137600
As, Tot	Closure	Feb	6	-	-	-	0.070495	0.063720	0.075300	0.136500	0.136500	0.136900
As, Tot	Closure	Mar	6	-	-	-	0.070960	0.066513	0.075430	0.134250	0.134200	0.134700
As, Tot	Closure	Apr	6	-	-	-	0.071645	0.068385	0.075680	0.132000	0.131867	0.132400
As, Tot	Closure	May	6	-	-	-	0.071900	0.069012	0.075750	0.131100	0.131000	0.131600
As, Tot	Closure	Jun	6	-	-	-	0.072200	0.069988	0.075860	0.132400	0.132300	0.132800
As, Tot	Closure	Jul	6	-	-	-	0.072805	0.071530	0.076140	0.135400	0.135350	0.135800
As, Tot	Closure	Aug	6	-	-	-	0.073495	0.072850	0.076480	0.138700	0.138733	0.139200
As, Tot	Closure	Sep	6	-	-	-	0.074040	0.073632	0.076760	0.140400	0.140400	0.140800

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
As, Tot	Closure	Oct	6	-	-	-	0.074505	0.074078	0.076990	0.139700	0.139700	0.140100
As, Tot	Closure	Nov	6	-	-	-	0.074480	0.073872	0.076950	0.138600	0.138617	0.139000
As, Tot	Closure	Dec	6	-	-	-	0.074060	0.073222	0.076700	0.137950	0.137950	0.138400
As, Tot	Post-Closure	Jan	109	-	-	-	0.038620	0.041971	0.076440	0.041390	0.049497	0.137900
As, Tot	Post-Closure	Feb	109	-	-	-	0.038610	0.041942	0.076170	0.041220	0.049299	0.137300
As, Tot	Post-Closure	Mar	109	-	-	-	0.038590	0.041911	0.075910	0.040700	0.048679	0.135600
As, Tot	Post-Closure	Apr	109	-	-	-	0.038580	0.041883	0.075610	0.040180	0.048042	0.133800
As, Tot	Post-Closure	May	109	-	-	-	0.038570	0.041854	0.075270	0.040000	0.047788	0.132600
As, Tot	Post-Closure	Jun	109	-	-	-	0.038560	0.041818	0.074850	0.040290	0.047999	0.132000
As, Tot	Post-Closure	Jul	109	-	-	-	0.038540	0.041775	0.074370	0.040950	0.048576	0.131700
As, Tot	Post-Closure	Aug	109	-	-	-	0.038530	0.041733	0.073890	0.041710	0.049245	0.131300
As, Tot	Post-Closure	Sep	109	-	-	-	0.038520	0.041698	0.073480	0.042050	0.049496	0.130600
As, Tot	Post-Closure	Oct	109	-	-	-	0.038510	0.041670	0.073160	0.041880	0.049231	0.129400
As, Tot	Post-Closure	Nov	109	-	-	-	0.038500	0.041646	0.072870	0.041640	0.048941	0.128400
As, Tot	Post-Closure	Dec	109	-	-	-	0.038490	0.041620	0.072570	0.041500	0.048766	0.128000
Ba, Tot	Construction	Jan	2	0.0657	0.0657	0.0665	-	-	-	-	-	-
Ba, Tot	Construction	Feb	2	0.0676	0.0676	0.0679	-	-	-	-	-	-
Ba, Tot	Construction	Mar	2	0.0662	0.0662	0.0670	-	-	-	0.0049	0.0049	0.0071
Ba, Tot	Construction	Apr	2	0.0687	0.0687	0.0708	-	-	-	-	-	-
Ba, Tot	Construction	May	2	0.0688	0.0688	0.0711	-	-	-	0.0014	0.0014	0.0016
Ba, Tot	Construction	Jun	2	0.0648	0.0648	0.0682	-	-	-	0.0012	0.0012	0.0012
Ba, Tot	Construction	Jul	2	0.0626	0.0626	0.0665	-	-	-	0.0895	0.0895	0.1204
Ba, Tot	Construction	Aug	2	0.0620	0.0620	0.0675	-	-	-	0.0268	0.0268	0.0511
Ba, Tot	Construction	Sep	2	0.0691	0.0691	0.0801	-	-	-	0.0908	0.0908	0.0908
Ba, Tot	Construction	Oct	2	0.0657	0.0657	0.0730	-	-	-	0.0838	0.0838	0.0838
Ba, Tot	Construction	Nov	2	0.0673	0.0673	0.0748	-	-	-	0.0795	0.0795	0.0795
Ba, Tot	Construction	Dec	2	0.0703	0.0703	0.0781	-	-	-	0.0796	0.0796	0.0796
Ba, Tot	Operations	Jan	13	0.1985	0.2034	0.3214	-	-	-	0.1150	0.1168	0.1592
Ba, Tot	Operations	Feb	13	0.1396	0.1475	0.2272	-	-	-	0.1112	0.1143	0.1573
Ba, Tot	Operations	Mar	13	0.1056	0.1120	0.1655	-	-	-	0.1092	0.1121	0.1570
Ba, Tot	Operations	Apr	13	0.1392	0.1461	0.2123	-	-	-	0.1065	0.1103	0.1557
Ba, Tot	Operations	May	13	0.1621	0.1701	0.2582	-	-	-	0.1050	0.1102	0.1540
Ba, Tot	Operations	Jun	13	0.1364	0.1392	0.1996	-	-	-	0.1114	0.1172	0.1578
Ba, Tot	Operations	Jul	13	0.1449	0.1454	0.2098	-	-	-	0.1245	0.1296	0.1670
Ba, Tot	Operations	Aug	13	0.1410	0.1433	0.2036	-	-	-	0.1367	0.1394	0.1764
Ba, Tot	Operations	Sep	13	0.1499	0.1582	0.2282	-	-	-	0.1423	0.1420	0.1839
Ba, Tot	Operations	Oct	13	0.1856	0.1990	0.3120	-	-	-	0.1407	0.1383	0.1885
Ba, Tot	Operations	Nov	13	0.2213	0.2043	0.2921	-	-	-	0.1353	0.1331	0.1899
Ba, Tot	Operations	Dec	13	0.2333	0.2159	0.3089	-	-	-	0.1298	0.1288	0.1903
Ba, Tot	Closure	Jan	6	-	-	-	0.3000	0.2731	0.3037	0.1684	0.1696	0.1900
Ba, Tot	Closure	Feb	6	-	-	-	0.2978	0.2737	0.3005	0.1676	0.1688	0.1889
Ba, Tot	Closure	Mar	6	-	-	-	0.2967	0.2824	0.2980	0.1650	0.1660	0.1856
Ba, Tot	Closure	Apr	6	-	-	-	0.2960	0.2877	0.2966	0.1622	0.1632	0.1822
Ba, Tot	Closure	May	6	-	-	-	0.2955	0.2892	0.2958	0.1609	0.1618	0.1805
Ba, Tot	Closure	Jun	6	-	-	-	0.2962	0.2929	0.2982	0.1613	0.1622	0.1808
Ba, Tot	Closure	Jul	6	-	-	-	0.2986	0.2992	0.3040	0.1630	0.1640	0.1826
Ba, Tot	Closure	Aug	6	-	-	-	0.3029	0.3047	0.3116	0.1650	0.1659	0.1846
Ba, Tot	Closure	Sep	6	-	-	-	0.3049	0.3076	0.3190	0.1656	0.1665	0.1851
Ba, Tot	Closure	Oct	6	-	-	-	0.3050	0.3079	0.3204	0.1643	0.1652	0.1835
Ba, Tot	Closure	Nov	6	-	-	-	0.3036	0.3059	0.3159	0.1629	0.1638	0.1819
Ba, Tot	Closure	Dec	6	-	-	-	0.3019	0.3033	0.3090	0.1622	0.1631	0.1810
Ba, Tot	Post-Closure	Jan	109	-	-	-	0.3248	0.3171	0.3358	0.0367	0.0459	0.1471
Ba, Tot	Post-Closure	Feb	109	-	-	-	0.3248	0.3170	0.3358	0.0365	0.0458	0.1465
Ba, Tot	Post-Closure	Mar	109	-	-	-	0.3247	0.3169	0.3356	0.0362	0.0453	0.1448
Ba, Tot	Post-Closure	Apr	109	-	-	-	0.3246	0.3168	0.3355	0.0359	0.0449	0.1429
Ba, Tot	Post-Closure	May	109	-	-	-	0.3246	0.3168	0.3355	0.0358	0.0447	0.1417
Ba, Tot	Post-Closure	Jun	109	-	-	-	0.3247	0.3169	0.3355	0.0360	0.0448	0.1409
Ba, Tot	Post-Closure	Jul	109	-	-	-	0.3250	0.3171	0.3357	0.0364	0.0451	0.1402
Ba, Tot	Post-Closure	Aug	109	-	-	-	0.3252	0.3174	0.3359	0.0369	0.0455	0.1395
Ba, Tot	Post-Closure	Sep	109	-	-	-	0.3253	0.3175	0.3360	0.0371	0.0456	0.1384
Ba, Tot	Post-Closure	Oct	109	-	-	-	0.3253	0.3175	0.3360	0.0370	0.0454	0.1371
Ba, Tot	Post-Closure	Nov	109	-	-	-	0.3253	0.3175	0.3359	0.0368	0.0452	0.1361
Ba, Tot	Post-Closure	Dec	109	-	-	-	0.3253	0.3175	0.3359	0.0367	0.0450	0.1357
B, Tot	Construction	Jan	2	0.0176	0.0176	0.0190	-	-	-	-	-	-
B, Tot	Construction	Feb	2	0.0193	0.0193	0.0202	-	-	-	-	-	-
B, Tot	Construction	Mar	2	0.0220	0.0220	0.0234	-	-	-	0.0016	0.0016	0.0024
B, Tot	Construction	Apr	2	0.0222	0.0222	0.0235	-	-	-	-	-	-
B, Tot	Construction	May	2	0.0202	0.0202	0.0213	-	-	-	0.0004	0.0004	0.0005
B, Tot	Construction	Jun	2	0.0169	0.0169	0.0187	-	-	-	0.0002	0.0002	0.0002
B, Tot	Construction	Jul	2	0.0160	0.0160	0.0184	-	-	-	0.0279	0.0279	0.0459
B, Tot	Construction	Aug	2	0.0164	0.0164	0.0191	-	-	-	0.0054	0.0054	0.0095
B, Tot	Construction	Sep	2	0.0172	0.0172	0.0210	-	-	-	0.0470	0.0470	0.0470
B, Tot	Construction	Oct	2	0.0159	0.0159	0.0194	-	-	-	0.0445	0.0445	0.0445
B, Tot	Construction	Nov	2	0.0167	0.0167	0.0206	-	-	-	0.0442	0.0442	0.0442
B, Tot	Construction	Dec	2	0.0188	0.0188	0.0229	-	-	-	0.0459	0.0459	0.0459
B, Tot	Operations	Jan	13	0.0898	0.0914	0.1518	-	-	-	0.0647	0.0665	0.0859
B, Tot	Operations	Feb	13	0.0599	0.0635	0.1039	-	-	-	0.0636	0.0658	0.0852
B, Tot	Operations	Mar	13	0.0424	0.0455	0.0724	-	-	-	0.0627	0.0640	0.0850
B, Tot	Operations	Apr	13	0.0593	0.0625	0.0963	-	-	-	0.0603	0.0618	0.0840
B, Tot	Operations	May	13	0.0697	0.0734	0.1183	-	-	-	0.0580	0.0604	0.0825
B, Tot	Operations	Jun	13	0.0568	0.0580	0.0888	-	-	-	0.0605	0.0633	0.0839
B, Tot	Operations	Jul	13	0.0615	0.0616	0.0944	-	-	-	0.0666	0.0691	0.0881
B, Tot	Operations	Aug	13	0.0597	0.0606	0.0913	-	-	-	0.0723	0.0736	0.0924
B, Tot	Operations	Sep	13	0.0637	0.0675	0.1032	-	-	-	0.0751	0.0752	0.0958
B, Tot	Operations	Oct	13	0.0813	0.0875	0.1450	-	-	-	0.0748	0.0740	0.0977
B, Tot	Operations	Nov	13	0.0997	0.0908	0.1358	-	-	-	0.0729	0.0725	0.0983
B, Tot	Operations	Dec	13	0.1065	0.0976	0.1451	-	-	-	0.0710	0.0714	0.0984

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
B, Tot	Closure	Jan	6	-	-	-	0.1420	0.1280	0.1433	0.0872	0.0878	0.0983
B, Tot	Closure	Feb	6	-	-	-	0.1410	0.1284	0.1417	0.0868	0.0874	0.0977
B, Tot	Closure	Mar	6	-	-	-	0.1406	0.1329	0.1406	0.0854	0.0859	0.0959
B, Tot	Closure	Apr	6	-	-	-	0.1401	0.1357	0.1403	0.0839	0.0844	0.0941
B, Tot	Closure	May	6	-	-	-	0.1397	0.1364	0.1401	0.0832	0.0837	0.0932
B, Tot	Closure	Jun	6	-	-	-	0.1403	0.1383	0.1404	0.0835	0.0839	0.0934
B, Tot	Closure	Jul	6	-	-	-	0.1415	0.1414	0.1432	0.0844	0.0849	0.0944
B, Tot	Closure	Aug	6	-	-	-	0.1434	0.1441	0.1470	0.0855	0.0860	0.0955
B, Tot	Closure	Sep	6	-	-	-	0.1444	0.1456	0.1507	0.0858	0.0863	0.0958
B, Tot	Closure	Oct	6	-	-	-	0.1444	0.1457	0.1514	0.0851	0.0856	0.0950
B, Tot	Closure	Nov	6	-	-	-	0.1438	0.1448	0.1491	0.0844	0.0849	0.0941
B, Tot	Closure	Dec	6	-	-	-	0.1430	0.1435	0.1456	0.0840	0.0845	0.0937
B, Tot	Post-Closure	Jan	109	-	-	-	0.0736	0.0789	0.1416	0.0162	0.0213	0.0763
B, Tot	Post-Closure	Feb	109	-	-	-	0.0736	0.0789	0.1412	0.0162	0.0212	0.0760
B, Tot	Post-Closure	Mar	109	-	-	-	0.0735	0.0788	0.1403	0.0160	0.0209	0.0751
B, Tot	Post-Closure	Apr	109	-	-	-	0.0735	0.0787	0.1394	0.0158	0.0207	0.0741
B, Tot	Post-Closure	May	109	-	-	-	0.0735	0.0787	0.1386	0.0158	0.0206	0.0734
B, Tot	Post-Closure	Jun	109	-	-	-	0.0735	0.0786	0.1377	0.0159	0.0207	0.0730
B, Tot	Post-Closure	Jul	109	-	-	-	0.0735	0.0785	0.1367	0.0161	0.0208	0.0726
B, Tot	Post-Closure	Aug	109	-	-	-	0.0735	0.0785	0.1356	0.0164	0.0210	0.0722
B, Tot	Post-Closure	Sep	109	-	-	-	0.0735	0.0784	0.1347	0.0165	0.0211	0.0716
B, Tot	Post-Closure	Oct	109	-	-	-	0.0734	0.0784	0.1338	0.0164	0.0210	0.0709
B, Tot	Post-Closure	Nov	109	-	-	-	0.0734	0.0783	0.1332	0.0163	0.0208	0.0704
B, Tot	Post-Closure	Dec	109	-	-	-	0.0734	0.0783	0.1327	0.0162	0.0208	0.0701
Cd, Diss	Construction	Jan	2	0.0000233	0.0000233	0.0000359	-	-	-	-	-	-
Cd, Diss	Construction	Feb	2	0.0000294	0.0000294	0.0000393	-	-	-	-	-	-
Cd, Diss	Construction	Mar	2	0.0000406	0.0000406	0.0000532	-	-	-	0.0000067	0.0000067	0.0000132
Cd, Diss	Construction	Apr	2	0.0000426	0.0000426	0.0000536	-	-	-	-	-	-
Cd, Diss	Construction	May	2	0.0000485	0.0000485	0.0000620	-	-	-	0.0000010	0.0000010	0.0000019
Cd, Diss	Construction	Jun	2	0.0000477	0.0000477	0.0000618	-	-	-	0.0000003	0.0000003	0.0000003
Cd, Diss	Construction	Jul	2	0.0000501	0.0000501	0.0000679	-	-	-	0.0001869	0.0001869	0.0003349
Cd, Diss	Construction	Aug	2	0.0000542	0.0000542	0.0000743	-	-	-	0.0000281	0.0000281	0.0000465
Cd, Diss	Construction	Sep	2	0.0000731	0.0000731	0.0001111	-	-	-	0.0002406	0.0002406	0.0002406
Cd, Diss	Construction	Oct	2	0.0000618	0.0000618	0.0000891	-	-	-	0.0002036	0.0002036	0.0002036
Cd, Diss	Construction	Nov	2	0.0000627	0.0000627	0.0000912	-	-	-	0.0001697	0.0001697	0.0001697
Cd, Diss	Construction	Dec	2	0.0000640	0.0000640	0.0000932	-	-	-	0.0001533	0.0001533	0.0001533
Cd, Diss	Operations	Jan	13	0.0006414	0.0006633	0.0011500	-	-	-	0.0003156	0.0003070	0.0005106
Cd, Diss	Operations	Feb	13	0.0003826	0.0004175	0.0007854	-	-	-	0.0002891	0.0002893	0.0005000
Cd, Diss	Operations	Mar	13	0.0002259	0.0002510	0.0004946	-	-	-	0.0002783	0.0002852	0.0004981
Cd, Diss	Operations	Apr	13	0.0003723	0.0003950	0.0006732	-	-	-	0.0002641	0.0002762	0.0004915
Cd, Diss	Operations	May	13	0.0004846	0.0005115	0.0008801	-	-	-	0.0002571	0.0002778	0.0004840
Cd, Diss	Operations	Jun	13	0.0003636	0.0003716	0.0006237	-	-	-	0.0002939	0.0003205	0.0005042
Cd, Diss	Operations	Jul	13	0.0004017	0.0004009	0.0006690	-	-	-	0.0003955	0.0003966	0.0005533
Cd, Diss	Operations	Aug	13	0.0003841	0.0003917	0.0006425	-	-	-	0.0004617	0.0004578	0.0006045
Cd, Diss	Operations	Sep	13	0.0004209	0.0004536	0.0007453	-	-	-	0.0004744	0.0004698	0.0006445
Cd, Diss	Operations	Oct	13	0.0005801	0.0006328	0.0011050	-	-	-	0.0004626	0.0004432	0.0006689
Cd, Diss	Operations	Nov	13	0.0007378	0.0006585	0.0010210	-	-	-	0.0004295	0.0004064	0.0006768
Cd, Diss	Operations	Dec	13	0.0007955	0.0007113	0.0010950	-	-	-	0.0003931	0.0003736	0.0006793
Cd, Diss	Closure	Jan	6	-	-	-	0.0010650	0.0009474	0.0010770	0.0005877	0.0005927	0.0006785
Cd, Diss	Closure	Feb	6	-	-	-	0.0010565	0.0009503	0.0010640	0.0005847	0.0005895	0.0006745
Cd, Diss	Closure	Mar	6	-	-	-	0.0010520	0.0009878	0.0010540	0.0005751	0.0005796	0.0006621
Cd, Diss	Closure	Apr	6	-	-	-	0.0010490	0.0010109	0.0010500	0.0005651	0.0005693	0.0006493
Cd, Diss	Closure	May	6	-	-	-	0.0010455	0.0010172	0.0010480	0.0005599	0.0005639	0.0006425
Cd, Diss	Closure	Jun	6	-	-	-	0.0010500	0.0010326	0.0010510	0.0005608	0.0005648	0.0006430
Cd, Diss	Closure	Jul	6	-	-	-	0.0010600	0.0010598	0.0010760	0.0005660	0.0005701	0.0006485
Cd, Diss	Closure	Aug	6	-	-	-	0.0010765	0.0010828	0.0011080	0.0005720	0.0005761	0.0006546
Cd, Diss	Closure	Sep	6	-	-	-	0.0010850	0.0010953	0.0011400	0.0005735	0.0005776	0.0006557
Cd, Diss	Closure	Oct	6	-	-	-	0.0010855	0.0010967	0.0011460	0.0005686	0.0005726	0.0006494
Cd, Diss	Closure	Nov	6	-	-	-	0.0010805	0.0010892	0.0011270	0.0005637	0.0005676	0.0006434
Cd, Diss	Closure	Dec	6	-	-	-	0.0010730	0.0010780	0.0010980	0.0005611	0.0005650	0.0006402
Cd, Diss	Post-Closure	Jan	109	-	-	-	0.0015190	0.0014480	0.0016060	0.0000851	0.0001198	0.0004978
Cd, Diss	Post-Closure	Feb	109	-	-	-	0.0015190	0.0014477	0.0016050	0.0000848	0.0001193	0.0004959
Cd, Diss	Post-Closure	Mar	109	-	-	-	0.0015180	0.0014472	0.0016040	0.0000837	0.0001178	0.0004896
Cd, Diss	Post-Closure	Apr	109	-	-	-	0.0015180	0.0014470	0.0016040	0.0000827	0.0001163	0.0004829
Cd, Diss	Post-Closure	May	109	-	-	-	0.0015180	0.0014470	0.0016040	0.0000823	0.0001156	0.0004784
Cd, Diss	Post-Closure	Jun	109	-	-	-	0.0015190	0.0014479	0.0016040	0.0000829	0.0001158	0.0004753
Cd, Diss	Post-Closure	Jul	109	-	-	-	0.0015200	0.0014496	0.0016050	0.0000842	0.0001168	0.0004722
Cd, Diss	Post-Closure	Aug	109	-	-	-	0.0015220	0.0014515	0.0016060	0.0000858	0.0001180	0.0004691
Cd, Diss	Post-Closure	Sep	109	-	-	-	0.0015230	0.0014528	0.0016060	0.0000864	0.0001183	0.0004652
Cd, Diss	Post-Closure	Oct	109	-	-	-	0.0015230	0.0014533	0.0016060	0.0000861	0.0001175	0.0004603
Cd, Diss	Post-Closure	Nov	109	-	-	-	0.0015230	0.0014533	0.0016060	0.0000856	0.0001168	0.0004569
Cd, Diss	Post-Closure	Dec	109	-	-	-	0.0015230	0.0014532	0.0016060	0.0000853	0.0001164	0.0004553
Cd, Tot	Construction	Jan	2	0.0001920	0.0001920	0.0001926	-	-	-	-	-	-
Cd, Tot	Construction	Feb	2	0.0001692	0.0001692	0.0001721	-	-	-	-	-	-
Cd, Tot	Construction	Mar	2	0.0001367	0.0001367	0.0001402	-	-	-	0.0000067	0.0000067	0.0000132
Cd, Tot	Construction	Apr	2	0.0001213	0.0001213	0.0001217	-	-	-	-	-	-
Cd, Tot	Construction	May	2	0.0001158	0.0001158	0.0001185	-	-	-	0.0000010	0.0000010	0.0000019
Cd, Tot	Construction	Jun	2	0.0001305	0.0001305	0.0001336	-	-	-	0.0000003	0.0000003	0.0000003
Cd, Tot	Construction	Jul	2	0.0001487	0.0001487	0.0001510	-	-	-	0.0001869	0.0001869	0.0003349
Cd, Tot	Construction	Aug	2	0.0001532	0.0001532	0.0001567	-	-	-	0.0000279	0.0000279	0.0000465
Cd, Tot	Construction	Sep	2	0.0001704	0.0001704	0.0001815	-	-	-	0.0002186	0.0002186	0.0002186
Cd, Tot	Construction	Oct	2	0.0001805	0.0001805	0.0001833	-	-	-	0.0001820	0.0001820	0.0001820
Cd, Tot	Construction	Nov	2	0.0001917	0.0001917	0.0001944	-	-	-	0.0001473	0.0001473	0.0001473
Cd, Tot	Construction	Dec	2	0.0001972	0.0001972	0.0001998	-	-	-	0.0001295	0.0001295	0.0001295
Cd, Tot	Operations	Jan	13	0.0006637	0.0006976	0.0011690	-	-	-	0.0002906	0.0002811	0.0004870
Cd, Tot	Operations	Feb	13	0.0003945	0.0004387	0.0008055	-	-	-	0.0002634	0.0002631	0.0004763
Cd, Tot	Operations	Mar	13	0.0002312	0.0002616	0.0005057	-	-	-	0.0002535	0.0002609	0.0004748

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cd, Tot	Operations	Apr	13	0.0003830	0.0004122	0.0006839	-	-	-	0.0002414	0.0002539	0.0004691
Cd, Tot	Operations	May	13	0.0004992	0.0005334	0.0008947	-	-	-	0.0002362	0.0002568	0.0004626
Cd, Tot	Operations	Jun	13	0.0003730	0.0003842	0.0006328	-	-	-	0.0002732	0.0002991	0.0004831
Cd, Tot	Operations	Jul	13	0.0004118	0.0004140	0.0006785	-	-	-	0.0003738	0.0003743	0.0005322
Cd, Tot	Operations	Aug	13	0.0003934	0.0004042	0.0006514	-	-	-	0.0004396	0.0004348	0.0005834
Cd, Tot	Operations	Sep	13	0.0004311	0.0004685	0.0007558	-	-	-	0.0004519	0.0004466	0.0006237
Cd, Tot	Operations	Oct	13	0.0005943	0.0006543	0.0011210	-	-	-	0.0004400	0.0004201	0.0006486
Cd, Tot	Operations	Nov	13	0.0007561	0.0006828	0.0010350	-	-	-	0.0004064	0.0003827	0.0006569
Cd, Tot	Operations	Dec	13	0.0008162	0.0007383	0.0011120	-	-	-	0.0003691	0.0003489	0.0006595
Cd, Tot	Closure	Jan	6	-	-	-	0.0010710	0.0009534	0.0010840	0.0005725	0.0005773	0.0006588
Cd, Tot	Closure	Feb	6	-	-	-	0.0010620	0.0009560	0.0010700	0.0005696	0.0005742	0.0006549
Cd, Tot	Closure	Mar	6	-	-	-	0.0010575	0.0009937	0.0010600	0.0005603	0.0005646	0.0006429
Cd, Tot	Closure	Apr	6	-	-	-	0.0010545	0.0010165	0.0010550	0.0005505	0.0005545	0.0006305
Cd, Tot	Closure	May	6	-	-	-	0.0010510	0.0010229	0.0010530	0.0005455	0.0005493	0.0006240
Cd, Tot	Closure	Jun	6	-	-	-	0.0010555	0.0010386	0.0010580	0.0005465	0.0005503	0.0006246
Cd, Tot	Closure	Jul	6	-	-	-	0.0010655	0.0010658	0.0010830	0.0005518	0.0005557	0.0006301
Cd, Tot	Closure	Aug	6	-	-	-	0.0010825	0.0010888	0.0011150	0.0005578	0.0005617	0.0006363
Cd, Tot	Closure	Sep	6	-	-	-	0.0010905	0.0011013	0.0011470	0.0005594	0.0005633	0.0006375
Cd, Tot	Closure	Oct	6	-	-	-	0.0010915	0.0011030	0.0011530	0.0005546	0.0005585	0.0006315
Cd, Tot	Closure	Nov	6	-	-	-	0.0010855	0.0010948	0.0011340	0.0005499	0.0005536	0.0006256
Cd, Tot	Closure	Dec	6	-	-	-	0.0010785	0.0010838	0.0011050	0.0005473	0.0005510	0.0006225
Cd, Tot	Post-Closure	Jan	109	-	-	-	0.0015350	0.0014622	0.0016230	0.0000851	0.0001189	0.0004872
Cd, Tot	Post-Closure	Feb	109	-	-	-	0.0015340	0.0014619	0.0016220	0.0000848	0.0001184	0.0004852
Cd, Tot	Post-Closure	Mar	109	-	-	-	0.0015340	0.0014613	0.0016210	0.0000837	0.0001169	0.0004791
Cd, Tot	Post-Closure	Apr	109	-	-	-	0.0015340	0.0014610	0.0016210	0.0000826	0.0001154	0.0004726
Cd, Tot	Post-Closure	May	109	-	-	-	0.0015340	0.0014612	0.0016210	0.0000823	0.0001147	0.0004682
Cd, Tot	Post-Closure	Jun	109	-	-	-	0.0015340	0.0014621	0.0016210	0.0000828	0.0001150	0.0004651
Cd, Tot	Post-Closure	Jul	109	-	-	-	0.0015360	0.0014639	0.0016220	0.0000842	0.0001160	0.0004621
Cd, Tot	Post-Closure	Aug	109	-	-	-	0.0015370	0.0014657	0.0016230	0.0000857	0.0001171	0.0004592
Cd, Tot	Post-Closure	Sep	109	-	-	-	0.0015380	0.0014670	0.0016240	0.0000864	0.0001174	0.0004554
Cd, Tot	Post-Closure	Oct	109	-	-	-	0.0015380	0.0014675	0.0016230	0.0000861	0.0001167	0.0004506
Cd, Tot	Post-Closure	Nov	109	-	-	-	0.0015380	0.0014675	0.0016230	0.0000856	0.0001160	0.0004473
Cd, Tot	Post-Closure	Dec	109	-	-	-	0.0015380	0.0014675	0.0016230	0.0000853	0.0001156	0.0004457
Cr, Diss	Construction	Jan	2	0.0002019	0.0002019	0.0002192	-	-	-	-	-	-
Cr, Diss	Construction	Feb	2	0.0002617	0.0002617	0.0002628	-	-	-	-	-	-
Cr, Diss	Construction	Mar	2	0.0003426	0.0003426	0.0003513	-	-	-	0.0000113	0.0000113	0.0000173
Cr, Diss	Construction	Apr	2	0.0003755	0.0003755	0.0003880	-	-	-	-	-	-
Cr, Diss	Construction	May	2	0.0003864	0.0003864	0.0003968	-	-	-	0.0000030	0.0000030	0.0000036
Cr, Diss	Construction	Jun	2	0.0003435	0.0003435	0.0003547	-	-	-	0.0000019	0.0000019	0.0000019
Cr, Diss	Construction	Jul	2	0.0003074	0.0003074	0.0003338	-	-	-	0.0002101	0.0002101	0.0003374
Cr, Diss	Construction	Aug	2	0.0003103	0.0003103	0.0003403	-	-	-	0.0000454	0.0000454	0.0000793
Cr, Diss	Construction	Sep	2	0.0003171	0.0003171	0.0003654	-	-	-	0.0002727	0.0002727	0.0002727
Cr, Diss	Construction	Oct	2	0.0002688	0.0002688	0.0003094	-	-	-	0.0002286	0.0002286	0.0002286
Cr, Diss	Construction	Nov	2	0.0002534	0.0002534	0.0002965	-	-	-	0.0001872	0.0001872	0.0001872
Cr, Diss	Construction	Dec	2	0.0002573	0.0002573	0.0003029	-	-	-	0.0001669	0.0001669	0.0001669
Cr, Diss	Operations	Jan	13	0.0008124	0.0008095	0.0012500	-	-	-	0.0003334	0.0003175	0.0005200
Cr, Diss	Operations	Feb	13	0.0006868	0.0006906	0.0009295	-	-	-	0.0003023	0.0002972	0.0005078
Cr, Diss	Operations	Mar	13	0.0006203	0.0006258	0.0007700	-	-	-	0.0002853	0.0002905	0.0005025
Cr, Diss	Operations	Apr	13	0.0006896	0.0006964	0.0009413	-	-	-	0.0002931	0.0003104	0.0005021
Cr, Diss	Operations	May	13	0.0007310	0.0007409	0.0010610	-	-	-	0.0003220	0.0003435	0.0005088
Cr, Diss	Operations	Jun	13	0.0006928	0.0006966	0.0009131	-	-	-	0.0003735	0.0003875	0.0005343
Cr, Diss	Operations	Jul	13	0.0007222	0.0007209	0.0009508	-	-	-	0.0004498	0.0004492	0.0005807
Cr, Diss	Operations	Aug	13	0.0007158	0.0007177	0.0009344	-	-	-	0.0005128	0.0005024	0.0006294
Cr, Diss	Operations	Sep	13	0.0007343	0.0007494	0.0010010	-	-	-	0.0005232	0.0005052	0.0006668
Cr, Diss	Operations	Oct	13	0.0008217	0.0008461	0.0012430	-	-	-	0.0005009	0.0004683	0.0006881
Cr, Diss	Operations	Nov	13	0.0009109	0.0008505	0.0011850	-	-	-	0.0004599	0.0004246	0.0006941
Cr, Diss	Operations	Dec	13	0.0009337	0.0008740	0.0012250	-	-	-	0.0004177	0.0003875	0.0006955
Cr, Diss	Closure	Jan	6	-	-	-	0.0012265	0.0011501	0.0012490	0.0005997	0.0006049	0.0006943
Cr, Diss	Closure	Feb	6	-	-	-	0.0012210	0.0011504	0.0012380	0.0005967	0.0006017	0.0006902
Cr, Diss	Closure	Mar	6	-	-	-	0.0012150	0.0011762	0.0012280	0.0005871	0.0005918	0.0006779
Cr, Diss	Closure	Apr	6	-	-	-	0.0012105	0.0011915	0.0012280	0.0005771	0.0005815	0.0006650
Cr, Diss	Closure	May	6	-	-	-	0.0012075	0.0011953	0.0012280	0.0005719	0.0005761	0.0006582
Cr, Diss	Closure	Jun	6	-	-	-	0.0012105	0.0012070	0.0012350	0.0005727	0.0005769	0.0006585
Cr, Diss	Closure	Jul	6	-	-	-	0.0012250	0.0012275	0.0012540	0.0005777	0.0005819	0.0006637
Cr, Diss	Closure	Aug	6	-	-	-	0.0012375	0.0012453	0.0012790	0.0005833	0.0005876	0.0006694
Cr, Diss	Closure	Sep	6	-	-	-	0.0012435	0.0012545	0.0013030	0.0005845	0.0005888	0.0006702
Cr, Diss	Closure	Oct	6	-	-	-	0.0012430	0.0012547	0.0013070	0.0005795	0.0005837	0.0006637
Cr, Diss	Closure	Nov	6	-	-	-	0.0012380	0.0012480	0.0012930	0.0005745	0.0005785	0.0006575
Cr, Diss	Closure	Dec	6	-	-	-	0.0012320	0.0012393	0.0012710	0.0005718	0.0005758	0.0006543
Cr, Diss	Post-Closure	Jan	109	-	-	-	0.0022650	0.0021340	0.0024090	0.0000945	0.0001291	0.0005059
Cr, Diss	Post-Closure	Feb	109	-	-	-	0.0022640	0.0021338	0.0024090	0.0000942	0.0001286	0.0005040
Cr, Diss	Post-Closure	Mar	109	-	-	-	0.0022640	0.0021334	0.0024080	0.0000932	0.0001272	0.0004978
Cr, Diss	Post-Closure	Apr	109	-	-	-	0.0022630	0.0021334	0.0024070	0.0000923	0.0001258	0.0004913
Cr, Diss	Post-Closure	May	109	-	-	-	0.0022630	0.0021340	0.0024060	0.0000920	0.0001252	0.0004869
Cr, Diss	Post-Closure	Jun	109	-	-	-	0.0022650	0.0021357	0.0024070	0.0000926	0.0001255	0.0004838
Cr, Diss	Post-Closure	Jul	109	-	-	-	0.0022670	0.0021384	0.0024080	0.0000939	0.0001264	0.0004806
Cr, Diss	Post-Closure	Aug	109	-	-	-	0.0022690	0.0021414	0.0024100	0.0000953	0.0001274	0.0004774
Cr, Diss	Post-Closure	Sep	109	-	-	-	0.0022700	0.0021436	0.0024100	0.0000959	0.0001276	0.0004735
Cr, Diss	Post-Closure	Oct	109	-	-	-	0.0022710	0.0021445	0.0024100	0.0000955	0.0001268	0.0004685
Cr, Diss	Post-Closure	Nov	109	-	-	-	0.0022700	0.0021448	0.0024100	0.0000950	0.0001261	0.0004651
Cr, Diss	Post-Closure	Dec	109	-	-	-	0.0022710	0.0021448	0.0024100	0.0000947	0.0001257	0.0004635
Cr (VI), Diss	Construction	Jan	2	0.0002019	0.0002019	0.0002192	-	-	-	-	-	-
Cr (VI), Diss	Construction	Feb	2	0.0002617	0.0002617	0.0002628	-	-	-	-	-	-
Cr (VI), Diss	Construction	Mar	2	0.0003426	0.0003426	0.0003513	-	-	-	0.0000113	0.0000113	0.0000173
Cr (VI), Diss	Construction	Apr	2	0.0003755	0.0003755	0.0003880	-	-	-	-	-	-
Cr (VI), Diss	Construction	May	2	0.0003884	0.0003884	0.0003982	-	-	-	0.0000030	0.0000030	0.0000036
Cr (VI), Diss	Construction	Jun	2	0.0003453	0.0003453	0.0003549	-	-	-	0.0000019	0.0000019	0.0000019

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cr (VI), Diss	Construction	Jul	2	0.0003071	0.0003071	0.0003327	-	-	-	0.0002101	0.0002101	0.0003374
Cr (VI), Diss	Construction	Aug	2	0.0003103	0.0003103	0.0003402	-	-	-	0.0000454	0.0000454	0.0000793
Cr (VI), Diss	Construction	Sep	2	0.0003170	0.0003170	0.0003653	-	-	-	0.0002727	0.0002727	0.0002727
Cr (VI), Diss	Construction	Oct	2	0.0002688	0.0002688	0.0003094	-	-	-	0.0002286	0.0002286	0.0002286
Cr (VI), Diss	Construction	Nov	2	0.0002534	0.0002534	0.0002965	-	-	-	0.0001872	0.0001872	0.0001872
Cr (VI), Diss	Construction	Dec	2	0.0002573	0.0002573	0.0003029	-	-	-	0.0001669	0.0001669	0.0001669
Cr (VI), Diss	Operations	Jan	13	0.0008124	0.0008095	0.0012500	-	-	-	0.0003334	0.0003175	0.0005200
Cr (VI), Diss	Operations	Feb	13	0.0006868	0.0006906	0.0009295	-	-	-	0.0003023	0.0002972	0.0005078
Cr (VI), Diss	Operations	Mar	13	0.0006203	0.0006258	0.0007700	-	-	-	0.0002853	0.0002905	0.0005025
Cr (VI), Diss	Operations	Apr	13	0.0006896	0.0006964	0.0009413	-	-	-	0.0002931	0.0003104	0.0005021
Cr (VI), Diss	Operations	May	13	0.0007310	0.0007409	0.0010610	-	-	-	0.0003220	0.0003435	0.0005088
Cr (VI), Diss	Operations	Jun	13	0.0006928	0.0006966	0.0009131	-	-	-	0.0003735	0.0003875	0.0005343
Cr (VI), Diss	Operations	Jul	13	0.0007222	0.0007209	0.0009508	-	-	-	0.0004498	0.0004492	0.0005807
Cr (VI), Diss	Operations	Aug	13	0.0007158	0.0007177	0.0009344	-	-	-	0.0005128	0.0005024	0.0006294
Cr (VI), Diss	Operations	Sep	13	0.0007343	0.0007494	0.0010010	-	-	-	0.0005232	0.0005052	0.0006668
Cr (VI), Diss	Operations	Oct	13	0.0008217	0.0008461	0.0012430	-	-	-	0.0005009	0.0004683	0.0006881
Cr (VI), Diss	Operations	Nov	13	0.0009109	0.0008505	0.0011850	-	-	-	0.0004599	0.0004246	0.0006941
Cr (VI), Diss	Operations	Dec	13	0.0009337	0.0008740	0.0012250	-	-	-	0.0004177	0.0003875	0.0006955
Cr (VI), Diss	Closure	Jan	6	-	-	-	0.0012265	0.0011501	0.0012490	0.0005997	0.0006049	0.0006943
Cr (VI), Diss	Closure	Feb	6	-	-	-	0.0012210	0.0011504	0.0012380	0.0005967	0.0006017	0.0006902
Cr (VI), Diss	Closure	Mar	6	-	-	-	0.0012150	0.0011762	0.0012280	0.0005871	0.0005918	0.0006779
Cr (VI), Diss	Closure	Apr	6	-	-	-	0.0012105	0.0011915	0.0012280	0.0005771	0.0005815	0.0006650
Cr (VI), Diss	Closure	May	6	-	-	-	0.0012075	0.0011953	0.0012280	0.0005719	0.0005761	0.0006582
Cr (VI), Diss	Closure	Jun	6	-	-	-	0.0012105	0.0012070	0.0012350	0.0005727	0.0005769	0.0006585
Cr (VI), Diss	Closure	Jul	6	-	-	-	0.0012250	0.0012275	0.0012540	0.0005777	0.0005819	0.0006637
Cr (VI), Diss	Closure	Aug	6	-	-	-	0.0012375	0.0012453	0.0012790	0.0005833	0.0005876	0.0006694
Cr (VI), Diss	Closure	Sep	6	-	-	-	0.0012435	0.0012545	0.0013030	0.0005845	0.0005888	0.0006702
Cr (VI), Diss	Closure	Oct	6	-	-	-	0.0012430	0.0012547	0.0013070	0.0005795	0.0005837	0.0006637
Cr (VI), Diss	Closure	Nov	6	-	-	-	0.0012380	0.0012480	0.0012930	0.0005745	0.0005785	0.0006575
Cr (VI), Diss	Closure	Dec	6	-	-	-	0.0012320	0.0012393	0.0012710	0.0005718	0.0005758	0.0006543
Cr (VI), Diss	Post-Closure	Jan	109	-	-	-	0.0022650	0.0021340	0.0024090	0.0000945	0.0001291	0.0005059
Cr (VI), Diss	Post-Closure	Feb	109	-	-	-	0.0022640	0.0021338	0.0024090	0.0000942	0.0001286	0.0005040
Cr (VI), Diss	Post-Closure	Mar	109	-	-	-	0.0022640	0.0021334	0.0024080	0.0000932	0.0001272	0.0004978
Cr (VI), Diss	Post-Closure	Apr	109	-	-	-	0.0022630	0.0021334	0.0024070	0.0000923	0.0001258	0.0004913
Cr (VI), Diss	Post-Closure	May	109	-	-	-	0.0022630	0.0021340	0.0024060	0.0000920	0.0001252	0.0004869
Cr (VI), Diss	Post-Closure	Jun	109	-	-	-	0.0022650	0.0021357	0.0024070	0.0000926	0.0001255	0.0004838
Cr (VI), Diss	Post-Closure	Jul	109	-	-	-	0.0022670	0.0021384	0.0024080	0.0000939	0.0001264	0.0004806
Cr (VI), Diss	Post-Closure	Aug	109	-	-	-	0.0022690	0.0021414	0.0024100	0.0000953	0.0001274	0.0004774
Cr (VI), Diss	Post-Closure	Sep	109	-	-	-	0.0022700	0.0021436	0.0024100	0.0000959	0.0001276	0.0004735
Cr (VI), Diss	Post-Closure	Oct	109	-	-	-	0.0022710	0.0021445	0.0024100	0.0000955	0.0001268	0.0004685
Cr (VI), Diss	Post-Closure	Nov	109	-	-	-	0.0022700	0.0021448	0.0024100	0.0000950	0.0001261	0.0004651
Cr (VI), Diss	Post-Closure	Dec	109	-	-	-	0.0022710	0.0021448	0.0024100	0.0000947	0.0001257	0.0004635
Cr, Tot	Construction	Jan	2	0.0032445	0.0032445	0.0034200	-	-	-	-	-	-
Cr, Tot	Construction	Feb	2	0.0028470	0.0028470	0.0028900	-	-	-	-	-	-
Cr, Tot	Construction	Mar	2	0.0022090	0.0022090	0.0022160	-	-	-	0.0000134	0.0000134	0.0000193
Cr, Tot	Construction	Apr	2	0.0019385	0.0019385	0.0019770	-	-	-	-	-	-
Cr, Tot	Construction	May	2	0.0017730	0.0017730	0.0017810	-	-	-	0.0000040	0.0000040	0.0000045
Cr, Tot	Construction	Jun	2	0.0020155	0.0020155	0.0020160	-	-	-	0.0000035	0.0000035	0.0000035
Cr, Tot	Construction	Jul	2	0.0022580	0.0022580	0.0023110	-	-	-	0.0002529	0.0002529	0.0003758
Cr, Tot	Construction	Aug	2	0.0022585	0.0022585	0.0023210	-	-	-	0.0000585	0.0000585	0.0000914
Cr, Tot	Construction	Sep	2	0.0022575	0.0022575	0.0024580	-	-	-	0.0008611	0.0008611	0.0008611
Cr, Tot	Construction	Oct	2	0.0025985	0.0025985	0.0027540	-	-	-	0.0008044	0.0008044	0.0008044
Cr, Tot	Construction	Nov	2	0.0027855	0.0027855	0.0029420	-	-	-	0.0007832	0.0007832	0.0007832
Cr, Tot	Construction	Dec	2	0.0028805	0.0028805	0.0030450	-	-	-	0.0008019	0.0008019	0.0008019
Cr, Tot	Operations	Jan	13	0.0028460	0.0028351	0.0031740	-	-	-	0.0010020	0.0010076	0.0011510
Cr, Tot	Operations	Feb	13	0.0018550	0.0019400	0.0027890	-	-	-	0.0009872	0.0009974	0.0011420
Cr, Tot	Operations	Mar	13	0.0011740	0.0012678	0.0020020	-	-	-	0.0009485	0.0009408	0.0011260
Cr, Tot	Operations	Apr	13	0.0017440	0.0018277	0.0022960	-	-	-	0.0009012	0.0009082	0.0011010
Cr, Tot	Operations	May	13	0.0022100	0.0022328	0.0025550	-	-	-	0.0008796	0.0009054	0.0010830
Cr, Tot	Operations	Jun	13	0.0015630	0.0015969	0.0018460	-	-	-	0.0009388	0.0009617	0.0010990
Cr, Tot	Operations	Jul	13	0.0016150	0.0016415	0.0019080	-	-	-	0.0010350	0.0010510	0.0011460
Cr, Tot	Operations	Aug	13	0.0016640	0.0015988	0.0018360	-	-	-	0.0011210	0.0011183	0.0011940
Cr, Tot	Operations	Sep	13	0.0017770	0.0017878	0.0021560	-	-	-	0.0011250	0.0011246	0.0012240
Cr, Tot	Operations	Oct	13	0.0021760	0.0023148	0.0028330	-	-	-	0.0011060	0.0010860	0.0012310
Cr, Tot	Operations	Nov	13	0.0024890	0.0024752	0.0027210	-	-	-	0.0010780	0.0010585	0.0012280
Cr, Tot	Operations	Dec	13	0.0027770	0.0027086	0.0029370	-	-	-	0.0010580	0.0010482	0.0012250
Cr, Tot	Closure	Jan	6	-	-	-	0.0024440	0.0022360	0.0024870	0.0010074	0.0010190	0.0012200
Cr, Tot	Closure	Feb	6	-	-	-	0.0024295	0.0022498	0.0024630	0.0010024	0.0010137	0.0012130
Cr, Tot	Closure	Mar	6	-	-	-	0.0024195	0.0023198	0.0024420	0.0009862	0.0009968	0.0011910
Cr, Tot	Closure	Apr	6	-	-	-	0.0024100	0.0023567	0.0024370	0.0009695	0.0009795	0.0011690
Cr, Tot	Closure	May	6	-	-	-	0.0024040	0.0023667	0.0024370	0.0009596	0.0009693	0.0011550
Cr, Tot	Closure	Jun	6	-	-	-	0.0024105	0.0023952	0.0024560	0.0009584	0.0009681	0.0011530
Cr, Tot	Closure	Jul	6	-	-	-	0.0024320	0.0024452	0.0025020	0.0009626	0.0009723	0.0011570
Cr, Tot	Closure	Aug	6	-	-	-	0.0024710	0.0024868	0.0025470	0.0009673	0.0009768	0.0011610
Cr, Tot	Closure	Sep	6	-	-	-	0.0024860	0.0025090	0.0026030	0.0009659	0.0009754	0.0011580
Cr, Tot	Closure	Oct	6	-	-	-	0.0024840	0.0025088	0.0026120	0.0009563	0.0009656	0.0011460
Cr, Tot	Closure	Nov	6	-	-	-	0.0024715	0.0024920	0.0025770	0.0009477	0.0009568	0.0011350
Cr, Tot	Closure	Dec	6	-	-	-	0.0024585	0.0024718	0.0025250	0.0009432	0.0009523	0.0011290
Cr, Tot	Post-Closure	Jan	109	-	-	-	0.0042310	0.0039923	0.0044950	0.0001034	0.0001616	0.0007959
Cr, Tot	Post-Closure	Feb	109	-	-	-	0.0042310	0.0039921	0.0044950	0.0001030	0.0001610	0.0007928
Cr, Tot	Post-Closure	Mar	109	-	-	-	0.0042290	0.0039914	0.0044920	0.0001020	0.0001593	0.0007831
Cr, Tot	Post-Closure	Apr	109	-	-	-	0.0042280	0.0039911	0.0044900	0.0001011	0.0001575	0.0007727
Cr, Tot	Post-Closure	May	109	-	-	-	0.0042290	0.0039918	0.0044900	0.0001008	0.0001567	0.0007655
Cr, Tot	Post-Closure	Jun	109	-	-	-	0.0042310	0.0039949	0.0044910	0.0001016	0.0001569	0.0007600
Cr, Tot	Post-Closure	Jul	109	-	-	-	0.0042350	0.0040003	0.0044940	0.0001030	0.0001577	0.0007540
Cr, Tot	Post-Closure	Aug	109	-	-	-	0.0042390	0.0040058	0.0044960	0.0001044	0.0001585	0.0007476
Cr, Tot	Post-Closure	Sep	109	-	-	-	0.0042410	0.0040096	0.0044980	0.0001049	0.0001583	0.0007405

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of	Collection Pond			Open Pit			TMF		
			Years	Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
			in	Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt			Phase	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cr, Tot	Post-Closure	Oct	109	-	-	-	0.0042420	0.0040110	0.0044970	0.0001044	0.0001572	0.0007322
Cr, Tot	Post-Closure	Nov	109	-	-	-	0.0042420	0.0040111	0.0044970	0.0001038	0.0001562	0.0007268
Cr, Tot	Post-Closure	Dec	109	-	-	-	0.0042420	0.0040112	0.0044970	0.0001035	0.0001557	0.0007242
Cu, Diss	Construction	Jan	2	0.00359	0.00359	0.00454	-	-	-	-	-	-
Cu, Diss	Construction	Feb	2	0.00558	0.00558	0.00572	-	-	-	-	-	-
Cu, Diss	Construction	Mar	2	0.00823	0.00823	0.00834	-	-	-	0.00007	0.00007	0.00013
Cu, Diss	Construction	Apr	2	0.00945	0.00945	0.00969	-	-	-	-	-	-
Cu, Diss	Construction	May	2	0.01022	0.01022	0.01037	-	-	-	0.00002	0.00002	0.00002
Cu, Diss	Construction	Jun	2	0.00928	0.00928	0.00941	-	-	-	0.00001	0.00001	0.00001
Cu, Diss	Construction	Jul	2	0.00803	0.00803	0.00860	-	-	-	0.00172	0.00172	0.00290
Cu, Diss	Construction	Aug	2	0.00816	0.00816	0.00882	-	-	-	0.00089	0.00089	0.00123
Cu, Diss	Construction	Sep	2	0.00937	0.00937	0.01168	-	-	-	0.04877	0.04877	0.04877
Cu, Diss	Construction	Oct	2	0.00679	0.00679	0.00787	-	-	-	0.04737	0.04737	0.04737
Cu, Diss	Construction	Nov	2	0.00590	0.00590	0.00690	-	-	-	0.04850	0.04850	0.04850
Cu, Diss	Construction	Dec	2	0.00560	0.00560	0.00662	-	-	-	*0.05130*	*0.05130*	*0.05130*
Cu, Diss	Operations	Jan	13	0.01219	0.01182	0.01597	-	-	-	0.05583	0.05730	0.06372
Cu, Diss	Operations	Feb	13	0.01308	0.01308	0.01574	-	-	-	0.05675	0.05783	0.06306
Cu, Diss	Operations	Mar	13	0.01456	0.01432	0.01581	-	-	-	0.05476	0.05370	0.05611
Cu, Diss	Operations	Apr	13	0.01389	0.01345	0.01575	-	-	-	0.05174	0.05043	*0.05369*
Cu, Diss	Operations	May	13	0.01335	0.01292	0.01574	-	-	-	0.04930	0.04860	0.05222
Cu, Diss	Operations	Jun	13	0.01453	0.01442	0.01624	-	-	-	0.05029	0.04991	0.05347
Cu, Diss	Operations	Jul	13	0.01464	0.01457	0.01650	-	-	-	0.05164	0.05227	0.05813
Cu, Diss	Operations	Aug	13	0.01479	0.01465	0.01651	-	-	-	0.05300	0.05381	0.06088
Cu, Diss	Operations	Sep	13	0.01465	0.01441	0.01656	-	-	-	0.05346	0.05402	0.06058
Cu, Diss	Operations	Oct	13	0.01440	0.01393	0.01711	-	-	-	0.05302	0.05339	0.05857
Cu, Diss	Operations	Nov	13	0.01393	0.01342	0.01679	-	-	-	0.05363	0.05416	*0.05976*
Cu, Diss	Operations	Dec	13	0.01343	0.01296	0.01642	-	-	-	*0.05449*	*0.05581*	*0.06306*
Cu, Diss	Closure	Jan	6	-	-	-	0.01905	0.01869	0.02024	0.04240	0.04275	0.04864
Cu, Diss	Closure	Feb	6	-	-	-	0.01905	0.01866	0.02022	0.04218	0.04252	0.04835
Cu, Diss	Closure	Mar	6	-	-	-	0.01925	0.01885	0.02026	0.04150	0.04181	0.04747
Cu, Diss	Closure	Apr	6	-	-	-	0.01948	0.01904	0.02032	0.04077	0.04106	0.04655
Cu, Diss	Closure	May	6	-	-	-	0.01958	0.01912	0.02035	0.04040	0.04068	0.04607
Cu, Diss	Closure	Jun	6	-	-	-	0.01961	0.01918	0.02035	0.04049	0.04076	0.04613
Cu, Diss	Closure	Jul	6	-	-	-	0.01962	0.01925	0.02034	0.04089	0.04117	0.04655
Cu, Diss	Closure	Aug	6	-	-	-	0.01963	0.01932	0.02035	0.04135	0.04163	0.04703
Cu, Diss	Closure	Sep	6	-	-	-	0.01968	0.01937	0.02036	0.04147	0.04176	0.04712
Cu, Diss	Closure	Oct	6	-	-	-	0.01978	0.01947	0.02039	0.04113	0.04140	0.04668
Cu, Diss	Closure	Nov	6	-	-	-	0.01984	0.01951	0.02040	0.04077	0.04104	0.04625
Cu, Diss	Closure	Dec	6	-	-	-	0.01981	0.01948	0.02039	0.04058	0.04085	0.04602
Cu, Diss	Post-Closure	Jan	109	-	-	-	0.01394	0.01467	0.02035	0.00645	0.00895	0.03623
Cu, Diss	Post-Closure	Feb	109	-	-	-	0.01394	0.01467	0.02031	0.00642	0.00892	0.03609
Cu, Diss	Post-Closure	Mar	109	-	-	-	0.01393	0.01466	0.02030	0.00634	0.00880	0.03563
Cu, Diss	Post-Closure	Apr	109	-	-	-	0.01393	0.01465	0.02029	0.00626	0.00869	0.03515
Cu, Diss	Post-Closure	May	109	-	-	-	0.01392	0.01465	0.02027	0.00624	0.00864	0.03482
Cu, Diss	Post-Closure	Jun	109	-	-	-	0.01392	0.01464	0.02023	0.00628	0.00866	0.03460
Cu, Diss	Post-Closure	Jul	109	-	-	-	0.01392	0.01463	0.02019	0.00638	0.00873	0.03438
Cu, Diss	Post-Closure	Aug	109	-	-	-	0.01391	0.01463	0.02015	0.00650	0.00882	0.03416
Cu, Diss	Post-Closure	Sep	109	-	-	-	0.01391	0.01462	0.02012	0.00655	0.00885	0.03388
Cu, Diss	Post-Closure	Oct	109	-	-	-	0.01391	0.01461	0.02010	0.00652	0.00879	0.03352
Cu, Diss	Post-Closure	Nov	109	-	-	-	0.01390	0.01461	0.02007	0.00649	0.00874	0.03328
Cu, Diss	Post-Closure	Dec	109	-	-	-	0.01390	0.01461	0.02004	0.00646	0.00871	0.03316
Cu, Tot	Construction	Jan	2	0.00587	0.00587	0.00672	-	-	-	-	-	-
Cu, Tot	Construction	Feb	2	0.00750	0.00750	0.00763	-	-	-	-	-	-
Cu, Tot	Construction	Mar	2	0.00959	0.00959	0.00968	-	-	-	0.00008	0.00008	0.00013
Cu, Tot	Construction	Apr	2	0.01059	0.01059	0.01077	-	-	-	-	-	-
Cu, Tot	Construction	May	2	0.01125	0.01125	0.01136	-	-	-	0.00002	0.00002	0.00002
Cu, Tot	Construction	Jun	2	0.01053	0.01053	0.01064	-	-	-	0.00001	0.00001	0.00001
Cu, Tot	Construction	Jul	2	0.00948	0.00948	0.00996	-	-	-	0.00179	0.00179	0.00296
Cu, Tot	Construction	Aug	2	0.00982	0.00982	0.01061	-	-	-	0.00227	0.00227	0.00397
Cu, Tot	Construction	Sep	2	0.01525	0.01525	0.02174	-	-	-	0.16220	0.16220	0.16220
Cu, Tot	Construction	Oct	2	0.00942	0.00942	0.01115	-	-	-	0.15850	0.15850	0.15850
Cu, Tot	Construction	Nov	2	0.00827	0.00827	0.00949	-	-	-	0.16360	0.16360	0.16360
Cu, Tot	Construction	Dec	2	0.00791	0.00791	0.00904	-	-	-	0.17390	0.17390	0.17390
Cu, Tot	Operations	Jan	13	0.01340	0.01320	0.01721	-	-	-	0.18480	0.19039	0.21810
Cu, Tot	Operations	Feb	13	0.01430	0.01392	0.01643	-	-	-	0.18880	0.19285	0.21580
Cu, Tot	Operations	Mar	13	0.01500	0.01474	0.01613	-	-	-	0.18000	0.17889	0.19180
Cu, Tot	Operations	Apr	13	0.01450	0.01419	0.01645	-	-	-	0.16820	0.16546	0.18220
Cu, Tot	Operations	May	13	0.01421	0.01391	0.01672	-	-	-	0.15940	0.15667	0.17400
Cu, Tot	Operations	Jun	13	0.01509	0.01502	0.01686	-	-	-	0.15900	0.16012	0.17600
Cu, Tot	Operations	Jul	13	0.01523	0.01518	0.01713	-	-	-	0.16510	0.16771	0.19260
Cu, Tot	Operations	Aug	13	0.01532	0.01523	0.01710	-	-	-	0.16840	0.17220	0.20220
Cu, Tot	Operations	Sep	13	0.01526	0.01512	0.01728	-	-	-	0.16970	0.17331	0.20250
Cu, Tot	Operations	Oct	13	0.01516	0.01494	0.01818	-	-	-	0.16980	0.17239	0.19750
Cu, Tot	Operations	Nov	13	0.01501	0.01452	0.01778	-	-	-	0.17170	0.17640	0.20320
Cu, Tot	Operations	Dec	13	0.01464	0.01417	0.01754	-	-	-	0.17810	0.18320	0.21550
Cu, Tot	Closure	Jan	6	-	-	-	0.02298	0.02249	0.02745	0.12045	0.12208	0.14990
Cu, Tot	Closure	Feb	6	-	-	-	0.02308	0.02251	0.02743	0.11985	0.12141	0.14900
Cu, Tot	Closure	Mar	6	-	-	-	0.02401	0.02305	0.02766	0.11790	0.11938	0.14630
Cu, Tot	Closure	Apr	6	-	-	-	0.02497	0.02358	0.02793	0.11585	0.11723	0.14340
Cu, Tot	Closure	May	6	-	-	-	0.02544	0.02382	0.02804	0.11455	0.11591	0.14170
Cu, Tot	Closure	Jun	6	-	-	-	0.02549	0.02389	0.02800	0.11420	0.11554	0.14110
Cu, Tot	Closure	Jul	6	-	-	-	0.02534	0.02388	0.02788	0.11445	0.11577	0.14130
Cu, Tot	Closure	Aug	6	-	-	-	0.02522	0.02388	0.02777	0.11465	0.11598	0.14140
Cu, Tot	Closure	Sep	6	-	-	-	0.02527	0.02393	0.02774	0.11430	0.11563	0.14090
Cu, Tot	Closure	Oct	6	-	-	-	0.02566	0.02427	0.02785	0.11305	0.11435	0.13920
Cu, Tot	Closure	Nov	6	-	-	-	0.02590	0.02449	0.02791	0.11205	0.11331	0.13790
Cu, Tot	Closure	Dec	6	-	-	-	0.02589	0.02448	0.02787	0.11150	0.11276	0.13720

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Cu, Tot	Post-Closure	Jan	109	-	-	-	0.01682	0.01838	0.02784	0.00659	0.01370	0.09120
Cu, Tot	Post-Closure	Feb	109	-	-	-	0.01681	0.01838	0.02778	0.00657	0.01365	0.09084
Cu, Tot	Post-Closure	Mar	109	-	-	-	0.01680	0.01837	0.02783	0.00648	0.01348	0.08969
Cu, Tot	Post-Closure	Apr	109	-	-	-	0.01679	0.01835	0.02792	0.00640	0.01330	0.08846
Cu, Tot	Post-Closure	May	109	-	-	-	0.01678	0.01834	0.02795	0.00637	0.01320	0.08758
Cu, Tot	Post-Closure	Jun	109	-	-	-	0.01677	0.01833	0.02794	0.00642	0.01318	0.08686
Cu, Tot	Post-Closure	Jul	109	-	-	-	0.01677	0.01832	0.02794	0.00652	0.01320	0.08605
Cu, Tot	Post-Closure	Aug	109	-	-	-	0.01676	0.01831	0.02794	0.00663	0.01324	0.08522
Cu, Tot	Post-Closure	Sep	109	-	-	-	0.01675	0.01830	0.02795	0.00668	0.01321	0.08434
Cu, Tot	Post-Closure	Oct	109	-	-	-	0.01674	0.01829	0.02799	0.00665	0.01310	0.08337
Cu, Tot	Post-Closure	Nov	109	-	-	-	0.01673	0.01828	0.02797	0.00662	0.01301	0.08274
Cu, Tot	Post-Closure	Dec	109	-	-	-	0.01673	0.01827	0.02791	0.00659	0.01297	0.08244
Fe, Tot	Construction	Jan	2	0.197	0.197	0.200	-	-	-	-	-	-
Fe, Tot	Construction	Feb	2	0.200	0.200	0.200	-	-	-	-	-	-
Fe, Tot	Construction	Mar	2	0.200	0.200	0.200	-	-	-	0.013	0.013	0.014
Fe, Tot	Construction	Apr	2	0.200	0.200	0.200	-	-	-	-	-	-
Fe, Tot	Construction	May	2	0.200	0.200	0.200	-	-	-	0.003	0.003	0.004
Fe, Tot	Construction	Jun	2	0.200	0.200	0.200	-	-	-	0.004	0.004	0.004
Fe, Tot	Construction	Jul	2	0.200	0.200	0.200	-	-	-	0.165	0.165	0.184
Fe, Tot	Construction	Aug	2	0.200	0.200	0.200	-	-	-	0.096	0.096	0.162
Fe, Tot	Construction	Sep	2	0.200	0.200	0.200	-	-	-	0.187	0.187	0.187
Fe, Tot	Construction	Oct	2	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Construction	Nov	2	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Construction	Dec	2	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Jan	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Feb	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Mar	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Apr	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	May	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Jun	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Jul	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Aug	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Sep	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Oct	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Nov	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Operations	Dec	13	0.200	0.200	0.200	-	-	-	0.200	0.200	0.200
Fe, Tot	Closure	Jan	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Feb	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Mar	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Apr	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	May	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Jun	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Jul	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Aug	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Sep	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Oct	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Nov	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Closure	Dec	6	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Jan	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Feb	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Mar	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Apr	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	May	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Jun	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Jul	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Aug	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Sep	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Oct	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Nov	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Fe, Tot	Post-Closure	Dec	109	-	-	-	0.200	0.200	0.200	0.200	0.200	0.200
Pb, Diss	Construction	Jan	2	0.000105	0.000105	0.000129	-	-	-	-	-	-
Pb, Diss	Construction	Feb	2	0.000146	0.000146	0.000152	-	-	-	-	-	-
Pb, Diss	Construction	Mar	2	0.000198	0.000198	0.000200	-	-	-	0.000005	0.000005	0.000008
Pb, Diss	Construction	Apr	2	0.000226	0.000226	0.000232	-	-	-	-	-	-
Pb, Diss	Construction	May	2	0.000244	0.000244	0.000249	-	-	-	0.000001	0.000001	0.000001
Pb, Diss	Construction	Jun	2	0.000227	0.000227	0.000232	-	-	-	0.000001	0.000001	0.000001
Pb, Diss	Construction	Jul	2	0.000204	0.000204	0.000218	-	-	-	0.000106	0.000106	0.000157
Pb, Diss	Construction	Aug	2	0.000212	0.000212	0.000234	-	-	-	0.000072	0.000072	0.000092
Pb, Diss	Construction	Sep	2	0.000338	0.000338	0.000494	-	-	-	0.001999	0.001999	0.001999
Pb, Diss	Construction	Oct	2	0.000201	0.000201	0.000247	-	-	-	0.001665	0.001665	0.001665
Pb, Diss	Construction	Nov	2	0.000173	0.000173	0.000208	-	-	-	0.001342	0.001342	0.001342
Pb, Diss	Construction	Dec	2	0.000164	0.000164	0.000196	-	-	-	0.001182	0.001182	0.001182
Pb, Diss	Operations	Jan	13	0.000409	0.000418	0.000598	-	-	-	0.001606	0.001418	0.001786
Pb, Diss	Operations	Feb	13	0.000389	0.000390	0.000494	-	-	-	0.001452	0.001312	0.001734
Pb, Diss	Operations	Mar	13	0.000379	0.000375	0.000442	-	-	-	0.001267	0.001165	0.001657
Pb, Diss	Operations	Apr	13	0.000394	0.000386	0.000492	-	-	-	0.001100	0.001076	0.001566
Pb, Diss	Operations	May	13	0.000411	0.000403	0.000538	-	-	-	0.001095	0.001140	0.001525
Pb, Diss	Operations	Jun	13	0.000405	0.000402	0.000492	-	-	-	0.001412	0.001457	0.001980
Pb, Diss	Operations	Jul	13	0.000414	0.000410	0.000507	-	-	-	0.001779	0.001957	0.003070
Pb, Diss	Operations	Aug	13	0.000413	0.000410	0.000502	-	-	-	0.002145	0.002341	0.003621
Pb, Diss	Operations	Sep	13	0.000419	0.000419	0.000525	-	-	-	0.002174	0.002332	0.003133
Pb, Diss	Operations	Oct	13	0.000449	0.000449	0.000615	-	-	-	0.002137	0.002059	0.002403
Pb, Diss	Operations	Nov	13	0.000479	0.000445	0.000590	-	-	-	0.001956	0.001808	0.002185
Pb, Diss	Operations	Dec	13	0.000486	0.000448	0.000599	-	-	-	0.001835	0.001630	0.002169
Pb, Diss	Closure	Jan	6	-	-	-	0.000686	0.000654	0.000763	0.002070	0.002076	0.002157
Pb, Diss	Closure	Feb	6	-	-	-	0.000686	0.000655	0.000762	0.002059	0.002064	0.002144
Pb, Diss	Closure	Mar	6	-	-	-	0.000698	0.000672	0.000766	0.002026	0.002030	0.002105

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Pb, Diss	Closure	Apr	6	-	-	-	0.000712	0.000685	0.000771	0.001991	0.001994	0.002065
Pb, Diss	Closure	May	6	-	-	-	0.000718	0.000690	0.000773	0.001977	0.001980	0.002048
Pb, Diss	Closure	Jun	6	-	-	-	0.000720	0.000695	0.000773	0.001991	0.001994	0.002064
Pb, Diss	Closure	Jul	6	-	-	-	0.000721	0.000701	0.000773	0.002029	0.002033	0.002104
Pb, Diss	Closure	Aug	6	-	-	-	0.000722	0.000706	0.000773	0.002071	0.002075	0.002150
Pb, Diss	Closure	Sep	6	-	-	-	0.000725	0.000710	0.000774	0.002090	0.002095	0.002170
Pb, Diss	Closure	Oct	6	-	-	-	0.000732	0.000716	0.000777	0.002078	0.002082	0.002155
Pb, Diss	Closure	Nov	6	-	-	-	0.000735	0.000718	0.000778	0.002062	0.002066	0.002137
Pb, Diss	Closure	Dec	6	-	-	-	0.000734	0.000716	0.000777	0.002052	0.002056	0.002127
Pb, Diss	Post-Closure	Jan	109	-	-	-	0.000810	0.000810	0.000821	0.000537	0.000658	0.001988
Pb, Diss	Post-Closure	Feb	109	-	-	-	0.000810	0.000810	0.000820	0.000534	0.000656	0.001980
Pb, Diss	Post-Closure	Mar	109	-	-	-	0.000810	0.000810	0.000820	0.000528	0.000648	0.001955
Pb, Diss	Post-Closure	Apr	109	-	-	-	0.000809	0.000810	0.000820	0.000521	0.000639	0.001929
Pb, Diss	Post-Closure	May	109	-	-	-	0.000810	0.000810	0.000820	0.000519	0.000636	0.001912
Pb, Diss	Post-Closure	Jun	109	-	-	-	0.000810	0.000810	0.000820	0.000522	0.000638	0.001903
Pb, Diss	Post-Closure	Jul	109	-	-	-	0.000810	0.000810	0.000821	0.000531	0.000646	0.001895
Pb, Diss	Post-Closure	Aug	109	-	-	-	0.000810	0.000810	0.000822	0.000541	0.000654	0.001889
Pb, Diss	Post-Closure	Sep	109	-	-	-	0.000810	0.000810	0.000822	0.000545	0.000657	0.001877
Pb, Diss	Post-Closure	Oct	109	-	-	-	0.000810	0.000811	0.000822	0.000543	0.000653	0.001859
Pb, Diss	Post-Closure	Nov	109	-	-	-	0.000810	0.000810	0.000822	0.000540	0.000650	0.001846
Pb, Diss	Post-Closure	Dec	109	-	-	-	0.000810	0.000810	0.000821	0.000538	0.000647	0.001839
Pb, Tot	Construction	Jan	2	0.003661	0.003661	0.003888	-	-	-	-	-	-
Pb, Tot	Construction	Feb	2	0.003095	0.003095	0.003232	-	-	-	-	-	-
Pb, Tot	Construction	Mar	2	0.002230	0.002230	0.002412	-	-	-	0.000005	0.000005	0.000008
Pb, Tot	Construction	Apr	2	0.001889	0.001889	0.002120	-	-	-	-	-	-
Pb, Tot	Construction	May	2	0.001729	0.001729	0.001913	-	-	-	0.000001	0.000001	0.000001
Pb, Tot	Construction	Jun	2	0.002032	0.002032	0.002243	-	-	-	0.000002	0.000002	0.000002
Pb, Tot	Construction	Jul	2	0.002308	0.002308	0.002619	-	-	-	0.000160	0.000160	0.000203
Pb, Tot	Construction	Aug	2	0.002312	0.002312	0.002631	-	-	-	0.000094	0.000094	0.000116
Pb, Tot	Construction	Sep	2	0.002462	0.002462	0.002800	-	-	-	0.003008	0.003008	0.003008
Pb, Tot	Construction	Oct	2	0.002722	0.002722	0.003174	-	-	-	0.002653	0.002653	0.002653
Pb, Tot	Construction	Nov	2	0.002904	0.002904	0.003397	-	-	-	0.002364	0.002364	0.002364
Pb, Tot	Construction	Dec	2	0.002984	0.002984	0.003501	-	-	-	0.002271	0.002271	0.002271
Pb, Tot	Operations	Jan	13	0.001023	0.001182	0.002324	-	-	-	0.002753	0.002601	0.002867
Pb, Tot	Operations	Feb	13	0.000719	0.000860	0.001916	-	-	-	0.002626	0.002512	0.002820
Pb, Tot	Operations	Mar	13	0.000534	0.000612	0.001340	-	-	-	0.002403	0.002277	0.002724
Pb, Tot	Operations	Apr	13	0.000721	0.000774	0.001478	-	-	-	0.002141	0.002098	0.002592
Pb, Tot	Operations	May	13	0.000875	0.000920	0.001555	-	-	-	0.002035	0.002101	0.002509
Pb, Tot	Operations	Jun	13	0.000707	0.000708	0.000836	-	-	-	0.002405	0.002440	0.002947
Pb, Tot	Operations	Jul	13	0.000703	0.000708	0.000843	-	-	-	0.002784	0.002987	0.004124
Pb, Tot	Operations	Aug	13	0.000694	0.000694	0.000818	-	-	-	0.003215	0.003396	0.004704
Pb, Tot	Operations	Sep	13	0.000747	0.000754	0.000900	-	-	-	0.003218	0.003394	0.004217
Pb, Tot	Operations	Oct	13	0.000923	0.000934	0.001350	-	-	-	0.003135	0.003118	0.003463
Pb, Tot	Operations	Nov	13	0.000928	0.000990	0.001529	-	-	-	0.003005	0.002895	0.003099
Pb, Tot	Operations	Dec	13	0.000988	0.001055	0.001610	-	-	-	0.002918	0.002763	0.003076
Pb, Tot	Closure	Jan	6	-	-	-	0.000897	0.000846	0.000999	0.002767	0.002783	0.003058
Pb, Tot	Closure	Feb	6	-	-	-	0.000895	0.000848	0.000997	0.002752	0.002768	0.003040
Pb, Tot	Closure	Mar	6	-	-	-	0.000912	0.000873	0.001002	0.002708	0.002722	0.002984
Pb, Tot	Closure	Apr	6	-	-	-	0.000931	0.000891	0.001008	0.002661	0.002674	0.002927
Pb, Tot	Closure	May	6	-	-	-	0.000939	0.000899	0.001010	0.002638	0.002651	0.002899
Pb, Tot	Closure	Jun	6	-	-	-	0.000943	0.000906	0.001010	0.002650	0.002662	0.002909
Pb, Tot	Closure	Jul	6	-	-	-	0.000945	0.000916	0.001011	0.002686	0.002699	0.002948
Pb, Tot	Closure	Aug	6	-	-	-	0.000947	0.000924	0.001011	0.002726	0.002739	0.002991
Pb, Tot	Closure	Sep	6	-	-	-	0.000951	0.000929	0.001013	0.002741	0.002755	0.003005
Pb, Tot	Closure	Oct	6	-	-	-	0.000960	0.000937	0.001016	0.002721	0.002734	0.002980
Pb, Tot	Closure	Nov	6	-	-	-	0.000964	0.000939	0.001017	0.002698	0.002711	0.002953
Pb, Tot	Closure	Dec	6	-	-	-	0.000961	0.000935	0.001015	0.002685	0.002698	0.002939
Pb, Tot	Post-Closure	Jan	109	-	-	-	0.001229	0.001206	0.001236	0.000545	0.000707	0.002481
Pb, Tot	Post-Closure	Feb	109	-	-	-	0.001229	0.001206	0.001236	0.000542	0.000704	0.002471
Pb, Tot	Post-Closure	Mar	109	-	-	-	0.001228	0.001206	0.001236	0.000536	0.000696	0.002440
Pb, Tot	Post-Closure	Apr	109	-	-	-	0.001228	0.001205	0.001235	0.000529	0.000687	0.002407
Pb, Tot	Post-Closure	May	109	-	-	-	0.001228	0.001205	0.001235	0.000526	0.000683	0.002385
Pb, Tot	Post-Closure	Jun	109	-	-	-	0.001228	0.001206	0.001236	0.000530	0.000685	0.002371
Pb, Tot	Post-Closure	Jul	109	-	-	-	0.001229	0.001207	0.001236	0.000539	0.000692	0.002359
Pb, Tot	Post-Closure	Aug	109	-	-	-	0.001230	0.001208	0.001237	0.000549	0.000700	0.002347
Pb, Tot	Post-Closure	Sep	109	-	-	-	0.001230	0.001208	0.001237	0.000553	0.000702	0.002330
Pb, Tot	Post-Closure	Oct	109	-	-	-	0.001230	0.001208	0.001237	0.000551	0.000698	0.002306
Pb, Tot	Post-Closure	Nov	109	-	-	-	0.001230	0.001208	0.001237	0.000548	0.000694	0.002290
Pb, Tot	Post-Closure	Dec	109	-	-	-	0.001230	0.001208	0.001237	0.000546	0.000692	0.002282
Mn, Diss	Construction	Jan	2	0.692	0.692	0.857	-	-	-	-	-	-
Mn, Diss	Construction	Feb	2	0.731	0.731	0.842	-	-	-	-	-	-
Mn, Diss	Construction	Mar	2	0.778	0.778	0.798	-	-	-	0.038	0.038	0.040
Mn, Diss	Construction	Apr	2	0.779	0.779	0.780	-	-	-	-	-	-
Mn, Diss	Construction	May	2	0.737	0.737	0.744	-	-	-	0.016	0.016	0.017
Mn, Diss	Construction	Jun	2	0.676	0.676	0.680	-	-	-	0.016	0.016	0.016
Mn, Diss	Construction	Jul	2	0.537	0.537	0.538	-	-	-	0.507	0.507	0.527
Mn, Diss	Construction	Aug	2	0.478	0.478	0.496	-	-	-	0.150	0.150	0.292
Mn, Diss	Construction	Sep	2	0.422	0.422	0.448	-	-	-	0.183	0.183	0.183
Mn, Diss	Construction	Oct	2	0.345	0.345	0.374	-	-	-	0.140	0.140	0.140
Mn, Diss	Construction	Nov	2	0.383	0.383	0.419	-	-	-	0.111	0.111	0.111
Mn, Diss	Construction	Dec	2	0.488	0.488	0.531	-	-	-	0.101	0.101	0.101
Mn, Diss	Operations	Jan	13	0.774	0.781	0.964	-	-	-	0.196	0.184	0.296
Mn, Diss	Operations	Feb	13	0.745	0.753	0.849	-	-	-	0.176	0.173	0.288
Mn, Diss	Operations	Mar	13	0.738	0.752	0.812	-	-	-	0.169	0.183	0.286
Mn, Diss	Operations	Apr	13	0.780	0.800	0.883	-	-	-	0.227	0.220	0.294
Mn, Diss	Operations	May	13	0.762	0.781	0.897	-	-	-	0.262	0.262	0.310
Mn, Diss	Operations	Jun	13	0.750	0.756	0.841	-	-	-	0.286	0.287	0.329

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Mn, Diss	Operations	Jul	13	0.710	0.710	0.807	-	-	-	0.308	0.305	0.352
Mn, Diss	Operations	Aug	13	0.707	0.705	0.800	-	-	-	0.328	0.317	0.375
Mn, Diss	Operations	Sep	13	0.686	0.681	0.793	-	-	-	0.325	0.306	0.392
Mn, Diss	Operations	Oct	13	0.683	0.673	0.843	-	-	-	0.303	0.276	0.401
Mn, Diss	Operations	Nov	13	0.743	0.717	0.877	-	-	-	0.274	0.246	0.403
Mn, Diss	Operations	Dec	13	0.808	0.785	0.942	-	-	-	0.246	0.224	0.403
Mn, Diss	Closure	Jan	6	-	-	-	0.893	0.876	0.915	0.480	0.476	0.538
Mn, Diss	Closure	Feb	6	-	-	-	0.891	0.875	0.908	0.477	0.473	0.536
Mn, Diss	Closure	Mar	6	-	-	-	0.888	0.885	0.908	0.471	0.467	0.528
Mn, Diss	Closure	Apr	6	-	-	-	0.887	0.892	0.912	0.465	0.461	0.521
Mn, Diss	Closure	May	6	-	-	-	0.890	0.894	0.913	0.464	0.460	0.520
Mn, Diss	Closure	Jun	6	-	-	-	0.892	0.898	0.917	0.472	0.469	0.528
Mn, Diss	Closure	Jul	6	-	-	-	0.896	0.905	0.934	0.488	0.485	0.544
Mn, Diss	Closure	Aug	6	-	-	-	0.900	0.909	0.941	0.505	0.502	0.560
Mn, Diss	Closure	Sep	6	-	-	-	0.902	0.910	0.942	0.514	0.511	0.568
Mn, Diss	Closure	Oct	6	-	-	-	0.900	0.908	0.938	0.512	0.509	0.566
Mn, Diss	Closure	Nov	6	-	-	-	0.897	0.904	0.930	0.509	0.506	0.562
Mn, Diss	Closure	Dec	6	-	-	-	0.895	0.901	0.922	0.507	0.503	0.560
Mn, Diss	Post-Closure	Jan	109	-	-	-	0.980	0.967	0.996	0.291	0.314	0.558
Mn, Diss	Post-Closure	Feb	109	-	-	-	0.980	0.967	0.996	0.291	0.313	0.556
Mn, Diss	Post-Closure	Mar	109	-	-	-	0.980	0.967	0.996	0.288	0.310	0.550
Mn, Diss	Post-Closure	Apr	109	-	-	-	0.981	0.967	0.997	0.286	0.308	0.545
Mn, Diss	Post-Closure	May	109	-	-	-	0.981	0.968	0.997	0.286	0.307	0.542
Mn, Diss	Post-Closure	Jun	109	-	-	-	0.982	0.969	0.998	0.288	0.309	0.542
Mn, Diss	Post-Closure	Jul	109	-	-	-	0.982	0.969	0.998	0.292	0.313	0.543
Mn, Diss	Post-Closure	Aug	109	-	-	-	0.982	0.969	0.998	0.295	0.316	0.543
Mn, Diss	Post-Closure	Sep	109	-	-	-	0.982	0.969	0.997	0.296	0.317	0.541
Mn, Diss	Post-Closure	Oct	109	-	-	-	0.981	0.968	0.997	0.295	0.315	0.536
Mn, Diss	Post-Closure	Nov	109	-	-	-	0.981	0.968	0.996	0.293	0.313	0.533
Mn, Diss	Post-Closure	Dec	109	-	-	-	0.981	0.968	0.996	0.292	0.312	0.531
Hg, Diss	Construction	Jan	2	0.0000032	0.0000032	0.0000038	-	-	-	-	-	-
Hg, Diss	Construction	Feb	2	0.0000043	0.0000043	0.0000044	-	-	-	-	-	-
Hg, Diss	Construction	Mar	2	0.0000057	0.0000057	0.0000057	-	-	-	0.0000001	0.0000001	0.0000001
Hg, Diss	Construction	Apr	2	0.0000064	0.0000064	0.0000065	-	-	-	-	-	-
Hg, Diss	Construction	May	2	0.0000068	0.0000068	0.0000069	-	-	-	0.00000003	0.00000003	0.00000003
Hg, Diss	Construction	Jun	2	0.0000064	0.0000064	0.0000064	-	-	-	0.00000003	0.00000003	0.00000003
Hg, Diss	Construction	Jul	2	0.0000056	0.0000056	0.0000058	-	-	-	0.0000017	0.0000017	0.0000019
Hg, Diss	Construction	Aug	2	0.0000056	0.0000056	0.0000059	-	-	-	0.0000010	0.0000010	0.0000013
Hg, Diss	Construction	Sep	2	0.0000065	0.0000065	0.0000078	-	-	-	0.0000162	0.0000162	0.0000162
Hg, Diss	Construction	Oct	2	0.0000050	0.0000050	0.0000056	-	-	-	0.0000132	0.0000132	0.0000132
Hg, Diss	Construction	Nov	2	0.0000045	0.0000045	0.0000050	-	-	-	0.0000102	0.0000102	0.0000102
Hg, Diss	Construction	Dec	2	0.0000043	0.0000043	0.0000048	-	-	-	0.0000086	0.0000086	0.0000086
Hg, Diss	Operations	Jan	13	0.0000064	0.0000062	0.0000074	-	-	-	0.0000123	0.0000105	0.0000140
Hg, Diss	Operations	Feb	13	0.0000076	0.0000075	0.0000085	-	-	-	0.0000108	0.0000095	0.0000135
Hg, Diss	Operations	Mar	13	0.0000089	0.0000086	0.0000092	-	-	-	0.0000092	0.0000083	0.0000129
Hg, Diss	Operations	Apr	13	0.0000081	0.0000078	0.0000085	-	-	-	0.0000082	0.0000081	0.0000122
Hg, Diss	Operations	May	13	0.0000075	0.0000072	0.0000080	-	-	-	0.0000094	0.0000092	0.0000121
Hg, Diss	Operations	Jun	13	0.0000085	0.0000084	0.0000089	-	-	-	0.0000116	0.0000120	0.0000170
Hg, Diss	Operations	Jul	13	0.0000084	0.0000084	0.0000089	-	-	-	0.0000147	0.0000161	0.0000260
Hg, Diss	Operations	Aug	13	0.0000086	0.0000085	0.0000090	-	-	-	0.0000174	0.0000193	0.0000306
Hg, Diss	Operations	Sep	13	0.0000085	0.0000082	0.0000088	-	-	-	0.0000179	0.0000191	0.0000261
Hg, Diss	Operations	Oct	13	0.0000079	0.0000076	0.0000085	-	-	-	0.0000175	0.0000166	0.0000196
Hg, Diss	Operations	Nov	13	0.0000075	0.0000072	0.0000083	-	-	-	0.0000157	0.0000143	0.0000181
Hg, Diss	Operations	Dec	13	0.0000068	0.0000067	0.0000079	-	-	-	0.0000145	0.0000125	0.0000179
Hg, Diss	Closure	Jan	6	-	-	-	0.0000097	0.0000099	0.0000112	0.0000319	0.0000311	0.0000425
Hg, Diss	Closure	Feb	6	-	-	-	0.0000097	0.0000099	0.0000112	0.0000317	0.0000310	0.0000423
Hg, Diss	Closure	Mar	6	-	-	-	0.0000099	0.0000099	0.0000113	0.0000312	0.0000305	0.0000416
Hg, Diss	Closure	Apr	6	-	-	-	0.0000101	0.0000101	0.0000115	0.0000307	0.0000300	0.0000410
Hg, Diss	Closure	May	6	-	-	-	0.0000102	0.0000101	0.0000115	0.0000308	0.0000301	0.0000409
Hg, Diss	Closure	Jun	6	-	-	-	0.0000102	0.0000101	0.0000115	0.0000317	0.0000310	0.0000418
Hg, Diss	Closure	Jul	6	-	-	-	0.0000102	0.0000101	0.0000115	0.0000336	0.0000329	0.0000436
Hg, Diss	Closure	Aug	6	-	-	-	0.0000102	0.0000101	0.0000115	0.0000356	0.0000350	0.0000456
Hg, Diss	Closure	Sep	6	-	-	-	0.0000102	0.0000101	0.0000115	0.0000368	0.0000362	0.0000468
Hg, Diss	Closure	Oct	6	-	-	-	0.0000103	0.0000102	0.0000115	0.0000370	0.0000364	0.0000468
Hg, Diss	Closure	Nov	6	-	-	-	0.0000104	0.0000103	0.0000116	0.0000368	0.0000362	0.0000465
Hg, Diss	Closure	Dec	6	-	-	-	0.0000104	0.0000103	0.0000116	0.0000366	0.0000360	0.0000463
Hg, Diss	Post-Closure	Jan	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000238	0.0000257	0.0000461
Hg, Diss	Post-Closure	Feb	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000237	0.0000256	0.0000459
Hg, Diss	Post-Closure	Mar	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000234	0.0000252	0.0000454
Hg, Diss	Post-Closure	Apr	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000231	0.0000249	0.0000448
Hg, Diss	Post-Closure	May	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000230	0.0000248	0.0000444
Hg, Diss	Post-Closure	Jun	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000232	0.0000249	0.0000444
Hg, Diss	Post-Closure	Jul	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000236	0.0000253	0.0000445
Hg, Diss	Post-Closure	Aug	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000240	0.0000257	0.0000447
Hg, Diss	Post-Closure	Sep	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000242	0.0000259	0.0000447
Hg, Diss	Post-Closure	Oct	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000241	0.0000258	0.0000443
Hg, Diss	Post-Closure	Nov	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000240	0.0000256	0.0000440
Hg, Diss	Post-Closure	Dec	109	-	-	-	0.0000110	0.0000112	0.0000124	0.0000239	0.0000255	0.0000439
Hg, Tot	Construction	Jan	2	0.0000041	0.0000041	0.0000044	-	-	-	-	-	-
Hg, Tot	Construction	Feb	2	0.0000051	0.0000051	0.0000052	-	-	-	-	-	-
Hg, Tot	Construction	Mar	2	0.0000065	0.0000065	0.0000065	-	-	-	0.0000001	0.0000001	0.0000002
Hg, Tot	Construction	Apr	2	0.0000070	0.0000070	0.0000071	-	-	-	-	-	-
Hg, Tot	Construction	May	2	0.0000074	0.0000074	0.0000074	-	-	-	0.00000005	0.00000005	0.00000005
Hg, Tot	Construction	Jun	2	0.0000068	0.0000068	0.0000069	-	-	-	0.00000005	0.00000005	0.00000005
Hg, Tot	Construction	Jul	2	0.0000061	0.0000061	0.0000062	-	-	-	0.0000024	0.0000024	0.0000025
Hg, Tot	Construction	Aug	2	0.0000060	0.0000060	0.0000063	-	-	-	0.0000013	0.0000013	0.0000017
Hg, Tot	Construction	Sep	2	0.0000068	0.0000068	0.0000081	-	-	-	0.0000163	0.0000163	0.0000163

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Hg, Tot	Construction	Oct	2	0.0000052	0.0000052	0.0000057	-	-	-	0.0000133	0.0000133	0.0000133
Hg, Tot	Construction	Nov	2	0.0000048	0.0000048	0.0000053	-	-	-	0.0000102	0.0000102	0.0000102
Hg, Tot	Construction	Dec	2	0.0000048	0.0000048	0.0000052	-	-	-	0.0000086	0.0000086	0.0000086
Hg, Tot	Operations	Jan	13	0.0000067	0.0000065	0.0000078	-	-	-	0.0000123	0.0000105	0.0000141
Hg, Tot	Operations	Feb	13	0.0000078	0.0000077	0.0000087	-	-	-	0.0000109	0.0000095	0.0000136
Hg, Tot	Operations	Mar	13	0.0000090	0.0000088	0.0000093	-	-	-	0.0000092	0.0000084	0.0000129
Hg, Tot	Operations	Apr	13	0.0000083	0.0000080	0.0000087	-	-	-	0.0000082	0.0000082	0.0000123
Hg, Tot	Operations	May	13	0.0000077	0.0000075	0.0000083	-	-	-	0.0000094	0.0000093	0.0000122
Hg, Tot	Operations	Jun	13	0.0000087	0.0000086	0.0000091	-	-	-	0.0000116	0.0000121	0.0000171
Hg, Tot	Operations	Jul	13	0.0000085	0.0000085	0.0000090	-	-	-	0.0000148	0.0000162	0.0000261
Hg, Tot	Operations	Aug	13	0.0000087	0.0000086	0.0000091	-	-	-	0.0000174	0.0000194	0.0000307
Hg, Tot	Operations	Sep	13	0.0000085	0.0000083	0.0000089	-	-	-	0.0000179	0.0000192	0.0000262
Hg, Tot	Operations	Oct	13	0.0000079	0.0000076	0.0000085	-	-	-	0.0000175	0.0000166	0.0000197
Hg, Tot	Operations	Nov	13	0.0000076	0.0000073	0.0000084	-	-	-	0.0000157	0.0000143	0.0000181
Hg, Tot	Operations	Dec	13	0.0000071	0.0000070	0.0000081	-	-	-	0.0000146	0.0000126	0.0000180
Hg, Tot	Closure	Jan	6	-	-	-	0.0000098	0.0000100	0.0000113	0.0000319	0.0000312	0.0000426
Hg, Tot	Closure	Feb	6	-	-	-	0.0000098	0.0000100	0.0000113	0.0000318	0.0000311	0.0000424
Hg, Tot	Closure	Mar	6	-	-	-	0.0000100	0.0000101	0.0000114	0.0000313	0.0000305	0.0000417
Hg, Tot	Closure	Apr	6	-	-	-	0.0000102	0.0000102	0.0000116	0.0000308	0.0000301	0.0000411
Hg, Tot	Closure	May	6	-	-	-	0.0000103	0.0000102	0.0000116	0.0000308	0.0000301	0.0000410
Hg, Tot	Closure	Jun	6	-	-	-	0.0000103	0.0000102	0.0000116	0.0000318	0.0000311	0.0000419
Hg, Tot	Closure	Jul	6	-	-	-	0.0000103	0.0000102	0.0000116	0.0000336	0.0000330	0.0000437
Hg, Tot	Closure	Aug	6	-	-	-	0.0000103	0.0000102	0.0000116	0.0000357	0.0000351	0.0000458
Hg, Tot	Closure	Sep	6	-	-	-	0.0000103	0.0000102	0.0000116	0.0000369	0.0000363	0.0000469
Hg, Tot	Closure	Oct	6	-	-	-	0.0000104	0.0000103	0.0000117	0.0000370	0.0000365	0.0000469
Hg, Tot	Closure	Nov	6	-	-	-	0.0000105	0.0000104	0.0000117	0.0000368	0.0000363	0.0000466
Hg, Tot	Closure	Dec	6	-	-	-	0.0000105	0.0000104	0.0000117	0.0000367	0.0000361	0.0000464
Hg, Tot	Post-Closure	Jan	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000239	0.0000258	0.0000462
Hg, Tot	Post-Closure	Feb	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000239	0.0000257	0.0000460
Hg, Tot	Post-Closure	Mar	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000236	0.0000254	0.0000455
Hg, Tot	Post-Closure	Apr	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000233	0.0000251	0.0000449
Hg, Tot	Post-Closure	May	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000232	0.0000250	0.0000445
Hg, Tot	Post-Closure	Jun	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000233	0.0000251	0.0000445
Hg, Tot	Post-Closure	Jul	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000237	0.0000255	0.0000447
Hg, Tot	Post-Closure	Aug	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000241	0.0000259	0.0000448
Hg, Tot	Post-Closure	Sep	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000243	0.0000261	0.0000448
Hg, Tot	Post-Closure	Oct	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000242	0.0000259	0.0000444
Hg, Tot	Post-Closure	Nov	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000241	0.0000258	0.0000441
Hg, Tot	Post-Closure	Dec	109	-	-	-	0.0000114	0.0000116	0.0000126	0.0000240	0.0000257	0.0000440
Mo, Tot	Construction	Jan	2	0.001670	0.001670	0.002372	-	-	-	-	-	-
Mo, Tot	Construction	Feb	2	0.002464	0.002464	0.002820	-	-	-	-	-	-
Mo, Tot	Construction	Mar	2	0.003620	0.003620	0.004037	-	-	-	0.000213	0.000213	0.000422
Mo, Tot	Construction	Apr	2	0.004053	0.004053	0.004455	-	-	-	-	-	-
Mo, Tot	Construction	May	2	0.004380	0.004380	0.004743	-	-	-	0.000030	0.000030	0.000059
Mo, Tot	Construction	Jun	2	0.004170	0.004170	0.004620	-	-	-	0.000008	0.000008	0.000008
Mo, Tot	Construction	Jul	2	0.003877	0.003877	0.004569	-	-	-	0.005992	0.005992	0.010780
Mo, Tot	Construction	Aug	2	0.004022	0.004022	0.004800	-	-	-	0.000956	0.000956	0.001453
Mo, Tot	Construction	Sep	2	0.004615	0.004615	0.006079	-	-	-	0.015300	0.015300	0.015300
Mo, Tot	Construction	Oct	2	0.003800	0.003800	0.004877	-	-	-	0.014210	0.014210	0.014210
Mo, Tot	Construction	Nov	2	0.003582	0.003582	0.004697	-	-	-	0.013720	0.013720	0.013720
Mo, Tot	Construction	Dec	2	0.003515	0.003515	0.004670	-	-	-	0.013940	0.013940	0.013940
Mo, Tot	Operations	Jan	13	0.022670	0.022904	0.038990	-	-	-	0.066310	0.065201	0.088500
Mo, Tot	Operations	Feb	13	0.015320	0.016053	0.026220	-	-	-	0.068220	0.067295	0.089080
Mo, Tot	Operations	Mar	13	0.011030	0.011650	0.018420	-	-	-	0.063050	0.061761	0.072610
Mo, Tot	Operations	Apr	13	0.015040	0.015665	0.024730	-	-	-	0.056110	0.055611	0.070370
Mo, Tot	Operations	May	13	0.018120	0.018930	0.030870	-	-	-	0.051640	0.051598	0.067900
Mo, Tot	Operations	Jun	13	0.015050	0.015332	0.023450	-	-	-	0.051700	0.052583	0.067530
Mo, Tot	Operations	Jul	13	0.016280	0.016289	0.024910	-	-	-	0.054830	0.056755	0.069030
Mo, Tot	Operations	Aug	13	0.015810	0.016043	0.024120	-	-	-	0.060790	0.060745	0.070930
Mo, Tot	Operations	Sep	13	0.016840	0.017802	0.027190	-	-	-	0.062460	0.063015	0.072130
Mo, Tot	Operations	Oct	13	0.021390	0.022948	0.038040	-	-	-	0.062780	0.063208	0.072370
Mo, Tot	Operations	Nov	13	0.025810	0.023492	0.035410	-	-	-	0.065510	0.064152	0.072550
Mo, Tot	Operations	Dec	13	0.027170	0.024807	0.037440	-	-	-	0.066730	0.066610	0.080240
Mo, Tot	Closure	Jan	6	-	-	-	0.038980	0.035110	0.040240	0.057465	0.058097	0.068990
Mo, Tot	Closure	Feb	6	-	-	-	0.038695	0.035210	0.040090	0.057165	0.057785	0.068580
Mo, Tot	Closure	Mar	6	-	-	-	0.038780	0.036512	0.040050	0.056235	0.056812	0.067320
Mo, Tot	Closure	Apr	6	-	-	-	0.038980	0.037365	0.040070	0.055245	0.055787	0.066010
Mo, Tot	Closure	May	6	-	-	-	0.039040	0.037642	0.040060	0.054690	0.055213	0.065270
Mo, Tot	Closure	Jun	6	-	-	-	0.039175	0.038123	0.040110	0.054650	0.055170	0.065160
Mo, Tot	Closure	Jul	6	-	-	-	0.039515	0.038920	0.040290	0.054950	0.055472	0.065450
Mo, Tot	Closure	Aug	6	-	-	-	0.039885	0.039600	0.040490	0.055295	0.055817	0.065790
Mo, Tot	Closure	Sep	6	-	-	-	0.040150	0.039992	0.040630	0.055280	0.055798	0.065700
Mo, Tot	Closure	Oct	6	-	-	-	0.040300	0.040150	0.040690	0.054745	0.055253	0.065000
Mo, Tot	Closure	Nov	6	-	-	-	0.040230	0.039997	0.040630	0.054255	0.054752	0.064370
Mo, Tot	Closure	Dec	6	-	-	-	0.040015	0.039667	0.040500	0.054005	0.054497	0.064060
Mo, Tot	Post-Closure	Jan	109	-	-	-	0.014870	0.017217	0.040370	0.005630	0.009025	0.046020
Mo, Tot	Post-Closure	Feb	109	-	-	-	0.014870	0.017204	0.040220	0.005608	0.008989	0.045840
Mo, Tot	Post-Closure	Mar	109	-	-	-	0.014850	0.017177	0.039990	0.005537	0.008876	0.045260
Mo, Tot	Post-Closure	Apr	109	-	-	-	0.014840	0.017150	0.039730	0.005466	0.008758	0.044640
Mo, Tot	Post-Closure	May	109	-	-	-	0.014830	0.017128	0.039490	0.005442	0.008700	0.044210
Mo, Tot	Post-Closure	Jun	109	-	-	-	0.014820	0.017106	0.039200	0.005479	0.008707	0.043880
Mo, Tot	Post-Closure	Jul	109	-	-	-	0.014820	0.017077	0.038860	0.005568	0.008759	0.043540
Mo, Tot	Post-Closure	Aug	109	-	-	-	0.014810	0.017049	0.038520	0.005670	0.008823	0.043180
Mo, Tot	Post-Closure	Sep	109	-	-	-	0.014800	0.017023	0.038220	0.005715	0.008831	0.042780
Mo, Tot	Post-Closure	Oct	109	-	-	-	0.014790	0.017000	0.037970	0.005691	0.008769	0.042310
Mo, Tot	Post-Closure	Nov	109	-	-	-	0.014780	0.016984	0.037790	0.005659	0.008713	0.041990
Mo, Tot	Post-Closure	Dec	109	-	-	-	0.014780	0.016973	0.037630	0.005639	0.008682	0.041840

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ni, Diss	Construction	Jan	2	0.002072	0.002072	0.002997	-	-	-	-	-	-
Ni, Diss	Construction	Feb	2	0.002553	0.002553	0.003276	-	-	-	-	-	-
Ni, Diss	Construction	Mar	2	0.003374	0.003374	0.004282	-	-	-	0.000521	0.000521	0.001016
Ni, Diss	Construction	Apr	2	0.003560	0.003560	0.004394	-	-	-	-	-	-
Ni, Diss	Construction	May	2	0.004153	0.004153	0.005325	-	-	-	0.000080	0.000080	0.000147
Ni, Diss	Construction	Jun	2	0.003902	0.003902	0.005020	-	-	-	0.000027	0.000027	0.000027
Ni, Diss	Construction	Jul	2	0.004137	0.004137	0.005489	-	-	-	0.014390	0.014390	0.025570
Ni, Diss	Construction	Aug	2	0.004437	0.004437	0.005983	-	-	-	0.002073	0.002073	0.003766
Ni, Diss	Construction	Sep	2	0.005611	0.005611	0.008306	-	-	-	0.012470	0.012470	0.012470
Ni, Diss	Construction	Oct	2	0.004882	0.004882	0.006935	-	-	-	0.011260	0.011260	0.011260
Ni, Diss	Construction	Nov	2	0.004983	0.004983	0.007137	-	-	-	0.010470	0.010470	0.010470
Ni, Diss	Construction	Dec	2	0.005105	0.005105	0.007329	-	-	-	0.010310	0.010310	0.010310
Ni, Diss	Operations	Jan	13	0.048570	0.049576	0.087070	-	-	-	0.020970	0.021438	0.034960
Ni, Diss	Operations	Feb	13	0.028830	0.031178	0.057190	-	-	-	0.019830	0.020687	0.034420
Ni, Diss	Operations	Mar	13	0.017090	0.019007	0.036320	-	-	-	0.019800	0.020782	0.034600
Ni, Diss	Operations	Apr	13	0.027970	0.029897	0.051080	-	-	-	0.019280	0.020304	0.034430
Ni, Diss	Operations	May	13	0.036190	0.038559	0.066630	-	-	-	0.018620	0.019953	0.033940
Ni, Diss	Operations	Jun	13	0.027430	0.028218	0.047380	-	-	-	0.020230	0.021668	0.035000
Ni, Diss	Operations	Jul	13	0.030460	0.030530	0.050880	-	-	-	0.023890	0.025058	0.037730
Ni, Diss	Operations	Aug	13	0.029150	0.029839	0.048880	-	-	-	0.027330	0.027840	0.040540
Ni, Diss	Operations	Sep	13	0.031850	0.034464	0.056610	-	-	-	0.029040	0.028827	0.042900
Ni, Diss	Operations	Oct	13	0.043650	0.047882	0.083710	-	-	-	0.028830	0.028170	0.044530
Ni, Diss	Operations	Nov	13	0.055240	0.049700	0.077310	-	-	-	0.027360	0.026734	0.045140
Ni, Diss	Operations	Dec	13	0.059160	0.053464	0.082780	-	-	-	0.025610	0.025307	0.045380
Ni, Diss	Closure	Jan	6	-	-	-	0.081545	0.072427	0.081950	0.053770	0.053352	0.060210
Ni, Diss	Closure	Feb	6	-	-	-	0.080915	0.072653	0.081380	0.053490	0.053065	0.059900
Ni, Diss	Closure	Mar	6	-	-	-	0.080410	0.075567	0.081170	0.052620	0.052180	0.058920
Ni, Diss	Closure	Apr	6	-	-	-	0.080165	0.077342	0.081070	0.051745	0.051295	0.057930
Ni, Diss	Closure	May	6	-	-	-	0.079955	0.077867	0.080990	0.051565	0.051120	0.057680
Ni, Diss	Closure	Jun	6	-	-	-	0.080265	0.079048	0.081160	0.052450	0.052023	0.058530
Ni, Diss	Closure	Jul	6	-	-	-	0.081380	0.081075	0.081760	0.054305	0.053907	0.060370
Ni, Diss	Closure	Aug	6	-	-	-	0.082360	0.082815	0.084150	0.056390	0.056020	0.062430
Ni, Diss	Closure	Sep	6	-	-	-	0.082930	0.083770	0.086600	0.057520	0.057170	0.063530
Ni, Diss	Closure	Oct	6	-	-	-	0.083045	0.083930	0.087040	0.057425	0.057078	0.063360
Ni, Diss	Closure	Nov	6	-	-	-	0.082730	0.083375	0.085610	0.057030	0.056685	0.062910
Ni, Diss	Closure	Dec	6	-	-	-	0.082265	0.082538	0.083400	0.056765	0.056418	0.062610
Ni, Diss	Post-Closure	Jan	109	-	-	-	0.102000	0.098277	0.106900	0.024540	0.027718	0.062390
Ni, Diss	Post-Closure	Feb	109	-	-	-	0.102000	0.098250	0.106800	0.024440	0.027607	0.062140
Ni, Diss	Post-Closure	Mar	109	-	-	-	0.102000	0.098215	0.106800	0.024130	0.027261	0.061350
Ni, Diss	Post-Closure	Apr	109	-	-	-	0.102000	0.098202	0.106800	0.023820	0.026906	0.060530
Ni, Diss	Post-Closure	May	109	-	-	-	0.102000	0.098203	0.106700	0.023720	0.026771	0.060050
Ni, Diss	Post-Closure	Jun	109	-	-	-	0.102000	0.098251	0.106800	0.023890	0.026911	0.059870
Ni, Diss	Post-Closure	Jul	109	-	-	-	0.102100	0.098341	0.106800	0.024280	0.027271	0.059860
Ni, Diss	Post-Closure	Aug	109	-	-	-	0.102200	0.098440	0.106900	0.024730	0.027688	0.059890
Ni, Diss	Post-Closure	Sep	109	-	-	-	0.102200	0.098520	0.106900	0.024940	0.027856	0.059670
Ni, Diss	Post-Closure	Oct	109	-	-	-	0.102200	0.098541	0.106900	0.024830	0.027717	0.059150
Ni, Diss	Post-Closure	Nov	109	-	-	-	0.102200	0.098537	0.106900	0.024690	0.027557	0.058750
Ni, Diss	Post-Closure	Dec	109	-	-	-	0.102200	0.098524	0.106900	0.024610	0.027458	0.058530
Ni, Tot	Construction	Jan	2	0.006039	0.006039	0.006714	-	-	-	-	-	-
Ni, Tot	Construction	Feb	2	0.005912	0.005912	0.006570	-	-	-	-	-	-
Ni, Tot	Construction	Mar	2	0.005800	0.005800	0.006682	-	-	-	0.000525	0.000525	0.001021
Ni, Tot	Construction	Apr	2	0.005573	0.005573	0.006317	-	-	-	-	-	-
Ni, Tot	Construction	May	2	0.005662	0.005662	0.006541	-	-	-	0.000081	0.000081	0.000148
Ni, Tot	Construction	Jun	2	0.005996	0.005996	0.007011	-	-	-	0.000028	0.000028	0.000028
Ni, Tot	Construction	Jul	2	0.006636	0.006636	0.007850	-	-	-	0.014428	0.014428	0.025600
Ni, Tot	Construction	Aug	2	0.007017	0.007017	0.008467	-	-	-	0.002168	0.002168	0.003812
Ni, Tot	Construction	Sep	2	0.008784	0.008784	0.011780	-	-	-	0.018490	0.018490	0.018490
Ni, Tot	Construction	Oct	2	0.008022	0.008022	0.009899	-	-	-	0.017150	0.017150	0.017150
Ni, Tot	Construction	Nov	2	0.008320	0.008320	0.010230	-	-	-	0.016570	0.016570	0.016570
Ni, Tot	Construction	Dec	2	0.008541	0.008541	0.010490	-	-	-	0.016810	0.016810	0.016810
Ni, Tot	Operations	Jan	13	0.050750	0.051967	0.089290	-	-	-	0.027800	0.028487	0.041400
Ni, Tot	Operations	Feb	13	0.030020	0.032653	0.059370	-	-	-	0.026820	0.027836	0.040890
Ni, Tot	Operations	Mar	13	0.017640	0.019761	0.037560	-	-	-	0.026570	0.027413	0.040960
Ni, Tot	Operations	Apr	13	0.029080	0.031225	0.052340	-	-	-	0.025490	0.026398	0.040540
Ni, Tot	Operations	May	13	0.037690	0.040288	0.068340	-	-	-	0.024310	0.025678	0.039800
Ni, Tot	Operations	Jun	13	0.028390	0.029255	0.048450	-	-	-	0.025890	0.027507	0.040760
Ni, Tot	Operations	Jul	13	0.031490	0.031610	0.051990	-	-	-	0.029750	0.031170	0.043490
Ni, Tot	Operations	Aug	13	0.030110	0.030874	0.049920	-	-	-	0.033360	0.034114	0.046290
Ni, Tot	Operations	Sep	13	0.032900	0.035683	0.057840	-	-	-	0.035170	0.035145	0.048580
Ni, Tot	Operations	Oct	13	0.045110	0.049608	0.085550	-	-	-	0.035000	0.034475	0.050070
Ni, Tot	Operations	Nov	13	0.057130	0.051610	0.079030	-	-	-	0.033670	0.033210	0.050580
Ni, Tot	Operations	Dec	13	0.061300	0.055615	0.084760	-	-	-	0.032150	0.032055	0.050770
Ni, Tot	Closure	Jan	6	-	-	-	0.083205	0.073827	0.083460	0.057905	0.057555	0.063430
Ni, Tot	Closure	Feb	6	-	-	-	0.082480	0.074072	0.083090	0.057610	0.057248	0.063100
Ni, Tot	Closure	Mar	6	-	-	-	0.082000	0.077052	0.082880	0.056675	0.056295	0.062080
Ni, Tot	Closure	Apr	6	-	-	-	0.081775	0.078865	0.082790	0.055725	0.055335	0.061030
Ni, Tot	Closure	May	6	-	-	-	0.081580	0.079403	0.082700	0.055490	0.055105	0.060740
Ni, Tot	Closure	Jun	6	-	-	-	0.081895	0.080607	0.082880	0.056365	0.055993	0.061580
Ni, Tot	Closure	Jul	6	-	-	-	0.083060	0.082662	0.083410	0.058210	0.057863	0.063410
Ni, Tot	Closure	Aug	6	-	-	-	0.084035	0.084428	0.085600	0.060275	0.059962	0.065460
Ni, Tot	Closure	Sep	6	-	-	-	0.084605	0.085395	0.088080	0.061380	0.061087	0.066530
Ni, Tot	Closure	Oct	6	-	-	-	0.084725	0.085568	0.088530	0.061235	0.060945	0.066330
Ni, Tot	Closure	Nov	6	-	-	-	0.084420	0.085007	0.087080	0.060805	0.060515	0.065850
Ni, Tot	Closure	Dec	6	-	-	-	0.083965	0.084162	0.084830	0.060525	0.060232	0.065540
Ni, Tot	Post-Closure	Jan	109	-	-	-	0.104400	0.100560	0.109300	0.024560	0.027981	0.065300
Ni, Tot	Post-Closure	Feb	109	-	-	-	0.104400	0.100535	0.109300	0.024460	0.027870	0.065040
Ni, Tot	Post-Closure	Mar	109	-	-	-	0.104300	0.100491	0.109200	0.024150	0.027519	0.064220

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ni, Tot	Post-Closure	Apr	109	-	-	-	0.104300	0.100481	0.109200	0.023840	0.027161	0.063360
Ni, Tot	Post-Closure	May	109	-	-	-	0.104300	0.100481	0.109200	0.023740	0.027025	0.062850
Ni, Tot	Post-Closure	Jun	109	-	-	-	0.104400	0.100532	0.109200	0.023910	0.027163	0.062650
Ni, Tot	Post-Closure	Jul	109	-	-	-	0.104400	0.100627	0.109200	0.024300	0.027519	0.062600
Ni, Tot	Post-Closure	Aug	109	-	-	-	0.104500	0.100729	0.109300	0.024750	0.027935	0.062600
Ni, Tot	Post-Closure	Sep	109	-	-	-	0.104600	0.100804	0.109300	0.024960	0.028099	0.062350
Ni, Tot	Post-Closure	Oct	109	-	-	-	0.104600	0.100831	0.109300	0.024850	0.027958	0.061800
Ni, Tot	Post-Closure	Nov	109	-	-	-	0.104600	0.100826	0.109300	0.024710	0.027795	0.061370
Ni, Tot	Post-Closure	Dec	109	-	-	-	0.104600	0.100812	0.109300	0.024630	0.027695	0.061150
Se, Tot	Construction	Jan	2	0.000332	0.000332	0.000409	-	-	-	-	-	-
Se, Tot	Construction	Feb	2	0.000403	0.000403	0.000443	-	-	-	-	-	-
Se, Tot	Construction	Mar	2	0.000505	0.000505	0.000551	-	-	-	0.000030	0.000030	0.000057
Se, Tot	Construction	Apr	2	0.000542	0.000542	0.000584	-	-	-	-	-	-
Se, Tot	Construction	May	2	0.000582	0.000582	0.000630	-	-	-	0.000005	0.000005	0.000008
Se, Tot	Construction	Jun	2	0.000564	0.000564	0.000613	-	-	-	0.000002	0.000002	0.000002
Se, Tot	Construction	Jul	2	0.000542	0.000542	0.000615	-	-	-	0.000813	0.000813	0.001436
Se, Tot	Construction	Aug	2	0.000564	0.000564	0.000652	-	-	-	0.000136	0.000136	0.000220
Se, Tot	Construction	Sep	2	0.000663	0.000663	0.000854	-	-	-	0.001864	0.001864	0.001864
Se, Tot	Construction	Oct	2	0.000560	0.000560	0.000682	-	-	-	0.001751	0.001751	0.001751
Se, Tot	Construction	Nov	2	0.000541	0.000541	0.000664	-	-	-	0.001716	0.001716	0.001716
Se, Tot	Construction	Dec	2	0.000537	0.000537	0.000664	-	-	-	0.001762	0.001762	0.001762
Se, Tot	Operations	Jan	13	0.002940	0.002976	0.005077	-	-	-	0.008275	0.008209	0.011330
Se, Tot	Operations	Feb	13	0.001951	0.002055	0.003382	-	-	-	0.008582	0.008497	0.011460
Se, Tot	Operations	Mar	13	0.001373	0.001461	0.002347	-	-	-	0.007924	0.007814	0.009171
Se, Tot	Operations	Apr	13	0.001910	0.002002	0.003186	-	-	-	0.007061	0.007040	0.008893
Se, Tot	Operations	May	13	0.002321	0.002439	0.004000	-	-	-	0.006497	0.006521	0.008582
Se, Tot	Operations	Jun	13	0.001908	0.001950	0.003012	-	-	-	0.006492	0.006621	0.008528
Se, Tot	Operations	Jul	13	0.002072	0.002077	0.003204	-	-	-	0.006858	0.007107	0.008708
Se, Tot	Operations	Aug	13	0.002009	0.002043	0.003100	-	-	-	0.007598	0.007569	0.008935
Se, Tot	Operations	Sep	13	0.002146	0.002279	0.003507	-	-	-	0.007799	0.007844	0.009081
Se, Tot	Operations	Oct	13	0.002750	0.002966	0.004943	-	-	-	0.007846	0.007886	0.009115
Se, Tot	Operations	Nov	13	0.003338	0.003041	0.004595	-	-	-	0.008262	0.008028	0.009143
Se, Tot	Operations	Dec	13	0.003518	0.003218	0.004866	-	-	-	0.008379	0.008361	0.010210
Se, Tot	Closure	Jan	6	-	-	-	0.005046	0.004535	0.005198	0.007198	0.007280	0.008687
Se, Tot	Closure	Feb	6	-	-	-	0.005008	0.004548	0.005177	0.007161	0.007240	0.008635
Se, Tot	Closure	Mar	6	-	-	-	0.005017	0.004719	0.005172	0.007044	0.007119	0.008478
Se, Tot	Closure	Apr	6	-	-	-	0.005040	0.004830	0.005174	0.006920	0.006990	0.008312
Se, Tot	Closure	May	6	-	-	-	0.005047	0.004866	0.005171	0.006850	0.006917	0.008218
Se, Tot	Closure	Jun	6	-	-	-	0.005065	0.004930	0.005179	0.006843	0.006910	0.008202
Se, Tot	Closure	Jul	6	-	-	-	0.005109	0.005035	0.005202	0.006877	0.006944	0.008234
Se, Tot	Closure	Aug	6	-	-	-	0.005160	0.005125	0.005229	0.006915	0.006982	0.008271
Se, Tot	Closure	Sep	6	-	-	-	0.005194	0.005177	0.005248	0.006911	0.006978	0.008257
Se, Tot	Closure	Oct	6	-	-	-	0.005213	0.005196	0.005255	0.006843	0.006908	0.008167
Se, Tot	Closure	Nov	6	-	-	-	0.005202	0.005175	0.005247	0.006781	0.006845	0.008088
Se, Tot	Closure	Dec	6	-	-	-	0.005174	0.005132	0.005230	0.006750	0.006813	0.008049
Se, Tot	Post-Closure	Jan	109	-	-	-	0.005023	0.004977	0.005215	0.000664	0.001089	0.005718
Se, Tot	Post-Closure	Feb	109	-	-	-	0.005022	0.004975	0.005203	0.000662	0.001085	0.005695
Se, Tot	Post-Closure	Mar	109	-	-	-	0.005020	0.004972	0.005196	0.000653	0.001071	0.005623
Se, Tot	Post-Closure	Apr	109	-	-	-	0.005018	0.004970	0.005193	0.000645	0.001057	0.005546
Se, Tot	Post-Closure	May	109	-	-	-	0.005017	0.004970	0.005187	0.000642	0.001050	0.005493
Se, Tot	Post-Closure	Jun	109	-	-	-	0.005018	0.004971	0.005185	0.000647	0.001050	0.005452
Se, Tot	Post-Closure	Jul	109	-	-	-	0.005021	0.004973	0.005189	0.000657	0.001056	0.005408
Se, Tot	Post-Closure	Aug	109	-	-	-	0.005024	0.004976	0.005194	0.000669	0.001063	0.005362
Se, Tot	Post-Closure	Sep	109	-	-	-	0.005026	0.004978	0.005197	0.000674	0.001064	0.005312
Se, Tot	Post-Closure	Oct	109	-	-	-	0.005026	0.004978	0.005195	0.000671	0.001056	0.005253
Se, Tot	Post-Closure	Nov	109	-	-	-	0.005023	0.004977	0.005187	0.000668	0.001050	0.005214
Se, Tot	Post-Closure	Dec	109	-	-	-	0.005023	0.004976	0.005174	0.000665	0.001046	0.005195
Ag, Tot	Construction	Jan	2	0.000076	0.000076	0.000079	-	-	-	-	-	-
Ag, Tot	Construction	Feb	2	0.000066	0.000066	0.000068	-	-	-	-	-	-
Ag, Tot	Construction	Mar	2	0.000052	0.000052	0.000055	-	-	-	0.00000047	0.00000047	0.00000078
Ag, Tot	Construction	Apr	2	0.000046	0.000046	0.000050	-	-	-	-	-	-
Ag, Tot	Construction	May	2	0.000044	0.000044	0.000047	-	-	-	0.00000011	0.00000011	0.00000014
Ag, Tot	Construction	Jun	2	0.000048	0.000048	0.000052	-	-	-	0.00000009	0.00000009	0.00000009
Ag, Tot	Construction	Jul	2	0.000053	0.000053	0.000058	-	-	-	0.000011	0.000011	0.000016
Ag, Tot	Construction	Aug	2	0.000054	0.000054	0.000059	-	-	-	0.000003	0.000003	0.000006
Ag, Tot	Construction	Sep	2	0.000054	0.000054	0.000062	-	-	-	0.000013	0.000013	0.000013
Ag, Tot	Construction	Oct	2	0.000060	0.000060	0.000068	-	-	-	0.000012	0.000012	0.000012
Ag, Tot	Construction	Nov	2	0.000064	0.000064	0.000072	-	-	-	0.000011	0.000011	0.000011
Ag, Tot	Construction	Dec	2	0.000065	0.000065	0.000074	-	-	-	0.000010	0.000010	0.000010
Ag, Tot	Operations	Jan	13	0.000050	0.000050	0.000062	-	-	-	0.000017	0.000016	0.000024
Ag, Tot	Operations	Feb	13	0.000039	0.000038	0.000049	-	-	-	0.000016	0.000016	0.000024
Ag, Tot	Operations	Mar	13	0.000030	0.000030	0.000038	-	-	-	0.000015	0.000015	0.000024
Ag, Tot	Operations	Apr	13	0.000036	0.000037	0.000045	-	-	-	0.000015	0.000016	0.000024
Ag, Tot	Operations	May	13	0.000041	0.000041	0.000052	-	-	-	0.000016	0.000017	0.000024
Ag, Tot	Operations	Jun	13	0.000034	0.000035	0.000043	-	-	-	0.000018	0.000018	0.000025
Ag, Tot	Operations	Jul	13	0.000035	0.000036	0.000045	-	-	-	0.000020	0.000021	0.000026
Ag, Tot	Operations	Aug	13	0.000034	0.000036	0.000044	-	-	-	0.000022	0.000022	0.000028
Ag, Tot	Operations	Sep	13	0.000038	0.000038	0.000048	-	-	-	0.000023	0.000023	0.000029
Ag, Tot	Operations	Oct	13	0.000042	0.000046	0.000061	-	-	-	0.000022	0.000021	0.000030
Ag, Tot	Operations	Nov	13	0.000048	0.000047	0.000058	-	-	-	0.000021	0.000020	0.000030
Ag, Tot	Operations	Dec	13	0.000050	0.000049	0.000060	-	-	-	0.000020	0.000019	0.000030
Ag, Tot	Closure	Jan	6	-	-	-	0.000057	0.000053	0.000058	0.000044	0.000044	0.000055
Ag, Tot	Closure	Feb	6	-	-	-	0.000057	0.000053	0.000057	0.000044	0.000043	0.000054
Ag, Tot	Closure	Mar	6	-	-	-	0.000057	0.000054	0.000057	0.000043	0.000043	0.000054
Ag, Tot	Closure	Apr	6	-	-	-	0.000057	0.000055	0.000057	0.000043	0.000042	0.000053
Ag, Tot	Closure	May	6	-	-	-	0.000056	0.000056	0.000057	0.000043	0.000042	0.000053
Ag, Tot	Closure	Jun	6	-	-	-	0.000057	0.000056	0.000057	0.000044	0.000043	0.000054

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ag, Tot	Closure	Jul	6	-	-	-	0.000057	0.000057	0.000058	0.000046	0.000045	0.000056
Ag, Tot	Closure	Aug	6	-	-	-	0.000058	0.000058	0.000059	0.000048	0.000047	0.000058
Ag, Tot	Closure	Sep	6	-	-	-	0.000058	0.000058	0.000060	0.000049	0.000049	0.000059
Ag, Tot	Closure	Oct	6	-	-	-	0.000058	0.000059	0.000060	0.000049	0.000049	0.000059
Ag, Tot	Closure	Nov	6	-	-	-	0.000058	0.000058	0.000059	0.000049	0.000049	0.000059
Ag, Tot	Closure	Dec	6	-	-	-	0.000058	0.000058	0.000058	0.000049	0.000048	0.000058
Ag, Tot	Post-Closure	Jan	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000058
Ag, Tot	Post-Closure	Feb	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000058
Ag, Tot	Post-Closure	Mar	109	-	-	-	0.000075	0.000073	0.000078	0.000027	0.000030	0.000057
Ag, Tot	Post-Closure	Apr	109	-	-	-	0.000075	0.000073	0.000078	0.000027	0.000029	0.000057
Ag, Tot	Post-Closure	May	109	-	-	-	0.000075	0.000073	0.000078	0.000027	0.000029	0.000056
Ag, Tot	Post-Closure	Jun	109	-	-	-	0.000076	0.000073	0.000078	0.000027	0.000029	0.000056
Ag, Tot	Post-Closure	Jul	109	-	-	-	0.000076	0.000073	0.000078	0.000027	0.000030	0.000056
Ag, Tot	Post-Closure	Aug	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000056
Ag, Tot	Post-Closure	Sep	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000056
Ag, Tot	Post-Closure	Oct	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000056
Ag, Tot	Post-Closure	Nov	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000055
Ag, Tot	Post-Closure	Dec	109	-	-	-	0.000076	0.000073	0.000078	0.000028	0.000030	0.000055
Tl, Tot	Construction	Jan	2	0.000148	0.000148	0.000152	-	-	-	-	-	-
Tl, Tot	Construction	Feb	2	0.000132	0.000132	0.000134	-	-	-	-	-	-
Tl, Tot	Construction	Mar	2	0.000108	0.000108	0.000110	-	-	-	0.000004	0.000004	0.000006
Tl, Tot	Construction	Apr	2	0.000097	0.000097	0.000101	-	-	-	-	-	-
Tl, Tot	Construction	May	2	0.000094	0.000094	0.000096	-	-	-	0.0000010	0.0000010	0.0000012
Tl, Tot	Construction	Jun	2	0.000101	0.000101	0.000105	-	-	-	0.0000009	0.0000009	0.0000009
Tl, Tot	Construction	Jul	2	0.000112	0.000112	0.000119	-	-	-	0.000081	0.000081	0.000110
Tl, Tot	Construction	Aug	2	0.000113	0.000113	0.000119	-	-	-	0.000026	0.000026	0.000050
Tl, Tot	Construction	Sep	2	0.000117	0.000117	0.000124	-	-	-	0.000043	0.000043	0.000043
Tl, Tot	Construction	Oct	2	0.000127	0.000127	0.000136	-	-	-	0.000036	0.000036	0.000036
Tl, Tot	Construction	Nov	2	0.000133	0.000133	0.000143	-	-	-	0.000029	0.000029	0.000029
Tl, Tot	Construction	Dec	2	0.000136	0.000136	0.000146	-	-	-	0.000026	0.000026	0.000026
Tl, Tot	Operations	Jan	13	0.000185	0.000197	0.000299	-	-	-	0.000057	0.000056	0.000102
Tl, Tot	Operations	Feb	13	0.000125	0.000138	0.000211	-	-	-	0.000052	0.000053	0.000100
Tl, Tot	Operations	Mar	13	0.000090	0.000099	0.000148	-	-	-	0.000051	0.000054	0.000100
Tl, Tot	Operations	Apr	13	0.000123	0.000133	0.000192	-	-	-	0.000052	0.000056	0.000100
Tl, Tot	Operations	May	13	0.000149	0.000160	0.000239	-	-	-	0.000053	0.000058	0.000100
Tl, Tot	Operations	Jun	13	0.000123	0.000127	0.000182	-	-	-	0.000060	0.000065	0.000105
Tl, Tot	Operations	Jul	13	0.000132	0.000134	0.000192	-	-	-	0.000073	0.000077	0.000114
Tl, Tot	Operations	Aug	13	0.000128	0.000132	0.000186	-	-	-	0.000085	0.000087	0.000124
Tl, Tot	Operations	Sep	13	0.000136	0.000147	0.000210	-	-	-	0.000091	0.000089	0.000132
Tl, Tot	Operations	Oct	13	0.000172	0.000189	0.000291	-	-	-	0.000088	0.000085	0.000138
Tl, Tot	Operations	Nov	13	0.000207	0.000194	0.000271	-	-	-	0.000082	0.000078	0.000140
Tl, Tot	Operations	Dec	13	0.000218	0.000205	0.000286	-	-	-	0.000074	0.000071	0.000141
Tl, Tot	Closure	Jan	6	-	-	-	0.000272	0.000248	0.000277	0.000120	0.000122	0.000141
Tl, Tot	Closure	Feb	6	-	-	-	0.000271	0.000248	0.000274	0.000120	0.000121	0.000140
Tl, Tot	Closure	Mar	6	-	-	-	0.000269	0.000256	0.000272	0.000118	0.000119	0.000137
Tl, Tot	Closure	Apr	6	-	-	-	0.000268	0.000261	0.000270	0.000116	0.000117	0.000135
Tl, Tot	Closure	May	6	-	-	-	0.000268	0.000262	0.000270	0.000115	0.000116	0.000133
Tl, Tot	Closure	Jun	6	-	-	-	0.000268	0.000266	0.000273	0.000115	0.000116	0.000133
Tl, Tot	Closure	Jul	6	-	-	-	0.000271	0.000272	0.000278	0.000116	0.000117	0.000134
Tl, Tot	Closure	Aug	6	-	-	-	0.000275	0.000277	0.000285	0.000117	0.000118	0.000135
Tl, Tot	Closure	Sep	6	-	-	-	0.000277	0.000280	0.000293	0.000117	0.000118	0.000135
Tl, Tot	Closure	Oct	6	-	-	-	0.000277	0.000280	0.000294	0.000116	0.000117	0.000134
Tl, Tot	Closure	Nov	6	-	-	-	0.000276	0.000278	0.000290	0.000115	0.000116	0.000133
Tl, Tot	Closure	Dec	6	-	-	-	0.000274	0.000276	0.000283	0.000115	0.000115	0.000132
Tl, Tot	Post-Closure	Jan	109	-	-	-	0.000291	0.000284	0.000301	0.000022	0.000029	0.000101
Tl, Tot	Post-Closure	Feb	109	-	-	-	0.000291	0.000284	0.000301	0.000022	0.000029	0.000100
Tl, Tot	Post-Closure	Mar	109	-	-	-	0.000291	0.000284	0.000301	0.000022	0.000029	0.000099
Tl, Tot	Post-Closure	Apr	109	-	-	-	0.000291	0.000284	0.000300	0.000022	0.000028	0.000098
Tl, Tot	Post-Closure	May	109	-	-	-	0.000291	0.000284	0.000300	0.000022	0.000028	0.000097
Tl, Tot	Post-Closure	Jun	109	-	-	-	0.000291	0.000284	0.000301	0.000022	0.000028	0.000096
Tl, Tot	Post-Closure	Jul	109	-	-	-	0.000291	0.000284	0.000301	0.000022	0.000028	0.000096
Tl, Tot	Post-Closure	Aug	109	-	-	-	0.000291	0.000284	0.000301	0.000023	0.000029	0.000095
Tl, Tot	Post-Closure	Sep	109	-	-	-	0.000291	0.000284	0.000301	0.000023	0.000029	0.000094
Tl, Tot	Post-Closure	Oct	109	-	-	-	0.000291	0.000284	0.000301	0.000023	0.000029	0.000093
Tl, Tot	Post-Closure	Nov	109	-	-	-	0.000291	0.000284	0.000301	0.000023	0.000028	0.000093
Tl, Tot	Post-Closure	Dec	109	-	-	-	0.000291	0.000284	0.000301	0.000022	0.000028	0.000092
U, Tot	Construction	Jan	2	0.002267	0.002267	0.002981	-	-	-	-	-	-
U, Tot	Construction	Feb	2	0.003576	0.003576	0.003707	-	-	-	-	-	-
U, Tot	Construction	Mar	2	0.005324	0.005324	0.005384	-	-	-	0.000049	0.000049	0.000097
U, Tot	Construction	Apr	2	0.006146	0.006146	0.006284	-	-	-	-	-	-
U, Tot	Construction	May	2	0.006678	0.006678	0.006760	-	-	-	0.000007	0.000007	0.000014
U, Tot	Construction	Jun	2	0.006108	0.006108	0.006175	-	-	-	0.0000023	0.0000023	0.0000023
U, Tot	Construction	Jul	2	0.005299	0.005299	0.005650	-	-	-	0.001376	0.001376	0.002456
U, Tot	Construction	Aug	2	0.005347	0.005347	0.005718	-	-	-	0.000215	0.000215	0.000351
U, Tot	Construction	Sep	2	0.005151	0.005151	0.005579	-	-	-	0.002528	0.002528	0.002528
U, Tot	Construction	Oct	2	0.004344	0.004344	0.004840	-	-	-	0.002309	0.002309	0.002309
U, Tot	Construction	Nov	2	0.003837	0.003837	0.004373	-	-	-	0.002175	0.002175	0.002175
U, Tot	Construction	Dec	2	0.003624	0.003624	0.004198	-	-	-	0.002172	0.002172	0.002172
U, Tot	Operations	Jan	13	0.009041	0.008762	0.012560	-	-	-	0.003660	0.003637	0.005208
U, Tot	Operations	Feb	13	0.009564	0.009200	0.011520	-	-	-	0.003473	0.003518	0.005119
U, Tot	Operations	Mar	13	0.010030	0.009766	0.011040	-	-	-	0.003331	0.003382	0.005065
U, Tot	Operations	Apr	13	0.009671	0.009409	0.011520	-	-	-	0.003662	0.003852	0.005147
U, Tot	Operations	May	13	0.009504	0.009266	0.011900	-	-	-	0.004368	0.004403	0.005343
U, Tot	Operations	Jun	13	0.010130	0.010070	0.011790	-	-	-	0.004572	0.004618	0.005558
U, Tot	Operations	Jul	13	0.010280	0.010232	0.012060	-	-	-	0.004812	0.004707	0.005815
U, Tot	Operations	Aug	13	0.010350	0.010275	0.012020	-	-	-	0.005058	0.004856	0.006085
U, Tot	Operations	Sep	13	0.010330	0.010233	0.012250	-	-	-	0.005092	0.004806	0.006299

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
U, Tot	Operations	Oct	13	0.010390	0.010228	0.013280	-	-	-	0.004885	0.004567	0.006421
U, Tot	Operations	Nov	13	0.010380	0.009908	0.012900	-	-	-	0.004594	0.004319	0.006448
U, Tot	Operations	Dec	13	0.010090	0.009654	0.012760	-	-	-	0.004322	0.004125	0.006453
U, Tot	Closure	Jan	6	-	-	-	0.013385	0.013103	0.013820	0.005690	0.005732	0.006438
U, Tot	Closure	Feb	6	-	-	-	0.013345	0.013077	0.013700	0.005661	0.005701	0.006400
U, Tot	Closure	Mar	6	-	-	-	0.013275	0.013173	0.013650	0.005569	0.005606	0.006283
U, Tot	Closure	Apr	6	-	-	-	0.013220	0.013235	0.013660	0.005471	0.005505	0.006162
U, Tot	Closure	May	6	-	-	-	0.013190	0.013247	0.013660	0.005424	0.005456	0.006100
U, Tot	Closure	Jun	6	-	-	-	0.013250	0.013315	0.013700	0.005439	0.005471	0.006113
U, Tot	Closure	Jul	6	-	-	-	0.013385	0.013447	0.013810	0.005501	0.005534	0.006177
U, Tot	Closure	Aug	6	-	-	-	0.013465	0.013563	0.013980	0.005570	0.005604	0.006250
U, Tot	Closure	Sep	6	-	-	-	0.013510	0.013623	0.014120	0.005593	0.005627	0.006270
U, Tot	Closure	Oct	6	-	-	-	0.013490	0.013608	0.014140	0.005548	0.005581	0.006214
U, Tot	Closure	Nov	6	-	-	-	0.013445	0.013560	0.014070	0.005501	0.005533	0.006157
U, Tot	Closure	Dec	6	-	-	-	0.013420	0.013512	0.013950	0.005475	0.005507	0.006126
U, Tot	Post-Closure	Jan	109	-	-	-	0.007838	0.008438	0.013210	0.000956	0.001292	0.004952
U, Tot	Post-Closure	Feb	109	-	-	-	0.007839	0.008437	0.013200	0.000952	0.001287	0.004933
U, Tot	Post-Closure	Mar	109	-	-	-	0.007833	0.008428	0.013150	0.000940	0.001270	0.004871
U, Tot	Post-Closure	Apr	109	-	-	-	0.007827	0.008420	0.013090	0.000928	0.001254	0.004804
U, Tot	Post-Closure	May	109	-	-	-	0.007824	0.008414	0.013040	0.000924	0.001246	0.004760
U, Tot	Post-Closure	Jun	109	-	-	-	0.007823	0.008410	0.013000	0.000930	0.001250	0.004730
U, Tot	Post-Closure	Jul	109	-	-	-	0.007821	0.008404	0.012930	0.000946	0.001261	0.004703
U, Tot	Post-Closure	Aug	109	-	-	-	0.007819	0.008397	0.012870	0.000963	0.001275	0.004675
U, Tot	Post-Closure	Sep	109	-	-	-	0.007816	0.008392	0.012810	0.000971	0.001279	0.004639
U, Tot	Post-Closure	Oct	109	-	-	-	0.007813	0.008385	0.012760	0.000967	0.001271	0.004590
U, Tot	Post-Closure	Nov	109	-	-	-	0.007811	0.008383	0.012740	0.000961	0.001264	0.004557
U, Tot	Post-Closure	Dec	109	-	-	-	0.007812	0.008383	0.012730	0.000958	0.001259	0.004541
Zn, Diss	Construction	Jan	2	0.01022	0.01022	0.01319	-	-	-	-	-	-
Zn, Diss	Construction	Feb	2	0.01585	0.01585	0.01641	-	-	-	-	-	-
Zn, Diss	Construction	Mar	2	0.02342	0.02342	0.02385	-	-	-	0.00022	0.00022	0.00039
Zn, Diss	Construction	Apr	2	0.02684	0.02684	0.02753	-	-	-	-	-	-
Zn, Diss	Construction	May	2	0.02915	0.02915	0.02962	-	-	-	0.00004	0.00004	0.00007
Zn, Diss	Construction	Jun	2	0.02670	0.02670	0.02706	-	-	-	0.00003	0.00003	0.00003
Zn, Diss	Construction	Jul	2	0.02310	0.02310	0.02467	-	-	-	0.00543	0.00543	0.00890
Zn, Diss	Construction	Aug	2	0.02319	0.02319	0.02485	-	-	-	0.00104	0.00104	0.00189
Zn, Diss	Construction	Sep	2	0.02213	0.02213	0.02378	-	-	-	0.00432	0.00432	0.00432
Zn, Diss	Construction	Oct	2	0.01895	0.01895	0.02111	-	-	-	0.00353	0.00353	0.00353
Zn, Diss	Construction	Nov	2	0.01682	0.01682	0.01918	-	-	-	0.00274	0.00274	0.00274
Zn, Diss	Construction	Dec	2	0.01593	0.01593	0.01846	-	-	-	0.00229	0.00229	0.00229
Zn, Diss	Operations	Jan	13	0.03545	0.03454	0.04686	-	-	-	0.00734	0.00695	0.01307
Zn, Diss	Operations	Feb	13	0.03862	0.03781	0.04564	-	-	-	0.00645	0.00639	0.01270
Zn, Diss	Operations	Mar	13	0.04168	0.04108	0.04545	-	-	-	0.00604	0.00630	0.01254
Zn, Diss	Operations	Apr	13	0.04002	0.03874	0.04563	-	-	-	0.00936	0.00890	0.01315
Zn, Diss	Operations	May	13	0.03879	0.03753	0.04598	-	-	-	0.01181	0.01169	0.01430
Zn, Diss	Operations	Jun	13	0.04195	0.04160	0.04708	-	-	-	0.01248	0.01240	0.01523
Zn, Diss	Operations	Jul	13	0.04226	0.04201	0.04784	-	-	-	0.01303	0.01226	0.01611
Zn, Diss	Operations	Aug	13	0.04263	0.04223	0.04783	-	-	-	0.01366	0.01253	0.01705
Zn, Diss	Operations	Sep	13	0.04238	0.04173	0.04820	-	-	-	0.01355	0.01217	0.01783
Zn, Diss	Operations	Oct	13	0.04172	0.04068	0.05027	-	-	-	0.01262	0.01117	0.01835
Zn, Diss	Operations	Nov	13	0.04083	0.03920	0.04919	-	-	-	0.01134	0.01002	0.01850
Zn, Diss	Operations	Dec	13	0.03946	0.03787	0.04816	-	-	-	0.01007	0.00901	0.01854
Zn, Diss	Closure	Jan	6	-	-	-	0.05027	0.05000	0.05234	0.01770	0.01775	0.01851
Zn, Diss	Closure	Feb	6	-	-	-	0.05016	0.04986	0.05202	0.01761	0.01766	0.01840
Zn, Diss	Closure	Mar	6	-	-	-	0.04989	0.04999	0.05184	0.01733	0.01737	0.01807
Zn, Diss	Closure	Apr	6	-	-	-	0.04965	0.05008	0.05184	0.01704	0.01706	0.01773
Zn, Diss	Closure	May	6	-	-	-	0.04986	0.05008	0.05182	0.01691	0.01694	0.01758
Zn, Diss	Closure	Jun	6	-	-	-	0.05006	0.05026	0.05194	0.01703	0.01706	0.01771
Zn, Diss	Closure	Jul	6	-	-	-	0.05031	0.05065	0.05225	0.01735	0.01738	0.01805
Zn, Diss	Closure	Aug	6	-	-	-	0.05057	0.05099	0.05276	0.01770	0.01774	0.01843
Zn, Diss	Closure	Sep	6	-	-	-	0.05069	0.05116	0.05315	0.01786	0.01789	0.01859
Zn, Diss	Closure	Oct	6	-	-	-	0.05059	0.05109	0.05322	0.01775	0.01779	0.01847
Zn, Diss	Closure	Nov	6	-	-	-	0.05045	0.05092	0.05301	0.01761	0.01765	0.01831
Zn, Diss	Closure	Dec	6	-	-	-	0.05037	0.05079	0.05270	0.01753	0.01756	0.01822
Zn, Diss	Post-Closure	Jan	109	-	-	-	0.04238	0.04285	0.04950	0.00464	0.00568	0.01694
Zn, Diss	Post-Closure	Feb	109	-	-	-	0.04237	0.04285	0.04942	0.00463	0.00566	0.01687
Zn, Diss	Post-Closure	Mar	109	-	-	-	0.04235	0.04282	0.04927	0.00457	0.00559	0.01666
Zn, Diss	Post-Closure	Apr	109	-	-	-	0.04233	0.04279	0.04913	0.00451	0.00552	0.01644
Zn, Diss	Post-Closure	May	109	-	-	-	0.04233	0.04278	0.04903	0.00450	0.00549	0.01629
Zn, Diss	Post-Closure	Jun	109	-	-	-	0.04233	0.04278	0.04896	0.00453	0.00551	0.01621
Zn, Diss	Post-Closure	Jul	109	-	-	-	0.04235	0.04279	0.04889	0.00460	0.00557	0.01615
Zn, Diss	Post-Closure	Aug	109	-	-	-	0.04237	0.04280	0.04883	0.00468	0.00564	0.01610
Zn, Diss	Post-Closure	Sep	109	-	-	-	0.04237	0.04280	0.04875	0.00472	0.00566	0.01600
Zn, Diss	Post-Closure	Oct	109	-	-	-	0.04237	0.04279	0.04866	0.00470	0.00563	0.01584
Zn, Diss	Post-Closure	Nov	109	-	-	-	0.04236	0.04279	0.04859	0.00467	0.00560	0.01573
Zn, Diss	Post-Closure	Dec	109	-	-	-	0.04236	0.04279	0.04853	0.00466	0.00558	0.01568
Zn, Tot	Construction	Jan	2	0.02096	0.02096	0.02319	-	-	-	-	-	-
Zn, Tot	Construction	Feb	2	0.02476	0.02476	0.02492	-	-	-	-	-	-
Zn, Tot	Construction	Mar	2	0.02956	0.02956	0.02966	-	-	-	0.00023	0.00023	0.00041
Zn, Tot	Construction	Apr	2	0.03188	0.03188	0.03188	-	-	-	-	-	-
Zn, Tot	Construction	May	2	0.03358	0.03358	0.03369	-	-	-	0.00005	0.00005	0.00007
Zn, Tot	Construction	Jun	2	0.03201	0.03201	0.03225	-	-	-	0.00004	0.00004	0.00004
Zn, Tot	Construction	Jul	2	0.02975	0.02975	0.03038	-	-	-	0.00601	0.00601	0.00934
Zn, Tot	Construction	Aug	2	0.03000	0.03000	0.03063	-	-	-	0.00152	0.00152	0.00281
Zn, Tot	Construction	Sep	2	0.02859	0.02859	0.02860	-	-	-	0.00581	0.00581	0.00581
Zn, Tot	Construction	Oct	2	0.02660	0.02660	0.02725	-	-	-	0.00491	0.00491	0.00491
Zn, Tot	Construction	Nov	2	0.02510	0.02510	0.02589	-	-	-	0.00414	0.00414	0.00414
Zn, Tot	Construction	Dec	2	0.02449	0.02449	0.02538	-	-	-	0.00378	0.00378	0.00378

Appendix G-3: Summary of water quality model predictions for contact water discharges - upper case

Parameter	Project Phase	Month	# of Years in Phase	Collection Pond			Open Pit			TMF		
				Predicted Water Quality			Predicted Water Quality			Predicted Water Quality		
				Median	Mean	Max	Median	Mean	Max	Median	Mean	Max
Unt				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Zn, Tot	Operations	Jan	13	0.03720	0.03703	0.04842	-	-	-	0.00889	0.00854	0.01452
Zn, Tot	Operations	Feb	13	0.04023	0.03935	0.04649	-	-	-	0.00803	0.00799	0.01416
Zn, Tot	Operations	Mar	13	0.04247	0.04186	0.04586	-	-	-	0.00756	0.00779	0.01398
Zn, Tot	Operations	Apr	13	0.04088	0.04003	0.04651	-	-	-	0.01052	0.01026	0.01453
Zn, Tot	Operations	May	13	0.03997	0.03919	0.04720	-	-	-	0.01299	0.01298	0.01562
Zn, Tot	Operations	Jun	13	0.04271	0.04257	0.04785	-	-	-	0.01376	0.01371	0.01653
Zn, Tot	Operations	Jul	13	0.04320	0.04315	0.04876	-	-	-	0.01435	0.01366	0.01741
Zn, Tot	Operations	Aug	13	0.04351	0.04333	0.04870	-	-	-	0.01503	0.01399	0.01835
Zn, Tot	Operations	Sep	13	0.04320	0.04287	0.04909	-	-	-	0.01496	0.01364	0.01913
Zn, Tot	Operations	Oct	13	0.04284	0.04229	0.05157	-	-	-	0.01403	0.01261	0.01961
Zn, Tot	Operations	Nov	13	0.04228	0.04101	0.05039	-	-	-	0.01277	0.01149	0.01974
Zn, Tot	Operations	Dec	13	0.04111	0.03988	0.04954	-	-	-	0.01155	0.01054	0.01977
Zn, Tot	Closure	Jan	6	-	-	-	0.05104	0.05067	0.05306	0.01868	0.01874	0.01973
Zn, Tot	Closure	Feb	6	-	-	-	0.05092	0.05054	0.05273	0.01858	0.01864	0.01962
Zn, Tot	Closure	Mar	6	-	-	-	0.05065	0.05070	0.05254	0.01828	0.01833	0.01926
Zn, Tot	Closure	Apr	6	-	-	-	0.05041	0.05079	0.05254	0.01797	0.01801	0.01890
Zn, Tot	Closure	May	6	-	-	-	0.05052	0.05079	0.05253	0.01784	0.01787	0.01874
Zn, Tot	Closure	Jun	6	-	-	-	0.05081	0.05100	0.05265	0.01795	0.01799	0.01886
Zn, Tot	Closure	Jul	6	-	-	-	0.05107	0.05139	0.05297	0.01827	0.01831	0.01920
Zn, Tot	Closure	Aug	6	-	-	-	0.05135	0.05176	0.05351	0.01862	0.01867	0.01958
Zn, Tot	Closure	Sep	6	-	-	-	0.05147	0.05193	0.05392	0.01877	0.01883	0.01974
Zn, Tot	Closure	Oct	6	-	-	-	0.05137	0.05186	0.05399	0.01866	0.01871	0.01960
Zn, Tot	Closure	Nov	6	-	-	-	0.05122	0.05169	0.05377	0.01851	0.01856	0.01943
Zn, Tot	Closure	Dec	6	-	-	-	0.05113	0.05156	0.05344	0.01843	0.01847	0.01934
Zn, Tot	Post-Closure	Jan	109	-	-	-	0.04398	0.04436	0.05028	0.00476	0.00585	0.01766
Zn, Tot	Post-Closure	Feb	109	-	-	-	0.04398	0.04435	0.05020	0.00474	0.00582	0.01759
Zn, Tot	Post-Closure	Mar	109	-	-	-	0.04396	0.04432	0.05005	0.00469	0.00575	0.01737
Zn, Tot	Post-Closure	Apr	109	-	-	-	0.04394	0.04429	0.04992	0.00463	0.00568	0.01714
Zn, Tot	Post-Closure	May	109	-	-	-	0.04393	0.04428	0.04982	0.00461	0.00565	0.01699
Zn, Tot	Post-Closure	Jun	109	-	-	-	0.04394	0.04428	0.04975	0.00464	0.00567	0.01690
Zn, Tot	Post-Closure	Jul	109	-	-	-	0.04396	0.04430	0.04970	0.00471	0.00573	0.01684
Zn, Tot	Post-Closure	Aug	109	-	-	-	0.04397	0.04431	0.04966	0.00480	0.00580	0.01678
Zn, Tot	Post-Closure	Sep	109	-	-	-	0.04398	0.04432	0.04960	0.00484	0.00583	0.01667
Zn, Tot	Post-Closure	Oct	109	-	-	-	0.04398	0.04431	0.04951	0.00482	0.00580	0.01651
Zn, Tot	Post-Closure	Nov	109	-	-	-	0.04398	0.04430	0.04944	0.00479	0.00576	0.01639
Zn, Tot	Post-Closure	Dec	109	-	-	-	0.04398	0.04430	0.04938	0.00477	0.00574	0.01634

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cl	Construction	Jan	2	0.250	0.250	0.250	0	0.255	0.255	0.259	2	0.254	0.254	0.259	2	0.550	0.550	0.551	0	0.547	0.547	0.549	-1	0.269	0.269	0.271	0	7.100	7.100	7.100	0	0.595	0.595	0.598	0	0.250	0.250	0.250	0
Cl	Construction	Feb	2	0.250	0.250	0.250	0	0.263	0.263	0.276	5	0.263	0.263	0.276	5	0.551	0.551	0.551	0	0.544	0.544	0.545	-1	0.268	0.268	0.270	0	7.100	7.100	7.100	0	0.502	0.502	0.512	1	0.250	0.250	0.250	0
Cl	Construction	Mar	2	0.250	0.250	0.250	0	0.329	0.329	0.340	32	0.329	0.329	0.340	32	0.551	0.551	0.552	0	0.539	0.539	0.540	0	0.267	0.267	0.269	0	7.100	7.100	7.100	0	0.512	0.512	0.520	12	0.250	0.250	0.250	0
Cl	Construction	Apr	2	0.250	0.250	0.250	0	0.408	0.408	0.414	41	0.461	0.461	0.466	7	0.551	0.551	0.551	0	0.535	0.535	0.536	0	0.265	0.265	0.267	-1	7.100	7.100	7.100	0	0.636	0.636	0.640	5	0.250	0.250	0.250	0
Cl	Construction	May	2	0.250	0.250	0.250	0	0.338	0.338	0.340	14	0.415	0.415	0.417	-19	0.275	0.275	0.275	0	0.540	0.540	0.541	-1	0.264	0.264	0.266	0	4.777	4.777	4.777	2	0.680	0.680	0.682	-7	0.250	0.250	0.250	0
Cl	Construction	Jun	2	0.250	0.250	0.250	0	0.256	0.256	0.256	1	0.261	0.261	0.261	-2	0.250	0.250	0.250	0	0.520	0.520	0.521	-1	0.266	0.266	0.268	0	4.700	4.700	4.700	0	0.518	0.518	0.518	-1	0.250	0.250	0.250	0
Cl	Construction	Jul	2	0.250	0.250	0.250	0	0.257	0.257	0.258	2	0.264	0.264	0.265	-3	0.572	0.572	0.573	0	0.488	0.488	0.488	-1	0.273	0.273	0.274	-1	5.571	5.571	5.571	-1	0.448	0.448	0.448	-2	0.250	0.250	0.250	0
Cl	Construction	Aug	2	0.250	0.250	0.250	0	0.260	0.260	0.261	2	0.270	0.270	0.270	-4	0.574	0.574	0.574	0	0.472	0.472	0.472	-1	0.279	0.279	0.280	-1	5.600	5.600	5.600	0	0.446	0.446	0.446	-2	0.250	0.250	0.250	0
Cl	Construction	Sep	2	0.250	0.250	0.250	0	0.264	0.264	0.267	3	0.276	0.276	0.278	-4	0.257	0.257	0.257	0	0.470	0.470	0.471	-1	0.281	0.281	0.282	0	5.697	5.697	5.697	0	0.492	0.492	0.494	-2	0.250	0.250	0.250	0
Cl	Construction	Oct	2	0.250	0.250	0.250	0	0.262	0.262	0.263	2	0.275	0.275	0.275	-6	0.251	0.251	0.251	0	0.480	0.480	0.481	-2	0.278	0.278	0.280	0	5.700	5.700	5.700	0	0.563	0.563	0.563	-2	0.250	0.250	0.250	0
Cl	Construction	Nov	2	0.250	0.250	0.250	0	0.256	0.256	0.256	2	0.259	0.259	0.259	-1	0.540	0.540	0.540	0	0.507	0.507	0.508	-1	0.275	0.275	0.276	0	7.053	7.053	7.053	-1	0.727	0.727	0.727	0	0.250	0.250	0.250	0
Cl	Construction	Dec	2	0.250	0.250	0.250	0	0.254	0.254	0.254	2	0.254	0.254	0.254	1	0.549	0.549	0.549	0	0.536	0.536	0.536	-1	0.273	0.273	0.274	0	7.100	7.100	7.100	0	0.695	0.695	0.695	0	0.250	0.250	0.250	0
Cl	Operations	Jan	13	0.250	0.250	0.250	0	0.259	0.259	0.262	3	0.264	0.264	0.266	5	0.551	0.551	0.551	0	0.546	0.546	0.546	-1	0.277	0.277	0.278	0	7.100	7.100	7.100	0	0.605	0.605	0.607	1	0.250	0.250	0.250	0
Cl	Operations	Feb	13	0.250	0.250	0.250	0	0.288	0.285	0.296	14	0.294	0.291	0.302	16	0.552	0.551	0.552	0	0.544	0.544	0.545	0	0.276	0.275	0.276	-1	7.100	7.100	7.100	0	0.524	0.523	0.532	5	0.250	0.250	0.250	0
Cl	Operations	Mar	13	0.250	0.250	0.250	0	0.345	0.346	0.354	38	0.353	0.354	0.362	42	0.552	0.552	0.552	0	0.540	0.540	0.541	0	0.275	0.274	0.275	-1	7.100	7.100	7.100	0	0.522	0.525	0.536	15	0.250	0.250	0.250	0
Cl	Operations	Apr	13	0.250	0.250	0.250	0	0.386	0.386	0.399	33	0.439	0.439	0.453	2	0.551	0.551	0.551	0	0.536	0.537	0.538	0	0.274	0.273	0.274	-1	7.100	7.100	7.100	0	0.628	0.628	0.643	4	0.250	0.250	0.250	0
Cl	Operations	May	13	0.250	0.250	0.250	0	0.326	0.328	0.335	11	0.404	0.406	0.413	-21	0.275	0.275	0.276	0	0.541	0.541	0.542	-1	0.272	0.271	0.272	-1	4.777	4.777	4.777	2	0.674	0.675	0.681	-7	0.250	0.250	0.250	0
Cl	Operations	Jun	13	0.250	0.250	0.250	0	0.257	0.258	0.258	2	0.263	0.263	0.264	-2	0.251	0.250	0.251	0	0.521	0.521	0.522	-1	0.273	0.273	0.274	-1	4.700	4.700	4.700	0	0.519	0.519	0.519	-1	0.250	0.250	0.250	0
Cl	Operations	Jul	13	0.250	0.250	0.250	0	0.258	0.258	0.259	2	0.265	0.265	0.266	-3	0.573	0.573	0.573	0	0.488	0.488	0.489	-1	0.280	0.279	0.280	-1	5.571	5.571	5.571	-1	0.449	0.449	0.449	-1	0.250	0.250	0.250	0
Cl	Operations	Aug	13	0.250	0.250	0.250	0	0.261	0.261	0.262	2	0.270	0.270	0.271	-4	0.574	0.574	0.574	0	0.472	0.472	0.472	-1	0.286	0.285	0.286	-1	5.600	5.600	5.600	0	0.446	0.446	0.446	-2	0.250	0.250	0.250	0
Cl	Operations	Sep	13	0.250	0.250	0.250	0	0.263	0.263	0.264	3	0.274	0.275	0.275	-5	0.257	0.257	0.257	0	0.469	0.469	0.470	-1	0.287	0.287	0.287	0	5.697	5.697	5.697	0	0.491	0.491	0.492	-2	0.250	0.250	0.250	0
Cl	Operations	Oct	13	0.250	0.250	0.250	0	0.263	0.263	0.264	3	0.275	0.275	0.276	-5	0.252	0.251	0.252	0	0.480	0.480	0.480	-2	0.284	0.284	0.285	0	5.700	5.700	5.700	0	0.563	0.563	0.564	-2	0.250	0.250	0.250	0
Cl	Operations	Nov	13	0.250	0.250	0.250	0	0.257	0.257	0.258	2	0.262	0.261	0.262	0	0.540	0.540	0.540	0	0.508	0.508	0.508	-1	0.281	0.280	0.281	0	7.053	7.053	7.053	-1	0.730	0.730	0.730	0	0.250	0.250	0.250	0
Cl	Operations	Dec	13	0.250	0.250	0.250	0	0.254	0.254	0.255	2	0.258	0.258	0.258	3	0.549	0.549	0.549	0	0.537	0.537	0.537	-1	0.279	0.278	0.279	0	7.100	7.100	7.100	0	0.699	0.699	0.700	1	0.250	0.250	0.250	0
Cl	Closure	Jan	6	0.250	0.250	0.250	0	0.250	0.250	0.251	0	0.258	0.258	0.259	3	0.551	0.551	0.551	0	0.544	0.544	0.546	-1	0.273	0.274	0.277	1	7.100	7.100	7.100	0	0.601	0.601	0.601	1	0.250	0.250	0.250	0
Cl	Closure	Feb	6	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.261	0.261	0.261	4	0.552	0.552	0.552	0	0.541	0.542	0.543	-1	0.272	0.273	0.276	1	7.100	7.100	7.100	0	0.506	0.505	0.506	1	0.250	0.250	0.250	0
Cl	Closure	Mar	6	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.266	0.266	0.266	6	0.552	0.552	0.552	0	0.536	0.536	0.538	-1	0.271	0.272	0.275	1	7.100	7.100	7.100	0	0.470	0.471	0.471	3	0.250	0.250	0.250	0
Cl	Closure	Apr	6	0.250	0.250	0.250	0	0.297	0.297	0.298	2	0.358	0.359	0.361	-17	0.552	0.552	0.552	0	0.531	0.531	0.533	-1	0.269	0.270	0.273	1	7.100	7.100	7.100	0	0.574	0.575	0.578	-5	0.250	0.250	0.250	0
Cl	Closure	May	6	0.250	0.250	0.250	0	0.297	0.297	0.297	0	0.379	0.380	0.380	-26	0.275	0.275	0.276	0	0.536	0.536	0.537	-2	0.267	0.268	0.271	1	4.777	4.777	4.777	2	0.662	0.662	0.663	-9	0.250	0.250	0.250	0
Cl	Closure	Jun	6	0.250	0.250	0.250	0	0.253	0.253	0.253	0	0.258	0.258	0.258	-4	0.250	0.250	0.251	0	0.517	0.517	0.518	-2	0.269	0.270	0.273	1	4.700	4.700	4.700	0	0.516	0.516	0.516	-1	0.250	0.250	0.250	0
Cl	Closure	Jul	6	0.250	0.250	0.250	0	0.254	0.254	0.254	0	0.261	0.261	0.261	-5	0.573	0.573	0.573	0	0.486	0.486	0.486	-1	0.275	0.276	0.279	1	5.571	5.571	5.571	-1	0.446	0.446	0.446	-2	0.250	0.250	0.250	0
Cl	Closure	Aug	6	0.250	0.250	0.250	0	0.255	0.255	0.255	0	0.264	0.264	0.264	-6	0.574	0.574	0.574	0	0.469	0.469	0.469	-2	0.281	0.281	0.284	1	5.600	5.600	5.600	0	0.442	0.442	0.442	-3	0.250	0.250	0.250	0
Cl	Closure	Sep	6	0.250	0.250	0.250	0	0.256	0.256	0.256	0	0.268	0.268	0.268	-7	0.257	0.257	0.257	0	0.467	0.467	0.467	-2	0.283	0.283	0.286	1	5.697	5.697	5.697	0	0.487	0.487	0.487	-3	0.250	0.250	0.250	0
Cl	Closure	Oct	6	0.250	0.250	0.250	0	0.256	0.256	0.256	0	0.269	0.269	0.269	-8	0.251	0.251	0.251	0	0.477	0.477	0.477	-2	0.280	0.280	0.283	1	5.700	5.700	5.700	0	0.560	0.560	0.560	-2	0.250	0.250	0.250	0
Cl	Closure	Nov	6	0.250	0.250	0.250	0	0.252	0.252	0.252	0	0.258	0.258	0.258	-1	0.540	0.540	0.540	1	0.505	0.505	0.505	-2	0.276	0.277	0.279	1	7.053	7.053	7.053	-1	0.728	0.728	0.728	0	0.250	0.250	0.250	0
Cl	Closure	Dec	6	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.256	0.256	0.256	2	0.550	0.550	0.550	0	0.534	0.534	0.534	-1	0.274	0.275	0.277	1	7.100	7.100	7.100	0	0.699	0.699	0.699	0	0.250	0.250	0.250	0
Cl	Post-Closure	Jan	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.303	0.296	0.308	19	0.551	0.551	0.552	0	0.557	0.555	0.558	1	0.280	0.286	0.306	7	3.359	3.898	7.100	-45	0.630	0.626	0.633	5	0.250	0.253	0.263	1
Cl	Post-Closure	Feb	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.327	0.318	0.335	27	0.552	0.552	0.553	0	0.556	0.554	0.557	1	0.279	0.285	0.306	7	3.330	3.874	7.100	-45	0.554	0.547	0.560	10	0.250	0.253	0.263	1
Cl	Post-Closure	Mar	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.552	0.515	0.591	106	0.552	0.552	0.553	0	0.556	0.553	0.558	2	0.278	0.284	0.305	7	3.208	3.769	7.100	-47	0.695	0.667	0.729	46	0.250	0.253	0.263	1
Cl	Post-Closure	Apr	109	0.250	0.252	0.256	1	0.298	0.299	0.304	3	0.715	0.661	0.761	53	0.552	0.552	0.553	0	0.558	0.554	0.560	4	0.277	0.283	0.305	8	3.391	3.709	7.100	-48	0.848	0.806	0.886	33	0.250	0.251	0.254	0
Cl	Post-Closure	May	109	0.250	0.251	0.252	0	0.297	0.297	0.299	0	0.499	0.481	0.513	-6	0.276	0.276	0.277	0	0.564	0.560	0.566	3	0.275	0.280	0.301	7	3.861	3.939	4.777	-16	0.725	0.715	0.734	-2	0.250	0.250	0.251	0
Cl	Post-Closure	Jun	109	0.250	0.250	0.250	0	0.253	0.253	0.253	0	0.271	0.269	0.273	1	0.251	0.251	0.251	0	0.535	0.532	0.536	1	0.277	0.282	0.302	7	3.507	3.609	4.700	-23	0.525	0.524	0.526	0	0.250	0.250	0.251	0
Cl	Post-Closure	Jul	109	0.250	0.250	0.250	0	0.254	0.254	0.254	0	0.274	0.272	0.275	-1	0.573	0.573	0.573	0	0.496	0.494	0.497	0	0.283	0.289	0.310	7	3.668	3.874	5.571	-31	0.455	0.454	0.456	0	0.250	0.250	0.250	0
Cl	Post-Closure	Aug	109	0.250	0.250	0.250	0	0.255	0.255	0.255	0	0.281	0.278	0.282	-1	0.574	0.574	0.575	1	0.479	0.477	0.479	0	0.289	0.295	0.316	7	3.773	3.965	5.600	-29	0.454	0.452	0.455	-1	0.250	0.250	0.250	0
Cl	Post-Closure	Sep	109	0.250	0.250	0.250	0	0.256	0.256	0.256	0	0.293	0.289	0.295	0	0.257	0.257	0.258	0	0.477	0.476	0.478	0	0.291	0.296	0.317	7	3.649	3.868	5.697	-32	0.505	0.502	0.506	0	0.250	0.250	0.251	0
Cl	Post-Closure	Oct	109	0.250	0.250	0.250	0	0.256	0.256	0.257	0	0.302	0.297	0.306	2	0.252	0.252	0.253	0	0.489	0.488	0.491	0	0.288	0.293	0.313	7	3.725	3.913	5.700	-31	0.580	0.577	0.583	1	0.250	0.250	0.251	0
Cl	Post-Closure	Nov	109	0.250	0.250	0.250	0	0.252	0.252	0.252	0	0.283	0.280	0.285	7	0.540	0.541	0.541	1	0.518	0.516	0.519	0	0.285	0.289	0.309	7	3.728	4.178	7.600	-41	0.741	0.739	0.743	1	0.250	0.252	0.260	1
Cl	Post-Closure	Dec	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.281	0.278	0.284	11	0.550	0.550	0.551	1	0.547	0.545	0.548	1	0.283	0.287	0.307	7	3.539	4.023	7.101	-43	0.712	0.710	0.714	2	0.250	0.253	0.263	1
F	Construction	Jan	2	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0525	0.0525	0.0525	0	0.0567	0.0567	0.0567	0	0.0373	0.0373	0.0376	0	0.0440	0.0440	0.0440	0	0.0626	0.0626	0.0626	0	0.0420	0.0420	0.0420	0
F	Construction	Feb	2	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0525	0.0525	0.0525	0	0.0566	0.0566	0.0567	0	0.0372	0.0372	0.0375	0	0.0440	0.0440	0.0440	0	0.0630	0.0630	0.0630	0	0.0420	0.0420	0.0420	0
F	Construction	Mar	2	0.0640	0.0640	0.0640	0	0.0639	0.0639	0.0639	0	0.0639	0.0639	0.0639	0	0.0525	0.0525	0.0526	0	0.0565	0.0565	0.0565	0	0.0371	0.0371	0.0375	0	0.0440	0.0440	0.0440	0	0.0631	0.0631	0.0631	0	0.0420	0.0420	0.0420	0
F	Construction	Apr	2	0.0632	0.0632	0.0632	0	0.0643	0.0643	0.0643	0	0.0641	0.0641	0.0641	0	0.0525	0.0525	0.0525	0	0.0562	0.0562	0.0562	0	0.0370	0.0370	0.0374	0	0.0440	0.0440	0.0440	0	0.0632	0.0632	0.0633	0	0.0420	0.0420	0.0420	0
F	Construction	May	2	0.0486	0.0486	0.0486	-3	0.0502	0.0502	0.0502	-3	0.0498	0.0498	0.0498	-3	0.0435	0.0435	0.0435	0	0.0551	0.0551	0.0551	0	0.0362	0.0362	0.0365	0	0.0295	0.0295	0.0295	2	0.0500	0.0500	0.0501	-3	0.0207	0.0207	0.0207	4
F	Construction	Jun	2	0.0519	0.0519	0.0519	0	0.0519	0.0519	0.0519	0	0.0519	0.0519	0.0519	0	0.0428	0.0428	0.0429	0	0.0525	0.0525	0.0525	0	0.0359	0.0359	0.0362	1	0.0290	0.0290	0.0290	0	0.0513	0.0513	0.0513	0	0.0200	0.0200	0.0200	0
F	Construction	Jul	2	0.0549	0.0549	0.0549	0	0.0550	0.0550	0.0550	0	0.0550	0.0550	0.0550	0	0.0517	0.0517	0.0517	0	0.0534	0.0534	0.0534	0	0.0367	0.0367	0.0370	1	0.0387	0.0387	0.0387	-1	0.0556	0.0556	0.0556	0	0.0287	0.0287	0.0287	-1
F	Construction	Aug	2	0.0548	0.0548	0.0548	0	0.0550	0.0550	0.0550	0	0.0550	0.0550	0.0550	0	0.0517	0.0517	0.0517	0	0.0550	0.0550	0.0551	0	0.0378	0.0378	0.0381	0	0.0390	0.0390	0.0390	0	0.0556	0.0556	0.0556	0	0.0290	0.0290	0.0290	0
F	Construction	Sep	2	0.0568	0.0568	0.0568	0	0.0570	0.0570	0.0570	0	0.0569	0.0569	0.0570	0	0.0478	0.0478	0.0478	0	0.0559	0.0559	0.0559	0	0.0383	0.0383	0.0386	0	0.0419	0.0419	0.0419	0	0.0581	0.0581	0.0582	0	0.0329	0.0329	0.0329	0
F	Construction	Oct	2	0.0568	0.0568	0.0568	0	0.0569	0.0569	0.0570	0	0.0569	0.0569	0.0569	0	0.0476	0.0476	0.0476	0	0.0561	0.0561	0.0561	0	0.0382	0.0382	0.0385	0	0.0420	0.0420	0.0420	0	0.0585	0.0585	0.0585	0	0.0330	0.0330	0.0330	0
F	Construction	Nov	2	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0522	0.0522	0.0522	0	0.0563	0.0563	0.0563	0	0.0380	0.0380	0.0383	0	0.0439	0.0439	0.0439	0	0.0621	0.0621	0.0621	0	0.0417	0.0417	0.0417	-1
F	Construction	Dec	2	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0524	0.0524	0.0524	0	0.0566	0.0566	0.0566	0	0.0379	0.0379	0.0382	0	0.0440	0.0440	0.0440	0	0.0622	0.0622	0.0622	0	0.0420	0.0420	0.0420	0
F	Operations	Jan	13	0.0640	0.0640	0.0640	0	0.0642	0.0642	0.0643	0	0.0641	0.0641	0.0642	0	0.0525	0.0525	0.0525	0	0.0568	0.0568	0.0569	0	0.0389	0.0388	0.0389	0	0.0440	0.0440	0.0440	0	0.0627	0.0627	0.0628	0	0.0420	0.0420	0.0420	0
F	Operations	Feb	13	0.0640	0.0640	0.0640	0	0.0648	0.0648	0.0655	1	0.0647	0.0647	0.0654	1	0.0526	0.0526	0.0526	0	0.0568	0.0568	0.0568	0	0.0388	0.0387	0.0389	0	0.0440	0.0440	0.0440	0	0.0636	0.0636	0.0642	1	0.0420	0.0420	0.0420	0
F	Operations	Mar	13	0.0639	0.0639	0.0639	0	0.0665	0.0665	0.0679	4	0.0663	0.0664	0.0678	4	0.0526	0.0526	0.0526	0	0.0567	0.0567	0.0568	0	0.0387	0.0386	0.0388	0	0.0440	0.0440	0.0440	0	0.0652	0.0653	0.0665	3	0.0420	0.0420	0.0420	0
F	Operations	Apr	13	0.0632	0.0632	0.0632	0	0.0661	0.0660	0.0671	3	0.0657	0.0655	0.0666	3	0.0526	0.0526	0.0526	0	0.0565	0.0565	0.0566	1	0.0386	0.0385	0.0387	0	0.0440	0.0440	0.0440	0	0.0645	0.0644	0.0653	2	0.0420	0.0420	0.0420	0
F	Operations	May	13	0.0486	0.0486	0.0486	-3	0.0508	0.0507	0.0511	-2	0.0503	0.0502	0.0507	-2	0.0436	0.0435	0.0436	0	0.0553	0.0553	0.0555	0	0.0377	0.0376	0.0377	1	0.0295	0.0295	0.0295	2	0.0504	0.0503	0.0506	-2	0.0207	0.0207	0.0207	4
F	Operations	Jun	13	0.0519	0.0519	0.0519	0	0.0521	0.0521	0.0522	0	0.0521	0.0520	0.0521	1	0.0429	0.0429	0.0429	0	0.0527	0.0527	0.0528	0	0.0373	0.0372	0.0373	1	0.0290	0.0290	0.0290	0	0.0514	0.0514	0.0515	0	0.0200	0.0200	0.0200	0
F	Operations	Jul	13	0.0549	0.0549	0.0549	0	0.0552	0.0551	0.0552	0	0.0551	0.0551	0.0552	0	0.0517	0.0517	0.0517	0	0.0536	0.0535	0.0536	0	0.0381	0.0380	0.0381	1	0.0387	0.0387	0.0387	-1	0.0558	0.0558	0.0558	0	0.0287	0.0287	0.0287	-1
F	Operations	Aug	13	0.0548	0.0548	0.0548	0	0.0552	0.0552	0.0553	0	0.0552	0.0552	0.0553	1	0.0517	0.0517	0.0517	0	0.0552	0.0552	0.0552	0	0.0391	0.0390	0.0391	1	0.0390	0.0390	0.0390	0	0.0558	0.0558	0.0558	0	0.0290	0.0290	0.0290	0
F	Operations	Sep	13	0.0568	0.0568	0.0568	0	0.0572	0.0572	0.0573	0	0.0572	0.0571	0.0572	1	0.0478	0.0478	0.0478	0	0.0560	0.0560	0.0561	0	0.0396	0.0395	0.0396	1	0.0419	0.0419	0.0419	0	0.0583	0.0583	0.0584	0	0.0329	0.0329	0.0329	0
F	Operations	Oct	13	0.0568	0.0568	0.0568	0	0.0572	0.0571	0.0573	0	0.0571	0.0571	0.0572	0	0.0476	0.0476	0.0476	0	0.0563	0.0563	0.0563	0	0.0394	0.0393	0.0394	1	0.0420	0.0420	0.0420	0	0.0586	0.0586	0.0587	0	0.0330	0.0330	0.0330	0
F	Operations	Nov	13	0.0640	0.0640	0.0640	0	0.0641	0.0641	0.0642	0	0.0641	0.0641	0.0642	0	0.0523	0.0522	0.0523	0	0.0564	0.0564	0.0565	0	0.0391	0.0390	0.0391	1	0.0439	0.0439	0.0439	0	0.0622	0.0622	0.0622	0	0.0417	0.0417	0.0417	-1
F	Operations	Dec	13	0.0640	0.0640	0.0640	0	0.0641	0.0641	0.0642	0	0.0640	0.0640	0.0641	0	0.0525	0.0525	0.0525	0	0.0567	0.0567	0.0568	0	0.0390	0.0389	0.0390	0	0.0440	0.0440	0.0440	0	0.0623	0.0622	0.0623	0	0.0420	0.0420	0.0420	0
F	Closure	Jan	6	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0639	0.0639	0.0640	0	0.0525	0.0525	0.0526	0	0.0567	0.0567	0.0569	0	0.0381	0.0382	0.0389	2	0.0440	0.0440	0.0440	0	0.0626	0.0626	0.0626	0	0.0420	0.0420	0.0420	0
F	Closure	Feb	6	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0639	0.0639	0.0639	0	0.0526	0.0526	0.0526	0	0.0567	0.0567	0.0568	0	0.0380	0.0381	0.0388	2	0.0440	0.0440	0.0440	0	0.0630	0.0630	0.0630	0	0.0420	0.0420	0.0420	0
F	Closure	Mar	6	0.0639	0.0639	0.0639	0	0.0640	0.0640	0.0640	0	0.0639	0.0639	0.0639	0	0.0526	0.0526	0.0526	0	0.0565	0.0565	0.0567	0	0.0378	0.0380	0.0387	2	0.0440	0.0440	0.0440	0	0.0631	0.0631	0.0631	0	0.0420	0.0420	0.0420	0
F	Closure	Apr	6	0.0632	0.0632	0.0632	0	0.0643	0.0643	0.0643	0	0.0641	0.0641	0.0641	0	0.0526	0.0526	0.0526	0	0.0562	0.0562	0.0563	0	0.0377	0.0378	0.0385	2	0.0440	0.0440	0.0440	0	0.0631	0.0631	0.0631	0	0.0420	0.0420	0.0420	0
F	Closure	May	6	0.0486	0.0486	0.0486	-3	0.0499	0.0498	0.0499	-4	0.0495	0.0495	0.0495	-4	0.0435	0.0435	0.0436	0	0.0551	0.0551	0.0552	0	0.0368	0.0369	0.0375	2	0.0295	0.0295	0.0295	2	0.0499	0.0499	0.0499	-3	0.0207	0.0207	0.0207	4
F	Closure	Jun	6	0.0519	0.0519	0.0519	0	0.0519	0.0519	0.0519	0	0.0518	0.0518	0.0518	0	0.0429	0.0429	0.0429	0	0.0525	0.0525	0.0525	0	0.0364	0.0365	0.0371	3	0.0290	0.0290	0.0290	0	0.0513	0.0513	0.0513	0	0.0200	0.0200	0.0200	0
F	Closure	Jul	6	0.0549	0.0549	0.0549	0	0.0550	0.0550	0.0550	0	0.0550	0.0550	0.0550	0	0.0517	0.0517	0.0517	0	0.0534	0.0534	0.0534	0	0.0372	0.0373	0.0379	3	0.0387	0.0387	0.0387	-1	0.0556	0.0556	0.0556	0	0.0287	0.0287	0.0287	-1
F	Closure	Aug	6	0.0548	0.0548	0.0548	0	0.0550	0.0550	0.0550	0	0.0549	0.0549	0.0549	0	0.0517	0.0517	0.0517	0	0.0550	0.0550	0.0551	0	0.0381	0.0382	0.0388	3	0.0390	0.0390	0.0390	0	0.0556	0.0556	0.0556	0	0.0290	0.0290	0.0290	0
F	Closure	Sep	6	0.0568	0.0568	0.0568	0	0.0569	0.0569	0.0569	0	0.0569	0.0569	0.0569	0	0.0478	0.0478	0.0478	0	0.0559	0.0559	0.0559	0	0.0386	0.0387	0.0393	2	0.0419	0.0419	0.0419	0	0.0581	0.0581	0.0581	0	0.0329	0.0329	0.0329	0
F	Closure	Oct	6	0.0568	0.0568	0.0568	0	0.0569	0.0569	0.0569	0	0.0569	0.0569	0.0569	0	0.0476	0.0476	0.0476	0	0.0561	0.0561	0.0561	0	0.0385	0.0386	0.0391	2	0.0420	0.0420	0.0420	0	0.0585	0.0585	0.0585	0	0.0330	0.0330	0.0330	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
F	Closure	Nov	6	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0522	0.0522	0.0523	0	0.0563	0.0563	0.0563	0	0.0382	0.0383	0.0388	2	0.0439	0.0439	0.0439	0	0.0621	0.0621	0.0621	0	0.0417	0.0417	0.0417	-1
F	Closure	Dec	6	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0525	0.0525	0.0525	0	0.0566	0.0566	0.0566	0	0.0380	0.0381	0.0386	2	0.0440	0.0440	0.0440	0	0.0622	0.0622	0.0622	0	0.0420	0.0420	0.0420	0
F	Post-Closure	Jan	109	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0650	0.0648	0.0651	1	0.0527	0.0527	0.0529	1	0.0572	0.0571	0.0572	1	0.0430	0.0433	0.0499	18	*0.1216*	0.1110	*0.1310*	152	0.0633	0.0632	0.0635	1	0.0420	0.0421	0.0423	0
F	Post-Closure	Feb	109	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0655	0.0652	0.0657	2	0.0527	0.0527	0.0529	0	0.0571	0.0571	0.0572	1	0.0430	0.0432	0.0500	18	*0.1227*	0.1121	*0.1324*	155	0.0642	0.0640	0.0644	2	0.0420	0.0421	0.0423	0
F	Post-Closure	Mar	109	0.0639	0.0639	0.0639	0	0.0640	0.0640	0.0640	0	0.0706	0.0697	0.0717	9	0.0527	0.0527	0.0529	0	0.0572	0.0571	0.0572	1	0.0431	0.0433	0.0502	18	*0.1273*	0.1162	*0.1377*	164	0.0688	0.0680	0.0698	8	0.0420	0.0421	0.0423	0
F	Post-Closure	Apr	109	0.0632	0.0633	0.0635	0	0.0643	0.0644	0.0646	0	0.0745	0.0729	0.0753	14	0.0527	0.0527	0.0529	0	0.0571	0.0569	0.0571	1	0.0432	0.0433	0.0503	19	*0.1382*	*0.1363*	*0.2074*	210	0.0719	0.0705	0.0725	12	0.0420	0.0420	0.0421	0
F	Post-Closure	May	109	0.0486	0.0486	0.0487	-3	0.0499	0.0499	0.0500	-4	0.0536	0.0529	0.0538	3	0.0438	0.0438	0.0441	1	0.0560	0.0558	0.0560	1	0.0422	0.0422	0.0489	19	0.1012	0.0927	0.1054	220	0.0521	0.0518	0.0523	1	0.0207	0.0207	0.0207	4
F	Post-Closure	Jun	109	0.0519	0.0519	0.0519	0	0.0519	0.0519	0.0519	0	0.0523	0.0522	0.0523	1	0.0430	0.0430	0.0431	0	0.0531	0.0530	0.0531	1	0.0417	0.0416	0.0482	19	0.1191	0.1081	*0.1237*	273	0.0516	0.0515	0.0516	1	0.0200	0.0200	0.0200	0
F	Post-Closure	Jul	109	0.0549	0.0549	0.0549	0	0.0550	0.0550	0.0550	0	0.0553	0.0553	0.0554	1	0.0518	0.0518	0.0519	0	0.0538	0.0537	0.0538	1	0.0428	0.0427	0.0495	20	0.1168	0.1070	*0.1203*	174	0.0559	0.0559	0.0559	1	0.0287	0.0287	0.0287	-1
F	Post-Closure	Aug	109	0.0548	0.0548	0.0548	0	0.0550	0.0550	0.0550	0	0.0554	0.0554	0.0555	1	0.0518	0.0518	0.0520	1	0.0554	0.0553	0.0554	1	0.0440	0.0438	0.0507	19	0.1191	0.1090	*0.1231*	180	0.0560	0.0559	0.0560	1	0.0290	0.0290	0.0290	0
F	Post-Closure	Sep	109	0.0568	0.0568	0.0568	0	0.0569	0.0569	0.0570	0	0.0577	0.0575	0.0577	1	0.0480	0.0479	0.0482	1	0.0562	0.0562	0.0563	1	0.0444	0.0442	0.0509	18	*0.1218*	0.1124	*0.1257*	168	0.0587	0.0586	0.0587	1	0.0329	0.0329	0.0329	0
F	Post-Closure	Oct	109	0.0568	0.0568	0.0568	0	0.0569	0.0569	0.0570	0	0.0579	0.0578	0.0580	2	0.0478	0.0478	0.0481	1	0.0565	0.0565	0.0566	1	0.0442	0.0439	0.0504	18	*0.1309*	*0.1218*	*0.1364*	190	0.0592	0.0591	0.0592	1	0.0330	0.0330	0.0330	0
F	Post-Closure	Nov	109	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0647	0.0646	0.0647	1	0.0525	0.0525	0.0528	1	0.0567	0.0567	0.0568	1	0.0439	0.0436	0.0500	18	*0.1375*	*0.1351*	*0.1490*	207	0.0625	0.0625	0.0626	1	0.0417	0.0418	0.0419	-1
F	Post-Closure	Dec	109	0.0640	0.0640	0.0640	0	0.0640	0.0640	0.0640	0	0.0646	0.0645	0.0646	1	0.0527	0.0527	0.0529	1	0.0570	0.0570	0.0571	1	0.0438	0.0435	0.0500	18	*0.1244*	0.1143	*0.1342*	160	0.0626	0.0625	0.0626	1	0.0420	0.0421	0.0423	-1
P, Tot	Construction	Jan	2	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0385	0.0385	0.0386	0	0.0198	0.0198	0.0198	0	0.0253	0.0253	0.0255	-1	0.0220	0.0220	0.0220	0	0.0212	0.0212	0.0212	0	0.0280	0.0280	0.0280	0
P, Tot	Construction	Feb	2	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0219	0.0219	0.0220	0	0.0386	0.0386	0.0386	0	0.0203	0.0203	0.0203	0	0.0251	0.0251	0.0252	-1	0.0220	0.0220	0.0220	0	0.0214	0.0214	0.0214	0	0.0280	0.0280	0.0280	0
P, Tot	Construction	Mar	2	0.0220	0.0220	0.0220	0	0.0218	0.0218	0.0218	-1	0.0218	0.0218	0.0218	-1	0.0386	0.0386	0.0386	0	0.0206	0.0206	0.0206	0	0.0249	0.0249	0.0250	-1	0.0220	0.0220	0.0220	0	0.0213	0.0213	0.0214	-1	0.0280	0.0280	0.0280	0
P, Tot	Construction	Apr	2	0.0222	0.0222	0.0222	0	0.0216	0.0216	0.0216	-2	0.0214	0.0214	0.0214	-2	0.0385	0.0385	0.0386	0	0.0208	0.0208	0.0208	0	0.0246	0.0246	0.0247	-1	0.0220	0.0220	0.0220	0	0.0210	0.0210	0.0210	-2	0.0280	0.0280	0.0280	0
P, Tot	Construction	May	2	0.0138	0.0138	0.0138	-5	0.0147	0.0147	0.0147	-6	0.0149	0.0149	0.0150	-8	0.0305	0.0305	0.0305	0	0.0202	0.0202	0.0203	0	0.0245	0.0245	0.0246	-1	0.0259	0.0259	0.0259	0	0.0145	0.0145	0.0145	-7	0.0203	0.0203	0.0203	1
P, Tot	Construction	Jun	2	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0131	0.0131	0.0131	0	0.0299	0.0299	0.0299	0	0.0176	0.0176	0.0176	0	0.0248	0.0248	0.0249	-1	0.0260	0.0260	0.0260	0	0.0134	0.0134	0.0134	0	0.0200	0.0200	0.0200	0
P, Tot	Construction	Jul	2	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0177	0.0177	0.0177	0	0.0254	0.0254	0.0255	-2	0.0212	0.0212	0.0212	1	0.0191	0.0191	0.0191	0	0.0210	0.0210	0.0210	0
P, Tot	Construction	Aug	2	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0188	0.0188	0.0188	0	0.0260	0.0260	0.0261	-2	0.0210	0.0210	0.0210	0	0.0192	0.0192	0.0192	0	0.0210	0.0210	0.0210	0
P, Tot	Construction	Sep	2	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0242	0.0242	0.0242	0	0.0185	0.0185	0.0185	0	0.0263	0.0263	0.0264	-2	0.0123	0.0123	0.0123	3	0.0160	0.0160	0.0160	0	0.0171	0.0171	0.0171	1
P, Tot	Construction	Oct	2	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0241	0.0241	0.0241	0	0.0178	0.0178	0.0178	0	0.0262	0.0262	0.0263	-2	0.0120	0.0120	0.0120	0	0.0160	0.0160	0.0160	0	0.0170	0.0170	0.0170	0
P, Tot	Construction	Nov	2	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0380	0.0380	0.0380	0	0.0182	0.0182	0.0182	0	0.0258	0.0258	0.0258	-2	0.0217	0.0217	0.0217	-2	0.0208	0.0208	0.0209	0	0.0276	0.0276	0.0276	-1
P, Tot	Construction	Dec	2	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0385	0.0385	0.0385	0	0.0192	0.0192	0.0192	0	0.0254	0.0254	0.0255	-2	0.0220	0.0220	0.0220	0	0.0209	0.0209	0.0209	0	0.0280	0.0280	0.0280	0
P, Tot	Operations	Jan	13	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0221	0	0.0220	0.0220	0.0220	0	0.0385	0.0385	0.0386	0	0.0198	0.0198	0.0198	0	0.0248	0.0249	0.0251	-4	0.0220	0.0220	0.0220	0	0.0212	0.0212	0.0212	0	0.0280	0.0280	0.0280	0
P, Tot	Operations	Feb	13	0.0220	0.0220	0.0220	0	0.0216	0.0217	0.0220	-1	0.0216	0.0217	0.0219	-2	0.0386	0.0386	0.0386	0	0.0203	0.0202	0.0203	0	0.0246	0.0246	0.0248	-4	0.0220	0.0220	0.0220	0	0.0211	0.0212	0.0214	-1	0.0280	0.0280	0.0280	0
P, Tot	Operations	Mar	13	0.0220	0.0220	0.0220	0	0.0208	0.0209	0.0218	-5	0.0208	0.0209	0.0217	-5	0.0386	0.0386	0.0386	0	0.0206	0.0205	0.0206	0	0.0244	0.0244	0.0246	-4	0.0220	0.0220	0.0220	0	0.0205	0.0206	0.0213	-4	0.0280	0.0280	0.0280	0
P, Tot	Operations	Apr	13	0.0222	0.0222	0.0222	0	0.0213	0.0214	0.0218	-2	0.0211	0.0212	0.0216	-3	0.0385	0.0385	0.0386	0	0.0207	0.0207	0.0208	0	0.0241	0.0241	0.0244	-4	0.0220	0.0220	0.0220	0	0.0207	0.0208	0.0211	-2	0.0280	0.0280	0.0280	0
P, Tot	Operations	May	13	0.0138	0.0138	0.0138	-5	0.0146	0.0146	0.0147	-7	0.0149	0.0149	0.0149	-9	0.0304	0.0304	0.0305	0	0.0202	0.0202	0.0202	0	0.0241	0.0241	0.0243	-4	0.0259	0.0259	0.0259	0	0.0144	0.0144	0.0145	-7	0.0203	0.0203	0.0203	1
P, Tot	Operations	Jun	13	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0131	0.0131	0.0131	0	0.0299	0.0299	0.0299	0	0.0175	0.0175	0.0176	0	0.0244	0.0244	0.0246	-4	0.0260	0.0260	0.0260	0	0.0134	0.0134	0.0134	0	0.0200	0.0200	0.0200	0
P, Tot	Operations	Jul	13	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0176	0.0176	0.0177	0	0.0249	0.0249	0.0251	-4	0.0212	0.0212	0.0212	1	0.0191	0.0191	0.0191	0	0.0210	0.0210	0.0210	0
P, Tot	Operations	Aug	13	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0188	0.0188	0.0188	0	0.0255	0.0256	0.0258	-4	0.0210	0.0210	0.0210	0	0.0191	0.0191	0.0192	0	0.0210	0.0210	0.0210	0
P, Tot	Operations	Sep	13	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0242	0.0242	0.0242	0	0.0184	0.0184	0.0185	0	0.0259	0.0260	0.0261	-4	0.0123	0.0123	0.0123	3	0.0160	0.0160	0.0160	0	0.0171	0.0171	0.0171	1
P, Tot	Operations	Oct	13	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0241	0.0241	0.0241	0	0.0178	0.0178	0.0178	0	0.0258	0.0258	0.0260	-4	0.0120	0.0120	0.0120	0	0.0160	0.0160	0.0160	0	0.0170	0.0170	0.0170	0
P, Tot	Operations	Nov	13	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0380	0.0380	0.0380	0	0.0182	0.0182	0.0182	0	0.0254	0.0254	0.0256	-4	0.0217	0.0217	0.0217	-2	0.0208	0.0208	0.0209	0	0.0276	0.0276	0.0276	-1
P, Tot	Operations	Dec	13	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0385	0.0385	0.0385	0	0.0192	0.0192	0.0192	0	0.0251	0.0251	0.0253	-4	0.0220	0.0220	0.0220	0	0.0209	0.0209	0.0209	0	0.0280	0.0280	0.0280	0
P, Tot	Closure	Jan	6	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0386	0.0386	0.0386	0	0.0198	0.0198	0.0198	0	0.0251	0.0250	0.0251	-2	0.0220	0.0220	0.0220	0	0.0212	0.0212	0.0212	0	0.0280	0.0280	0.0280	0
P, Tot	Closure	Feb	6	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0386	0.0386	0.0386	0	0.0203	0.0203	0.0203	0	0.0248	0.0248	0.0249	-2	0.0220	0.0220	0.0220	0	0.0214	0.0214	0.0214	0	0.0280	0.0280	0.0280	0
P, Tot	Closure	Mar	6	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0386	0.0386	0.0386	0	0.0206	0.0206	0.0206	0	0.0246	0.0246	0.0247	-2	0.0220	0.0220	0.0220	0	0.0215	0.0215	0.0215	0	0.0280	0.0280	0.0280	0
P, Tot	Closure	Apr	6	0.0222	0.0222	0.0222	0	0.0220	0.0220	0.0220	0	0.0218	0.0218	0.0218	0	0.0386	0.0386	0.0386	0	0.0208	0.0208	0.0208	0	0.0244	0.0243	0.0245	-2	0.0220	0.0220	0.0220	0	0.0213	0.0213	0.0213	0	0.0280	0.0280	0.0280	0
P, Tot	Closure	May	6	0.0138	0.0138	0.0138	-5	0.0146	0.0146	0.0147	-7	0.0149	0.0149	0.0149	-9	0.0305	0.0305	0.0305	0	0.0203	0.0203	0.0203	0	0.0243	0.0243	0.0244	-2	0.0259	0.0259	0.0259	0	0.0145	0.0145	0.0145	-7	0.0203	0.0203	0.0203	1
P, Tot	Closure	Jun	6	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0131	0.0131	0.0131	0	0.0299	0.0299	0.0299	0	0.0176	0.0176	0.0176	0	0.0246	0.0246	0.0247	-2	0.0260	0.0260	0.0260	0	0.0134	0.0134	0.0134	0	0.0200	0.0200	0.0200	0
P, Tot	Closure	Jul	6	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0177	0.0177	0.0177	0	0.0252	0.0251	0.0253	-2	0.0212	0.0212	0.0212	1	0.0191	0.0191	0.0191	0	0.0210	0.0210	0.0210	0
P, Tot	Closure	Aug	6	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0188	0.0188	0.0188	0	0.0258	0.0258	0.0259	-2	0.0210	0.0210	0.0210	0	0.0192	0.0192	0.0192	0	0.0210	0.0210	0.0210	0
P, Tot	Closure	Sep	6	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0242	0.0242	0.0242	0	0.0185	0.0185	0.0185	0	0.0262	0.0262	0.0263	-2	0.0123	0.0123	0.0123	3	0.0160	0.0160	0.0160	0	0.0171	0.0171	0.0171	1
P, Tot	Closure	Oct	6	0.0160	0.0160	0.0160	0	0.0161	0.0161	0.0161	0	0.0160	0.0160	0.0160	0	0.0241	0.0241	0.0241	0	0.0178	0.0178	0.0178	0	0.0261	0.0260	0.0261	-2	0.0120	0.0120	0.0120	0	0.0160	0.0160	0.0160	0	0.0170	0.0170	0.0170	0
P, Tot	Closure	Nov	6	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	1	0.0381	0.0380	0.0381	0	0.0182	0.0182	0.0182	0	0.0257	0.0256	0.0257	-2	0.0217	0.0217	0.0217	-2	0.0209	0.0209	0.0209	0	0.0276	0.0276	0.0276	-1
P, Tot	Closure	Dec	6	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0385	0.0385	0.0385	0	0.0192	0.0192	0.0192	0	0.0254	0.0253	0.0254	-2	0.0220	0.0220	0.0220	0	0.0209	0.0209	0.0209	0	0.0280	0.0280	0.0280	0
P, Tot	Post-Closure	Jan	109	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0219	0.0219	0.0220	0	0.0386	0.0386	0.0386	0	0.0198	0.0198	0.0198	0	0.0255	0.0255	0.0259	0	0.0163	0.0169	0.0220	-23	0.0211	0.0211	0.0212	0	0.0280	0.0280	0.0280	0
P, Tot	Post-Closure	Feb	109	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0219	0.0219	0.0220	-1	0.0386	0.0386	0.0386	0	0.0203	0.0203	0.0203	0	0.0253	0.0253	0.0257	0	0.0163	0.0169	0.0220	-23	0.0213	0.0213	0.0214	0	0.0280	0.0280	0.0280	0
P, Tot	Post-Closure	Mar	109	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0214	0.0215	0.0220	-2	0.0386	0.0386	0.0386	0	0.0206	0.0206	0.0206	0	0.0251	0.0251	0.0255	0	0.0162	0.0168	0.0220	-24	0.0210	0.0211	0.0215	-2	0.0280	0.0280	0.0280	0
P, Tot	Post-Closure	Apr	109	0.0222	0.0222	0.0222	0	0.0220	0.0220	0.0220	0	0.0210	0.0211	0.0218	-3	0.0386	0.0386	0.0386	0	0.0208	0.0208	0.0208	0	0.0248	0.0248	0.0252	0	0.0162	0.0170	0.0238	-23	0.0207	0.0207	0.0213	-3	0.0280	0.0280	0.0280	0
P, Tot	Post-Closure	May	109	0.0138	0.0138	0.0138	-5	0.0146	0.0146	0.0147	-7	0.0149	0.0149	0.0150	-9	0.0305	0.0305	0.0305	0	0.0202	0.0202	0.0203	0	0.0248	0.0248	0.0251	0	0.0198	0.0206	0.0261	-21	0.0144	0.0144	0.0145	-7	0.0203	0.0203	0.0203	1
P, Tot	Post-Closure	Jun	109	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0131	0.0131	0.0131	0	0.0299	0.0299	0.0299	0	0.0175	0.0175	0.0176	0	0.0251	0.0251	0.0254	0	0.0176	0.0187	0.0262	-28	0.0134	0.0134	0.0134	0	0.0200	0.0200	0.0200	0
P, Tot	Post-Closure	Jul	109	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0177	0.0177	0.0177	0	0.0256	0.0256	0.0260	0	0.0169	0.0173	0.0216	-18	0.0191	0.0191	0.0191	0	0.0210	0.0210	0.0210	0
P, Tot	Post-Closure	Aug	109	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0299	0.0299	0.0299	0	0.0188	0.0188	0.0188	0	0.0263	0.0263	0.0266	0	0.0172	0.0175	0.0215	-16	0.0192	0.0192	0.0192	0	0.0210	0.0210	0.0210	0
P, Tot	Post-Closure	Sep	109	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0242	0.0242	0.0242	0	0.0185	0.0185	0.0185	0	0.0267	0.0266	0.0270	0	0.0154	0.0148	0.0155	24	0.0160	0.0160	0.0160	0	0.0171	0.0171	0.0171	1
P, Tot	Post-Closure	Oct	109	0.0160	0.0160	0.0160	0	0.0161	0.0161	0.0161	0	0.0160	0.0160	0.0160	0	0.0241	0.0241	0.0241	0	0.0178	0.0178	0.0178	0	0.0265	0.0265	0.0269	0	0.0159	0.0153	0.0161	28	0.0160	0.0160	0.0160	0	0.0170	0.0170	0.0170	0
P, Tot	Post-Closure	Nov	109	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0219	0.0219	0.0220	0	0.0381	0.0381	0.0381	0	0.0182	0.0182	0.0182	0	0.0261	0.0261	0.0264	0	0.0172	0.0178	0.0233	-19	0.0208	0.0208	0.0209	0	0.0276	0.0276	0.0276	-1
P, Tot	Post-Closure	Dec	109	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0220	0.0220	0.0220	0	0.0385	0.0385	0.0385	0	0.0192	0.0192	0.0192	0	0.0258	0.0258	0.0261	0	0.0170	0.0174	0.0220	-21	0.0209	0.0209	0.0209	0	0.0280	0.0280	0.0280	0
NH3 (as N)	Construction	Jan	2	0.0240	0.0240	0.0240	0	0.0244	0.0244	0.0247	2	0.0244	0.0244	0.0247	2	0.1070	0.1070	0.1071	0	0.0243	0.0243	0.0243	0	0.0215	0.0215	0.0217	0	0.2400	0.2400	0.2400	0	0.0352	0.0352	0.0354	0	0.2300	0.2300	0.2300	0
NH3 (as N)	Construction	Feb	2	0.0240	0.0240	0.0240	0	0.0253	0.0253	0.0264	5	0.0252	0.0252	0.0264	5	0.1073	0.1073	0.1074	0	0.0268	0.0268	0.0268	0	0.0216	0.0216	0.0217	0	0.2400	0.2400	0.2400	0	0.0327	0.0327	0.0336	2	0.2300	0.2300	0.2300	0
NH3 (as N)	Construction	Mar	2	0.0240	0.0240	0.0240	0	0.0288	0.0288	0.0310	20	0.0288	0.0288	0.0309	20	0.1074	0.1074	0.1074	0	0.0287	0.0287	0.0288	1	0.0216	0.0216	0.0218	0	0.2400	0.2400	0.2400	0	0.0343	0.0343	0.0361	12	0.2300	0.2300	0.2300	0
NH3 (as N)	Construction	Apr	2	0.0316	0.0316	0.0316	2	0.0400	0.0400	0.0424	26	0.0415	0.0415	0.0437	18	0.1073	0.1073	0.1073	0	0.0302	0.0302	0.0304	1	0.0216	0.0216	0.0218	0	0.2400	0.2400	0.2400	0	0.0452	0.0452	0.0471	16	0.2300	0.2300	0.2300	0
NH3 (as N)	Construction	May	2	0.0055	0.0055	0.0055	-32	0.0090	0.0090	0.0100	-12	0.0139	0.0139	0.0149	-40	0.0201	0.0201	0.0201	0	0.0284	0.0284	0.0286	0	0.0205	0.0205	0.0207	1	0.2594	0.2594	0.2594	0	0.0122	0.0122	0.0128	-34	0.0123	0.0123	0.0123	145
NH3 (as N)	Construction	Jun	2	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0054	6	0.0057	0.0057	0.0058	-4	0.0122	0.0122	0.0122	0	0.0176	0.0176	0.0177	-2	0.0197	0.0197	0.0199	3	0.2600	0.2600	0.2600	0	0.0070	0.0070	0.0071	-2	0.0050	0.0050	0.0050	0
NH3 (as N)	Construction	Jul	2	0.0130	0.0130	0.0130	0	0.0132	0.0132	0.0132	1	0.0132	0.0132	0.0133	1	0.0082	0.0082	0.0082	-1	0.0117	0.0117	0.0117	0	0.0200	0.0200	0.0202	3	0.0336	0.0336	0.0336	29	0.0114	0.0114	0.0115	1	0.0166	0.0166	0.0166	-2
NH3 (as N)	Construction	Aug	2	0.0130	0.0130	0.0130	0	0.0133	0.0133	0.0134	2	0.0133	0.0133	0.0134	1	0.0082	0.0082	0.0083	-1	0.0110	0.0110	0.0110	0	0.0201	0.0201	0.0203	4	0.0260	0.0260	0.0260	0	0.0115	0.0115	0.0116	1	0.0170	0.0170	0.0170	0
NH3 (as N)	Construction	Sep	2	0.0050	0.0050	0.0050	0	0.0056	0.0056	0.0061	11	0.0057	0.0057	0.0061	9	0.0097	0.0097	0.0097	-1	0.0099	0.0099	0.0100	1	0.0200	0.0200	0.0202	4	0.0289	0.0289	0.0289	0	0.0074	0.0074	0.0077	5	0.0054	0.0054	0.0054	8
NH3 (as N)	Construction	Oct	2	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0054	5	0.0054	0.0054	0.0055	3	0.0099	0.0099	0.0099	-1	0.0089	0.0089	0.0091	1	0.0200	0.0200	0.0202	3	0.0290	0.0290	0.0290	0	0.0077	0.0077	0.0078	1	0.0050	0.0050	0.0050	0
NH3 (as N)	Construction	Nov	2	0.0243	0.0243	0.0243	0	0.0246	0.0246	0.0247	1	0.0247	0.0247	0.0248	1	0.1035	0.1035	0.1035	1	0.0135	0.0135	0.0136	2	0.0208	0.0208	0.0209	2	0.2330	0.2330	0.2330	-3	0.0395	0.0395	0.0396	1	0.2225	0.2225	0.2225	-3
NH3 (as N)	Construction	Dec	2	0.0240	0.0240	0.0240	0	0.0243	0.0243	0.0244	1	0.0243	0.0243	0.0244	1	0.1067	0.1067	0.1067	1	0.0202	0.0202	0.0203	1	0.0215	0.0215	0.0217	1	0.2400	0.2400	0.2400	0	0.0384	0.0384	0.0384	0	0.2300	0.2300	0.2300	0
NH3 (as N)	Operations	Jan	13	0.0243	0.0243	0.0243	1	0.0277	0.0275	0.0291	14	0.0279	0.0276	0.0293	15	0.1072	0.1072	0.1072	0	0.0248	0.0248	0.0251	3	0.0223	0.0222	0.0223	1	0.2400	0.2400	0.2400	0	0.0379	0.0376	0.0389	7	0.2300	0.2300	0.2300	0
NH3 (as N)	Operations	Feb	13	0.0244	0.0244	0.0244	2	0.0372	0.0358	0.0425	49	0.0373	0.0360	0.0427	50	0.1074	0.1074	0.1074	0	0.0277	0.0276	0.0281	3	0.0224	0.0223	0.0224	0	0.2400	0.2400	0.2400	0	0.0424	0.0414	0.0467	30	0.2300	0.2300	0.2300	0
NH3 (as N)	Operations	Mar	13	0.0246	0.0246	0.0246	3	0.0377	0.0383	0.0473	60	0.0379	0.0385	0.0475	61	0.1074	0.1074	0.1075	0	0.0300	0.0299	0.0305	5	0.0224	0.0223	0.0224	0	0.2400	0.2400	0.2400	0	0.0417	0.0423	0.0500	38	0.2300	0.2300	0.2300	0
NH3 (as N)	Operations	Apr	13	0.0317	0.0318	0.0319	3	0.0450	0.0454	0.0495	42	0.0462	0.0466	0.0505	33	0.1073	0.1073	0.1073	0	0.0317	0.0316	0.0322	6	0.0224	0.0223	0.0224	0	0.2400	0.2400	0.2400	0	0.0493	0.0496	0.0528	27	0.2300	0.2300	0.2300	0
NH3 (as N)	Operations	May	13	0.0055	0.0055	0.0055	-32	0.0112	0.0113	0.0129	12	0.0160	0.0161	0.0175	-31	0.0201	0.0201	0.0202	0	0.0298	0.0297	0.0303	4	0.0213	0.0212	0.0213	2	0.2594	0.2594	0.2594	0	0.0135	0.0135	0.0144	-27	0.0123	0.0123	0.0123	145
NH3 (as N)	Operations	Jun	13	0.0050	0.0050	0.0050	0	0.0060	0.0060	0.0062	19	0.0063	0.0063	0.0065	6	0.0122	0.0122	0.0122	0	0.0184	0.0184	0.0187	3	0.0204	0.0203	0.0204	3	0.2600	0.2600	0.2600	0	0.0074	0.0074	0.0076	4	0.0050	0.0050	0.0050	0
NH3 (as N)	Operations	Jul	13	0.0130	0.0130	0.0130	0	0.0135	0.0135	0.0137	4	0.0135	0.0135	0.0137	3	0.0082	0.0082	0.0082	-1	0.0121	0.0121	0.0122	3	0.0207	0.0206	0.0207	3	0.0336	0.0336	0.0336	29	0.0117	0.0117	0.0118	3	0.0166	0.0166	0.0166	-2
NH3 (as N)	Operations	Aug	13	0.0130	0.0130	0.0130	0	0.0137	0.0137	0.0139	5	0.0137	0.0137	0.0140	5	0.0083	0.0083	0.0083	-1	0.0113	0.0113	0.0114	3	0.0208	0.0207	0.0208	4	0.0260	0.0260	0.0260	0	0.0119	0.0119	0.0121	4	0.0170	0.0170	0.0170	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
NH3 (as N)	Operations	Sep	13	0.0050	0.0050	0.0050	0	0.0058	0.0059	0.0063	16	0.0059	0.0059	0.0063	14	0.0097	0.0097	0.0097	-1	0.0101	0.0101	0.0103	3	0.0206	0.0206	0.0207	4	0.0289	0.0289	0.0289	0	0.0075	0.0076	0.0079	8	0.0054	0.0054	0.0054	8
NH3 (as N)	Operations	Oct	13	0.0050	0.0050	0.0050	0	0.0060	0.0060	0.0066	19	0.0061	0.0061	0.0066	17	0.0099	0.0099	0.0099	-1	0.0092	0.0092	0.0094	4	0.0206	0.0206	0.0206	4	0.0290	0.0290	0.0290	0	0.0082	0.0082	0.0086	8	0.0050	0.0050	0.0050	0
NH3 (as N)	Operations	Nov	13	0.0244	0.0244	0.0244	0	0.0256	0.0255	0.0259	5	0.0257	0.0256	0.0260	5	0.1036	0.1036	0.1036	1	0.0138	0.0138	0.0140	4	0.0213	0.0213	0.0213	2	0.2330	0.2330	0.2330	-3	0.0402	0.0401	0.0404	2	0.2225	0.2225	0.2225	-3
NH3 (as N)	Operations	Dec	13	0.0242	0.0242	0.0242	1	0.0255	0.0255	0.0261	6	0.0256	0.0256	0.0262	7	0.1067	0.1067	0.1067	1	0.0206	0.0206	0.0208	3	0.0221	0.0220	0.0221	1	0.2400	0.2400	0.2400	0	0.0393	0.0393	0.0397	3	0.2300	0.2300	0.2300	0
NH3 (as N)	Closure	Jan	6	0.0244	0.0244	0.0244	2	0.0244	0.0244	0.0244	2	0.0246	0.0246	0.0247	3	0.1072	0.1072	0.1072	0	0.0243	0.0243	0.0245	0	0.0216	0.0217	0.0223	2	0.2400	0.2400	0.2400	0	0.0355	0.0355	0.0355	1	0.2300	0.2300	0.2300	0
NH3 (as N)	Closure	Feb	6	0.0245	0.0245	0.0245	2	0.0245	0.0245	0.0245	2	0.0248	0.0248	0.0248	3	0.1075	0.1075	0.1075	0	0.0268	0.0268	0.0270	0	0.0216	0.0217	0.0223	2	0.2400	0.2400	0.2400	0	0.0326	0.0325	0.0326	2	0.2300	0.2300	0.2300	0
NH3 (as N)	Closure	Mar	6	0.0247	0.0247	0.0247	3	0.0247	0.0247	0.0247	3	0.0252	0.0252	0.0252	5	0.1076	0.1076	0.1076	0	0.0286	0.0286	0.0288	1	0.0216	0.0217	0.0223	2	0.2400	0.2400	0.2400	0	0.0316	0.0316	0.0316	3	0.2300	0.2300	0.2300	0
NH3 (as N)	Closure	Apr	6	0.0317	0.0318	0.0319	3	0.0340	0.0341	0.0343	7	0.0358	0.0359	0.0361	2	0.1074	0.1074	0.1075	0	0.0301	0.0301	0.0303	1	0.0216	0.0217	0.0223	2	0.2400	0.2400	0.2400	0	0.0411	0.0412	0.0414	5	0.2300	0.2300	0.2300	0
NH3 (as N)	Closure	May	6	0.0055	0.0055	0.0055	-32	0.0061	0.0061	0.0061	-40	0.0114	0.0114	0.0114	-51	0.0201	0.0201	0.0202	0	0.0282	0.0282	0.0284	-1	0.0205	0.0206	0.0211	3	0.2594	0.2594	0.2594	0	0.0106	0.0106	0.0106	-43	0.0123	0.0123	0.0123	145
NH3 (as N)	Closure	Jun	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0054	-9	0.0122	0.0122	0.0122	0	0.0174	0.0174	0.0175	-3	0.0196	0.0197	0.0202	5	0.2600	0.2600	0.2600	0	0.0068	0.0068	0.0068	-5	0.0050	0.0050	0.0050	0
NH3 (as N)	Closure	Jul	6	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0131	0.0131	0.0131	0	0.0082	0.0082	0.0082	-1	0.0115	0.0115	0.0116	-2	0.0199	0.0199	0.0205	5	0.0336	0.0336	0.0336	29	0.0113	0.0113	0.0113	0	0.0166	0.0166	0.0166	-2
NH3 (as N)	Closure	Aug	6	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0131	0.0131	0.0131	0	0.0082	0.0082	0.0082	-1	0.0109	0.0109	0.0109	-1	0.0199	0.0200	0.0205	6	0.0260	0.0260	0.0260	0	0.0114	0.0114	0.0114	0	0.0170	0.0170	0.0170	0
NH3 (as N)	Closure	Sep	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	-2	0.0097	0.0097	0.0097	-1	0.0097	0.0097	0.0097	-1	0.0198	0.0199	0.0204	6	0.0289	0.0289	0.0289	0	0.0069	0.0069	0.0069	-1	0.0054	0.0054	0.0054	8
NH3 (as N)	Closure	Oct	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	-2	0.0099	0.0099	0.0099	-1	0.0087	0.0087	0.0087	-1	0.0198	0.0199	0.0203	6	0.0290	0.0290	0.0290	0	0.0076	0.0076	0.0076	-1	0.0050	0.0050	0.0050	0
NH3 (as N)	Closure	Nov	6	0.0244	0.0244	0.0244	0	0.0245	0.0245	0.0245	1	0.0247	0.0247	0.0247	1	0.1036	0.1036	0.1036	1	0.0133	0.0133	0.0133	0	0.0205	0.0206	0.0210	4	0.2330	0.2330	0.2330	-3	0.0396	0.0396	0.0396	1	0.2225	0.2225	0.2225	-3
NH3 (as N)	Closure	Dec	6	0.0243	0.0243	0.0243	1	0.0243	0.0243	0.0243	1	0.0244	0.0244	0.0244	2	0.1068	0.1068	0.1068	1	0.0201	0.0201	0.0201	0	0.0212	0.0213	0.0217	3	0.2400	0.2400	0.2400	0	0.0385	0.0385	0.0385	1	0.2300	0.2300	0.2300	0
NH3 (as N)	Post-Closure	Jan	109	0.0244	0.0244	0.0244	2	0.0244	0.0244	0.0244	2	0.0270	0.0271	0.0291	13	0.1073	0.1073	0.1074	0	0.0253	0.0253	0.0258	4	0.0221	0.0231	0.0260	12	0.2110	0.2160	0.3076	-10	0.0371	0.0372	0.0387	6	0.2300	0.2306	0.2322	0
NH3 (as N)	Post-Closure	Feb	109	0.0245	0.0245	0.0245	2	0.0245	0.0245	0.0245	2	0.0284	0.0285	0.0316	19	0.1075	0.1075	0.1076	0	0.0279	0.0279	0.0285	4	0.0222	0.0232	0.0261	12	0.2122	0.2163	0.3094	-10	0.0353	0.0354	0.0378	11	0.2300	0.2306	0.2323	0
NH3 (as N)	Post-Closure	Mar	109	0.0247	0.0247	0.0247	3	0.0247	0.0247	0.0247	3	0.0407	0.0416	0.0554	73	0.1076	0.1076	0.1077	0	0.0301	0.0300	0.0309	5	0.0222	0.0232	0.0262	12	0.2139	0.2175	0.3159	-9	0.0442	0.0451	0.0567	47	0.2300	0.2306	0.2323	0
NH3 (as N)	Post-Closure	Apr	109	0.0319	0.0321	0.0330	4	0.0343	0.0344	0.0352	8	0.0618	0.0595	0.0726	69	0.1075	0.1075	0.1076	0	0.0320	0.0319	0.0331	7	0.0222	0.0233	0.0263	12	0.2343	0.2431	0.3107	1	0.0621	0.0603	0.0711	54	0.2300	0.2302	0.2306	0
NH3 (as N)	Post-Closure	May	109	0.0055	0.0056	0.0058	-30	0.0061	0.0062	0.0064	-39	0.0208	0.0199	0.0244	-15	0.0201	0.0202	0.0204	0	0.0303	0.0301	0.0314	6	0.0211	0.0221	0.0250	14	0.2520	0.2562	0.2946	-1	0.0162	0.0156	0.0182	-16	0.0123	0.0123	0.0123	146
NH3 (as N)	Post-Closure	Jun	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0051	0	0.0064	0.0063	0.0068	7	0.0122	0.0122	0.0123	0	0.0188	0.0187	0.0194	4	0.0203	0.0212	0.0240	16	0.2468	0.2466	0.2986	-5	0.0075	0.0074	0.0077	4	0.0050	0.0050	0.0051	0
NH3 (as N)	Post-Closure	Jul	109	0.0130	0.0130	0.0130	0	0.0131	0.0131	0.0131	0	0.0141	0.0140	0.0145	7	0.0082	0.0082	0.0083	0	0.0123	0.0123	0.0127	5	0.0206	0.0215	0.0245	16	0.1814	0.1722	0.2512	562	0.0121	0.0120	0.0124	6	0.0166	0.0166	0.0167	-2
NH3 (as N)	Post-Closure	Aug	109	0.0130	0.0130	0.0131	0	0.0131	0.0131	0.0131	0	0.0144	0.0143	0.0148	9	0.0083	0.0083	0.0083	0	0.0116	0.0116	0.0119	6	0.0206	0.0216	0.0246	17	0.1861	0.1739	0.2490	569	0.0124	0.0123	0.0127	8	0.0170	0.0170	0.0171	0
NH3 (as N)	Post-Closure	Sep	109	0.0050	0.0050	0.0050	0	0.0050	0.0051	0.0051	0	0.0071	0.0069	0.0078	34	0.0097	0.0098	0.0098	0	0.0105	0.0105	0.0109	7	0.0206	0.0215	0.0244	17	0.1906	0.1791	0.2599	518	0.0085	0.0083	0.0090	19	0.0054	0.0054	0.0055	8
NH3 (as N)	Post-Closure	Oct	109	0.0050	0.0050	0.0051	1	0.0050	0.0051	0.0051	0	0.0079	0.0076	0.0087	46	0.0099	0.0099	0.0101	0	0.0098	0.0097	0.0102	10	0.0205	0.0214	0.0242	16	0.2137	0.1979	0.2759	582	0.0094	0.0093	0.0100	22	0.0050	0.0050	0.0051	1
NH3 (as N)	Post-Closure	Nov	109	0.0244	0.0244	0.0244	0	0.0245	0.0245	0.0245	1	0.0264	0.0263	0.0273	8	0.1036	0.1037	0.1038	1	0.0145	0.0143	0.0148	8	0.0212	0.0221	0.0249	14	0.2558	0.2735	0.4905	14	0.0405	0.0405	0.0411	3	0.2225	0.2229	0.2241	-3
NH3 (as N)	Post-Closure	Dec	109	0.0243	0.0243	0.0243	1	0.0243	0.0243	0.0243	1	0.0258	0.0259	0.0270	8	0.1068	0.1068	0.1069	1	0.0212	0.0211	0.0216	5	0.0220	0.0229	0.0257	12	0.2178	0.2221	0.3175	-7	0.0393	0.0394	0.0401	3	0.2300	0.2306	0.2322	0
NO2 (as N)	Construction	Jan	2	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0094	0.0094	0.0094	0	0.0122	0.0122	0.0123	-1	0.0160	0.0160	0.0160	0	0.0114	0.0114	0.0114	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Construction	Feb	2	0.0150	0.0150	0.0150	0	0.0151	0.0151	0.0152	1	0.0151	0.0151	0.0152	1	0.0130	0.0130	0.0130	0	0.0096	0.0096	0.0096	0	0.0121	0.0121	0.0122	-1	0.0160	0.0160	0.0160	0	0.0125	0.0125	0.0127	1	0.0170	0.0170	0.0170	0
NO2 (as N)	Construction	Mar	2	0.0150	0.0150	0.0150	0	0.0153	0.0153	0.0158	2	0.0153	0.0153	0.0157	2	0.0130	0.0130	0.0130	0	0.0098	0.0098	0.0098	0	0.0121	0.0121	0.0121	-1	0.0160	0.0160	0.0160	0	0.0132	0.0132	0.0136	3	0.0170	0.0170	0.0170	0
NO2 (as N)	Construction	Apr	2	0.0151	0.0151	0.0151	0	0.0152	0.0152	0.0156	2	0.0151	0.0151	0.0155	1	0.0130	0.0130	0.0130	0	0.0099	0.0099	0.0099	0	0.0120	0.0120	0.0120	-1	0.0160	0.0160	0.0160	0	0.0129	0.0129	0.0132	2	0.0170	0.0170	0.0170	0
NO2 (as N)	Construction	May	2	0.0082	0.0082	0.0082	-7	0.0077	0.0077	0.0079	-8	0.0077	0.0077	0.0079	-10	0.0129	0.0129	0.0129	0	0.0095	0.0095	0.0095	0	0.0117	0.0117	0.0118	-1	0.0083	0.0083	0.0083	3	0.0073	0.0073	0.0074	-8	0.0218	0.0218	0.0218	-1
NO2 (as N)	Construction	Jun	2	0.0066	0.0066	0.0066	0	0.0066	0.0066	0.0066	0	0.0066	0.0066	0.0066	0	0.0130	0.0130	0.0130	0	0.0078	0.0078	0.0078	0	0.0117	0.0117	0.0117	0	0.0080	0.0080	0.0080	0	0.0066	0.0066	0.0067	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Construction	Jul	2	0.0130	0.0130	0.0130	0	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0129	0	0.0120	0.0120	0.0120	0	0.0086	0.0086	0.0086	0	0.0119	0.0119	0.0119	0	0.0070	0.0070	0.0070	0	0.0112	0.0112	0.0112	0	0.0133	0.0133	0.0133	2
NO2 (as N)	Construction	Aug	2	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0130	0	0.0129	0.0129	0.0129	0	0.0120	0.0120	0.0120	0	0.0099	0.0099	0.0099	0	0.0120	0.0120	0.0120	0	0.0070	0.0070	0.0070	0	0.0113	0.0113	0.0113	0	0.0130	0.0130	0.0130	0
NO2 (as N)	Construction	Sep	2	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0111	0	0.0110	0.0110	0.0110	0	0.0015	0.0015	0.0015	-7	0.0097	0.0097	0.0097	0	0.0121	0.0121	0.0121	0	0.0070	0.0070	0.0070	0	0.0096	0.0096	0.0096	0	0.0140	0.0140	0.0140	0
NO2 (as N)	Construction	Oct	2	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0111	0	0.0110	0.0110	0.0111	0	0.0015	0.0015	0.0015	-9	0.0091	0.0091	0.0091	0	0.0122	0.0122	0.0123	-1	0.0070	0.0070	0.0070	0	0.0091	0.0091	0.0091	0	0.0140	0.0140	0.0140	0
NO2 (as N)	Construction	Nov	2	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0127	0.0127	0.0127	0	0.0090	0.0090	0.0090	0	0.0123	0.0123	0.0123	-1	0.0157	0.0157	0.0157	-2	0.0100	0.0100	0.0100	1	0.0169	0.0169	0.0169	-1
NO2 (as N)	Construction	Dec	2	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0092	0.0092	0.0093	0	0.0122	0.0122	0.0123	-1	0.0160	0.0160	0.0160	0	0.0103	0.0103	0.0103	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Operations	Jan	13	0.0150	0.0150	0.0150	0	0.0156	0.0155	0.0158	3	0.0156	0.0155	0.0158	3	0.0130	0.0130	0.0130	0	0.0095	0.0095	0.0095	1	0.0121	0.0121	0.0122	-3	0.0160	0.0160	0.0160	0	0.0118	0.0117	0.0119	3	0.0170	0.0170	0.0170	0
NO2 (as N)	Operations	Feb	13	0.0150	0.0150	0.0150	0	0.0167	0.0166	0.0177	11	0.0167	0.0166	0.0177	11	0.0130	0.0130	0.0130	0	0.0098	0.0097	0.0098	1	0.0120	0.0120	0.0121	-3	0.0160	0.0160	0.0160	0	0.0139	0.0138	0.0147	11	0.0170	0.0170	0.0170	0
NO2 (as N)	Operations	Mar	13	0.0150	0.0150	0.0150	0	0.0159	0.0160	0.0178	7	0.0158	0.0160	0.0178	7	0.0130	0.0130	0.0130	0	0.0100	0.0100	0.0101	2	0.0119	0.0119	0.0120	-3	0.0160	0.0160	0.0160	0	0.0138	0.0139	0.0153	8	0.0170	0.0170	0.0170	0
NO2 (as N)	Operations	Apr	13	0.0151	0.0151	0.0151	0	0.0161	0.0161	0.0168	8	0.0160	0.0160	0.0167	7	0.0130	0.0130	0.0130	0	0.0101	0.0101	0.0102	2	0.0118	0.0118	0.0119	-3	0.0160	0.0160	0.0160	0	0.0134	0.0134	0.0140	7	0.0170	0.0170	0.0170	0
NO2 (as N)	Operations	May	13	0.0082	0.0082	0.0082	-7	0.0080	0.0080	0.0083	-4	0.0081	0.0081	0.0083	-6	0.0129	0.0129	0.0129	0	0.0096	0.0096	0.0097	2	0.0116	0.0116	0.0117	-3	0.0083	0.0083	0.0083	3	0.0075	0.0075	0.0077	-6	0.0218	0.0218	0.0218	-1
NO2 (as N)	Operations	Jun	13	0.0066	0.0066	0.0066	0	0.0067	0.0067	0.0067	2	0.0067	0.0067	0.0067	1	0.0130	0.0130	0.0130	0	0.0079	0.0079	0.0080	1	0.0116	0.0116	0.0116	-2	0.0080	0.0080	0.0080	0	0.0067	0.0067	0.0067	1	0.0220	0.0220	0.0220	0
NO2 (as N)	Operations	Jul	13	0.0130	0.0130	0.0130	0	0.0130	0.0130	0.0130	0	0.0130	0.0130	0.0130	0	0.0120	0.0120	0.0120	0	0.0086	0.0086	0.0087	1	0.0118	0.0118	0.0118	-2	0.0070	0.0070	0.0070	0	0.0113	0.0112	0.0113	0	0.0133	0.0133	0.0133	2
NO2 (as N)	Operations	Aug	13	0.0130	0.0130	0.0130	0	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0130	1	0.0120	0.0120	0.0120	0	0.0099	0.0099	0.0099	1	0.0118	0.0118	0.0119	-2	0.0070	0.0070	0.0070	0	0.0113	0.0113	0.0113	1	0.0130	0.0130	0.0130	0
NO2 (as N)	Operations	Sep	13	0.0110	0.0110	0.0110	0	0.0111	0.0111	0.0112	1	0.0111	0.0111	0.0111	1	0.0015	0.0015	0.0015	-8	0.0097	0.0097	0.0098	0	0.0120	0.0120	0.0120	-2	0.0070	0.0070	0.0070	0	0.0096	0.0096	0.0097	1	0.0140	0.0140	0.0140	0
NO2 (as N)	Operations	Oct	13	0.0110	0.0110	0.0110	0	0.0112	0.0111	0.0112	1	0.0111	0.0111	0.0112	1	0.0015	0.0015	0.0015	-10	0.0091	0.0091	0.0092	1	0.0121	0.0121	0.0122	-2	0.0070	0.0070	0.0070	0	0.0092	0.0092	0.0092	1	0.0140	0.0140	0.0140	0
NO2 (as N)	Operations	Nov	13	0.0150	0.0150	0.0150	0	0.0152	0.0152	0.0152	1	0.0152	0.0151	0.0152	1	0.0127	0.0127	0.0127	0	0.0091	0.0091	0.0091	1	0.0122	0.0122	0.0122	-3	0.0157	0.0157	0.0157	-2	0.0101	0.0101	0.0101	2	0.0169	0.0169	0.0169	-1
NO2 (as N)	Operations	Dec	13	0.0150	0.0150	0.0150	0	0.0152	0.0152	0.0153	1	0.0152	0.0152	0.0153	1	0.0130	0.0130	0.0130	0	0.0093	0.0093	0.0093	1	0.0121	0.0121	0.0122	-3	0.0160	0.0160	0.0160	0	0.0104	0.0104	0.0105	1	0.0170	0.0170	0.0170	0
NO2 (as N)	Closure	Jan	6	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0094	0.0094	0.0094	0	0.0121	0.0121	0.0121	-2	0.0160	0.0160	0.0160	0	0.0114	0.0114	0.0114	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Closure	Feb	6	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0096	0.0096	0.0096	0	0.0120	0.0120	0.0120	-2	0.0160	0.0160	0.0160	0	0.0124	0.0124	0.0124	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Closure	Mar	6	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0098	0.0098	0.0098	0	0.0119	0.0119	0.0119	-2	0.0160	0.0160	0.0160	0	0.0128	0.0128	0.0128	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Closure	Apr	6	0.0151	0.0151	0.0151	0	0.0150	0.0150	0.0150	0	0.0149	0.0149	0.0149	0	0.0130	0.0130	0.0130	0	0.0098	0.0098	0.0098	0	0.0118	0.0118	0.0118	-2	0.0160	0.0160	0.0160	0	0.0124	0.0124	0.0124	-1	0.0170	0.0170	0.0170	0
NO2 (as N)	Closure	May	6	0.0082	0.0082	0.0082	-7	0.0074	0.0074	0.0074	-12	0.0075	0.0075	0.0075	-13	0.0129	0.0129	0.0129	0	0.0094	0.0094	0.0094	0	0.0116	0.0116	0.0116	-1	0.0083	0.0083	0.0083	3	0.0072	0.0072	0.0072	-10	0.0218	0.0218	0.0218	-1
NO2 (as N)	Closure	Jun	6	0.0066	0.0066	0.0066	0	0.0066	0.0066	0.0066	0	0.0066	0.0066	0.0066	0	0.0130	0.0130	0.0130	0	0.0078	0.0078	0.0078	0	0.0116	0.0116	0.0116	-1	0.0080	0.0080	0.0080	0	0.0066	0.0066	0.0066	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Closure	Jul	6	0.0130	0.0130	0.0130	0	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0129	0	0.0120	0.0120	0.0120	0	0.0086	0.0086	0.0086	0	0.0118	0.0118	0.0118	-1	0.0070	0.0070	0.0070	0	0.0112	0.0112	0.0112	0	0.0133	0.0133	0.0133	2
NO2 (as N)	Closure	Aug	6	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0129	0	0.0129	0.0129	0.0129	0	0.0120	0.0120	0.0120	0	0.0099	0.0099	0.0099	0	0.0118	0.0118	0.0118	0	0.0070	0.0070	0.0070	0	0.0113	0.0113	0.0113	0	0.0130	0.0130	0.0130	0
NO2 (as N)	Closure	Sep	6	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0015	0.0015	0.0015	-8	0.0097	0.0097	0.0097	0	0.0120	0.0120	0.0120	0	0.0070	0.0070	0.0070	0	0.0095	0.0095	0.0095	0	0.0140	0.0140	0.0140	0
NO2 (as N)	Closure	Oct	6	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0015	0.0015	0.0015	-10	0.0091	0.0091	0.0091	0	0.0121	0.0121	0.0122	-1	0.0070	0.0070	0.0070	0	0.0091	0.0091	0.0091	0	0.0140	0.0140	0.0140	0
NO2 (as N)	Closure	Nov	6	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0127	0.0127	0.0127	0	0.0090	0.0090	0.0090	0	0.0122	0.0122	0.0122	-1	0.0157	0.0157	0.0157	-2	0.0100	0.0100	0.0100	1	0.0169	0.0169	0.0169	-1
NO2 (as N)	Closure	Dec	6	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0092	0.0092	0.0092	0	0.0121	0.0121	0.0122	-1	0.0160	0.0160	0.0160	0	0.0103	0.0103	0.0103	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Post-Closure	Jan	109	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0149	0.0149	0.0150	-1	0.0130	0.0130	0.0130	0	0.0094	0.0094	0.0094	0	0.0122	0.0123	0.0125	0	0.0088	0.0099	0.0160	-38	0.0113	0.0113	0.0114	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Post-Closure	Feb	109	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0149	0.0149	0.0150	-1	0.0130	0.0130	0.0130	0	0.0096	0.0096	0.0096	0	0.0122	0.0122	0.0124	1	0.0088	0.0099	0.0160	-38	0.0123	0.0123	0.0124	0	0.0170	0.0170	0.0170	0
NO2 (as N)	Post-Closure	Mar	109	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0143	0.0144	0.0150	-4	0.0130	0.0130	0.0130	0	0.0098	0.0098	0.0098	0	0.0121	0.0121	0.0123	1	0.0086	0.0097	0.0160	-39	0.0124	0.0125	0.0128	-3	0.0170	0.0170	0.0170	0
NO2 (as N)	Post-Closure	Apr	109	0.0151	0.0151	0.0151	0	0.0150	0.0150	0.0150	0	0.0141	0.0142	0.0149	-5	0.0130	0.0130	0.0130	0	0.0098	0.0098	0.0098	0	0.0120	0.0120	0.0122	1	0.0089	0.0099	0.0160	-38	0.0120	0.0121	0.0124	-4	0.0170	0.0170	0.0170	0
NO2 (as N)	Post-Closure	May	109	0.0082	0.0082	0.0082	-7	0.0074	0.0074	0.0074	-12	0.0075	0.0075	0.0076	-13	0.0130	0.0129	0.0130	0	0.0094	0.0094	0.0094	0	0.0118	0.0118	0.0120	1	0.0085	0.0085	0.0091	7	0.0072	0.0072	0.0072	-10	0.0218	0.0218	0.0218	-1
NO2 (as N)	Post-Closure	Jun	109	0.0066	0.0066	0.0066	0	0.0066	0.0066	0.0066	0	0.0066	0.0066	0.0066	0	0.0130	0.0130	0.0130	0	0.0078	0.0078	0.0078	0	0.0118	0.0117	0.0120	1	0.0083	0.0084	0.0092	5	0.0066	0.0066	0.0066	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Post-Closure	Jul	109	0.0130	0.0130	0.0130	0	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0129	0	0.0120	0.0120	0.0120	0	0.0086	0.0086	0.0086	0	0.0120	0.0119	0.0122	1	0.0080	0.0081	0.0089	15	0.0112	0.0112	0.0112	0	0.0133	0.0133	0.0133	2
NO2 (as N)	Post-Closure	Aug	109	0.0130	0.0130	0.0130	0	0.0129	0.0129	0.0129	0	0.0129	0.0129	0.0129	0	0.0120	0.0120	0.0120	0	0.0099	0.0099	0.0099	0	0.0120	0.0120	0.0122	2	0.0082	0.0082	0.0090	17	0.0112	0.0112	0.0113	0	0.0130	0.0130	0.0130	0
NO2 (as N)	Post-Closure	Sep	109	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0015	0.0015	0.0015	-7	0.0097	0.0097	0.0097	0	0.0122	0.0122	0.0124	2	0.0081	0.0082	0.0091	17	0.0095	0.0095	0.0095	0	0.0140	0.0140	0.0140	0
NO2 (as N)	Post-Closure	Oct	109	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0110	0.0110	0.0110	0	0.0015	0.0015	0.0015	-9	0.0091	0.0091	0.0091	0	0.0123	0.0123	0.0125	1	0.0085	0.0085	0.0095	22	0.0091	0.0091	0.0091	0	0.0140	0.0140	0.0140	0
NO2 (as N)	Post-Closure	Nov	109	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0149	0.0149	0.0150	0	0.0127	0.0127	0.0127	0	0.0090	0.0090	0.0090	0	0.0123	0.0123	0.0125	1	0.0095	0.0106	0.0175	-34	0.0100	0.0100	0.0100	1	0.0169	0.0169	0.0169	-1
NO2 (as N)	Post-Closure	Dec	109	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0150	0.0150	0.0150	0	0.0130	0.0130	0.0130	0	0.0092	0.0092	0.0092	0	0.0123	0.0123	0.0125	1	0.0093	0.0102	0.0160	-36	0.0103	0.0103	0.0103	0	0.0170	0.0170	0.0170	0
N_NO3_NO2	Construction	Jan	2	0.0870	0.0870	0.0870	0	0.0886	0.0886	0.0902	2	0.0885	0.0885	0.0901	2	0.2039	0.2039	0.2042	0	0.0562	0.0562	0.0564	1	0.0310	0.0310	0.0315	0	0.0250	0.0250	0.0250	0	0.0884	0.0884	0.0896	1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Feb	2	0.0870	0.0870	0.0870	0	0.0933	0.0933	0.0997	7	0.0933	0.0933	0.0996	7	0.2045	0.2045	0.2047	0	0.0616	0.0616	0.0620	1	0.0311	0.0311	0.0315	0	0.0250	0.0250	0.0250	0	0.0923	0.0923	0.0975	6	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Mar	2	0.0870	0.0870	0.0870	0	0.1014	0.1014	0.1166	17	0.1013	0.1013	0.1165	16	0.2047	0.2047	0.2048	0	0.0660	0.0660	0.0668	2	0.0311	0.0311	0.0316	0	0.0250	0.0250	0.0250	0	0.0992	0.0992	0.1121	14	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Apr	2	0.0847	0.0847	0.0847	0	0.0985	0.0985	0.1157	18	0.0974	0.0974	0.1141	18	0.2044	0.2044	0.2045	0	0.0690	0.0690	0.0702	2	0.0311	0.0311	0.0316	0	0.0250	0.0250	0.0250	0	0.0958	0.0958	0.1097	14	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	May	2	0.0250	0.0250	0.0250	-18	0.0353	0.0353	0.0441	7	0.0345	0.0345	0.0427	1	0.0398	0.0398	0.0398	0	0.0655	0.0655	0.0668	2	0.0307	0.0307	0.0312	0	0.0250	0.0250	0.0250	0	0.0374	0.0374	0.0426	-2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Jun	2	0.0250	0.0250	0.0250	0	0.0258	0.0258	0.0262	3	0.0258	0.0258	0.0262	3	0.0251	0.0251	0.0251	0	0.0470	0.0470	0.0478	2	0.0308	0.0308	0.0313	0	0.0250	0.0250	0.0250	0	0.0305	0.0305	0.0308	2	0.0250	0.0250	0.0250	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
N_NO3_NO2	Construction	Jul	2	0.0250	0.0250	0.0250	0	0.0256	0.0256	0.0258	3	0.0256	0.0256	0.0258	3	0.0251	0.0251	0.0251	0	0.0330	0.0330	0.0333	2	0.0316	0.0316	0.0320	0	0.0250	0.0250	0.0250	0	0.0255	0.0255	0.0257	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Aug	2	0.0250	0.0250	0.0250	0	0.0259	0.0259	0.0263	4	0.0259	0.0259	0.0263	3	0.0252	0.0252	0.0252	0	0.0284	0.0284	0.0287	2	0.0323	0.0323	0.0327	1	0.0250	0.0250	0.0250	0	0.0257	0.0257	0.0260	3	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Sep	2	0.0250	0.0250	0.0250	0	0.0263	0.0263	0.0271	5	0.0263	0.0263	0.0271	5	0.0252	0.0252	0.0253	0	0.0272	0.0272	0.0276	2	0.0323	0.0323	0.0327	1	0.0250	0.0250	0.0250	0	0.0260	0.0260	0.0266	4	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Oct	2	0.0250	0.0250	0.0250	0	0.0263	0.0263	0.0269	5	0.0263	0.0263	0.0269	5	0.0253	0.0253	0.0253	0	0.0266	0.0266	0.0269	3	0.0320	0.0320	0.0323	1	0.0250	0.0250	0.0250	0	0.0259	0.0259	0.0263	3	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Nov	2	0.0869	0.0869	0.0869	0	0.0879	0.0879	0.0885	2	0.0879	0.0879	0.0885	3	0.1975	0.1975	0.1975	1	0.0354	0.0354	0.0357	3	0.0318	0.0318	0.0321	1	0.0250	0.0250	0.0250	0	0.0879	0.0879	0.0883	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Dec	2	0.0870	0.0870	0.0870	0	0.0885	0.0885	0.0893	2	0.0885	0.0885	0.0892	2	0.2033	0.2033	0.2033	1	0.0483	0.0483	0.0487	1	0.0318	0.0318	0.0321	1	0.0250	0.0250	0.0250	0	0.0883	0.0883	0.0888	1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Jan	13	0.0869	0.0869	0.0869	0	0.1114	0.1093	0.1224	26	0.1112	0.1091	0.1222	25	0.2043	0.2043	0.2043	0	0.0596	0.0596	0.0613	7	0.0332	0.0330	0.0333	2	0.0250	0.0250	0.0250	0	0.1050	0.1034	0.1129	18	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Feb	13	0.0869	0.0869	0.0869	0	0.1699	0.1628	0.2125	87	0.1696	0.1625	0.2121	87	0.2047	0.2047	0.2047	0	0.0676	0.0670	0.0700	10	0.0332	0.0331	0.0333	2	0.0250	0.0250	0.0250	0	0.1540	0.1483	0.1884	70	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Mar	13	0.0868	0.0868	0.0868	0	0.1460	0.1493	0.2255	72	0.1457	0.1489	0.2250	71	0.2048	0.2048	0.2049	0	0.0741	0.0734	0.0776	13	0.0332	0.0331	0.0333	2	0.0250	0.0250	0.0250	0	0.1372	0.1398	0.2039	60	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Apr	13	0.0847	0.0847	0.0847	0	0.1409	0.1431	0.1737	72	0.1381	0.1402	0.1698	70	0.2045	0.2045	0.2045	0	0.0778	0.0772	0.0818	14	0.0332	0.0330	0.0333	1	0.0250	0.0250	0.0250	0	0.1291	0.1307	0.1551	56	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	May	13	0.0250	0.0250	0.0250	-18	0.0510	0.0517	0.0640	57	0.0489	0.0496	0.0609	46	0.0399	0.0399	0.0400	0	0.0737	0.0733	0.0777	14	0.0327	0.0326	0.0328	2	0.0250	0.0250	0.0250	0	0.0465	0.0469	0.0539	22	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Jun	13	0.0250	0.0250	0.0250	0	0.0288	0.0288	0.0305	15	0.0288	0.0288	0.0305	15	0.0252	0.0252	0.0252	0	0.0518	0.0516	0.0542	12	0.0327	0.0325	0.0327	2	0.0250	0.0250	0.0250	0	0.0325	0.0325	0.0336	9	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Jul	13	0.0250	0.0250	0.0250	0	0.0273	0.0274	0.0284	10	0.0273	0.0274	0.0284	9	0.0251	0.0251	0.0251	0	0.0351	0.0351	0.0363	8	0.0334	0.0333	0.0335	2	0.0250	0.0250	0.0250	0	0.0268	0.0268	0.0277	7	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Aug	13	0.0250	0.0250	0.0250	0	0.0284	0.0284	0.0300	14	0.0283	0.0284	0.0299	14	0.0252	0.0252	0.0252	0	0.0301	0.0301	0.0310	8	0.0340	0.0339	0.0341	2	0.0250	0.0250	0.0250	0	0.0276	0.0277	0.0289	11	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Sep	13	0.0250	0.0250	0.0250	0	0.0294	0.0294	0.0319	18	0.0293	0.0294	0.0318	17	0.0253	0.0253	0.0253	0	0.0288	0.0289	0.0299	8	0.0340	0.0339	0.0341	2	0.0250	0.0250	0.0250	0	0.0283	0.0283	0.0302	13	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Oct	13	0.0250	0.0250	0.0250	0	0.0315	0.0313	0.0342	25	0.0315	0.0312	0.0342	25	0.0254	0.0254	0.0254	0	0.0283	0.0284	0.0297	10	0.0335	0.0334	0.0336	2	0.0250	0.0250	0.0250	0	0.0294	0.0293	0.0313	17	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Nov	13	0.0869	0.0869	0.0869	0	0.0947	0.0940	0.0969	9	0.0946	0.0939	0.0968	10	0.1975	0.1975	0.1975	1	0.0375	0.0374	0.0387	9	0.0333	0.0331	0.0333	2	0.0250	0.0250	0.0250	0	0.0921	0.0916	0.0934	6	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Dec	13	0.0869	0.0869	0.0869	0	0.0962	0.0959	0.1009	10	0.0961	0.0958	0.1008	10	0.2033	0.2033	0.2033	1	0.0507	0.0507	0.0520	7	0.0333	0.0331	0.0333	2	0.0250	0.0250	0.0250	0	0.0932	0.0931	0.0963	7	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Jan	6	0.0869	0.0869	0.0869	0	0.0869	0.0869	0.0871	0	0.0868	0.0868	0.0870	0	0.2044	0.2044	0.2045	0	0.0560	0.0561	0.0566	1	0.0322	0.0324	0.0333	4	0.0250	0.0250	0.0250	0	0.0871	0.0872	0.0872	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Feb	6	0.0869	0.0869	0.0869	0	0.0869	0.0869	0.0869	0	0.0868	0.0868	0.0868	0	0.2049	0.2049	0.2050	0	0.0613	0.0614	0.0619	0	0.0322	0.0323	0.0332	4	0.0250	0.0250	0.0250	0	0.0870	0.0870	0.0870	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Mar	6	0.0868	0.0868	0.0868	0	0.0869	0.0869	0.0869	0	0.0867	0.0867	0.0867	0	0.2051	0.2051	0.2051	0	0.0652	0.0653	0.0658	0	0.0321	0.0323	0.0332	4	0.0250	0.0250	0.0250	0	0.0869	0.0869	0.0869	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Apr	6	0.0847	0.0847	0.0847	0	0.0825	0.0824	0.0825	-1	0.0818	0.0817	0.0818	-1	0.2049	0.2049	0.2049	0	0.0680	0.0681	0.0685	0	0.0321	0.0322	0.0331	3	0.0250	0.0250	0.0250	0	0.0830	0.0829	0.0830	-1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	May	6	0.0250	0.0250	0.0250	-19	0.0250	0.0250	0.0250	-24	0.0250	0.0250	0.0250	-27	0.0399	0.0399	0.0400	0	0.0643	0.0644	0.0647	0	0.0316	0.0317	0.0325	4	0.0250	0.0250	0.0250	0	0.0314	0.0314	0.0315	-18	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Jun	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0251	0.0251	0.0252	0	0.0461	0.0461	0.0463	0	0.0316	0.0317	0.0324	4	0.0250	0.0250	0.0250	0	0.0299	0.0299	0.0299	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Jul	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0251	0.0251	0.0251	0	0.0324	0.0324	0.0325	0	0.0323	0.0324	0.0332	4	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Aug	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0252	0.0252	0.0252	0	0.0280	0.0280	0.0280	0	0.0329	0.0330	0.0337	4	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Sep	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0252	0.0253	0.0253	0	0.0266	0.0266	0.0266	0	0.0328	0.0329	0.0336	4	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Oct	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0253	0.0253	0.0254	0	0.0259	0.0259	0.0259	0	0.0324	0.0325	0.0331	4	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Nov	6	0.0869	0.0869	0.0869	0	0.0868	0.0868	0.0868	1	0.0867	0.0867	0.0867	1	0.1977	0.1977	0.1977	1	0.0347	0.0347	0.0347	1	0.0321	0.0322	0.0328	4	0.0250	0.0250	0.0250	0	0.0872	0.0872	0.0872	1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Dec	6	0.0869	0.0869	0.0869	0	0.0870	0.0870	0.0870	0	0.0869	0.0869	0.0869	0	0.2035	0.2035	0.2035	1	0.0477	0.0477	0.0477	1	0.0321	0.0322	0.0328	4	0.0250	0.0250	0.0250	0	0.0873	0.0873	0.0873	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Jan	109	0.0869	0.0869	0.0869	0	0.0869	0.0869	0.0869	0	0.0867	0.0867	0.0869	0	0.2046	0.2045	0.2047	0	0.0563	0.0563	0.0563	1	0.0357	0.0359	0.0410	18	0.0736	0.0685	0.0844	174	0.0871	0.0871	0.0872	0	0.0250	0.0251	0.0253	0
N_NO3_NO2	Post-Closure	Feb	109	0.0869	0.0869	0.0869	0	0.0869	0.0869	0.0869	0	0.0866	0.0866	0.0868	0	0.2051	0.2050	0.2052	0	0.0616	0.0616	0.0617	1	0.0358	0.0359	0.0411	18	0.0743	0.0692	0.0853	177	0.0869	0.0869	0.0871	0	0.0250	0.0251	0.0253	0
N_NO3_NO2	Post-Closure	Mar	109	0.0868	0.0868	0.0868	0	0.0869	0.0869	0.0869	0	0.0860	0.0861	0.0869	-1	0.2052	0.2052	0.2054	0	0.0655	0.0655	0.0656	1	0.0359	0.0360	0.0413	18	0.0772	0.0718	0.0889	187	0.0863	0.0864	0.0871	-1	0.0250	0.0251	0.0253	0
N_NO3_NO2	Post-Closure	Apr	109	0.0847	0.0847	0.0849	0	0.0825	0.0825	0.0827	-1	0.0831	0.0830	0.0841	1	0.2050	0.2049	0.2051	0	0.0683	0.0683	0.0685	1	0.0360	0.0361	0.0414	19	0.0893	0.0891	0.1533	256	0.0839	0.0839	0.0848	0	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	May	109	0.0250	0.0251	0.0251	-18	0.0250	0.0251	0.0251	-24	0.0279	0.0275	0.0282	-19	0.0401	0.0401	0.0404	1	0.0646	0.0646	0.0647	0	0.0354	0.0355	0.0406	19	0.0673	0.0632	0.0729	153	0.0329	0.0327	0.0331	-15	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Jun	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0253	0.0253	0.0254	1	0.0252	0.0252	0.0253	0	0.0463	0.0463	0.0464	0	0.0354	0.0354	0.0403	18	0.0773	0.0720	0.0835	188	0.0301	0.0301	0.0301	1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Jul	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0253	0.0253	0.0253	1	0.0252	0.0252	0.0253	0	0.0326	0.0326	0.0326	1	0.0363	0.0363	0.0414	18	0.0742	0.0688	0.0787	175	0.0252	0.0252	0.0253	1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Aug	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0254	0.0253	0.0254	1	0.0252	0.0252	0.0253	0	0.0282	0.0281	0.0282	1	0.0370	0.0369	0.0422	19	0.0759	0.0704	0.0814	182	0.0253	0.0253	0.0253	1	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Sep	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0256	0.0255	0.0256	2	0.0254	0.0254	0.0255	0	0.0269	0.0268	0.0269	1	0.0370	0.0368	0.0420	18	0.0771	0.0719	0.0823	188	0.0255	0.0254	0.0255	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Oct	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0258	0.0257	0.0259	3	0.0255	0.0255	0.0257	1	0.0262	0.0262	0.0262	1	0.0365	0.0363	0.0413	18	0.0836	0.0788	0.0911	215	0.0255	0.0255	0.0256	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Nov	109	0.0869	0.0869	0.0869	0	0.0868	0.0868	0.0868	1	0.0867	0.0867	0.0868	1	0.1978	0.1978	0.1980	1	0.0350	0.0350	0.0351	2	0.0362	0.0360	0.0410	18	0.0883	0.0891	0.1214	256	0.0872	0.0872	0.0872	1	0.0250	0.0251	0.0252	0
N_NO3_NO2	Post-Closure	Dec	109	0.0869	0.0869	0.0869	0	0.0870	0.0870	0.0870	0	0.0868	0.0868	0.0869	0	0.2036	0.2036	0.2038	1	0.0480	0.0480	0.0481	1	0.0362	0.0360	0.0409	18	0.0753	0.0705	0.0864	182	0.0872	0.0872	0.0873	0	0.0250	0.0251	0.0253	0
CN, Tot	Construction	Jan	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Feb	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Mar	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Apr	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	May	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	-1	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Jun	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Jul	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Aug	2	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00054	4	0.00052	0.00052	0.00054	4	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	3	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Sep	2	0.00050	0.00050	0.00050	0	0.00072	0.00072	0.00094	44	0.00072	0.00072	0.00094	44	0.00050	0.00050	0.00050	0	0.00057	0.00057	0.00063	12	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00067	0.00067	0.00084	34	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Oct	2	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00055	5	0.00053	0.00053	0.00055	5	0.00050	0.00050	0.00050	0	0.00056	0.00056	0.00061	11	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00054	4	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Nov	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00052	2	0.00051	0.00051	0.00052	2	0.00061	0.00061	0.00061	0	0.00054	0.00054	0.00059	9	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Dec	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.00051	0.00051	0.00051	1	0.00062	0.00062	0.00062	0	0.00054	0.00054	0.00057	7	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Jan	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00052	0	0.00050	0.00050	0.00052	0	0.00062	0.00062	0.00062	0	0.00050	0.00051	0.00056	1	0.00050	0.00050	0.00050	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00052	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Feb	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00054	1	0.00050	0.00050	0.00054	0	0.00062	0.00062	0.00062	0	0.00050	0.00051	0.00056	1	0.00050	0.00050	0.00050	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00053	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Mar	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00053	1	0.00050	0.00050	0.00053	1	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00056	1	0.00050	0.00050	0.00050	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00053	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Apr	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00055	1	0.00049	0.00049	0.00049	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	May	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00054	1	0.00049	0.00049	0.00049	-2	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Jun	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00052	0	0.00050	0.00050	0.00050	-2	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Jul	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00051	0.00051	0	0.00051	0.00051	0.00051	-2	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Aug	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Sep	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Oct	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Nov	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00061	0.00061	0.00061	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Dec	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Jan	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Feb	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Mar	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Apr	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	May	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	-1	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Jun	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	-1	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Jul	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Aug	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Sep	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Oct	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
CN, Tot	Closure	Nov	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00061	0.00061	0.00061	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Dec	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00062	0.00062	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Post-Closure	Jan	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00078	0.00078	0.00101	56	0.00062	0.00063	0.00065	2	0.00066	0.00065	0.00074	30	0.00051	0.00097	0.00162	93	0.01635	0.01683	0.03060	3266	0.00070	0.00070	0.00087	41	0.00050	0.00080	0.00144	60
CN, Tot	Post-Closure	Feb	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00091	0.00092	0.00126	83	0.00062	0.00063	0.00065	2	0.00068	0.00065	0.00073	31	0.00051	0.00098	0.00164	96	0.01656	0.01706	0.03103	3312	0.00083	0.00084	0.00111	67	0.00050	0.00080	0.00144	60
CN, Tot	Post-Closure	Mar	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00229	0.00233	0.00390	367	0.00062	0.00063	0.00065	2	0.00073	0.00069	0.00076	38	0.00050	0.00099	0.00167	100	0.01742	0.01797	0.03270	3493	0.00202	0.00206	0.00338	311	0.00050	0.00080	0.00144	60
CN, Tot	Post-Closure	Apr	109	0.00050	0.00066	0.00091	33	0.00050	0.00065	0.00089	31	0.00470	0.00515	0.00866	930	0.00062	0.00063	0.00065	2	0.00080	0.00075	0.00084	50	0.00050	0.00100	0.00169	103	0.03100	0.03398	0.05822	6696	0.00400	0.00435	0.00724	770	0.00050	0.00058	0.00076	17
CN, Tot	Post-Closure	May	109	0.00050	0.00056	0.00064	12	0.00050	0.00055	0.00062	10	0.00188	0.00199	0.00308	295	0.00051	0.00053	0.00056	4	0.00085	0.00079	0.00094	59	0.00050	0.00097	0.00164	99	0.02008	0.02330	0.04124	3918	0.00131	0.00140	0.00208	180	0.00050	0.00051	0.00053	2
CN, Tot	Post-Closure	Jun	109	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00065	0.00066	0.00078	32	0.00050	0.00051	0.00052	2	0.00072	0.00070	0.00081	40	0.00050	0.00096	0.00160	94	0.02540	0.02751	0.04716	4643	0.00060	0.00061	0.00070	22	0.00050	0.00051	0.00054	2
CN, Tot	Post-Closure	Jul	109	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00065	0.00064	0.00073	29	0.00050	0.00051	0.00052	2	0.00063	0.00062	0.00069	23	0.00052	0.00099	0.00165	95	0.02506	0.02383	0.03815	4665	0.00061	0.00061	0.00068	22	0.00050	0.00051	0.00052	2
CN, Tot	Post-Closure	Aug	109	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00068	0.00069	0.00083	39	0.00050	0.00051	0.00052	2	0.00062	0.00062	0.00069	22	0.00053	0.00101	0.00167	94	0.02506	0.02585	0.04320	5070	0.00064	0.00065	0.00076	30	0.00050	0.00051	0.00053	2
CN, Tot	Post-Closure	Sep	109	0.00050	0.00051	0.00052	1	0.00050	0.00051	0.00052	1	0.00078	0.00079	0.00098	57	0.00050	0.00052	0.00054	3	0.00063	0.00064	0.00072	25	0.00053	0.00100	0.00164	91	0.02626	0.02591	0.04227	5082	0.00071	0.00072	0.00086	44	0.00050	0.00051	0.00053	2
CN, Tot	Post-Closure	Oct	109	0.00050	0.00051	0.00053	2	0.00050	0.00051	0.00053	2	0.00087	0.00093	0.00125	85	0.00050	0.00052	0.00055	4	0.00065	0.00066	0.00077	31	0.00053	0.00098	0.00160	88	0.02790	0.03141	0.05459	6183	0.00075	0.00079	0.00101	58	0.00050	0.00052	0.00055	3
CN, Tot	Post-Closure	Nov	109	0.00050	0.00051	0.00052	1	0.00050	0.00051	0.00052	1	0.00082	0.00076	0.00086	53	0.00061	0.00063	0.00066	3	0.00066	0.00068	0.00079	35	0.00052	0.00097	0.00159	90	0.04214	0.04165	0.11540	8231	0.00070	0.00067	0.00073	33	0.00050	0.00072	0.00119	44
CN, Tot	Post-Closure	Dec	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00066	0.00066	0.00079	32	0.00062	0.00063	0.00066	3	0.00066	0.00066	0.00076	32	0.00052	0.00097	0.00160	92	0.01674	0.01730	0.03117	3361	0.00060	0.00060	0.00069	21	0.00050	0.00080	0.00144	60
CN, Free	Construction	Jan	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Feb	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Mar	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00050	0.00050	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Apr	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00050	0.00050	0.00050	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	May	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00050	0.00050	0.00050	-1	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Jun	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	-1	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Jul	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Aug	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Sep	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Oct	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Nov	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Dec	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Jan	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Feb	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Mar	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	-2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0
CN, Free	Operations	Apr	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	May	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00050	0.00050	0.00050	-2	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Jun	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-2	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Jul	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Aug	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Sep	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00054	0.00054	0.00054	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Oct	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Nov	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Dec	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00050	0	0.00052	0.00052	0.00052	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Jan	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00052	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Feb	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Mar	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Apr	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00050	0.00050	0.00051	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	May	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00050	0.00050	0.00050	0	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Jun	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00058	0.00058	0.00058	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Jul	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Aug	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Sep	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Oct	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Nov	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Dec	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00049	0.00049	0.00049	0	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Jan	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00054	0.00053	0.00054	7	0.00050	0.00050	0.00050	0	0.00051	0.00050	0.00051	2	0.00052	0.00053	0.00054	3	0.00279	0.00246	0.00300	392	0.00053	0.00052	0.00053	5	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Feb	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00056	0.00055	0.00056	10	0.00050	0.00050	0.00050	0	0.00051	0.00050	0.00051	3	0.00052	0.00052	0.00054	3	0.00282	0.00249	0.00304	397	0.00055	0.00054	0.00055	8	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Mar	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00076	0.00072	0.00078	44	0.00050	0.00050	0.00050	0	0.00051	0.00050	0.00051	4	0.00051	0.00052	0.00054	3	0.00295	0.00260	0.00318	420	0.00072	0.00069	0.00074	37	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Apr	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00085	0.00080	0.00090	61	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	5	0.00051	0.00052	0.00053	3	0.00308	0.00271	0.00335	441	0.00079	0.00075	0.00083	50	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	May	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00062	0.00060	0.00063	19	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00052	5	0.00051	0.00051	0.00053	3	0.00220	0.00198	0.00241	241	0.00057	0.00056	0.00058	11	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Jun	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	3	0.00051	0.00052	0.00053	3	0.00263	0.00233	0.00284	302	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Jul	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00053	0.00053	0.00055	3	0.00258	0.00225	0.00271	350	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Aug	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00051	0.00052	3	0.00050	0.00050	0.00050	0	0.00052	0.00051	0.00052	2	0.00054	0.00054	0.00056	3	0.00258	0.00227	0.00276	355	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Sep	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	4	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	2	0.00054	0.00055	0.00056	3	0.00268	0.00235	0.00283	369	0.00052	0.00052	0.00052	3	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Oct	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00054	5	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00052	2	0.00054	0.00054	0.00056	3	0.00284	0.00252	0.00310	404	0.00052	0.00052	0.00052	4	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Nov	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	4	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00053	0.00053	0.00055	3	0.00316	0.00279	0.00328	459	0.00052	0.00051	0.00052	3	0.00050	0.00050	0.00051	0
CN, Free	Post-Closure	Dec	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	4	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00052	0.00053	0.00055	3	0.00285	0.00253	0.00307	406	0.00051	0.00051	0.00052	3	0.00050	0.00050	0.00051	1
Al, Tot	Construction	Jan	2	0.013	0.013	0.013	0	0.014	0.014	0.014	4	0.014	0.014	0.014	4	0.128	0.128	0.128	0	0.084	0.084	0.085	0	0.081	0.081	0.082	-1	0.015	0.015	0.015	0	0.064	0.064	0.065	0	0.073	0.073	0.073	0
Al, Tot	Construction	Feb	2	0.013	0.013	0.013	0	0.014	0.014	0.016	11	0.014	0.014	0.016	11	0.128	0.128	0.129	0	0.083	0.083	0.084	0	0.080	0.080	0.081	-1	0.015	0.015	0.015	0	0.050	0.050	0.051	0	0.073	0.073	0.073	0
Al, Tot	Construction	Mar	2	0.013	0.013	0.013	0	0.021	0.021	0.022	61	0.021	0.021	0.022	61	0.129	0.129	0.129	0	0.082	0.082	0.083	0	0.079	0.079	0.080	-1	0.015	0.015	0.015	0	0.049	0.049	0.050	11	0.073	0.073	0.073	0
Al, Tot	Construction	Apr	2	0.015	0.015	0.015	1	0.029	0.029	0.029	69	0.029	0.029	0.029	74	0.128	0.128	0.128	0	0.082	0.082	0.082	0	0.078	0.078	0.079	-1	0.015	0.015	0.015	0	0.058	0.058	0.058	17	0.073	0.073	0.073	0
Al, Tot	Construction	May	2	0.035	0.035	0.035	6	0.045	0.045	0.045	17	0.045	0.045	0.045	22	0.128	0.128	0.128	0	0.089	0.089	0.090	1	0.078	0.078	0.078	-1	0.009	0.009	0.009	2	0.165	0.165	0.165	7	0.036	0.036	0.036	4
Al, Tot	Construction	Jun	2	0.035	0.035	0.035	0	0.036	0.036	0.036	1	0.036	0.036	0.036	1	0.129	0.129	0.129	0	0.110	0.110	0.110	0	0.078	0.078	0.079	-1	0.009	0.009	0.009	0	0.132	0.132	0.132	0	0.035	0.035	0.035	0
Al, Tot	Construction	Jul	2	0.032	0.032	0.032	0	0.033	0.033	0.033	1	0.033	0.033	0.033	2	0.087	0.087	0.087	0	0.096	0.096	0.096	0	0.080	0.080	0.081	-2	0.009	0.009	0.009	0	0.072	0.072	0.072	1	0.073	0.073	0.073	-2
Al, Tot	Construction	Aug	2	0.032	0.032	0.032	0	0.033	0.033	0.033	2	0.033	0.033	0.033	2	0.087	0.087	0.087	0	0.079	0.079	0.079	0	0.083	0.083	0.083	-2	0.009	0.009	0.009	0	0.071	0.071	0.071	1	0.074	0.074	0.074	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Al, Tot	Construction	Sep	2	0.028	0.028	0.028	0	0.029	0.029	0.029	3	0.029	0.029	0.029	3	0.099	0.099	0.099	0	0.076	0.076	0.076	1	0.085	0.085	0.085	-2	0.006	0.006	0.006	1	0.081	0.081	0.081	1	0.047	0.047	0.047	2
Al, Tot	Construction	Oct	2	0.028	0.028	0.028	0	0.029	0.029	0.029	2	0.029	0.029	0.029	3	0.099	0.099	0.099	0	0.081	0.081	0.081	1	0.084	0.084	0.084	-2	0.006	0.006	0.006	0	0.098	0.098	0.098	1	0.046	0.046	0.046	0
Al, Tot	Construction	Nov	2	0.013	0.013	0.013	0	0.014	0.014	0.014	2	0.014	0.014	0.014	1	0.127	0.127	0.127	0	0.084	0.084	0.084	0	0.082	0.082	0.083	-2	0.015	0.015	0.015	-2	0.084	0.084	0.084	0	0.072	0.072	0.072	-1
Al, Tot	Construction	Dec	2	0.013	0.013	0.013	0	0.013	0.013	0.013	3	0.013	0.013	0.013	3	0.128	0.128	0.128	0	0.085	0.085	0.085	0	0.081	0.081	0.082	-2	0.015	0.015	0.015	0	0.079	0.079	0.080	0	0.073	0.073	0.073	0
Al, Tot	Operations	Jan	13	0.013	0.013	0.013	1	0.014	0.014	0.014	10	0.014	0.014	0.014	9	0.128	0.128	0.128	0	0.085	0.085	0.085	0	0.079	0.079	0.080	-4	0.015	0.015	0.015	0	0.066	0.065	0.066	1	0.073	0.073	0.073	0
Al, Tot	Operations	Feb	13	0.013	0.013	0.013	1	0.018	0.017	0.018	32	0.018	0.017	0.018	32	0.128	0.128	0.129	0	0.084	0.084	0.084	0	0.078	0.078	0.079	-4	0.015	0.015	0.015	0	0.052	0.052	0.053	4	0.073	0.073	0.073	0
Al, Tot	Operations	Mar	13	0.013	0.013	0.013	1	0.024	0.024	0.027	82	0.024	0.024	0.027	81	0.129	0.129	0.129	0	0.083	0.083	0.083	0	0.077	0.077	0.078	-4	0.015	0.015	0.015	0	0.050	0.050	0.053	14	0.073	0.073	0.073	0
Al, Tot	Operations	Apr	13	0.015	0.015	0.015	2	0.029	0.029	0.031	69	0.029	0.028	0.030	73	0.128	0.128	0.128	0	0.082	0.082	0.082	1	0.076	0.076	0.077	-5	0.015	0.015	0.015	0	0.059	0.059	0.060	20	0.073	0.073	0.073	0
Al, Tot	Operations	May	13	0.035	0.035	0.035	6	0.045	0.046	0.046	18	0.045	0.045	0.046	23	0.128	0.128	0.128	0	0.090	0.090	0.090	1	0.076	0.076	0.077	-4	0.009	0.009	0.009	2	0.166	0.166	0.166	8	0.036	0.036	0.036	4
Al, Tot	Operations	Jun	13	0.035	0.035	0.035	0	0.036	0.036	0.036	2	0.036	0.036	0.036	2	0.129	0.129	0.129	0	0.110	0.110	0.110	1	0.076	0.076	0.077	-4	0.009	0.009	0.009	0	0.132	0.132	0.132	0	0.035	0.035	0.035	0
Al, Tot	Operations	Jul	13	0.032	0.032	0.032	0	0.033	0.033	0.033	2	0.033	0.033	0.033	2	0.087	0.087	0.087	0	0.096	0.096	0.096	0	0.078	0.078	0.079	-4	0.009	0.009	0.009	0	0.072	0.072	0.072	1	0.073	0.073	0.073	-2
Al, Tot	Operations	Aug	13	0.032	0.032	0.032	0	0.033	0.033	0.034	2	0.033	0.033	0.034	3	0.087	0.087	0.087	0	0.079	0.079	0.079	0	0.081	0.081	0.082	-5	0.009	0.009	0.009	0	0.071	0.071	0.071	1	0.074	0.074	0.074	0
Al, Tot	Operations	Sep	13	0.028	0.028	0.028	0	0.030	0.030	0.030	3	0.030	0.030	0.030	4	0.099	0.099	0.099	0	0.076	0.076	0.076	1	0.083	0.083	0.084	-5	0.006	0.006	0.006	1	0.081	0.081	0.081	1	0.047	0.047	0.047	2
Al, Tot	Operations	Oct	13	0.028	0.028	0.028	0	0.030	0.030	0.030	3	0.030	0.030	0.030	4	0.099	0.099	0.099	0	0.081	0.081	0.081	1	0.082	0.082	0.083	-4	0.006	0.006	0.006	0	0.098	0.098	0.098	1	0.046	0.046	0.046	0
Al, Tot	Operations	Nov	13	0.013	0.013	0.013	0	0.014	0.014	0.014	4	0.014	0.014	0.014	3	0.127	0.127	0.127	0	0.084	0.084	0.084	1	0.081	0.081	0.082	-4	0.015	0.015	0.015	-2	0.084	0.084	0.084	0	0.072	0.072	0.072	-1
Al, Tot	Operations	Dec	13	0.013	0.013	0.013	1	0.014	0.014	0.014	5	0.014	0.014	0.014	5	0.128	0.128	0.128	0	0.085	0.085	0.085	0	0.080	0.080	0.080	-4	0.015	0.015	0.015	0	0.080	0.080	0.080	0	0.073	0.073	0.073	0
Al, Tot	Closure	Jan	6	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.128	0.128	0.128	0	0.085	0.085	0.085	0	0.080	0.080	0.080	-3	0.015	0.015	0.015	0	0.065	0.065	0.065	0	0.073	0.073	0.073	0
Al, Tot	Closure	Feb	6	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.129	0.129	0.129	0	0.083	0.083	0.084	0	0.079	0.079	0.079	-3	0.015	0.015	0.015	0	0.050	0.050	0.050	0	0.073	0.073	0.073	0
Al, Tot	Closure	Mar	6	0.013	0.013	0.013	2	0.013	0.013	0.013	2	0.013	0.013	0.013	2	0.129	0.129	0.129	0	0.082	0.082	0.083	0	0.078	0.078	0.079	-3	0.015	0.015	0.015	0	0.044	0.044	0.044	1	0.073	0.073	0.073	0
Al, Tot	Closure	Apr	6	0.015	0.015	0.015	2	0.018	0.018	0.018	5	0.018	0.018	0.018	9	0.129	0.128	0.129	0	0.082	0.082	0.082	0	0.077	0.077	0.078	-3	0.015	0.015	0.015	0	0.052	0.052	0.053	6	0.073	0.073	0.073	0
Al, Tot	Closure	May	6	0.035	0.035	0.035	6	0.042	0.042	0.042	8	0.041	0.041	0.041	13	0.128	0.128	0.128	0	0.089	0.089	0.090	1	0.077	0.077	0.077	-3	0.009	0.009	0.009	2	0.165	0.165	0.165	7	0.036	0.036	0.036	4
Al, Tot	Closure	Jun	6	0.035	0.035	0.035	0	0.035	0.035	0.035	0	0.035	0.035	0.035	0	0.129	0.129	0.129	0	0.110	0.110	0.110	0	0.078	0.077	0.078	-3	0.009	0.009	0.009	0	0.132	0.132	0.132	0	0.035	0.035	0.035	0
Al, Tot	Closure	Jul	6	0.032	0.032	0.032	0	0.032	0.032	0.032	0	0.032	0.032	0.032	0	0.087	0.087	0.087	0	0.096	0.096	0.096	0	0.079	0.079	0.080	-3	0.009	0.009	0.009	0	0.072	0.072	0.072	0	0.073	0.073	0.073	-2
Al, Tot	Closure	Aug	6	0.032	0.032	0.032	0	0.033	0.033	0.033	0	0.033	0.033	0.033	0	0.087	0.087	0.087	0	0.079	0.079	0.079	0	0.082	0.082	0.083	-3	0.009	0.009	0.009	0	0.070	0.070	0.070	0	0.074	0.074	0.074	0
Al, Tot	Closure	Sep	6	0.028	0.028	0.028	0	0.029	0.029	0.029	0	0.029	0.029	0.029	0	0.099	0.099	0.099	0	0.076	0.076	0.076	0	0.084	0.084	0.084	-3	0.006	0.006	0.006	1	0.081	0.081	0.081	0	0.047	0.047	0.047	2
Al, Tot	Closure	Oct	6	0.028	0.028	0.028	0	0.029	0.029	0.029	0	0.029	0.029	0.029	0	0.099	0.099	0.099	0	0.081	0.081	0.081	0	0.083	0.083	0.084	-3	0.006	0.006	0.006	0	0.098	0.098	0.098	0	0.046	0.046	0.046	0
Al, Tot	Closure	Nov	6	0.013	0.013	0.013	0	0.013	0.013	0.013	-1	0.013	0.013	0.013	-2	0.127	0.127	0.127	0	0.084	0.084	0.084	0	0.082	0.082	0.082	-3	0.015	0.015	0.015	-2	0.084	0.084	0.084	0	0.072	0.072	0.072	-1
Al, Tot	Closure	Dec	6	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.128	0.128	0.128	0	0.085	0.085	0.085	0	0.081	0.081	0.081	-3	0.015	0.015	0.015	0	0.080	0.080	0.080	0	0.073	0.073	0.073	0
Al, Tot	Post-Closure	Jan	109	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.016	0.016	0.016	20	0.129	0.129	0.129	0	0.085	0.085	0.085	1	0.083	0.083	0.087	2	0.186	0.158	0.186	954	0.066	0.066	0.066	2	0.073	0.073	0.073	0
Al, Tot	Post-Closure	Feb	109	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.018	0.017	0.018	30	0.129	0.129	0.129	0	0.084	0.084	0.084	1	0.083	0.083	0.086	2	0.188	0.160	0.188	968	0.053	0.052	0.053	5	0.073	0.073	0.073	0
Al, Tot	Post-Closure	Mar	109	0.013	0.013	0.013	2	0.013	0.013	0.013	2	0.033	0.029	0.033	127	0.129	0.129	0.129	0	0.083	0.083	0.083	1	0.082	0.082	0.086	2	0.198	0.169	0.198	1024	0.058	0.056	0.058	27	0.073	0.073	0.073	0
Al, Tot	Post-Closure	Apr	109	0.015	0.015	0.015	2	0.018	0.018	0.018	6	0.043	0.039	0.044	136	0.129	0.129	0.129	0	0.083	0.083	0.083	1	0.081	0.081	0.085	2	0.196	0.173	0.200	1057	0.069	0.067	0.070	35	0.073	0.073	0.073	0
Al, Tot	Post-Closure	May	109	0.035	0.035	0.035	6	0.042	0.042	0.042	8	0.049	0.047	0.049	29	0.128	0.128	0.128	1	0.091	0.090	0.091	2	0.081	0.081	0.084	2	0.131	0.114	0.134	1121	0.166	0.166	0.166	8	0.036	0.036	0.036	4
Al, Tot	Post-Closure	Jun	109	0.035	0.035	0.035	0	0.035	0.035	0.035	0	0.036	0.036	0.036	2	0.129	0.129	0.129	0	0.110	0.110	0.110	1	0.081	0.081	0.085	2	0.163	0.141	0.166	1417	0.132	0.132	0.132	0	0.035	0.035	0.035	0
Al, Tot	Post-Closure	Jul	109	0.032	0.032	0.032	0	0.032	0.032	0.032	0	0.033	0.033	0.033	2	0.087	0.087	0.087	0	0.096	0.096	0.096	1	0.083	0.083	0.087	2	0.159	0.137	0.161	1497	0.072	0.072	0.072	1	0.073	0.073	0.073	-2
Al, Tot	Post-Closure	Aug	109	0.032	0.032	0.032	0	0.033	0.033	0.033	0	0.034	0.033	0.034	3	0.087	0.087	0.087	0	0.079	0.079	0.079	1	0.086	0.086	0.090	2	0.159	0.138	0.162	1500	0.071	0.071	0.071	1	0.074	0.074	0.074	0
Al, Tot	Post-Closure	Sep	109	0.028	0.028	0.028	0	0.029	0.029	0.029	0	0.030	0.030	0.030	5	0.099	0.099	0.100	0	0.077	0.077	0.077	1	0.088	0.088	0.091	1	0.165	0.143	0.168	2166	0.081	0.081	0.082	1	0.047	0.047	0.047	2
Al, Tot	Post-Closure	Oct	109	0.028	0.028	0.028	0	0.029	0.029	0.029	0	0.031	0.030	0.031	6	0.099	0.099	0.100	0	0.082	0.081	0.082	1	0.087	0.087	0.090	1	0.176	0.154	0.180	2338	0.099	0.098	0.099	1	0.046	0.046	0.046	0
Al, Tot	Post-Closure	Nov	109	0.013	0.013	0.013	0	0.013	0.013	0.013	-1	0.015	0.015	0.015	9	0.127	0.127	0.128	0	0.085	0.085	0.085	1	0.086	0.085	0.089	2	0.195	0.172	0.198	1046	0.085	0.085	0.085	0	0.072	0.072	0.072	-1
Al, Tot	Post-Closure	Dec	109	0.013	0.013	0.013	1	0.013	0.013	0.013	1	0.015	0.014	0.015	12	0.128	0.128	0.129	0	0.085	0.085	0.086	1	0.084	0.084	0.088	2	0.189	0.163	0.190	984	0.080	0.080	0.080	1	0.073	0.073	0.073	0
Sb, Diss	Construction	Jan	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Construction	Feb	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Construction	Mar	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000102	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Construction	Apr	2	0.00010	0.00010	0.00010	0	0.000099	0.000099	0.000101	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Construction	May	2	0.00009	0.00009	0.00009	-1	0.000093	0.000093	0.000094	0	0.00009	0.00009	0.00009	-1	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Jun	2	0.00009	0.00009	0.00009	0	0.000093	0.000093	0.000093	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	-2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Jul	2	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00009	-2	0.00008	0.00008	0.00008	1	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Aug	2	0.00007	0.00007	0.00007	0	0.000071	0.000071	0.000071	1	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-2	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Diss	Construction	Sep	2	0.00008	0.00008	0.00008	0	0.000082	0.000082	0.000085	3	0.00008	0.00008	0.00009	3	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	1	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00008	3	0.00005	0.00005	0.00005	2
Sb, Diss	Construction	Oct	2	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000081	1	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	1	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	1	0.00005	0.00005	0.00005	0
Sb, Diss	Construction	Nov	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	1	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	-1
Sb, Diss	Construction	Dec	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Operations	Jan	13	0.00010	0.00010	0.00010	0	0.000110	0.000113	0.000126	13	0.00011	0.00011	0.00013	13	0.00009	0.00009	0.00009	0	0.00008	0.00009	0.00009	6	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00011	0.00012	9	0.00009	0.00009	0.00009	0
Sb, Diss	Operations	Feb	13	0.00010	0.00010	0.00010	0	0.000145	0.000146	0.000199	46	0.00015	0.00015	0.00020	46	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	7	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00014	0.00014	0.00018	38	0.00009	0.00009	0.00009	0
Sb, Diss	Operations	Mar	13	0.00010	0.00010	0.00010	0	0.000208	0.000201	0.000304	101	0.00021	0.00020	0.00030	101	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00010	10	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00019	0.00018	0.00027	87	0.00009	0.00009	0.00009	0
Sb, Diss	Operations	Apr	13	0.00010	0.00010	0.00010	0	0.000213	0.000196	0.000265	98	0.00021	0.00019	0.00026	94	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00010	12	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00019	0.00017	0.00023	78	0.00009	0.00009	0.00009	0
Sb, Diss	Operations	May	13	0.00009	0.00009	0.00009	-1	0.000139	0.000133	0.000162	42	0.00014	0.00013	0.00016	38	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00010	13	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00012	0.00011	0.00013	24	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Jun	13	0.00009	0.00009	0.00009	0	0.000102	0.000100	0.000105	8	0.00010	0.00010	0.00011	8	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	8	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	6	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Jul	13	0.00007	0.00007	0.00007	0	0.000077	0.000077	0.000081	9	0.00008	0.00008	0.00008	9	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	5	0.00008	0.00008	0.00008	-3	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	7	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Aug	13	0.00007	0.00007	0.00007	0	0.000080	0.000079	0.000085	12	0.00008	0.00008	0.00008	12	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00009	6	0.00009	0.00009	0.00009	-3	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	9	0.00008	0.00008	0.00008	0
Sb, Diss	Operations	Sep	13	0.00008	0.00008	0.00008	0	0.000091	0.000090	0.000096	13	0.00009	0.00009	0.00010	13	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00009	7	0.00009	0.00009	0.00009	-3	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00009	11	0.00005	0.00005	0.00005	2
Sb, Diss	Operations	Oct	13	0.00008	0.00008	0.00008	0	0.000092	0.000091	0.000098	14	0.00009	0.00009	0.00010	13	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	7	0.00009	0.00009	0.00009	-3	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	10	0.00005	0.00005	0.00005	0
Sb, Diss	Operations	Nov	13	0.00010	0.00010	0.00010	0	0.000108	0.000108	0.000114	8	0.00011	0.00011	0.00011	8	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	7	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00011	5	0.00009	0.00009	0.00009	-1
Sb, Diss	Operations	Dec	13	0.00010	0.00010	0.00010	0	0.000108	0.000106	0.000111	6	0.00011	0.00011	0.00011	6	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	6	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	4	0.00009	0.00009	0.00009	0
Sb, Diss	Closure	Jan	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000101	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	2	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Closure	Feb	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	2	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Closure	Mar	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Closure	Apr	6	0.00010	0.00010	0.00010	0	0.000099	0.000099	0.000099	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Closure	May	6	0.00009	0.00009	0.00009	-1	0.000093	0.000093	0.000093	-1	0.00009	0.00009	0.00009	-1	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Jun	6	0.00009	0.00009	0.00009	0	0.000093	0.000093	0.000093	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	-2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Sb, Diss	Closure	Jul	6	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-2	0.00008	0.00008	0.00008	1	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Aug	6	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-2	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Diss	Closure	Sep	6	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000080	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	0	0.00005	0.00005	0.00005	2
Sb, Diss	Closure	Oct	6	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000080	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	0	0.00005	0.00005	0.00005	0
Sb, Diss	Closure	Nov	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	-1
Sb, Diss	Closure	Dec	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Diss	Post-Closure	Jan	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00014	0.00014	0.00016	38	0.00010	0.00010	0.00010	4	0.00010	0.00010	0.00010	18	0.00020	0.00021	0.00037	156	0.00246	0.00230	0.00338	2454	0.00013	0.00013	0.00014	28	0.00009	0.00009	0.00010	5
Sb, Diss	Post-Closure	Feb	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00016	0.00016	0.00018	56	0.00010	0.00010	0.00010	4	0.00010	0.00010	0.00010	19	0.00021	0.00022	0.00037	160	0.00249	0.00233	0.00343	2488	0.00015	0.00014	0.00017	46	0.00009	0.00009	0.00010	5
Sb, Diss	Post-Closure	Mar	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00036	0.00035	0.00047	247	0.00010	0.00010	0.00010	4	0.00011	0.00010	0.00011	25	0.00021	0.00022	0.00038	165	0.00262	0.00245	0.00361	2624	0.00032	0.00031	0.00041	213	0.00009	0.00009	0.00010	5
Sb, Diss	Post-Closure	Apr	109	0.00010	0.00010	0.00011	4	0.000099	0.000103	0.000111	4	0.00053	0.00047	0.00059	376	0.00010	0.00010	0.00010	4	0.00011	0.00011	0.00012	33	0.00022	0.00022	0.00039	172	0.00317	0.00309	0.00430	3332	0.00045	0.00041	0.00051	316	0.00009	0.00009	0.00009	1
Sb, Diss	Post-Closure	May	109	0.00009	0.00009	0.00010	1	0.000093	0.000094	0.000096	0	0.00023	0.00022	0.00025	130	0.00010	0.00010	0.00011	7	0.00012	0.00011	0.00012	36	0.00021	0.00022	0.00038	164	0.00214	0.00193	0.00245	1976	0.00017	0.00016	0.00019	78	0.00008	0.00008	0.00008	0
Sb, Diss	Post-Closure	Jun	109	0.00009	0.00009	0.00009	0	0.000093	0.000093	0.000093	0	0.00011	0.00011	0.00011	14	0.00010	0.00010	0.00010	3	0.00011	0.00011	0.00011	21	0.00021	0.00021	0.00037	156	0.00263	0.00238	0.00304	2460	0.00010	0.00010	0.00010	10	0.00008	0.00008	0.00008	0
Sb, Diss	Post-Closure	Jul	109	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00008	0.00008	0.00009	18	0.00008	0.00008	0.00008	3	0.00010	0.00009	0.00010	13	0.00022	0.00022	0.00038	158	0.00248	0.00224	0.00296	2703	0.00008	0.00008	0.00009	14	0.00008	0.00008	0.00008	0
Sb, Diss	Post-Closure	Aug	109	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000071	0	0.00009	0.00009	0.00009	23	0.00008	0.00008	0.00009	3	0.00009	0.00009	0.00009	13	0.00023	0.00023	0.00039	159	0.00255	0.00230	0.00297	2773	0.00009	0.00009	0.00009	18	0.00008	0.00008	0.00008	0
Sb, Diss	Post-Closure	Sep	109	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000080	0	0.00011	0.00010	0.00011	31	0.00008	0.00008	0.00009	5	0.00009	0.00009	0.00009	15	0.00022	0.00022	0.00038	155	0.00261	0.00238	0.00310	2875	0.00009	0.00009	0.00010	26	0.00005	0.00005	0.00005	2
Sb, Diss	Post-Closure	Oct	109	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000081	0	0.00012	0.00011	0.00012	42	0.00009	0.00009	0.00009	7	0.00009	0.00009	0.00009	18	0.00022	0.00022	0.00037	153	0.00291	0.00266	0.00333	3221	0.00010	0.00009	0.00010	33	0.00005	0.00005	0.00005	0
Sb, Diss	Post-Closure	Nov	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00013	0.00012	0.00013	25	0.00010	0.00010	0.00010	6	0.00009	0.00009	0.00010	20	0.00022	0.00022	0.00037	154	0.00308	0.00311	0.00389	3357	0.00011	0.00011	0.00012	16	0.00009	0.00009	0.00010	2
Sb, Diss	Post-Closure	Dec	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00012	0.00012	0.00013	21	0.00010	0.00010	0.00010	5	0.00010	0.00009	0.00010	18	0.00022	0.00022	0.00037	157	0.00251	0.00236	0.00344	2524	0.00011	0.00011	0.00012	14	0.00009	0.00009	0.00010	5
Sb, Tot	Construction	Jan	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Construction	Feb	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000101	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Construction	Mar	2	0.00010	0.00010	0.00010	0	0.000102	0.000102	0.000103	2	0.00010	0.00010	0.00010	2	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	2	0.00009	0.00009	0.00009	0
Sb, Tot	Construction	Apr	2	0.00010	0.00010	0.00010	0	0.000102	0.000102	0.000104	3	0.00010	0.00010	0.00010	3	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	2	0.00009	0.00009	0.00009	0
Sb, Tot	Construction	May	2	0.00009	0.00009	0.00009	-1	0.000094	0.000094	0.000095	1	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Jun	2	0.00009	0.00009	0.00009	0	0.000093	0.000093	0.000093	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	-2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Jul	2	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00009	-2	0.00011	0.00011	0.00011	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Aug	2	0.00007	0.00007	0.00007	0	0.000071	0.000071	0.000071	1	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-2	0.00011	0.00011	0.00011	0	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00008	0
Sb, Tot	Construction	Sep	2	0.00008	0.00008	0.00008	0	0.000083	0.000083	0.000085	4	0.00008	0.00008	0.00009	4	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	1	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	1	0.00007	0.00007	0.00008	3	0.00005	0.00005	0.00005	2
Sb, Tot	Construction	Oct	2	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000081	1	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	1	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	1	0.00005	0.00005	0.00005	0
Sb, Tot	Construction	Nov	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000101	1	0.00010	0.00010	0.00010	1	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	1	0.00009	0.00009	0.00009	-1
Sb, Tot	Construction	Dec	2	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000101	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Operations	Jan	13	0.00010	0.00010	0.00010	0	0.000110	0.000113	0.000126	13	0.00011	0.00011	0.00013	13	0.00009	0.00009	0.00009	0	0.00008	0.00009	0.00009	6	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00011	0.00011	0.00012	9	0.00009	0.00009	0.00009	0
Sb, Tot	Operations	Feb	13	0.00010	0.00010	0.00010	0	0.000146	0.000146	0.000199	46	0.00015	0.00015	0.00020	46	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	7	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00014	0.00014	0.00018	38	0.00009	0.00009	0.00009	0
Sb, Tot	Operations	Mar	13	0.00010	0.00010	0.00010	0	0.000208	0.000202	0.000304	102	0.00021	0.00020	0.00030	101	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00010	10	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00019	0.00018	0.00027	87	0.00009	0.00009	0.00009	0
Sb, Tot	Operations	Apr	13	0.00010	0.00010	0.00010	0	0.000214	0.000197	0.000266	98	0.00021	0.00019	0.00026	95	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00010	12	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00019	0.00017	0.00023	79	0.00009	0.00009	0.00009	0
Sb, Tot	Operations	May	13	0.00009	0.00009	0.00009	-1	0.000140	0.000133	0.000162	42	0.00014	0.00013	0.00016	38	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00010	13	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00012	0.00011	0.00013	24	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Jun	13	0.00009	0.00009	0.00009	0	0.000102	0.000100	0.000105	8	0.00010	0.00010	0.00011	8	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	8	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	6	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Jul	13	0.00007	0.00007	0.00007	0	0.000077	0.000077	0.000081	9	0.00008	0.00008	0.00008	9	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	5	0.00008	0.00008	0.00008	-3	0.00011	0.00011	0.00011	0	0.00008	0.00008	0.00008	7	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Aug	13	0.00007	0.00007	0.00007	0	0.000080	0.000079	0.000085	12	0.00008	0.00008	0.00008	12	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	6	0.00009	0.00009	0.00009	-3	0.00011	0.00011	0.00011	0	0.00008	0.00008	0.00009	9	0.00008	0.00008	0.00008	0
Sb, Tot	Operations	Sep	13	0.00008	0.00008	0.00008	0	0.000091	0.000090	0.000097	13	0.00009	0.00009	0.00010	13	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00009	7	0.00009	0.00009	0.00009	-3	0.00008	0.00008	0.00008	1	0.00008	0.00008	0.00009	11	0.00005	0.00005	0.00005	2
Sb, Tot	Operations	Oct	13	0.00008	0.00008	0.00008	0	0.000092	0.000091	0.000098	14	0.00009	0.00009	0.00010	14	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	7	0.00009	0.00009	0.00009	-3	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	10	0.00005	0.00005	0.00005	0
Sb, Tot	Operations	Nov	13	0.00010	0.00010	0.00010	0	0.000108	0.000108	0.000114	8	0.00011	0.00011	0.00011	8	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	7	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00011	5	0.00009	0.00009	0.00009	-1
Sb, Tot	Operations	Dec	13	0.00010	0.00010	0.00010	0	0.000108	0.000106	0.000111	6	0.00011	0.00011	0.00011	6	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	6	0.00008	0.00008	0.00008	-3	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	4	0.00009	0.00009	0.00009	0
Sb, Tot	Closure	Jan	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000101	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	2	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Closure	Feb	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Closure	Mar	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Closure	Apr	6	0.00010	0.00010	0.00010	0	0.000099	0.000099	0.000099	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Closure	May	6	0.00009	0.00009	0.00009	-1	0.000093	0.000093	0.000093	-1	0.00009	0.00009	0.00009	-1	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00009	1	0.00008	0.00008	0.00008	-2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Jun	6	0.00009	0.00009	0.00009	0	0.000093	0.000093	0.000093	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	-2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Jul	6	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-2	0.00011	0.00011	0.00011	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Aug	6	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-2	0.00011	0.00011	0.00011	0	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0
Sb, Tot	Closure	Sep	6	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000080	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	1	0.00007	0.00007	0.00007	0	0.00005	0.00005	0.00005	2
Sb, Tot	Closure	Oct	6	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000080	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	-1	0.00008	0.00008	0.00008	0	0.00007	0.00007	0.00007	0	0.00005	0.00005	0.00005	0
Sb, Tot	Closure	Nov	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	-1
Sb, Tot	Closure	Dec	6	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0	0.00008	0.00008	0.00008	-1	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0
Sb, Tot	Post-Closure	Jan	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00014	0.00014	0.00015	37	0.00010	0.00010	0.00010	4	0.00010	0.00010	0.00010	18	0.00020	0.00021	0.00037	156	0.00245	0.00229	0.00334	2441	0.00013	0.00013	0.00014	28	0.00009	0.00009	0.00010	5
Sb, Tot	Post-Closure	Feb	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00016	0.00016	0.00018	56	0.00010	0.00010	0.00010	4	0.00010	0.00010	0.00010	19	0.00021	0.00022	0.00037	159	0.00249	0.00232	0.00338	2474	0.00015	0.00014	0.00016	46	0.00009	0.00009	0.00010	5
Sb, Tot	Post-Closure	Mar	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00036	0.00035	0.00046	246	0.00010	0.00010	0.00010	4	0.00011	0.00010	0.00011	25	0.00021	0.00022	0.00038	165	0.00262	0.00244	0.00356	2610	0.00032	0.00031	0.00041	212	0.00009	0.00009	0.00010	5
Sb, Tot	Post-Closure	Apr	109	0.00010	0.00010	0.00011	4	0.000099	0.000103	0.000110	4	0.00052	0.00047	0.00059	373	0.00010	0.00010	0.00010	4	0.00011	0.00011	0.00012	33	0.00022	0.00022	0.00039	171	0.00315	0.00307	0.00429	3308	0.00045	0.00040	0.00050	314	0.00009	0.00009	0.00009	1
Sb, Tot	Post-Closure	May	109	0.00009	0.00009	0.00010	1	0.000093	0.000094	0.000096	0	0.00023	0.00021	0.00025	129	0.00010	0.00010	0.00011	6	0.00012	0.00011	0.00012	35	0.00021	0.00022	0.00037	163	0.00212	0.00192	0.00243	1961	0.00017	0.00016	0.00018	78	0.00008	0.00008	0.00008	0
Sb, Tot	Post-Closure	Jun	109	0.00009	0.00009	0.00009	0	0.000093	0.000093	0.000093	0	0.00011	0.00011	0.00011	14	0.00010	0.00010	0.00010	3	0.00011	0.00011	0.00011	21	0.00021	0.00021	0.00037	155	0.00262	0.00236	0.00300	2442	0.00010	0.00010	0.00010	10	0.00008	0.00008	0.00008	0
Sb, Tot	Post-Closure	Jul	109	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000070	0	0.00008	0.00008	0.00009	18	0.00008	0.00008	0.00008	3	0.00010	0.00009	0.00010	13	0.00022	0.00022	0.00038	158	0.00247	0.00224	0.00293	1933	0.00008	0.00008	0.00009	14	0.00008	0.00008	0.00008	0
Sb, Tot	Post-Closure	Aug	109	0.00007	0.00007	0.00007	0	0.000070	0.000070	0.000071	0	0.00009	0.00009	0.00009	23	0.00008	0.00008	0.00009	3	0.00009	0.00009	0.00009	13	0.00023	0.00023	0.00039	159	0.00253	0.00229	0.00294	1983	0.00009	0.00009	0.00009	17	0.00008	0.00008	0.00008	0
Sb, Tot	Post-Closure	Sep	109	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000080	0	0.00011	0.00010	0.00011	31	0.00008	0.00008	0.00009	5	0.00009	0.00009	0.00009	15	0.00022	0.00022	0.00038	155	0.00260	0.00236	0.00306	2855	0.00009	0.00009	0.00010	26	0.00005	0.00005	0.00005	2
Sb, Tot	Post-Closure	Oct	109	0.00008	0.00008	0.00008	0	0.000080	0.000080	0.000081	0	0.00012	0.00011	0.00012	42	0.00009	0.00009	0.00009	7	0.00009	0.00009	0.00009	18	0.00022	0.00022	0.00037	153	0.00289	0.00264	0.00329	3197	0.00010	0.00009	0.00010	33	0.00005	0.00005	0.00005	0
Sb, Tot	Post-Closure	Nov	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00013	0.00012	0.00013	24	0.00010	0.00010	0.00010	6	0.00009	0.00009	0.00010	19	0.00022	0.00022	0.00037	154	0.00306	0.00308	0.00381	3327	0.00011	0.00011	0.00012	16	0.00009	0.00009	0.00010	2
Sb, Tot	Post-Closure	Dec	109	0.00010	0.00010	0.00010	0	0.000100	0.000100	0.000100	0	0.00012	0.00012	0.00013	21	0.00010	0.00010	0.00010	5	0.00010	0.00009	0.00010	18	0.00022	0.00022	0.00037	156	0.00250	0.00235	0.00340	2511	0.00011	0.00011	0.00012	14	0.00009	0.00009	0.00010	5
As, Diss	Construction	Jan	2	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000143	1	0.00014	0.00014	0.00014	1	0.00037	0.00037	0.00037	0	0.00019	0.00019	0.00019	0	0.00049	0.00049	0.00049	-1	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00016	0	0.00031	0.00031	0.00031	0
As, Diss	Construction	Feb	2	0.00014	0.00014	0.00014	0	0.000144	0.000144	0.000148	3	0.00014	0.00014	0.00015	3	0.00037	0.00037	0.00037	0	0.00019	0.00019	0.00019	0	0.00049	0.00049	0.00049	-1	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00016	2	0.00031	0.00031	0.00031	0
As, Diss	Construction	Mar	2	0.00014	0.00014	0.00014	0	0.000168	0.000168	0.000183	20	0.00017	0.00017	0.00018	20	0.00037	0.00037	0.00037	0	0.00019	0.00019	0.00019	0	0.00048	0.00048	0.00048	-1	0.00110	0.00110	0.00110	0	0.00018	0.00018	0.00019	15	0.00031	0.00031	0.00031	0
As, Diss	Construction	Apr	2	0.00015	0.00015	0.00015	0	0.000188	0.000188	0.000203	25	0.00019	0.00019	0.00021	15	0.00037	0.00037	0.00037	0	0.00019	0.00019	0.00019	0	0.00048	0.00048	0.00048	-1	0.00110	0.00110	0.00110	0	0.00020	0.00020	0.00021	14	0.00031	0.00031	0.00031	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
As, Diss	Construction	May	2	0.00012	0.00012	0.00012	-2	0.000142	0.000142	0.000148	9	0.00016	0.00016	0.00016	-9	0.00029	0.00029	0.00029	-1	0.00019	0.00019	0.00019	0	0.00047	0.00047	0.00048	-1	0.00095	0.00095	0.00095	1	0.00017	0.00017	0.00018	-4	0.00013	0.00013	0.00013	5
As, Diss	Construction	Jun	2	0.00012	0.00012	0.00012	0	0.000122	0.000122	0.000123	1	0.00012	0.00012	0.00012	0	0.00027	0.00027	0.00027	-1	0.00018	0.00018	0.00018	0	0.00048	0.00048	0.00048	-1	0.00094	0.00094	0.00094	0	0.00015	0.00015	0.00015	0	0.00012	0.00012	0.00012	0
As, Diss	Construction	Jul	2	0.00014	0.00014	0.00014	0	0.000143	0.000143	0.000143	1	0.00014	0.00014	0.00014	0	0.00041	0.00041	0.00041	0	0.00017	0.00017	0.00017	0	0.00049	0.00049	0.00049	-1	0.00098	0.00098	0.00098	0	0.00016	0.00016	0.00016	0	0.00018	0.00018	0.00018	-1
As, Diss	Construction	Aug	2	0.00014	0.00014	0.00014	0	0.000144	0.000144	0.000146	2	0.00015	0.00015	0.00015	0	0.00041	0.00041	0.00041	0	0.00018	0.00018	0.00018	0	0.00050	0.00050	0.00050	-1	0.00098	0.00098	0.00098	0	0.00016	0.00016	0.00016	0	0.00018	0.00018	0.00018	0
As, Diss	Construction	Sep	2	0.00014	0.00014	0.00014	0	0.000149	0.000149	0.000155	5	0.00015	0.00015	0.00016	3	0.00030	0.00030	0.00030	-1	0.00018	0.00018	0.00018	1	0.00051	0.00051	0.00051	-1	0.00082	0.00082	0.00082	1	0.00016	0.00016	0.00016	2	0.00019	0.00019	0.00019	0
As, Diss	Construction	Oct	2	0.00014	0.00014	0.00014	0	0.000145	0.000145	0.000147	2	0.00015	0.00015	0.00015	0	0.00030	0.00030	0.00030	-1	0.00018	0.00018	0.00018	1	0.00050	0.00050	0.00050	-1	0.00081	0.00081	0.00081	0	0.00016	0.00016	0.00016	0	0.00019	0.00019	0.00019	0
As, Diss	Construction	Nov	2	0.00014	0.00014	0.00014	0	0.000143	0.000143	0.000144	1	0.00014	0.00014	0.00014	1	0.00037	0.00037	0.00037	0	0.00018	0.00018	0.00018	0	0.00050	0.00050	0.00050	-1	0.00109	0.00109	0.00109	-1	0.00017	0.00017	0.00017	0	0.00031	0.00031	0.00031	-1
As, Diss	Construction	Dec	2	0.00014	0.00014	0.00014	0	0.000142	0.000142	0.000143	1	0.00014	0.00014	0.00014	1	0.00037	0.00037	0.00037	0	0.00018	0.00018	0.00019	0	0.00049	0.00049	0.00049	-1	0.00110	0.00110	0.00110	0	0.00017	0.00017	0.00017	1	0.00031	0.00031	0.00031	0
As, Diss	Operations	Jan	13	0.00014	0.00014	0.00014	0	0.000212	0.000217	0.000280	55	0.00021	0.00022	0.00028	55	0.00037	0.00037	0.00037	0	0.00021	0.00022	0.00025	16	0.00048	0.00049	0.00049	-3	0.00110	0.00110	0.00110	0	0.00022	0.00022	0.00026	35	0.00031	0.00031	0.00031	0
As, Diss	Operations	Feb	13	0.00014	0.00014	0.00014	0	0.000376	0.000419	0.000655	199	0.00038	0.00042	0.00066	199	0.00037	0.00037	0.00037	0	0.00022	0.00022	0.00026	19	0.00048	0.00048	0.00048	-3	0.00110	0.00110	0.00110	0	0.00035	0.00038	0.00057	145	0.00031	0.00031	0.00031	0
As, Diss	Operations	Mar	13	0.00014	0.00014	0.00014	0	0.000822	0.000822	0.001315	487	0.00082	0.00082	0.00131	486	0.00037	0.00037	0.00037	0	0.00024	0.00024	0.00029	28	0.00048	0.00048	0.00048	-3	0.00110	0.00110	0.00110	0	0.00073	0.00073	0.00115	378	0.00031	0.00031	0.00031	0
As, Diss	Operations	Apr	13	0.00015	0.00015	0.00015	0	0.000858	0.000826	0.001358	450	0.00084	0.00081	0.00133	380	0.00037	0.00037	0.00037	0	0.00026	0.00026	0.00031	35	0.00047	0.00047	0.00048	-3	0.00110	0.00110	0.00110	0	0.00073	0.00070	0.00113	302	0.00031	0.00031	0.00031	0
As, Diss	Operations	May	13	0.00012	0.00012	0.00012	-2	0.000402	0.000397	0.000604	203	0.00039	0.00039	0.00058	128	0.00029	0.00029	0.00029	-1	0.00026	0.00026	0.00032	35	0.00047	0.00047	0.00047	-3	0.00095	0.00095	0.00095	1	0.00032	0.00032	0.00043	76	0.00013	0.00013	0.00013	5
As, Diss	Operations	Jun	13	0.00012	0.00012	0.00012	0	0.000176	0.000174	0.000216	45	0.00018	0.00018	0.00022	42	0.00027	0.00027	0.00027	-1	0.00022	0.00022	0.00026	26	0.00047	0.00047	0.00048	-3	0.00094	0.00094	0.00094	0	0.00018	0.00018	0.00021	24	0.00012	0.00012	0.00012	0
As, Diss	Operations	Jul	13	0.00014	0.00014	0.00014	0	0.000191	0.000190	0.000227	35	0.00019	0.00019	0.00023	32	0.00041	0.00041	0.00041	0	0.00021	0.00021	0.00023	18	0.00048	0.00048	0.00049	-3	0.00098	0.00098	0.00098	0	0.00020	0.00020	0.00023	23	0.00018	0.00018	0.00018	-1
As, Diss	Operations	Aug	13	0.00014	0.00014	0.00014	0	0.000207	0.000204	0.000252	45	0.00021	0.00021	0.00025	41	0.00041	0.00041	0.00041	0	0.00021	0.00021	0.00024	19	0.00050	0.00050	0.00050	-3	0.00098	0.00098	0.00098	0	0.00021	0.00021	0.00025	29	0.00018	0.00018	0.00018	0
As, Diss	Operations	Sep	13	0.00014	0.00014	0.00014	0	0.000221	0.000216	0.000270	53	0.00022	0.00022	0.00027	49	0.00030	0.00030	0.00030	-1	0.00022	0.00022	0.00024	21	0.00050	0.00050	0.00050	-3	0.00082	0.00082	0.00082	1	0.00021	0.00021	0.00025	35	0.00019	0.00019	0.00019	0
As, Diss	Operations	Oct	13	0.00014	0.00014	0.00014	0	0.000220	0.000219	0.000280	55	0.00022	0.00022	0.00028	51	0.00030	0.00030	0.00030	-1	0.00022	0.00021	0.00024	22	0.00050	0.00050	0.00050	-3	0.00081	0.00081	0.00081	0	0.00021	0.00021	0.00025	32	0.00019	0.00019	0.00019	0
As, Diss	Operations	Nov	13	0.00014	0.00014	0.00014	0	0.000191	0.000194	0.000239	38	0.00019	0.00019	0.00024	37	0.00037	0.00037	0.00037	-1	0.00022	0.00022	0.00025	21	0.00049	0.00049	0.00049	-3	0.00109	0.00109	0.00109	-1	0.00020	0.00020	0.00023	19	0.00031	0.00031	0.00031	-1
As, Diss	Operations	Dec	13	0.00014	0.00014	0.00014	0	0.000188	0.000182	0.000208	30	0.00019	0.00018	0.00021	30	0.00037	0.00037	0.00037	0	0.00022	0.00022	0.00025	19	0.00049	0.00049	0.00049	-3	0.00110	0.00110	0.00110	0	0.00020	0.00020	0.00021	16	0.00031	0.00031	0.00031	0
As, Diss	Closure	Jan	6	0.00014	0.00014	0.00014	0	0.000140	0.000141	0.000147	1	0.00014	0.00014	0.00015	2	0.00037	0.00037	0.00037	0	0.00018	0.00019	0.00024	5	0.00049	0.00049	0.00049	-2	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00017	1	0.00031	0.00031	0.00031	0
As, Diss	Closure	Feb	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00014	0.00014	0.00014	1	0.00037	0.00037	0.00037	0	0.00019	0.00020	0.00024	4	0.00048	0.00048	0.00048	-2	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00016	1	0.00031	0.00031	0.00031	0
As, Diss	Closure	Mar	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	1	0.00014	0.00014	0.00014	2	0.00037	0.00037	0.00037	0	0.00019	0.00020	0.00024	4	0.00048	0.00048	0.00048	-2	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00016	2	0.00031	0.00031	0.00031	0
As, Diss	Closure	Apr	6	0.00015	0.00015	0.00015	1	0.000153	0.000153	0.000153	2	0.00016	0.00016	0.00016	-5	0.00037	0.00037	0.00037	0	0.00019	0.00020	0.00024	4	0.00047	0.00047	0.00048	-2	0.00110	0.00110	0.00110	0	0.00017	0.00017	0.00017	-2	0.00031	0.00031	0.00031	0
As, Diss	Closure	May	6	0.00012	0.00012	0.00012	-2	0.000127	0.000127	0.000127	-3	0.00014	0.00014	0.00014	-17	0.00029	0.00029	0.00029	-1	0.00019	0.00019	0.00023	2	0.00047	0.00047	0.00047	-1	0.00095	0.00095	0.00095	1	0.00016	0.00016	0.00016	-9	0.00013	0.00013	0.00013	5
As, Diss	Closure	Jun	6	0.00012	0.00012	0.00012	0	0.000120	0.000120	0.000120	0	0.00012	0.00012	0.00012	-1	0.00027	0.00027	0.00027	-1	0.00017	0.00018	0.00019	1	0.00047	0.00047	0.00048	-1	0.00094	0.00094	0.00094	0	0.00015	0.00015	0.00015	-1	0.00012	0.00012	0.00012	0
As, Diss	Closure	Jul	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00014	0.00014	0.00014	-1	0.00041	0.00041	0.00041	0	0.00017	0.00017	0.00018	0	0.00048	0.00048	0.00049	-1	0.00098	0.00098	0.00098	0	0.00016	0.00016	0.00016	-1	0.00018	0.00018	0.00018	-1
As, Diss	Closure	Aug	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00014	0.00014	0.00014	-2	0.00041	0.00041	0.00041	0	0.00018	0.00018	0.00018	-1	0.00050	0.00050	0.00050	-1	0.00098	0.00098	0.00098	0	0.00016	0.00016	0.00016	-1	0.00018	0.00018	0.00018	0
As, Diss	Closure	Sep	6	0.00014	0.00014	0.00014	0	0.000142	0.000142	0.000142	0	0.00014	0.00014	0.00014	-2	0.00030	0.00030	0.00030	-1	0.00018	0.00018	0.00018	-1	0.00050	0.00050	0.00050	-1	0.00082	0.00082	0.00082	1	0.00015	0.00015	0.00015	-1	0.00019	0.00019	0.00019	0
As, Diss	Closure	Oct	6	0.00014	0.00014	0.00014	0	0.000142	0.000142	0.000142	0	0.00014	0.00014	0.00014	-2	0.00030	0.00030	0.00030	-1	0.00017	0.00017	0.00018	-1	0.00050	0.00050	0.00050	-1	0.00081	0.00081	0.00081	0	0.00016	0.00016	0.00016	-1	0.00019	0.00019	0.00019	0
As, Diss	Closure	Nov	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00014	0.00014	0.00014	0	0.00037	0.00037	0.00037	0	0.00018	0.00018	0.00018	-1	0.00049	0.00049	0.00049	-1	0.00109	0.00109	0.00109	-1	0.00017	0.00017	0.00017	0	0.00031	0.00031	0.00031	-1
As, Diss	Closure	Dec	6	0.00014	0.00014	0.00014	0	0.000140	0.000140	0.000140	0	0.00014	0.00014	0.00014	1	0.00037	0.00037	0.00037	0	0.00018	0.00018	0.00018	-1	0.00049	0.00049	0.00049	-1	0.00110	0.00110	0.00110	0	0.00017	0.00017	0.00017	0	0.00031	0.00031	0.00031	0
As, Diss	Post-Closure	Jan	109	0.00014	0.00014	0.00014	0	0.000140	0.000140	0.000140	0	0.00027	0.00025	0.00029	81	0.00039	0.00040	0.00042	6	0.00023	0.00023	0.00024	23	0.00116	0.00119	0.00202	143	0.00762	0.00688	0.00881	525	0.00026	0.00024	0.00027	51	0.00031	0.00032	0.00035	5
As, Diss	Post-Closure	Feb	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00034	0.00031	0.00036	121	0.00039	0.00039	0.00042	5	0.00024	0.00023	0.00025	25	0.00117	0.00120	0.00203	146	0.00775	0.00699	0.00896	536	0.00031	0.00029	0.00033	88	0.00031	0.00032	0.00035	5
As, Diss	Post-Closure	Mar	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	1	0.00100	0.00089	0.00113	536	0.00039	0.00039	0.00042	5	0.00026	0.00025	0.00027	33	0.00119	0.00121	0.00207	151	0.00822	0.00742	0.00953	575	0.00088	0.00079	0.00099	415	0.00031	0.00032	0.00035	5
As, Diss	Post-Closure	Apr	109	0.00015	0.00016	0.00020	13	0.000153	0.000170	0.000201	13	0.00152	0.00135	0.00166	700	0.00039	0.00039	0.00042	6	0.00029	0.00027	0.00029	44	0.00121	0.00123	0.00211	156	0.01060	0.01055	0.02267	859	0.00130	0.00116	0.00141	563	0.00031	0.00031	0.00032	1
As, Diss	Post-Closure	May	109	0.00012	0.00013	0.00014	3	0.000127	0.000133	0.000143	1	0.00059	0.00053	0.00063	213	0.00032	0.00032	0.00036	10	0.00030	0.00028	0.00030	48	0.00119	0.00119	0.00203	152	0.00701	0.00655	0.00758	597	0.00043	0.00040	0.00046	121	0.00013	0.00013	0.00013	6
As, Diss	Post-Closure	Jun	109	0.00012	0.00012	0.00012	0	0.000120	0.000121	0.000122	0	0.00017	0.00016	0.00017	33	0.00029	0.00029	0.00031	5	0.00024	0.00023	0.00025	33	0.00118	0.00118	0.00199	147	0.00853	0.00780	0.00904	730	0.00018	0.00017	0.00018	19	0.00012	0.00012	0.00012	0
As, Diss	Post-Closure	Jul	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000142	0	0.00019	0.00018	0.00019	26	0.00042	0.00042	0.00044	3	0.00021	0.00021	0.00021	19	0.00123	0.00122	0.00206	149	0.00820	0.00725	0.00836	640	0.00020	0.00019	0.00020	18	0.00018	0.00018	0.00018	-1
As, Diss	Post-Closure	Aug	109	0.00014	0.00014	0.00014	0	0.000141	0.000142	0.000143	0	0.00020	0.00019	0.00021	33	0.00043	0.00043	0.00044	3	0.00021	0.00021	0.00022	17	0.00126	0.00125	0.00211	149	0.00830	0.00747	0.00867	662	0.00021	0.00020	0.00021	24	0.00018	0.00018	0.00018	0
As, Diss	Post-Closure	Sep	109	0.00014	0.00014	0.00014	1	0.000142	0.000142	0.000144	1	0.00023	0.00022	0.00024	52	0.00032	0.00032	0.00035	7	0.00022	0.00021	0.00022	19	0.00126	0.00123	0.00207	143	0.00848	0.00760	0.00874	839	0.00022	0.00021	0.00023	37	0.00019	0.00019	0.00019	0
As, Diss	Post-Closure	Oct	109	0.00014	0.00014	0.00014	1	0.000142	0.000143	0.000145	1	0.00026	0.00025	0.00027	70	0.00033	0.00033	0.00037	9	0.00022	0.00022	0.00023	23	0.00124	0.00121	0.00203	141	0.00912	0.00855	0.00980	955	0.00024	0.00023	0.00025	44	0.00019	0.00019	0.00019	0
As, Diss	Post-Closure	Nov	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000142	0	0.00023	0.00021	0.00023	51	0.00041	0.00040	0.00044	8	0.00023	0.00022	0.00024	25	0.00123	0.00120	0.00201	142	0.00973	0.00965	0.01338	777	0.00022	0.00022	0.00023	26	0.00031	0.00032	0.00034	2
As, Diss	Post-Closure	Dec	109	0.00014	0.00014	0.00014	0	0.000140	0.000140	0.000140	0	0.00021	0.00020	0.00022	46	0.00040	0.00040	0.00043	7	0.00023	0.00023	0.00024	24	0.00124	0.00120	0.00201	143	0.00774	0.00705	0.00895	541	0.00022	0.00021	0.00022	25	0.00031	0.00032	0.00035	5
As, Tot	Construction	Jan	2	0.00014	0.00014	0.00014	0	0.000162	0.000162	0.000183	16	0.00016	0.00016	0.00018	15	0.00039	0.00039	0.00039	0	0.00022	0.00022	0.00022	3	0.00053	0.00053	0.00053	-1	0.00110	0.00110	0.00110	0	0.00018	0.00018	0.00020	9	0.00032	0.00032	0.00032	0
As, Tot	Construction	Feb	2	0.00014	0.00014	0.00014	0	0.000197	0.000197	0.000254	41	0.00020	0.00020	0.00025	41	0.00038	0.00038	0.00038	0	0.00022	0.00022	0.00023	3	0.00052	0.00052	0.00053	-1	0.00110	0.00110	0.00110	0	0.00021	0.00021	0.00025	29	0.00032	0.00032	0.00032	0
As, Tot	Construction	Mar	2	0.00014	0.00014	0.00014	0	0.000450	0.000450	0.000477	221	0.00045	0.00045	0.00048	221	0.00038	0.00038	0.00038	0	0.00023	0.00023	0.00023	6	0.00052	0.00052	0.00052	-1	0.00110	0.00110	0.00110	0	0.00042	0.00042	0.00044	167	0.00032	0.00032	0.00032	0
As, Tot	Construction	Apr	2	0.00015	0.00015	0.00015	0	0.000587	0.000587	0.000605	286	0.00058	0.00058	0.00060	241	0.00038	0.00038	0.00038	0	0.00023	0.00023	0.00024	10	0.00051	0.00051	0.00052	-1	0.00110	0.00110	0.00110	0	0.00052	0.00052	0.00054	192	0.00032	0.00032	0.00032	0
As, Tot	Construction	May	2	0.00013	0.00013	0.00013	-1	0.000280	0.000280	0.000285	107	0.00029	0.00029	0.00029	61	0.00031	0.00031	0.00031	-1	0.00023	0.00023	0.00024	11	0.00051	0.00051	0.00051	-1	0.00099	0.00099	0.00099	0	0.00027	0.00027	0.00027	36	0.00017	0.00017	0.00017	3
As, Tot	Construction	Jun	2	0.00012	0.00012	0.00012	0	0.000138	0.000138	0.000138	15	0.00014	0.00014	0.00014	13	0.00029	0.00029	0.00030	-1	0.00021	0.00021	0.00021	8	0.00051	0.00051	0.00051	-1	0.00099	0.00099	0.00099	0	0.00017	0.00017	0.00017	7	0.00017	0.00017	0.00017	0
As, Tot	Construction	Jul	2	0.00016	0.00016	0.00016	0	0.000180	0.000180	0.000180	12	0.00018	0.00018	0.00018	11	0.00043	0.00043	0.00043	0	0.00020	0.00020	0.00020	6	0.00052	0.00052	0.00053	-1	0.00098	0.00098	0.00098	0	0.00019	0.00019	0.00019	8	0.00021	0.00021	0.00021	-1
As, Tot	Construction	Aug	2	0.00016	0.00016	0.00016	0	0.000187	0.000187	0.000188	16	0.00019	0.00019	0.00019	14	0.00043	0.00043	0.00043	0	0.00021	0.00021	0.00021	6	0.00054	0.00054	0.00054	-1	0.00098	0.00098	0.00098	0	0.00020	0.00020	0.00020	10	0.00021	0.00021	0.00021	0
As, Tot	Construction	Sep	2	0.00018	0.00018	0.00018	0	0.000214	0.000214	0.000217	18	0.00022	0.00022	0.00022	16	0.00036	0.00036	0.00036	-1	0.00022	0.00022	0.00022	7	0.00055	0.00055	0.00055	-1	0.00082	0.00082	0.00082	1	0.00023	0.00023	0.00023	11	0.00023	0.00023	0.00023	0
As, Tot	Construction	Oct	2	0.00018	0.00018	0.00018	0	0.000210	0.000210	0.000210	16	0.00021	0.00021	0.00021	14	0.00036	0.00036	0.00036	-1	0.00022	0.00022	0.00023	7	0.00054	0.00054	0.00054	-1	0.00081	0.00081	0.00081	0	0.00023	0.00023	0.00023	8	0.00023	0.00023	0.00023	0
As, Tot	Construction	Nov	2	0.00014	0.00014	0.00014	0	0.000159	0.000159	0.000159	13	0.00016	0.00016	0.00016	12	0.00039	0.00039	0.00039	0	0.00023	0.00023	0.00023	6	0.00053	0.00053	0.00054	-1	0.00109	0.00109	0.00109	-1	0.00019	0.00019	0.00019	6	0.00032	0.00032	0.00032	-1
As, Tot	Construction	Dec	2	0.00014	0.00014	0.00014	0	0.000157	0.000157	0.000157	12	0.00016	0.00016	0.00016	12	0.00039	0.00039	0.00039	0	0.00022	0.00022	0.00023	6	0.00053	0.00053	0.00053	-2	0.00110	0.00110	0.00110	0	0.00019	0.00019	0.00019	6	0.00032	0.00032	0.00032	0
As, Tot	Operations	Jan	13	0.00014	0.00014	0.00014	0	0.000221	0.000229	0.000288	63	0.00022	0.00023	0.00029	64	0.00038	0.00038	0.00038	0	0.00024	0.00025	0.00027	16	0.00052	0.00052	0.00052	-3	0.00110	0.00110	0.00110	0	0.00023	0.00023	0.00028	39	0.00032	0.00032	0.00032	0
As, Tot	Operations	Feb	13	0.00014	0.00014	0.00014	0	0.000413	0.000456	0.000684	226	0.00041	0.00046	0.00068	226	0.00038	0.00038	0.00038	0	0.00025	0.00025	0.00029	19	0.00052	0.00052	0.00052	-3	0.00110	0.00110	0.00110	0	0.00038	0.00042	0.00060	160	0.00032	0.00032	0.00032	0
As, Tot	Operations	Mar	13	0.00014	0.00014	0.00014	0	0.000893	0.000913	0.001380	552	0.00089	0.00091	0.00138	552	0.00038	0.00038	0.00038	0	0.00027	0.00027	0.00032	28	0.00051	0.00051	0.00052	-3	0.00110	0.00110	0.00110	0	0.00080	0.00081	0.00121	419	0.00032	0.00032	0.00032	0
As, Tot	Operations	Apr	13	0.00015	0.00015	0.00015	0	0.000943	0.000927	0.001436	509	0.00092	0.00091	0.00140	432	0.00038	0.00038	0.00038	0	0.00028	0.00029	0.00034	36	0.00051	0.00051	0.00051	-3	0.00110	0.00110	0.00110	0	0.00080	0.00079	0.00119	338	0.00032	0.00032	0.00032	0
As, Tot	Operations	May	13	0.00013	0.00013	0.00013	-2	0.000441	0.000445	0.000641	229	0.00043	0.00044	0.00062	146	0.00031	0.00031	0.00031	-1	0.00028	0.00029	0.00034	36	0.00050	0.00050	0.00051	-3	0.00099	0.00099	0.00099	0	0.00035	0.00036	0.00047	83	0.00017	0.00017	0.00017	3
As, Tot	Operations	Jun	13	0.00012	0.00012	0.00012	0	0.000182	0.000182	0.000222	51	0.00018	0.00018	0.00022	48	0.00029	0.00029	0.00029	-1	0.00024	0.00024	0.00028	28	0.00051	0.00051	0.00051	-3	0.00099	0.00099	0.00099	0	0.00020	0.00020	0.00022	26	0.00017	0.00017	0.00017	0
As, Tot	Operations	Jul	13	0.00016	0.00016	0.00016	0	0.000216	0.000216	0.000252	34	0.00022	0.00022	0.00025	32	0.00043	0.00043	0.00043	0	0.00022	0.00022	0.00025	19	0.00052	0.00052	0.00052	-3	0.00098	0.00098	0.00098	0	0.00022	0.00022	0.00025	24	0.00021	0.00021	0.00021	-1
As, Tot	Operations	Aug	13	0.00016	0.00016	0.00016	0	0.000234	0.000232	0.000279	44	0.00023	0.00023	0.00028	41	0.00043	0.00043	0.00043	0	0.00023	0.00023	0.00026	20	0.00053	0.00053	0.00054	-3	0.00098	0.00098	0.00098	0	0.00023	0.00023	0.00027	30	0.00021	0.00021	0.00021	0
As, Tot	Operations	Sep	13	0.00018	0.00018	0.00018	0	0.000268	0.000266	0.000317	47	0.00027	0.00027	0.00032	44	0.00036	0.00036	0.00036	-1	0.00024	0.00024	0.00027	21	0.00054	0.00054	0.00054	-3	0.00082	0.00082	0.00082	1	0.00027	0.00027	0.00031	30	0.00023	0.00023	0.00023	0
As, Tot	Operations	Oct	13	0.00018	0.00018	0.00018	0	0.000267	0.000268	0.000327	48	0.00027	0.00027	0.00033	45	0.00036	0.00036	0.00036	-1	0.00025	0.00025	0.00028	21	0.00054	0.00054	0.00054	-3	0.00081	0.00081	0.00081	0	0.00027	0.00027	0.00031	27	0.00023	0.00023	0.00023	0
As, Tot	Operations	Nov	13	0.00014	0.00014	0.00014	0	0.000196	0.000200	0.000245	42	0.00020	0.00020	0.00025	41	0.00039	0.00039	0.00039	-1	0.00025	0.00025	0.00028	20	0.00053	0.00053	0.00053	-3	0.00109	0.00109	0.00109	-1	0.00021	0.00022	0.00024	20	0.00032	0.00032	0.00032	-1
As, Tot	Operations	Dec	13	0.00014	0.00014	0.00014	0	0.000192	0.000187	0.000211	33	0.00019	0.00019	0.00021	34	0.00039	0.00039	0.00039	0	0.00025	0.00025	0.00028	19	0.00053	0.00053	0.00053	-3	0.00110	0.00110	0.00110	0	0.00021	0.00021	0.00022	17	0.00032	0.00032	0.00032	0
As, Tot	Closure	Jan	6	0.00014	0.00014	0.00014	0	0.000140	0.000142	0.000147	1	0.00014	0.00014	0.00015	2	0.00038	0.00038	0.00038	0	0.00021	0.00022	0.00027	4	0.00052	0.00052	0.00052	-2	0.00110	0.00110	0.00110	0	0.00017	0.00017	0.00017	1	0.00032	0.00032	0.00032	0
As, Tot	Closure	Feb	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00014	0.00014	0.00014	1	0.00038	0.00038	0.00038	0	0.00021	0.00022	0.00027	4	0.00052	0.00052	0.00052	-2	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00016	1	0.00032	0.00032	0.00032	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
As, Tot	Closure	Mar	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	1	0.00014	0.00014	0.00014	2	0.00038	0.00038	0.00038	0	0.00021	0.00022	0.00026	4	0.00052	0.00052	0.00052	-2	0.00110	0.00110	0.00110	0	0.00016	0.00016	0.00016	2	0.00032	0.00032	0.00032	0
As, Tot	Closure	Apr	6	0.00015	0.00015	0.00015	1	0.000155	0.000155	0.000155	2	0.00016	0.00016	0.00016	-4	0.00038	0.00038	0.00038	0	0.00021	0.00022	0.00026	3	0.00051	0.00051	0.00051	-2	0.00110	0.00110	0.00110	0	0.00018	0.00018	0.00018	-1	0.00032	0.00032	0.00032	0
As, Tot	Closure	May	6	0.00013	0.00013	0.00013	-2	0.000132	0.000132	0.000132	-2	0.00015	0.00015	0.00015	-16	0.00031	0.00031	0.00031	-1	0.00021	0.00022	0.00025	2	0.00051	0.00051	0.00051	-1	0.00099	0.00099	0.00099	0	0.00018	0.00018	0.00018	-8	0.00017	0.00017	0.00017	3
As, Tot	Closure	Jun	6	0.00012	0.00012	0.00012	0	0.000121	0.000121	0.000121	0	0.00012	0.00012	0.00012	-2	0.00029	0.00029	0.00029	-1	0.00019	0.00019	0.00021	1	0.00051	0.00051	0.00051	-1	0.00099	0.00099	0.00099	0	0.00016	0.00016	0.00016	-1	0.00017	0.00017	0.00017	0
As, Tot	Closure	Jul	6	0.00016	0.00016	0.00016	0	0.000161	0.000161	0.000161	0	0.00016	0.00016	0.00016	-1	0.00043	0.00043	0.00043	0	0.00019	0.00019	0.00019	0	0.00052	0.00052	0.00052	-1	0.00098	0.00098	0.00098	0	0.00017	0.00017	0.00017	-1	0.00021	0.00021	0.00021	-1
As, Tot	Closure	Aug	6	0.00016	0.00016	0.00016	0	0.000161	0.000161	0.000161	0	0.00016	0.00016	0.00016	-2	0.00043	0.00043	0.00043	0	0.00019	0.00019	0.00019	-1	0.00054	0.00054	0.00054	-1	0.00098	0.00098	0.00098	0	0.00017	0.00017	0.00017	-1	0.00021	0.00021	0.00021	0
As, Tot	Closure	Sep	6	0.00018	0.00018	0.00018	0	0.000181	0.000181	0.000181	0	0.00018	0.00018	0.00018	-1	0.00036	0.00036	0.00036	-1	0.00020	0.00020	0.00020	-1	0.00054	0.00054	0.00054	-1	0.00082	0.00082	0.00082	1	0.00020	0.00020	0.00020	-1	0.00023	0.00023	0.00023	0
As, Tot	Closure	Oct	6	0.00018	0.00018	0.00018	0	0.000181	0.000181	0.000181	0	0.00018	0.00018	0.00018	-1	0.00036	0.00036	0.00036	-1	0.00021	0.00021	0.00021	-1	0.00054	0.00054	0.00054	-1	0.00081	0.00081	0.00081	0	0.00021	0.00021	0.00021	-1	0.00023	0.00023	0.00023	0
As, Tot	Closure	Nov	6	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00014	0.00014	0.00014	-1	0.00039	0.00039	0.00039	-1	0.00021	0.00021	0.00021	-1	0.00053	0.00053	0.00053	-1	0.00109	0.00109	0.00109	-1	0.00018	0.00018	0.00018	-1	0.00032	0.00032	0.00032	-1
As, Tot	Closure	Dec	6	0.00014	0.00014	0.00014	0	0.000140	0.000140	0.000140	0	0.00014	0.00014	0.00014	1	0.00039	0.00039	0.00039	0	0.00021	0.00021	0.00021	-1	0.00053	0.00053	0.00053	-1	0.00110	0.00110	0.00110	0	0.00018	0.00018	0.00018	0	0.00032	0.00032	0.00032	0
As, Tot	Post-Closure	Jan	109	0.00014	0.00014	0.00014	0	0.000140	0.000140	0.000141	0	0.00029	0.00026	0.00030	89	0.00041	0.00041	0.00043	5	0.00026	0.00026	0.00027	22	0.00119	0.00123	0.00206	132	*0.00843*	*0.00748*	*0.00937*	580	0.00027	0.00026	0.00028	54	0.00032	0.00033	0.00036	4
As, Tot	Post-Closure	Feb	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	0	0.00036	0.00033	0.00037	133	0.00040	0.00040	0.00043	5	0.00027	0.00026	0.00028	24	0.00120	0.00123	0.00207	135	*0.00857*	*0.00761*	*0.00953*	592	0.00033	0.00031	0.00035	94	0.00032	0.00033	0.00036	4
As, Tot	Post-Closure	Mar	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000141	1	0.00109	0.00096	0.00119	586	0.00040	0.00040	0.00043	5	0.00029	0.00028	0.00030	32	0.00122	0.00125	0.00210	139	*0.00909*	*0.00808*	*0.01014*	635	0.00096	0.00085	0.00105	444	0.00032	0.00033	0.00036	4
As, Tot	Post-Closure	Apr	109	0.00015	0.00017	0.00020	13	0.000155	0.000172	0.000203	13	0.00161	0.00144	0.00178	746	0.00041	0.00041	0.00043	6	0.00032	0.00030	0.00032	42	0.00125	0.00126	0.00214	145	*0.01146*	*0.01119*	*0.02267*	917	0.00138	0.00124	0.00152	589	0.00032	0.00032	0.00033	1
As, Tot	Post-Closure	May	109	0.00013	0.00013	0.00014	4	0.000132	0.000138	0.000148	2	0.00063	0.00057	0.00068	221	0.00034	0.00034	0.00038	9	0.00032	0.00031	0.00033	46	0.00122	0.00123	0.00207	141	*0.00744*	*0.00699*	*0.00812*	606	0.00046	0.00043	0.00049	121	0.00017	0.00018	0.00018	3
As, Tot	Post-Closure	Jun	109	0.00012	0.00012	0.00012	0	0.000121	0.000121	0.000122	0	0.00017	0.00017	0.00018	35	0.00031	0.00031	0.00033	5	0.00026	0.00025	0.00027	32	0.00121	0.00121	0.00203	136	*0.00905*	*0.00834*	*0.00970*	743	0.00019	0.00019	0.00019	19	0.00017	0.00017	0.00017	0
As, Tot	Post-Closure	Jul	109	0.00016	0.00016	0.00016	0	0.000161	0.000161	0.000162	0	0.00021	0.00020	0.00021	25	0.00044	0.00044	0.00046	3	0.00023	0.00022	0.00023	19	0.00126	0.00125	0.00210	139	*0.00870*	*0.00777*	*0.00900*	693	0.00021	0.00021	0.00022	18	0.00021	0.00021	0.00021	0
As, Tot	Post-Closure	Aug	109	0.00016	0.00016	0.00016	0	0.000161	0.000162	0.000163	0	0.00022	0.00022	0.00023	32	0.00045	0.00045	0.00046	3	0.00023	0.00023	0.00023	17	0.00130	0.00128	0.00214	137	*0.00877*	*0.00799*	*0.00931*	715	0.00022	0.00022	0.00023	23	0.00021	0.00021	0.00021	0
As, Tot	Post-Closure	Sep	109	0.00018	0.00018	0.00018	0	0.000181	0.000182	0.000184	0	0.00028	0.00027	0.00028	44	0.00038	0.00038	0.00041	6	0.00024	0.00024	0.00025	18	0.00130	0.00127	0.00211	132	*0.00897*	*0.00814*	*0.00941*	905	0.00028	0.00027	0.00028	30	0.00023	0.00023	0.00023	0
As, Tot	Post-Closure	Oct	109	0.00018	0.00018	0.00018	1	0.000181	0.000183	0.000185	1	0.00031	0.00029	0.00032	59	0.00039	0.00039	0.00043	8	0.00026	0.00025	0.00027	21	0.00128	0.00125	0.00207	130	*0.00962*	*0.00911*	*0.01050*	1025	0.00029	0.00029	0.00031	35	0.00023	0.00023	0.00023	0
As, Tot	Post-Closure	Nov	109	0.00014	0.00014	0.00014	0	0.000141	0.000141	0.000142	0	0.00023	0.00022	0.00024	54	0.00042	0.00042	0.00045	8	0.00026	0.00026	0.00027	23	0.00127	0.00124	0.00205	131	*0.01054*	*0.01028*	*0.01338*	834	0.00024	0.00023	0.00024	27	0.00032	0.00033	0.00035	2
As, Tot	Post-Closure	Dec	109	0.00014	0.00014	0.00014	0	0.000140	0.000140	0.000140	0	0.00022	0.00021	0.00023	50	0.00041	0.00041	0.00044	6	0.00026	0.00026	0.00027	22	0.00127	0.00124	0.00205	133	*0.00856*	*0.00767*	*0.00952*	597	0.00023	0.00022	0.00023	26	0.00032	0.00033	0.00036	4
Ba, Tot	Construction	Jan	2	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0101	0	0.0100	0.0100	0.0101	0	0.0128	0.0128	0.0128	0	0.0078	0.0078	0.0079	0	0.0069	0.0069	0.0070	0	0.0710	0.0710	0.0710	0	0.0100	0.0100	0.0101	0	0.0170	0.0170	0.0170	0
Ba, Tot	Construction	Feb	2	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0102	1	0.0101	0.0101	0.0102	1	0.0128	0.0128	0.0128	0	0.0081	0.0081	0.0081	0	0.0069	0.0069	0.0070	0	0.0710	0.0710	0.0710	0	0.0101	0.0101	0.0102	1	0.0170	0.0170	0.0170	0
Ba, Tot	Construction	Mar	2	0.0100	0.0100	0.0100	0	0.0108	0.0108	0.0110	8	0.0108	0.0108	0.0110	8	0.0128	0.0128	0.0128	0	0.0082	0.0082	0.0082	0	0.0069	0.0069	0.0070	0	0.0710	0.0710	0.0710	0	0.0107	0.0107	0.0108	7	0.0170	0.0170	0.0170	0
Ba, Tot	Construction	Apr	2	0.0103	0.0103	0.0103	0	0.0114	0.0114	0.0115	12	0.0118	0.0118	0.0119	3	0.0128	0.0128	0.0128	0	0.0083	0.0083	0.0083	0	0.0069	0.0069	0.0070	0	0.0710	0.0710	0.0710	0	0.0115	0.0115	0.0116	4	0.0170	0.0170	0.0170	0
Ba, Tot	Construction	May	2	0.0053	0.0053	0.0053	-8	0.0059	0.0059	0.0059	-3	0.0067	0.0067	0.0067	-20	0.0082	0.0082	0.0082	0	0.0082	0.0082	0.0082	-1	0.0068	0.0068	0.0069	0	0.0507	0.0507	0.0507	1	0.0072	0.0072	0.0072	-13	0.0044	0.0044	0.0044	10
Ba, Tot	Construction	Jun	2	0.0054	0.0054	0.0054	0	0.0054	0.0054	0.0054	1	0.0055	0.0055	0.0055	-1	0.0078	0.0078	0.0078	0	0.0073	0.0073	0.0073	-1	0.0068	0.0068	0.0068	1	0.0500	0.0500	0.0500	0	0.0063	0.0063	0.0063	-1	0.0040	0.0040	0.0040	0
Ba, Tot	Construction	Jul	2	0.0055	0.0055	0.0055	0	0.0056	0.0056	0.0056	1	0.0056	0.0056	0.0056	-1	0.0083	0.0083	0.0083	0	0.0066	0.0066	0.0066	-1	0.0069	0.0069	0.0070	0	0.0481	0.0481	0.0481	0	0.0061	0.0061	0.0061	-1	0.0064	0.0064	0.0064	-1
Ba, Tot	Construction	Aug	2	0.0055	0.0055	0.0055	0	0.0056	0.0056	0.0056	1	0.0056	0.0056	0.0057	-1	0.0083	0.0083	0.0083	0	0.0064	0.0064	0.0064	-1	0.0071	0.0071	0.0072	0	0.0480	0.0480	0.0480	0	0.0061	0.0061	0.0061	-1	0.0065	0.0065	0.0065	0
Ba, Tot	Construction	Sep	2	0.0056	0.0056	0.0056	0	0.0057	0.0057	0.0057	1	0.0058	0.0058	0.0058	-1	0.0070	0.0070	0.0070	0	0.0064	0.0064	0.0064	-1	0.0072	0.0072	0.0072	1	0.0441	0.0441	0.0441	0	0.0064	0.0064	0.0064	-1	0.0062	0.0062	0.0062	0
Ba, Tot	Construction	Oct	2	0.0056	0.0056	0.0056	0	0.0057	0.0057	0.0057	1	0.0057	0.0057	0.0058	-2	0.0070	0.0070	0.0070	0	0.0064	0.0064	0.0064	-1	0.0071	0.0071	0.0071	1	0.0440	0.0440	0.0440	0	0.0066	0.0066	0.0066	-1	0.0062	0.0062	0.0062	0
Ba, Tot	Construction	Nov	2	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	1	0.0101	0.0101	0.0101	1	0.0126	0.0126	0.0126	0	0.0068	0.0068	0.0069	0	0.0070	0.0070	0.0071	1	0.0701	0.0701	0.0701	-1	0.0100	0.0100	0.0100	1	0.0166	0.0166	0.0166	-2
Ba, Tot	Construction	Dec	2	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0128	0.0128	0.0128	0	0.0075	0.0075	0.0075	0	0.0071	0.0071	0.0071	0	0.0710	0.0710	0.0710	0	0.0100	0.0100	0.0100	0	0.0170	0.0170	0.0170	0
Ba, Tot	Operations	Jan	13	0.0100	0.0100	0.0100	0	0.0102	0.0102	0.0103	2	0.0102	0.0102	0.0103	2	0.0128	0.0128	0.0128	0	0.0079	0.0079	0.0079	1	0.0073	0.0073	0.0073	1	0.0710	0.0710	0.0710	0	0.0102	0.0102	0.0102	2	0.0170	0.0170	0.0170	0
Ba, Tot	Operations	Feb	13	0.0100	0.0100	0.0100	0	0.0108	0.0108	0.0112	8	0.0109	0.0109	0.0113	9	0.0128	0.0128	0.0128	0	0.0081	0.0081	0.0082	1	0.0073	0.0073	0.0073	1	0.0710	0.0710	0.0710	0	0.0107	0.0107	0.0110	7	0.0170	0.0170	0.0170	0
Ba, Tot	Operations	Mar	13	0.0100	0.0100	0.0100	0	0.0124	0.0123	0.0130	23	0.0124	0.0123	0.0131	23	0.0128	0.0128	0.0128	0	0.0083	0.0083	0.0084	2	0.0073	0.0073	0.0073	1	0.0710	0.0710	0.0710	0	0.0121	0.0120	0.0126	20	0.0170	0.0170	0.0170	0
Ba, Tot	Operations	Apr	13	0.0103	0.0103	0.0103	0	0.0123	0.0122	0.0130	20	0.0127	0.0126	0.0133	10	0.0128	0.0128	0.0128	0	0.0085	0.0085	0.0086	2	0.0073	0.0072	0.0073	1	0.0710	0.0710	0.0710	0	0.0122	0.0121	0.0127	10	0.0170	0.0170	0.0170	0
Ba, Tot	Operations	May	13	0.0053	0.0053	0.0053	-8	0.0062	0.0062	0.0065	2	0.0070	0.0070	0.0073	-17	0.0082	0.0082	0.0082	0	0.0083	0.0083	0.0084	1	0.0071	0.0071	0.0071	1	0.0507	0.0507	0.0507	1	0.0074	0.0074	0.0075	-11	0.0044	0.0044	0.0044	10
Ba, Tot	Operations	Jun	13	0.0054	0.0054	0.0054	0	0.0056	0.0056	0.0056	3	0.0056	0.0056	0.0057	1	0.0078	0.0078	0.0078	0	0.0074	0.0074	0.0074	0	0.0071	0.0070	0.0071	2	0.0500	0.0500	0.0500	0	0.0063	0.0063	0.0064	1	0.0040	0.0040	0.0040	0
Ba, Tot	Operations	Jul	13	0.0055	0.0055	0.0055	0	0.0057	0.0057	0.0057	3	0.0057	0.0057	0.0058	1	0.0083	0.0083	0.0083	0	0.0067	0.0067	0.0067	0	0.0072	0.0072	0.0072	1	0.0481	0.0481	0.0481	0	0.0062	0.0062	0.0062	1	0.0064	0.0064	0.0064	-1
Ba, Tot	Operations	Aug	13	0.0055	0.0055	0.0055	0	0.0057	0.0057	0.0058	3	0.0058	0.0058	0.0058	1	0.0083	0.0083	0.0083	0	0.0065	0.0065	0.0065	0	0.0074	0.0074	0.0074	1	0.0480	0.0480	0.0480	0	0.0062	0.0062	0.0063	1	0.0065	0.0065	0.0065	0
Ba, Tot	Operations	Sep	13	0.0056	0.0056	0.0056	0	0.0058	0.0058	0.0059	4	0.0059	0.0059	0.0060	1	0.0070	0.0070	0.0070	0	0.0065	0.0065	0.0065	1	0.0074	0.0074	0.0074	2	0.0441	0.0441	0.0441	0	0.0065	0.0065	0.0065	1	0.0062	0.0062	0.0062	0
Ba, Tot	Operations	Oct	13	0.0056	0.0056	0.0056	0	0.0058	0.0058	0.0059	3	0.0059	0.0059	0.0060	0	0.0070	0.0070	0.0070	0	0.0065	0.0065	0.0065	0	0.0073	0.0073	0.0073	2	0.0440	0.0440	0.0440	0	0.0067	0.0067	0.0067	0	0.0062	0.0062	0.0062	0
Ba, Tot	Operations	Nov	13	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0102	2	0.0102	0.0102	0.0102	2	0.0126	0.0126	0.0126	0	0.0069	0.0069	0.0070	1	0.0073	0.0073	0.0073	2	0.0701	0.0701	0.0701	-1	0.0101	0.0101	0.0101	1	0.0166	0.0166	0.0166	-2
Ba, Tot	Operations	Dec	13	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0101	1	0.0101	0.0101	0.0102	1	0.0128	0.0128	0.0128	0	0.0075	0.0075	0.0076	1	0.0073	0.0073	0.0073	1	0.0710	0.0710	0.0710	0	0.0101	0.0101	0.0101	1	0.0170	0.0170	0.0170	0
Ba, Tot	Closure	Jan	6	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0101	1	0.0128	0.0128	0.0128	0	0.0078	0.0078	0.0079	0	0.0071	0.0071	0.0073	3	0.0710	0.0710	0.0710	0	0.0101	0.0101	0.0101	1	0.0170	0.0170	0.0170	0
Ba, Tot	Closure	Feb	6	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0101	1	0.0128	0.0128	0.0128	0	0.0080	0.0080	0.0081	0	0.0071	0.0071	0.0073	3	0.0710	0.0710	0.0710	0	0.0101	0.0101	0.0101	1	0.0170	0.0170	0.0170	0
Ba, Tot	Closure	Mar	6	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0102	0.0102	0.0102	2	0.0128	0.0128	0.0128	0	0.0082	0.0082	0.0083	0	0.0071	0.0071	0.0073	3	0.0710	0.0710	0.0710	0	0.0101	0.0101	0.0101	1	0.0170	0.0170	0.0170	0
Ba, Tot	Closure	Apr	6	0.0103	0.0103	0.0103	0	0.0103	0.0103	0.0103	1	0.0108	0.0108	0.0108	-6	0.0128	0.0128	0.0128	0	0.0083	0.0083	0.0084	0	0.0071	0.0071	0.0072	3	0.0710	0.0710	0.0710	0	0.0106	0.0106	0.0106	-4	0.0170	0.0170	0.0170	0
Ba, Tot	Closure	May	6	0.0053	0.0053	0.0053	-8	0.0054	0.0054	0.0054	-12	0.0063	0.0063	0.0063	-25	0.0082	0.0082	0.0082	0	0.0081	0.0081	0.0082	-1	0.0069	0.0069	0.0071	3	0.0507	0.0507	0.0507	1	0.0069	0.0069	0.0069	-16	0.0044	0.0044	0.0044	10
Ba, Tot	Closure	Jun	6	0.0054	0.0054	0.0054	0	0.0054	0.0054	0.0054	0	0.0055	0.0055	0.0055	-2	0.0078	0.0078	0.0078	0	0.0072	0.0072	0.0073	-1	0.0069	0.0069	0.0070	3	0.0500	0.0500	0.0500	0	0.0062	0.0062	0.0062	-1	0.0040	0.0040	0.0040	0
Ba, Tot	Closure	Jul	6	0.0055	0.0055	0.0055	0	0.0055	0.0055	0.0055	0	0.0056	0.0056	0.0056	-2	0.0083	0.0083	0.0083	0	0.0066	0.0066	0.0066	-1	0.0070	0.0070	0.0072	3	0.0481	0.0481	0.0481	0	0.0061	0.0061	0.0061	-1	0.0064	0.0064	0.0064	-1
Ba, Tot	Closure	Aug	6	0.0055	0.0055	0.0055	0	0.0055	0.0055	0.0055	0	0.0056	0.0056	0.0056	-2	0.0083	0.0083	0.0083	0	0.0064	0.0064	0.0064	-1	0.0072	0.0072	0.0073	3	0.0480	0.0480	0.0480	0	0.0061	0.0061	0.0061	-2	0.0065	0.0065	0.0065	0
Ba, Tot	Closure	Sep	6	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0056	0	0.0057	0.0057	0.0057	-3	0.0070	0.0070	0.0070	0	0.0063	0.0063	0.0063	-1	0.0072	0.0072	0.0074	3	0.0441	0.0441	0.0441	0	0.0063	0.0063	0.0063	-2	0.0062	0.0062	0.0062	0
Ba, Tot	Closure	Oct	6	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0056	0	0.0057	0.0057	0.0057	-3	0.0070	0.0070	0.0070	0	0.0064	0.0064	0.0064	-1	0.0071	0.0071	0.0073	3	0.0440	0.0440	0.0440	0	0.0065	0.0065	0.0065	-2	0.0062	0.0062	0.0062	0
Ba, Tot	Closure	Nov	6	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0101	1	0.0126	0.0126	0.0126	1	0.0068	0.0068	0.0068	-1	0.0071	0.0071	0.0072	3	0.0701	0.0701	0.0701	-1	0.0100	0.0100	0.0100	1	0.0166	0.0166	0.0166	-2
Ba, Tot	Closure	Dec	6	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0101	0.0101	0.0101	1	0.0128	0.0128	0.0128	0	0.0074	0.0074	0.0074	-1	0.0071	0.0071	0.0072	3	0.0710	0.0710	0.0710	0	0.0100	0.0100	0.0100	0	0.0170	0.0170	0.0170	0
Ba, Tot	Post-Closure	Jan	109	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0109	0.0107	0.0109	7	0.0129	0.0129	0.0130	1	0.0081	0.0080	0.0081	3	0.0093	0.0094	0.0122	38	0.0602	0.0600	0.0710	-16	0.0106	0.0105	0.0107	5	0.0170	0.0170	0.0170	0
Ba, Tot	Post-Closure	Feb	109	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0113	0.0111	0.0113	11	0.0129	0.0129	0.0130	1	0.0083	0.0083	0.0084	3	0.0093	0.0094	0.0122	38	0.0603	0.0600	0.0710	-15	0.0110	0.0109	0.0111	9	0.0170	0.0170	0.0170	0
Ba, Tot	Post-Closure	Mar	109	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0152	0.0144	0.0155	44	0.0129	0.0129	0.0130	1	0.0086	0.0085	0.0086	4	0.0094	0.0094	0.0123	39	0.0605	0.0601	0.0710	-15	0.0144	0.0137	0.0147	37	0.0170	0.0170	0.0170	0
Ba, Tot	Post-Closure	Apr	109	0.0103	0.0103	0.0104	1	0.0103	0.0103	0.0104	1	0.0172	0.0162	0.0177	42	0.0129	0.0129	0.0130	1	0.0088	0.0087	0.0089	5	0.0095	0.0095	0.0124	40	0.0620	0.0657	0.1197	-7	0.0160	0.0151	0.0164	37	0.0170	0.0170	0.0170	0
Ba, Tot	Post-Closure	May	109	0.0053	0.0053	0.0053	-8	0.0054	0.0054	0.0054	-11	0.0086	0.0082	0.0088	-2	0.0083	0.0083	0.0084	2	0.0087	0.0086	0.0087	5	0.0093	0.0093	0.0121	40	0.0579	0.0570	0.0640	14	0.0083	0.0081	0.0084	-2	0.0044	0.0044	0.0044	10
Ba, Tot	Post-Closure	Jun	109	0.0054	0.0054	0.0054	0	0.0054	0.0054	0.0054	0	0.0057	0.0057	0.0057	2	0.0078	0.0078	0.0079	1	0.0076	0.0075	0.0076	3	0.0092	0.0091	0.0119	40	0.0588	0.0575	0.0644	15	0.0064	0.0064	0.0064	1	0.0040	0.0040	0.0040	0
Ba, Tot	Post-Closure	Jul	109	0.0055	0.0055	0.0055	0	0.0055	0.0055	0.0055	0	0.0058	0.0058	0.0058	2	0.0083	0.0083	0.0084	1	0.0068	0.0067	0.0068	2	0.0095	0.0094	0.0122	40	0.0577	0.0560	0.0592	17	0.0063	0.0062	0.0063	1	0.0064	0.0064	0.0064	-1
Ba, Tot	Post-Closure	Aug	109	0.0055	0.0055	0.0055	0	0.0055	0.0055	0.0055	0	0.0059	0.0059	0.0059	2	0.0083	0.0083	0.0084	1	0.0066	0.0065	0.0066	1	0.0097	0.0096	0.0125	40	0.0587	0.0570	0.0601	19	0.0063	0.0063	0.0063	2	0.0065	0.0065	0.0065	0
Ba, Tot	Post-Closure	Sep	109	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0056	0	0.0062	0.0061	0.0062	5	0.0071	0.0071	0.0072	1	0.0066	0.0065	0.0066	2	0.0097	0.0096	0.0124	39	0.0579	0.0559	0.0595	27	0.0067	0.0066	0.0067	3	0.0062	0.0062	0.0062	0
Ba, Tot	Post-Closure	Oct	109	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0056	0	0.0063	0.0062	0.0064	7	0.0071	0.0071	0.0072	2	0.0066	0.0066	0.0066	2	0.0096	0.0094	0.0122	39	0.0607	0.0589	0.0656	34	0.0070	0.0069	0.0070	4	0.0062	0.0062	0.0062	0
Ba, Tot	Post-Closure	Nov	109	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0105	0.0104	0.0105	4	0.0127	0.0127	0.0128	1	0.0071	0.0071	0.0071	3	0.0096	0.0094	0.0121	38	0.0647	0.0669	0.0949	-6	0.0103	0.0103	0.0103	3	0.0166	0.0166	0.0167	-2
Ba, Tot	Post-Closure	Dec	109	0.0100	0.0100	0.0100	0	0.0100	0.0100	0.0100	0	0.0105	0.0104	0.0105	4	0.0129	0.0129	0.0130	1	0.0077	0.0077	0.0077	3	0.0096	0.0094	0.0121	38	0.0625	0.0618	0.0710	-13	0.0103	0.0103	0.0103	3	0.0170	0.0170	0.0170	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
B, Tot	Construction	Jan	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0118	0.0118	0.0118	0	0.0054	0.0054	0.0054	0	0.0057	0.0057	0.0057	0	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	0
B, Tot	Construction	Feb	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	2	0.0051	0.0051	0.0051	2	0.0118	0.0118	0.0118	0	0.0055	0.0055	0.0055	0	0.0057	0.0057	0.0057	-1	0.0140	0.0140	0.0140	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Construction	Mar	2	0.0050	0.0050	0.0050	0	0.0052	0.0052	0.0053	5	0.0052	0.0052	0.0053	5	0.0118	0.0118	0.0118	0	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0056	-1	0.0140	0.0140	0.0140	0	0.0052	0.0052	0.0052	4	0.0050	0.0050	0.0050	0
B, Tot	Construction	Apr	2	0.0050	0.0050	0.0050	0	0.0057	0.0057	0.0057	7	0.0057	0.0057	0.0058	6	0.0118	0.0118	0.0118	0	0.0057	0.0057	0.0057	0	0.0056	0.0056	0.0056	-1	0.0140	0.0140	0.0140	0	0.0056	0.0056	0.0056	6	0.0050	0.0050	0.0050	0
B, Tot	Construction	May	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	0	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0056	0	0.0055	0.0055	0.0055	-1	0.0053	0.0053	0.0053	6	0.0050	0.0050	0.0051	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Jun	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0053	0	0.0056	0.0056	0.0056	-1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Jul	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0057	0.0057	0.0057	-1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Aug	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0058	0.0058	0.0058	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Sep	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0058	0.0058	0.0058	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Oct	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0057	0.0057	0.0057	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Nov	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	0	0.0116	0.0116	0.0116	1	0.0051	0.0051	0.0051	0	0.0057	0.0057	0.0057	-1	0.0137	0.0137	0.0137	-2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Dec	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	1	0.0118	0.0118	0.0118	0	0.0053	0.0053	0.0053	0	0.0057	0.0057	0.0057	-1	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Jan	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0052	2	0.0051	0.0051	0.0052	2	0.0118	0.0118	0.0118	0	0.0055	0.0055	0.0055	1	0.0057	0.0057	0.0057	-2	0.0140	0.0140	0.0140	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Feb	13	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0057	8	0.0054	0.0054	0.0057	8	0.0118	0.0118	0.0118	0	0.0056	0.0056	0.0056	1	0.0057	0.0057	0.0057	-2	0.0140	0.0140	0.0140	0	0.0053	0.0053	0.0056	6	0.0050	0.0050	0.0050	0
B, Tot	Operations	Mar	13	0.0050	0.0050	0.0050	0	0.0061	0.0061	0.0067	21	0.0061	0.0061	0.0067	21	0.0118	0.0118	0.0118	0	0.0057	0.0057	0.0057	1	0.0057	0.0057	0.0057	-2	0.0140	0.0140	0.0140	0	0.0059	0.0059	0.0064	18	0.0050	0.0050	0.0050	0
B, Tot	Operations	Apr	13	0.0050	0.0050	0.0050	0	0.0063	0.0062	0.0068	18	0.0063	0.0062	0.0068	15	0.0118	0.0118	0.0118	0	0.0058	0.0058	0.0058	2	0.0056	0.0056	0.0056	-2	0.0140	0.0140	0.0140	0	0.0061	0.0060	0.0065	13	0.0050	0.0050	0.0050	0
B, Tot	Operations	May	13	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0056	6	0.0053	0.0053	0.0055	5	0.0056	0.0056	0.0056	0	0.0057	0.0057	0.0058	2	0.0056	0.0056	0.0056	-2	0.0053	0.0053	0.0053	6	0.0052	0.0052	0.0053	2	0.0050	0.0050	0.0050	0
B, Tot	Operations	Jun	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0054	1	0.0056	0.0056	0.0056	-1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Jul	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0	0.0052	0.0052	0.0052	1	0.0057	0.0057	0.0057	-2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Aug	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	2	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0	0.0052	0.0052	0.0052	1	0.0058	0.0058	0.0058	-1	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Sep	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0052	2	0.0051	0.0051	0.0052	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0052	1	0.0058	0.0058	0.0058	-1	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Oct	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0052	2	0.0051	0.0051	0.0052	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0058	0.0058	0.0058	-1	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Nov	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0116	0.0116	0.0116	0	0.0052	0.0052	0.0052	1	0.0057	0.0057	0.0057	-1	0.0137	0.0137	0.0137	-2	0.0050	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Dec	13	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0118	0.0118	0.0118	0	0.0053	0.0053	0.0054	1	0.0058	0.0057	0.0058	-2	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Jan	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0118	0.0118	0.0118	0	0.0054	0.0054	0.0055	0	0.0057	0.0057	0.0057	0	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Feb	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0118	0.0118	0.0118	0	0.0055	0.0055	0.0056	0	0.0057	0.0057	0.0057	0	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Mar	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0118	0.0118	0.0118	0	0.0056	0.0056	0.0057	0	0.0056	0.0056	0.0057	0	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Apr	6	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0053	0	0.0054	0.0054	0.0054	-1	0.0118	0.0118	0.0118	0	0.0057	0.0057	0.0057	0	0.0056	0.0056	0.0056	0	0.0140	0.0140	0.0140	0	0.0053	0.0053	0.0053	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	May	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	-1	0.0050	0.0050	0.0050	-2	0.0056	0.0056	0.0056	0	0.0056	0.0056	0.0057	0	0.0055	0.0055	0.0056	0	0.0053	0.0053	0.0053	6	0.0050	0.0050	0.0050	-1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Jun	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0053	0	0.0056	0.0056	0.0056	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Jul	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0057	0.0057	0.0057	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Aug	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0058	0.0058	0.0058	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Sep	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0058	0.0058	0.0058	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Oct	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0057	0.0057	0.0057	1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Nov	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0116	0.0116	0.0116	1	0.0051	0.0051	0.0051	0	0.0057	0.0057	0.0057	0	0.0137	0.0137	0.0137	-2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Dec	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0118	0.0118	0.0118	0	0.0053	0.0053	0.0053	0	0.0057	0.0057	0.0057	0	0.0140	0.0140	0.0140	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Jan	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0053	0.0052	0.0053	4	0.0118	0.0118	0.0119	0	0.0055	0.0055	0.0055	1	0.0067	0.0068	0.0080	20	0.0198	0.0190	0.0212	36	0.0052	0.0052	0.0052	3	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Feb	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0054	0.0053	0.0054	6	0.0119	0.0119	0.0119	0	0.0056	0.0056	0.0056	2	0.0067	0.0067	0.0080	20	0.0200	0.0191	0.0213	36	0.0053	0.0053	0.0053	5	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Mar	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0066	0.0064	0.0068	28	0.0119	0.0119	0.0119	0	0.0057	0.0057	0.0057	2	0.0067	0.0067	0.0080	21	0.0204	0.0195	0.0219	39	0.0064	0.0062	0.0065	24	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Apr	109	0.0050	0.0050	0.0051	0	0.0053	0.0053	0.0054	1	0.0076	0.0072	0.0077	33	0.0119	0.0118	0.0119	0	0.0058	0.0058	0.0058	3	0.0067	0.0067	0.0081	21	0.0217	0.0228	0.0431	63	0.0071	0.0069	0.0073	29	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	May	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	-1	0.0058	0.0056	0.0058	11	0.0056	0.0056	0.0057	1	0.0058	0.0058	0.0058	3	0.0066	0.0066	0.0079	21	0.0159	0.0148	0.0165	197	0.0054	0.0054	0.0055	6	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Jun	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0051	0	0.0054	0.0054	0.0054	2	0.0066	0.0066	0.0079	20	0.0187	0.0172	0.0195	244	0.0051	0.0050	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Jul	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0051	0	0.0052	0.0052	0.0052	1	0.0068	0.0068	0.0081	21	0.0181	0.0165	0.0190	231	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Aug	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0051	0	0.0052	0.0052	0.0052	1	0.0070	0.0069	0.0082	21	0.0184	0.0168	0.0192	237	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Sep	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0052	0.0051	0.0052	3	0.0051	0.0051	0.0051	1	0.0052	0.0051	0.0052	1	0.0070	0.0069	0.0082	21	0.0188	0.0173	0.0197	246	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Oct	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0052	0.0052	0.0052	4	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0069	0.0068	0.0080	21	0.0202	0.0188	0.0211	277	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Nov	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0052	0.0051	0.0052	2	0.0116	0.0116	0.0117	1	0.0052	0.0052	0.0052	2	0.0068	0.0068	0.0080	20	0.0220	0.0224	0.0285	60	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Dec	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0052	0.0051	0.0052	3	0.0118	0.0118	0.0119	1	0.0054	0.0054	0.0054	1	0.0069	0.0068	0.0080	20	0.0204	0.0196	0.0218	40	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0
Cd, Diss	Construction	Jan	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Feb	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	-1	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Mar	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	-1	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Apr	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	-1	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	May	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000011	3	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Jun	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	0	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Jul	2	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Aug	2	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0
Cd, Diss	Construction	Sep	2	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000005	0	0.000004	0.000004	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000003	0.000003	0.000003	2
Cd, Diss	Construction	Oct	2	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000003	0.000003	0.000003	0
Cd, Diss	Construction	Nov	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	-1
Cd, Diss	Construction	Dec	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Jan	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Feb	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	7	0.000005	0.000005	0.000006	7	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	4	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Mar	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000007	17	0.000006	0.000006	0.000007	16	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000008	9	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Apr	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	12	0.000006	0.000006	0.000006	12	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	7	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	May	13	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000011	4	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Jun	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	0	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Jul	13	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Aug	13	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0
Cd, Diss	Operations	Sep	13	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	1	0.000003	0.000003	0.000003	2
Cd, Diss	Operations	Oct	13	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	1	0.000003	0.000003	0.000003	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cd, Diss	Operations	Nov	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	-1
Cd, Diss	Operations	Dec	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Jan	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Feb	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Mar	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Apr	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	May	6	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000011	3	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Jun	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Jul	6	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Aug	6	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0
Cd, Diss	Closure	Sep	6	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000003	0.000003	0.000003	2
Cd, Diss	Closure	Oct	6	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000003	0.000003	0.000003	0
Cd, Diss	Closure	Nov	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	-1
Cd, Diss	Closure	Dec	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Jan	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	14	0.000005	0.000005	0.000006	11	0.000007	0.000007	0.000007	6	0.000021	0.000021	0.000040	355	0.000053	0.000045	0.000061	894	0.000008	0.000008	0.000008	7	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Feb	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	21	0.000005	0.000005	0.000006	10	0.000007	0.000007	0.000007	7	0.000021	0.000021	0.000040	361	0.000054	0.000046	0.000062	923	0.000007	0.000007	0.000008	13	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Mar	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000011	0.000010	0.000012	96	0.000005	0.000005	0.000006	10	0.000007	0.000007	0.000007	8	0.000022	0.000022	0.000041	372	0.000059	0.000050	0.000068	1022	0.000011	0.000010	0.000012	64	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Apr	109	0.000005	0.000005	0.000006	5	0.000005	0.000005	0.000006	5	0.000015	0.000015	0.000018	193	0.000005	0.000005	0.000006	11	0.000007	0.000007	0.000007	11	0.000022	0.000022	0.000042	386	0.000087	0.000112	0.000519	2395	0.000015	0.000014	0.000017	124	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	May	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	67	0.000006	0.000006	0.000007	15	0.000007	0.000007	0.000008	11	0.000022	0.000021	0.000041	371	0.000060	0.000058	0.000126	1170	0.000013	0.000012	0.000013	20	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Jun	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	7	0.000005	0.000005	0.000006	7	0.000009	0.000008	0.000009	6	0.000021	0.000021	0.000040	356	0.000069	0.000069	0.000134	1390	0.000009	0.000009	0.000009	2	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Jul	109	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	8	0.000004	0.000004	0.000004	7	0.000007	0.000007	0.000008	4	0.000022	0.000022	0.000041	362	0.000062	0.000060	0.000091	1395	0.000006	0.000005	0.000006	5	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Aug	109	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	11	0.000004	0.000004	0.000005	9	0.000006	0.000006	0.000006	4	0.000023	0.000022	0.000042	363	0.000065	0.000063	0.000103	1470	0.000006	0.000006	0.000006	6	0.000004	0.000004	0.000004	0
Cd, Diss	Post-Closure	Sep	109	0.000004	0.000004	0.000005	0	0.000004	0.000004	0.000005	0	0.000005	0.000005	0.000005	13	0.000006	0.000006	0.000006	10	0.000006	0.000006	0.000006	5	0.000023	0.000022	0.000041	354	0.000064	0.000064	0.000122	1495	0.000006	0.000006	0.000006	8	0.000003	0.000003	0.000003	2
Cd, Diss	Post-Closure	Oct	109	0.000004	0.000005	0.000005	0	0.000004	0.000004	0.000005	0	0.000005	0.000005	0.000006	18	0.000006	0.000006	0.000007	14	0.000006	0.000006	0.000006	6	0.000023	0.000021	0.000040	351	0.000075	0.000075	0.000192	1787	0.000007	0.000007	0.000007	9	0.000003	0.000003	0.000003	0
Cd, Diss	Post-Closure	Nov	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	10	0.000005	0.000005	0.000006	16	0.000006	0.000006	0.000007	7	0.000022	0.000021	0.000040	353	0.000072	0.000087	0.000242	1837	0.000008	0.000008	0.000008	4	0.000004	0.000004	0.000004	-1
Cd, Diss	Post-Closure	Dec	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	8	0.000005	0.000005	0.000006	13	0.000007	0.000006	0.000007	6	0.000022	0.000021	0.000040	357	0.000053	0.000045	0.000061	910	0.000008	0.000008	0.000008	3	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	Jan	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	Feb	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	10	0.000005	0.000005	0.000006	10	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	5	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	Mar	2	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	53	0.000008	0.000008	0.000008	53	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	34	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	Apr	2	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	74	0.000009	0.000009	0.000009	72	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	3	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000010	45	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	May	2	0.000005	0.000005	0.000005	-1	0.000006	0.000006	0.000006	25	0.000006	0.000006	0.000006	24	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	3	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000012	0.000012	0.000012	9	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	Jun	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	0	0.000009	0.000009	0.000009	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	1	0.000004	0.000004	0.000004	0
Cd, Tot	Construction	Jul	2	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	4	0.000004	0.000004	0.000004	4	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	2	0.000009	0.000009	0.000009	-2
Cd, Tot	Construction	Aug	2	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	6	0.000004	0.000004	0.000004	6	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	3	0.000010	0.000010	0.000010	0
Cd, Tot	Construction	Sep	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	3	0.000003	0.000003	0.000003	9
Cd, Tot	Construction	Oct	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	2	0.000003	0.000003	0.000003	0
Cd, Tot	Construction	Nov	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	1	0.000004	0.000004	0.000004	-1
Cd, Tot	Construction	Dec	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	1	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	Jan	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	Feb	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	15	0.000006	0.000006	0.000006	14	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	8	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	Mar	13	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000008	35	0.000007	0.000007	0.000008	34	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	21	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	Apr	13	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	32	0.000006	0.000007	0.000007	31	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	19	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	May	13	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000006	13	0.000005	0.000005	0.000006	12	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000012	0.000012	0.000012	6	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	Jun	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	0	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	1	0.000004	0.000004	0.000004	0
Cd, Tot	Operations	Jul	13	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	1	0.000009	0.000009	0.000009	-2
Cd, Tot	Operations	Aug	13	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	4	0.000004	0.000004	0.000004	3	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	2	0.000010	0.000010	0.000010	0
Cd, Tot	Operations	Sep	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	2	0.000003	0.000003	0.000003	9
Cd, Tot	Operations	Oct	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	1	0.000003	0.000003	0.000003	0
Cd, Tot	Operations	Nov	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	1	0.000004	0.000004	0.000004	-1
Cd, Tot	Operations	Dec	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	1	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	Jan	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	Feb	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	Mar	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	Apr	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	1	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	May	6	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	-1	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000012	0.000012	0.000012	4	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	Jun	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000009	0.000009	0.000009	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	0	0.000004	0.000004	0.000004	0
Cd, Tot	Closure	Jul	6	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	0	0.000005	0.000005	0.000005	0	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000009	0.000009	0.000009	-2
Cd, Tot	Closure	Aug	6	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000006	0.000006	0.000006	0	0.000010	0.000010	0.000010	0
Cd, Tot	Closure	Sep	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	0	0.000003	0.000003	0.000003	9
Cd, Tot	Closure	Oct	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000007	0.000007	0.000007	0	0.000003	0.000003	0.000003	0
Cd, Tot	Closure	Nov	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000004	0.000004	0.000004	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	-1
Cd, Tot	Closure	Dec	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	Jan	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	15	0.000006	0.000006	0.000006	10	0.000007	0.000007	0.000007	6	0.000021	0.000021	0.000040	354	0.000056	0.000048	0.000065	966	0.000008	0.000008	0.000008	7	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	Feb	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000007	23	0.000006	0.000006	0.000006	9	0.000007	0.000007	0.000007	6	0.000021	0.000021	0.000040	361	0.000058	0.000049	0.000067	997	0.000008	0.000007	0.000008	13	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	Mar	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000011	0.000010	0.000012	103	0.000006	0.000006	0.000006	9	0.000007	0.000007	0.000007	8	0.000022	0.000022	0.000041	371	0.000064	0.000054	0.000073	1104	0.000011	0.000011	0.000012	68	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	Apr	109	0.000005	0.000005	0.000006	5	0.000005	0.000005	0.000006	5	0.000016	0.000015	0.000018	203	0.000006	0.000006	0.000006	10	0.000007	0.000007	0.000008	10	0.000022	0.000022	0.000042	385	0.000091	0.000116	*0.000518*	2477	0.000016	0.000015	0.000017	129	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	May	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	68	0.000007	0.000007	0.000008	12	0.000008	0.000008	0.000008	11	0.000022	0.000021	*0.000041*	371	0.000061	0.000061	0.000126	1222	0.000014	0.000013	0.000014	20	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	Jun	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	8	0.000007	0.000007	0.000007	6	0.000009	0.000009	0.000009	6	0.000021	0.000021	0.000040	355	0.000072	0.000071	0.000134	1454	0.000010	0.000010	0.000010	2	0.000004	0.000004	0.000004	0
Cd, Tot	Post-Closure	Jul	109	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	9	0.000004	0.000004	0.000004	7	0.000008	0.000008	0.000008	4	0.000022	0.000022	*0.000041*	362	0.000066	0.000063	0.000091	1466	0.000006	0.000006	0.000006	4	0.000009	0.000009	0.000009	-2
Cd, Tot	Post-Closure	Aug	109	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	0	0.000004	0.000004	0.000004	11	0.000004	0.000004	0.000005	9	0.000007	0.000007	0.000007	4	0.000023	0.000022	*0.000042*	362	0.000068	0.000066	0.000103	1540	0.000006	0.000006	0.000006	6	0.000010	0.000010	0.000010	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cd, Tot	Post-Closure	Sep	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	13	0.000007	0.000007	0.000007	9	0.000007	0.000007	0.000007	5	0.000023	0.000022	*0.000041*	354	0.000068	0.000067	0.000122	1567	0.000007	0.000007	0.000007	7	0.000003	0.000003	0.000003	9
Cd, Tot	Post-Closure	Oct	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	17	0.000007	0.000007	0.000008	12	0.000007	0.000007	0.000007	6	0.000023	0.000021	*0.000040*	351	0.000078	0.000078	0.000192	1861	0.000008	0.000008	0.000008	8	0.000003	0.000003	0.000003	0
Cd, Tot	Post-Closure	Nov	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	11	0.000006	0.000006	0.000007	14	0.000007	0.000007	0.000007	6	0.000022	0.000021	0.000040	353	0.000076	0.000090	0.000241	1908	0.000008	0.000008	0.000008	4	0.000004	0.000004	0.000004	-1
Cd, Tot	Post-Closure	Dec	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	8	0.000006	0.000006	0.000006	12	0.000007	0.000007	0.000007	6	0.000022	0.000021	0.000040	357	0.000057	0.000049	0.000065	983	0.000008	0.000008	0.000008	3	0.000004	0.000004	0.000004	0
Cr, Diss	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000216	0.000216	0.000217	0	0.000073	0.000073	0.000073	0	0.000113	0.000113	0.000113	0	0.000090	0.000090	0.000090	0	0.000053	0.000053	0.000053	0	0.000240	0.000240	0.000240	0
Cr, Diss	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000217	0.000217	0.000217	0	0.000075	0.000075	0.000075	0	0.000112	0.000112	0.000113	-1	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	0	0.000240	0.000240	0.000240	0
Cr, Diss	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	4	0.000052	0.000052	0.000052	4	0.000217	0.000217	0.000217	0	0.000076	0.000076	0.000076	0	0.000112	0.000112	0.000112	-1	0.000090	0.000090	0.000090	0	0.000053	0.000053	0.000053	3	0.000240	0.000240	0.000240	0
Cr, Diss	Construction	Apr	2	0.000057	0.000057	0.000057	1	0.000064	0.000064	0.000064	9	0.000064	0.000064	0.000064	10	0.000217	0.000217	0.000217	0	0.000078	0.000078	0.000078	0	0.000111	0.000111	0.000111	-1	0.000090	0.000090	0.000090	0	0.000063	0.000063	0.000064	10	0.000240	0.000240	0.000240	0
Cr, Diss	Construction	May	2	0.000055	0.000055	0.000055	0	0.000061	0.000061	0.000061	2	0.000060	0.000060	0.000060	2	0.000154	0.000154	0.000154	0	0.000077	0.000077	0.000077	0	0.000109	0.000109	0.000109	0	0.000051	0.000051	0.000051	3	0.000053	0.000053	0.000053	0	0.000098	0.000098	0.000098	5
Cr, Diss	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000149	0.000149	0.000149	0	0.000070	0.000070	0.000070	0	0.000109	0.000109	0.000109	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000093	0.000093	0.000093	0
Cr, Diss	Construction	Jul	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000218	0.000218	0.000218	0	0.000064	0.000064	0.000064	0	0.000111	0.000111	0.000111	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr, Diss	Construction	Aug	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000218	0.000218	0.000218	0	0.000061	0.000061	0.000061	0	0.000113	0.000113	0.000113	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr, Diss	Construction	Sep	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000198	0.000198	0.000198	1	0.000063	0.000063	0.000063	0	0.000115	0.000115	0.000115	0	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	0	0.000110	0.000110	0.000110	0
Cr, Diss	Construction	Oct	2	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000196	0.000196	0.000196	1	0.000065	0.000065	0.000065	0	0.000115	0.000115	0.000116	-1	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	0	0.000110	0.000110	0.000110	0
Cr, Diss	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000215	0.000215	0.000215	0	0.000068	0.000068	0.000068	0	0.000115	0.000115	0.000115	-1	0.000089	0.000089	0.000089	-1	0.000054	0.000054	0.000054	0	0.000236	0.000236	0.000236	-2
Cr, Diss	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000216	0.000216	0.000216	0	0.000070	0.000070	0.000070	0	0.000114	0.000114	0.000114	-1	0.000090	0.000090	0.000090	0	0.000054	0.000054	0.000054	0	0.000240	0.000240	0.000240	0
Cr, Diss	Operations	Jan	13	0.000050	0.000050	0.000050	1	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	1	0.000217	0.000217	0.000217	0	0.000073	0.000073	0.000073	0	0.000114	0.000114	0.000114	-2	0.000090	0.000090	0.000090	0	0.000053	0.000053	0.000053	1	0.000240	0.000240	0.000240	0
Cr, Diss	Operations	Feb	13	0.000050	0.000050	0.000050	1	0.000055	0.000054	0.000056	9	0.000055	0.000054	0.000056	9	0.000217	0.000217	0.000217	0	0.000075	0.000075	0.000075	0	0.000114	0.000114	0.000114	-2	0.000090	0.000090	0.000090	0	0.000056	0.000056	0.000057	7	0.000240	0.000240	0.000240	0
Cr, Diss	Operations	Mar	13	0.000051	0.000051	0.000051	1	0.000065	0.000064	0.000067	28	0.000065	0.000064	0.000067	28	0.000217	0.000217	0.000217	0	0.000077	0.000077	0.000077	1	0.000113	0.000113	0.000113	-2	0.000090	0.000090	0.000090	0	0.000064	0.000063	0.000066	23	0.000240	0.000240	0.000240	0
Cr, Diss	Operations	Apr	13	0.000057	0.000057	0.000057	1	0.000069	0.000068	0.000070	16	0.000069	0.000068	0.000069	17	0.000217	0.000217	0.000217	0	0.000078	0.000078	0.000079	1	0.000112	0.000112	0.000112	-2	0.000090	0.000090	0.000090	0	0.000067	0.000066	0.000068	16	0.000240	0.000240	0.000240	0
Cr, Diss	Operations	May	13	0.000055	0.000055	0.000055	0	0.000062	0.000062	0.000062	3	0.000061	0.000060	0.000061	3	0.000154	0.000154	0.000154	0	0.000078	0.000078	0.000078	1	0.000110	0.000110	0.000110	-1	0.000051	0.000051	0.000051	3	0.000054	0.000054	0.000054	1	0.000098	0.000098	0.000098	5
Cr, Diss	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000149	0.000149	0.000149	0	0.000070	0.000070	0.000070	1	0.000110	0.000110	0.000110	-1	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	1	0.000093	0.000093	0.000093	0
Cr, Diss	Operations	Jul	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000218	0.000218	0.000218	0	0.000064	0.000064	0.000064	1	0.000112	0.000112	0.000112	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000110	0.000110	0.000110	0
Cr, Diss	Operations	Aug	13	0.000050	0.000050	0.000050	0	0.000052	0.000051	0.000052	1	0.000052	0.000051	0.000052	1	0.000218	0.000218	0.000218	0	0.000062	0.000062	0.000062	1	0.000114	0.000114	0.000114	-1	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000110	0.000110	0.000110	0
Cr, Diss	Operations	Sep	13	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000198	0.000198	0.000198	0	0.000063	0.000063	0.000063	1	0.000116	0.000116	0.000116	-1	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	1	0.000110	0.000110	0.000110	0
Cr, Diss	Operations	Oct	13	0.000051	0.000051	0.000051	0	0.000052	0.000051	0.000052	1	0.000052	0.000051	0.000052	1	0.000196	0.000196	0.000196	1	0.000066	0.000066	0.000066	1	0.000116	0.000116	0.000116	-1	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000056	1	0.000110	0.000110	0.000110	0
Cr, Diss	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000215	0.000215	0.000215	0	0.000068	0.000068	0.000068	0	0.000116	0.000115	0.000116	-1	0.000089	0.000089	0.000089	-1	0.000054	0.000054	0.000054	0	0.000236	0.000236	0.000236	-2
Cr, Diss	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000216	0.000216	0.000216	0	0.000071	0.000071	0.000071	0	0.000115	0.000115	0.000115	-1	0.000090	0.000090	0.000090	0	0.000054	0.000054	0.000054	1	0.000240	0.000240	0.000240	0
Cr, Diss	Closure	Jan	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000217	0.000217	0.000217	0	0.000073	0.000073	0.000073	0	0.000113	0.000113	0.000114	0	0.000090	0.000090	0.000090	0	0.000053	0.000053	0.000053	1	0.000240	0.000240	0.000240	0
Cr, Diss	Closure	Feb	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000051	0.000051	0.000051	1	0.000217	0.000217	0.000217	0	0.000075	0.000075	0.000075	0	0.000113	0.000113	0.000114	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr, Diss	Closure	Mar	6	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000217	0.000217	0.000217	0	0.000076	0.000076	0.000077	0	0.000112	0.000112	0.000113	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr, Diss	Closure	Apr	6	0.000057	0.000057	0.000057	1	0.000061	0.000061	0.000062	4	0.000061	0.000061	0.000062	6	0.000217	0.000217	0.000217	0	0.000078	0.000078	0.000078	0	0.000111	0.000111	0.000112	0	0.000090	0.000090	0.000090	0	0.000061	0.000061	0.000061	6	0.000240	0.000240	0.000240	0
Cr, Diss	Closure	May	6	0.000055	0.000055	0.000055	0	0.000060	0.000060	0.000060	0	0.000058	0.000059	0.000059	0	0.000154	0.000154	0.000154	0	0.000077	0.000077	0.000077	0	0.000109	0.000109	0.000110	0	0.000051	0.000051	0.000051	3	0.000052	0.000052	0.000052	-1	0.000098	0.000098	0.000098	5
Cr, Diss	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000149	0.000149	0.000149	0	0.000070	0.000070	0.000070	0	0.000109	0.000109	0.000110	1	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000093	0.000093	0.000093	0
Cr, Diss	Closure	Jul	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000218	0.000218	0.000218	0	0.000064	0.000064	0.000064	0	0.000111	0.000111	0.000112	1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr, Diss	Closure	Aug	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000218	0.000218	0.000218	0	0.000061	0.000061	0.000061	0	0.000113	0.000113	0.000114	1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr, Diss	Closure	Sep	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000198	0.000198	0.000198	1	0.000063	0.000063	0.000063	0	0.000115	0.000115	0.000116	1	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	0	0.000110	0.000110	0.000110	0
Cr, Diss	Closure	Oct	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000196	0.000196	0.000196	1	0.000065	0.000065	0.000065	0	0.000115	0.000115	0.000116	0	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	0	0.000110	0.000110	0.000110	0
Cr, Diss	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000215	0.000215	0.000215	1	0.000068	0.000068	0.000068	0	0.000114	0.000114	0.000115	0	0.000089	0.000089	0.000089	-1	0.000054	0.000054	0.000054	0	0.000236	0.000236	0.000236	-2
Cr, Diss	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000216	0.000216	0.000216	0	0.000070	0.000070	0.000070	0	0.000114	0.000114	0.000114	0	0.000090	0.000090	0.000090	0	0.000054	0.000054	0.000054	0	0.000240	0.000240	0.000240	0
Cr, Diss	Post-Closure	Jan	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000054	0.000054	0.000055	7	0.000217	0.000217	0.000218	1	0.000074	0.000074	0.000074	2	0.000134	0.000135	0.000160	20	0.000286	0.000252	0.000311	180	0.000056	0.000055	0.000056	5	0.000240	0.000240	0.000240	0
Cr, Diss	Post-Closure	Feb	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000056	0.000055	0.000057	11	0.000218	0.000218	0.000218	0	0.000076	0.000076	0.000076	2	0.000134	0.000134	0.000160	20	0.000289	0.000254	0.000314	183	0.000057	0.000056	0.000058	8	0.000240	0.000240	0.000240	0
Cr, Diss	Post-Closure	Mar	109	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000077	0.000072	0.000080	45	0.000218	0.000218	0.000218	0	0.000078	0.000078	0.000079	2	0.000134	0.000134	0.000161	21	0.000300	0.000264	0.000327	194	0.000074	0.000071	0.000077	37	0.000240	0.000240	0.000240	0
Cr, Diss	Post-Closure	Apr	109	0.000057	0.000057	0.000058	2	0.000061	0.000062	0.000062	4	0.000097	0.000092	0.000102	58	0.000218	0.000217	0.000218	0	0.000080	0.000080	0.000081	3	0.000134	0.000134	0.000161	22	0.000331	0.000335	0.000745	273	0.000090	0.000086	0.000095	50	0.000240	0.000240	0.000240	0
Cr, Diss	Post-Closure	May	109	0.000055	0.000055	0.000055	0	0.000060	0.000060	0.000060	0	0.000070	0.000069	0.000072	17	0.000155	0.000155	0.000156	1	0.000080	0.000079	0.000080	3	0.000132	0.000131	0.000157	22	0.000228	0.000211	0.000245	322	0.000059	0.000058	0.000060	10	0.000098	0.000098	0.000098	5
Cr, Diss	Post-Closure	Jun	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	2	0.000150	0.000150	0.000150	1	0.000072	0.000071	0.000072	2	0.000131	0.000130	0.000155	21	0.000274	0.000251	0.000296	401	0.000049	0.000049	0.000050	2	0.000093	0.000093	0.000093	0
Cr, Diss	Post-Closure	Jul	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	2	0.000218	0.000218	0.000219	0	0.000065	0.000064	0.000065	1	0.000134	0.000133	0.000159	22	0.000265	0.000239	0.000286	378	0.000051	0.000051	0.000051	2	0.000110	0.000110	0.000110	0
Cr, Diss	Post-Closure	Aug	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000053	3	0.000218	0.000218	0.000219	1	0.000062	0.000062	0.000062	1	0.000137	0.000136	0.000162	22	0.000269	0.000244	0.000290	388	0.000051	0.000051	0.000052	2	0.000110	0.000110	0.000110	0
Cr, Diss	Post-Closure	Sep	109	0.000050	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000053	0.000053	0.000054	4	0.000198	0.000198	0.000199	1	0.000064	0.000064	0.000064	2	0.000138	0.000137	0.000163	21	0.000276	0.000252	0.000298	403	0.000056	0.000056	0.000056	3	0.000110	0.000110	0.000110	0
Cr, Diss	Post-Closure	Oct	109	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000054	0.000054	0.000055	6	0.000197	0.000197	0.000198	1	0.000067	0.000066	0.000067	2	0.000138	0.000137	0.000162	20	0.000297	0.000278	0.000322	455	0.000057	0.000057	0.000058	4	0.000110	0.000110	0.000110	0
Cr, Diss	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000053	0.000053	0.000053	4	0.000216	0.000216	0.000217	1	0.000069	0.000069	0.000070	2	0.000138	0.000136	0.000161	20	0.000325	0.000317	0.000392	252	0.000056	0.000055	0.000056	2	0.000236	0.000236	0.000236	-2
Cr, Diss	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000052	0.000053	4	0.000217	0.000217	0.000218	1	0.000072	0.000072	0.000072	2	0.000137	0.000135	0.000160	20	0.000293	0.000260	0.000318	188	0.000055	0.000055	0.000055	3	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000216	0.000216	0.000217	0	0.000072	0.000072	0.000072	0	0.000113	0.000113	0.000113	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	0	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000217	0.000217	0.000217	0	0.000074	0.000074	0.000074	0	0.000112	0.000112	0.000113	-1	0.000090	0.000090	0.000090	0	0.000051	0.000051	0.000051	0	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	4	0.000052	0.000052	0.000052	4	0.000217	0.000217	0.000217	0	0.000076	0.000076	0.000076	0	0.000112	0.000112	0.000112	-1	0.000090	0.000090	0.000090	0	0.000053	0.000053	0.000053	3	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Construction	Apr	2	0.000057	0.000057	0.000057	1	0.000064	0.000064	0.000064	9	0.000064	0.000064	0.000064	10	0.000217	0.000217	0.000217	0	0.000077	0.000077	0.000077	0	0.000111	0.000111	0.000111	-1	0.000090	0.000090	0.000090	0	0.000063	0.000063	0.000063	10	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Construction	May	2	0.000055	0.000055	0.000055	0	0.000061	0.000061	0.000061	2	0.000060	0.000060	0.000060	2	0.000154	0.000154	0.000154	0	0.000077	0.000077	0.000077	0	0.000109	0.000109	0.000109	0	0.000051	0.000051	0.000051	3	0.000053	0.000053	0.000053	0	0.000098	0.000098	0.000098	5
Cr (VI), Diss	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000149	0.000149	0.000149	0	0.000070	0.000070	0.000070	0	0.000109	0.000109	0.000109	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000093	0.000093	0.000093	0
Cr (VI), Diss	Construction	Jul	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000208	0.000208	0.000208	0	0.000063	0.000063	0.000063	0	0.000111	0.000111	0.000111	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Construction	Aug	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000208	0.000208	0.000208	0	0.000061	0.000061	0.000061	0	0.000113	0.000113	0.000113	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Construction	Sep	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000197	0.000197	0.000197	0	0.000062	0.000062	0.000062	0	0.000115	0.000115	0.000115	0	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Construction	Oct	2	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000196	0.000196	0.000196	1	0.000065	0.000065	0.000065	0	0.000115	0.000115	0.000116	-1	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000215	0.000215	0.000215	0	0.000068	0.000068	0.000068	0	0.000115	0.000115	0.000115	-1	0.000089	0.000089	0.000089	-1	0.000053	0.000053	0.000053	0	0.000236	0.000236	0.000236	-2
Cr (VI), Diss	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000216	0.000216	0.000216	0	0.000070	0.000070	0.000070	0	0.000114	0.000114	0.000114	-1	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	0	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Operations	Jan	13	0.000050	0.000050	0.000050	1	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	1	0.000217	0.000217	0.000217	0	0.000072	0.000072	0.000072	0	0.000114	0.000114	0.000114	-2	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Operations	Feb	13	0.000050	0.000050	0.000050	1	0.000055	0.000054	0.000056	9	0.000055	0.000054	0.000056	9	0.000217	0.000217	0.000217	0	0.000074	0.000074	0.000074	0	0.000114	0.000114	0.000114	-2	0.000090	0.000090	0.000090	0	0.000055	0.000055	0.000056	7	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Operations	Mar	13	0.000051	0.000051	0.000051	1	0.000065	0.000064	0.000067	28	0.000065	0.000064	0.000067	28	0.000217	0.000217	0.000217	0	0.000076	0.000076	0.000076	1	0.000113	0.000113	0.000113	-2	0.000090	0.000090	0.000090	0	0.000063	0.000063	0.000066	23	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Operations	Apr	13	0.000057	0.000057	0.000057	1	0.000069	0.000068	0.000070	16	0.000069	0.000068	0.000069	17	0.000217	0.000217	0.000217	0	0.000078	0.000078	0.000078	1	0.000112	0.000112	0.000112	-2	0.000090	0.000090	0.000090	0	0.000067	0.000066	0.000067	16	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Operations	May	13	0.000055	0.000055	0.000055	0	0.000062	0.000062	0.000062	3	0.000061	0.000060	0.000061	3	0.000154	0.000154	0.000154	0	0.000077	0.000077	0.000078	1	0.000110	0.000110	0.000110	-1	0.000051	0.000051	0.000051	3	0.000054	0.000054	0.000054	1	0.000098	0.000098	0.000098	5
Cr (VI), Diss	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000149	0.000149	0.000149	0	0.000070	0.000070	0.000070	1	0.000110	0.000110	0.000110	-1	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	1	0.000093	0.000093	0.000093	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cr (VI), Diss	Operations	Jul	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000208	0.000208	0.000208	0	0.000064	0.000064	0.000064	1	0.000112	0.000112	0.000112	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Operations	Aug	13	0.000050	0.000050	0.000050	0	0.000052	0.000051	0.000052	1	0.000052	0.000051	0.000052	1	0.000208	0.000208	0.000208	0	0.000061	0.000061	0.000061	1	0.000114	0.000114	0.000114	-1	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Operations	Sep	13	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000198	0.000197	0.000198	0	0.000063	0.000063	0.000063	1	0.000116	0.000116	0.000116	-1	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	1	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Operations	Oct	13	0.000051	0.000051	0.000051	0	0.000052	0.000051	0.000052	1	0.000052	0.000051	0.000052	1	0.000196	0.000196	0.000196	1	0.000065	0.000065	0.000065	1	0.000116	0.000116	0.000116	-1	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000056	1	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000215	0.000215	0.000215	0	0.000068	0.000068	0.000068	0	0.000116	0.000115	0.000116	-1	0.000089	0.000089	0.000089	-1	0.000053	0.000053	0.000053	0	0.000236	0.000236	0.000236	-2
Cr (VI), Diss	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000216	0.000216	0.000216	0	0.000070	0.000070	0.000070	0	0.000115	0.000115	0.000115	-1	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Closure	Jan	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000217	0.000217	0.000217	0	0.000072	0.000072	0.000072	0	0.000113	0.000113	0.000114	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Closure	Feb	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000051	0.000051	0.000051	1	0.000217	0.000217	0.000217	0	0.000074	0.000074	0.000074	0	0.000113	0.000113	0.000114	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Closure	Mar	6	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000217	0.000217	0.000217	0	0.000076	0.000076	0.000076	0	0.000112	0.000112	0.000113	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	1	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Closure	Apr	6	0.000057	0.000057	0.000057	1	0.000061	0.000061	0.000062	4	0.000061	0.000061	0.000062	6	0.000217	0.000217	0.000217	0	0.000077	0.000077	0.000077	0	0.000111	0.000111	0.000112	0	0.000090	0.000090	0.000090	0	0.000060	0.000060	0.000060	6	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Closure	May	6	0.000055	0.000055	0.000055	0	0.000060	0.000060	0.000060	0	0.000058	0.000059	0.000059	0	0.000154	0.000154	0.000154	0	0.000077	0.000077	0.000077	0	0.000109	0.000109	0.000110	0	0.000051	0.000051	0.000051	3	0.000052	0.000052	0.000052	-1	0.000098	0.000098	0.000098	5
Cr (VI), Diss	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000149	0.000149	0.000149	0	0.000070	0.000070	0.000070	0	0.000109	0.000109	0.000110	1	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000093	0.000093	0.000093	0
Cr (VI), Diss	Closure	Jul	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000208	0.000208	0.000208	0	0.000063	0.000063	0.000063	0	0.000111	0.000111	0.000112	1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Closure	Aug	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000208	0.000208	0.000208	0	0.000061	0.000061	0.000061	0	0.000113	0.000113	0.000114	1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Closure	Sep	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000198	0.000198	0.000198	1	0.000062	0.000062	0.000062	0	0.000115	0.000115	0.000116	1	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Closure	Oct	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000196	0.000196	0.000196	1	0.000065	0.000065	0.000065	0	0.000115	0.000115	0.000116	0	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000215	0.000215	0.000215	1	0.000068	0.000068	0.000068	0	0.000114	0.000114	0.000115	0	0.000089	0.000089	0.000089	-1	0.000053	0.000053	0.000053	0	0.000236	0.000236	0.000236	-2
Cr (VI), Diss	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000216	0.000216	0.000216	0	0.000070	0.000070	0.000070	0	0.000114	0.000114	0.000114	0	0.000090	0.000090	0.000090	0	0.000052	0.000052	0.000052	0	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Post-Closure	Jan	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000054	0.000054	0.000055	7	0.000217	0.000217	0.000218	1	0.000074	0.000073	0.000074	2	0.000134	0.000135	0.000160	20	0.000286	0.000252	0.000311	180	0.000055	0.000054	0.000055	5	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Post-Closure	Feb	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000056	0.000055	0.000057	11	0.000218	0.000218	0.000218	0	0.000076	0.000075	0.000076	2	0.000134	0.000134	0.000160	20	0.000289	0.000254	0.000314	183	0.000056	0.000056	0.000057	9	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Post-Closure	Mar	109	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000077	0.000072	0.000080	45	0.000218	0.000218	0.000218	0	0.000078	0.000077	0.000078	2	0.000134	0.000134	0.000161	21	0.000300	0.000264	0.000327	194	0.000074	0.000070	0.000076	37	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Post-Closure	Apr	109	0.000057	0.000057	0.000058	2	0.000061	0.000062	0.000062	4	0.000097	0.000092	0.000102	58	0.000218	0.000217	0.000218	0	0.000080	0.000079	0.000080	3	0.000134	0.000134	0.000161	22	0.000331	0.000335	0.000745	273	0.000090	0.000086	0.000094	51	0.000240	0.000240	0.000240	0
Cr (VI), Diss	Post-Closure	May	109	0.000055	0.000055	0.000055	0	0.000060	0.000060	0.000060	0	0.000070	0.000069	0.000072	17	0.000155	0.000155	0.000156	1	0.000079	0.000079	0.000080	3	0.000132	0.000131	0.000157	22	0.000228	0.000211	0.000245	322	0.000059	0.000058	0.000060	10	0.000098	0.000098	0.000098	5
Cr (VI), Diss	Post-Closure	Jun	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	2	0.000150	0.000150	0.000150	1	0.000071	0.000071	0.000072	2	0.000131	0.000130	0.000155	21	0.000274	0.000251	0.000296	401	0.000049	0.000049	0.000050	2	0.000093	0.000093	0.000093	0
Cr (VI), Diss	Post-Closure	Jul	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	2	0.000208	0.000208	0.000209	0	0.000064	0.000064	0.000064	1	0.000134	0.000133	0.000159	22	0.000265	0.000239	0.000286	378	0.000051	0.000051	0.000051	2	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Post-Closure	Aug	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000053	3	0.000209	0.000209	0.000209	1	0.000062	0.000062	0.000062	1	0.000137	0.000136	0.000162	22	0.000269	0.000244	0.000290	388	0.000051	0.000051	0.000052	2	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Post-Closure	Sep	109	0.000050	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000053	0.000053	0.000054	4	0.000198	0.000198	0.000199	1	0.000063	0.000063	0.000064	2	0.000138	0.000137	0.000163	21	0.000276	0.000252	0.000298	403	0.000056	0.000056	0.000056	3	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Post-Closure	Oct	109	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000054	0.000054	0.000055	6	0.000197	0.000197	0.000198	1	0.000066	0.000066	0.000067	2	0.000138	0.000137	0.000162	20	0.000297	0.000278	0.000322	455	0.000057	0.000057	0.000058	4	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000053	0.000053	0.000053	4	0.000216	0.000216	0.000217	1	0.000069	0.000069	0.000069	2	0.000138	0.000136	0.000161	20	0.000325	0.000317	0.000392	252	0.000054	0.000054	0.000054	2	0.000236	0.000236	0.000236	-2
Cr (VI), Diss	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000052	0.000053	4	0.000217	0.000217	0.000218	1	0.000071	0.000071	0.000072	2	0.000137	0.000135	0.000160	20	0.000293	0.000260	0.000318	188	0.000054	0.000054	0.000054	3	0.000240	0.000240	0.000240	0
Cr, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000057	8	0.000054	0.000054	0.000057	8	0.000336	0.000336	0.000336	0	0.000171	0.000171	0.000172	0	0.000219	0.000219	0.000220	-1	0.000140	0.000140	0.000140	0	0.000127	0.000127	0.000129	1	0.000290	0.000290	0.000290	0
Cr, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000060	0.000060	0.000070	20	0.000060	0.000060	0.000070	20	0.000336	0.000336	0.000336	0	0.000171	0.000171	0.000172	1	0.000218	0.000218	0.000218	-1	0.000140	0.000140	0.000140	0	0.000110	0.000110	0.000118	6	0.000290	0.000290	0.000290	0
Cr, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000104	0.000104	0.000112	108	0.000104	0.000104	0.000112	108	0.000336	0.000336	0.000336	0	0.000171	0.000171	0.000173	1	0.000216	0.000216	0.000216	-1	0.000140	0.000140	0.000140	0	0.000138	0.000138	0.000144	46	0.000290	0.000290	0.000290	0
Cr, Tot	Construction	Apr	2	0.000059	0.000059	0.000059	2	0.000144	0.000144	0.000147	125	0.000143	0.000143	0.000146	123	0.000336	0.000336	0.000336	0	0.000172	0.000172	0.000174	2	0.000214	0.000214	0.000214	-1	0.000140	0.000140	0.000140	0	0.000173	0.000173	0.000175	59	0.000290	0.000290	0.000290	0
Cr, Tot	Construction	May	2	0.000073	0.000073	0.000073	2	0.000117	0.000117	0.000118	32	0.000116	0.000116	0.000117	31	0.000343	0.000343	0.000343	0	0.000177	0.000177	0.000179	2	0.000213	0.000213	0.000213	-1	0.000111	0.000111	0.000111	1	0.000200	0.000200	0.000200	12	0.000164	0.000164	0.000164	3
Cr, Tot	Construction	Jun	2	0.000062	0.000062	0.000062	0	0.000067	0.000067	0.000067	5	0.000067	0.000067	0.000067	5	0.000347	0.000347	0.000347	0	0.000177	0.000177	0.000178	2	0.000215	0.000215	0.000216	-1	0.000110	0.000110	0.000110	0	0.000148	0.000148	0.000148	1	0.000160	0.000160	0.000160	0
Cr, Tot	Construction	Jul	2	0.000088	0.000088	0.000088	0	0.000092	0.000092	0.000092	4	0.000092	0.000092	0.000092	4	0.000289	0.000289	0.000289	0	0.000161	0.000161	0.000161	1	0.000220	0.000220	0.000220	-1	0.000052	0.000052	0.000052	4	0.000129	0.000129	0.000129	2	0.000296	0.000296	0.000296	-1
Cr, Tot	Construction	Aug	2	0.000088	0.000088	0.000088	0	0.000093	0.000093	0.000093	5	0.000094	0.000094	0.000094	5	0.000289	0.000289	0.000289	0	0.000150	0.000150	0.000150	2	0.000225	0.000225	0.000226	-2	0.000050	0.000050	0.000050	0	0.000129	0.000129	0.000129	3	0.000300	0.000300	0.000300	0
Cr, Tot	Construction	Sep	2	0.000111	0.000111	0.000111	0	0.000116	0.000116	0.000116	4	0.000115	0.000115	0.000116	5	0.000269	0.000269	0.000269	0	0.000155	0.000155	0.000155	2	0.000228	0.000228	0.000229	-2	0.000050	0.000050	0.000050	0	0.000161	0.000161	0.000161	2	0.000184	0.000184	0.000184	2
Cr, Tot	Construction	Oct	2	0.000111	0.000111	0.000111	0	0.000115	0.000115	0.000116	4	0.000115	0.000115	0.000115	4	0.000268	0.000268	0.000268	0	0.000165	0.000165	0.000165	2	0.000226	0.000226	0.000227	-1	0.000050	0.000050	0.000050	0	0.000176	0.000176	0.000176	2	0.000180	0.000180	0.000180	0
Cr, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	-1	0.000054	0.000054	0.000054	5	0.000054	0.000054	0.000054	4	0.000333	0.000333	0.000333	0	0.000169	0.000169	0.000169	1	0.000223	0.000223	0.000223	-2	0.000137	0.000137	0.000137	-2	0.000154	0.000154	0.000154	0	0.000286	0.000286	0.000286	-1
Cr, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000053	6	0.000053	0.000053	0.000053	6	0.000336	0.000336	0.000336	0	0.000171	0.000171	0.000171	1	0.000221	0.000221	0.000221	-2	0.000140	0.000140	0.000140	0	0.000148	0.000148	0.000148	1	0.000290	0.000290	0.000290	0
Cr, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	1	0.000059	0.000058	0.000059	17	0.000059	0.000058	0.000059	16	0.000336	0.000336	0.000336	0	0.000173	0.000173	0.000174	2	0.000217	0.000217	0.000218	-3	0.000140	0.000140	0.000140	0	0.000131	0.000130	0.000131	5	0.000290	0.000290	0.000290	0
Cr, Tot	Operations	Feb	13	0.000050	0.000050	0.000050	1	0.000084	0.000080	0.000087	60	0.000084	0.000080	0.000086	60	0.000336	0.000336	0.000336	0	0.000173	0.000173	0.000174	2	0.000215	0.000215	0.000216	-3	0.000140	0.000140	0.000140	0	0.000129	0.000126	0.000131	22	0.000290	0.000290	0.000290	0
Cr, Tot	Operations	Mar	13	0.000051	0.000051	0.000051	1	0.000130	0.000129	0.000147	158	0.000130	0.000129	0.000147	157	0.000336	0.000336	0.000336	0	0.000174	0.000174	0.000175	3	0.000213	0.000214	0.000215	-3	0.000140	0.000140	0.000140	0	0.000158	0.000157	0.000174	66	0.000290	0.000290	0.000290	0
Cr, Tot	Operations	Apr	13	0.000059	0.000059	0.000059	2	0.000150	0.000146	0.000157	127	0.000148	0.000144	0.000155	125	0.000336	0.000336	0.000336	0	0.000176	0.000176	0.000177	4	0.000211	0.000212	0.000213	-3	0.000140	0.000140	0.000140	0	0.000178	0.000175	0.000184	61	0.000290	0.000290	0.000290	0
Cr, Tot	Operations	May	13	0.000073	0.000073	0.000073	2	0.000123	0.000123	0.000127	39	0.000121	0.000121	0.000125	37	0.000343	0.000343	0.000343	0	0.000180	0.000180	0.000181	4	0.000211	0.000211	0.000212	-3	0.000111	0.000111	0.000111	1	0.000203	0.000203	0.000205	14	0.000164	0.000164	0.000164	3
Cr, Tot	Operations	Jun	13	0.000062	0.000062	0.000062	0	0.000070	0.000070	0.000070	9	0.000070	0.000070	0.000070	9	0.000347	0.000347	0.000347	0	0.000180	0.000180	0.000180	3	0.000213	0.000213	0.000214	-3	0.000110	0.000110	0.000110	0	0.000149	0.000149	0.000150	3	0.000160	0.000160	0.000160	0
Cr, Tot	Operations	Jul	13	0.000088	0.000088	0.000088	0	0.000094	0.000094	0.000094	6	0.000094	0.000094	0.000094	6	0.000289	0.000289	0.000289	0	0.000162	0.000162	0.000163	2	0.000218	0.000218	0.000219	-3	0.000052	0.000052	0.000052	4	0.000130	0.000130	0.000131	3	0.000296	0.000296	0.000296	-1
Cr, Tot	Operations	Aug	13	0.000088	0.000088	0.000088	0	0.000096	0.000095	0.000096	7	0.000096	0.000096	0.000097	7	0.000289	0.000289	0.000289	0	0.000151	0.000151	0.000151	2	0.000224	0.000224	0.000224	-3	0.000050	0.000050	0.000050	0	0.000131	0.000130	0.000131	4	0.000300	0.000300	0.000300	0
Cr, Tot	Operations	Sep	13	0.000111	0.000111	0.000111	0	0.000118	0.000118	0.000119	7	0.000118	0.000118	0.000119	7	0.000269	0.000269	0.000269	0	0.000156	0.000156	0.000157	3	0.000226	0.000226	0.000227	-3	0.000050	0.000050	0.000050	0	0.000163	0.000163	0.000163	4	0.000184	0.000184	0.000184	2
Cr, Tot	Operations	Oct	13	0.000111	0.000111	0.000111	0	0.000118	0.000118	0.000119	7	0.000118	0.000118	0.000119	7	0.000268	0.000268	0.000268	0	0.000166	0.000166	0.000166	2	0.000225	0.000225	0.000225	-3	0.000050	0.000050	0.000050	0	0.000178	0.000178	0.000178	3	0.000180	0.000180	0.000180	0
Cr, Tot	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000055	0.000056	0.000057	9	0.000056	0.000056	0.000057	7	0.000333	0.000333	0.000333	0	0.000170	0.000170	0.000171	2	0.000221	0.000221	0.000222	-3	0.000137	0.000137	0.000137	-2	0.000156	0.000156	0.000156	1	0.000286	0.000286	0.000286	-1
Cr, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	1	0.000054	0.000054	0.000055	8	0.000054	0.000054	0.000055	8	0.000335	0.000335	0.000336	0	0.000173	0.000172	0.000173	2	0.000219	0.000219	0.000220	-3	0.000140	0.000140	0.000140	0	0.000149	0.000149	0.000149	2	0.000290	0.000290	0.000290	0
Cr, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	1	0.000050	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000336	0.000336	0.000336	0	0.000170	0.000170	0.000173	0	0.000218	0.000218	0.000218	-2	0.000140	0.000140	0.000140	0	0.000125	0.000125	0.000125	0	0.000290	0.000290	0.000290	0
Cr, Tot	Closure	Feb	6	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000337	0.000336	0.000337	0	0.000170	0.000170	0.000173	0	0.000216	0.000216	0.000217	-2	0.000140	0.000140	0.000140	0	0.000104	0.000104	0.000104	0	0.000290	0.000290	0.000290	0
Cr, Tot	Closure	Mar	6	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000337	0.000337	0.000337	0	0.000169	0.000170	0.000172	0	0.000215	0.000214	0.000215	-2	0.000140	0.000140	0.000140	0	0.000096	0.000096	0.000096	1	0.000290	0.000290	0.000290	0
Cr, Tot	Closure	Apr	6	0.000059	0.000059	0.000059	2	0.000067	0.000067	0.000068	5	0.000068	0.000068	0.000069	7	0.000336	0.000336	0.000336	0	0.000169	0.000170	0.000172	0	0.000213	0.000212	0.000213	-2	0.000140	0.000140	0.000140	0	0.000116	0.000116	0.000117	6	0.000290	0.000290	0.000290	0
Cr, Tot	Closure	May	6	0.000073	0.000073	0.000073	2	0.000091	0.000091	0.000091	2	0.000091	0.000091	0.000092	3	0.000343	0.000343	0.000343	0	0.000173	0.000174	0.000176	0	0.000212	0.000212	0.000212	-2	0.000111	0.000111	0.000111	1	0.000186	0.000186	0.000186	4	0.000164	0.000164	0.000164	3
Cr, Tot	Closure	Jun	6	0.000062	0.000062	0.000062	0	0.000064	0.000064	0.000064	0	0.000064	0.000064	0.000064	0	0.000347	0.000347	0.000347	0	0.000175	0.000175	0.000176	0	0.000214	0.000214	0.000215	-2	0.000110	0.000110	0.000110	0	0.000146	0.000146	0.000146	0	0.000160	0.000160	0.000160	0
Cr, Tot	Closure	Jul	6	0.000088	0.000088	0.000088	0	0.000089	0.000089	0.000089	0	0.000089	0.000089	0.000089	0	0.000289	0.000289	0.000289	0	0.000159	0.000159	0.000159	0	0.000219	0.000219	0.000219	-2	0.000052	0.000052	0.000052	4	0.000127	0.000127	0.000127	0	0.000296	0.000296	0.000296	-1
Cr, Tot	Closure	Aug	6	0.000088	0.000088	0.000088	0	0.000089	0.000089	0.000089	0	0.000089	0.000089	0.000089	0	0.000289	0.000289	0.000289	0	0.000147	0.000147	0.000148	0	0.000225	0.000225	0.000225	-2	0.000050	0.000050	0.000050	0	0.000126	0.000126	0.000126	0	0.000300	0.000300	0.000300	0
Cr, Tot	Closure	Sep	6	0.000111	0.000111	0.000111	0	0.000111	0.000111	0.000111	0	0.000111	0.000111	0.000111	0	0.000269	0.000269	0.000269	0	0.000152	0.000152	0.000152	0	0.000228	0.000227	0.000228	-2	0.000050	0.000050	0.000050	0	0.000158	0.000158	0.000158	0	0.000184	0.000184	0.000184	2
Cr, Tot	Closure	Oct	6	0.000111	0.000111	0.000111	0	0.000111	0.000111	0.000111	0	0.000111	0.000111	0.000111	0	0.000268	0.000268	0.000268	0	0.000162	0.000162	0.000162	0	0.000226	0.000226	0.000226	-1	0.000050	0.000050	0.000050	0	0.000173	0.000173	0.000173	0	0.000180	0.000180	0.000180	0
Cr, Tot	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	-1	0.000051	0.000051	0.000051	-2	0.000333	0.000333	0.000333	0	0.000167	0.000167	0.000167	0	0.000222	0.000222	0.000223	-1	0.000137	0.000137	0.000137	-2	0.000153	0.000153	0.000153	-1	0.000286	0.000286	0.000286	-1
Cr, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000336	0.000336	0.000336	0	0.000169	0.000169	0.000169	0	0.000220	0.000220	0.000220	-1	0.000140	0.000140	0.000140	0	0.000146	0.000146	0.000146	0	0.000290	0.000290	0.000290	0
Cr, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000082	0.000076	0.000085	52	0.000337	0.000337	0.000338	0	0.000179	0.000178	0.000181	5	0.000240	0.000240	0.000266	9	0.001871	0.001557	0.002049	1012	0.000147	0.000143	0.000150	15	0.000290	0.000290	0.000290	0
Cr, Tot	Post-Closure	Feb	109	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000097	0.000089	0.000103	78	0.000337	0.000337	0.000338	0	0.000180	0.000178	0.000181	5	0.000239	0.000239	0.000265	9	0.001895	0.001577	0.002074	1026	0.000140	0.000134	0.000145	29	0.000290	0.000290	0.000290	0
Cr, Tot	Post-Closure	Mar	109	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000255	0.000218	0.000277	337	0.000337	0.000337	0.000338	0	0.000184	0.000181	0.000185	7	0.000238	0.000238	0.000264	10	0.001991	0.001656	0.002177	1083	0.000265	0.000234	0.000284	148	0.000290	0.000290	0.000290	0
Cr, Tot	Post-Closure	Apr	109	0.000059	0.000059	0.000060	2	0.000067	0.000068	0.000069	5	0.000327	0.000282	0.000360	340	0.000337	0.000337	0.000338	0	0.000189	0.000185	0.000191	9	0.000237	0.000237	0.000264	10	0.001952	0.001680	0.002133	1100	0.000326	0.000289	0.000353	166	0.000290	0.000290	0.000290	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cr, Tot	Post-Closure	May	109	0.000073	0.000073	0.000073	2	0.000091	0.000091	0.000091	2	0.000176	0.000161	0.000186	82	0.000344	0.000344	0.000345	1	0.000194	0.000190	0.000197	10	0.000235	0.000235	0.000261	10	0.001307	0.001107	0.001428	906	0.000233	0.000225	0.000239	26	0.000164	0.000164	0.000164	3
Cr, Tot	Post-Closure	Jun	109	0.000062	0.000062	0.000062	0	0.000064	0.000064	0.000064	0	0.000073	0.000071	0.000074	11	0.000348	0.000348	0.000348	0	0.000188	0.000185	0.000189	6	0.000237	0.000237	0.000262	9	0.001631	0.001374	0.001780	1149	0.000152	0.000150	0.000152	3	0.000160	0.000160	0.000160	0
Cr, Tot	Post-Closure	Jul	109	0.000088	0.000088	0.000088	0	0.000089	0.000089	0.000089	0	0.000098	0.000096	0.000099	8	0.000290	0.000290	0.000290	0	0.000166	0.000165	0.000167	4	0.000243	0.000242	0.000269	9	0.001590	0.001330	0.001737	2560	0.000134	0.000132	0.000134	5	0.000296	0.000296	0.000296	-1
Cr, Tot	Post-Closure	Aug	109	0.000088	0.000088	0.000088	0	0.000089	0.000089	0.000089	0	0.000101	0.000099	0.000102	10	0.000289	0.000289	0.000290	0	0.000154	0.000153	0.000155	4	0.000250	0.000248	0.000275	9	0.001590	0.001333	0.001738	2566	0.000134	0.000133	0.000135	6	0.000300	0.000300	0.000300	0
Cr, Tot	Post-Closure	Sep	109	0.000111	0.000111	0.000111	0	0.000111	0.000111	0.000111	0	0.000128	0.000125	0.000130	13	0.000270	0.000270	0.000271	0	0.000160	0.000159	0.000161	4	0.000252	0.000251	0.000277	9	0.001662	0.001394	0.001814	2688	0.000170	0.000168	0.000172	7	0.000184	0.000184	0.000184	2
Cr, Tot	Post-Closure	Oct	109	0.000111	0.000111	0.000111	0	0.000111	0.000111	0.000111	0	0.000133	0.000129	0.000136	17	0.000269	0.000269	0.000270	1	0.000171	0.000170	0.000172	5	0.000250	0.000248	0.000273	9	0.001771	0.001495	0.001935	2890	0.000188	0.000185	0.000190	7	0.000180	0.000180	0.000180	0
Cr, Tot	Post-Closure	Nov	109	0.000050	0.000050	0.000051	0	0.000051	0.000051	0.000051	-1	0.000069	0.000066	0.000071	26	0.000334	0.000334	0.000335	1	0.000176	0.000175	0.000177	5	0.000246	0.000245	0.000270	9	0.001961	0.001684	0.002143	1103	0.000163	0.000162	0.000165	5	0.000286	0.000286	0.000287	-1
Cr, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000068	0.000065	0.000070	30	0.000337	0.000336	0.000337	0	0.000178	0.000177	0.000180	5	0.000244	0.000243	0.000268	9	0.001915	0.001604	0.002089	1046	0.000157	0.000155	0.000159	6	0.000290	0.000290	0.000290	0
Cu, Diss	Construction	Jan	2	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00169	0.00169	0.00169	0	0.00054	0.00054	0.00055	0	0.00034	0.00034	0.00034	0	0.00139	0.00139	0.00139	-1	0.00019	0.00019	0.00019	0
Cu, Diss	Construction	Feb	2	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00162	0.00162	0.00162	0	0.00054	0.00054	0.00055	0	0.00034	0.00034	0.00034	0	0.00108	0.00108	0.00108	-2	0.00019	0.00019	0.00019	0
Cu, Diss	Construction	Mar	2	0.00033	0.00033	0.00033	0	0.00035	0.00035	0.00035	5	0.00035	0.00035	0.00035	5	0.00062	0.00062	0.00062	0	0.00156	0.00156	0.00157	0	0.00054	0.00054	0.00055	0	0.00034	0.00034	0.00034	0	0.00095	0.00095	0.00095	-2	0.00019	0.00019	0.00019	0
Cu, Diss	Construction	Apr	2	0.00032	0.00032	0.00032	0	0.00037	0.00037	0.00038	10	0.00037	0.00037	0.00037	10	0.00062	0.00062	0.00062	0	0.00152	0.00152	0.00152	0	0.00054	0.00054	0.00055	0	0.00034	0.00034	0.00034	0	0.00102	0.00102	0.00102	-2	0.00019	0.00019	0.00019	0
Cu, Diss	Construction	May	2	0.00035	0.00035	0.00035	1	0.00038	0.00038	0.00038	5	0.00038	0.00038	0.00038	6	0.00077	0.00077	0.00077	0	0.00201	0.00201	0.00201	0	0.00054	0.00054	0.00055	0	0.00020	0.00020	0.00020	2	0.00695	0.00695	0.00696	6	0.00025	0.00025	0.00025	-1
Cu, Diss	Construction	Jun	2	0.00036	0.00036	0.00036	0	0.00036	0.00036	0.00036	0	0.00036	0.00036	0.00036	0	0.00078	0.00078	0.00078	0	0.00349	0.00349	0.00349	0	0.00054	0.00054	0.00055	0	0.00020	0.00020	0.00020	0	0.00546	0.00546	0.00546	0	0.00025	0.00025	0.00025	0
Cu, Diss	Construction	Jul	2	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00109	0.00109	0.00109	0	0.00294	0.00294	0.00294	0	0.00055	0.00055	0.00056	0	0.00018	0.00018	0.00018	0	0.00143	0.00143	0.00143	0	0.00034	0.00034	0.00034	-1
Cu, Diss	Construction	Aug	2	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00029	1	0.00029	0.00029	0.00029	1	0.00109	0.00109	0.00109	0	0.00205	0.00205	0.00205	0	0.00057	0.00057	0.00058	0	0.00018	0.00018	0.00018	0	0.00139	0.00139	0.00139	0	0.00034	0.00034	0.00034	0
Cu, Diss	Construction	Sep	2	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00043	2	0.00042	0.00042	0.00043	2	0.00068	0.00068	0.00068	0	0.00183	0.00183	0.00184	0	0.00057	0.00057	0.00058	1	0.00010	0.00010	0.00010	3	0.00171	0.00171	0.00171	0	0.00011	0.00011	0.00011	8
Cu, Diss	Construction	Oct	2	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	1	0.00067	0.00067	0.00068	0	0.00183	0.00183	0.00184	0	0.00056	0.00056	0.00057	1	0.00010	0.00010	0.00010	0	0.00212	0.00212	0.00213	0	0.00010	0.00010	0.00010	0
Cu, Diss	Construction	Nov	2	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00181	0.00181	0.00181	0	0.00056	0.00056	0.00056	1	0.00033	0.00033	0.00033	-2	0.00179	0.00179	0.00179	0	0.00019	0.00019	0.00019	-2
Cu, Diss	Construction	Dec	2	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00175	0.00175	0.00175	0	0.00056	0.00056	0.00056	1	0.00034	0.00034	0.00034	0	0.00170	0.00170	0.00170	-1	0.00019	0.00019	0.00019	0
Cu, Diss	Operations	Jan	13	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00034	2	0.00034	0.00034	0.00034	2	0.00062	0.00062	0.00062	0	0.00169	0.00169	0.00169	0	0.00058	0.00058	0.00058	2	0.00034	0.00034	0.00034	0	0.00140	0.00140	0.00140	0	0.00019	0.00019	0.00019	0
Cu, Diss	Operations	Feb	13	0.00033	0.00033	0.00033	0	0.00038	0.00038	0.00040	15	0.00038	0.00038	0.00040	14	0.00062	0.00062	0.00062	0	0.00163	0.00163	0.00163	0	0.00058	0.00058	0.00058	2	0.00034	0.00034	0.00034	0	0.00111	0.00111	0.00112	1	0.00019	0.00019	0.00019	0
Cu, Diss	Operations	Mar	13	0.00033	0.00033	0.00033	0	0.00049	0.00049	0.00053	47	0.00049	0.00048	0.00053	47	0.00062	0.00062	0.00062	0	0.00157	0.00157	0.00157	0	0.00058	0.00058	0.00058	2	0.00034	0.00034	0.00034	0	0.00104	0.00104	0.00107	7	0.00019	0.00019	0.00019	0
Cu, Diss	Operations	Apr	13	0.00032	0.00032	0.00032	0	0.00045	0.00043	0.00046	27	0.00044	0.00043	0.00045	27	0.00062	0.00062	0.00062	0	0.00152	0.00152	0.00153	0	0.00058	0.00058	0.00058	2	0.00034	0.00034	0.00034	0	0.00111	0.00110	0.00112	6	0.00019	0.00019	0.00019	0
Cu, Diss	Operations	May	13	0.00035	0.00035	0.00035	1	0.00040	0.00040	0.00041	9	0.00040	0.00039	0.00040	10	0.00077	0.00077	0.00077	0	0.00202	0.00202	0.00202	1	0.00057	0.00057	0.00058	2	0.00020	0.00020	0.00020	2	0.00699	0.00699	0.00701	6	0.00025	0.00025	0.00025	-1
Cu, Diss	Operations	Jun	13	0.00036	0.00036	0.00036	0	0.00037	0.00037	0.00037	2	0.00037	0.00037	0.00037	2	0.00079	0.00079	0.00079	0	0.00349	0.00349	0.00349	0	0.00057	0.00057	0.00058	2	0.00020	0.00020	0.00020	0	0.00545	0.00545	0.00546	0	0.00025	0.00025	0.00025	0
Cu, Diss	Operations	Jul	13	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	3	0.00029	0.00029	0.00029	3	0.00109	0.00109	0.00109	0	0.00294	0.00294	0.00295	0	0.00059	0.00059	0.00059	2	0.00018	0.00018	0.00018	0	0.00143	0.00143	0.00144	0	0.00034	0.00034	0.00034	-1
Cu, Diss	Operations	Aug	13	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	3	0.00029	0.00029	0.00030	3	0.00109	0.00109	0.00109	0	0.00205	0.00205	0.00206	0	0.00060	0.00060	0.00060	2	0.00018	0.00018	0.00018	0	0.00139	0.00139	0.00140	0	0.00034	0.00034	0.00034	0
Cu, Diss	Operations	Sep	13	0.00042	0.00042	0.00042	0	0.00043	0.00043	0.00043	2	0.00043	0.00043	0.00043	2	0.00068	0.00068	0.00068	0	0.00183	0.00183	0.00184	0	0.00060	0.00060	0.00060	2	0.00010	0.00010	0.00010	3	0.00171	0.00171	0.00171	0	0.00011	0.00011	0.00011	8
Cu, Diss	Operations	Oct	13	0.00042	0.00042	0.00042	0	0.00043	0.00042	0.00043	2	0.00042	0.00042	0.00043	2	0.00068	0.00068	0.00068	0	0.00184	0.00184	0.00184	0	0.00059	0.00059	0.00059	3	0.00010	0.00010	0.00010	0	0.00213	0.00213	0.00213	0	0.00010	0.00010	0.00010	0
Cu, Diss	Operations	Nov	13	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00034	1	0.00033	0.00033	0.00034	1	0.00062	0.00062	0.00062	0	0.00181	0.00181	0.00181	0	0.00058	0.00058	0.00059	3	0.00033	0.00033	0.00033	-2	0.00180	0.00180	0.00180	0	0.00019	0.00019	0.00019	-2
Cu, Diss	Operations	Dec	13	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	1	0.00033	0.00033	0.00033	1	0.00062	0.00062	0.00062	0	0.00176	0.00176	0.00176	0	0.00058	0.00058	0.00058	3	0.00034	0.00034	0.00034	0	0.00171	0.00171	0.00171	0	0.00019	0.00019	0.00019	0
Cu, Diss	Closure	Jan	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00169	0.00169	0.00169	0	0.00056	0.00057	0.00058	4	0.00034	0.00034	0.00034	0	0.00140	0.00140	0.00140	0	0.00019	0.00019	0.00019	0
Cu, Diss	Closure	Feb	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00163	0.00163	0.00163	0	0.00056	0.00057	0.00058	4	0.00034	0.00034	0.00034	0	0.00109	0.00109	0.00109	0	0.00019	0.00019	0.00019	0
Cu, Diss	Closure	Mar	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00157	0.00157	0.00157	0	0.00056	0.00057	0.00058	4	0.00034	0.00034	0.00034	0	0.00097	0.00097	0.00097	0	0.00019	0.00019	0.00019	0
Cu, Diss	Closure	Apr	6	0.00032	0.00032	0.00032	0	0.00034	0.00034	0.00034	0	0.00034	0.00034	0.00034	0	0.00062	0.00062	0.00062	0	0.00153	0.00152	0.00153	0	0.00056	0.00056	0.00058	4	0.00034	0.00034	0.00034	0	0.00107	0.00107	0.00108	3	0.00019	0.00019	0.00019	0
Cu, Diss	Closure	May	6	0.00035	0.00035	0.00035	1	0.00037	0.00037	0.00037	1	0.00037	0.00037	0.00037	3	0.00077	0.00077	0.00077	0	0.00202	0.00202	0.00202	1	0.00055	0.00056	0.00057	4	0.00020	0.00020	0.00020	2	0.00705	0.00705	0.00706	7	0.00025	0.00025	0.00025	-1
Cu, Diss	Closure	Jun	6	0.00036	0.00036	0.00036	0	0.00036	0.00036	0.00036	0	0.00036	0.00036	0.00036	0	0.00078	0.00078	0.00079	0	0.00350	0.00350	0.00350	0	0.00055	0.00056	0.00057	4	0.00020	0.00020	0.00020	0	0.00547	0.00547	0.00547	0	0.00025	0.00025	0.00025	0
Cu, Diss	Closure	Jul	6	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00109	0.00109	0.00109	0	0.00295	0.00295	0.00295	0	0.00057	0.00057	0.00058	4	0.00018	0.00018	0.00018	0	0.00143	0.00143	0.00143	0	0.00034	0.00034	0.00034	-1
Cu, Diss	Closure	Aug	6	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00109	0.00109	0.00109	0	0.00206	0.00206	0.00206	0	0.00058	0.00058	0.00060	4	0.00018	0.00018	0.00018	0	0.00139	0.00139	0.00139	0	0.00034	0.00034	0.00034	0
Cu, Diss	Closure	Sep	6	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00068	0.00068	0.00068	0	0.00184	0.00184	0.00184	0	0.00058	0.00058	0.00060	4	0.00010	0.00010	0.00010	3	0.00171	0.00171	0.00171	0	0.00011	0.00011	0.00011	8
Cu, Diss	Closure	Oct	6	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00068	0.00068	0.00068	0	0.00184	0.00184	0.00184	0	0.00057	0.00057	0.00058	4	0.00010	0.00010	0.00010	0	0.00213	0.00213	0.00213	0	0.00010	0.00010	0.00010	0
Cu, Diss	Closure	Nov	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	-1	0.00062	0.00062	0.00062	0	0.00181	0.00181	0.00181	0	0.00056	0.00056	0.00058	4	0.00033	0.00033	0.00033	-2	0.00180	0.00180	0.00180	0	0.00019	0.00019	0.00019	-2
Cu, Diss	Closure	Dec	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00062	0.00062	0.00062	0	0.00176	0.00176	0.00176	0	0.00056	0.00056	0.00057	4	0.00034	0.00034	0.00034	0	0.00171	0.00171	0.00171	0	0.00019	0.00019	0.00019	0
Cu, Diss	Post-Closure	Jan	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00035	0.00035	0.00036	6	0.00062	0.00062	0.00063	1	0.00170	0.00170	0.00170	0	0.00072	0.00073	0.00094	38	0.00175	0.00158	0.00196	365	0.00140	0.00140	0.00141	0	0.00019	0.00019	0.00020	2
Cu, Diss	Post-Closure	Feb	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00037	0.00036	0.00037	10	0.00062	0.00062	0.00063	1	0.00163	0.00163	0.00163	0	0.00072	0.00073	0.00094	38	0.00178	0.00161	0.00200	374	0.00111	0.00111	0.00111	1	0.00019	0.00019	0.00020	2
Cu, Diss	Post-Closure	Mar	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00050	0.00047	0.00052	44	0.00062	0.00062	0.00063	1	0.00157	0.00157	0.00158	0	0.00073	0.00074	0.00095	39	0.00190	0.00172	0.00214	405	0.00106	0.00105	0.00108	8	0.00019	0.00019	0.00020	2
Cu, Diss	Post-Closure	Apr	109	0.00032	0.00033	0.00034	1	0.00034	0.00034	0.00035	2	0.00061	0.00059	0.00067	74	0.00062	0.00062	0.00063	1	0.00153	0.00153	0.00153	1	0.00074	0.00074	0.00096	40	0.00249	0.00253	0.00586	645	0.00122	0.00121	0.00127	17	0.00019	0.00019	0.00019	1
Cu, Diss	Post-Closure	May	109	0.00035	0.00035	0.00035	1	0.00037	0.00037	0.00037	2	0.00046	0.00045	0.00047	25	0.00077	0.00077	0.00078	2	0.00202	0.00202	0.00203	1	0.00072	0.00073	0.00094	39	0.00160	0.00155	0.00190	674	0.00694	0.00696	0.00707	6	0.00025	0.00025	0.00025	-1
Cu, Diss	Post-Closure	Jun	109	0.00036	0.00036	0.00036	0	0.00036	0.00036	0.00036	0	0.00037	0.00037	0.00037	2	0.00079	0.00079	0.00079	1	0.00350	0.00350	0.00350	0	0.00072	0.00072	0.00093	38	0.00194	0.00184	0.00224	819	0.00546	0.00546	0.00547	0	0.00025	0.00025	0.00025	0
Cu, Diss	Post-Closure	Jul	109	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	3	0.00109	0.00109	0.00110	1	0.00295	0.00295	0.00295	0	0.00074	0.00074	0.00096	38	0.00185	0.00169	0.00203	836	0.00144	0.00144	0.00144	0	0.00034	0.00034	0.00034	-1
Cu, Diss	Post-Closure	Aug	109	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00030	0.00029	0.00030	4	0.00109	0.00109	0.00110	1	0.00206	0.00206	0.00206	0	0.00076	0.00076	0.00098	38	0.00187	0.00174	0.00213	866	0.00140	0.00140	0.00140	1	0.00034	0.00034	0.00034	0
Cu, Diss	Post-Closure	Sep	109	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00043	0.00043	0.00044	4	0.00069	0.00069	0.00070	1	0.00184	0.00184	0.00184	0	0.00076	0.00076	0.00097	38	0.00190	0.00175	0.00212	1652	0.00171	0.00171	0.00171	1	0.00011	0.00011	0.00011	8
Cu, Diss	Post-Closure	Oct	109	0.00042	0.00042	0.00042	0	0.00042	0.00042	0.00042	0	0.00044	0.00044	0.00044	5	0.00068	0.00068	0.00069	2	0.00184	0.00184	0.00184	1	0.00075	0.00074	0.00095	38	0.00204	0.00197	0.00241	1872	0.00213	0.00213	0.00214	1	0.00010	0.00010	0.00010	0
Cu, Diss	Post-Closure	Nov	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00035	0.00034	0.00035	4	0.00063	0.00063	0.00064	2	0.00182	0.00182	0.00182	1	0.00074	0.00073	0.00094	38	0.00226	0.00231	0.00418	580	0.00180	0.00180	0.00180	0	0.00019	0.00019	0.00020	0
Cu, Diss	Post-Closure	Dec	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00035	4	0.00062	0.00062	0.00063	1	0.00176	0.00176	0.00176	1	0.00074	0.00073	0.00094	38	0.00178	0.00162	0.00199	376	0.00171	0.00171	0.00171	0	0.00019	0.00019	0.00020	2
Cu, Tot	Construction	Jan	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00093	0.00093	0.00093	0	*0.00203*	*0.00203*	*0.00203*	0	0.00060	0.00060	0.00061	0	0.00034	0.00034	0.00034	0	0.00160	0.00160	0.00160	-1	0.00027	0.00027	0.00027	0
Cu, Tot	Construction	Feb	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00052	2	0.00051	0.00051	0.00052	2	0.00093	0.00093	0.00093	0	0.00196	0.00196	0.00196	0	0.00060	0.00060	0.00061	0	0.00034	0.00034	0.00034	0	0.00128	0.00128	0.00128	-1	0.00027	0.00027	0.00027	0
Cu, Tot	Construction	Mar	2	0.00050	0.00050	0.00050	0	0.00055	0.00055	0.00056	11	0.00055	0.00055	0.00056	11	0.00093	0.00093	0.00093	0	0.00189	0.00189	0.00189	0	0.00060	0.00060	0.00061	0	0.00034	0.00034	0.00034	0	0.00117	0.00117	0.00117	1	0.00027	0.00027	0.00027	0
Cu, Tot	Construction	Apr	2	0.00049	0.00049	0.00049	0	0.00059	0.00059	0.00060	16	0.00059	0.00059	0.00059	17	0.00093	0.00093	0.00093	0	0.00184	0.00184	0.00184	0	0.00060	0.00060	0.00061	0	0.00034	0.00034	0.00034	0	0.00125	0.00125	0.00125	2	0.00027	0.00027	0.00027	0
Cu, Tot	Construction	May	2	0.00036	0.00036	0.00036	-3	0.00042	0.00042	0.00042	4	0.00042	0.00042	0.00042	4	0.00089	0.00089	0.00089	0	*0.00240*	*0.00240*	*0.00240*	0	0.00059	0.00059	0.00060	0	0.00027	0.00027	0.00027	1	*0.00816*	*0.00816*	*0.00817*	6	0.00025	0.00025	0.00025	0
Cu, Tot	Construction	Jun	2	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	1	0.00037	0.00037	0.00037	1	0.00089	0.00089	0.00089	0	*0.00408*	*0.00408*	*0.00408*	0	0.00059	0.00059	0.00059	1	0.00027	0.00027	0.00027	0	*0.00639*	*0.00639*	*0.00639*	0	0.00025	0.00025	0.00025	0
Cu, Tot	Construction	Jul	2	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	1	0.00029	0.00029	0.00029	1	0.00129	0.00129	0.00129	0	*0.00346*	*0.00346*	*0.00346*	0	0.00060	0.00060	0.00061	1	0.00024	0.00024	0.00024	0	0.00172	0.00172	0.00172	0	0.00057	0.00057	0.00057	-2
Cu, Tot	Construction	Aug	2	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	2	0.00029	0.00029	0.00029	2	0.00129	0.00129	0.00129	0	*0.00245*	*0.00245*	*0.00245*	0	0.00062	0.00062	0.00062	1	0.00024	0.00024	0.00024	0	0.00167	0.00167	0.00167	0	0.00058	0.00058	0.00058	0
Cu, Tot	Construction	Sep	2	0.00046	0.00046	0.00046	0	0.00048	0.00048	0.00051	6	0.00048	0.00048	0.00050	6	0.00071	0.00071	0.00071	0	*0.00221*	*0.00221*	*0.00222*	0	0.00062	0.00062	0.00063	1	0.00025	0.00025	0.00025	0	*0.00215*	*0.00215*	*0.00217*	1	0.00030	0.00030	0.00030	3
Cu, Tot	Construction	Oct	2	0.00046	0.00046	0.00046	0	0.00047	0.00047	0.00047	1	0.00047	0.00047	0.00047	2	0.00070	0.00070	0.00070	0	*0.00224*	*0.00224*	*0.00225*	0	0.00061	0.00061	0.00062	1	0.00025	0.00025	0.00025	0	*0.00269*	*0.00269*	*0.00269*	0	0.00029	0.00029	0.00029	0
Cu, Tot	Construction	Nov	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00092	0.00092	0.00092	0	*0.00221*	*0.00221*	*0.00221*	0	0.00061	0.00061	0.00062	1	0.00034	0.00034	0.00034	-1	*0.00201*	*0.00201*	*0.00201*	0	0.00027	0.00027	0.00027	0
Cu, Tot	Construction	Dec	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	1	0.00093	0.00093	0.00093	0	*0.00212*	*0.00212*	*0.00212*	0	0.00061	0.00061	0.00062	1	0.00034	0.00034	0.00034	0	0.00192	0.00192	0.00192	0	0.00027	0.00027	0.00027	0
Cu, Tot	Operations	Jan	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00051	0.00051	0.00051	2	0.00093	0.00093	0.00093	0	*0.00204*	*0.00204*	*0.00204*	0	0.00064	0.00063	0.00064	1	0.00034	0.00034	0.00034	0	0.00161	0.00161	0.00161	0	0.00027	0.00027	0.00027	0
Cu, Tot	Operations	Feb	13	0.00050	0.00050	0.00050	0	0.00056	0.00056	0.00058	12	0.00056	0.00056	0.00058	12	0.00093	0.00093	0.00093	0	0.00196	0.00196	0.00196	0	0.00064	0.00063	0.00064	1	0.00034	0.00034	0.00034	0	0.00132	0.00132	0.00133	2	0.00027	0.00027	0.00027	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cu, Tot	Operations	Mar	13	0.00050	0.00050	0.00050	0	0.00068	0.00068	0.00072	35	0.00068	0.00068	0.00072	35	0.00093	0.00093	0.00093	0	0.00190	0.00190	0.00190	0	0.00064	0.00063	0.00064	1	0.00034	0.00034	0.00034	0	0.00125	0.00125	0.00127	7	0.00027	0.00027	0.00027	0
Cu, Tot	Operations	Apr	13	0.00049	0.00049	0.00049	0	0.00065	0.00063	0.00067	25	0.00064	0.00063	0.00066	25	0.00093	0.00093	0.00093	0	0.00184	0.00184	0.00185	0	0.00063	0.00063	0.00064	1	0.00034	0.00034	0.00034	0	0.00132	0.00132	0.00134	8	0.00027	0.00027	0.00027	0
Cu, Tot	Operations	May	13	0.00036	0.00036	0.00036	-3	0.00044	0.00044	0.00045	8	0.00044	0.00044	0.00045	7	0.00089	0.00089	0.00089	0	0.00241	0.00241	0.00241	1	0.00062	0.00062	0.00062	1	0.00027	0.00027	0.00027	1	0.00820	0.00820	0.00823	6	0.00025	0.00025	0.00025	0
Cu, Tot	Operations	Jun	13	0.00037	0.00037	0.00037	0	0.00038	0.00038	0.00038	3	0.00038	0.00038	0.00038	3	0.00089	0.00089	0.00089	0	0.00409	0.00409	0.00409	0	0.00062	0.00062	0.00062	2	0.00027	0.00027	0.00027	0	0.00638	0.00638	0.00638	0	0.00025	0.00025	0.00025	0
Cu, Tot	Operations	Jul	13	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00030	4	0.00030	0.00029	0.00030	4	0.00129	0.00129	0.00129	0	0.00346	0.00346	0.00346	0	0.00063	0.00063	0.00063	2	0.00024	0.00024	0.00024	0	0.00172	0.00172	0.00173	0	0.00057	0.00057	0.00057	-2
Cu, Tot	Operations	Aug	13	0.00028	0.00028	0.00028	0	0.00030	0.00030	0.00030	5	0.00030	0.00030	0.00030	5	0.00129	0.00129	0.00129	0	0.00245	0.00245	0.00245	0	0.00065	0.00064	0.00065	2	0.00024	0.00024	0.00024	0	0.00167	0.00167	0.00168	0	0.00058	0.00058	0.00058	0
Cu, Tot	Operations	Sep	13	0.00046	0.00046	0.00046	0	0.00047	0.00047	0.00048	3	0.00047	0.00047	0.00047	3	0.00071	0.00071	0.00071	0	0.00221	0.00221	0.00221	0	0.00065	0.00065	0.00065	2	0.00025	0.00025	0.00025	0	0.00214	0.00214	0.00214	0	0.00030	0.00030	0.00030	3
Cu, Tot	Operations	Oct	13	0.00046	0.00046	0.00046	0	0.00047	0.00047	0.00047	2	0.00047	0.00047	0.00047	3	0.00070	0.00070	0.00070	0	0.00224	0.00224	0.00224	0	0.00064	0.00064	0.00064	2	0.00025	0.00025	0.00025	0	0.00269	0.00269	0.00269	0	0.00029	0.00029	0.00029	0
Cu, Tot	Operations	Nov	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.00051	0.00051	0.00051	2	0.00092	0.00092	0.00092	0	0.00221	0.00221	0.00221	0	0.00064	0.00063	0.00064	2	0.00034	0.00034	0.00034	-1	0.00202	0.00202	0.00202	0	0.00027	0.00027	0.00027	0
Cu, Tot	Operations	Dec	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.00051	0.00050	0.00051	1	0.00093	0.00093	0.00093	0	0.00212	0.00212	0.00212	0	0.00064	0.00064	0.00064	2	0.00034	0.00034	0.00034	0	0.00193	0.00193	0.00193	0	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	Jan	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00093	0.00093	0.00093	0	0.00204	0.00204	0.00204	0	0.00062	0.00062	0.00064	3	0.00034	0.00034	0.00034	0	0.00160	0.00160	0.00160	0	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	Feb	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00093	0.00093	0.00093	0	0.00196	0.00196	0.00196	0	0.00062	0.00062	0.00064	3	0.00034	0.00034	0.00034	0	0.00129	0.00129	0.00129	0	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	Mar	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00093	0.00093	0.00093	0	0.00189	0.00189	0.00189	0	0.00062	0.00062	0.00063	3	0.00034	0.00034	0.00034	0	0.00116	0.00116	0.00116	0	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	Apr	6	0.00049	0.00049	0.00049	0	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0	0.00093	0.00093	0.00093	0	0.00184	0.00184	0.00184	0	0.00061	0.00062	0.00063	3	0.00034	0.00034	0.00034	0	0.00126	0.00126	0.00127	3	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	May	6	0.00036	0.00036	0.00036	-4	0.00039	0.00039	0.00039	-4	0.00039	0.00039	0.00039	-4	0.00089	0.00089	0.00089	0	0.00241	0.00241	0.00241	1	0.00060	0.00061	0.00062	3	0.00027	0.00027	0.00027	1	0.00827	0.00827	0.00828	7	0.00025	0.00025	0.00025	0
Cu, Tot	Closure	Jun	6	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00089	0.00089	0.00089	0	0.00409	0.00409	0.00409	0	0.00060	0.00060	0.00061	4	0.00027	0.00027	0.00027	0	0.00640	0.00640	0.00640	0	0.00025	0.00025	0.00025	0
Cu, Tot	Closure	Jul	6	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00129	0.00129	0.00129	0	0.00347	0.00347	0.00347	0	0.00061	0.00061	0.00063	4	0.00024	0.00024	0.00024	0	0.00172	0.00172	0.00172	0	0.00057	0.00057	0.00057	-2
Cu, Tot	Closure	Aug	6	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	0	0.00029	0.00029	0.00029	0	0.00129	0.00129	0.00129	1	0.00245	0.00245	0.00245	0	0.00062	0.00063	0.00064	4	0.00024	0.00024	0.00024	0	0.00167	0.00167	0.00167	0	0.00058	0.00058	0.00058	0
Cu, Tot	Closure	Sep	6	0.00046	0.00046	0.00046	0	0.00046	0.00046	0.00046	0	0.00046	0.00046	0.00046	0	0.00071	0.00071	0.00071	0	0.00221	0.00221	0.00221	0	0.00063	0.00063	0.00064	4	0.00025	0.00025	0.00025	0	0.00214	0.00214	0.00214	0	0.00030	0.00030	0.00030	3
Cu, Tot	Closure	Oct	6	0.00046	0.00046	0.00046	0	0.00046	0.00046	0.00046	0	0.00046	0.00046	0.00046	0	0.00070	0.00070	0.00070	0	0.00224	0.00224	0.00224	0	0.00062	0.00062	0.00063	4	0.00025	0.00025	0.00025	0	0.00269	0.00269	0.00269	0	0.00029	0.00029	0.00029	0
Cu, Tot	Closure	Nov	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00092	0.00092	0.00092	0	0.00221	0.00221	0.00221	0	0.00062	0.00062	0.00063	3	0.00034	0.00034	0.00034	-1	0.00201	0.00201	0.00201	0	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	Dec	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00093	0.00093	0.00093	0	0.00212	0.00212	0.00212	0	0.00062	0.00062	0.00063	3	0.00034	0.00034	0.00034	0	0.00192	0.00192	0.00192	0	0.00027	0.00027	0.00027	0
Cu, Tot	Post-Closure	Jan	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00054	0.00054	0.00056	7	0.00093	0.00094	0.00094	1	0.00205	0.00204	0.00205	1	0.00078	0.00079	0.00101	34	0.00265	0.00261	0.00410	668	0.00162	0.00162	0.00164	1	0.00027	0.00028	0.00029	3
Cu, Tot	Post-Closure	Feb	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00056	0.00055	0.00059	11	0.00094	0.00094	0.00094	1	0.00197	0.00197	0.00197	1	0.00078	0.00079	0.00101	35	0.00272	0.00266	0.00418	683	0.00132	0.00132	0.00135	2	0.00027	0.00028	0.00029	3
Cu, Tot	Post-Closure	Mar	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00075	0.00075	0.00092	50	0.00094	0.00094	0.00094	1	0.00191	0.00190	0.00191	1	0.00078	0.00080	0.00102	36	0.00291	0.00285	0.00449	738	0.00132	0.00132	0.00146	14	0.00027	0.00028	0.00029	3
Cu, Tot	Post-Closure	Apr	109	0.00049	0.00050	0.00051	1	0.00051	0.00051	0.00052	1	0.00098	0.00092	0.00108	83	0.00094	0.00094	0.00094	1	0.00186	0.00186	0.00187	1	0.00079	0.00080	0.00103	37	0.00386	0.00385	0.00586	1034	0.00157	0.00153	0.00166	25	0.00027	0.00027	0.00028	1
Cu, Tot	Post-Closure	May	109	0.00036	0.00036	0.00036	-3	0.00039	0.00039	0.00039	-4	0.00055	0.00053	0.00059	31	0.00090	0.00090	0.00091	1	0.00242	0.00242	0.00243	1	0.00077	0.00078	0.00100	36	0.00268	0.00245	0.00314	808	0.00817	0.00818	0.00829	6	0.00025	0.00025	0.00025	0
Cu, Tot	Post-Closure	Jun	109	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00039	0.00039	0.00039	4	0.00090	0.00090	0.00090	1	0.00410	0.00410	0.00411	1	0.00077	0.00077	0.00099	36	0.00319	0.00293	0.00384	985	0.00639	0.00639	0.00640	0	0.00025	0.00025	0.00025	0
Cu, Tot	Post-Closure	Jul	109	0.00028	0.00028	0.00028	0	0.00028	0.00028	0.00028	0	0.00030	0.00030	0.00031	5	0.00129	0.00129	0.00129	1	0.00347	0.00347	0.00347	0	0.00079	0.00079	0.00102	36	0.00291	0.00271	0.00370	1030	0.00173	0.00173	0.00173	1	0.00057	0.00057	0.00057	-2
Cu, Tot	Post-Closure	Aug	109	0.00028	0.00028	0.00028	0	0.00029	0.00029	0.00029	0	0.00031	0.00030	0.00031	6	0.00129	0.00129	0.00130	1	0.00246	0.00245	0.00246	1	0.00081	0.00081	0.00104	36	0.00302	0.00278	0.00370	1059	0.00168	0.00168	0.00169	1	0.00058	0.00058	0.00058	0
Cu, Tot	Post-Closure	Sep	109	0.00046	0.00046	0.00046	0	0.00046	0.00046	0.00046	0	0.00049	0.00049	0.00050	6	0.00071	0.00071	0.00072	1	0.00222	0.00222	0.00222	1	0.00081	0.00081	0.00103	36	0.00305	0.00284	0.00381	1038	0.00215	0.00215	0.00216	1	0.00030	0.00030	0.00030	3
Cu, Tot	Post-Closure	Oct	109	0.00046	0.00046	0.00046	0	0.00046	0.00046	0.00046	0	0.00050	0.00049	0.00051	8	0.00070	0.00070	0.00071	2	0.00225	0.00225	0.00225	1	0.00080	0.00080	0.00101	35	0.00343	0.00316	0.00404	1166	0.00270	0.00270	0.00271	1	0.00029	0.00029	0.00029	0
Cu, Tot	Post-Closure	Nov	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00052	0.00054	5	0.00093	0.00093	0.00094	1	0.00222	0.00221	0.00222	1	0.00080	0.00079	0.00101	35	0.00346	0.00354	0.00477	940	0.00202	0.00202	0.00203	0	0.00027	0.00028	0.00029	2
Cu, Tot	Post-Closure	Dec	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	4	0.00093	0.00093	0.00094	1	0.00213	0.00213	0.00213	1	0.00080	0.00079	0.00101	35	0.00269	0.00267	0.00415	684	0.00193	0.00193	0.00194	0	0.00027	0.00028	0.00029	3
Fe, Tot	Construction	Jan	2	0.110	0.110	0.110	0	0.111	0.111	0.111	0	0.110	0.110	0.111	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Construction	Feb	2	0.110	0.110	0.110	0	0.111	0.111	0.111	1	0.111	0.111	0.111	1	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Construction	Mar	2	0.110	0.110	0.110	0	0.113	0.113	0.114	3	0.113	0.113	0.114	3	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Construction	Apr	2	0.113	0.113	0.113	-39	0.132	0.132	0.132	-27	0.133	0.133	0.134	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Construction	May	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-13	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Construction	Jun	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-13	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Construction	Jul	2	0.199	0.199	0.199	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.196	0.196	0.197	78	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Construction	Aug	2	0.190	0.190	0.190	-5	0.195	0.195	0.195	-2	0.196	0.196	0.196	-2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.110	0.110	0.110	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Construction	Sep	2	0.180	0.180	0.180	-10	0.181	0.181	0.181	-10	0.181	0.181	0.181	-10	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.063	0.063	0.063	3	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Construction	Oct	2	0.180	0.180	0.180	-8	0.181	0.181	0.181	-10	0.181	0.181	0.181	-9	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.061	0.061	0.061	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Construction	Nov	2	0.110	0.110	0.110	-7	0.111	0.111	0.111	-21	0.111	0.111	0.111	-22	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.195	0.195	0.195	-25	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Construction	Dec	2	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Operations	Jan	13	0.110	0.110	0.110	0	0.111	0.111	0.111	1	0.111	0.111	0.111	1	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Operations	Feb	13	0.110	0.110	0.110	0	0.114	0.114	0.115	3	0.114	0.114	0.115	3	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Operations	Mar	13	0.110	0.110	0.110	0	0.123	0.121	0.124	10	0.122	0.121	0.124	10	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Operations	Apr	13	0.113	0.113	0.114	-39	0.134	0.134	0.135	-26	0.135	0.135	0.136	-22	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Operations	May	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-13	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Operations	Jun	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-13	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Operations	Jul	13	0.199	0.199	0.199	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	82	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Operations	Aug	13	0.190	0.190	0.190	-5	0.195	0.195	0.195	-2	0.196	0.196	0.196	-2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.113	0.113	0.113	2	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Operations	Sep	13	0.180	0.180	0.180	-10	0.181	0.181	0.181	-10	0.181	0.181	0.181	-10	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.063	0.063	0.063	3	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Operations	Oct	13	0.180	0.180	0.180	-8	0.181	0.181	0.181	-10	0.181	0.181	0.181	-9	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.061	0.061	0.061	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Operations	Nov	13	0.110	0.110	0.110	-7	0.111	0.111	0.111	-21	0.111	0.111	0.111	-22	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.195	0.195	0.195	-25	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Operations	Dec	13	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Closure	Jan	6	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Closure	Feb	6	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Closure	Mar	6	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.111	0.111	0.111	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Closure	Apr	6	0.113	0.113	0.114	-39	0.128	0.128	0.128	-29	0.129	0.130	0.130	-25	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Closure	May	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-13	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Closure	Jun	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-13	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Closure	Jul	6	0.199	0.199	0.199	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	82	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Closure	Aug	6	0.190	0.190	0.190	-5	0.195	0.195	0.195	-3	0.196	0.196	0.196	-2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.122	0.121	0.122	10	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Closure	Sep	6	0.180	0.180	0.180	-10	0.181	0.181	0.181	-10	0.181	0.181	0.181	-10	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.063	0.063	0.063	3	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Closure	Oct	6	0.180	0.180	0.180	-8	0.181	0.181	0.181	-10	0.181	0.181	0.181	-9	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.061	0.061	0.061	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Closure	Nov	6	0.110	0.110	0.110	-7	0.111	0.111	0.111	-21	0.111	0.111	0.111	-22	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.195	0.195	0.195	-25	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Closure	Dec	6	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-23	0.200	0.200	0.200	0	0.200	0.200	0.200	-96

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Fe, Tot	Post-Closure	Jan	109	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.111	0.111	0.111	1	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.178	0.177	0.200	-32	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Post-Closure	Feb	109	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.112	0.112	0.112	1	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.177	0.177	0.200	-32	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Post-Closure	Mar	109	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.117	0.116	0.118	5	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.176	0.175	0.200	-33	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Post-Closure	Apr	109	0.114	0.113	0.114	-39	0.128	0.128	0.129	-29	0.135	0.135	0.139	-22	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.189	0.182	0.200	-30	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Post-Closure	May	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.198	0.198	0.200	-1	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.195	0.193	0.200	-16	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Post-Closure	Jun	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.189	0.200	-18	0.200	0.200	0.200	0	0.200	0.200	0.200	-80
Fe, Tot	Post-Closure	Jul	109	0.199	0.199	0.199	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.173	0.169	0.200	53	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Post-Closure	Aug	109	0.190	0.190	0.190	-5	0.195	0.195	0.195	-3	0.195	0.195	0.196	-2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.157	0.156	0.177	42	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Post-Closure	Sep	109	0.180	0.180	0.180	-10	0.181	0.181	0.181	-10	0.181	0.181	0.181	-10	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.150	0.143	0.170	134	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Post-Closure	Oct	109	0.180	0.180	0.180	-8	0.181	0.181	0.181	-10	0.181	0.181	0.181	-9	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.154	0.149	0.179	144	0.200	0.200	0.200	0	0.200	0.200	0.200	-73
Fe, Tot	Post-Closure	Nov	109	0.110	0.110	0.110	-7	0.111	0.111	0.111	-21	0.112	0.112	0.112	-21	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.194	0.189	0.199	-27	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Fe, Tot	Post-Closure	Dec	109	0.110	0.110	0.110	0	0.110	0.110	0.110	0	0.111	0.111	0.111	1	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.185	0.183	0.200	-30	0.200	0.200	0.200	0	0.200	0.200	0.200	-96
Pb, Diss	Construction	Jan	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Construction	Feb	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Construction	Mar	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00005	0.00005	0.00005	0
Pb, Diss	Construction	Apr	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	2	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	2	0.00005	0.00005	0.00005	0
Pb, Diss	Construction	May	2	0.00004	0.00004	0.00004	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	-2	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	-1	0.00004	0.00004	0.00004	1
Pb, Diss	Construction	Jun	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00007	0.00007	0.00007	-3	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	0
Pb, Diss	Construction	Jul	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-3	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	0
Pb, Diss	Construction	Aug	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-2	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	0
Pb, Diss	Construction	Sep	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00003	1
Pb, Diss	Construction	Oct	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00003	0
Pb, Diss	Construction	Nov	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	-1
Pb, Diss	Construction	Dec	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00005	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Operations	Jan	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00005	0.00005	0.00005	0
Pb, Diss	Operations	Feb	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	4	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	0
Pb, Diss	Operations	Mar	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	12	0.00005	0.00005	0.00005	12	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	12	0.00005	0.00005	0.00005	0
Pb, Diss	Operations	Apr	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	8	0.00005	0.00005	0.00005	7	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00004	1	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	7	0.00005	0.00005	0.00005	0
Pb, Diss	Operations	May	13	0.00004	0.00004	0.00004	-1	0.00004	0.00004	0.00004	2	0.00004	0.00004	0.00004	1	0.00005	0.00005	0.00005	0	0.00003	0.00003	0.00004	1	0.00006	0.00006	0.00006	-2	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	1
Pb, Diss	Operations	Jun	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	1	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	1	0.00007	0.00007	0.00007	-3	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00004	0.00004	0.00004	0
Pb, Diss	Operations	Jul	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-3	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00004	0.00004	0.00004	0
Pb, Diss	Operations	Aug	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	1	0.00007	0.00007	0.00007	-3	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00004	0.00004	0.00004	0
Pb, Diss	Operations	Sep	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	1	0.00007	0.00007	0.00007	-2	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00003	0.00003	0.00003	1
Pb, Diss	Operations	Oct	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	1	0.00007	0.00007	0.00007	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00003	0.00003	0.00003	0
Pb, Diss	Operations	Nov	13	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	1	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	1	0.00004	0.00004	0.00004	-1
Pb, Diss	Operations	Dec	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Closure	Jan	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Closure	Feb	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Closure	Mar	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Closure	Apr	6	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	0
Pb, Diss	Closure	May	6	0.00004	0.00004	0.00004	-1	0.00004	0.00004	0.00004	-1	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	-3	0.00004	0.00004	0.00004	1
Pb, Diss	Closure	Jun	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00007	0.00007	0.00007	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	0
Pb, Diss	Closure	Jul	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-2	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	0
Pb, Diss	Closure	Aug	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	0
Pb, Diss	Closure	Sep	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00003	1
Pb, Diss	Closure	Oct	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00007	0.00007	0.00007	1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00003	0.00003	0.00003	0
Pb, Diss	Closure	Nov	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00004	0.00004	0.00004	-1
Pb, Diss	Closure	Dec	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00006	0.00006	0.00006	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Diss	Post-Closure	Jan	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	7	0.00004	0.00004	0.00004	1	0.00004	0.00003	0.00004	4	0.00008	0.00008	0.00010	32	0.00026	0.00022	0.00029	433	0.00004	0.00004	0.00004	6	0.00005	0.00005	0.00005	0
Pb, Diss	Post-Closure	Feb	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	10	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	4	0.00008	0.00008	0.00010	33	0.00027	0.00023	0.00029	439	0.00004	0.00004	0.00004	10	0.00005	0.00005	0.00005	0
Pb, Diss	Post-Closure	Mar	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00007	0.00007	0.00007	45	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	5	0.00008	0.00008	0.00011	34	0.00028	0.00024	0.00030	464	0.00006	0.00006	0.00006	43	0.00005	0.00005	0.00005	0
Pb, Diss	Post-Closure	Apr	109	0.00005	0.00005	0.00005	1	0.00004	0.00005	0.00005	1	0.00008	0.00007	0.00008	66	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	7	0.00008	0.00008	0.00011	35	0.00031	0.00030	0.00063	619	0.00007	0.00006	0.00007	62	0.00005	0.00005	0.00005	0
Pb, Diss	Post-Closure	May	109	0.00004	0.00004	0.00004	-1	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	22	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	7	0.00008	0.00008	0.00011	31	0.00021	0.00019	0.00023	360	0.00004	0.00004	0.00004	16	0.00004	0.00004	0.00004	1
Pb, Diss	Post-Closure	Jun	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	3	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	4	0.00009	0.00009	0.00011	27	0.00025	0.00023	0.00028	448	0.00003	0.00003	0.00004	2	0.00004	0.00004	0.00004	0
Pb, Diss	Post-Closure	Jul	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	2	0.00009	0.00009	0.00011	28	0.00024	0.00022	0.00027	488	0.00003	0.00003	0.00003	3	0.00004	0.00004	0.00004	0
Pb, Diss	Post-Closure	Aug	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	2	0.00009	0.00009	0.00011	29	0.00025	0.00022	0.00027	500	0.00003	0.00003	0.00003	3	0.00004	0.00004	0.00004	0
Pb, Diss	Post-Closure	Sep	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	1	0.00003	0.00003	0.00003	3	0.00009	0.00009	0.00011	30	0.00025	0.00023	0.00028	521	0.00003	0.00003	0.00003	5	0.00003	0.00003	0.00003	1
Pb, Diss	Post-Closure	Oct	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	1	0.00003	0.00003	0.00003	3	0.00009	0.00009	0.00011	31	0.00027	0.00025	0.00030	586	0.00003	0.00003	0.00003	6	0.00003	0.00003	0.00003	0
Pb, Diss	Post-Closure	Nov	109	0.00004	0.00004	0.00005	0	0.00004	0.00004	0.00005	0	0.00005	0.00005	0.00005	5	0.00004	0.00004	0.00004	2	0.00003	0.00003	0.00003	4	0.00008	0.00008	0.00011	32	0.00029	0.00029	0.00033	580	0.00004	0.00004	0.00004	4	0.00004	0.00004	0.00004	-1
Pb, Diss	Post-Closure	Dec	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	4	0.00004	0.00004	0.00004	1	0.00003	0.00003	0.00004	4	0.00008	0.00008	0.00010	32	0.00027	0.00023	0.00029	449	0.00004	0.00004	0.00004	3	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	Jan	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	9	0.00005	0.00005	0.00005	9	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	3	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	8	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	Feb	2	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00007	23	0.00006	0.00006	0.00007	23	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	3	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00006	21	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	Mar	2	0.00005	0.00005	0.00005	0	0.00010	0.00010	0.00010	124	0.00010	0.00010	0.00010	124	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	6	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00009	0.00009	0.00009	117	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	Apr	2	0.00005	0.00005	0.00005	0	0.00012	0.00012	0.00013	174	0.00012	0.00012	0.00013	169	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	9	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00010	0.00010	0.00011	158	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	May	2	0.00004	0.00004	0.00004	-1	0.00007	0.00007	0.00008	58	0.00007	0.00007	0.00007	50	0.00007	0.00007	0.00007	-1	0.00005	0.00005	0.00005	10	0.00010	0.00010	0.00010	-1	0.00008	0.00008	0.00008	-2	0.00005	0.00005	0.00005	42	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	Jun	2	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	8	0.00005	0.00005	0.00005	7	0.00007	0.00007	0.00007	0	0.00005	0.00005	0.00005	7	0.00010	0.00010	0.00010	-2	0.00008	0.00008	0.00008	0	0.00004	0.00004	0.00004	6	0.00005	0.00005	0.00005	0
Pb, Tot	Construction	Jul	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	9	0.00004	0.00004	0.00004	9	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	5	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	6	0.00013	0.00013	0.00013	-2
Pb, Tot	Construction	Aug	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	12	0.00004	0.00004	0.00004	12	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	5	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	9	0.00013	0.00013	0.00013	0
Pb, Tot	Construction	Sep	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	14	0.00004	0.00004	0.00004	14	0.00008	0.00008	0.00008	-1	0.00005	0.00005	0.00005	6	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	11	0.00011	0.00011	0.00011	1
Pb, Tot	Construction	Oct	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	13	0.00004	0.00004	0.00004	13	0.00008	0.00008	0.00008	-1	0.00005	0.00005	0.00005	6	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	9	0.00011	0.00011	0.00011	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Pb, Tot	Construction	Nov	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	7	0.00005	0.00005	0.00005	7	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	6	0.00011	0.00011	0.00011	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	6	0.00005	0.00005	0.00005	5
Pb, Tot	Construction	Dec	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	6	0.00005	0.00005	0.00005	6	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	5	0.00010	0.00010	0.00011	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	5	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	Jan	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	6	0.00005	0.00005	0.00005	6	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	3	0.00010	0.00010	0.00010	-3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	6	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	Feb	13	0.00005	0.00005	0.00005	0	0.00005	0.00006	0.00006	22	0.00005	0.00005	0.00006	22	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	3	0.00010	0.00010	0.00010	-3	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	21	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	Mar	13	0.00005	0.00005	0.00005	0	0.00007	0.00007	0.00009	57	0.00007	0.00007	0.00009	57	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	4	0.00010	0.00010	0.00010	-3	0.00004	0.00004	0.00004	0	0.00006	0.00006	0.00008	55	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	Apr	13	0.00005	0.00005	0.00005	0	0.00007	0.00007	0.00008	57	0.00007	0.00007	0.00008	55	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	5	0.00010	0.00010	0.00010	-3	0.00004	0.00004	0.00004	0	0.00006	0.00006	0.00007	51	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	May	13	0.00004	0.00004	0.00004	-1	0.00006	0.00006	0.00007	24	0.00006	0.00006	0.00006	20	0.00007	0.00007	0.00007	-1	0.00005	0.00005	0.00005	5	0.00010	0.00010	0.00010	-3	0.00008	0.00008	0.00008	-2	0.00004	0.00004	0.00005	15	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	Jun	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00005	5	0.00004	0.00004	0.00005	5	0.00007	0.00007	0.00007	-1	0.00004	0.00004	0.00005	4	0.00010	0.00010	0.00010	-3	0.00008	0.00008	0.00008	0	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	0
Pb, Tot	Operations	Jul	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	5	0.00004	0.00004	0.00004	4	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	3	0.00011	0.00011	0.00011	-3	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	3	0.00013	0.00013	0.00013	-2
Pb, Tot	Operations	Aug	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	6	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	3	0.00011	0.00011	0.00011	-3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	4	0.00013	0.00013	0.00013	0
Pb, Tot	Operations	Sep	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	7	0.00004	0.00004	0.00004	7	0.00008	0.00008	0.00008	-1	0.00005	0.00005	0.00005	3	0.00011	0.00011	0.00011	-3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	5	0.00011	0.00011	0.00011	1
Pb, Tot	Operations	Oct	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	6	0.00004	0.00004	0.00004	6	0.00008	0.00008	0.00008	-1	0.00004	0.00004	0.00005	3	0.00011	0.00011	0.00011	-3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	5	0.00011	0.00011	0.00011	0
Pb, Tot	Operations	Nov	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	4	0.00011	0.00011	0.00011	0	0.00004	0.00004	0.00004	3	0.00011	0.00011	0.00011	-3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	3	0.00005	0.00005	0.00005	5
Pb, Tot	Operations	Dec	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	3	0.00005	0.00005	0.00005	3	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	3	0.00010	0.00010	0.00010	-3	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	2	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	Jan	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	0	0.00004	0.00005	0.00005	0	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	Feb	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	0	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	Mar	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	0	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	Apr	6	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	0	0.00005	0.00005	0.00005	0	0.00010	0.00010	0.00010	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	May	6	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00007	0.00007	0.00007	-1	0.00005	0.00005	0.00005	0	0.00010	0.00010	0.00010	-1	0.00008	0.00008	0.00008	-2	0.00004	0.00004	0.00004	-2	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	Jun	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00007	0.00007	0.00007	0	0.00004	0.00004	0.00004	0	0.00010	0.00010	0.00010	-2	0.00008	0.00008	0.00008	0	0.00003	0.00003	0.00003	0	0.00005	0.00005	0.00005	0
Pb, Tot	Closure	Jul	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00012	0.00012	0.00012	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	0	0.00013	0.00013	0.00013	-2
Pb, Tot	Closure	Aug	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00013	0.00013	0.00013	0
Pb, Tot	Closure	Sep	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00008	0.00008	0.00008	-1	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	-2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	1
Pb, Tot	Closure	Oct	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00008	0.00008	0.00008	-1	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	0
Pb, Tot	Closure	Nov	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	-1	0.00004	0.00004	0.00004	0	0.00003	0.00003	0.00003	0	0.00005	0.00005	0.00005	5
Pb, Tot	Closure	Dec	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00011	0.00011	0.00011	0	0.00004	0.00004	0.00004	0	0.00011	0.00011	0.00011	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	Jan	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00006	17	0.00011	0.00011	0.00011	1	0.00005	0.00005	0.00005	6	0.00012	0.00012	0.00015	18	0.00058	0.00049	0.00064	1055	0.00004	0.00004	0.00005	15	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	Feb	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	25	0.00011	0.00011	0.00011	1	0.00005	0.00005	0.00005	6	0.00012	0.00012	0.00015	19	0.00059	0.00049	0.00064	1070	0.00005	0.00005	0.00005	23	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	Mar	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00011	0.00009	0.00011	110	0.00011	0.00011	0.00011	1	0.00005	0.00005	0.00005	8	0.00012	0.00012	0.00015	19	0.00062	0.00052	0.00068	1129	0.00009	0.00008	0.00010	105	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	Apr	109	0.00005	0.00005	0.00005	1	0.00004	0.00005	0.00005	1	0.00012	0.00011	0.00014	150	0.00011	0.00011	0.00011	1	0.00005	0.00005	0.00005	11	0.00012	0.00012	0.00015	20	0.00063	0.00057	0.00069	1267	0.00011	0.00010	0.00012	140	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	May	109	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	1	0.00007	0.00007	0.00008	45	0.00007	0.00007	0.00007	1	0.00005	0.00005	0.00005	12	0.00012	0.00012	0.00014	19	0.00044	0.00039	0.00048	363	0.00005	0.00005	0.00005	34	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	Jun	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00004	0.00005	5	0.00007	0.00007	0.00007	0	0.00005	0.00005	0.00005	8	0.00012	0.00012	0.00015	17	0.00053	0.00047	0.00058	456	0.00004	0.00004	0.00004	5	0.00005	0.00005	0.00005	0
Pb, Tot	Post-Closure	Jul	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	6	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	4	0.00013	0.00013	0.00015	17	0.00051	0.00044	0.00056	950	0.00004	0.00004	0.00004	4	0.00013	0.00013	0.00013	-2
Pb, Tot	Post-Closure	Aug	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	8	0.00012	0.00012	0.00012	0	0.00005	0.00005	0.00005	4	0.00013	0.00013	0.00015	17	0.00051	0.00045	0.00057	960	0.00004	0.00004	0.00004	6	0.00013	0.00013	0.00013	0
Pb, Tot	Post-Closure	Sep	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	12	0.00008	0.00008	0.00008	0	0.00005	0.00005	0.00005	4	0.00013	0.00013	0.00015	17	0.00053	0.00046	0.00059	1148	0.00004	0.00004	0.00004	10	0.00011	0.00011	0.00011	1
Pb, Tot	Post-Closure	Oct	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00005	16	0.00008	0.00008	0.00008	1	0.00005	0.00005	0.00005	5	0.00013	0.00013	0.00015	17	0.00057	0.00050	0.00063	1256	0.00004	0.00004	0.00004	12	0.00011	0.00011	0.00011	0
Pb, Tot	Post-Closure	Nov	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	10	0.00011	0.00011	0.00011	1	0.00005	0.00005	0.00005	6	0.00013	0.00013	0.00015	18	0.00062	0.00056	0.00068	1241	0.00004	0.00004	0.00004	9	0.00005	0.00005	0.00005	5
Pb, Tot	Post-Closure	Dec	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	10	0.00011	0.00011	0.00011	1	0.00005	0.00005	0.00005	6	0.00013	0.00012	0.00015	18	0.00060	0.00050	0.00065	1090	0.00004	0.00004	0.00004	8	0.00005	0.00005	0.00005	0
Mn, Diss	Construction	Jan	2	0.011	0.011	0.011	0	0.011	0.011	0.012	3	0.011	0.011	0.012	3	0.116	0.116	0.117	0	0.019	0.019	0.019	0	0.016	0.016	0.017	1	0.900	0.900	0.900	0	0.014	0.014	0.015	1	0.210	0.210	0.210	0
Mn, Diss	Construction	Feb	2	0.011	0.011	0.011	0	0.012	0.012	0.013	11	0.012	0.012	0.013	11	0.117	0.117	0.117	0	0.021	0.021	0.021	0	0.016	0.016	0.017	1	0.900	0.900	0.900	0	0.014	0.014	0.015	7	0.210	0.210	0.210	0
Mn, Diss	Construction	Mar	2	0.011	0.011	0.011	0	0.021	0.021	0.022	94	0.021	0.021	0.022	94	0.117	0.117	0.117	0	0.023	0.023	0.023	1	0.016	0.016	0.017	1	*0.900*	*0.900*	*0.900*	0	0.022	0.022	0.022	66	0.210	0.210	0.210	0
Mn, Diss	Construction	Apr	2	0.018	0.018	0.018	4	0.036	0.036	0.037	92	0.043	0.043	0.043	17	0.117	0.117	0.117	0	0.024	0.024	0.024	2	0.017	0.017	0.017	1	*0.900*	*0.900*	*0.900*	0	0.039	0.039	0.040	26	0.210	0.210	0.210	0
Mn, Diss	Construction	May	2	0.006	0.006	0.006	-18	0.012	0.012	0.012	38	0.020	0.020	0.020	-37	0.049	0.049	0.049	1	0.025	0.025	0.025	-1	0.016	0.016	0.016	2	0.465	0.465	0.465	3	0.025	0.025	0.025	-20	0.011	0.011	0.011	154
Mn, Diss	Construction	Jun	2	0.005	0.005	0.005	0	0.006	0.006	0.006	7	0.006	0.006	0.006	-8	0.043	0.043	0.043	0	0.021	0.021	0.021	-2	0.015	0.015	0.016	4	*0.450*	*0.450*	*0.450*	0	0.015	0.015	0.015	-3	0.004	0.004	0.004	0
Mn, Diss	Construction	Jul	2	0.003	0.003	0.003	0	0.003	0.003	0.003	9	0.003	0.003	0.003	-3	0.061	0.061	0.061	0	0.015	0.015	0.015	-2	0.016	0.016	0.016	4	0.160	0.160	0.160	6	0.006	0.006	0.006	-1	0.005	0.005	0.005	0
Mn, Diss	Construction	Aug	2	0.003	0.003	0.003	0	0.003	0.003	0.003	9	0.003	0.003	0.003	-6	0.061	0.061	0.061	1	0.011	0.011	0.011	-1	0.016	0.016	0.016	5	0.150	0.150	0.150	0	0.006	0.006	0.006	-3	0.005	0.005	0.005	0
Mn, Diss	Construction	Sep	2	0.003	0.003	0.003	0	0.003	0.003	0.003	8	0.003	0.003	0.003	2	0.033	0.033	0.033	1	0.010	0.010	0.010	-1	0.015	0.015	0.016	6	0.048	0.048	0.048	8	0.006	0.006	0.006	1	0.004	0.004	0.004	1
Mn, Diss	Construction	Oct	2	0.003	0.003	0.003	0	0.003	0.003	0.003	4	0.003	0.003	0.003	-2	0.032	0.032	0.032	1	0.009	0.009	0.009	-1	0.015	0.015	0.015	7	0.044	0.044	0.044	0	0.006	0.006	0.006	-1	0.004	0.004	0.004	0
Mn, Diss	Construction	Nov	2	0.011	0.011	0.011	-1	0.012	0.012	0.012	1	0.012	0.012	0.012	-4	0.113	0.113	0.113	1	0.012	0.012	0.012	-1	0.016	0.016	0.016	5	0.872	0.872	0.872	-3	0.016	0.016	0.016	-2	0.203	0.203	0.203	-3
Mn, Diss	Construction	Dec	2	0.011	0.011	0.011	0	0.011	0.011	0.011	2	0.011	0.011	0.011	2	0.116	0.116	0.116	1	0.016	0.016	0.016	0	0.016	0.016	0.017	3	*0.900*	*0.900*	*0.900*	0	0.015	0.015	0.015	1	0.210	0.210	0.210	0
Mn, Diss	Operations	Jan	13	0.011	0.011	0.011	3	0.012	0.012	0.013	13	0.013	0.013	0.013	19	0.117	0.117	0.117	0	0.019	0.019	0.019	1	0.018	0.018	0.018	6	0.900	0.900	0.900	0	0.016	0.016	0.016	10	0.210	0.210	0.210	0
Mn, Diss	Operations	Feb	13	0.011	0.011	0.011	4	0.018	0.017	0.018	55	0.019	0.018	0.019	63	0.117	0.117	0.117	0	0.021	0.021	0.021	2	0.018	0.018	0.018	6	0.900	0.900	0.900	0	0.020	0.019	0.020	41	0.210	0.210	0.210	0
Mn, Diss	Operations	Mar	13	0.012	0.012	0.012	5	0.029	0.029	0.030	162	0.030	0.030	0.031	171	0.117	0.117	0.117	0	0.023	0.023	0.023	4	0.019	0.018	0.019	6	*0.900*	*0.900*	*0.900*	0	0.029	0.029	0.030	122	0.210	0.210	0.210	0
Mn, Diss	Operations	Apr	13	0.018	0.018	0.019	5	0.035	0.035	0.036	86	0.042	0.042	0.043	15	0.117	0.117	0.117	0	0.025	0.025	0.025	5	0.019	0.019	0.019	5	*0.900*	*0.900*	*0.900*	0	0.038	0.038	0.039	23	0.210	0.210	0.210	0
Mn, Diss	Operations	May	13	0.006	0.006	0.006	-18	0.011	0.012	0.012	31	0.020	0.020	0.020	-38	0.049	0.049	0.049	1	0.026	0.026	0.026	2	0.018	0.018	0.018	7	0.465	0.465	0.465	3	0.025	0.025	0.025	-22	0.011	0.011	0.011	154
Mn, Diss	Operations	Jun	13	0.005	0.005	0.005	0	0.006	0.006	0.006	15	0.007	0.007	0.007	-2	0.043	0.043	0.043	0	0.022	0.022	0.022	-1	0.017	0.017	0.017	8	*0.450*	*0.450*	*0.450*	0	0.015	0.015	0.015	-1	0.004	0.004	0.004	0
Mn, Diss	Operations	Jul	13	0.003	0.003	0.003	0	0.003	0.003	0.003	17	0.004	0.004	0.004	4	0.061	0.061	0.061	0	0.015	0.015	0.015	0	0.017	0.017	0.017	9	0.160	0.160	0.160	6	0.006	0.006	0.006	2	0.005	0.005	0.005	0
Mn, Diss	Operations	Aug	13	0.003	0.003	0.003	0	0.004	0.003	0.004	22	0.004	0.004	0.004	4	0.061	0.061	0.061	1	0.011	0.011	0.011	0	0.018	0.017	0.018	9	0.150	0.150	0.150	0	0.006	0.006	0.006	2	0.005	0.005	0.005	0
Mn, Diss	Operations	Sep	13	0.003	0.003	0.003	0	0.003	0.003	0.004	19	0.003	0.003	0.004	12	0.033	0.033	0.033	1	0.010	0.010	0.010	1	0.017	0.017	0.017	10	0.048	0.048	0.048	8	0.006	0.006	0.006	5	0.004	0.004	0.004	1
Mn, Diss	Operations	Oct	13	0.003	0.003	0.003	0	0.003	0.003	0.003	13	0.003	0.003	0.004	6	0.032	0.032	0.032	1	0.009	0.009	0.010	1	0.017	0.016	0.017	11	0.044	0.044	0.044	0	0.007	0.007	0.007	2	0.004	0.004	0.004	0
Mn, Diss	Operations	Nov	13	0.011	0.011	0.011	0	0.012	0.012	0.012	4	0.012	0.012	0.013	0	0.113	0.113	0.113	1	0.012	0.012	0.012	1	0.017	0.017	0.017	9	0.872	0.872	0.872	-3	0.016	0.016	0.016	0	0.203	0.203	0.203	-3
Mn, Diss	Operations	Dec	13	0.011	0.011	0.011	2	0.012	0.012	0.012	6	0.012	0.012	0.012	11	0.116	0.116	0.116	1	0.016	0.016	0.016	1	0.018	0.018	0.018	7	*0.900*	*0.900*	*0.900*	0	0.016	0.016	0.016	5	0.210	0.210	0.210	0
Mn, Diss	Closure	Jan	6	0.011	0.011	0.011	3	0.011	0.011	0.011	3	0.012	0.012	0.012	13	0.117	0.117	0.117	0	0.019	0.019	0.019	0	0.017	0.017	0.018	8	0.900	0.900	0.900	0	0.015	0.015	0.015	7	0.210	0.210	0.210	0
Mn, Diss	Closure	Feb	6	0.011	0.011	0.011	4	0.011	0.011	0.011	4	0.013	0.013	0.013	17	0.117	0.117	0.117	0	0.021	0.021	0.021	1	0.017	0.017	0.018	8	0.900	0.900	0.900	0	0.015	0.015	0.015	11	0.210	0.210	0.210	0
Mn, Diss	Closure	Mar	6	0.012	0.012	0.012	6	0.012	0.012	0.012	6	0.014	0.014	0.014	25	0.117	0.117	0.117	0	0.023	0.023	0.023	1	0.017	0.017	0.018	8	*0.900*	*0.900*	*0.900*	0	0.015	0.015	0.015	17	0.210	0.210	0.210	0
Mn, Diss	Closure	Apr	6	0.018	0.019	0.019	5	0.021	0.021	0.021	12	0.029	0.029	0.029	-21	0.117	0.117	0.117	0	0.024	0.024	0.024	1	0.017	0.017	0.019	8	*0.900*	*0.900*	*0.900*	0	0.028	0.028	0.028	-12	0.210	0.210	0.210	0
Mn, Diss	Closure	May	6	0.006	0.006	0.006	-18	0.007	0.007	0.007	-25	0.015	0.015	0.015	-52	0.049	0.049	0.049	1	0.025	0.025	0.025	-2	0.016	0.017	0.018	9	0.465	0.465	0.465	3	0.022	0.022	0.022	-30	0.011	0.011	0.011	154
Mn, Diss	Closure	Jun	6	0.005	0.005	0.005	0	0.006	0.006	0.006	0	0.006	0.006	0.006	-14	0.043	0.043	0.043	1	0.021	0.021	0.021	-4	0.016	0.016	0.017	11	*0.450*	*0.450*	*0.450*	0	0.015	0.015	0.015	-4	0.004	0.004	0.004	0
Mn, Diss	Closure	Jul	6	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.003	0.003	0.003	-10	0.061	0.061	0.061	0	0.014	0.014	0.014	-3	0.016	0.016	0.017	11	0.160	0.160	0.160	6	0.005	0.005	0.005	-5	0.005	0.005	0.005	0
Mn, Diss	Closure	Aug	6	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.003	0.003	0.003	-13	0.061	0.061	0.061	1	0.011	0.011	0.011	-3	0.016	0.016	0.017	12	0.150	0.150	0.150	0	0.005	0.005	0.005	-6	0.005	0.005	0.005	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality Median	AQM4 Mean	AQM4 Max	AQM4 Change	AQM7 Predicted Project Water Quality Median	AQM7 Mean	AQM7 Max	AQM7 Change	AQM8 Predicted Project Water Quality Median	AQM8 Mean	AQM8 Max	AQM8 Change	AQM10 Predicted Project Water Quality Median	AQM10 Mean	AQM10 Max	AQM10 Change	AQM11 Predicted Water Quality Median	AQM11 Mean	AQM11 Max	AQM11 Change	AQM16 Predicted Project Water Quality Median	AQM16 Mean	AQM16 Max	AQM16 Change	AQM18 Predicted Project Water Quality Median	AQM18 Mean	AQM18 Max	AQM18 Change	AQM29 Predicted Project Water Quality Median	AQM29 Mean	AQM29 Max	AQM29 Change	AQM31 Predicted Project Water Quality Median	AQM31 Mean	AQM31 Max	AQM31 Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Mn, Diss	Closure	Sep	6	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.003	0.003	0.003	-5	0.033	0.033	0.033	1	0.010	0.010	0.010	-3	0.016	0.016	0.017	13	0.048	0.048	0.048	8	0.006	0.006	0.006	-2	0.004	0.004	0.004	1
Mn, Diss	Closure	Oct	6	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.003	0.003	0.003	-6	0.032	0.032	0.032	1	0.009	0.009	0.009	-2	0.015	0.015	0.016	13	0.044	0.044	0.044	0	0.006	0.006	0.006	-2	0.004	0.004	0.004	0
Mn, Diss	Closure	Nov	6	0.011	0.011	0.011	1	0.011	0.011	0.011	1	0.012	0.012	0.012	-2	0.113	0.113	0.113	1	0.012	0.012	0.012	-1	0.016	0.016	0.017	11	0.872	0.872	0.872	-3	0.016	0.016	0.016	-1	0.203	0.203	0.203	-3
Mn, Diss	Closure	Dec	6	0.011	0.011	0.011	2	0.011	0.011	0.011	2	0.012	0.012	0.012	9	0.116	0.116	0.116	1	0.016	0.016	0.016	-1	0.016	0.017	0.017	9	*0.900*	*0.900*	*0.900*	0	0.016	0.016	0.016	4	0.210	0.210	0.210	0
Mn, Diss	Post-Closure	Jan	109	0.011	0.011	0.011	3	0.011	0.011	0.011	3	0.017	0.016	0.017	47	0.117	0.117	0.117	1	0.020	0.020	0.020	7	0.024	0.024	0.034	62	0.348	0.415	0.900	-54	0.019	0.018	0.019	26	0.210	0.210	0.210	0
Mn, Diss	Post-Closure	Feb	109	0.011	0.011	0.011	4	0.011	0.011	0.011	4	0.020	0.018	0.020	68	0.117	0.117	0.118	1	0.023	0.022	0.023	7	0.025	0.025	0.034	62	0.344	0.411	0.900	-54	0.020	0.019	0.021	45	0.210	0.210	0.210	0
Mn, Diss	Post-Closure	Mar	109	0.012	0.012	0.012	6	0.012	0.012	0.012	6	0.043	0.038	0.046	248	0.117	0.117	0.118	0	0.025	0.024	0.025	9	0.025	0.025	0.035	62	0.325	0.394	*0.900*	-56	0.040	0.036	0.042	178	0.210	0.210	0.210	0
Mn, Diss	Post-Closure	Apr	109	0.019	0.019	0.019	6	0.021	0.021	0.022	12	0.061	0.056	0.064	53	0.117	0.117	0.118	0	0.027	0.027	0.027	11	0.025	0.025	0.036	63	0.323	0.392	*0.900*	-56	0.055	0.050	0.057	61	0.210	0.210	0.210	0
Mn, Diss	Post-Closure	May	109	0.006	0.006	0.006	-17	0.007	0.007	0.007	-24	0.027	0.025	0.028	-20	0.049	0.049	0.050	2	0.028	0.027	0.028	8	0.024	0.024	0.034	67	0.366	0.375	0.483	-17	0.029	0.028	0.030	-12	0.011	0.011	0.011	154
Mn, Diss	Post-Closure	Jun	109	0.005	0.005	0.006	0	0.006	0.006	0.006	0	0.007	0.007	0.008	2	0.044	0.044	0.044	1	0.023	0.022	0.023	3	0.024	0.023	0.033	70	0.334	0.342	*0.475*	-24	0.015	0.015	0.015	1	0.004	0.004	0.004	0
Mn, Diss	Post-Closure	Jul	109	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.004	0.004	0.005	25	0.061	0.061	0.061	1	0.015	0.015	0.016	3	0.024	0.024	0.034	71	0.272	0.254	0.290	69	0.007	0.006	0.007	11	0.005	0.005	0.005	0
Mn, Diss	Post-Closure	Aug	109	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.005	0.005	0.005	28	0.061	0.061	0.061	1	0.012	0.012	0.012	5	0.025	0.024	0.034	74	0.273	0.254	0.291	69	0.007	0.007	0.007	14	0.005	0.005	0.005	0
Mn, Diss	Post-Closure	Sep	109	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.006	0.005	0.006	70	0.033	0.033	0.034	2	0.011	0.011	0.011	8	0.024	0.024	0.033	75	0.258	0.229	0.279	420	0.008	0.007	0.008	29	0.004	0.004	0.004	1
Mn, Diss	Post-Closure	Oct	109	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.006	0.006	0.007	92	0.033	0.033	0.033	2	0.011	0.010	0.011	11	0.024	0.023	0.032	76	0.273	0.245	0.297	457	0.009	0.008	0.009	30	0.004	0.004	0.004	0
Mn, Diss	Post-Closure	Nov	109	0.011	0.011	0.011	1	0.011	0.011	0.012	1	0.015	0.014	0.015	15	0.114	0.114	0.114	1	0.013	0.013	0.014	9	0.024	0.024	0.033	70	0.362	0.422	0.872	-53	0.018	0.017	0.018	7	0.203	0.203	0.203	-3
Mn, Diss	Post-Closure	Dec	109	0.011	0.011	0.011	2	0.011	0.011	0.011	2	0.015	0.014	0.015	29	0.117	0.116	0.117	1	0.017	0.017	0.018	7	0.025	0.024	0.034	64	0.370	0.429	*0.900*	-52	0.017	0.017	0.018	13	0.210	0.210	0.210	0
Hg, Diss	Construction	Jan	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	Feb	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000006	0.0000006	0.0000006	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	Mar	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	3	0.0000006	0.0000006	0.0000006	3	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000006	0.0000006	0.0000006	2	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	Apr	2	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000007	0.0000007	7	0.0000007	0.0000007	0.0000007	6	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	5	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	May	2	0.0000011	0.0000011	0.0000011	4	0.0000011	0.0000011	0.0000011	7	0.0000011	0.0000011	0.0000011	7	0.0000022	0.0000022	0.0000022	0	0.0000009	0.0000009	0.0000009	0	0.0000019	0.0000019	0.0000019	-1	0.0000014	0.0000014	0.0000014	0	0.0000013	0.0000013	0.0000013	5	0.0000017	0.0000017	0.0000017	-1
Hg, Diss	Construction	Jun	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000023	0.0000023	0.0000023	0	0.0000011	0.0000011	0.0000011	0	0.0000019	0.0000019	0.0000019	-1	0.0000014	0.0000014	0.0000014	0	0.0000012	0.0000012	0.0000012	0	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Construction	Jul	2	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	1	0.0000009	0.0000009	0.0000009	0	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Construction	Aug	2	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	-1	0.0000012	0.0000012	0.0000012	0	0.0000009	0.0000009	0.0000009	0	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Construction	Sep	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000006	0.0000006	0.0000006	1	0.0000015	0.0000015	0.0000015	0	0.0000010	0.0000010	0.0000010	0	0.0000020	0.0000020	0.0000020	-2	0.0000009	0.0000009	0.0000009	1	0.0000007	0.0000007	0.0000007	0	0.0000012	0.0000012	0.0000012	1
Hg, Diss	Construction	Oct	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	-1	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	-1	0.0000009	0.0000009	0.0000009	0	0.0000007	0.0000007	0.0000007	0	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Construction	Nov	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	0	0.0000019	0.0000019	0.0000020	-1	0.0000012	0.0000012	0.0000012	-1	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Construction	Dec	2	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Jan	13	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000006	0.0000006	0.0000006	1	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	1	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Feb	13	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	6	0.0000006	0.0000006	0.0000006	6	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	4	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Mar	13	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000007	0.0000007	20	0.0000007	0.0000007	0.0000007	20	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000008	15	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Apr	13	0.0000006	0.0000006	0.0000006	1	0.0000007	0.0000007	0.0000007	11	0.0000007	0.0000007	0.0000007	10	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000009	1	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	9	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	May	13	0.0000011	0.0000011	0.0000011	4	0.0000011	0.0000011	0.0000011	7	0.0000011	0.0000011	0.0000011	7	0.0000022	0.0000022	0.0000022	0	0.0000009	0.0000009	0.0000009	1	0.0000019	0.0000019	0.0000019	-3	0.0000014	0.0000014	0.0000014	0	0.0000013	0.0000013	0.0000013	6	0.0000017	0.0000017	0.0000017	-1
Hg, Diss	Operations	Jun	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000023	0.0000023	0.0000023	0	0.0000011	0.0000011	0.0000011	0	0.0000019	0.0000019	0.0000019	-3	0.0000014	0.0000014	0.0000014	0	0.0000012	0.0000012	0.0000012	0	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Operations	Jul	13	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	0	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	1	0.0000009	0.0000009	0.0000009	0	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Operations	Aug	13	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	1	0.0000008	0.0000008	0.0000008	0	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	-3	0.0000012	0.0000012	0.0000012	0	0.0000009	0.0000009	0.0000009	0	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Operations	Sep	13	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000006	0.0000006	0.0000006	1	0.0000015	0.0000015	0.0000015	-1	0.0000010	0.0000010	0.0000010	0	0.0000020	0.0000020	0.0000020	-3	0.0000009	0.0000009	0.0000009	1	0.0000007	0.0000007	0.0000007	1	0.0000012	0.0000012	0.0000012	1
Hg, Diss	Operations	Oct	13	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	-1	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	-3	0.0000009	0.0000009	0.0000009	0	0.0000007	0.0000007	0.0000007	0	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Operations	Nov	13	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	0	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	-1	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Operations	Dec	13	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000006	0.0000006	0.0000006	1	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-3	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Jan	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Feb	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000006	0.0000006	0.0000006	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Mar	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000006	0.0000006	0.0000006	1	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000006	0.0000006	0.0000006	1	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Apr	6	0.0000006	0.0000006	0.0000006	1	0.0000007	0.0000007	0.0000007	2	0.0000007	0.0000007	0.0000007	2	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	2	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	May	6	0.0000011	0.0000011	0.0000011	4	0.0000011	0.0000011	0.0000011	6	0.0000011	0.0000011	0.0000011	6	0.0000022	0.0000022	0.0000022	0	0.0000009	0.0000009	0.0000009	0	0.0000019	0.0000019	0.0000019	-1	0.0000014	0.0000014	0.0000014	0	0.0000013	0.0000013	0.0000013	5	0.0000017	0.0000017	0.0000017	-1
Hg, Diss	Closure	Jun	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000023	0.0000023	0.0000023	0	0.0000011	0.0000011	0.0000011	0	0.0000019	0.0000019	0.0000019	-1	0.0000014	0.0000014	0.0000014	0	0.0000012	0.0000012	0.0000012	0	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Closure	Jul	6	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	0	0.0000019	0.0000019	0.0000019	-2	0.0000012	0.0000012	0.0000012	1	0.0000009	0.0000009	0.0000009	0	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Closure	Aug	6	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	-1	0.0000012	0.0000012	0.0000012	0	0.0000009	0.0000009	0.0000009	0	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Closure	Sep	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000010	0.0000010	0.0000010	0	0.0000020	0.0000020	0.0000020	-1	0.0000009	0.0000009	0.0000009	1	0.0000007	0.0000007	0.0000007	0	0.0000012	0.0000012	0.0000012	1
Hg, Diss	Closure	Oct	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	-1	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	-1	0.0000009	0.0000009	0.0000009	0	0.0000007	0.0000007	0.0000007	0	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Closure	Nov	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	-1	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Closure	Dec	6	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000015	0.0000015	0.0000015	0	0.0000008	0.0000008	0.0000008	0	0.0000019	0.0000019	0.0000019	-1	0.0000012	0.0000012	0.0000012	0	0.0000007	0.0000007	0.0000007	0	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Jan	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000007	0.0000007	13	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	3	0.0000019	0.0000019	0.0000020	1	0.0000058	0.0000050	0.0000059	318	0.0000007	0.0000007	0.0000007	8	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Feb	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000007	0.0000007	19	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	3	0.0000019	0.0000019	0.0000020	2	0.0000059	0.0000051	0.0000060	323	0.0000008	0.0000007	0.0000008	14	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Mar	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	1	0.0000012	0.0000011	0.0000012	81	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	4	0.0000019	0.0000019	0.0000020	2	0.0000062	0.0000053	0.0000062	342	0.0000011	0.0000010	0.0000011	65	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Apr	109	0.0000006	0.0000006	0.0000006	1	0.0000007	0.0000007	0.0000007	2	0.0000014	0.0000013	0.0000015	101	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	5	0.0000019	0.0000019	0.0000019	2	0.0000061	0.0000054	0.0000066	354	0.0000013	0.0000012	0.0000014	81	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	May	109	0.0000011	0.0000011	0.0000011	4	0.0000011	0.0000011	0.0000011	6	0.0000013	0.0000013	0.0000013	25	0.0000022	0.0000022	0.0000022	0	0.0000010	0.0000010	0.0000010	6	0.0000019	0.0000019	0.0000019	1	0.0000044	0.0000041	0.0000048	190	0.0000014	0.0000014	0.0000014	15	0.0000017	0.0000017	0.0000017	-1
Hg, Diss	Post-Closure	Jun	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	2	0.0000023	0.0000023	0.0000023	0	0.0000011	0.0000011	0.0000011	3	0.0000019	0.0000019	0.0000020	1	0.0000052	0.0000047	0.0000056	238	0.0000012	0.0000012	0.0000012	1	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Post-Closure	Jul	109	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000009	0.0000008	0.0000009	2	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	1	0.0000020	0.0000020	0.0000020	1	0.0000051	0.0000046	0.0000054	281	0.0000010	0.0000009	0.0000010	2	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Post-Closure	Aug	109	0.0000008	0.0000008	0.0000008	0	0.0000008	0.0000008	0.0000008	0	0.0000009	0.0000009	0.0000009	3	0.0000022	0.0000022	0.0000022	0	0.0000011	0.0000011	0.0000011	1	0.0000020	0.0000020	0.0000021	1	0.0000051	0.0000046	0.0000055	284	0.0000010	0.0000010	0.0000010	2	0.0000016	0.0000016	0.0000016	0
Hg, Diss	Post-Closure	Sep	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000007	0.0000007	7	0.0000015	0.0000015	0.0000015	0	0.0000010	0.0000010	0.0000010	2	0.0000020	0.0000020	0.0000021	1	0.0000053	0.0000047	0.0000056	436	0.0000007	0.0000007	0.0000007	5	0.0000012	0.0000012	0.0000012	1
Hg, Diss	Post-Closure	Oct	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000007	0.0000007	9	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	2	0.0000020	0.0000020	0.0000021	1	0.0000056	0.0000050	0.0000061	474	0.0000007	0.0000007	0.0000007	6	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Post-Closure	Nov	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000006	0.0000007	7	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	3	0.0000020	0.0000020	0.0000020	1	0.0000062	0.0000056	0.0000065	363	0.0000007	0.0000007	0.0000007	4	0.0000014	0.0000014	0.0000014	0
Hg, Diss	Post-Closure	Dec	109	0.0000006	0.0000006	0.0000006	0	0.0000006	0.0000006	0.0000006	0	0.0000007	0.0000006	0.0000007	7	0.0000015	0.0000015	0.0000015	0	0.0000009	0.0000009	0.0000009	3	0.0000020	0.0000020	0.0000020	1	0.0000060	0.0000052	0.0000060	331	0.0000007	0.0000007	0.0000007	4	0.0000014	0.0000014	0.0000014	0
Hg, Tot	Construction	Jan	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Feb	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-1	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Mar	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	5	0.0000007	0.0000007	0.0000007	5	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-1	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	3	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Apr	2	0.0000007	0.0000007	0.0000007	1	0.0000008	0.0000008	0.0000008	9	0.0000008	0.0000008	0.0000008	7	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-1	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	6	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	May	2	0.0000011	0.0000011	0.0000011	3	0.0000012	0.0000012	0.0000012	6	0.0000012	0.0000012	0.0000012	5	0.0000025	0.0000025	0.0000025	0	0.0000011	0.0000011	0.0000011	0	0.0000021	0.0000021	0.0000021	-1	0.0000021	0.0000021	0.0000021	0	0.0000016	0.0000016	0.0000016	5	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Jun	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000026	0.0000026	0.0000026	0	0.0000013	0.0000013	0.0000013	0	0.0000022	0.0000022	0.0000022	-2	0.0000021	0.0000021	0.0000021	0	0.0000014	0.0000014	0.0000014	0	0.0000020	0.0000020	0.0000020	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Hg, Tot	Construction	Jul	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	0	0.0000013	0.0000013	0.0000013	0	0.0000022	0.0000022	0.0000022	-2	0.0000014	0.0000014	0.0000014	2	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Aug	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	0	0.0000012	0.0000012	0.0000012	0	0.0000023	0.0000023	0.0000023	-2	0.0000014	0.0000014	0.0000014	0	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Sep	2	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	1	0.0000008	0.0000008	0.0000008	1	0.0000018	0.0000018	0.0000018	0	0.0000011	0.0000011	0.0000011	0	0.0000023	0.0000023	0.0000023	-2	0.0000011	0.0000011	0.0000011	1	0.0000008	0.0000008	0.0000008	0	0.0000012	0.0000012	0.0000012	2
Hg, Tot	Construction	Oct	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000018	0.0000018	0.0000018	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000011	0.0000011	0.0000011	0	0.0000008	0.0000008	0.0000008	0	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Construction	Nov	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000024	0.0000024	0.0000024	-2	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	-1
Hg, Tot	Construction	Dec	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Jan	13	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000022	-3	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	1	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Feb	13	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	6	0.0000007	0.0000007	0.0000007	6	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-3	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	4	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Mar	13	0.0000007	0.0000007	0.0000007	1	0.0000008	0.0000008	0.0000008	18	0.0000008	0.0000008	0.0000008	18	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-3	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	13	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Apr	13	0.0000007	0.0000007	0.0000007	1	0.0000008	0.0000008	0.0000009	11	0.0000009	0.0000009	0.0000009	9	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000011	0.0000011	0	0.0000021	0.0000021	0.0000021	-3	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	8	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	May	13	0.0000011	0.0000011	0.0000011	3	0.0000012	0.0000012	0.0000012	6	0.0000012	0.0000012	0.0000012	5	0.0000025	0.0000025	0.0000025	0	0.0000011	0.0000011	0.0000011	0	0.0000021	0.0000021	0.0000021	-3	0.0000021	0.0000021	0.0000021	0	0.0000016	0.0000016	0.0000016	4	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Jun	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000026	0.0000026	0.0000026	0	0.0000013	0.0000013	0.0000013	0	0.0000021	0.0000021	0.0000022	-3	0.0000021	0.0000021	0.0000021	0	0.0000014	0.0000014	0.0000014	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Jul	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	0	0.0000013	0.0000013	0.0000013	0	0.0000022	0.0000022	0.0000022	-4	0.0000014	0.0000014	0.0000014	2	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Aug	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	0	0.0000012	0.0000012	0.0000012	0	0.0000023	0.0000023	0.0000023	-3	0.0000014	0.0000014	0.0000014	0	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Operations	Sep	13	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	1	0.0000008	0.0000008	0.0000008	1	0.0000018	0.0000018	0.0000018	0	0.0000011	0.0000011	0.0000011	0	0.0000023	0.0000023	0.0000023	-3	0.0000011	0.0000011	0.0000011	1	0.0000008	0.0000008	0.0000008	0	0.0000012	0.0000012	0.0000012	2
Hg, Tot	Operations	Oct	13	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	1	0.0000008	0.0000008	0.0000008	0	0.0000018	0.0000018	0.0000018	-1	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-3	0.0000011	0.0000011	0.0000011	0	0.0000008	0.0000008	0.0000008	0	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Operations	Nov	13	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-3	0.0000024	0.0000024	0.0000024	-2	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	-1
Hg, Tot	Operations	Dec	13	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-3	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Jan	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Feb	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-1	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	1	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Mar	6	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-1	0.0000024	0.0000024	0.0000024	0	0.0000008	0.0000008	0.0000008	1	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Apr	6	0.0000007	0.0000007	0.0000007	1	0.0000008	0.0000008	0.0000008	2	0.0000008	0.0000008	0.0000008	1	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-1	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	2	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	May	6	0.0000011	0.0000011	0.0000011	3	0.0000012	0.0000012	0.0000012	5	0.0000012	0.0000012	0.0000012	4	0.0000025	0.0000025	0.0000025	0	0.0000011	0.0000011	0.0000011	0	0.0000021	0.0000021	0.0000021	-2	0.0000021	0.0000021	0.0000021	0	0.0000016	0.0000016	0.0000016	4	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Jun	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000026	0.0000026	0.0000026	0	0.0000013	0.0000013	0.0000013	0	0.0000022	0.0000022	0.0000022	-2	0.0000021	0.0000021	0.0000021	0	0.0000014	0.0000014	0.0000014	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Jul	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	0	0.0000013	0.0000013	0.0000013	0	0.0000022	0.0000022	0.0000022	-2	0.0000014	0.0000014	0.0000014	2	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Aug	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	0	0.0000012	0.0000012	0.0000012	0	0.0000023	0.0000023	0.0000023	-2	0.0000014	0.0000014	0.0000014	0	0.0000011	0.0000011	0.0000011	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Closure	Sep	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000018	0.0000018	0.0000018	0	0.0000011	0.0000011	0.0000011	0	0.0000023	0.0000023	0.0000023	-2	0.0000011	0.0000011	0.0000011	1	0.0000008	0.0000008	0.0000008	0	0.0000012	0.0000012	0.0000012	2
Hg, Tot	Closure	Oct	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000018	0.0000018	0.0000018	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000011	0.0000011	0.0000011	0	0.0000008	0.0000008	0.0000008	0	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Closure	Nov	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000024	0.0000024	0.0000024	-2	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	-1
Hg, Tot	Closure	Dec	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000020	0.0000020	0.0000020	0	0.0000010	0.0000010	0.0000010	0	0.0000022	0.0000022	0.0000022	-1	0.0000024	0.0000024	0.0000024	0	0.0000009	0.0000009	0.0000009	0	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Jan	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	12	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000011	0.0000011	2	0.0000022	0.0000022	0.0000022	1	0.0000062	0.0000055	0.0000062	129	0.0000009	0.0000009	0.0000009	7	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Feb	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	17	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000011	0.0000011	2	0.0000022	0.0000022	0.0000022	1	0.0000063	0.0000055	0.0000063	131	0.0000009	0.0000009	0.0000009	12	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Mar	109	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000013	0.0000012	0.0000013	74	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000011	0.0000011	3	0.0000022	0.0000022	0.0000022	1	0.0000065	0.0000057	0.0000065	139	0.0000013	0.0000012	0.0000013	55	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Apr	109	0.0000007	0.0000007	0.0000007	1	0.0000008	0.0000008	0.0000008	3	0.0000015	0.0000014	0.0000016	84	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000011	0.0000011	4	0.0000021	0.0000021	0.0000022	1	0.0000064	0.0000058	0.0000069	143	0.0000015	0.0000014	0.0000016	65	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	May	109	0.0000011	0.0000011	0.0000011	3	0.0000012	0.0000012	0.0000012	5	0.0000014	0.0000014	0.0000015	21	0.0000025	0.0000025	0.0000025	0	0.0000012	0.0000012	0.0000012	4	0.0000021	0.0000022	0.0000022	1	0.0000049	0.0000045	0.0000053	115	0.0000017	0.0000017	0.0000017	11	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Jun	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	2	0.0000026	0.0000026	0.0000026	0	0.0000014	0.0000014	0.0000014	2	0.0000022	0.0000022	0.0000022	1	0.0000056	0.0000051	0.0000060	144	0.0000014	0.0000014	0.0000014	1	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Jul	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	2	0.0000022	0.0000022	0.0000022	0	0.0000013	0.0000013	0.0000013	1	0.0000022	0.0000023	0.0000023	0	0.0000054	0.0000048	0.0000057	244	0.0000011	0.0000011	0.0000011	1	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Aug	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	3	0.0000022	0.0000022	0.0000022	0	0.0000013	0.0000013	0.0000013	1	0.0000023	0.0000023	0.0000023	0	0.0000054	0.0000049	0.0000058	247	0.0000011	0.0000011	0.0000011	2	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Post-Closure	Sep	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	6	0.0000018	0.0000018	0.0000018	0	0.0000012	0.0000011	0.0000012	1	0.0000023	0.0000023	0.0000024	1	0.0000055	0.0000049	0.0000059	347	0.0000008	0.0000008	0.0000008	4	0.0000012	0.0000012	0.0000012	2
Hg, Tot	Post-Closure	Oct	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	8	0.0000018	0.0000018	0.0000018	0	0.0000011	0.0000011	0.0000011	2	0.0000023	0.0000023	0.0000023	1	0.0000058	0.0000053	0.0000064	378	0.0000009	0.0000009	0.0000009	5	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Post-Closure	Nov	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000008	6	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000010	0.0000011	2	0.0000022	0.0000022	0.0000023	1	0.0000066	0.0000060	0.0000069	150	0.0000009	0.0000009	0.0000009	3	0.0000020	0.0000020	0.0000020	-1
Hg, Tot	Post-Closure	Dec	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	7	0.0000020	0.0000020	0.0000020	0	0.0000011	0.0000011	0.0000011	2	0.0000022	0.0000022	0.0000023	1	0.0000063	0.0000057	0.0000064	135	0.0000009	0.0000009	0.0000009	3	0.0000020	0.0000020	0.0000020	0
Mo, Tot	Construction	Jan	2	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	0	0.00015	0.00015	0.00015	1	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	0
Mo, Tot	Construction	Feb	2	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	2	0.00010	0.00010	0.00010	2	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	0	0.00015	0.00015	0.00016	1	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	1	0.00008	0.00008	0.00008	0
Mo, Tot	Construction	Mar	2	0.00010	0.00010	0.00010	0	0.00011	0.00011	0.00012	14	0.00011	0.00011	0.00012	14	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	1	0.00015	0.00015	0.00016	1	0.00010	0.00010	0.00010	0	0.00011	0.00011	0.00012	12	0.00008	0.00008	0.00008	0
Mo, Tot	Construction	Apr	2	0.00010	0.00010	0.00010	0	0.00013	0.00013	0.00013	27	0.00013	0.00013	0.00013	26	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	1	0.00015	0.00015	0.00016	1	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00013	22	0.00008	0.00008	0.00008	0
Mo, Tot	Construction	May	2	0.00009	0.00009	0.00009	-1	0.00010	0.00010	0.00011	12	0.00010	0.00010	0.00011	11	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	1	0.00015	0.00015	0.00016	2	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	7	0.00008	0.00008	0.00008	0
Mo, Tot	Construction	Jun	2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	1	0.00009	0.00009	0.00009	1	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	1	0.00015	0.00015	0.00016	2	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	1	0.00008	0.00008	0.00008	0
Mo, Tot	Construction	Jul	2	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	2	0.00007	0.00007	0.00007	2	0.00017	0.00017	0.00017	0	0.00009	0.00009	0.00009	1	0.00016	0.00016	0.00016	2	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00008	1	0.00003	0.00003	0.00003	6
Mo, Tot	Construction	Aug	2	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	3	0.00007	0.00007	0.00007	3	0.00017	0.00017	0.00017	0	0.00009	0.00009	0.00009	1	0.00016	0.00016	0.00017	3	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	2	0.00003	0.00003	0.00003	0
Mo, Tot	Construction	Sep	2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	5	0.00009	0.00009	0.00009	5	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	2	0.00016	0.00016	0.00016	3	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	4	0.00003	0.00003	0.00003	0
Mo, Tot	Construction	Oct	2	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	2	0.00009	0.00009	0.00009	2	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	2	0.00016	0.00016	0.00016	4	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	1	0.00003	0.00003	0.00003	0
Mo, Tot	Construction	Nov	2	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	1	0.00010	0.00010	0.00010	1	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	2	0.00016	0.00016	0.00016	4	0.00010	0.00010	0.00010	-1	0.00010	0.00010	0.00010	1	0.00008	0.00008	0.00008	-2
Mo, Tot	Construction	Dec	2	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	1	0.00010	0.00010	0.00010	1	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	1	0.00016	0.00016	0.00016	4	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	1	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	Jan	13	0.00010	0.00010	0.00010	0	0.00014	0.00014	0.00017	35	0.00013	0.00014	0.00017	35	0.00012	0.00012	0.00012	0	0.00011	0.00011	0.00012	17	0.00018	0.00017	0.00018	8	0.00010	0.00010	0.00010	0	0.00013	0.00013	0.00015	26	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	Feb	13	0.00010	0.00010	0.00010	0	0.00023	0.00024	0.00036	141	0.00023	0.00024	0.00036	140	0.00012	0.00012	0.00012	0	0.00011	0.00011	0.00013	20	0.00018	0.00018	0.00018	8	0.00010	0.00010	0.00010	0	0.00021	0.00021	0.00031	114	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	Mar	13	0.00010	0.00010	0.00010	0	0.00048	0.00047	0.00073	370	0.00048	0.00047	0.00073	368	0.00012	0.00012	0.00012	0	0.00012	0.00012	0.00014	30	0.00018	0.00018	0.00018	8	0.00010	0.00010	0.00010	0	0.00042	0.00041	0.00063	314	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	Apr	13	0.00010	0.00010	0.00010	0	0.00045	0.00044	0.00070	341	0.00044	0.00043	0.00068	330	0.00012	0.00012	0.00012	0	0.00013	0.00013	0.00016	38	0.00018	0.00018	0.00018	7	0.00010	0.00010	0.00010	0	0.00038	0.00037	0.00058	270	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	May	13	0.00009	0.00009	0.00009	-1	0.00022	0.00022	0.00032	144	0.00021	0.00021	0.00030	130	0.00011	0.00011	0.00011	0	0.00013	0.00013	0.00016	38	0.00018	0.00018	0.00018	8	0.00010	0.00010	0.00010	0	0.00016	0.00016	0.00022	81	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	Jun	13	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00014	31	0.00012	0.00012	0.00014	31	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00014	27	0.00018	0.00017	0.00018	8	0.00010	0.00010	0.00010	0	0.00011	0.00011	0.00012	21	0.00008	0.00008	0.00008	0
Mo, Tot	Operations	Jul	13	0.00007	0.00007	0.00007	0	0.00010	0.00010	0.00012	35	0.00010	0.00010	0.00012	35	0.00017	0.00017	0.00017	0	0.00011	0.00011	0.00012	19	0.00018	0.00018	0.00018	8	0.00007	0.00007	0.00007	1	0.00010	0.00009	0.00011	26	0.00003	0.00003	0.00003	6
Mo, Tot	Operations	Aug	13	0.00007	0.00007	0.00007	0	0.00011	0.00010	0.00013	46	0.00011	0.00010	0.00013	46	0.00017	0.00017	0.00017	0	0.00010	0.00010	0.00012	22	0.00018	0.00018	0.00018	8	0.00007	0.00007	0.00007	0	0.00010	0.00010	0.00012	35	0.00003	0.00003	0.00003	0
Mo, Tot	Operations	Sep	13	0.00009	0.00009	0.00009	0	0.00013	0.00012	0.00015	45	0.00013	0.00012	0.00015	45	0.00010	0.00010	0.00010	0	0.00011	0.00011	0.00012	24	0.00018	0.00018	0.00018	9	0.00008	0.00008	0.00008	0	0.00012	0.00012	0.00013	34	0.00003	0.00003	0.00003	0
Mo, Tot	Operations	Oct	13	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00015	45	0.00012	0.00012	0.00015	45	0.00010	0.00010	0.00010	0	0.00011	0.00011	0.00012	24	0.00018	0.00018	0.00018	9	0.00008	0.00008	0.00008	0	0.00011	0.00011	0.00013	30	0.00003	0.00003	0.00003	0
Mo, Tot	Operations	Nov	13	0.00010	0.00010	0.00010	0	0.00012	0.00013	0.00015	26	0.00012	0.00013	0.00015	26	0.00012	0.00012	0.00012	0	0.00011	0.00011	0.00012	23	0.00018	0.00017	0.00018	9	0.00010	0.00010	0.00010	-1	0.00011	0.00012	0.00013	16	0.00008	0.00008	0.00008	-2
Mo, Tot	Operations	Dec	13	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00013	20	0.00012	0.00012	0.00013	19	0.00012	0.00012	0.00012	0	0.00011	0.00011	0.00012	21	0.00018	0.00017	0.00018	9	0.00010	0.00010	0.00010	0	0.00011	0.00011	0.00012	13	0.00008	0.00008	0.00008	0
Mo, Tot	Closure	Jan	6	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	1	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00010	0.00012	5	0.00016	0.00017	0.00018	11	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	0
Mo, Tot	Closure	Feb	6	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00010	0.00012	5	0.00017	0.00017	0.00018	11	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	0
Mo, Tot	Closure	Mar	6	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00010	0.00012	5	0.00017	0.00017	0.00018	11	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	0
Mo, Tot	Closure	Apr	6	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00010	0.00012	4	0.00017	0.00017	0.00018	11	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Mo, Tot	Closure	May	6	0.00009	0.00009	0.00009	-1	0.00009	0.00009	0.00009	-2	0.00009	0.00009	0.00009	-2	0.00010	0.00010	0.00010	0	0.00009	0.00010	0.00011	4	0.00016	0.00017	0.00018	11	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	-2	0.00008	0.00008	0.00008	0
Mo, Tot	Closure	Jun	6	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00010	2	0.00016	0.00016	0.00017	11	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00008	0.00008	0.00008	0
Mo, Tot	Closure	Jul	6	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	0	0.00017	0.00017	0.00017	0	0.00009	0.00009	0.00009	1	0.00017	0.00017	0.00018	11	0.00007	0.00007	0.00007	1	0.00008	0.00008	0.00008	0	0.00003	0.00003	0.00003	6
Mo, Tot	Closure	Aug	6	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	0	0.00017	0.00017	0.00017	0	0.00008	0.00008	0.00009	0	0.00017	0.00017	0.00018	11	0.00007	0.00007	0.00007	0	0.00008	0.00008	0.00008	0	0.00003	0.00003	0.00003	0
Mo, Tot	Closure	Sep	6	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00017	0.00017	0.00018	11	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	0	0.00003	0.00003	0.00003	0
Mo, Tot	Closure	Oct	6	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00010	0.00010	0.00010	0	0.00009	0.00009	0.00009	0	0.00016	0.00016	0.00017	12	0.00008	0.00008	0.00008	0	0.00009	0.00009	0.00009	0	0.00003	0.00003	0.00003	0
Mo, Tot	Closure	Nov	6	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	0	0.00016	0.00016	0.00017	12	0.00010	0.00010	0.00010	-1	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	-2
Mo, Tot	Closure	Dec	6	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00012	0.00012	0.00012	0	0.00009	0.00009	0.00009	0	0.00016	0.00016	0.00017	12	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00008	0.00008	0.00008	0
Mo, Tot	Post-Closure	Jan	109	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00016	0.00015	0.00019	54	0.00013	0.00013	0.00013	5	0.00011	0.00011	0.00012	22	0.00033	0.00034	0.00055	137	0.00333	0.00326	0.00533	3164	0.00014	0.00014	0.00016	40	0.00008	0.00008	0.00009	4
Mo, Tot	Post-Closure	Feb	109	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00018	0.00018	0.00023	81	0.00013	0.00013	0.00013	5	0.00012	0.00011	0.00012	23	0.00033	0.00034	0.00056	137	0.00337	0.00331	0.00540	3207	0.00017	0.00017	0.00021	65	0.00008	0.00008	0.00009	4
Mo, Tot	Post-Closure	Mar	109	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00046	0.00046	0.00069	355	0.00013	0.00013	0.00013	5	0.00012	0.00012	0.00014	31	0.00034	0.00035	0.00057	139	0.00357	0.00348	0.00569	3383	0.00041	0.00040	0.00060	301	0.00008	0.00008	0.00009	4
Mo, Tot	Post-Closure	Apr	109	0.00010	0.00010	0.00011	5	0.00010	0.00010	0.00011	4	0.00065	0.00061	0.00088	515	0.00013	0.00013	0.00013	5	0.00013	0.00013	0.00015	41	0.00035	0.00035	0.00058	142	0.00412	0.00422	0.00581	4117	0.00056	0.00052	0.00075	426	0.00008	0.00008	0.00008	1
Mo, Tot	Post-Closure	May	109	0.00009	0.00009	0.00009	1	0.00009	0.00009	0.00009	0	0.00027	0.00026	0.00035	182	0.00011	0.00011	0.00012	8	0.00014	0.00013	0.00016	45	0.00034	0.00034	0.00056	140	0.00274	0.00261	0.00377	2564	0.00020	0.00019	0.00024	109	0.00008	0.00008	0.00008	0
Mo, Tot	Post-Closure	Jun	109	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00011	0.00011	0.00012	20	0.00011	0.00011	0.00011	4	0.00012	0.00012	0.00013	28	0.00033	0.00033	0.00054	138	0.00340	0.00325	0.00476	3213	0.00010	0.00010	0.00011	14	0.00008	0.00008	0.00008	0
Mo, Tot	Post-Closure	Jul	109	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	0	0.00009	0.00009	0.00010	25	0.00017	0.00017	0.00018	2	0.00010	0.00010	0.00011	17	0.00035	0.00035	0.00056	140	0.00324	0.00308	0.00464	4303	0.00009	0.00009	0.00010	18	0.00003	0.00003	0.00003	7
Mo, Tot	Post-Closure	Aug	109	0.00007	0.00007	0.00007	0	0.00007	0.00007	0.00007	0	0.00010	0.00009	0.00011	31	0.00017	0.00017	0.00018	3	0.00010	0.00010	0.00011	16	0.00036	0.00035	0.00057	141	0.00329	0.00314	0.00465	4385	0.00009	0.00009	0.00010	24	0.00003	0.00003	0.00003	0
Mo, Tot	Post-Closure	Sep	109	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00012	0.00012	0.00014	40	0.00011	0.00011	0.00012	6	0.00010	0.00010	0.00011	18	0.00035	0.00035	0.00056	139	0.00341	0.00326	0.00485	4194	0.00011	0.00011	0.00013	31	0.00003	0.00003	0.00003	1
Mo, Tot	Post-Closure	Oct	109	0.00009	0.00009	0.00009	0	0.00009	0.00009	0.00009	0	0.00014	0.00013	0.00015	54	0.00011	0.00011	0.00012	8	0.00011	0.00010	0.00011	22	0.00035	0.00034	0.00055	139	0.00374	0.00361	0.00521	4654	0.00012	0.00012	0.00013	37	0.00003	0.00003	0.00003	1
Mo, Tot	Post-Closure	Nov	109	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00014	0.00013	0.00015	34	0.00013	0.00013	0.00014	7	0.00011	0.00011	0.00012	23	0.00034	0.00034	0.00054	140	0.00403	0.00416	0.00596	4064	0.00012	0.00012	0.00013	21	0.00008	0.00008	0.00009	1
Mo, Tot	Post-Closure	Dec	109	0.00010	0.00010	0.00010	0	0.00010	0.00010	0.00010	0	0.00013	0.00013	0.00015	31	0.00013	0.00013	0.00014	6	0.00011	0.00011	0.00012	22	0.00035	0.00034	0.00055	140	0.00339	0.00335	0.00543	3250	0.00012	0.00012	0.00013	20	0.00008	0.00008	0.00009	4
Ni, Diss	Construction	Jan	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00061	0.00061	0.00061	0	0.02679	0.02679	0.02681	0	0.00026	0.00026	0.00026	0	0.00054	0.00054	0.00054	0	0.02555	0.02555	0.02557	-1	0.00033	0.00033	0.00033	0
Ni, Diss	Construction	Feb	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00020	0.00020	0.00020	1	0.00061	0.00061	0.00061	0	0.02568	0.02568	0.02570	0	0.00026	0.00026	0.00026	0	0.00054	0.00054	0.00054	0	0.01810	0.01810	0.01815	-3	0.00033	0.00033	0.00033	0
Ni, Diss	Construction	Mar	2	0.00020	0.00020	0.00020	0	0.00022	0.00022	0.00022	8	0.00022	0.00022	0.00022	8	0.00061	0.00061	0.00061	0	0.02456	0.02456	0.02457	0	0.00026	0.00026	0.00026	0	0.00054	0.00054	0.00054	0	0.01468	0.01468	0.01472	-6	0.00033	0.00033	0.00033	0
Ni, Diss	Construction	Apr	2	0.00020	0.00020	0.00020	0	0.00026	0.00026	0.00027	13	0.00026	0.00026	0.00027	12	0.00061	0.00061	0.00061	0	0.02364	0.02364	0.02365	-1	0.00026	0.00026	0.00026	0	0.00054	0.00054	0.00054	0	0.01596	0.01596	0.01599	-6	0.00033	0.00033	0.00033	0
Ni, Diss	Construction	May	2	0.00020	0.00020	0.00020	0	0.00024	0.00024	0.00025	4	0.00025	0.00025	0.00025	0	0.00039	0.00039	0.00039	0	0.02741	0.02741	0.02742	0	0.00026	0.00026	0.00026	0	0.00058	0.00058	0.00058	0	0.07132	0.07132	0.07136	5	0.00020	0.00020	0.00020	2
Ni, Diss	Construction	Jun	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00020	0.00020	0.00020	0	0.00038	0.00038	0.00038	0	0.03850	0.03850	0.03850	0	0.00026	0.00026	0.00026	0	0.00058	0.00058	0.00058	0	0.05528	0.05528	0.05528	0	0.00020	0.00020	0.00020	0
Ni, Diss	Construction	Jul	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00020	0.00020	0.00020	0	0.00098	0.00098	0.00098	0	0.03386	0.03386	0.03386	0	0.00027	0.00027	0.00027	0	0.00053	0.00053	0.00053	0	0.02437	0.02437	0.02437	0	0.00020	0.00020	0.00020	0
Ni, Diss	Construction	Aug	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00021	1	0.00021	0.00021	0.00021	0	0.00098	0.00098	0.00099	1	0.02660	0.02660	0.02660	0	0.00027	0.00027	0.00027	1	0.00053	0.00053	0.00053	0	0.02347	0.02347	0.02347	0	0.00020	0.00020	0.00020	0
Ni, Diss	Construction	Sep	2	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	2	0.00022	0.00022	0.00022	2	0.00066	0.00066	0.00066	1	0.02497	0.02497	0.02497	0	0.00027	0.00027	0.00027	1	0.00041	0.00041	0.00041	1	0.02829	0.02829	0.02829	0	0.00023	0.00023	0.00023	0
Ni, Diss	Construction	Oct	2	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	1	0.00022	0.00022	0.00022	0	0.00065	0.00065	0.00065	1	0.02656	0.02656	0.02656	0	0.00027	0.00027	0.00027	1	0.00041	0.00041	0.00041	0	0.03751	0.03751	0.03751	0	0.00023	0.00023	0.00023	0
Ni, Diss	Construction	Nov	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00020	0.00020	0.00020	0	0.00061	0.00061	0.00061	1	0.02760	0.02760	0.02760	0	0.00027	0.00027	0.00027	1	0.00054	0.00054	0.00054	-1	0.03521	0.03521	0.03521	0	0.00033	0.00033	0.00033	-1
Ni, Diss	Construction	Dec	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00020	0.00020	0.00020	0	0.00061	0.00061	0.00061	0	0.02755	0.02755	0.02755	0	0.00027	0.00027	0.00027	1	0.00054	0.00054	0.00054	0	0.03306	0.03306	0.03306	-1	0.00033	0.00033	0.00033	0
Ni, Diss	Operations	Jan	13	0.00020	0.00020	0.00020	0	0.00024	0.00024	0.00027	20	0.00024	0.00024	0.00027	20	0.00061	0.00061	0.00061	0	0.02686	0.02685	0.02687	0	0.00028	0.00028	0.00028	2	0.00054	0.00054	0.00054	0	0.02580	0.02581	0.02594	0	0.00033	0.00033	0.00033	0
Ni, Diss	Operations	Feb	13	0.00020	0.00020	0.00020	0	0.00034	0.00035	0.00048	75	0.00034	0.00035	0.00048	75	0.00061	0.00061	0.00061	0	0.02575	0.02575	0.02578	0	0.00028	0.00028	0.00028	2	0.00054	0.00054	0.00054	0	0.01807	0.01814	0.01849	-2	0.00033	0.00033	0.00033	0
Ni, Diss	Operations	Mar	13	0.00020	0.00020	0.00020	0	0.00059	0.00058	0.00086	192	0.00059	0.00058	0.00086	192	0.00061	0.00061	0.00061	0	0.02458	0.02458	0.02464	0	0.00028	0.00028	0.00028	1	0.00054	0.00054	0.00054	0	0.01429	0.01437	0.01519	-8	0.00033	0.00033	0.00033	0
Ni, Diss	Operations	Apr	13	0.00020	0.00020	0.00021	0	0.00061	0.00060	0.00088	159	0.00060	0.00059	0.00086	153	0.00061	0.00061	0.00061	0	0.02364	0.02365	0.02371	0	0.00028	0.00028	0.00028	1	0.00054	0.00054	0.00054	0	0.01717	0.01715	0.01744	1	0.00033	0.00033	0.00033	0
Ni, Diss	Operations	May	13	0.00020	0.00020	0.00020	0	0.00037	0.00037	0.00049	61	0.00037	0.00037	0.00048	48	0.00039	0.00039	0.00039	0	0.02745	0.02745	0.02751	0	0.00027	0.00027	0.00027	2	0.00058	0.00058	0.00058	0	0.07166	0.07171	0.07197	6	0.00020	0.00020	0.00020	2
Ni, Diss	Operations	Jun	13	0.00020	0.00020	0.00020	0	0.00023	0.00023	0.00025	15	0.00023	0.00023	0.00025	14	0.00038	0.00038	0.00038	0	0.03852	0.03852	0.03855	0	0.00027	0.00027	0.00027	2	0.00058	0.00058	0.00058	0	0.05518	0.05518	0.05522	0	0.00020	0.00020	0.00020	0
Ni, Diss	Operations	Jul	13	0.00020	0.00020	0.00020	0	0.00023	0.00023	0.00025	13	0.00023	0.00023	0.00025	13	0.00098	0.00098	0.00098	0	0.03385	0.03385	0.03386	0	0.00028	0.00028	0.00028	2	0.00053	0.00053	0.00053	0	0.02435	0.02435	0.02435	0	0.00020	0.00020	0.00020	0
Ni, Diss	Operations	Aug	13	0.00020	0.00020	0.00020	0	0.00024	0.00024	0.00026	17	0.00024	0.00024	0.00026	16	0.00099	0.00099	0.00099	1	0.02658	0.02658	0.02658	0	0.00028	0.00028	0.00028	2	0.00053	0.00053	0.00053	0	0.02345	0.02345	0.02348	0	0.00020	0.00020	0.00020	0
Ni, Diss	Operations	Sep	13	0.00021	0.00021	0.00021	0	0.00026	0.00025	0.00028	19	0.00026	0.00026	0.00028	18	0.00066	0.00066	0.00066	1	0.02495	0.02495	0.02497	0	0.00028	0.00028	0.00028	2	0.00041	0.00041	0.00041	1	0.02828	0.02828	0.02832	0	0.00023	0.00023	0.00023	0
Ni, Diss	Operations	Oct	13	0.00021	0.00021	0.00021	0	0.00026	0.00026	0.00029	19	0.00026	0.00026	0.00029	19	0.00065	0.00065	0.00065	1	0.02656	0.02656	0.02657	0	0.00028	0.00028	0.00028	2	0.00041	0.00041	0.00041	0	0.03756	0.03755	0.03758	0	0.00023	0.00023	0.00023	0
Ni, Diss	Operations	Nov	13	0.00020	0.00020	0.00020	0	0.00023	0.00023	0.00025	14	0.00023	0.00023	0.00025	14	0.00061	0.00061	0.00061	1	0.02762	0.02762	0.02763	0	0.00028	0.00028	0.00028	2	0.00054	0.00054	0.00054	-1	0.03530	0.03530	0.03531	0	0.00033	0.00033	0.00033	-1
Ni, Diss	Operations	Dec	13	0.00020	0.00020	0.00020	0	0.00022	0.00022	0.00024	11	0.00022	0.00022	0.00024	11	0.00061	0.00061	0.00061	0	0.02758	0.02758	0.02759	0	0.00028	0.00028	0.00028	2	0.00054	0.00054	0.00054	0	0.03321	0.03321	0.03321	0	0.00033	0.00033	0.00033	0
Ni, Diss	Closure	Jan	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00061	0.00061	0.00061	0	0.02691	0.02690	0.02691	0	0.00027	0.00027	0.00028	3	0.00054	0.00054	0.00054	0	0.02582	0.02582	0.02582	0	0.00033	0.00033	0.00033	0
Ni, Diss	Closure	Feb	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00061	0.00061	0.00061	0	0.02582	0.02581	0.02582	0	0.00027	0.00027	0.00028	3	0.00054	0.00054	0.00054	0	0.01853	0.01850	0.01853	0	0.00033	0.00033	0.00033	0
Ni, Diss	Closure	Mar	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00061	0.00061	0.00061	0	0.02472	0.02470	0.02472	0	0.00027	0.00027	0.00028	3	0.00054	0.00054	0.00054	0	0.01560	0.01560	0.01561	0	0.00033	0.00033	0.00033	0
Ni, Diss	Closure	Apr	6	0.00020	0.00020	0.00021	0	0.00024	0.00024	0.00024	2	0.00024	0.00024	0.00024	2	0.00061	0.00061	0.00061	0	0.02383	0.02382	0.02383	0	0.00027	0.00027	0.00028	3	0.00054	0.00054	0.00054	0	0.01776	0.01782	0.01795	4	0.00033	0.00033	0.00033	0
Ni, Diss	Closure	May	6	0.00020	0.00020	0.00020	0	0.00023	0.00023	0.00023	0	0.00024	0.00024	0.00024	-4	0.00039	0.00039	0.00039	0	0.02763	0.02762	0.02763	1	0.00026	0.00027	0.00027	3	0.00058	0.00058	0.00058	0	0.07244	0.07248	0.07257	7	0.00020	0.00020	0.00020	2
Ni, Diss	Closure	Jun	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00038	0.00038	0.00038	0	0.03865	0.03865	0.03865	0	0.00026	0.00027	0.00027	4	0.00058	0.00058	0.00058	0	0.05540	0.05540	0.05540	0	0.00020	0.00020	0.00020	0
Ni, Diss	Closure	Jul	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00098	0.00098	0.00098	0	0.03395	0.03395	0.03395	0	0.00027	0.00027	0.00028	4	0.00053	0.00053	0.00053	0	0.02442	0.02442	0.02442	0	0.00020	0.00020	0.00020	0
Ni, Diss	Closure	Aug	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	-1	0.00099	0.00099	0.00099	1	0.02667	0.02667	0.02667	0	0.00027	0.00028	0.00028	4	0.00053	0.00053	0.00053	0	0.02355	0.02355	0.02355	0	0.00020	0.00020	0.00020	0
Ni, Diss	Closure	Sep	6	0.00021	0.00021	0.00021	0	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	0	0.00066	0.00066	0.00066	1	0.02504	0.02504	0.02504	0	0.00027	0.00028	0.00028	4	0.00041	0.00041	0.00041	1	0.02840	0.02840	0.02840	0	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Oct	6	0.00021	0.00021	0.00021	0	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	0	0.00065	0.00065	0.00065	1	0.02664	0.02664	0.02664	0	0.00027	0.00027	0.00028	4	0.00041	0.00041	0.00041	0	0.03765	0.03765	0.03765	0	0.00023	0.00023	0.00023	0
Ni, Diss	Closure	Nov	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00061	0.00061	0.00061	1	0.02769	0.02769	0.02769	0	0.00027	0.00027	0.00028	4	0.00054	0.00054	0.00054	-1	0.03533	0.03533	0.03533	0	0.00033	0.00033	0.00033	-1
Ni, Diss	Closure	Dec	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00061	0.00061	0.00061	0	0.02764	0.02764	0.02764	0	0.00027	0.00027	0.00027	4	0.00054	0.00054	0.00054	0	0.03322	0.03322	0.03322	0	0.00033	0.00033	0.00033	0
Ni, Diss	Post-Closure	Jan	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00049	0.00044	0.00052	121	0.00065	0.00065	0.00070	8	0.02690	0.02689	0.02692	0	0.00165	0.00168	0.00334	557	0.01712	0.01423	0.01870	2535	0.02575	0.02575	0.02582	-1	0.00033	0.00033	0.00034	1
Ni, Diss	Post-Closure	Feb	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00063	0.00056	0.00068	180	0.00065	0.00065	0.00070	7	0.02579	0.02579	0.02583	0	0.00168	0.00170	0.00338	565	0.01735	0.01442	0.01894	2570	0.01853	0.01850	0.01856	-1	0.00033	0.00033	0.00034	1
Ni, Diss	Post-Closure	Mar	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00210	0.00177	0.00230	785	0.00065	0.00065	0.00070	7	0.02468	0.02467	0.02473	0	0.00173	0.00174	0.00346	580	0.01826	0.01518	0.01991	2711	0.01585	0.01577	0.01601	1	0.00033	0.00033	0.00034	1
Ni, Diss	Post-Closure	Apr	109	0.00021	0.00023	0.00027	11	0.00024	0.00026	0.00030	11	0.00288	0.00251	0.00325	981	0.00065	0.00065	0.00070	7	0.02378	0.02378	0.02384	0	0.00179	0.00178	0.00354	599	0.02048	0.02006	0.04518	3615	0.01813	0.01808	0.01849	6	0.00033	0.00033	0.00033	0
Ni, Diss	Post-Closure	May	109	0.00020	0.00021	0.00023	4	0.00023	0.00024	0.00025	3	0.00111	0.00099	0.00123	293	0.00046	0.00046	0.00053	17	0.02759	0.02758	0.02765	1	0.00174	0.00172	0.00340	584	0.01304	0.01185	0.01433	1944	0.07120	0.07138	0.07266	5	0.00020	0.00020	0.00020	2
Ni, Diss	Post-Closure	Jun	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00030	0.00028	0.00031	39	0.00041	0.00041	0.00044	8	0.03861	0.03861	0.03866	0	0.00172	0.00168	0.00331	568	0.01639	0.01466	0.01793	2428	0.05529	0.05530	0.05541	0	0.00020	0.00020	0.00020	0
Ni, Diss	Post-Closure	Jul	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00030	0.00028	0.00031	38	0.00101	0.00101	0.00104	3	0.03392	0.03392	0.03396	0	0.00180	0.00174	0.00344	579	0.01577	0.01383	0.01722	2510	0.02441	0.02441	0.02443	0	0.00020	0.00020	0.00020	0
Ni, Diss	Post-Closure	Aug	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00021	0	0.00032	0.00030	0.00033	48	0.00102	0.00102	0.00105	4	0.02665	0.02665	0.02668	0	0.00186	0.00178	0.00351	583	0.01598	0.01415	0.01749	2570	0.02354	0.02353	0.02356	0	0.00020	0.00020	0.00020	0
Ni, Diss	Post-Closure	Sep	109	0.00021	0.00021	0.00021	1	0.00021	0.00022	0.00022	1	0.00039	0.00037	0.00042	71	0.00071	0.00071	0.00076	8	0.02502	0.02502	0.02505	0	0.00184	0.00175	0.00343	570	0.01651	0.01469	0.01806	3482	0.02835	0.02835	0.02841	0	0.00023	0.00023	0.00023	0
Ni, Diss	Post-Closure	Oct	109	0.00021	0.00021	0.00022	1	0.00021	0.00022	0.00022	1	0.00045	0.00042	0.00048	94	0.00072	0.00072	0.00079	11	0.02662	0.02662	0.02665	0	0.00181	0.00171	0.00334	562	0.01789	0.01641	0.01964	3903	0.03752	0.03753	0.03767	0	0.00023	0.00023	0.00023	0
Ni, Diss	Post-Closure	Nov	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00038	0.00035	0.00040	73	0.00067	0.00067	0.00074	11	0.02767	0.02767	0.02770	0	0.00180	0.00170	0.00332	562	0.01928	0.01862	0.02151	3349	0.03525	0.03526	0.03534	0	0.00033	0.00033	0.00033	0
Ni, Diss	Post-Closure	Dec	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00037	0.00034	0.00039	69	0.00066	0.00066	0.00072	9	0.02763	0.02762	0.02765	0	0.00181	0.00170	0.00332	564	0.01749	0.01465	0.01905	2614	0.03314	0.03315	0.03322	0	0.00033	0.00033	0.00034	1
Ni, Tot	Construction	Jan	2	0.00020	0.00020	0.00020	0	0.00021	0.00021	0.00021	3	0.00021	0.00021	0.00021	3	0.00074	0.00074	0.00074	0	*0.02724*	*0.02724*	*0.02727*	0	0.00038	0.00038	0.00038	0	0.00074	0.00074	0.00074	0	*0.02638*	*0.02638*	*0.02639*	-1	0.00042	0.00042	0.00042	0
Ni, Tot	Construction	Feb	2	0.00020	0.00020	0.00020	0	0.00021	0.00021	0.00023	7	0.00021	0.00021	0.00023	7	0.00074	0.00074	0.00074	0	*0.02614*	*0.02614*	*0.02616*	0	0.00038	0.00038	0.00038	0	0.00074	0.00074	0.00074	0	0.01869	0.01869	0.01873	-3	0.00042	0.00042	0.00042	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Ni, Tot	Construction	Mar	2	0.00020	0.00020	0.00020	0	0.00028	0.00028	0.00030	42	0.00028	0.00028	0.00030	42	0.00074	0.00074	0.00074	0	0.02501	0.02501	0.02503	0	0.00038	0.00038	0.00038	-1	0.00074	0.00074	0.00074	0	0.01520	0.01520	0.01524	-5	0.00042	0.00042	0.00042	0
Ni, Tot	Construction	Apr	2	0.00021	0.00021	0.00021	0	0.00036	0.00036	0.00037	54	0.00036	0.00036	0.00037	50	0.00074	0.00074	0.00074	0	0.02408	0.02408	0.02410	-1	0.00038	0.00038	0.00038	-1	0.00074	0.00074	0.00074	0	0.01655	0.01655	0.01658	-6	0.00042	0.00042	0.00042	0
Ni, Tot	Construction	May	2	0.00021	0.00021	0.00021	0	0.00029	0.00029	0.00029	17	0.00030	0.00030	0.00030	12	0.00059	0.00059	0.00059	0	0.02785	0.02785	0.02786	0	0.00037	0.00037	0.00037	0	0.00059	0.00059	0.00059	1	0.07135	0.07135	0.07139	5	0.00021	0.00021	0.00021	4
Ni, Tot	Construction	Jun	2	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	2	0.00022	0.00022	0.00022	2	0.00058	0.00058	0.00058	0	0.03891	0.03891	0.03891	0	0.00036	0.00036	0.00036	1	0.00059	0.00059	0.00059	0	0.05529	0.05529	0.05529	0	0.00020	0.00020	0.00020	0
Ni, Tot	Construction	Jul	2	0.00022	0.00022	0.00022	0	0.00023	0.00023	0.00023	2	0.00023	0.00023	0.00023	2	0.00128	0.00128	0.00128	0	0.03422	0.03422	0.03422	0	0.00037	0.00037	0.00037	1	0.00065	0.00065	0.00065	0	0.02439	0.02439	0.02439	0	0.00020	0.00020	0.00020	0
Ni, Tot	Construction	Aug	2	0.00022	0.00022	0.00022	0	0.00023	0.00023	0.00023	3	0.00023	0.00023	0.00023	3	0.00128	0.00128	0.00128	1	0.02693	0.02693	0.02693	0	0.00038	0.00038	0.00038	1	0.00065	0.00065	0.00065	0	0.02349	0.02349	0.02349	0	0.00020	0.00020	0.00020	0
Ni, Tot	Construction	Sep	2	0.00021	0.00021	0.00021	0	0.00023	0.00023	0.00023	5	0.00023	0.00023	0.00023	5	0.00078	0.00078	0.00078	1	0.02528	0.02528	0.02528	0	0.00039	0.00039	0.00039	0	0.00044	0.00044	0.00044	2	0.02830	0.02830	0.02830	0	0.00035	0.00035	0.00035	-1
Ni, Tot	Construction	Oct	2	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00023	4	0.00023	0.00023	0.00023	3	0.00076	0.00076	0.00076	1	0.02681	0.02681	0.02681	0	0.00039	0.00039	0.00039	0	0.00043	0.00043	0.00043	0	0.03751	0.03751	0.03751	0	0.00036	0.00036	0.00036	0
Ni, Tot	Construction	Nov	2	0.00020	0.00020	0.00020	0	0.00021	0.00021	0.00021	2	0.00021	0.00021	0.00021	2	0.00073	0.00073	0.00073	0	0.02790	0.02790	0.02790	0	0.00039	0.00039	0.00039	0	0.00073	0.00073	0.00073	-1	0.03634	0.03634	0.03634	0	0.00042	0.00042	0.00042	0
Ni, Tot	Construction	Dec	2	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00021	2	0.00020	0.00020	0.00021	2	0.00074	0.00074	0.00074	0	0.02796	0.02796	0.02796	0	0.00039	0.00039	0.00039	-1	0.00074	0.00074	0.00074	0	0.03412	0.03412	0.03412	-1	0.00042	0.00042	0.00042	0
Ni, Tot	Operations	Jan	13	0.00020	0.00020	0.00020	0	0.00025	0.00025	0.00028	24	0.00025	0.00025	0.00028	24	0.00074	0.00074	0.00074	0	0.02732	0.02731	0.02732	0	0.00039	0.00039	0.00039	-1	0.00074	0.00074	0.00074	0	0.02664	0.02665	0.02677	0	0.00042	0.00042	0.00042	0
Ni, Tot	Operations	Feb	13	0.00020	0.00020	0.00020	0	0.00037	0.00038	0.00052	90	0.00037	0.00038	0.00052	90	0.00074	0.00074	0.00074	0	0.02621	0.02621	0.02624	0	0.00039	0.00039	0.00039	-1	0.00074	0.00074	0.00074	0	0.01867	0.01874	0.01910	-2	0.00042	0.00042	0.00042	0
Ni, Tot	Operations	Mar	13	0.00020	0.00020	0.00020	0	0.00066	0.00066	0.00094	231	0.00066	0.00066	0.00094	230	0.00074	0.00074	0.00074	0	0.02504	0.02504	0.02509	0	0.00039	0.00039	0.00039	-1	0.00074	0.00074	0.00074	0	0.01480	0.01488	0.01573	-7	0.00042	0.00042	0.00042	0
Ni, Tot	Operations	Apr	13	0.00021	0.00021	0.00021	0	0.00070	0.00069	0.00098	195	0.00069	0.00067	0.00096	183	0.00074	0.00074	0.00074	0	0.02409	0.02410	0.02416	0	0.00039	0.00039	0.00039	-1	0.00074	0.00074	0.00074	0	0.01778	0.01775	0.01805	1	0.00042	0.00042	0.00042	0
Ni, Tot	Operations	May	13	0.00021	0.00021	0.00021	0	0.00043	0.00043	0.00054	73	0.00042	0.00042	0.00053	58	0.00059	0.00059	0.00059	0	0.02789	0.02790	0.02796	0	0.00038	0.00037	0.00038	0	0.00059	0.00059	0.00059	1	0.07170	0.07174	0.07200	6	0.00021	0.00021	0.00021	4
Ni, Tot	Operations	Jun	13	0.00021	0.00021	0.00021	0	0.00025	0.00025	0.00027	17	0.00025	0.00025	0.00027	16	0.00059	0.00059	0.00059	0	0.03893	0.03893	0.03896	0	0.00037	0.00037	0.00037	1	0.00059	0.00059	0.00059	0	0.05519	0.05520	0.05524	0	0.00020	0.00020	0.00020	0
Ni, Tot	Operations	Jul	13	0.00022	0.00022	0.00022	0	0.00026	0.00026	0.00028	15	0.00026	0.00026	0.00028	14	0.00128	0.00128	0.00128	0	0.03420	0.03420	0.03421	0	0.00038	0.00038	0.00038	1	0.00065	0.00065	0.00065	0	0.02437	0.02437	0.02438	0	0.00020	0.00020	0.00020	0
Ni, Tot	Operations	Aug	13	0.00022	0.00022	0.00022	0	0.00027	0.00027	0.00029	19	0.00027	0.00027	0.00029	18	0.00128	0.00128	0.00128	1	0.02691	0.02690	0.02691	0	0.00039	0.00039	0.00039	0	0.00065	0.00065	0.00065	0	0.02347	0.02347	0.02350	0	0.00020	0.00020	0.00020	0
Ni, Tot	Operations	Sep	13	0.00021	0.00021	0.00021	0	0.00027	0.00026	0.00029	23	0.00027	0.00027	0.00030	22	0.00078	0.00078	0.00078	1	0.02526	0.02526	0.02528	0	0.00040	0.00040	0.00040	0	0.00044	0.00044	0.00044	2	0.02829	0.02829	0.02833	0	0.00035	0.00035	0.00035	-1
Ni, Tot	Operations	Oct	13	0.00021	0.00021	0.00021	0	0.00026	0.00027	0.00030	23	0.00027	0.00027	0.00030	22	0.00076	0.00076	0.00076	1	0.02681	0.02681	0.02683	0	0.00040	0.00040	0.00040	0	0.00043	0.00043	0.00043	0	0.03757	0.03756	0.03759	0	0.00036	0.00036	0.00036	0
Ni, Tot	Operations	Nov	13	0.00020	0.00020	0.00020	0	0.00023	0.00024	0.00026	17	0.00023	0.00024	0.00026	16	0.00073	0.00073	0.00073	0	0.02792	0.02792	0.02793	0	0.00040	0.00040	0.00040	-1	0.00073	0.00073	0.00073	-1	0.03643	0.03643	0.03644	0	0.00042	0.00042	0.00042	0
Ni, Tot	Operations	Dec	13	0.00020	0.00020	0.00020	0	0.00023	0.00023	0.00024	13	0.00023	0.00023	0.00024	13	0.00074	0.00074	0.00074	0	0.02800	0.02799	0.02800	0	0.00039	0.00039	0.00039	-1	0.00074	0.00074	0.00074	0	0.03428	0.03428	0.03428	0	0.00042	0.00042	0.00042	0
Ni, Tot	Closure	Jan	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00020	0.00020	0.00020	1	0.00074	0.00074	0.00074	0	0.02737	0.02736	0.02737	0	0.00039	0.00039	0.00039	1	0.00074	0.00074	0.00074	0	0.02665	0.02665	0.02665	0	0.00042	0.00042	0.00042	0
Ni, Tot	Closure	Feb	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00074	0.00074	0.00074	0	0.02628	0.02627	0.02628	0	0.00038	0.00039	0.00039	1	0.00074	0.00074	0.00074	0	0.01912	0.01909	0.01912	-1	0.00042	0.00042	0.00042	0
Ni, Tot	Closure	Mar	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	1	0.00074	0.00074	0.00074	0	0.02517	0.02516	0.02517	0	0.00038	0.00038	0.00039	1	0.00074	0.00074	0.00074	0	0.01610	0.01610	0.01611	0	0.00042	0.00042	0.00042	0
Ni, Tot	Closure	Apr	6	0.00021	0.00021	0.00021	0	0.00024	0.00024	0.00024	3	0.00024	0.00024	0.00024	2	0.00074	0.00074	0.00074	0	0.02428	0.02427	0.02428	0	0.00038	0.00038	0.00039	1	0.00074	0.00074	0.00074	0	0.01833	0.01840	0.01853	4	0.00042	0.00042	0.00042	0
Ni, Tot	Closure	May	6	0.00021	0.00021	0.00021	0	0.00025	0.00025	0.00025	1	0.00026	0.00026	0.00026	-3	0.00059	0.00059	0.00059	0	0.02807	0.02806	0.02807	1	0.00037	0.00037	0.00037	1	0.00059	0.00059	0.00059	1	0.07245	0.07250	0.07259	7	0.00021	0.00021	0.00021	4
Ni, Tot	Closure	Jun	6	0.00021	0.00021	0.00021	0	0.00021	0.00021	0.00021	0	0.00021	0.00021	0.00021	0	0.00059	0.00059	0.00059	0	0.03906	0.03906	0.03906	0	0.00036	0.00036	0.00037	2	0.00059	0.00059	0.00059	0	0.05541	0.05541	0.05541	0	0.00020	0.00020	0.00020	0
Ni, Tot	Closure	Jul	6	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00022	0	0.00128	0.00128	0.00128	0	0.03430	0.03430	0.03430	0	0.00037	0.00037	0.00037	2	0.00065	0.00065	0.00065	0	0.02444	0.02444	0.02444	0	0.00020	0.00020	0.00020	0
Ni, Tot	Closure	Aug	6	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00022	0	0.00023	0.00023	0.00023	-1	0.00128	0.00128	0.00128	1	0.02700	0.02700	0.02700	0	0.00038	0.00038	0.00039	2	0.00065	0.00065	0.00065	0	0.02356	0.02356	0.02356	0	0.00020	0.00020	0.00020	0
Ni, Tot	Closure	Sep	6	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00022	0	0.00078	0.00078	0.00078	1	0.02535	0.02535	0.02535	0	0.00039	0.00039	0.00039	2	0.00044	0.00044	0.00044	2	0.02840	0.02840	0.02840	0	0.00035	0.00035	0.00035	-1
Ni, Tot	Closure	Oct	6	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00022	0	0.00076	0.00076	0.00076	1	0.02689	0.02689	0.02689	0	0.00039	0.00039	0.00040	1	0.00043	0.00043	0.00043	0	0.03765	0.03765	0.03765	0	0.00036	0.00036	0.00036	0
Ni, Tot	Closure	Nov	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00073	0.00073	0.00073	1	0.02798	0.02798	0.02798	0	0.00039	0.00039	0.00039	1	0.00073	0.00073	0.00073	-1	0.03647	0.03647	0.03647	0	0.00042	0.00042	0.00042	0
Ni, Tot	Closure	Dec	6	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00074	0.00074	0.00074	0	0.02805	0.02805	0.02805	0	0.00039	0.00039	0.00039	1	0.00074	0.00074	0.00074	0	0.03429	0.03429	0.03429	0	0.00042	0.00042	0.00042	0
Ni, Tot	Post-Closure	Jan	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00052	0.00047	0.00056	134	0.00078	0.00078	0.00083	6	0.02736	0.02735	0.02738	0	0.00177	0.00180	0.00346	375	0.01897	0.01577	0.02073	2031	0.02659	0.02659	0.02665	-1	0.00042	0.00042	0.00043	1
Ni, Tot	Post-Closure	Feb	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00068	0.00060	0.00074	199	0.00078	0.00078	0.00083	6	0.02626	0.02625	0.02629	0	0.00180	0.00182	0.00350	382	0.01922	0.01598	0.02099	2059	0.01912	0.01911	0.01919	0	0.00042	0.00042	0.00043	1
Ni, Tot	Post-Closure	Mar	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00231	0.00194	0.00253	870	0.00078	0.00078	0.00083	6	0.02514	0.02514	0.02518	0	0.00185	0.00185	0.00357	393	0.02022	0.01682	0.02207	2172	0.01648	0.01638	0.01666	2	0.00042	0.00042	0.00043	1
Ni, Tot	Post-Closure	Apr	109	0.00021	0.00023	0.00028	11	0.00024	0.00026	0.00030	12	0.00315	0.00273	0.00355	1042	0.00078	0.00078	0.00083	6	0.02425	0.02424	0.02429	0	0.00191	0.00189	0.00366	407	0.02247	0.02164	0.04531	2824	0.01882	0.01877	0.01925	7	0.00042	0.00042	0.00042	0
Ni, Tot	Post-Closure	May	109	0.00021	0.00022	0.00024	4	0.00025	0.00026	0.00027	3	0.00122	0.00108	0.00134	302	0.00066	0.00066	0.00073	11	0.02804	0.02803	0.02809	1	0.00185	0.00182	0.00351	408	0.01427	0.01286	0.01569	2080	0.07127	0.07144	0.07267	5	0.00021	0.00021	0.00021	4
Ni, Tot	Post-Closure	Jun	109	0.00021	0.00021	0.00021	0	0.00021	0.00021	0.00021	0	0.00032	0.00030	0.00033	41	0.00062	0.00062	0.00065	6	0.03903	0.03902	0.03907	0	0.00182	0.00177	0.00341	409	0.01795	0.01595	0.01964	2603	0.05530	0.05531	0.05541	0	0.00020	0.00020	0.00020	0
Ni, Tot	Post-Closure	Jul	109	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00022	0	0.00033	0.00031	0.00034	38	0.00131	0.00130	0.00133	2	0.03427	0.03427	0.03431	0	0.00190	0.00184	0.00354	418	0.01733	0.01513	0.01893	2228	0.02443	0.02443	0.02444	0	0.00020	0.00020	0.00020	0
Ni, Tot	Post-Closure	Aug	109	0.00022	0.00022	0.00022	0	0.00022	0.00022	0.00023	0	0.00035	0.00033	0.00037	48	0.00131	0.00131	0.00135	3	0.02698	0.02698	0.02701	0	0.00196	0.00189	0.00361	412	0.01754	0.01545	0.01920	2277	0.02356	0.02356	0.02357	0	0.00020	0.00020	0.00020	0
Ni, Tot	Post-Closure	Sep	109	0.00021	0.00021	0.00021	0	0.00022	0.00022	0.00022	1	0.00041	0.00039	0.00044	77	0.00083	0.00082	0.00088	7	0.02534	0.02533	0.02536	0	0.00195	0.00186	0.00354	391	0.01812	0.01602	0.01982	3625	0.02836	0.02836	0.02841	0	0.00035	0.00035	0.00036	-1
Ni, Tot	Post-Closure	Oct	109	0.00021	0.00021	0.00022	1	0.00022	0.00022	0.00022	1	0.00048	0.00044	0.00051	102	0.00083	0.00083	0.00090	9	0.02688	0.02687	0.02690	0	0.00193	0.00183	0.00346	377	0.01960	0.01783	0.02151	4046	0.03754	0.03754	0.03767	0	0.00036	0.00036	0.00036	0
Ni, Tot	Post-Closure	Nov	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00039	0.00037	0.00042	80	0.00080	0.00080	0.00087	9	0.02798	0.02797	0.02800	0	0.00192	0.00182	0.00344	376	0.02121	0.02023	0.02302	2634	0.03639	0.03640	0.03648	0	0.00042	0.00042	0.00042	0
Ni, Tot	Post-Closure	Dec	109	0.00020	0.00020	0.00020	0	0.00020	0.00020	0.00020	0	0.00038	0.00035	0.00041	77	0.00079	0.00079	0.00085	8	0.02804	0.02804	0.02806	0	0.00193	0.00182	0.00344	379	0.01938	0.01625	0.02112	2095	0.03422	0.03422	0.03429	0	0.00042	0.00042	0.00043	1
Se, Tot	Construction	Jan	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Feb	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Mar	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Apr	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	7	0.00005	0.00005	0.00005	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	5	0.00005	0.00005	0.00005	0
Se, Tot	Construction	May	2	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	1
Se, Tot	Construction	Jun	2	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0
Se, Tot	Construction	Jul	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0
Se, Tot	Construction	Aug	2	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	1	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Se, Tot	Construction	Sep	2	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	1	0.00006	0.00006	0.00006	1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0
Se, Tot	Construction	Oct	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0
Se, Tot	Construction	Nov	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1
Se, Tot	Construction	Dec	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Jan	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Feb	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00006	9	0.00005	0.00005	0.00006	8	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00006	7	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Mar	13	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00007	23	0.00006	0.00006	0.00007	22	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00007	19	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Apr	13	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00007	20	0.00006	0.00006	0.00007	19	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	16	0.00005	0.00005	0.00005	0
Se, Tot	Operations	May	13	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	7	0.00005	0.00005	0.00005	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	3	0.00004	0.00004	0.00004	1
Se, Tot	Operations	Jun	13	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0
Se, Tot	Operations	Jul	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	2	0.00004	0.00004	0.00004	2	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00005	1	0.00005	0.00005	0.00005	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	1	0.00004	0.00004	0.00004	0
Se, Tot	Operations	Aug	13	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	3	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	1	0.00005	0.00005	0.00005	-1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	2	0.00005	0.00005	0.00005	0
Se, Tot	Operations	Sep	13	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	2	0.00006	0.00006	0.00006	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1	0.00004	0.00004	0.00004	0	0.00006	0.00006	0.00006	2	0.00004	0.00004	0.00004	0
Se, Tot	Operations	Oct	13	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	2	0.00006	0.00006	0.00006	2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00006	1	0.00004	0.00004	0.00004	0
Se, Tot	Operations	Nov	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1
Se, Tot	Operations	Dec	13	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Se, Tot	Closure	Jan	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Feb	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Mar	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Apr	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Closure	May	6	0.00004	0.00004	0.00004	-1	0.00005	0.00005	0.00005	-2	0.00005	0.00005	0.00005	-2	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	-2	0.00004	0.00004	0.00004	1
Se, Tot	Closure	Jun	6	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0
Se, Tot	Closure	Jul	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0
Se, Tot	Closure	Aug	6	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0
Se, Tot	Closure	Sep	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0
Se, Tot	Closure	Oct	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	0	0.00005	0.00005	0.00005	0	0.00004	0.00004	0.00004	0
Se, Tot	Closure	Nov	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	-1
Se, Tot	Closure	Dec	6	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0
Se, Tot	Post-Closure	Jan	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00006	0.00005	0.00006	10	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	4	0.00007	0.00007	0.00009	38	0.00037	0.00033	0.00043	564	0.00005	0.00005	0.00005	7	0.00005	0.00005	0.00005	1
Se, Tot	Post-Closure	Feb	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	14	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	4	0.00007	0.00007	0.00009	39	0.00037	0.00034	0.00044	572	0.00006	0.00006	0.00006	12	0.00005	0.00005	0.00005	1
Se, Tot	Post-Closure	Mar	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00009	0.00008	0.00009	63	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	6	0.00007	0.00007	0.00010	40	0.00039	0.00035	0.00046	604	0.00008	0.00008	0.00009	54	0.00005	0.00005	0.00005	1
Se, Tot	Post-Closure	Apr	109	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	1	0.00011	0.00010	0.00011	94	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	7	0.00007	0.00007	0.00010	41	0.00045	0.00043	0.00065	765	0.00010	0.00009	0.00010	78	0.00005	0.00005	0.00005	0
Se, Tot	Post-Closure	May	109	0.00004	0.00004	0.00005	-1	0.00005	0.00005	0.00005	-1	0.00006	0.00006	0.00006	32	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	8	0.00007	0.00007	0.00009	41	0.00031	0.00028	0.00034	522	0.00006	0.00005	0.00006	19	0.00004	0.00004	0.00004	1
Se, Tot	Post-Closure	Jun	109	0.00004	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	5	0.00007	0.00007	0.00009	39	0.00038	0.00034	0.00041	650	0.00005	0.00005	0.00005	3	0.00004	0.00004	0.00004	0
Se, Tot	Post-Closure	Jul	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	3	0.00007	0.00007	0.00010	40	0.00036	0.00032	0.00038	699	0.00004	0.00004	0.00004	3	0.00004	0.00004	0.00004	0
Se, Tot	Post-Closure	Aug	109	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	0	0.00004	0.00004	0.00004	5	0.00005	0.00005	0.00005	1	0.00004	0.00004	0.00004	3	0.00007	0.00007	0.00010	40	0.00037	0.00033	0.00039	716	0.00004	0.00004	0.00004	4	0.00005	0.00005	0.00005	0
Se, Tot	Post-Closure	Sep	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	6	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	3	0.00007	0.00007	0.00010	39	0.00038	0.00034	0.00040	743	0.00006	0.00006	0.00006	5	0.00004	0.00004	0.00004	0
Se, Tot	Post-Closure	Oct	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00006	0.00006	0.00006	8	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	4	0.00007	0.00007	0.00010	38	0.00041	0.00037	0.00045	832	0.00006	0.00006	0.00006	5	0.00004	0.00004	0.00004	0
Se, Tot	Post-Closure	Nov	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	6	0.00005	0.00005	0.00005	2	0.00005	0.00005	0.00005	4	0.00007	0.00007	0.00009	38	0.00044	0.00043	0.00049	757	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	0
Se, Tot	Post-Closure	Dec	109	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	0	0.00005	0.00005	0.00005	6	0.00005	0.00005	0.00005	1	0.00005	0.00005	0.00005	4	0.00007	0.00007	0.00009	38	0.00038	0.00034	0.00044	583	0.00005	0.00005	0.00005	4	0.00005	0.00005	0.00005	1
Ag, Tot	Construction	Jan	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Feb	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Mar	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	21	0.000006	0.000006	0.000006	21	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	18	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Apr	2	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	30	0.000007	0.000007	0.000007	29	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	24	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	May	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	10	0.000005	0.000005	0.000005	9	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Jun	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Aug	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Sep	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Oct	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Nov	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Dec	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Jan	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Feb	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Mar	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	13	0.000006	0.000006	0.000006	12	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	10	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Apr	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	12	0.000006	0.000006	0.000006	12	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	10	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	May	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Jun	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Jul	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Aug	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Sep	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Oct	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Nov	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Dec	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	-2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Jan	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Feb	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Mar	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Apr	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	May	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Jun	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Jul	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Aug	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Sep	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Oct	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Nov	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Dec	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Jan	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000007	17	0.000023	0.000020	0.000025	299	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Feb	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	8	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000007	18	0.000024	0.000020	0.000025	303	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Mar	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	34	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000007	18	0.000025	0.000021	0.000026	321	0.000007	0.000006	0.000007	29	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Apr	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000008	0.000007	0.000008	46	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	4	0.000006	0.000006	0.000007	19	0.000025	0.000024	0.000030	373	0.000007	0.000007	0.000008	38	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	May	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	15	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	4	0.000006	0.000006	0.000007	18	0.000018	0.000016	0.000020	227	0.000006	0.000005	0.000006	8	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Jun	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000007	17	0.000021	0.000019	0.000023	284	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Jul	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000007	18	0.000021	0.000019	0.000023	273	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Aug	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000007	18	0.000021	0.000019	0.000023	278	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Sep	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000007	17	0.000022	0.000019	0.000024	289	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Oct	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000007	17	0.000023	0.000021	0.000025	320	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Ag, Tot	Post-Closure	Nov	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000007	17	0.000025	0.000023	0.000027	363	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Dec	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000007	17	0.000024	0.000021	0.000025	311	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000031	0.000031	0.000031	0	0.000035	0.000035	0.000035	-1	0.000042	0.000042	0.000042	0	0.000048	0.000048	0.000048	0	0.000039	0.000039	0.000039	0
Tl, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000032	0.000032	0.000032	0	0.000035	0.000035	0.000035	-1	0.000042	0.000042	0.000042	0	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	0
Tl, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000033	0	0.000035	0.000035	0.000035	-1	0.000042	0.000042	0.000042	0	0.000050	0.000050	0.000050	2	0.000039	0.000039	0.000039	0
Tl, Tot	Construction	Apr	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	2	0.000050	0.000050	0.000050	2	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000034	1	0.000034	0.000034	0.000034	-1	0.000042	0.000042	0.000042	0	0.000049	0.000049	0.000049	2	0.000039	0.000039	0.000039	0
Tl, Tot	Construction	May	2	0.000043	0.000043	0.000043	-1	0.000044	0.000044	0.000044	-1	0.000044	0.000044	0.000044	-1	0.000043	0.000043	0.000043	0	0.000035	0.000035	0.000035	0	0.000035	0.000035	0.000035	-1	0.000044	0.000044	0.000044	0	0.000042	0.000042	0.000042	-1	0.000035	0.000035	0.000035	0
Tl, Tot	Construction	Jun	2	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000039	0.000039	0.000039	0	0.000036	0.000036	0.000036	-2	0.000044	0.000044	0.000044	0	0.000042	0.000042	0.000043	0	0.000035	0.000035	0.000035	0
Tl, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000032	0.000032	0.000032	0	0.000030	0.000030	0.000030	0	0.000036	0.000036	0.000036	-2	0.000032	0.000032	0.000032	1	0.000011	0.000011	0.000011	0	0.000006	0.000006	0.000006	19
Tl, Tot	Construction	Aug	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	2	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	0	0.000037	0.000037	0.000037	-2	0.000032	0.000032	0.000032	0	0.000011	0.000011	0.000011	1	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Sep	2	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	1	0.000032	0.000032	0.000032	1	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	1	0.000037	0.000037	0.000037	-2	0.000032	0.000032	0.000032	0	0.000026	0.000026	0.000026	1	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Oct	2	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000023	0.000023	0.000023	0	0.000036	0.000036	0.000036	-1	0.000032	0.000032	0.000032	0	0.000024	0.000024	0.000024	0	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000041	0.000041	0.000041	0	0.000026	0.000026	0.000026	1	0.000036	0.000036	0.000036	-1	0.000042	0.000042	0.000042	-1	0.000047	0.000047	0.000047	1	0.000038	0.000038	0.000038	-3
Tl, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000029	0.000029	0.000029	1	0.000035	0.000035	0.000036	-1	0.000042	0.000042	0.000042	0	0.000047	0.000047	0.000047	0	0.000039	0.000039	0.000039	0
Tl, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000031	0.000031	0.000031	0	0.000035	0.000035	0.000035	-3	0.000042	0.000042	0.000042	0	0.000048	0.000048	0.000048	0	0.000039	0.000039	0.000039	0
Tl, Tot	Operations	Feb	13	0.000050	0.000050	0.000050	0	0.000049	0.000050	0.000050	-1	0.000049	0.000049	0.000050	-1	0.000042	0.000042	0.000042	0	0.000032	0.000032	0.000032	0	0.000035	0.000035	0.000035	-3	0.000042	0.000042	0.000042	0	0.000048	0.000048	0.000049	-1	0.000039	0.000039	0.000039	0
Tl, Tot	Operations	Mar	13	0.000050	0.000050	0.000050	0	0.000048	0.000048	0.000050	-4	0.000048	0.000048	0.000050	-4	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000033	0	0.000034	0.000034	0.000035	-3	0.000042	0.000042	0.000042	0	0.000047	0.000047	0.000049	-3	0.000039	0.000039	0.000039	0
Tl, Tot	Operations	Apr	13	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000050	-1	0.000048	0.000048	0.000049	-2	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000033	0	0.000034	0.000034	0.000034	-3	0.000042	0.000042	0.000042	0	0.000047	0.000047	0.000048	-2	0.000039	0.000039	0.000039	0
Tl, Tot	Operations	May	13	0.000043	0.000043	0.000043	-1	0.000044	0.000044	0.000044	-2	0.000044	0.000044	0.000044	-2	0.000043	0.000043	0.000043	0	0.000035	0.000035	0.000035	0	0.000034	0.000034	0.000034	-3	0.000044	0.000044	0.000044	0	0.000042	0.000042	0.000042	-2	0.000035	0.000035	0.000035	0
Tl, Tot	Operations	Jun	13	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000039	0.000039	0.000039	0	0.000035	0.000035	0.000035	-4	0.000044	0.000044	0.000044	0	0.000042	0.000042	0.000042	0	0.000035	0.000035	0.000035	0
Tl, Tot	Operations	Jul	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000006	0.000006	0.000006	2	0.000032	0.000032	0.000032	0	0.000030	0.000030	0.000030	0	0.000036	0.000036	0.000036	-4	0.000032	0.000032	0.000032	1	0.000011	0.000011	0.000011	1	0.000006	0.000006	0.000006	19
Tl, Tot	Operations	Aug	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	4	0.000006	0.000006	0.000006	2	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	0	0.000037	0.000037	0.000037	-3	0.000032	0.000032	0.000032	0	0.000011	0.000011	0.000011	1	0.000005	0.000005	0.000005	0
Tl, Tot	Operations	Sep	13	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	1	0.000037	0.000037	0.000037	-3	0.000032	0.000032	0.000032	0	0.000026	0.000026	0.000026	0	0.000005	0.000005	0.000005	0
Tl, Tot	Operations	Oct	13	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000023	0.000023	0.000023	0	0.000036	0.000036	0.000036	-3	0.000032	0.000032	0.000032	0	0.000023	0.000023	0.000024	0	0.000005	0.000005	0.000005	0
Tl, Tot	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000041	0.000041	0.000041	0	0.000026	0.000026	0.000026	1	0.000036	0.000036	0.000036	-3	0.000042	0.000042	0.000042	-1	0.000047	0.000047	0.000047	1	0.000038	0.000038	0.000038	-3
Tl, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000029	0.000029	0.000029	0	0.000035	0.000035	0.000035	-3	0.000042	0.000042	0.000042	0	0.000047	0.000047	0.000047	0	0.000039	0.000039	0.000039	0
Tl, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000031	0.000031	0.000031	0	0.000035	0.000035	0.000035	-2	0.000042	0.000042	0.000042	0	0.000048	0.000048	0.000048	0	0.000039	0.000039	0.000039	0
Tl, Tot	Closure	Feb	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000032	0.000032	0.000032	0	0.000035	0.000035	0.000035	-2	0.000042	0.000042	0.000042	0	0.000048	0.000048	0.000048	0	0.000039	0.000039	0.000039	0
Tl, Tot	Closure	Mar	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000033	0	0.000035	0.000035	0.000035	-2	0.000042	0.000042	0.000042	0	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	0
Tl, Tot	Closure	Apr	6	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000033	0	0.000034	0.000034	0.000034	-2	0.000042	0.000042	0.000042	0	0.000048	0.000048	0.000048	-1	0.000039	0.000039	0.000039	0
Tl, Tot	Closure	May	6	0.000043	0.000043	0.000043	-1	0.000044	0.000044	0.000044	-2	0.000044	0.000044	0.000044	-2	0.000043	0.000043	0.000043	0	0.000035	0.000035	0.000035	0	0.000035	0.000034	0.000035	-2	0.000044	0.000044	0.000044	0	0.000042	0.000042	0.000042	-2	0.000035	0.000035	0.000035	0
Tl, Tot	Closure	Jun	6	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000039	0.000039	0.000039	0	0.000035	0.000035	0.000035	-2	0.000044	0.000044	0.000044	0	0.000042	0.000042	0.000042	0	0.000035	0.000035	0.000035	0
Tl, Tot	Closure	Jul	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	-2	0.000032	0.000032	0.000032	0	0.000030	0.000030	0.000030	0	0.000036	0.000036	0.000036	-2	0.000032	0.000032	0.000032	1	0.000011	0.000011	0.000011	0	0.000006	0.000006	0.000006	19
Tl, Tot	Closure	Aug	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	-2	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	0	0.000037	0.000037	0.000037	-2	0.000032	0.000032	0.000032	0	0.000011	0.000011	0.000011	0	0.000005	0.000005	0.000005	0
Tl, Tot	Closure	Sep	6	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	0	0.000037	0.000037	0.000037	-2	0.000032	0.000032	0.000032	0	0.000025	0.000025	0.000025	0	0.000005	0.000005	0.000005	0
Tl, Tot	Closure	Oct	6	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000023	0.000023	0.000023	0	0.000036	0.000036	0.000036	-1	0.000032	0.000032	0.000032	0	0.000023	0.000023	0.000023	0	0.000005	0.000005	0.000005	0
Tl, Tot	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000041	0.000041	0.000041	0	0.000026	0.000026	0.000026	0	0.000036	0.000036	0.000036	-1	0.000042	0.000042	0.000042	-1	0.000047	0.000047	0.000047	1	0.000038	0.000038	0.000038	-3
Tl, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000029	0.000029	0.000029	0	0.000035	0.000035	0.000035	-1	0.000042	0.000042	0.000042	0	0.000047	0.000047	0.000047	0	0.000039	0.000039	0.000039	0
Tl, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000031	0.000031	0.000031	1	0.000037	0.000037	0.000040	6	0.000052	0.000050	0.000054	18	0.000048	0.000048	0.000048	0	0.000039	0.000039	0.000039	0
Tl, Tot	Post-Closure	Feb	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000032	0.000032	0.000032	1	0.000037	0.000037	0.000040	6	0.000052	0.000050	0.000055	19	0.000048	0.000048	0.000049	0	0.000039	0.000039	0.000039	0
Tl, Tot	Post-Closure	Mar	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	0	0.000042	0.000042	0.000042	0	0.000033	0.000033	0.000033	1	0.000037	0.000037	0.000040	6	0.000053	0.000051	0.000056	21	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	0
Tl, Tot	Post-Closure	Apr	109	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000050	0.000050	0.000050	1	0.000042	0.000042	0.000042	0	0.000034	0.000034	0.000034	1	0.000037	0.000037	0.000040	6	0.000055	0.000056	0.000097	34	0.000048	0.000048	0.000049	1	0.000039	0.000039	0.000039	0
Tl, Tot	Post-Closure	May	109	0.000043	0.000043	0.000043	-1	0.000044	0.000044	0.000044	-2	0.000044	0.000044	0.000044	-1	0.000044	0.000044	0.000044	0	0.000035	0.000035	0.000035	1	0.000037	0.000037	0.000040	6	0.000052	0.000051	0.000057	16	0.000042	0.000042	0.000042	-1	0.000035	0.000035	0.000035	0
Tl, Tot	Post-Closure	Jun	109	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000044	0	0.000039	0.000039	0.000039	0	0.000038	0.000038	0.000040	5	0.000053	0.000052	0.000058	17	0.000042	0.000042	0.000042	0	0.000035	0.000035	0.000035	0
Tl, Tot	Post-Closure	Jul	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	2	0.000032	0.000032	0.000032	0	0.000030	0.000030	0.000030	0	0.000039	0.000039	0.000041	5	0.000050	0.000047	0.000052	48	0.000011	0.000011	0.000011	1	0.000006	0.000006	0.000006	19
Tl, Tot	Post-Closure	Aug	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	3	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	0	0.000039	0.000039	0.000042	5	0.000051	0.000048	0.000052	50	0.000011	0.000011	0.000011	1	0.000005	0.000005	0.000005	0
Tl, Tot	Post-Closure	Sep	109	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	1	0.000032	0.000032	0.000032	0	0.000021	0.000021	0.000021	1	0.000039	0.000039	0.000042	5	0.000051	0.000048	0.000053	51	0.000026	0.000026	0.000026	1	0.000005	0.000005	0.000005	0
Tl, Tot	Post-Closure	Oct	109	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	0	0.000032	0.000032	0.000032	1	0.000032	0.000032	0.000032	0	0.000023	0.000023	0.000023	1	0.000039	0.000039	0.000041	6	0.000054	0.000051	0.000055	60	0.000024	0.000024	0.000024	1	0.000005	0.000005	0.000005	0
Tl, Tot	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000042	0.000042	0.000042	0	0.000026	0.000026	0.000026	1	0.000038	0.000038	0.000041	6	0.000057	0.000056	0.000068	34	0.000047	0.000047	0.000047	1	0.000038	0.000038	0.000038	-3
Tl, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000029	0.000029	0.000029	1	0.000038	0.000038	0.000040	6	0.000054	0.000051	0.000056	22	0.000047	0.000047	0.000047	0	0.000039	0.000039	0.000039	0
U, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0	0.000077	0.000077	0.000080	2	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000052	2	0.000051	0.000051	0.000052	2	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000043	0	0.000078	0.000078	0.000082	1	0.000044	0.000044	0.000044	0	0.000050	0.000050	0.000051	2	0.000042	0.000042	0.000042	0
U, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000058	0.000058	0.000060	16	0.000058	0.000058	0.000060	16	0.000049	0.000049	0.000049	0	0.000043	0.000043	0.000043	1	0.000079	0.000079	0.000083	1	0.000044	0.000044	0.000044	0	0.000056	0.000056	0.000058	14	0.000042	0.000042	0.000042	0
U, Tot	Construction	Apr	2	0.000050	0.000050	0.000050	0	0.000064	0.000064	0.000066	30	0.000064	0.000064	0.000066	29	0.000049	0.000049	0.000049	0	0.000043	0.000043	0.000043	1	0.000080	0.000080	0.000084	1	0.000044	0.000044	0.000044	0	0.000061	0.000061	0.000062	24	0.000042	0.000042	0.000042	0
U, Tot	Construction	May	2	0.000045	0.000045	0.000045	-1	0.000052	0.000052	0.000053	12	0.000051	0.000051	0.000052	11	0.000049	0.000049	0.000049	0	0.000044	0.000044	0.000044	2	0.000079	0.000079	0.000082	2	0.000046	0.000046	0.000046	0	0.000049	0.000049	0.000050	7	0.000035	0.000035	0.000035	1
U, Tot	Construction	Jun	2	0.000046	0.000046	0.000046	0	0.000047	0.000047	0.000047	1	0.000047	0.000047	0.000047	1	0.000048	0.000048	0.000048	0	0.000045	0.000045	0.000045	1	0.000079	0.000079	0.000082	3	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	1	0.000035	0.000035	0.000035	0
U, Tot	Construction	Jul	2	0.000036	0.000036	0.000036	0	0.000037	0.000037	0.000037	2	0.000037	0.000037	0.000037	2	0.000044	0.000044	0.000044	0	0.000043	0.000043	0.000043	1	0.000082	0.000082	0.000085	3	0.000035	0.000035	0.000035	1	0.000038	0.000038	0.000038	1	0.000029	0.000029	0.000029	1
U, Tot	Construction	Aug	2	0.000036	0.000036	0.000036	0	0.000037	0.000037	0.000037	2	0.000037	0.000037	0.000037	2	0.000044	0.000044	0.000044	-1	0.000040	0.000040	0.000041	1	0.000083	0.000083	0.000086	3	0.000035	0.000035	0.000035	0	0.000038	0.000038	0.000038	2	0.000029	0.000029	0.000029	0
U, Tot	Construction	Sep	2	0.000039	0.000039	0.000039	0	0.000040	0.000040	0.000040	3	0.000040	0.000040	0.000040	3	0.000041	0.000041	0.000042	-1	0.000040	0.000040	0.000040	1	0.000083	0.000083	0.000085	4	0.000033	0.000033	0.000033	0	0.000039	0.000039	0.000040	2	0.000022	0.000022	0.000022	1
U, Tot	Construction	Oct	2	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000040	2	0.000039	0.000039	0.000040	2	0.000042	0.000042	0.000042	-1	0.000040	0.000040	0.000040	1	0.000081	0.000081	0.000084	5	0.000033	0.000033	0.000033	0	0.000039	0.000039	0.000039	1	0.000022	0.000022	0.000022	0
U, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000049	0.000049	0.000049	0	0.000040	0.000040	0.000040	1	0.000081	0.000081	0.000084	5	0.000044	0.000044	0.000044	-1	0.000049	0.000049	0.000049	1	0.000041	0.000041	0.000041	-2
U, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	1	0.000082	0.000082	0.000084	5	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	0	0.000057	0.000057	0.000063	14	0.000057	0.000057	0.000063	14	0.000049	0.000049	0.000049	0	0.000046	0.000045	0.000048	8	0.000093	0.000092	0.000094	9	0.000044	0.000044	0.000044	0	0.000054	0.000054	0.000058	11	0.000042	0.000042	0.000042	0
U, Tot	Operations	Feb	13	0.000050	0.000050	0.000050	0	0.000084	0.000084	0.000110	69	0.000084	0.000084	0.000110	69	0.000049	0.000049	0.000049	0	0.000047	0.000046	0.000050	10	0.000094	0.000093	0.000095	9	0.000044	0.000044	0.000044	0	0.000077	0.000077	0.000098	57	0.000042	0.000042	0.000042	0
U, Tot	Operations	Mar	13	0.000050	0.000050	0.000050	0	0.000155	0.000148	0.000202	196	0.000155	0.000147	0.000201	195	0.000049	0.000049	0.000049	0	0.000049	0.000049	0.000054	15	0.000095	0.000094	0.000096	9	0.000044	0.000044	0.000044	0	0.000139	0.000132	0.000178	168	0.000042	0.000042	0.000042	0
U, Tot	Operations	Apr	13	0.000050	0.000050	0.000050	0	0.000133	0.000127	0.000178	157	0.000130	0.000124	0.000173	152	0.000049	0.000049	0.000050	1	0.000051	0.000051	0.000057	20	0.000096	0.000095	0.000097	8	0.000044	0.000044	0.000044	0	0.000115	0.000110	0.000150	126	0.000042	0.000042	0.000042	0
U, Tot	Operations	May	13	0.000045	0.000045	0.000045	-1	0.000075	0.000074	0.000093	61	0.000072	0.000072	0.000089	56	0.000049	0.000049	0.000049	0	0.000052	0.000051	0.000057	20	0.000094	0.000093	0.000094	9	0.000046	0.000046	0.000046	0	0.000062	0.000062	0.000073	34	0.000035	0.000035	0.000035	1
U, Tot	Operations	Jun	13	0.000046	0.000046	0.000046	0	0.000053	0.000052	0.000056	14	0.000053	0.000052	0.000056	14	0.000048	0.000048	0.000048	0	0.000051	0.000051	0.000055	13	0.000093	0.000091	0.000093	9	0.000046	0.000046	0.000046	0	0.000051	0.000050	0.000053	10	0.000035	0.000035	0.000035	0
U, Tot	Operations	Jul	13	0.000036	0.000036	0.000036	0	0.000042	0.000042	0.000045	16	0.000042	0.000042	0.000045	16	0.000044	0.000044	0.000044	0	0.000047	0.000047	0.000049	9	0.000095	0.000094	0.000096	9	0.000035	0.000035	0.000035	1	0.000042	0.000042	0.000045	12	0.000029	0.000029	0.000029	1
U, Tot	Operations	Aug	13	0.000036	0.000036	0.000036	0	0.000044	0.000044	0.000048	22	0.000044	0.000044	0.000048	21	0.000044	0.000044	0.000044	0	0.000044	0.000044	0.000047	11	0.000096	0.000095	0.000097	9	0.000035	0.000035	0.000035	0	0.000044	0.000043	0.000047	16	0.000029	0.000029	0.000029	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
U, Tot	Operations	Sep	13	0.000039	0.000039	0.000039	0	0.000048	0.000048	0.000052	22	0.000048	0.000047	0.000052	22	0.000042	0.000042	0.000042	-1	0.000044	0.000044	0.000047	12	0.000095	0.000094	0.000095	10	0.000033	0.000033	0.000033	0	0.000046	0.000045	0.000049	17	0.000022	0.000022	0.000022	1
U, Tot	Operations	Oct	13	0.000039	0.000039	0.000039	0	0.000047	0.000047	0.000052	21	0.000047	0.000047	0.000052	21	0.000042	0.000042	0.000042	0	0.000044	0.000044	0.000047	12	0.000093	0.000092	0.000093	11	0.000033	0.000033	0.000033	0	0.000044	0.000044	0.000047	14	0.000022	0.000022	0.000022	0
U, Tot	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000060	11	0.000055	0.000055	0.000060	11	0.000050	0.000050	0.000050	0	0.000045	0.000044	0.000047	11	0.000092	0.000091	0.000092	10	0.000044	0.000044	0.000044	-1	0.000051	0.000052	0.000054	7	0.000041	0.000041	0.000041	-2
U, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000056	8	0.000054	0.000054	0.000056	8	0.000050	0.000050	0.000050	0	0.000045	0.000045	0.000048	10	0.000092	0.000092	0.000093	10	0.000044	0.000044	0.000044	0	0.000051	0.000051	0.000053	5	0.000042	0.000042	0.000042	0
U, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000051	0	0.000049	0.000049	0.000049	0	0.000042	0.000043	0.000048	3	0.000086	0.000087	0.000093	12	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Closure	Feb	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000042	0.000043	0.000048	2	0.000087	0.000088	0.000094	12	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Closure	Mar	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000042	0.000043	0.000048	2	0.000087	0.000088	0.000095	12	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Closure	Apr	6	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	0	0.000049	0.000049	0.000049	0	0.000049	0.000049	0.000049	0	0.000043	0.000043	0.000047	2	0.000088	0.000089	0.000095	12	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Closure	May	6	0.000045	0.000045	0.000045	-1	0.000045	0.000045	0.000045	-1	0.000045	0.000045	0.000045	-2	0.000049	0.000049	0.000049	0	0.000043	0.000044	0.000047	2	0.000086	0.000087	0.000092	12	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	-1	0.000035	0.000035	0.000035	1
U, Tot	Closure	Jun	6	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000048	0.000048	0.000048	0	0.000045	0.000045	0.000047	1	0.000085	0.000086	0.000091	12	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000035	0.000035	0.000035	0
U, Tot	Closure	Jul	6	0.000036	0.000036	0.000036	0	0.000036	0.000036	0.000036	0	0.000036	0.000036	0.000036	0	0.000044	0.000044	0.000044	0	0.000043	0.000043	0.000043	0	0.000087	0.000088	0.000093	12	0.000035	0.000035	0.000035	1	0.000037	0.000037	0.000037	0	0.000029	0.000029	0.000029	1
U, Tot	Closure	Aug	6	0.000036	0.000036	0.000036	0	0.000036	0.000036	0.000036	0	0.000036	0.000036	0.000036	0	0.000044	0.000044	0.000044	0	0.000040	0.000040	0.000040	0	0.000088	0.000089	0.000094	12	0.000035	0.000035	0.000035	0	0.000037	0.000037	0.000037	0	0.000029	0.000029	0.000029	0
U, Tot	Closure	Sep	6	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000039	0	0.000042	0.000042	0.000042	0	0.000040	0.000040	0.000040	0	0.000087	0.000088	0.000092	13	0.000033	0.000033	0.000033	0	0.000038	0.000038	0.000038	0	0.000022	0.000022	0.000022	1
U, Tot	Closure	Oct	6	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000039	0	0.000042	0.000042	0.000042	0	0.000039	0.000039	0.000039	0	0.000085	0.000085	0.000090	13	0.000033	0.000033	0.000033	0	0.000038	0.000038	0.000038	0	0.000022	0.000022	0.000022	0
U, Tot	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000050	0	0.000040	0.000040	0.000040	0	0.000084	0.000085	0.000089	13	0.000044	0.000044	0.000044	-1	0.000048	0.000048	0.000048	0	0.000041	0.000041	0.000041	-2
U, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000050	0	0.000041	0.000041	0.000041	0	0.000084	0.000085	0.000089	13	0.000044	0.000044	0.000044	0	0.000049	0.000049	0.000049	0	0.000042	0.000042	0.000042	0
U, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000072	0.000068	0.000073	37	0.000052	0.000052	0.000056	7	0.000050	0.000049	0.000051	17	0.000179	0.000181	0.000298	148	0.001331	0.001125	0.001384	2457	0.000065	0.000062	0.000066	28	0.000042	0.000042	0.000043	1
U, Tot	Post-Closure	Feb	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000083	0.000078	0.000084	55	0.000052	0.000052	0.000055	6	0.000051	0.000050	0.000052	18	0.000182	0.000183	0.000301	148	0.001347	0.001140	0.001402	2491	0.000076	0.000071	0.000077	45	0.000042	0.000042	0.000043	1
U, Tot	Post-Closure	Mar	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000194	0.000171	0.000201	242	0.000052	0.000052	0.000055	6	0.000054	0.000053	0.000055	24	0.000186	0.000187	0.000307	150	0.001417	0.001200	0.001475	2627	0.000172	0.000152	0.000178	208	0.000042	0.000042	0.000043	1
U, Tot	Post-Closure	Apr	109	0.000050	0.000051	0.000054	3	0.000049	0.000051	0.000054	3	0.000253	0.000223	0.000260	351	0.000052	0.000052	0.000056	7	0.000058	0.000056	0.000059	31	0.000191	0.000190	0.000314	152	0.001524	0.001539	0.003174	3398	0.000218	0.000193	0.000224	295	0.000042	0.000042	0.000042	0
U, Tot	Post-Closure	May	109	0.000045	0.000045	0.000047	0	0.000045	0.000046	0.000047	0	0.000113	0.000103	0.000115	123	0.000053	0.000053	0.000058	9	0.000060	0.000057	0.000061	34	0.000186	0.000184	0.000303	150	0.001021	0.000919	0.001041	1897	0.000086	0.000080	0.000087	73	0.000035	0.000035	0.000035	1
U, Tot	Post-Closure	Jun	109	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000053	0.000052	0.000053	13	0.000050	0.000050	0.000052	5	0.000055	0.000054	0.000056	20	0.000184	0.000181	0.000295	148	0.001277	0.001139	0.001304	2375	0.000051	0.000050	0.000051	9	0.000035	0.000035	0.000035	0
U, Tot	Post-Closure	Jul	109	0.000036	0.000036	0.000036	0	0.000036	0.000036	0.000036	0	0.000043	0.000042	0.000043	17	0.000045	0.000045	0.000047	4	0.000049	0.000048	0.000049	12	0.000191	0.000187	0.000306	150	0.001225	0.001077	0.001256	2976	0.000043	0.000042	0.000043	13	0.000029	0.000029	0.000029	1
U, Tot	Post-Closure	Aug	109	0.000036	0.000036	0.000036	0	0.000036	0.000036	0.000036	0	0.000045	0.000044	0.000045	21	0.000046	0.000046	0.000048	5	0.000046	0.000045	0.000046	12	0.000196	0.000191	0.000312	151	0.001244	0.001098	0.001273	3038	0.000044	0.000043	0.000044	16	0.000029	0.000029	0.000029	0
U, Tot	Post-Closure	Sep	109	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000039	0	0.000053	0.000051	0.000053	31	0.000045	0.000045	0.000048	8	0.000046	0.000045	0.000046	14	0.000193	0.000187	0.000305	151	0.001285	0.001143	0.001318	3362	0.000049	0.000047	0.000049	23	0.000022	0.000022	0.000022	1
U, Tot	Post-Closure	Oct	109	0.000039	0.000039	0.000039	0	0.000039	0.000039	0.000039	0	0.000057	0.000055	0.000058	41	0.000047	0.000046	0.000051	10	0.000047	0.000046	0.000047	17	0.000190	0.000183	0.000297	151	0.001395	0.001271	0.001431	3752	0.000051	0.000049	0.000051	28	0.000022	0.000022	0.000022	0
U, Tot	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000063	0.000061	0.000064	23	0.000054	0.000054	0.000059	9	0.000048	0.000047	0.000049	18	0.000189	0.000181	0.000295	151	0.001489	0.001442	0.001657	3178	0.000057	0.000056	0.000057	15	0.000041	0.000041	0.000042	-1
U, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000063	0.000061	0.000063	21	0.000053	0.000053	0.000057	8	0.000049	0.000048	0.000050	17	0.000190	0.000182	0.000296	151	0.001355	0.001158	0.001409	2531	0.000057	0.000055	0.000057	14	0.000042	0.000042	0.000043	1
Zn, Diss	Construction	Jan	2	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00091	1	0.00090	0.00090	0.00091	0	0.00228	0.00228	0.00229	0	*0.00699*	*0.00699*	*0.00700*	0	0.00184	0.00184	0.00185	0	0.00110	0.00110	0.00110	0	*0.00885*	*0.00885*	*0.00886*	-1	0.00320	0.00320	0.00320	0
Zn, Diss	Construction	Feb	2	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00229	0.00229	0.00229	0	*0.00688*	*0.00688*	*0.00689*	0	0.00183	0.00183	0.00185	0	0.00110	0.00110	0.00110	0	*0.00652*	*0.00652*	*0.00653*	-2	0.00320	0.00320	0.00320	0
Zn, Diss	Construction	Mar	2	0.00090	0.00090	0.00090	0	0.00095	0.00095	0.00095	5	0.00095	0.00095	0.00095	5	0.00229	0.00229	0.00229	0	*0.00670*	*0.00670*	*0.00670*	0	0.00183	0.00183	0.00184	0	0.00110	0.00110	0.00110	0	*0.00547*	*0.00547*	*0.00549*	-4	0.00320	0.00320	0.00320	0
Zn, Diss	Construction	Apr	2	0.00099	0.00099	0.00099	1	0.00112	0.00112	0.00113	11	0.00111	0.00111	0.00112	12	0.00229	0.00229	0.00229	0	*0.00653*	*0.00653*	*0.00654*	-1	0.00182	0.00182	0.00184	0	0.00110	0.00110	0.00110	0	*0.00600*	*0.00600*	*0.00601*	-4	0.00320	0.00320	0.00320	0
Zn, Diss	Construction	May	2	0.00099	0.00099	0.00099	0	0.00101	0.00101	0.00102	2	0.00101	0.00101	0.00101	2	0.00193	0.00193	0.00193	0	*0.00700*	*0.00700*	*0.00700*	0	0.00178	0.00178	0.00179	0	0.00095	0.00095	0.00095	1	*0.01327*	*0.01327*	*0.01327*	4	0.00127	0.00127	0.00127	5
Zn, Diss	Construction	Jun	2	0.00096	0.00096	0.00096	0	0.00096	0.00096	0.00096	0	0.00096	0.00096	0.00096	0	0.00190	0.00190	0.00190	0	*0.00825*	*0.00825*	*0.00825*	0	0.00176	0.00176	0.00177	1	0.00095	0.00095	0.00095	0	*0.01047*	*0.01047*	*0.01047*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Construction	Jul	2	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00414	0.00414	0.00414	0	*0.00692*	*0.00692*	*0.00692*	0	0.00181	0.00181	0.00182	0	0.00066	0.00066	0.00066	1	*0.00504*	*0.00504*	*0.00504*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Construction	Aug	2	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00415	0.00415	0.00415	0	*0.00548*	*0.00548*	*0.00548*	0	0.00191	0.00191	0.00192	-1	0.00065	0.00065	0.00065	0	*0.00489*	*0.00489*	*0.00490*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Construction	Sep	2	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00242	0.00242	0.00242	0	*0.00517*	*0.00517*	*0.00517*	0	0.00195	0.00195	0.00196	-1	0.00087	0.00087	0.00087	-1	*0.00600*	*0.00600*	*0.00600*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Construction	Oct	2	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00238	0.00238	0.00238	0	*0.00551*	*0.00551*	*0.00551*	0	0.00191	0.00191	0.00192	0	0.00088	0.00088	0.00088	0	*0.00760*	*0.00760*	*0.00760*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Construction	Nov	2	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	0	0.00091	0.00091	0.00091	0	0.00228	0.00228	0.00228	0	*0.00622*	*0.00622*	*0.00622*	0	0.00188	0.00188	0.00189	0	0.00109	0.00109	0.00109	-1	*0.01188*	*0.01188*	*0.01188*	0	0.00313	0.00313	0.00313	-2
Zn, Diss	Construction	Dec	2	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00228	0.00228	0.00228	0	*0.00684*	*0.00684*	*0.00684*	0	0.00187	0.00187	0.00188	0	0.00110	0.00110	0.00110	0	*0.01121*	*0.01121*	*0.01121*	-1	0.00320	0.00320	0.00320	0
Zn, Diss	Operations	Jan	13	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00092	1	0.00091	0.00091	0.00092	1	0.00229	0.00229	0.00229	0	*0.00702*	*0.00702*	*0.00702*	0	0.00191	0.00190	0.00191	0	0.00110	0.00110	0.00110	0	*0.00893*	*0.00893*	*0.00897*	0	0.00320	0.00320	0.00320	0
Zn, Diss	Operations	Feb	13	0.00090	0.00090	0.00090	1	0.00101	0.00100	0.00104	11	0.00101	0.00100	0.00104	11	0.00229	0.00229	0.00229	0	*0.00691*	*0.00691*	*0.00692*	0	0.00190	0.00190	0.00190	0	0.00110	0.00110	0.00110	0	*0.00655*	*0.00657*	*0.00665*	-2	0.00320	0.00320	0.00320	0
Zn, Diss	Operations	Mar	13	0.00091	0.00091	0.00091	1	0.00124	0.00122	0.00129	35	0.00124	0.00121	0.00129	35	0.00229	0.00229	0.00229	0	*0.00672*	*0.00672*	*0.00673*	0	0.00190	0.00189	0.00190	0	0.00110	0.00110	0.00110	0	*0.00548*	*0.00551*	*0.00565*	-4	0.00320	0.00320	0.00320	0
Zn, Diss	Operations	Apr	13	0.00099	0.00099	0.00099	1	0.00121	0.00120	0.00124	18	0.00120	0.00118	0.00122	19	0.00229	0.00229	0.00229	0	*0.00655*	*0.00656*	*0.00657*	0	0.00189	0.00188	0.00189	0	0.00110	0.00110	0.00110	0	*0.00632*	*0.00635*	*0.00643*	2	0.00320	0.00320	0.00320	0
Zn, Diss	Operations	May	13	0.00099	0.00099	0.00099	0	0.00104	0.00103	0.00104	4	0.00103	0.00102	0.00104	3	0.00193	0.00193	0.00193	0	*0.00702*	*0.00702*	*0.00703*	0	0.00184	0.00184	0.00184	0	0.00095	0.00095	0.00095	1	*0.01331*	*0.01333*	*0.01337*	4	0.00127	0.00127	0.00127	5
Zn, Diss	Operations	Jun	13	0.00096	0.00096	0.00096	0	0.00098	0.00098	0.00098	2	0.00098	0.00098	0.00098	1	0.00190	0.00190	0.00190	0	*0.00826*	*0.00826*	*0.00826*	0	0.00182	0.00181	0.00182	1	0.00095	0.00095	0.00095	0	*0.01046*	*0.01046*	*0.01047*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Operations	Jul	13	0.00110	0.00110	0.00110	0	0.00111	0.00111	0.00111	1	0.00111	0.00111	0.00111	1	0.00414	0.00414	0.00414	0	*0.00692*	*0.00692*	*0.00692*	0	0.00187	0.00186	0.00187	1	0.00066	0.00066	0.00066	1	*0.00504*	*0.00504*	*0.00504*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Operations	Aug	13	0.00110	0.00110	0.00110	0	0.00112	0.00112	0.00112	1	0.00112	0.00112	0.00112	1	0.00415	0.00415	0.00415	0	*0.00548*	*0.00548*	*0.00548*	0	0.00197	0.00196	0.00197	0	0.00065	0.00065	0.00065	0	*0.00490*	*0.00490*	*0.00490*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Operations	Sep	13	0.00110	0.00110	0.00110	0	0.00111	0.00111	0.00112	1	0.00111	0.00111	0.00112	1	0.00242	0.00242	0.00242	0	*0.00517*	*0.00517*	*0.00518*	0	0.00201	0.00200	0.00201	0	0.00087	0.00087	0.00087	-1	*0.00600*	*0.00600*	*0.00600*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Operations	Oct	13	0.00110	0.00110	0.00110	0	0.00111	0.00111	0.00112	1	0.00110	0.00110	0.00111	1	0.00238	0.00238	0.00238	0	*0.00551*	*0.00551*	*0.00551*	0	0.00196	0.00195	0.00196	0	0.00088	0.00088	0.00088	0	*0.00761*	*0.00761*	*0.00762*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Operations	Nov	13	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00092	1	0.00091	0.00091	0.00092	0	0.00229	0.00229	0.00229	0	*0.00623*	*0.00623*	*0.00623*	0	0.00193	0.00192	0.00193	0	0.00109	0.00109	0.00109	-1	*0.01191*	*0.01191*	*0.01191*	0	0.00313	0.00313	0.00313	-2
Zn, Diss	Operations	Dec	13	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00229	0.00229	0.00229	0	*0.00685*	*0.00685*	*0.00686*	0	0.00192	0.00191	0.00192	0	0.00110	0.00110	0.00110	0	*0.01125*	*0.01125*	*0.01125*	0	0.00320	0.00320	0.00320	0
Zn, Diss	Closure	Jan	6	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00091	0	0.00090	0.00090	0.00090	0	0.00229	0.00229	0.00229	0	*0.00702*	*0.00702*	*0.00702*	0	0.00188	0.00188	0.00191	1	0.00110	0.00110	0.00110	0	*0.00894*	*0.00894*	*0.00894*	0	0.00320	0.00320	0.00320	0
Zn, Diss	Closure	Feb	6	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00229	0.00229	0.00229	0	*0.00692*	*0.00692*	*0.00692*	0	0.00187	0.00187	0.00190	1	0.00110	0.00110	0.00110	0	*0.00665*	*0.00664*	*0.00665*	0	0.00320	0.00320	0.00320	0
Zn, Diss	Closure	Mar	6	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00229	0.00229	0.00229	0	*0.00674*	*0.00674*	*0.00674*	0	0.00186	0.00187	0.00190	1	0.00110	0.00110	0.00110	0	*0.00574*	*0.00574*	*0.00574*	0	0.00320	0.00320	0.00320	0
Zn, Diss	Closure	Apr	6	0.00099	0.00099	0.00099	1	0.00104	0.00104	0.00104	3	0.00103	0.00103	0.00104	4	0.00229	0.00229	0.00229	0	*0.00658*	*0.00658*	*0.00658*	0	0.00185	0.00186	0.00189	1	0.00110	0.00110	0.00110	0	*0.00651*	*0.00653*	*0.00657*	4	0.00320	0.00320	0.00320	0
Zn, Diss	Closure	May	6	0.00099	0.00099	0.00099	0	0.00098	0.00098	0.00098	-1	0.00098	0.00098	0.00098	-1	0.00193	0.00193	0.00193	0	*0.00705*	*0.00705*	*0.00705*	1	0.00180	0.00181	0.00184	2	0.00095	0.00095	0.00095	1	*0.01344*	*0.01345*	*0.01346*	5	0.00127	0.00127	0.00127	5
Zn, Diss	Closure	Jun	6	0.00096	0.00096	0.00096	0	0.00096	0.00096	0.00096	0	0.00096	0.00096	0.00096	0	0.00190	0.00190	0.00190	0	*0.00828*	*0.00828*	*0.00828*	0	0.00178	0.00179	0.00181	3	0.00095	0.00095	0.00095	0	*0.01049*	*0.01049*	*0.01049*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Closure	Jul	6	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00415	0.00415	0.00415	0	*0.00694*	*0.00694*	*0.00694*	0	0.00183	0.00183	0.00186	2	0.00066	0.00066	0.00066	1	*0.00505*	*0.00505*	*0.00505*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Closure	Aug	6	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00416	0.00416	0.00416	0	*0.00549*	*0.00549*	*0.00549*	0	0.00193	0.00193	0.00196	1	0.00065	0.00065	0.00065	0	*0.00491*	*0.00491*	*0.00491*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Closure	Sep	6	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00109	0.00109	0.00109	0	0.00242	0.00242	0.00242	0	*0.00518*	*0.00518*	*0.00518*	0	0.00197	0.00197	0.00199	1	0.00087	0.00087	0.00087	-1	*0.00601*	*0.00601*	*0.00601*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Closure	Oct	6	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00109	0.00109	0.00109	0	0.00238	0.00238	0.00238	0	*0.00552*	*0.00552*	*0.00552*	0	0.00192	0.00192	0.00194	2	0.00088	0.00088	0.00088	0	*0.00763*	*0.00763*	*0.00763*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Closure	Nov	6	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	0	0.00091	0.00091	0.00091	0	0.00228	0.00228	0.00229	0	*0.00623*	*0.00623*	*0.00623*	0	0.00189	0.00189	0.00191	2	0.00109	0.00109	0.00109	-1	*0.01192*	*0.01192*	*0.01192*	0	0.00313	0.00313	0.00313	-2
Zn, Diss	Closure	Dec	6	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00228	0.00228	0.00229	0	*0.00686*	*0.00686*	*0.00686*	0	0.00188	0.00188	0.00190	2	0.00110	0.00110	0.00110	0	*0.01126*	*0.01126*	*0.01126*	0	0.00320	0.00320	0.00320	0
Zn, Diss	Post-Closure	Jan	109	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00102	0.00100	0.00103	11	0.00230	0.00230	0.00233	1	*0.00704*	*0.00704*	*0.00705*	0	0.00242	0.00243	0.00310	34	0.00751	0.00640	0.00827	482	*0.00893*	*0.00893*	*0.00894*	0	0.00320	0.00320	0.00321	0
Zn, Diss	Post-Closure	Feb	109	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00108	0.00105	0.00110	16	0.00230	0.00230	0.00232	1	*0.00693*	*0.00693*	*0.00694*	0	0.00242	0.00243	0.00311	34	0.00760	0.00648	0.00836	489	*0.00667*	*0.00667*	*0.00670*	0	0.00320	0.00320	0.00321	0
Zn, Diss	Post-Closure	Mar	109	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00165	0.00152	0.00174	69	0.00230	0.00230	0.00232	1	*0.00676*	*0.00675*	*0.00677*	0	0.00244	0.00244	0.00314	35	0.00796	0.00678	0.00876	517	*0.00594*	*0.00589*	*0.00601*	3	0.00320	0.00320	0.00321	0
Zn, Diss	Post-Closure	Apr	109	0.00099	0.00100	0.00102	2	0.00104	0.00105	0.00107	4	0.00205	0.00191	0.00222	93	0.00230	0.00230	0.00233	1	*0.00660*	*0.00660*	*0.00662*	1	0.00245	0.00245	0.00316	36	0.00892	0.00873	0.01885	694	*0.00677*	*0.00674*	*0.00694*	8	0.00320	0.00320	0.00320	0
Zn, Diss	Post-Closure	May	109	0.00099	0.00099	0.00100	0	0.00098	0.00099	0.00099	0	0.00132	0.00127	0.00137	28	0.00195	0.00195	0.00198	2	*0.00707*	*0.00707*	*0.00709*	1	0.00239	0.00238	0.00306	37	0.00590	0.00545	0.00652	473	*0.01335*	*0.01335*	*0.01350*	4	0.00127	0.00127	0.00127	5
Zn, Diss	Post-Closure	Jun	109	0.00096	0.00096	0.00096	0	0.00096	0.00096	0.00096	0	0.00100	0.00099	0.00100	3	0.00191	0.00191	0.00192	1	*0.00829*	*0.00829*	*0.00830*	1	0.00236	0.00234	0.00300	37	0.00721	0.00655	0.00795	590	*0.01049*	*0.01049*	*0.01049*	0	0.00120	0.00120	0.00120	0

Appendix G-4: Summary of water quality model predictions for the receiving environment - expected case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Zn, Diss	Post-Closure	Jul	109	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00114	0.00113	0.00114	3	0.00416	0.00415	0.00417	1	*0.00694*	*0.00694*	*0.00695*	0	0.00244	0.00241	0.00310	37	0.00691	0.00614	0.00761	844	*0.00506*	*0.00506*	*0.00507*	0	0.00110	0.00110	0.00110	0
Zn, Diss	Post-Closure	Aug	109	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00115	0.00114	0.00115	4	0.00417	0.00417	0.00418	1	*0.00550*	*0.00550*	*0.00551*	0	0.00256	0.00252	0.00322	34	0.00700	0.00627	0.00773	864	*0.00492*	*0.00492*	*0.00493*	1	0.00110	0.00110	0.00110	0
Zn, Diss	Post-Closure	Sep	109	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00116	0.00115	0.00117	5	0.00244	0.00244	0.00246	1	*0.00520*	*0.00519*	*0.00520*	1	0.00259	0.00255	0.00323	32	0.00726	0.00656	0.00801	645	*0.00603*	*0.00603*	*0.00604*	1	0.00120	0.00120	0.00120	0
Zn, Diss	Post-Closure	Oct	109	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00119	0.00117	0.00120	7	0.00241	0.00240	0.00243	1	*0.00554*	*0.00553*	*0.00554*	1	0.00253	0.00249	0.00315	33	0.00783	0.00727	0.00867	726	*0.00764*	*0.00764*	*0.00765*	0	0.00120	0.00120	0.00120	0
Zn, Diss	Post-Closure	Nov	109	0.00090	0.00090	0.00091	0	0.00091	0.00091	0.00091	0	0.00097	0.00097	0.00098	6	0.00231	0.00231	0.00234	1	*0.00625*	*0.00625*	*0.00626*	1	0.00250	0.00245	0.00311	34	0.00842	0.00820	0.00944	645	*0.01190*	*0.01190*	*0.01192*	0	0.00313	0.00313	0.00314	-2
Zn, Diss	Post-Closure	Dec	109	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00097	0.00096	0.00098	6	0.00231	0.00231	0.00233	1	*0.00688*	*0.00688*	*0.00689*	1	0.00249	0.00245	0.00310	34	0.00769	0.00660	0.00844	500	*0.01124*	*0.01124*	*0.01126*	0	0.00320	0.00320	0.00321	0
Zn, Tot	Construction	Jan	2	0.00090	0.00090	0.00090	0	0.00092	0.00092	0.00093	2	0.00092	0.00092	0.00093	2	0.00297	0.00297	0.00297	0	0.00730	0.00730	0.00731	0	0.00209	0.00209	0.00210	0	0.00150	0.00150	0.00150	0	0.00886	0.00886	0.00886	-1	0.00320	0.00320	0.00320	0
Zn, Tot	Construction	Feb	2	0.00090	0.00090	0.00090	0	0.00094	0.00094	0.00097	4	0.00094	0.00094	0.00097	4	0.00297	0.00297	0.00297	0	0.00718	0.00718	0.00719	0	0.00208	0.00208	0.00209	0	0.00150	0.00150	0.00150	0	0.00654	0.00654	0.00656	-2	0.00320	0.00320	0.00320	0
Zn, Tot	Construction	Mar	2	0.00090	0.00090	0.00090	0	0.00112	0.00112	0.00114	24	0.00112	0.00112	0.00113	24	0.00297	0.00297	0.00297	0	0.00699	0.00699	0.00700	0	0.00207	0.00207	0.00209	-1	0.00150	0.00150	0.00150	0	0.00562	0.00562	0.00562	-2	0.00320	0.00320	0.00320	0
Zn, Tot	Construction	Apr	2	0.00099	0.00099	0.00099	1	0.00137	0.00137	0.00138	34	0.00136	0.00136	0.00137	34	0.00297	0.00297	0.00297	0	0.00683	0.00683	0.00683	0	0.00206	0.00206	0.00208	-1	0.00150	0.00150	0.00150	0	0.00620	0.00620	0.00623	-1	0.00320	0.00320	0.00320	0
Zn, Tot	Construction	May	2	0.00114	0.00114	0.00114	2	0.00121	0.00121	0.00121	11	0.00120	0.00120	0.00120	10	0.00208	0.00208	0.00208	0	0.00727	0.00727	0.00728	0	0.00200	0.00200	0.00201	0	0.00140	0.00140	0.00140	0	0.01337	0.01337	0.01338	4	0.00262	0.00262	0.00262	1
Zn, Tot	Construction	Jun	2	0.00097	0.00097	0.00097	0	0.00098	0.00098	0.00098	1	0.00098	0.00098	0.00098	1	0.00200	0.00200	0.00200	0	0.00841	0.00841	0.00841	0	0.00197	0.00197	0.00198	1	0.00140	0.00140	0.00140	0	0.01048	0.01048	0.01048	0	0.00260	0.00260	0.00260	0
Zn, Tot	Construction	Jul	2	0.00111	0.00111	0.00111	0	0.00113	0.00113	0.00113	1	0.00113	0.00113	0.00113	1	0.00454	0.00454	0.00454	0	0.00705	0.00705	0.00705	0	0.00202	0.00202	0.00203	1	0.00150	0.00150	0.00150	0	0.00506	0.00506	0.00506	0	0.00337	0.00337	0.00337	-1
Zn, Tot	Construction	Aug	2	0.00112	0.00112	0.00112	0	0.00113	0.00113	0.00113	1	0.00113	0.00113	0.00113	1	0.00455	0.00455	0.00455	0	0.00563	0.00563	0.00564	0	0.00214	0.00214	0.00215	0	0.00150	0.00150	0.00150	0	0.00492	0.00492	0.00492	0	0.00340	0.00340	0.00340	0
Zn, Tot	Construction	Sep	2	0.00110	0.00110	0.00110	0	0.00112	0.00112	0.00112	2	0.00112	0.00112	0.00112	2	0.00272	0.00272	0.00272	0	0.00543	0.00543	0.00543	0	0.00221	0.00221	0.00222	-1	0.00111	0.00111	0.00111	1	0.00648	0.00648	0.00648	0	0.00166	0.00166	0.00166	4
Zn, Tot	Construction	Oct	2	0.00110	0.00110	0.00110	0	0.00112	0.00112	0.00112	1	0.00112	0.00112	0.00112	1	0.00268	0.00268	0.00268	0	0.00588	0.00588	0.00589	0	0.00217	0.00217	0.00218	-1	0.00110	0.00110	0.00110	0	0.00824	0.00824	0.00824	0	0.00160	0.00160	0.00160	0
Zn, Tot	Construction	Nov	2	0.00090	0.00090	0.00090	0	0.00092	0.00092	0.00092	1	0.00092	0.00092	0.00092	1	0.00295	0.00295	0.00295	0	0.00659	0.00659	0.00660	0	0.00214	0.00214	0.00214	0	0.00149	0.00149	0.00149	-1	0.01189	0.01189	0.01189	0	0.00315	0.00315	0.00315	-2
Zn, Tot	Construction	Dec	2	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00297	0.00297	0.00297	0	0.00717	0.00717	0.00717	0	0.00212	0.00212	0.00213	-1	0.00150	0.00150	0.00150	0	0.01121	0.01121	0.01121	-1	0.00320	0.00320	0.00320	0
Zn, Tot	Operations	Jan	13	0.00090	0.00090	0.00090	0	0.00092	0.00092	0.00093	2	0.00092	0.00092	0.00093	2	0.00297	0.00297	0.00297	0	0.00732	0.00732	0.00732	0	0.00215	0.00214	0.00215	-1	0.00150	0.00150	0.00150	0	0.00893	0.00894	0.00897	0	0.00320	0.00320	0.00320	0
Zn, Tot	Operations	Feb	13	0.00090	0.00090	0.00090	1	0.00104	0.00103	0.00106	14	0.00104	0.00103	0.00106	14	0.00297	0.00297	0.00297	0	0.00720	0.00720	0.00721	0	0.00214	0.00213	0.00214	-1	0.00150	0.00150	0.00150	0	0.00658	0.00659	0.00667	-1	0.00320	0.00320	0.00320	0
Zn, Tot	Operations	Mar	13	0.00091	0.00091	0.00091	1	0.00131	0.00129	0.00135	43	0.00130	0.00129	0.00135	43	0.00298	0.00297	0.00298	0	0.00701	0.00701	0.00702	0	0.00213	0.00213	0.00213	-1	0.00150	0.00150	0.00150	0	0.00553	0.00557	0.00576	-3	0.00320	0.00320	0.00320	0
Zn, Tot	Operations	Apr	13	0.00099	0.00099	0.00099	1	0.00129	0.00128	0.00132	26	0.00128	0.00127	0.00131	26	0.00297	0.00297	0.00297	0	0.00684	0.00684	0.00685	0	0.00212	0.00212	0.00212	-1	0.00150	0.00150	0.00150	0	0.00639	0.00642	0.00653	3	0.00320	0.00320	0.00320	0
Zn, Tot	Operations	May	13	0.00114	0.00114	0.00114	2	0.00118	0.00118	0.00119	9	0.00117	0.00117	0.00118	7	0.00208	0.00208	0.00208	0	0.00729	0.00729	0.00730	0	0.00206	0.00205	0.00206	0	0.00140	0.00140	0.00140	0	0.01339	0.01341	0.01346	4	0.00262	0.00262	0.00262	1
Zn, Tot	Operations	Jun	13	0.00097	0.00097	0.00097	0	0.00099	0.00099	0.00099	2	0.00099	0.00099	0.00099	2	0.00200	0.00200	0.00200	0	0.00841	0.00841	0.00842	0	0.00202	0.00201	0.00202	1	0.00140	0.00140	0.00140	0	0.01047	0.01047	0.01048	0	0.00260	0.00260	0.00260	0
Zn, Tot	Operations	Jul	13	0.00111	0.00111	0.00111	0	0.00113	0.00113	0.00113	1	0.00113	0.00113	0.00113	1	0.00454	0.00454	0.00454	0	0.00705	0.00705	0.00705	0	0.00207	0.00207	0.00207	0	0.00150	0.00150	0.00150	0	0.00506	0.00506	0.00506	0	0.00337	0.00337	0.00337	-1
Zn, Tot	Operations	Aug	13	0.00112	0.00112	0.00112	0	0.00114	0.00114	0.00114	2	0.00114	0.00114	0.00114	2	0.00455	0.00455	0.00455	0	0.00563	0.00563	0.00563	0	0.00219	0.00219	0.00219	-1	0.00150	0.00150	0.00150	0	0.00492	0.00492	0.00492	0	0.00340	0.00340	0.00340	0
Zn, Tot	Operations	Sep	13	0.00110	0.00110	0.00110	0	0.00112	0.00112	0.00113	2	0.00112	0.00112	0.00113	2	0.00272	0.00272	0.00272	0	0.00543	0.00543	0.00543	0	0.00225	0.00225	0.00225	-1	0.00111	0.00111	0.00111	1	0.00648	0.00648	0.00648	0	0.00166	0.00166	0.00166	4
Zn, Tot	Operations	Oct	13	0.00110	0.00110	0.00110	0	0.00112	0.00112	0.00112	2	0.00112	0.00112	0.00113	2	0.00268	0.00268	0.00268	0	0.00588	0.00588	0.00589	0	0.00221	0.00220	0.00221	-1	0.00110	0.00110	0.00110	0	0.00824	0.00824	0.00825	0	0.00160	0.00160	0.00160	0
Zn, Tot	Operations	Nov	13	0.00090	0.00090	0.00090	0	0.00092	0.00092	0.00092	1	0.00092	0.00092	0.00092	1	0.00296	0.00296	0.00296	0	0.00660	0.00660	0.00660	0	0.00218	0.00217	0.00218	-1	0.00149	0.00149	0.00149	-1	0.01191	0.01191	0.01192	0	0.00315	0.00315	0.00315	-2
Zn, Tot	Operations	Dec	13	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00297	0.00297	0.00297	0	0.00718	0.00718	0.00719	0	0.00216	0.00216	0.00216	-1	0.00150	0.00150	0.00150	0	0.01125	0.01125	0.01126	0	0.00320	0.00320	0.00320	0
Zn, Tot	Closure	Jan	6	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00091	1	0.00090	0.00090	0.00091	1	0.00297	0.00297	0.00297	0	0.00733	0.00732	0.00733	0	0.00212	0.00212	0.00215	1	0.00150	0.00150	0.00150	0	0.00894	0.00894	0.00894	0	0.00320	0.00320	0.00320	0
Zn, Tot	Closure	Feb	6	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00298	0.00297	0.00298	0	0.00721	0.00721	0.00721	0	0.00211	0.00211	0.00214	1	0.00150	0.00150	0.00150	0	0.00665	0.00664	0.00665	0	0.00320	0.00320	0.00320	0
Zn, Tot	Closure	Mar	6	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00298	0.00298	0.00298	0	0.00702	0.00702	0.00702	0	0.00210	0.00210	0.00213	1	0.00150	0.00150	0.00150	0	0.00574	0.00574	0.00574	0	0.00320	0.00320	0.00320	0
Zn, Tot	Closure	Apr	6	0.00099	0.00099	0.00099	1	0.00105	0.00105	0.00105	3	0.00105	0.00105	0.00105	4	0.00297	0.00297	0.00297	0	0.00686	0.00686	0.00686	0	0.00209	0.00209	0.00212	1	0.00150	0.00150	0.00150	0	0.00652	0.00654	0.00658	4	0.00320	0.00320	0.00320	0
Zn, Tot	Closure	May	6	0.00114	0.00114	0.00114	2	0.00110	0.00110	0.00110	1	0.00110	0.00110	0.00110	0	0.00208	0.00208	0.00208	0	0.00731	0.00731	0.00731	0	0.00202	0.00203	0.00205	2	0.00140	0.00140	0.00140	0	0.01350	0.01351	0.01353	5	0.00262	0.00262	0.00262	1
Zn, Tot	Closure	Jun	6	0.00097	0.00097	0.00097	0	0.00097	0.00097	0.00097	0	0.00097	0.00097	0.00097	0	0.00200	0.00200	0.00200	0	0.00843	0.00843	0.00843	0	0.00199	0.00199	0.00201	2	0.00140	0.00140	0.00140	0	0.01050	0.01050	0.01050	0	0.00260	0.00260	0.00260	0
Zn, Tot	Closure	Jul	6	0.00111	0.00111	0.00111	0	0.00111	0.00111	0.00111	0	0.00111	0.00111	0.00111	0	0.00454	0.00454	0.00454	0	0.00706	0.00706	0.00706	0	0.00204	0.00204	0.00206	2	0.00150	0.00150	0.00150	0	0.00506	0.00506	0.00506	0	0.00337	0.00337	0.00337	-1
Zn, Tot	Closure	Aug	6	0.00112	0.00112	0.00112	0	0.00112	0.00112	0.00112	0	0.00112	0.00112	0.00112	0	0.00455	0.00455	0.00455	0	0.00564	0.00564	0.00564	0	0.00216	0.00216	0.00218	1	0.00150	0.00150	0.00150	0	0.00492	0.00492	0.00492	0	0.00340	0.00340	0.00340	0
Zn, Tot	Closure	Sep	6	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00272	0.00272	0.00272	0	0.00543	0.00543	0.00543	0	0.00222	0.00222	0.00224	0	0.00111	0.00111	0.00111	1	0.00649	0.00649	0.00649	0	0.00166	0.00166	0.00166	4
Zn, Tot	Closure	Oct	6	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00110	0.00110	0.00110	0	0.00268	0.00268	0.00268	0	0.00589	0.00589	0.00589	0	0.00218	0.00218	0.00220	1	0.00110	0.00110	0.00110	0	0.00826	0.00826	0.00826	0	0.00160	0.00160	0.00160	0
Zn, Tot	Closure	Nov	6	0.00090	0.00090	0.00090	0	0.00091	0.00091	0.00091	0	0.00091	0.00091	0.00091	0	0.00296	0.00296	0.00296	0	0.00660	0.00660	0.00660	0	0.00214	0.00214	0.00216	1	0.00149	0.00149	0.00149	-1	0.01192	0.01192	0.01192	0	0.00315	0.00315	0.00315	-2
Zn, Tot	Closure	Dec	6	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00297	0.00297	0.00297	0	0.00719	0.00719	0.00719	0	0.00213	0.00213	0.00215	1	0.00150	0.00150	0.00150	0	0.01126	0.01126	0.01126	0	0.00320	0.00320	0.00320	0
Zn, Tot	Post-Closure	Jan	109	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00104	0.00102	0.00106	13	0.00299	0.00299	0.00301	1	0.00735	0.00734	0.00736	0	0.00266	0.00268	0.00335	29	0.00882	0.00754	0.00972	403	0.00895	0.00894	0.00896	0	0.00320	0.00320	0.00321	0
Zn, Tot	Post-Closure	Feb	109	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00111	0.00107	0.00114	19	0.00299	0.00299	0.00301	1	0.00723	0.00723	0.00724	0	0.00267	0.00267	0.00336	30	0.00893	0.00763	0.00983	409	0.00670	0.00669	0.00673	0	0.00320	0.00320	0.00321	0
Zn, Tot	Post-Closure	Mar	109	0.00091	0.00091	0.00091	1	0.00091	0.00091	0.00091	1	0.00180	0.00164	0.00190	82	0.00299	0.00299	0.00301	1	0.00705	0.00705	0.00706	0	0.00268	0.00268	0.00338	30	0.00935	0.00798	0.01028	432	0.00606	0.00599	0.00615	5	0.00320	0.00320	0.00321	0
Zn, Tot	Post-Closure	Apr	109	0.00099	0.00100	0.00102	2	0.00105	0.00106	0.00108	4	0.00225	0.00207	0.00244	106	0.00299	0.00299	0.00301	1	0.00690	0.00689	0.00691	1	0.00269	0.00269	0.00340	31	0.01033	0.00988	0.01910	559	0.00693	0.00688	0.00712	10	0.00320	0.00320	0.00320	0
Zn, Tot	Post-Closure	May	109	0.00114	0.00114	0.00115	2	0.00110	0.00111	0.00111	2	0.00149	0.00143	0.00155	31	0.00211	0.00211	0.00214	1	0.00735	0.00734	0.00736	1	0.00261	0.00260	0.00328	32	0.00693	0.00636	0.00763	354	0.01344	0.01344	0.01356	4	0.00262	0.00262	0.00262	1
Zn, Tot	Post-Closure	Jun	109	0.00097	0.00097	0.00097	0	0.00097	0.00097	0.00097	0	0.00101	0.00101	0.00102	4	0.00201	0.00201	0.00203	1	0.00845	0.00845	0.00846	1	0.00256	0.00255	0.00321	33	0.00839	0.00759	0.00924	442	0.01050	0.01049	0.01050	0	0.00260	0.00260	0.00260	0
Zn, Tot	Post-Closure	Jul	109	0.00111	0.00111	0.00111	0	0.00111	0.00111	0.00111	0	0.00116	0.00115	0.00116	3	0.00455	0.00455	0.00456	1	0.00707	0.00707	0.00708	0	0.00265	0.00262	0.00331	33	0.00816	0.00728	0.00896	386	0.00508	0.00507	0.00508	0	0.00337	0.00337	0.00337	-1
Zn, Tot	Post-Closure	Aug	109	0.00112	0.00112	0.00112	0	0.00112	0.00112	0.00112	0	0.00117	0.00116	0.00118	4	0.00456	0.00456	0.00458	1	0.00565	0.00565	0.00566	0	0.00279	0.00275	0.00346	30	0.00826	0.00743	0.00909	395	0.00494	0.00494	0.00495	1	0.00340	0.00340	0.00340	0
Zn, Tot	Post-Closure	Sep	109	0.00110	0.00110	0.00111	0	0.00110	0.00110	0.00110	0	0.00118	0.00117	0.00119	6	0.00274	0.00274	0.00276	1	0.00545	0.00545	0.00546	1	0.00284	0.00280	0.00348	28	0.00843	0.00756	0.00929	587	0.00651	0.00651	0.00652	1	0.00166	0.00166	0.00166	4
Zn, Tot	Post-Closure	Oct	109	0.00110	0.00111	0.00111	0	0.00110	0.00110	0.00110	0	0.00121	0.00119	0.00122	8	0.00270	0.00270	0.00273	1	0.00591	0.00591	0.00592	1	0.00279	0.00275	0.00341	28	0.00906	0.00832	0.01002	657	0.00827	0.00827	0.00828	1	0.00160	0.00160	0.00160	0
Zn, Tot	Post-Closure	Nov	109	0.00090	0.00090	0.00091	0	0.00091	0.00091	0.00091	0	0.00099	0.00098	0.00100	7	0.00298	0.00298	0.00301	1	0.00663	0.00662	0.00664	1	0.00275	0.00271	0.00337	29	0.00978	0.00938	0.01071	525	0.01191	0.01191	0.01193	0	0.00315	0.00315	0.00315	-2
Zn, Tot	Post-Closure	Dec	109	0.00090	0.00090	0.00090	0	0.00090	0.00090	0.00090	0	0.00098	0.00097	0.00099	8	0.00299	0.00299	0.00301	1	0.00721	0.00721	0.00722	1	0.00274	0.00270	0.00335	29	0.00904	0.00777	0.00992	418	0.01125	0.01125	0.01126	0	0.00320	0.00320	0.00321	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cl	Construction	Jan	2	0.250	0.250	0.250	0	0.257	0.257	0.264	3	0.257	0.257	0.263	3	1.180	1.180	1.182	0	0.639	0.639	0.641	0	0.607	0.607	0.644	2	8.700	8.700	8.700	0	0.624	0.624	0.628	0	0.250	0.250	0.250	0
Cl	Construction	Feb	2	0.250	0.250	0.250	0	0.272	0.272	0.293	9	0.271	0.271	0.293	9	1.182	1.182	1.184	0	0.645	0.645	0.646	0	0.620	0.620	0.656	2	8.700	8.700	8.700	0	0.528	0.528	0.544	2	0.250	0.250	0.250	0
Cl	Construction	Mar	2	0.250	0.250	0.250	0	0.410	0.410	0.437	64	0.410	0.410	0.437	64	1.183	1.183	1.184	0	0.648	0.648	0.648	0	0.633	0.633	0.669	2	8.700	8.700	8.700	0	0.595	0.595	0.617	26	0.250	0.250	0.250	0
Cl	Construction	Apr	2	0.250	0.250	0.250	0	0.568	0.568	0.584	86	0.628	0.628	0.644	31	1.183	1.183	1.184	0	0.654	0.654	0.655	1	0.646	0.646	0.682	2	8.700	8.700	8.700	0	0.792	0.792	0.805	21	0.250	0.250	0.250	0
Cl	Construction	May	2	0.250	0.250	0.250	0	0.400	0.400	0.411	29	0.501	0.501	0.511	-16	0.342	0.342	0.344	-1	0.663	0.663	0.664	0	0.633	0.633	0.666	3	6.281	6.281	6.281	1	0.810	0.810	0.817	-5	0.250	0.250	0.250	0
Cl	Construction	Jun	2	0.250	0.250	0.250	0	0.262	0.262	0.263	3	0.269	0.269	0.270	-2	0.258	0.258	0.259	-1	0.623	0.623	0.623	-1	0.627	0.627	0.658	4	6.200	6.200	6.200	0	0.585	0.585	0.585	-1	0.250	0.250	0.250	0
Cl	Construction	Jul	2	0.250	0.250	0.250	0	0.262	0.262	0.263	3	0.271	0.271	0.271	-3	1.282	1.282	1.282	0	0.580	0.580	0.580	-1	0.650	0.650	0.680	4	6.490	6.490	6.490	0	0.497	0.497	0.498	-1	0.250	0.250	0.250	0
Cl	Construction	Aug	2	0.250	0.250	0.250	0	0.267	0.267	0.268	4	0.278	0.278	0.279	-3	1.287	1.287	1.288	0	0.563	0.563	0.563	-1	0.664	0.664	0.694	5	6.500	6.500	6.500	0	0.494	0.494	0.496	-1	0.250	0.250	0.250	0
Cl	Construction	Sep	2	0.250	0.250	0.250	0	0.271	0.271	0.275	5	0.285	0.285	0.288	-4	0.281	0.281	0.282	-1	0.550	0.550	0.552	-1	0.658	0.658	0.686	6	6.693	6.693	6.693	0	0.522	0.522	0.525	-2	0.250	0.250	0.250	0
Cl	Construction	Oct	2	0.250	0.250	0.250	0	0.267	0.267	0.269	4	0.282	0.282	0.284	-6	0.268	0.268	0.269	-1	0.544	0.544	0.545	-1	0.648	0.648	0.673	6	6.700	6.700	6.700	0	0.599	0.599	0.600	-2	0.250	0.250	0.250	0
Cl	Construction	Nov	2	0.250	0.250	0.250	0	0.259	0.259	0.260	2	0.262	0.262	0.263	0	1.152	1.152	1.153	1	0.574	0.574	0.576	-1	0.647	0.647	0.672	6	8.633	8.633	8.633	-1	0.767	0.767	0.768	0	0.250	0.250	0.250	0
Cl	Construction	Dec	2	0.250	0.250	0.250	0	0.256	0.256	0.257	2	0.256	0.256	0.257	2	1.180	1.180	1.180	0	0.618	0.618	0.619	-1	0.656	0.656	0.680	6	8.700	8.700	8.700	0	0.732	0.732	0.732	0	0.250	0.250	0.250	0
Cl	Operations	Jan	13	0.250	0.250	0.250	0	0.271	0.271	0.273	8	0.277	0.277	0.279	11	1.187	1.186	1.188	0	0.650	0.649	0.654	1	0.789	0.777	0.817	15	8.700	8.700	8.700	0	0.642	0.642	0.643	3	0.250	0.250	0.250	0
Cl	Operations	Feb	13	0.250	0.250	0.250	0	0.443	0.415	0.454	66	0.450	0.423	0.462	69	1.188	1.188	1.189	0	0.658	0.657	0.662	1	0.801	0.789	0.829	15	8.700	8.700	8.700	0	0.672	0.650	0.681	26	0.250	0.250	0.250	0
Cl	Operations	Mar	13	0.250	0.250	0.250	0	0.846	0.789	0.879	215	0.855	0.798	0.888	219	1.189	1.188	1.190	0	0.673	0.671	0.678	3	0.814	0.801	0.841	14	8.700	8.700	8.700	0	0.965	0.918	0.992	94	0.250	0.250	0.250	0
Cl	Operations	Apr	13	0.250	0.250	0.250	0	0.652	0.636	0.689	108	0.864	0.834	0.904	74	1.188	1.188	1.189	0	0.687	0.684	0.693	5	0.826	0.813	0.853	14	25.040	23.500	31.030	170	0.993	0.970	1.025	47	0.250	0.250	0.250	0
Cl	Operations	May	13	0.250	0.250	0.250	0	0.411	0.409	0.421	32	0.563	0.556	0.575	-7	0.350	0.349	0.351	0	0.696	0.692	0.700	4	0.801	0.788	0.826	15	10.680	10.230	12.030	65	0.850	0.845	0.856	-1	0.250	0.250	0.250	0
Cl	Operations	Jun	13	0.250	0.250	0.250	0	0.280	0.279	0.282	10	0.292	0.291	0.295	6	0.262	0.262	0.262	0	0.644	0.642	0.647	2	0.785	0.772	0.808	15	10.940	10.438	12.250	68	0.600	0.599	0.602	2	0.250	0.250	0.250	0
Cl	Operations	Jul	13	0.250	0.250	0.250	0	0.277	0.276	0.280	9	0.289	0.288	0.292	4	1.284	1.284	1.284	0	0.594	0.593	0.595	1	0.808	0.795	0.831	15	9.634	9.290	10.440	43	0.511	0.510	0.513	2	0.250	0.250	0.250	0
Cl	Operations	Aug	13	0.250	0.250	0.250	0	0.286	0.285	0.290	12	0.303	0.301	0.307	5	1.290	1.290	1.291	1	0.577	0.576	0.579	1	0.819	0.806	0.842	16	10.060	9.659	10.910	49	0.514	0.513	0.517	2	0.250	0.250	0.250	0
Cl	Operations	Sep	13	0.250	0.250	0.250	0	0.287	0.287	0.299	12	0.308	0.308	0.322	4	0.286	0.286	0.287	0	0.565	0.564	0.567	2	0.804	0.792	0.825	16	10.890	10.419	11.860	56	0.540	0.540	0.550	2	0.250	0.250	0.250	0
Cl	Operations	Oct	13	0.250	0.250	0.250	0	0.277	0.279	0.295	8	0.306	0.306	0.325	2	0.274	0.273	0.275	0	0.558	0.557	0.564	1	0.786	0.773	0.805	17	13.390	12.621	14.860	88	0.616	0.615	0.628	1	0.250	0.250	0.250	0
Cl	Operations	Nov	13	0.250	0.250	0.250	0	0.266	0.267	0.270	6	0.277	0.276	0.280	5	1.158	1.158	1.159	1	0.589	0.588	0.594	1	0.782	0.769	0.800	17	13.360	12.848	14.580	48	0.777	0.777	0.779	1	0.250	0.250	0.250	0
Cl	Operations	Dec	13	0.250	0.250	0.250	0	0.262	0.262	0.262	5	0.266	0.266	0.266	6	1.184	1.184	1.185	1	0.631	0.630	0.635	1	0.789	0.776	0.807	16	8.701	8.701	8.701	0	0.740	0.740	0.740	1	0.250	0.250	0.250	0
Cl	Closure	Jan	6	0.250	0.250	0.250	0	0.250	0.250	0.251	0	0.260	0.260	0.261	4	1.186	1.186	1.188	1	0.638	0.640	0.650	0	0.741	0.752	0.816	23	8.700	8.700	8.700	0	0.630	0.630	0.631	1	0.250	0.250	0.250	0
Cl	Closure	Feb	6	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.263	0.263	0.263	5	1.187	1.187	1.189	0	0.645	0.646	0.655	0	0.750	0.760	0.824	22	8.700	8.700	8.700	0	0.527	0.527	0.527	2	0.250	0.250	0.250	0
Cl	Closure	Mar	6	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.269	0.269	0.270	8	1.188	1.188	1.190	0	0.646	0.648	0.656	0	0.759	0.769	0.832	22	8.700	8.700	8.700	0	0.490	0.490	0.490	4	0.250	0.250	0.250	0
Cl	Closure	Apr	6	0.250	0.250	0.250	0	0.314	0.315	0.316	3	0.526	0.530	0.553	11	1.188	1.188	1.189	0	0.649	0.651	0.659	0	0.767	0.777	0.840	22	21.855	22.162	24.040	155	0.727	0.731	0.751	11	0.250	0.250	0.250	0
Cl	Closure	May	6	0.250	0.250	0.250	0	0.311	0.311	0.312	0	0.471	0.472	0.477	-21	0.347	0.347	0.350	1	0.658	0.659	0.667	-1	0.742	0.751	0.809	22	10.145	10.183	10.470	64	0.795	0.795	0.799	-7	0.250	0.250	0.250	0
Cl	Closure	Jun	6	0.250	0.250	0.250	0	0.253	0.253	0.253	0	0.265	0.265	0.266	-3	0.260	0.261	0.262	0	0.620	0.620	0.624	-1	0.726	0.735	0.788	23	10.395	10.432	10.720	68	0.583	0.583	0.583	-1	0.250	0.250	0.250	0
Cl	Closure	Jul	6	0.250	0.250	0.250	0	0.254	0.254	0.254	0	0.266	0.266	0.266	-4	1.283	1.283	1.284	0	0.578	0.578	0.579	-1	0.745	0.754	0.807	23	9.259	9.287	9.492	43	0.494	0.494	0.494	-2	0.250	0.250	0.250	0
Cl	Closure	Aug	6	0.250	0.250	0.250	0	0.256	0.256	0.256	0	0.272	0.272	0.273	-5	1.289	1.289	1.290	1	0.561	0.561	0.561	-1	0.754	0.762	0.814	23	9.637	9.669	9.901	49	0.491	0.491	0.491	-2	0.250	0.250	0.250	0
Cl	Closure	Sep	6	0.250	0.250	0.250	0	0.257	0.257	0.257	0	0.278	0.278	0.279	-6	0.284	0.284	0.285	0	0.547	0.547	0.548	-1	0.739	0.747	0.795	24	10.390	10.428	10.710	56	0.519	0.519	0.519	-2	0.250	0.250	0.250	0
Cl	Closure	Oct	6	0.250	0.250	0.250	0	0.257	0.257	0.257	0	0.285	0.285	0.286	-5	0.271	0.271	0.273	1	0.542	0.542	0.543	-1	0.720	0.728	0.773	24	12.590	12.653	13.110	89	0.602	0.602	0.603	-1	0.250	0.250	0.250	0
Cl	Closure	Nov	6	0.250	0.250	0.250	0	0.253	0.253	0.253	0	0.264	0.264	0.264	0	1.156	1.156	1.158	1	0.574	0.574	0.575	-1	0.714	0.722	0.765	24	12.335	12.357	12.570	42	0.770	0.770	0.770	0	0.250	0.250	0.250	0
Cl	Closure	Dec	6	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.257	0.257	0.257	3	1.183	1.183	1.184	1	0.618	0.618	0.618	-1	0.719	0.726	0.769	24	8.701	8.701	8.701	0	0.735	0.735	0.735	1	0.250	0.250	0.250	0
Cl	Post-Closure	Jan	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.327	0.321	0.346	29	1.184	1.184	1.185	1	0.655	0.654	0.662	2	0.700	0.701	0.716	23	4.880	5.400	8.700	-38	0.675	0.671	0.688	8	0.250	0.254	0.264	1
Cl	Post-Closure	Feb	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.362	0.354	0.390	42	1.186	1.186	1.187	0	0.663	0.662	0.671	2	0.709	0.710	0.726	23	4.835	5.342	8.700	-39	0.602	0.596	0.625	15	0.250	0.254	0.264	1
Cl	Post-Closure	Mar	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.696	0.664	0.822	165	1.187	1.187	1.187	0	0.673	0.671	0.684	4	0.718	0.720	0.736	22	4.728	5.240	8.700	-40	0.833	0.808	0.940	71	0.250	0.254	0.264	1
Cl	Post-Closure	Apr	109	0.250	0.252	0.256	1	0.316	0.316	0.322	3	0.937	0.919	1.156	92	1.186	1.186	1.187	0	0.685	0.683	0.699	5	0.727	0.729	0.745	22	5.160	7.086	21.580	-19	1.049	1.036	1.231	57	0.250	0.251	0.254	0
Cl	Post-Closure	May	109	0.250	0.251	0.252	0	0.312	0.312	0.314	0	0.604	0.598	0.673	0	0.345	0.345	0.346	1	0.695	0.693	0.711	4	0.705	0.707	0.722	23	5.586	6.104	10.070	-2	0.864	0.862	0.905	1	0.250	0.250	0.251	0
Cl	Post-Closure	Jun	109	0.250	0.250	0.250	0	0.253	0.253	0.254	0	0.281	0.280	0.288	2	0.260	0.260	0.260	0	0.642	0.641	0.652	2	0.692	0.693	0.708	23	5.230	5.820	10.320	-6	0.593	0.592	0.598	1	0.250	0.250	0.251	0
Cl	Post-Closure	Jul	109	0.250	0.250	0.250	0	0.254	0.254	0.254	0	0.283	0.282	0.289	1	1.283	1.283	1.283	0	0.590	0.589	0.596	1	0.711	0.712	0.728	23	5.213	5.680	9.214	-13	0.506	0.506	0.512	1	0.250	0.250	0.250	0
Cl	Post-Closure	Aug	109	0.250	0.250	0.250	0	0.256	0.256	0.256	0	0.292	0.291	0.301	1	1.288	1.288	1.289	1	0.572	0.571	0.577	1	0.721	0.722	0.738	23	5.357	5.852	9.584	-10	0.505	0.505	0.512	1	0.250	0.250	0.250	0
Cl	Post-Closure	Sep	109	0.250	0.250	0.250	0	0.257	0.257	0.257	0	0.310	0.308	0.323	4	0.283	0.283	0.283	0	0.560	0.559	0.566	1	0.708	0.710	0.725	24	5.251	5.851	10.330	-13	0.541	0.539	0.551	2	0.250	0.250	0.251	0
Cl	Post-Closure	Oct	109	0.250	0.250	0.250	0	0.257	0.258	0.258	0	0.324	0.322	0.342	8	0.270	0.270	0.270	1	0.557	0.556	0.564	1	0.692	0.693	0.708	24	5.460	6.288	12.480	-6	0.626	0.625	0.639	2	0.250	0.250	0.251	0
Cl	Post-Closure	Nov	109	0.250	0.250	0.250	0	0.253	0.253	0.253	0	0.298	0.296	0.311	13	1.154	1.154	1.155	1	0.590	0.589	0.598	1	0.687	0.688	0.703	24	5.457	6.270	12.240	-28	0.788	0.787	0.796	2	0.250	0.253	0.260	1
Cl	Post-Closure	Dec	109	0.250	0.250	0.250	0	0.250	0.250	0.250	0	0.295	0.292	0.306	17	1.181	1.181	1.182	1	0.634	0.633	0.641	2	0.692	0.693	0.708	23	5.089	5.559	8.701	-36	0.757	0.755	0.764	3	0.250	0.254	0.264	1
F	Construction	Jan	2	0.0650	0.0650	0.0650	0	0.0651	0.0651	0.0651	0	0.0651	0.0651	0.0651	0	0.0657	0.0657	0.0658	0	0.0596	0.0596	0.0597	0	0.0570	0.0570	0.0587	1	0.0530	0.0530	0.0530	0	0.0640	0.0640	0.0640	0	0.0460	0.0460	0.0460	0
F	Construction	Feb	2	0.0650	0.0650	0.0650	0	0.0653	0.0653	0.0655	0	0.0652	0.0652	0.0655	0	0.0657	0.0657	0.0658	0	0.0597	0.0597	0.0598	0	0.0574	0.0574	0.0592	1	0.0530	0.0530	0.0530	0	0.0644	0.0644	0.0646	0	0.0460	0.0460	0.0460	0
F	Construction	Mar	2	0.0650	0.0650	0.0650	0	0.0675	0.0675	0.0680	4	0.0675	0.0675	0.0679	4	0.0658	0.0658	0.0658	0	0.0598	0.0598	0.0598	0	0.0579	0.0579	0.0596	1	0.0530	0.0530	0.0530	0	0.0665	0.0665	0.0668	3	0.0460	0.0460	0.0460	0
F	Construction	Apr	2	0.0643	0.0643	0.0643	0	0.0708	0.0708	0.0714	8	0.0705	0.0705	0.0711	8	0.0658	0.0658	0.0658	0	0.0597	0.0597	0.0598	0	0.0583	0.0583	0.0600	0	0.0530	0.0530	0.0530	0	0.0689	0.0689	0.0694	7	0.0460	0.0460	0.0460	0
F	Construction	May	2	0.0529	0.0529	0.0529	-2	0.0566	0.0566	0.0569	1	0.0560	0.0560	0.0563	1	0.0507	0.0507	0.0508	0	0.0590	0.0590	0.0590	0	0.0574	0.0574	0.0589	1	0.0385	0.0385	0.0385	1	0.0574	0.0574	0.0575	0	0.0276	0.0276	0.0276	2
F	Construction	Jun	2	0.0559	0.0559	0.0559	0	0.0561	0.0561	0.0561	0	0.0561	0.0561	0.0561	0	0.0492	0.0492	0.0492	0	0.0573	0.0573	0.0573	0	0.0572	0.0572	0.0586	2	0.0380	0.0380	0.0380	0	0.0570	0.0570	0.0570	0	0.0270	0.0270	0.0270	0
F	Construction	Jul	2	0.0559	0.0559	0.0559	0	0.0562	0.0562	0.0562	0	0.0562	0.0562	0.0562	0	0.0560	0.0560	0.0560	0	0.0575	0.0575	0.0575	0	0.0589	0.0589	0.0603	2	0.0419	0.0419	0.0419	0	0.0581	0.0581	0.0582	0	0.0309	0.0309	0.0309	0
F	Construction	Aug	2	0.0558	0.0558	0.0558	0	0.0563	0.0563	0.0564	0	0.0563	0.0563	0.0563	0	0.0561	0.0561	0.0561	0	0.0582	0.0582	0.0583	0	0.0603	0.0603	0.0617	2	0.0420	0.0420	0.0420	0	0.0581	0.0581	0.0582	0	0.0310	0.0310	0.0310	0
F	Construction	Sep	2	0.0588	0.0588	0.0588	0	0.0592	0.0592	0.0594	0	0.0592	0.0592	0.0593	1	0.0523	0.0523	0.0524	0	0.0588	0.0588	0.0588	0	0.0603	0.0603	0.0616	2	0.0420	0.0420	0.0420	0	0.0603	0.0603	0.0604	0	0.0339	0.0339	0.0339	0
F	Construction	Oct	2	0.0588	0.0588	0.0588	0	0.0591	0.0591	0.0592	0	0.0591	0.0591	0.0591	0	0.0523	0.0523	0.0524	0	0.0588	0.0588	0.0589	0	0.0596	0.0596	0.0608	3	0.0420	0.0420	0.0420	0	0.0606	0.0606	0.0606	0	0.0340	0.0340	0.0340	0
F	Construction	Nov	2	0.0650	0.0650	0.0650	0	0.0651	0.0651	0.0652	0	0.0651	0.0651	0.0651	0	0.0654	0.0654	0.0654	0	0.0590	0.0590	0.0591	0	0.0593	0.0593	0.0604	3	0.0526	0.0526	0.0526	-1	0.0636	0.0636	0.0636	0	0.0456	0.0456	0.0456	-1
F	Construction	Dec	2	0.0650	0.0650	0.0650	0	0.0651	0.0651	0.0651	0	0.0651	0.0651	0.0651	0	0.0658	0.0658	0.0658	0	0.0595	0.0595	0.0595	0	0.0595	0.0595	0.0606	3	0.0530	0.0530	0.0530	0	0.0636	0.0636	0.0637	0	0.0460	0.0460	0.0460	0
F	Operations	Jan	13	0.0650	0.0650	0.0650	0	0.0668	0.0668	0.0682	3	0.0668	0.0667	0.0681	3	0.0664	0.0664	0.0669	1	0.0609	0.0607	0.0615	2	0.0789	0.0774	0.0942	27	0.0530	0.0530	0.0530	0	0.0652	0.0652	0.0661	2	0.0460	0.0460	0.0460	0
F	Operations	Feb	13	0.0650	0.0650	0.0650	0	0.0750	0.0749	0.0806	15	0.0749	0.0748	0.0804	15	0.0664	0.0664	0.0669	1	0.0611	0.0609	0.0618	2	0.0796	0.0781	0.0951	27	0.0530	0.0530	0.0530	0	0.0723	0.0722	0.0768	12	0.0460	0.0460	0.0460	0
F	Operations	Mar	13	0.0649	0.0649	0.0649	0	0.0941	0.0944	0.1069	45	0.0939	0.0942	0.1067	45	0.0664	0.0664	0.0669	1	0.0616	0.0617	0.0629	3	0.0806	0.0790	0.0963	28	0.0530	0.0530	0.0530	0	0.0890	0.0893	0.1000	39	0.0460	0.0460	0.0460	0
F	Operations	Apr	13	0.0643	0.0643	0.0643	0	0.0887	0.0863	0.0969	32	0.0936	0.0907	0.1026	39	0.0665	0.0664	0.0670	1	0.0621	0.0621	0.0636	4	0.0816	0.0799	0.0976	28	*0.7056*	*0.6265*	*0.8194*	1082	0.0878	0.0854	0.0952	32	0.0460	0.0460	0.0460	0
F	Operations	May	13	0.0529	0.0529	0.0529	-2	0.0622	0.0616	0.0655	10	0.0629	0.0622	0.0663	12	0.0517	0.0517	0.0524	1	0.0614	0.0614	0.0629	5	0.0798	0.0780	0.0949	29	*0.1953*	*0.1755*	*0.2177*	362	0.0617	0.0612	0.0638	7	0.0276	0.0276	0.0276	2
F	Operations	Jun	13	0.0559	0.0559	0.0559	0	0.0578	0.0577	0.0584	3	0.0579	0.0578	0.0586	4	0.0497	0.0496	0.0500	1	0.0590	0.0589	0.0599	3	0.0789	0.0771	0.0934	29	*0.2109*	*0.1898*	*0.2376*	400	0.0582	0.0582	0.0587	2	0.0270	0.0270	0.0270	0
F	Operations	Jul	13	0.0559	0.0559	0.0559	0	0.0577	0.0576	0.0583	3	0.0578	0.0577	0.0584	3	0.0564	0.0563	0.0566	0	0.0587	0.0586	0.0592	2	0.0814	0.0795	0.0962	30	*0.1593*	*0.1448*	*0.1771*	245	0.0594	0.0593	0.0599	2	0.0309	0.0309	0.0309	0
F	Operations	Aug	13	0.0558	0.0558	0.0558	0	0.0583	0.0581	0.0590	4	0.0585	0.0583	0.0592	4	0.0566	0.0565	0.0569	1	0.0595	0.0594	0.0600	2	0.0832	0.0812	0.0980	30	*0.1758*	*0.1590*	*0.1957*	279	0.0599	0.0597	0.0605	3	0.0310	0.0310	0.0310	0
F	Operations	Sep	13	0.0588	0.0588	0.0588	0	0.0616	0.0612	0.0621	4	0.0618	0.0614	0.0624	4	0.0531	0.0530	0.0535	1	0.0601	0.0600	0.0606	2	0.0827	0.0807	0.0968	30	*0.2016*	*0.1815*	*0.2245*	332	0.0623	0.0620	0.0628	3	0.0339	0.0339	0.0339	0
F	Operations	Oct	13	0.0588	0.0588	0.0588	0	0.0613	0.0609	0.0619	3	0.0618	0.0613	0.0624	4	0.0533	0.0532	0.0539	1	0.0603	0.0601	0.0607	2	0.0814	0.0794	0.0949	31	*0.2958*	*0.2628*	*0.3323*	526	0.0625	0.0621	0.0629	3	0.0340	0.0340	0.0340	0
F	Operations	Nov	13	0.0650	0.0650	0.0650	0	0.0663	0.0664	0.0673	2	0.0664	0.0665	0.0676	2	0.0663	0.0662	0.0670	1	0.0604	0.0603	0.0610	2	0.0811	0.0790	0.0944	31	*0.3069*	*0.2753*	*0.3649*	419	0.0644	0.0644	0.0651	2	0.0456	0.0456	0.0456	-1
F	Operations	Dec	13	0.0650	0.0650	0.0650	0	0.0662	0.0661	0.0667	2	0.0661	0.0660	0.0666	2	0.0666	0.0665	0.0671	1	0.0607	0.0607	0.0613	2	0.0816	0.0794	0.0949	31	0.0531	0.0531	0.0531	0	0.0643	0.0643	0.0646	1	0.0460	0.0460	0.0460	0
F	Closure	Jan	6	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0651	0	0.0650	0.0650	0.0651	0	0.0669	0.0670	0.0672	2	0.0600	0.0603	0.0614	1	0.0951	0.0973	0.1046	69	0.0530	0.0530	0.0530	0	0.0639	0.0639	0.0640	0	0.0460	0.0460	0.0460	0
F	Closure	Feb	6	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0649	0.0649	0.0649	0	0.0669	0.0669	0.0671	2	0.0601	0.0603	0.0613	1	0.0959	0.0983	0.1058	70	0.0530	0.0530	0.0530	0	0.0642	0.0642	0.0642	0	0.0460	0.0460	0.0460	0
F	Closure	Mar	6	0.0649	0.0649	0.0649	0	0.0650	0.0650	0.0650	0	0.0649	0.0649	0.0649	0	0.0669	0.0669	0.0671	2	0.0601	0.0603	0.0612	1	0.0973	0.0996	0.1074	72	0.0530	0.0530	0.0530	0	0.0643	0.0643	0.0643	0	0.0460	0.0460	0.0460	0
F	Closure	Apr	6	0.0643	0.0643	0.0643	0	0.0657	0.0657	0.0657	0	0.0752	0.0749	0.0753	15	0.0669	0.0670	0.0672	2	0.0600	0.0601	0.0610	1	0.0987	0.1011	0.1091	74	*1.0030*	*0.9672*	*1.0060*	1725	0.0725	0.0722	0.0725	12	0.0460	0.0460	0.0460	0
F	Closure	May	6	0.0529	0.0529	0.0529	-2	0.0543	0.0543	0.0543	-3	0.0569	0.0568	0.0570	3	0.0524	0.0525	0.0529	3	0.0593	0.0595	0.0602	1	0.0961	0.0983	0.1061	74	*0.2710*	*0.2648*	*0.2819*	597	0.0579	0.0579	0.0580	1	0.0276	0.0276	0.0276	2
F	Closure	Jun	6	0.0559	0.0559	0.0559	0	0.0559	0.0559	0.0559	0	0.0562	0.0562	0.0562	1	0.0500	0.0500	0.0502	2	0.0575	0.0576	0.0579	1	0.0947	0.0967	0.1043	73	*0.3035*	*0.2932*	*0.3063*	671	0.0570	0.0570	0.0570	0	0.0270	0.0270	0.0270	0
F	Closure	Jul	6	0.0559	0.0559	0.0559	0	0.0560	0.0560	0.0560	0	0.0563	0.0562	0.0563	0	0.0566	0.0567	0.0568	1	0.0576	0.0576	0.0577	1	0.0977	0.0997	0.1077	74	*0.2230*	*0.2155*	*0.2237*	413	0.0582	0.0582	0.0582	0	0.0309	0.0309	0.0309	0
F	Closure	Aug	6	0.0558	0.0558	0.0558	0	0.0561	0.0561	0.0561	0	0.0564	0.0564	0.0564	1	0.0569	0.0569	0.0571	2	0.0584	0.0584	0.0584	0	0.0997	0.1017	0.1098	75	*0.2474*	*0.2388*	*0.2480*	468	0.0582	0.0582	0.0582	1	0.0310	0.0310	0.0310	0
F	Closure	Sep	6	0.0588	0.0588	0.0588	0	0.0590	0.0590	0.0590	0	0.0594	0.0594	0.0594	1	0.0535	0.0536	0.0539	2	0.0589	0.0589	0.0589	1	0.0986	0.1005	0.1085	74	*0.2853*	*0.2752*	*0.2860*	555	0.0605	0.0605	0.0605	1	0.0339	0.0339	0.0339	0
F	Closure	Oct	6	0.0588	0.0588	0.0588	0	0.0590	0.0590	0.0590	0	0.0597	0.0597	0.0597	1	0.0540	0.0541	0.0544	3	0.0591	0.0591	0.0591	1	0.0968	0.0986	0.1065	74	*0.4265*	*0.4083*	*0.4277*	872	0.0611	0.0610	0.0611	1	0.0340	0.0340	0.0340	0
F	Closure	Nov	6	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0654	0.0653	0.0654	1	0.0670	0.0671	0.0674	3	0.0594	0.0593	0.0594	1	0.0963	0.0980	0.1060	74	*0.3488*	*0.3363*	*0.3498*	534	0.0637	0.0637	0.0637	0	0.0456	0.0456	0.0456	-1
F	Closure	Dec	6	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0671	0.0672	0.0675	2	0.0598	0.0598	0.0599	1	0.0968	0.0985	0.1066	75	0.0531	0.0531	0.0531	0	0.0636	0.0636	0.0636	0	0.0460	0.0460	0.0460	0
F	Post-Closure	Jan	109	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0735	0.0721	0.0735	11	0.0686	0.0685	0.0686	4	0.0631	0.0626	0.0631	5	*0.1488*	*0.1478*	*0.1492*	168	*0.5512*	*0.4716*	*0.5528*	790	0.0701	0.0691	0.0701	8	0.0460	0.0461	0.0464	0
F	Post-Closure	Feb	109	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0776	0.0756	0.0777	16	0.0684	0.0684	0.0684	4	0.0634	0.0629	0.0634	5	*0.1501*	*0.1491*	*0.1506*	169	*0.5579*	*0.4786*	*0.5595*	803	0.0744	0.0728	0.0745	13	0.0460	0.0461	0.0464	0
F	Post-Closure	Mar	109	0.0649	0.0649	0.0649	0	0.0650	0.0650	0.0650	0	0.1198	0.1113	*0.1205*	71	0.0684	0.0683	0.0684	4	0.0646	0.0639	0.0646	7	*0.1524*	*0.1514*	*0.1530*	172	*0.5848*	*0.5024*	*0.5866*	848	0.1109	0.1037	0.1115	61	0.0460	0.0461	0.0464	0
F	Post-Closure	Apr	109	0.0643	0.0649	0.0662	1	0.0657	0.0663	0.0675	1	*0.1441*	*0.1345*	*0.1469*	106	0.0686	0.0685	0.0686	4	0.0659	0.0650	0.0659	9	*0.1551*	*0.1542*	*0.1557*	176	*0.6333*	*0.7089*	*1.3400*	1238	*0.1301*	*0.1221*	*0.1323*	89	0.0460	0.0460	0.0461	0
F	Post-Closure	May	109	0.0529	0.0532	0.0537	-2	0.0543	0.0545	0.0550	-3	0.0803	0.0771	0.0811	39	0.0548	0.0547	0.0548	8	0.0656	0.0647	0.0656	10	*0.1500*	*0.1491*	*0.1505*	173	*0.4316*	*0.4149*	*0.4350*	992	0.0716	0.0697	0.0720	22	0.0276	0.0276	0.0276	2
F	Post-Closure	Jun	109	0.0559	0.0559	0.0559	0	0.0559	0.0559	0.0560	0	0.0587	0.0584	0.0588	5	0.0511	0.0511	0.0511	4	0.0615	0.0609	0.0615	7	*0.1468*	*0.1460*	*0.1473*	170	*0.5334*	*0.5101*	*0.5373*	1242	0.0588	0.0585	0.0588	3	0.0270	0.0270	0.0270	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
F	Post-Closure	Jul	109	0.0559	0.0559	0.0559	0	0.0560	0.0561	0.0561	0	0.0588	0.0584	0.0589	4	0.0575	0.0575	0.0575	3	0.0598	0.0595	0.0598	4	0.1519	0.1511	0.1524	173	0.5132	0.4782	0.5158	1039	0.0602	0.0599	0.0602	3	0.0309	0.0309	0.0309	0
F	Post-Closure	Aug	109	0.0558	0.0559	0.0559	0	0.0561	0.0561	0.0561	0	0.0596	0.0591	0.0596	6	0.0580	0.0579	0.0580	3	0.0604	0.0601	0.0604	3	0.1548	0.1540	0.1553	173	0.5218	0.4905	0.5248	1068	0.0607	0.0604	0.0608	4	0.0310	0.0310	0.0310	0
F	Post-Closure	Sep	109	0.0588	0.0588	0.0589	0	0.0590	0.0590	0.0591	0	0.0643	0.0636	0.0644	8	0.0552	0.0552	0.0553	6	0.0612	0.0609	0.0612	4	0.1523	0.1516	0.1528	170	0.5376	0.5107	0.5405	1116	0.0642	0.0637	0.0642	6	0.0339	0.0339	0.0339	0
F	Post-Closure	Oct	109	0.0588	0.0588	0.0589	0	0.0590	0.0590	0.0591	0	0.0661	0.0652	0.0662	11	0.0563	0.0562	0.0563	8	0.0618	0.0614	0.0618	5	0.1489	0.1482	0.1493	168	0.5833	0.5724	0.5886	1263	0.0654	0.0648	0.0655	7	0.0340	0.0340	0.0340	0
F	Post-Closure	Nov	109	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0651	0	0.0701	0.0694	0.0702	7	0.0693	0.0693	0.0693	6	0.0623	0.0619	0.0623	5	0.1477	0.1471	0.1482	168	0.6181	0.5761	0.6226	987	0.0667	0.0663	0.0667	5	0.0456	0.0457	0.0459	-1
F	Post-Closure	Dec	109	0.0650	0.0650	0.0650	0	0.0650	0.0650	0.0650	0	0.0699	0.0691	0.0699	6	0.0690	0.0690	0.0690	5	0.0627	0.0623	0.0628	5	0.1480	0.1474	0.1485	168	0.5620	0.4852	0.5634	815	0.0667	0.0662	0.0667	4	0.0460	0.0461	0.0464	0
P, Tot	Construction	Jan	2	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0329	0.0329	0.0330	0	0.0458	0.0458	0.0458	0	0.0269	0.0269	0.0270	0	0.0407	0.0407	0.0412	0	0.0260	0.0260	0.0260	0	0.0305	0.0305	0.0305	0	0.0360	0.0360	0.0360	0
P, Tot	Construction	Feb	2	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0458	0.0458	0.0459	0	0.0275	0.0275	0.0275	0	0.0406	0.0406	0.0411	0	0.0260	0.0260	0.0260	0	0.0313	0.0313	0.0313	0	0.0360	0.0360	0.0360	0
P, Tot	Construction	Mar	2	0.0330	0.0330	0.0330	0	0.0337	0.0337	0.0338	2	0.0336	0.0336	0.0338	2	0.0458	0.0458	0.0459	0	0.0279	0.0279	0.0279	0	0.0406	0.0406	0.0411	0	0.0260	0.0260	0.0260	0	0.0321	0.0321	0.0323	2	0.0360	0.0360	0.0360	0
P, Tot	Construction	Apr	2	0.0331	0.0331	0.0331	0	0.0339	0.0339	0.0341	4	0.0336	0.0336	0.0337	4	0.0458	0.0458	0.0458	0	0.0282	0.0282	0.0282	0	0.0405	0.0405	0.0410	0	0.0260	0.0260	0.0260	0	0.0320	0.0320	0.0321	4	0.0360	0.0360	0.0360	0
P, Tot	Construction	May	2	0.0211	0.0211	0.0211	-5	0.0233	0.0233	0.0234	-2	0.0237	0.0237	0.0238	-5	0.0370	0.0370	0.0370	0	0.0276	0.0276	0.0276	0	0.0400	0.0400	0.0405	0	0.0396	0.0396	0.0396	-1	0.0222	0.0222	0.0222	-4	0.0225	0.0225	0.0225	2
P, Tot	Construction	Jun	2	0.0210	0.0210	0.0210	0	0.0212	0.0212	0.0212	0	0.0212	0.0212	0.0212	0	0.0361	0.0361	0.0361	0	0.0247	0.0247	0.0247	0	0.0401	0.0401	0.0405	0	0.0400	0.0400	0.0400	0	0.0208	0.0208	0.0208	0	0.0220	0.0220	0.0220	0
P, Tot	Construction	Jul	2	0.0320	0.0320	0.0320	0	0.0320	0.0320	0.0321	0	0.0320	0.0320	0.0320	0	0.0341	0.0341	0.0341	0	0.0261	0.0261	0.0261	0	0.0411	0.0411	0.0415	0	0.0313	0.0313	0.0313	1	0.0300	0.0300	0.0301	0	0.0394	0.0394	0.0394	-1
P, Tot	Construction	Aug	2	0.0321	0.0321	0.0321	0	0.0321	0.0321	0.0321	0	0.0320	0.0320	0.0321	0	0.0342	0.0342	0.0342	0	0.0284	0.0284	0.0284	0	0.0419	0.0419	0.0423	0	0.0310	0.0310	0.0310	0	0.0301	0.0301	0.0301	0	0.0400	0.0400	0.0400	0
P, Tot	Construction	Sep	2	0.0190	0.0190	0.0190	0	0.0192	0.0192	0.0192	0	0.0192	0.0192	0.0192	0	0.0362	0.0362	0.0362	0	0.0268	0.0268	0.0268	0	0.0423	0.0423	0.0427	0	0.0155	0.0155	0.0155	4	0.0194	0.0194	0.0194	0	0.0207	0.0207	0.0207	3
P, Tot	Construction	Oct	2	0.0190	0.0190	0.0190	0	0.0191	0.0191	0.0191	0	0.0191	0.0191	0.0191	0	0.0363	0.0363	0.0363	0	0.0247	0.0247	0.0247	0	0.0423	0.0423	0.0426	0	0.0150	0.0150	0.0150	0	0.0194	0.0194	0.0194	0	0.0200	0.0200	0.0200	0
P, Tot	Construction	Nov	2	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0329	0.0329	0.0329	1	0.0456	0.0456	0.0456	0	0.0249	0.0249	0.0249	0	0.0418	0.0418	0.0422	0	0.0256	0.0256	0.0256	-1	0.0296	0.0296	0.0296	1	0.0355	0.0355	0.0355	-1
P, Tot	Construction	Dec	2	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0458	0.0458	0.0459	0	0.0261	0.0261	0.0261	0	0.0416	0.0416	0.0419	0	0.0260	0.0260	0.0260	0	0.0298	0.0298	0.0298	0	0.0360	0.0360	0.0360	0
P, Tot	Operations	Jan	13	0.0330	0.0330	0.0330	0	0.0332	0.0332	0.0332	0	0.0331	0.0331	0.0332	0	0.0459	0.0459	0.0459	0	0.0271	0.0271	0.0272	1	0.0433	0.0431	0.0439	2	0.0260	0.0260	0.0260	0	0.0306	0.0306	0.0306	0	0.0360	0.0360	0.0360	0
P, Tot	Operations	Feb	13	0.0330	0.0330	0.0330	0	0.0352	0.0349	0.0355	6	0.0351	0.0348	0.0355	6	0.0459	0.0459	0.0459	0	0.0277	0.0277	0.0277	1	0.0433	0.0431	0.0438	2	0.0260	0.0260	0.0260	0	0.0330	0.0328	0.0333	5	0.0360	0.0360	0.0360	0
P, Tot	Operations	Mar	13	0.0330	0.0330	0.0330	0	0.0403	0.0396	0.0411	20	0.0403	0.0395	0.0410	20	0.0459	0.0459	0.0459	0	0.0283	0.0282	0.0284	1	0.0432	0.0430	0.0437	2	0.0260	0.0260	0.0260	0	0.0379	0.0372	0.0385	18	0.0360	0.0360	0.0360	0
P, Tot	Operations	Apr	13	0.0331	0.0331	0.0331	0	0.0362	0.0358	0.0366	10	0.0358	0.0354	0.0362	10	0.0459	0.0459	0.0459	0	0.0287	0.0286	0.0288	2	0.0431	0.0429	0.0437	2	0.0376	0.0360	0.0422	38	0.0337	0.0334	0.0341	8	0.0360	0.0360	0.0360	0
P, Tot	Operations	May	13	0.0211	0.0211	0.0211	-5	0.0237	0.0236	0.0238	-1	0.0241	0.0240	0.0242	-4	0.0371	0.0371	0.0371	0	0.0280	0.0280	0.0281	1	0.0425	0.0423	0.0430	2	0.0405	0.0404	0.0415	1	0.0224	0.0223	0.0225	-3	0.0225	0.0225	0.0225	2
P, Tot	Operations	Jun	13	0.0210	0.0210	0.0210	0	0.0215	0.0215	0.0215	2	0.0215	0.0215	0.0216	2	0.0361	0.0361	0.0362	0	0.0250	0.0249	0.0250	1	0.0424	0.0422	0.0429	2	0.0408	0.0407	0.0419	2	0.0211	0.0210	0.0211	1	0.0220	0.0220	0.0220	0
P, Tot	Operations	Jul	13	0.0320	0.0320	0.0320	0	0.0323	0.0323	0.0323	1	0.0323	0.0322	0.0323	1	0.0342	0.0342	0.0342	0	0.0263	0.0262	0.0263	1	0.0434	0.0432	0.0439	2	0.0329	0.0327	0.0336	5	0.0302	0.0302	0.0303	1	0.0394	0.0394	0.0394	-1
P, Tot	Operations	Aug	13	0.0321	0.0321	0.0321	0	0.0324	0.0324	0.0324	1	0.0324	0.0323	0.0324	1	0.0342	0.0342	0.0342	0	0.0286	0.0286	0.0286	1	0.0442	0.0440	0.0447	2	0.0329	0.0327	0.0337	5	0.0304	0.0304	0.0304	1	0.0400	0.0400	0.0400	0
P, Tot	Operations	Sep	13	0.0190	0.0190	0.0190	0	0.0195	0.0195	0.0197	2	0.0195	0.0195	0.0197	2	0.0362	0.0362	0.0363	0	0.0270	0.0270	0.0270	1	0.0445	0.0443	0.0450	2	0.0203	0.0196	0.0212	31	0.0196	0.0196	0.0198	2	0.0207	0.0207	0.0207	3
P, Tot	Operations	Oct	13	0.0190	0.0190	0.0190	0	0.0193	0.0193	0.0196	1	0.0193	0.0193	0.0196	2	0.0364	0.0364	0.0364	0	0.0248	0.0248	0.0249	1	0.0443	0.0441	0.0448	2	0.0227	0.0216	0.0241	44	0.0195	0.0195	0.0198	1	0.0200	0.0200	0.0200	0
P, Tot	Operations	Nov	13	0.0330	0.0330	0.0330	0	0.0331	0.0331	0.0332	1	0.0331	0.0331	0.0331	1	0.0457	0.0457	0.0457	0	0.0251	0.0251	0.0252	1	0.0438	0.0437	0.0443	2	0.0294	0.0290	0.0314	11	0.0296	0.0296	0.0297	1	0.0355	0.0355	0.0355	-1
P, Tot	Operations	Dec	13	0.0330	0.0330	0.0330	0	0.0331	0.0331	0.0331	0	0.0331	0.0331	0.0331	0	0.0459	0.0459	0.0459	0	0.0263	0.0263	0.0264	1	0.0436	0.0434	0.0440	2	0.0260	0.0260	0.0260	0	0.0299	0.0299	0.0299	0	0.0360	0.0360	0.0360	0
P, Tot	Closure	Jan	6	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0459	0.0459	0.0459	0	0.0269	0.0270	0.0271	0	0.0429	0.0431	0.0439	5	0.0260	0.0260	0.0260	0	0.0305	0.0305	0.0305	0	0.0360	0.0360	0.0360	0
P, Tot	Closure	Feb	6	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0459	0.0459	0.0459	0	0.0275	0.0275	0.0277	0	0.0428	0.0430	0.0437	5	0.0260	0.0260	0.0260	0	0.0312	0.0312	0.0312	0	0.0360	0.0360	0.0360	0
P, Tot	Closure	Mar	6	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0459	0.0459	0.0459	0	0.0279	0.0279	0.0281	0	0.0427	0.0429	0.0437	5	0.0260	0.0260	0.0260	0	0.0315	0.0315	0.0315	0	0.0360	0.0360	0.0360	0
P, Tot	Closure	Apr	6	0.0331	0.0331	0.0331	0	0.0325	0.0325	0.0325	0	0.0324	0.0324	0.0324	0	0.0459	0.0459	0.0459	0	0.0281	0.0282	0.0283	0	0.0426	0.0428	0.0435	5	0.0437	0.0433	0.0438	67	0.0308	0.0308	0.0308	0	0.0360	0.0360	0.0360	0
P, Tot	Closure	May	6	0.0211	0.0211	0.0211	-5	0.0224	0.0224	0.0224	-6	0.0229	0.0229	0.0229	-8	0.0371	0.0371	0.0371	0	0.0275	0.0275	0.0276	0	0.0420	0.0421	0.0428	5	0.0415	0.0415	0.0418	4	0.0216	0.0216	0.0217	-6	0.0225	0.0225	0.0225	2
P, Tot	Closure	Jun	6	0.0210	0.0210	0.0210	0	0.0211	0.0211	0.0211	0	0.0211	0.0211	0.0211	0	0.0361	0.0361	0.0361	0	0.0246	0.0246	0.0247	0	0.0419	0.0421	0.0427	5	0.0421	0.0421	0.0422	5	0.0208	0.0208	0.0208	0	0.0220	0.0220	0.0220	0
P, Tot	Closure	Jul	6	0.0320	0.0320	0.0320	0	0.0320	0.0320	0.0320	0	0.0320	0.0320	0.0320	0	0.0342	0.0342	0.0342	0	0.0260	0.0260	0.0261	0	0.0428	0.0430	0.0436	5	0.0341	0.0340	0.0341	10	0.0300	0.0300	0.0300	0	0.0394	0.0394	0.0394	-1
P, Tot	Closure	Aug	6	0.0321	0.0321	0.0321	0	0.0320	0.0320	0.0320	0	0.0320	0.0320	0.0320	0	0.0342	0.0342	0.0342	0	0.0284	0.0284	0.0284	0	0.0436	0.0438	0.0443	6	0.0342	0.0341	0.0342	10	0.0301	0.0301	0.0301	0	0.0400	0.0400	0.0400	0
P, Tot	Closure	Sep	6	0.0190	0.0190	0.0190	0	0.0191	0.0191	0.0191	0	0.0191	0.0191	0.0191	0	0.0362	0.0362	0.0362	0	0.0268	0.0268	0.0268	0	0.0439	0.0441	0.0446	5	0.0223	0.0221	0.0223	48	0.0193	0.0193	0.0193	0	0.0207	0.0207	0.0207	3
P, Tot	Closure	Oct	6	0.0190	0.0190	0.0190	0	0.0191	0.0191	0.0191	0	0.0191	0.0191	0.0191	0	0.0363	0.0363	0.0364	0	0.0246	0.0246	0.0246	0	0.0437	0.0439	0.0443	5	0.0259	0.0255	0.0259	70	0.0194	0.0194	0.0194	0	0.0200	0.0200	0.0200	0
P, Tot	Closure	Nov	6	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	1	0.0456	0.0456	0.0457	0	0.0249	0.0249	0.0249	0	0.0433	0.0434	0.0438	5	0.0310	0.0307	0.0311	18	0.0296	0.0296	0.0296	1	0.0355	0.0355	0.0355	-1
P, Tot	Closure	Dec	6	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0459	0.0459	0.0459	0	0.0261	0.0261	0.0261	0	0.0430	0.0431	0.0435	5	0.0260	0.0260	0.0260	0	0.0298	0.0298	0.0298	0	0.0360	0.0360	0.0360	0
P, Tot	Post-Closure	Jan	109	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0331	0.0332	0.0334	0	0.0459	0.0459	0.0459	0	0.0270	0.0270	0.0271	0	0.0439	0.0438	0.0439	9	0.0403	0.0408	0.0532	57	0.0306	0.0307	0.0308	0	0.0360	0.0360	0.0360	0
P, Tot	Post-Closure	Feb	109	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0332	0.0332	0.0335	1	0.0459	0.0459	0.0459	0	0.0276	0.0276	0.0277	0	0.0438	0.0438	0.0438	9	0.0407	0.0412	0.0536	59	0.0314	0.0314	0.0317	1	0.0360	0.0360	0.0360	0
P, Tot	Post-Closure	Mar	109	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0339	0.0341	0.0353	3	0.0459	0.0459	0.0459	0	0.0280	0.0280	0.0282	1	0.0437	0.0437	0.0438	9	0.0418	0.0423	0.0553	63	0.0324	0.0325	0.0336	3	0.0360	0.0360	0.0360	0
P, Tot	Post-Closure	Apr	109	0.0331	0.0331	0.0331	0	0.0325	0.0325	0.0326	0	0.0336	0.0338	0.0355	5	0.0459	0.0459	0.0459	0	0.0283	0.0283	0.0285	1	0.0437	0.0436	0.0437	9	0.0446	0.0462	0.0560	78	0.0320	0.0321	0.0336	4	0.0360	0.0360	0.0360	0
P, Tot	Post-Closure	May	109	0.0211	0.0211	0.0212	-5	0.0224	0.0224	0.0225	-6	0.0237	0.0237	0.0244	-5	0.0371	0.0371	0.0371	0	0.0277	0.0277	0.0278	1	0.0430	0.0429	0.0430	9	0.0432	0.0438	0.0509	10	0.0221	0.0221	0.0225	-4	0.0225	0.0225	0.0225	2
P, Tot	Post-Closure	Jun	109	0.0210	0.0210	0.0210	0	0.0211	0.0211	0.0211	0	0.0212	0.0212	0.0213	0	0.0362	0.0361	0.0362	0	0.0247	0.0247	0.0248	0	0.0429	0.0429	0.0429	9	0.0435	0.0442	0.0529	10	0.0208	0.0208	0.0209	0	0.0220	0.0220	0.0220	0
P, Tot	Post-Closure	Jul	109	0.0320	0.0320	0.0320	0	0.0320	0.0320	0.0320	0	0.0320	0.0320	0.0321	0	0.0342	0.0342	0.0342	0	0.0261	0.0261	0.0261	0	0.0439	0.0439	0.0439	9	0.0398	0.0414	0.0508	34	0.0300	0.0300	0.0301	0	0.0394	0.0394	0.0394	-1
P, Tot	Post-Closure	Aug	109	0.0321	0.0321	0.0321	0	0.0320	0.0320	0.0320	0	0.0320	0.0321	0.0321	0	0.0342	0.0342	0.0342	0	0.0284	0.0284	0.0285	0	0.0447	0.0447	0.0447	10	0.0403	0.0419	0.0513	35	0.0301	0.0301	0.0302	0	0.0400	0.0400	0.0400	0
P, Tot	Post-Closure	Sep	109	0.0190	0.0190	0.0190	0	0.0191	0.0191	0.0191	0	0.0193	0.0193	0.0194	1	0.0363	0.0362	0.0363	0	0.0268	0.0268	0.0269	0	0.0450	0.0450	0.0450	9	0.0379	0.0385	0.0494	156	0.0194	0.0194	0.0195	1	0.0207	0.0207	0.0207	3
P, Tot	Post-Closure	Oct	109	0.0190	0.0190	0.0190	0	0.0191	0.0191	0.0191	0	0.0193	0.0193	0.0195	2	0.0364	0.0364	0.0364	0	0.0247	0.0247	0.0248	0	0.0448	0.0448	0.0448	9	0.0401	0.0410	0.0525	173	0.0196	0.0195	0.0197	1	0.0200	0.0200	0.0200	0
P, Tot	Post-Closure	Nov	109	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0330	0.0331	0.0332	1	0.0457	0.0457	0.0457	0	0.0250	0.0250	0.0251	1	0.0443	0.0443	0.0443	9	0.0430	0.0442	0.0568	70	0.0296	0.0296	0.0297	1	0.0355	0.0355	0.0355	-1
P, Tot	Post-Closure	Dec	109	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0331	0.0331	0.0332	0	0.0459	0.0459	0.0459	0	0.0262	0.0262	0.0263	1	0.0440	0.0440	0.0440	9	0.0414	0.0419	0.0545	61	0.0299	0.0299	0.0300	0	0.0360	0.0360	0.0360	0
NH3 (as N)	Construction	Jan	2	0.0390	0.0390	0.0390	0	0.0399	0.0399	0.0407	2	0.0399	0.0399	0.0407	2	0.1872	0.1872	0.1876	0	0.0391	0.0391	0.0392	1	0.1085	0.1085	0.1155	3	0.3300	0.3300	0.3300	0	0.0514	0.0514	0.0520	1	0.3000	0.3000	0.3000	0
NH3 (as N)	Construction	Feb	2	0.0390	0.0390	0.0390	0	0.0423	0.0423	0.0453	8	0.0423	0.0423	0.0453	8	0.1875	0.1875	0.1878	0	0.0432	0.0432	0.0435	1	0.1113	0.1113	0.1182	2	0.3300	0.3300	0.3300	0	0.0500	0.0500	0.0524	5	0.3000	0.3000	0.3000	0
NH3 (as N)	Construction	Mar	2	0.0390	0.0390	0.0390	0	0.0580	0.0580	0.0636	49	0.0580	0.0580	0.0635	49	0.1878	0.1878	0.1880	0	0.0466	0.0466	0.0470	1	0.1141	0.1141	0.1209	2	0.3300	0.3300	0.3300	0	0.0617	0.0617	0.0664	34	0.3000	0.3000	0.3000	0
NH3 (as N)	Construction	Apr	2	0.0487	0.0487	0.0487	2	0.0848	0.0848	0.0909	72	0.0859	0.0859	0.0918	60	0.1877	0.1877	0.1879	0	0.0497	0.0497	0.0502	3	0.1168	0.1168	0.1235	2	0.3300	0.3300	0.3300	0	0.0851	0.0851	0.0900	49	0.3000	0.3000	0.3000	0
NH3 (as N)	Construction	May	2	0.0056	0.0056	0.0056	-43	0.0221	0.0221	0.0244	57	0.0337	0.0337	0.0358	-25	0.0437	0.0437	0.0440	-1	0.0474	0.0474	0.0479	1	0.1121	0.1121	0.1183	4	0.6010	0.6010	0.6010	-1	0.0275	0.0275	0.0289	-19	0.0145	0.0145	0.0145	190
NH3 (as N)	Construction	Jun	2	0.0050	0.0050	0.0050	0	0.0067	0.0067	0.0069	30	0.0075	0.0075	0.0077	3	0.0288	0.0288	0.0289	-1	0.0294	0.0294	0.0298	0	0.1085	0.1085	0.1143	6	0.6100	0.6100	0.6100	0	0.0110	0.0110	0.0111	1	0.0050	0.0050	0.0050	0
NH3 (as N)	Construction	Jul	2	0.0330	0.0330	0.0330	0	0.0340	0.0340	0.0342	3	0.0340	0.0340	0.0342	3	0.0128	0.0128	0.0129	-3	0.0222	0.0222	0.0223	2	0.1121	0.1121	0.1179	6	0.0632	0.0632	0.0632	41	0.0276	0.0276	0.0278	3	0.0282	0.0282	0.0282	-3
NH3 (as N)	Construction	Aug	2	0.0330	0.0330	0.0330	0	0.0343	0.0343	0.0346	4	0.0342	0.0342	0.0346	4	0.0131	0.0131	0.0132	-4	0.0236	0.0236	0.0237	2	0.1137	0.1137	0.1193	7	0.0450	0.0450	0.0450	0	0.0281	0.0281	0.0283	3	0.0290	0.0290	0.0290	0
NH3 (as N)	Construction	Sep	2	0.0050	0.0050	0.0050	0	0.0069	0.0069	0.0077	35	0.0070	0.0070	0.0078	30	0.0200	0.0200	0.0202	-4	0.0202	0.0202	0.0205	3	0.1124	0.1124	0.1177	8	0.0469	0.0469	0.0469	0	0.0105	0.0105	0.0112	13	0.0058	0.0058	0.0058	16
NH3 (as N)	Construction	Oct	2	0.0050	0.0050	0.0050	0	0.0062	0.0062	0.0065	21	0.0063	0.0063	0.0066	17	0.0212	0.0212	0.0215	-3	0.0167	0.0167	0.0170	4	0.1115	0.1115	0.1164	8	0.0470	0.0470	0.0470	0	0.0112	0.0112	0.0114	6	0.0050	0.0050	0.0050	0
NH3 (as N)	Construction	Nov	2	0.0393	0.0393	0.0393	0	0.0402	0.0402	0.0405	2	0.0403	0.0403	0.0406	2	0.1824	0.1824	0.1826	1	0.0229	0.0229	0.0232	3	0.1136	0.1136	0.1183	8	0.3206	0.3206	0.3206	-3	0.0561	0.0561	0.0562	1	0.2902	0.2902	0.2902	-3
NH3 (as N)	Construction	Dec	2	0.0390	0.0390	0.0390	0	0.0398	0.0398	0.0401	2	0.0398	0.0398	0.0401	2	0.1873	0.1873	0.1874	0	0.0330	0.0330	0.0333	2	0.1171	0.1171	0.1217	7	0.3300	0.3300	0.3300	0	0.0548	0.0548	0.0550	1	0.3000	0.3000	0.3000	0
NH3 (as N)	Operations	Jan	13	0.0394	0.0394	0.0394	1	0.0490	0.0487	0.0520	25	0.0492	0.0489	0.0522	25	0.1895	0.1891	0.1898	1	0.0428	0.0426	0.0443	9	0.1733	0.1633	0.1855	35	0.3300	0.3300	0.3300	0	0.0583	0.0580	0.0604	14	0.3000	0.3000	0.3000	0
NH3 (as N)	Operations	Feb	13	0.0395	0.0395	0.0395	1	0.0904	0.0872	0.1036	124	0.0905	0.0874	0.1037	124	0.1896	0.1893	0.1900	1	0.0479	0.0476	0.0495	10	0.1758	0.1671	0.1897	35	0.3300	0.3300	0.3300	0	0.0893	0.0868	0.1000	83	0.3000	0.3000	0.3000	0
NH3 (as N)	Operations	Mar	13	0.0398	0.0398	0.0398	2	0.1593	0.1483	0.1721	280	0.1593	0.1483	0.1720	280	0.1897	0.1894	0.1901	1	0.0542	0.0536	0.0563	16	0.1782	0.1704	0.1931	35	0.3300	0.3300	0.3300	0	0.1479	0.1385	0.1589	200	0.3000	0.3000	0.3000	0
NH3 (as N)	Operations	Apr	13	0.0488	0.0488	0.0490	2	0.1187	0.1160	0.1340	135	0.1569	0.1514	0.1745	182	0.1897	0.1895	0.1902	1	0.0592	0.0584	0.0616	20	0.1816	0.1733	0.1960	34	4.6150	4.1266	5.7160	1150	0.1434	0.1388	0.1579	143	0.3000	0.3000	0.3000	0
NH3 (as N)	Operations	May	13	0.0056	0.0056	0.0056	-43	0.0300	0.0298	0.0355	112	0.0534	0.0514	0.0583	15	0.0466	0.0461	0.0471	3	0.0566	0.0559	0.0590	19	0.1737	0.1652	0.1864	36	1.6030	1.4879	1.8470	144	0.0396	0.0384	0.0428	13	0.0145	0.0145	0.0145	190
NH3 (as N)	Operations	Jun	13	0.0050	0.0050	0.0050	0	0.0110	0.0108	0.0119	112	0.0129	0.0127	0.0140	75	0.0301	0.0299	0.0304	1	0.0353	0.0349	0.0367	18	0.1672	0.1586	0.1786	38	1.6530	1.5308	1.8830	151	0.0147	0.0146	0.0155	34	0.0050	0.0050	0.0050	0
NH3 (as N)	Operations	Jul	13	0.0330	0.0330	0.0330	0	0.0371	0.0371	0.0380	12	0.0380	0.0379	0.0391	15	0.0138	0.0137	0.0140	2	0.0257	0.0255	0.0263	17	0.1714	0.1624	0.1825	38	0.8203	0.7275	0.9597	1517	0.0308	0.0307	0.0316	14	0.0282	0.0282	0.0282	-3
NH3 (as N)	Operations	Aug	13	0.0330	0.0330	0.0330	0	0.0386	0.0386	0.0399	17	0.0400	0.0398	0.0414	20	0.0143	0.0141	0.0145	1	0.0269	0.0268	0.0277	16	0.1725	0.1632	0.1830	38	0.9081	0.8009	1.0590	1680	0.0326	0.0324	0.0337	20	0.0290	0.0290	0.0290	0
NH3 (as N)	Operations	Sep	13	0.0050	0.0050	0.0050	0	0.0106	0.0109	0.0140	114	0.0129	0.0127	0.0162	137	0.0218	0.0215	0.0221	1	0.0237	0.0235	0.0247	21	0.1683	0.1592	0.1778	39	1.0760	0.9471	1.2490	1915	0.0150	0.0149	0.0175	60	0.0058	0.0058	0.0058	16
NH3 (as N)	Operations	Oct	13	0.0050	0.0050	0.0050	0	0.0093	0.0096	0.0139	89	0.0133	0.0128	0.0177	139	0.0236	0.0232	0.0240	3	0.0202	0.0202	0.0220	25	0.1651	0.1559	0.1736	39	1.7140	1.5032	1.9910	3098	0.0159	0.0156	0.0191	48	0.0050	0.0050	0.0050	0
NH3 (as N)	Operations	Nov	13	0.0394	0.0394	0.0394	0	0.0435	0.0435	0.0447	11	0.0452	0.0449	0.0463	14	0.1848	0.1844	0.1852	1	0.0265	0.0264	0.0282	19	0.1665	0.1576	0.1754	37	2.0990	1.8428	2.3710	458	0.0591	0.0589	0.0598	7	0.2902	0.2902	0.2902	-3
NH3 (as N)	Operations	Dec	13	0.0393	0.0393	0.0393	1	0.0437	0.0436	0.0450	12	0.0438	0.0437	0.0451	12	0.1892	0.1889	0.1896	1	0.0363	0.0363	0.0379	12	0.1701	0.1621	0.1805	37	0.3304	0.3304	0.3305	0	0.0574	0.0573	0.0583	6	0.3000	0.3000	0.3000	0
NH3 (as N)	Closure	Jan	6	0.0395	0.0395	0.0395	1	0.0395	0.0395	0.0396	1	0.0398	0.0398	0.0400	2	0.1884	0.1885	0.1892	1	0.0399	0.0402	0.0420	4	0.1394	0.1430	0.1651	32	0.3300	0.3300	0.3300	0	0.0515	0.0515	0.0516	1	0.3000	0.3000	0.3000	0
NH3 (as N)	Closure	Feb	6	0.0396	0.0396	0.0396	2	0.0396	0.0396	0.0396	2	0.0401	0.0401	0.0401	3	0.1886	0.1887	0.1893	1	0.0440	0.0443	0.0460	3	0.1413	0.1448	0.1668	31	0.3300	0.3300	0.3300	0	0.0483	0.0483	0.0483	2	0.3000	0.3000	0.3000	0
NH3 (as N)	Closure	Mar	6	0.0399	0.0399	0.0399	2	0.0399	0.0399	0.0399	2	0.0405	0.0405	0.0406	4	0.1887	0.1888	0.1894	1	0.0470	0.0473	0.0489	3	0.1431	0.1467	0.1684	30	0.3300	0.3300	0.3300	0	0.0474	0.0474	0.0474	3	0.3000	0.3000	0.3000	0
NH3 (as N)	Closure	Apr	6	0.0488	0.0489	0.0491	2	0.0521	0.0522	0.0525	6	0.0918	0.0923	0.0949	72	0.1887	0.1888	0.1894	1	0.0497	0.0500	0.0515	3	0.1449	0.1484	0.1699	30	3.9920	4.0205	4.2260	1118	0.0897	0.0901	0.0922	58	0.3000	0.3000	0.3000	0
NH3 (as N)	Closure	May	6	0.0056	0.0056	0.0056	-43	0.0077	0.0077	0.0077	-46	0.0322	0.0322	0.0328	-28	0.0447	0.0449	0.0458	2	0.0475	0.0477	0.0491	2	0.1375	0.1407	0.1606	32	1.4915	1.4943	1.5250	145	0.0262	0.0262	0.0265	-23	0.0145	0.0145	0.0145	190
NH3 (as N)	Closure	Jun	6	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0070	0.0070	0.0071	-3	0.0293	0.0293	0.0297	1	0.0294	0.0296	0.0302	0	0.1316	0.1346	0.1531	34	1.5500	1.5535	1.5880	155	0.0107	0.0107	0.0107	-1	0.0050	0.0050	0.0050	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
NH3 (as N)	Closure	Jul	6	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0330	0	0.0340	0.0340	0.0340	3	0.0131	0.0132	0.0135	1	0.0221	0.0221	0.0224	1	0.1344	0.1374	0.1558	34	0.7729	0.7725	0.7824	1617	0.0276	0.0276	0.0276	3	0.0282	0.0282	0.0282	-3
NH3 (as N)	Closure	Aug	6	0.0330	0.0330	0.0330	0	0.0331	0.0331	0.0331	0	0.0344	0.0344	0.0344	4	0.0135	0.0135	0.0139	-1	0.0236	0.0236	0.0237	2	0.1348	0.1378	0.1557	34	0.8525	0.8520	0.8628	1793	0.0282	0.0282	0.0282	4	0.0290	0.0290	0.0290	0
NH3 (as N)	Closure	Sep	6	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0071	0.0071	0.0071	32	0.0205	0.0206	0.0211	0	0.0201	0.0202	0.0202	3	0.1316	0.1343	0.1511	35	1.0085	1.0078	1.0210	2044	0.0106	0.0106	0.0106	14	0.0058	0.0058	0.0058	16
NH3 (as N)	Closure	Oct	6	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0085	0.0085	0.0086	59	0.0219	0.0220	0.0227	2	0.0170	0.0170	0.0171	6	0.1288	0.1314	0.1470	34	1.5800	1.5788	1.6000	3259	0.0127	0.0127	0.0127	21	0.0050	0.0050	0.0050	0
NH3 (as N)	Closure	Nov	6	0.0395	0.0395	0.0395	0	0.0396	0.0396	0.0396	1	0.0410	0.0410	0.0410	4	0.1832	0.1833	0.1839	1	0.0235	0.0235	0.0236	6	0.1297	0.1322	0.1472	33	1.3860	1.3857	1.4040	320	0.0566	0.0566	0.0566	2	0.2902	0.2902	0.2902	-3
NH3 (as N)	Closure	Dec	6	0.0393	0.0393	0.0393	1	0.0393	0.0393	0.0393	1	0.0396	0.0396	0.0396	1	0.1879	0.1880	0.1885	1	0.0335	0.0335	0.0336	4	0.1323	0.1347	0.1494	31	0.3302	0.3302	0.3302	0	0.0547	0.0547	0.0547	1	0.3000	0.3000	0.3000	0
NH3 (as N)	Post-Closure	Jan	109	0.0395	0.0395	0.0395	1	0.0395	0.0395	0.0395	1	0.0457	0.0461	0.0521	18	0.1879	0.1879	0.1881	1	0.0413	0.0415	0.0436	7	0.1235	0.1238	0.1283	24	0.3947	0.4575	0.7609	39	0.0556	0.0560	0.0603	10	0.3000	0.3007	0.3026	0
NH3 (as N)	Post-Closure	Feb	109	0.0396	0.0396	0.0396	2	0.0396	0.0396	0.0396	2	0.0489	0.0496	0.0583	27	0.1882	0.1882	0.1883	1	0.0456	0.0458	0.0481	7	0.1255	0.1258	0.1303	23	0.4005	0.4622	0.7676	40	0.0553	0.0559	0.0629	18	0.3000	0.3007	0.3027	0
NH3 (as N)	Post-Closure	Mar	109	0.0399	0.0399	0.0399	2	0.0399	0.0399	0.0399	2	0.0786	0.0818	0.1197	110	0.1883	0.1883	0.1884	0	0.0494	0.0497	0.0528	8	0.1275	0.1278	0.1324	23	0.4076	0.4732	0.7942	43	0.0791	0.0819	0.1140	78	0.3000	0.3007	0.3027	0
NH3 (as N)	Post-Closure	Apr	109	0.0491	0.0493	0.0503	3	0.0525	0.0526	0.0536	6	0.1144	0.1232	0.1808	129	0.1882	0.1883	0.1884	0	0.0529	0.0533	0.0574	10	0.1294	0.1297	0.1343	22	0.5940	1.0013	3.9280	203	0.1088	0.1160	0.1638	103	0.3000	0.3002	0.3007	0
NH3 (as N)	Post-Closure	May	109	0.0056	0.0057	0.0060	-41	0.0077	0.0078	0.0080	-45	0.0411	0.0437	0.0624	-2	0.0441	0.0441	0.0443	1	0.0506	0.0511	0.0555	9	0.1231	0.1234	0.1278	24	0.6134	0.7214	1.4750	18	0.0314	0.0330	0.0441	-3	0.0145	0.0145	0.0146	191
NH3 (as N)	Post-Closure	Jun	109	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0082	0.0085	0.0105	17	0.0290	0.0290	0.0291	0	0.0312	0.0316	0.0344	7	0.1181	0.1184	0.1226	26	0.5872	0.7074	1.5330	16	0.0115	0.0117	0.0131	8	0.0050	0.0050	0.0051	1
NH3 (as N)	Post-Closure	Jul	109	0.0330	0.0330	0.0330	0	0.0330	0.0330	0.0331	0	0.0352	0.0354	0.0373	7	0.0129	0.0129	0.0130	0	0.0231	0.0233	0.0249	7	0.1210	0.1213	0.1256	26	0.4623	0.5027	0.7616	1017	0.0286	0.0287	0.0302	7	0.0282	0.0282	0.0283	-3
NH3 (as N)	Post-Closure	Aug	109	0.0330	0.0330	0.0330	0	0.0331	0.0331	0.0331	0	0.0358	0.0361	0.0385	9	0.0132	0.0132	0.0133	-2	0.0245	0.0247	0.0262	7	0.1217	0.1221	0.1263	27	0.4735	0.5215	0.8395	1059	0.0293	0.0295	0.0314	9	0.0290	0.0290	0.0291	0
NH3 (as N)	Post-Closure	Sep	109	0.0050	0.0050	0.0051	0	0.0051	0.0051	0.0051	0	0.0096	0.0100	0.0138	87	0.0201	0.0201	0.0203	-1	0.0212	0.0214	0.0230	10	0.1193	0.1196	0.1237	28	0.4833	0.5493	0.9925	1069	0.0125	0.0128	0.0157	38	0.0058	0.0058	0.0059	16
NH3 (as N)	Post-Closure	Oct	109	0.0050	0.0050	0.0051	1	0.0051	0.0051	0.0052	0	0.0113	0.0120	0.0171	123	0.0214	0.0214	0.0216	0	0.0181	0.0184	0.0204	15	0.1173	0.1176	0.1216	27	0.5428	0.6690	1.5530	1323	0.0146	0.0150	0.0185	43	0.0050	0.0050	0.0051	1
NH3 (as N)	Post-Closure	Nov	109	0.0395	0.0395	0.0395	0	0.0396	0.0397	0.0397	1	0.0437	0.0441	0.0477	12	0.1826	0.1827	0.1828	1	0.0247	0.0249	0.0271	13	0.1186	0.1189	0.1228	26	0.5740	0.6770	1.3650	105	0.0581	0.0584	0.0606	5	0.2902	0.2907	0.2921	-3
NH3 (as N)	Post-Closure	Dec	109	0.0393	0.0393	0.0393	1	0.0393	0.0393	0.0393	1	0.0429	0.0432	0.0466	11	0.1875	0.1875	0.1876	1	0.0347	0.0350	0.0371	8	0.1212	0.1215	0.1255	24	0.4069	0.4693	0.7796	42	0.0568	0.0569	0.0591	5	0.3000	0.3007	0.3026	0
NO2 (as N)	Construction	Jan	2	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0381	0	0.0380	0.0380	0.0381	0	0.0271	0.0271	0.0271	0	0.0211	0.0211	0.0211	0	0.0293	0.0293	0.0293	0	0.0250	0.0250	0.0250	0	0.0285	0.0285	0.0286	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Construction	Feb	2	0.0380	0.0380	0.0380	0	0.0382	0.0382	0.0386	1	0.0382	0.0382	0.0385	1	0.0271	0.0271	0.0271	0	0.0217	0.0217	0.0217	0	0.0291	0.0291	0.0292	-1	0.0250	0.0250	0.0250	0	0.0315	0.0315	0.0318	1	0.0220	0.0220	0.0220	0
NO2 (as N)	Construction	Mar	2	0.0380	0.0380	0.0380	0	0.0386	0.0386	0.0394	1	0.0385	0.0385	0.0394	1	0.0271	0.0271	0.0271	0	0.0221	0.0221	0.0222	0	0.0290	0.0290	0.0291	-1	0.0250	0.0250	0.0250	0	0.0330	0.0330	0.0338	2	0.0220	0.0220	0.0220	0
NO2 (as N)	Construction	Apr	2	0.0374	0.0374	0.0374	0	0.0371	0.0371	0.0381	1	0.0368	0.0368	0.0378	1	0.0271	0.0271	0.0271	0	0.0224	0.0224	0.0225	1	0.0288	0.0288	0.0289	-1	0.0250	0.0250	0.0250	0	0.0312	0.0312	0.0320	2	0.0220	0.0220	0.0220	0
NO2 (as N)	Construction	May	2	0.0205	0.0205	0.0205	-7	0.0197	0.0197	0.0201	-8	0.0197	0.0197	0.0200	-9	0.0253	0.0253	0.0253	0	0.0213	0.0213	0.0214	0	0.0284	0.0284	0.0284	0	0.0153	0.0153	0.0153	2	0.0156	0.0156	0.0158	-9	0.0249	0.0249	0.0249	0
NO2 (as N)	Construction	Jun	2	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0200	0.0200	0.0200	0	0.0251	0.0251	0.0251	0	0.0180	0.0180	0.0181	0	0.0283	0.0283	0.0284	0	0.0150	0.0150	0.0150	0	0.0167	0.0167	0.0167	0	0.0250	0.0250	0.0250	0
NO2 (as N)	Construction	Jul	2	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0249	0	0.0241	0.0241	0.0241	0	0.0182	0.0182	0.0183	0	0.0288	0.0288	0.0289	0	0.0098	0.0098	0.0098	2	0.0214	0.0214	0.0214	0	0.0182	0.0182	0.0182	1
NO2 (as N)	Construction	Aug	2	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0250	0	0.0248	0.0248	0.0249	0	0.0241	0.0241	0.0241	0	0.0196	0.0196	0.0196	0	0.0292	0.0292	0.0293	0	0.0096	0.0096	0.0096	0	0.0215	0.0215	0.0215	0	0.0180	0.0180	0.0180	0
NO2 (as N)	Construction	Sep	2	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0251	0	0.0250	0.0250	0.0251	0	0.0032	0.0032	0.0032	-9	0.0197	0.0197	0.0197	0	0.0294	0.0294	0.0295	0	0.0168	0.0168	0.0168	-1	0.0215	0.0215	0.0215	0	0.0238	0.0238	0.0238	-1
NO2 (as N)	Construction	Oct	2	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0251	0	0.0250	0.0250	0.0250	0	0.0031	0.0031	0.0031	-10	0.0191	0.0191	0.0192	0	0.0295	0.0295	0.0295	0	0.0170	0.0170	0.0170	0	0.0203	0.0203	0.0204	0	0.0240	0.0240	0.0240	0
NO2 (as N)	Construction	Nov	2	0.0380	0.0380	0.0380	0	0.0379	0.0379	0.0380	0	0.0379	0.0379	0.0380	1	0.0265	0.0265	0.0265	0	0.0195	0.0195	0.0195	1	0.0294	0.0294	0.0295	-1	0.0247	0.0247	0.0247	-1	0.0249	0.0249	0.0249	1	0.0221	0.0221	0.0221	0
NO2 (as N)	Construction	Dec	2	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0381	0	0.0380	0.0380	0.0381	0	0.0271	0.0271	0.0271	0	0.0204	0.0204	0.0204	0	0.0295	0.0295	0.0295	-1	0.0250	0.0250	0.0250	0	0.0257	0.0257	0.0257	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Operations	Jan	13	0.0380	0.0380	0.0380	0	0.0397	0.0397	0.0405	4	0.0396	0.0396	0.0404	4	0.0273	0.0273	0.0274	1	0.0214	0.0214	0.0215	2	0.0368	0.0352	0.0394	17	0.0250	0.0250	0.0250	0	0.0296	0.0296	0.0302	4	0.0220	0.0220	0.0220	0
NO2 (as N)	Operations	Feb	13	0.0380	0.0380	0.0380	0	0.0431	0.0430	0.0456	13	0.0430	0.0430	0.0456	13	0.0273	0.0272	0.0274	1	0.0221	0.0221	0.0223	2	0.0373	0.0354	0.0397	18	0.0250	0.0250	0.0250	0	0.0353	0.0354	0.0375	14	0.0220	0.0220	0.0220	0
NO2 (as N)	Operations	Mar	13	0.0380	0.0380	0.0380	0	0.0418	0.0420	0.0459	10	0.0417	0.0419	0.0458	10	0.0273	0.0272	0.0274	1	0.0228	0.0228	0.0231	3	0.0373	0.0354	0.0398	19	0.0250	0.0250	0.0250	0	0.0358	0.0361	0.0393	12	0.0220	0.0220	0.0220	0
NO2 (as N)	Operations	Apr	13	0.0374	0.0374	0.0374	0	0.0404	0.0404	0.0423	10	0.0410	0.0407	0.0429	11	0.0273	0.0273	0.0274	1	0.0231	0.0231	0.0234	4	0.0371	0.0353	0.0398	19	0.1123	0.1025	0.1515	310	0.0342	0.0340	0.0358	11	0.0220	0.0220	0.0220	0
NO2 (as N)	Operations	May	13	0.0205	0.0205	0.0205	-7	0.0209	0.0209	0.0217	-2	0.0211	0.0210	0.0218	-3	0.0257	0.0256	0.0258	1	0.0220	0.0220	0.0223	3	0.0361	0.0345	0.0387	19	0.0361	0.0337	0.0445	125	0.0165	0.0164	0.0169	-4	0.0249	0.0249	0.0249	0
NO2 (as N)	Operations	Jun	13	0.0200	0.0200	0.0200	0	0.0203	0.0203	0.0204	2	0.0203	0.0203	0.0204	2	0.0252	0.0252	0.0253	0	0.0184	0.0184	0.0186	2	0.0355	0.0342	0.0381	19	0.0332	0.0312	0.0404	108	0.0169	0.0169	0.0170	1	0.0250	0.0250	0.0250	0
NO2 (as N)	Operations	Jul	13	0.0250	0.0250	0.0250	0	0.0251	0.0251	0.0252	1	0.0250	0.0250	0.0251	1	0.0242	0.0242	0.0243	0	0.0185	0.0184	0.0185	1	0.0361	0.0348	0.0388	18	0.0214	0.0200	0.0253	108	0.0216	0.0216	0.0216	1	0.0182	0.0182	0.0182	1
NO2 (as N)	Operations	Aug	13	0.0250	0.0250	0.0250	0	0.0251	0.0251	0.0253	1	0.0251	0.0251	0.0252	1	0.0243	0.0242	0.0243	0	0.0198	0.0197	0.0198	1	0.0363	0.0351	0.0390	18	0.0236	0.0219	0.0284	128	0.0217	0.0217	0.0218	1	0.0180	0.0180	0.0180	0
NO2 (as N)	Operations	Sep	13	0.0250	0.0250	0.0250	0	0.0253	0.0253	0.0255	1	0.0253	0.0253	0.0255	2	0.0034	0.0033	0.0035	-4	0.0199	0.0199	0.0200	1	0.0361	0.0350	0.0387	17	0.0328	0.0309	0.0388	82	0.0217	0.0217	0.0219	1	0.0238	0.0238	0.0238	-1
NO2 (as N)	Operations	Oct	13	0.0250	0.0250	0.0250	0	0.0254	0.0254	0.0256	2	0.0255	0.0254	0.0257	2	0.0034	0.0034	0.0035	-4	0.0193	0.0193	0.0195	1	0.0358	0.0348	0.0383	16	0.0492	0.0454	0.0614	167	0.0206	0.0206	0.0208	2	0.0240	0.0240	0.0240	0
NO2 (as N)	Operations	Nov	13	0.0380	0.0380	0.0380	0	0.0385	0.0384	0.0386	2	0.0385	0.0385	0.0387	2	0.0268	0.0268	0.0269	1	0.0197	0.0197	0.0198	2	0.0357	0.0349	0.0384	16	0.1572	0.1326	0.2022	430	0.0252	0.0252	0.0253	2	0.0221	0.0221	0.0221	0
NO2 (as N)	Operations	Dec	13	0.0380	0.0380	0.0380	0	0.0388	0.0387	0.0391	2	0.0387	0.0387	0.0390	2	0.0273	0.0273	0.0275	1	0.0206	0.0206	0.0208	2	0.0361	0.0352	0.0389	17	0.0250	0.0250	0.0251	0	0.0261	0.0261	0.0263	2	0.0220	0.0220	0.0220	0
NO2 (as N)	Closure	Jan	6	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0271	0.0271	0.0272	0	0.0211	0.0211	0.0212	0	0.0309	0.0313	0.0339	6	0.0250	0.0250	0.0250	0	0.0284	0.0284	0.0284	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Closure	Feb	6	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0379	0.0379	0.0379	0	0.0271	0.0271	0.0272	0	0.0217	0.0217	0.0217	0	0.0307	0.0311	0.0337	6	0.0250	0.0250	0.0250	0	0.0311	0.0311	0.0311	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Closure	Mar	6	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0379	0.0379	0.0379	0	0.0271	0.0271	0.0272	0	0.0221	0.0221	0.0222	0	0.0306	0.0310	0.0335	6	0.0250	0.0250	0.0250	0	0.0322	0.0322	0.0322	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Closure	Apr	6	0.0374	0.0374	0.0374	0	0.0366	0.0366	0.0366	0	0.0365	0.0365	0.0366	0	0.0271	0.0271	0.0272	0	0.0223	0.0223	0.0224	0	0.0304	0.0308	0.0333	6	0.0517	0.0526	0.0577	110	0.0303	0.0302	0.0303	-1	0.0220	0.0220	0.0220	0
NO2 (as N)	Closure	May	6	0.0205	0.0205	0.0205	-7	0.0190	0.0190	0.0190	-11	0.0191	0.0191	0.0191	-12	0.0254	0.0254	0.0255	0	0.0212	0.0213	0.0213	0	0.0298	0.0301	0.0324	6	0.0241	0.0242	0.0249	61	0.0152	0.0152	0.0152	-12	0.0249	0.0249	0.0249	0
NO2 (as N)	Closure	Jun	6	0.0200	0.0200	0.0200	0	0.0199	0.0199	0.0199	0	0.0200	0.0200	0.0200	0	0.0251	0.0251	0.0252	0	0.0180	0.0180	0.0180	0	0.0296	0.0299	0.0321	6	0.0246	0.0247	0.0255	65	0.0167	0.0167	0.0167	0	0.0250	0.0250	0.0250	0
NO2 (as N)	Closure	Jul	6	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0249	0	0.0249	0.0249	0.0249	0	0.0241	0.0241	0.0242	0	0.0182	0.0182	0.0182	0	0.0301	0.0305	0.0326	6	0.0170	0.0170	0.0174	77	0.0214	0.0214	0.0214	0	0.0182	0.0182	0.0182	1
NO2 (as N)	Closure	Aug	6	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0249	0	0.0248	0.0248	0.0248	0	0.0241	0.0241	0.0242	0	0.0196	0.0196	0.0196	0	0.0304	0.0308	0.0328	6	0.0178	0.0179	0.0183	86	0.0215	0.0215	0.0215	0	0.0180	0.0180	0.0180	0
NO2 (as N)	Closure	Sep	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0032	0.0032	0.0033	-8	0.0197	0.0197	0.0197	0	0.0306	0.0309	0.0328	6	0.0251	0.0252	0.0260	48	0.0214	0.0214	0.0214	0	0.0238	0.0238	0.0238	-1
NO2 (as N)	Closure	Oct	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0032	0.0032	0.0033	-9	0.0191	0.0191	0.0191	0	0.0305	0.0308	0.0326	6	0.0303	0.0304	0.0316	79	0.0203	0.0203	0.0203	0	0.0240	0.0240	0.0240	0
NO2 (as N)	Closure	Nov	6	0.0380	0.0380	0.0380	0	0.0379	0.0379	0.0379	0	0.0379	0.0379	0.0379	1	0.0266	0.0266	0.0266	0	0.0195	0.0195	0.0195	0	0.0304	0.0307	0.0325	5	0.0322	0.0322	0.0328	29	0.0248	0.0248	0.0248	1	0.0221	0.0221	0.0221	0
NO2 (as N)	Closure	Dec	6	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0271	0.0271	0.0272	0	0.0204	0.0204	0.0204	0	0.0304	0.0307	0.0324	5	0.0250	0.0250	0.0250	0	0.0256	0.0256	0.0256	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Post-Closure	Jan	109	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0376	0.0377	0.0380	-1	0.0271	0.0271	0.0271	0	0.0211	0.0211	0.0211	0	0.0296	0.0296	0.0296	2	0.0182	0.0192	0.0250	-23	0.0283	0.0283	0.0284	0	0.0220	0.0220	0.0220	0
NO2 (as N)	Post-Closure	Feb	109	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0375	0.0375	0.0379	-1	0.0271	0.0271	0.0271	0	0.0216	0.0216	0.0217	0	0.0294	0.0294	0.0295	2	0.0181	0.0191	0.0250	-23	0.0308	0.0309	0.0311	-1	0.0220	0.0220	0.0220	0
NO2 (as N)	Post-Closure	Mar	109	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0358	0.0361	0.0379	-5	0.0271	0.0271	0.0271	0	0.0221	0.0221	0.0221	0	0.0293	0.0293	0.0294	2	0.0180	0.0191	0.0250	-24	0.0309	0.0311	0.0322	-4	0.0220	0.0220	0.0220	0
NO2 (as N)	Post-Closure	Apr	109	0.0374	0.0374	0.0374	0	0.0366	0.0366	0.0366	0	0.0339	0.0342	0.0366	-6	0.0271	0.0271	0.0271	0	0.0223	0.0223	0.0223	0	0.0291	0.0291	0.0292	2	0.0189	0.0230	0.0538	-8	0.0287	0.0289	0.0303	-6	0.0220	0.0220	0.0220	0
NO2 (as N)	Post-Closure	May	109	0.0205	0.0205	0.0205	-7	0.0190	0.0190	0.0190	-11	0.0190	0.0190	0.0193	-12	0.0253	0.0253	0.0253	0	0.0212	0.0212	0.0213	0	0.0286	0.0286	0.0287	2	0.0177	0.0185	0.0245	23	0.0152	0.0152	0.0153	-12	0.0249	0.0249	0.0249	0
NO2 (as N)	Post-Closure	Jun	109	0.0200	0.0200	0.0200	0	0.0199	0.0199	0.0199	0	0.0199	0.0199	0.0200	0	0.0251	0.0251	0.0251	0	0.0179	0.0179	0.0180	0	0.0285	0.0285	0.0286	3	0.0180	0.0188	0.0253	26	0.0167	0.0166	0.0167	0	0.0250	0.0250	0.0250	0
NO2 (as N)	Post-Closure	Jul	109	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0249	0	0.0248	0.0248	0.0249	0	0.0241	0.0241	0.0241	0	0.0182	0.0182	0.0182	0	0.0291	0.0291	0.0291	3	0.0165	0.0168	0.0217	75	0.0214	0.0214	0.0214	0	0.0182	0.0182	0.0182	1
NO2 (as N)	Post-Closure	Aug	109	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0249	0	0.0248	0.0248	0.0248	0	0.0241	0.0241	0.0241	0	0.0195	0.0195	0.0196	0	0.0294	0.0294	0.0295	3	0.0169	0.0171	0.0221	78	0.0215	0.0215	0.0215	0	0.0180	0.0180	0.0180	0
NO2 (as N)	Post-Closure	Sep	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0250	0	0.0032	0.0032	0.0032	-9	0.0197	0.0197	0.0197	0	0.0296	0.0296	0.0297	3	0.0182	0.0191	0.0257	13	0.0214	0.0214	0.0215	0	0.0238	0.0238	0.0238	-1
NO2 (as N)	Post-Closure	Oct	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0249	0.0249	0.0250	0	0.0031	0.0031	0.0031	-10	0.0191	0.0191	0.0191	0	0.0297	0.0297	0.0297	3	0.0190	0.0205	0.0311	21	0.0203	0.0203	0.0203	0	0.0240	0.0240	0.0240	0
NO2 (as N)	Post-Closure	Nov	109	0.0380	0.0380	0.0380	0	0.0379	0.0379	0.0379	0	0.0377	0.0378	0.0379	0	0.0265	0.0265	0.0265	0	0.0195	0.0194	0.0195	0	0.0296	0.0296	0.0297	2	0.0197	0.0214	0.0326	-14	0.0248	0.0248	0.0248	1	0.0221	0.0221	0.0221	0
NO2 (as N)	Post-Closure	Dec	109	0.0380	0.0380	0.0380	0	0.0380	0.0380	0.0380	0	0.0378	0.0378	0.0380	0	0.0271	0.0271	0.0271	0	0.0204	0.0204	0.0204	0	0.0297	0.0297	0.0297	2	0.0188	0.0198	0.0250	-21	0.0256	0.0256	0.0256	0	0.0220	0.0220	0.0220	0
N_NO3_NO2	Construction	Jan	2	0.0970	0.0970	0.0970	0	0.1063	0.1063	0.1156	10	0.1062	0.1062	0.1155	9	0.3806	0.3806	0.3813	0	0.0756	0.0756	0.0768	2	0.1152	0.1152	0.1234	3	0.0250	0.0250	0.0250	0	0.1101	0.1101	0.1169	6	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Feb	2	0.0970	0.0970	0.0970	0	0.1336	0.1336	0.1703	38	0.1335	0.1335	0.1702	38	0.3816	0.3816	0.3821	0	0.0854	0.0854	0.0874	3	0.1183	0.1183	0.1264	3	0.0250	0.0250	0.0250	0	0.1312	0.1312	0.1611	29	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Mar	2	0.0970	0.0970	0.0970	0	0.2162	0.2162	0.3254	123	0.2161	0.2161	0.3253	123	0.3820	0.3820	0.3824	0	0.0954	0.0954	0.1007	6	0.1214	0.1214	0.1294	2	0.0250	0.0250	0.0250	0	0.2012	0.2012	0.2933	100	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Apr	2	0.0943	0.0943	0.0943	0	0.2157	0.2157	0.3171	133	0.2119	0.2119	0.3104	130	0.3816	0.3816	0.3820	0	0.1030	0.1030	0.1103	8	0.1245	0.1245	0.1324	2	0.0250	0.0250	0.0250	0	0.1963	0.1963	0.2781	101	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	May	2	0.0250	0.0250	0.0250	-21	0.0732	0.0732	0.1062	114	0.0696	0.0696	0.1001	96	0.0580	0.0580	0.0584	-1	0.0987	0.0987	0.1064	10	0.1210	0.1210	0.1283	4	0.0250	0.0250	0.0250	0	0.0684	0.0684	0.0881	43	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Jun	2	0.0250	0.0250	0.0250	0	0.0301	0.0301	0.0322	20	0.0301	0.0301	0.0322	20	0.0271	0.0271	0.0272	-2	0.0673	0.0673	0.0717	10	0.1188	0.1188	0.1256	5	0.0250	0.0250	0.0250	0	0.0401	0.0401	0.0416	10	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Jul	2	0.0250	0.0250	0.0250	0	0.0290	0.0290	0.0302	16	0.0290	0.0290	0.0302	16	0.0267	0.0267	0.0268	-1	0.0417	0.0417	0.0436	9	0.1231	0.1231	0.1299	5	0.0250	0.0250	0.0250	0	0.0281	0.0281	0.0291	12	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Aug	2	0.0250	0.0250	0.0250	0	0.0302	0.0302	0.0322	21	0.0301	0.0301	0.0321	21	0.0271	0.0271	0.0272	-2	0.0332	0.0332	0.0345	10	0.1255	0.1255	0.1321	6	0.0250	0.0250	0.0250	0	0.0291	0.0291	0.0306	16	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Sep	2	0.0250	0.0250	0.0250	0	0.0313	0.0313	0.0340	25	0.0313	0.0313	0.0339	25	0.0282	0.0282	0.0284	-3	0.0312	0.0312	0.0326	12	0.1241	0.1241	0.1302	7	0.0250	0.0250	0.0250	0	0.0298	0.0298	0.0318	19	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Oct	2	0.0250	0.0250	0.0250	0	0.0323	0.0323	0.0354	29	0.0322	0.0322	0.0353	29	0.0294	0.0294	0.0296	-3	0.0302	0.0302	0.0317	13	0.1227	0.1227	0.1284	8	0.0250	0.0250	0.0250	0	0.0299	0.0299	0.0320	20	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Nov	2	0.0969	0.0969	0.0969	0	0.1035	0.1035	0.1067	8	0.1035	0.1035	0.1067	8	0.3692	0.3692	0.3694	1	0.0439	0.0439	0.0454	10	0.1234	0.1234	0.1289	8	0.0250	0.0250	0.0250	0	0.1097	0.1097	0.1116	5	0.0250	0.0250	0.0250	0
N_NO3_NO2	Construction	Dec	2	0.0970	0.0970	0.0970	0	0.1056	0.1056	0.1099	9	0.1056	0.1056	0.1099	9	0.3800	0.3800	0.3802	1	0.0645	0.0645	0.0661	6	0.1258	0.1258	0.1312	8	0.0250	0.0250	0.0250	0	0.1108	0.1108	0.1135	5	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Jan	13	0.0969	0.0969	0.0969	0	0.2669	0.2647	0.3376	173	0.2664	0.2643	0.3370	172	0.4043	0.3994	0.4123	5	0.1041	0.1036	0.1166	39	0.8345	0.6806	1.0810	424	0.0250	0.0250	0.0250	0	0.2268	0.2253	0.2784	118	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Feb	13	0.0969	0.0969	0.0969	0	0.6072	0.6084	0.8610	527	0.6062	0.6074	0.8597	526	0.4051	0.3996	0.4120	5	0.1301	0.1266	0.1466	52	0.8992	0.7131	1.1270	436	0.0250	0.0250	0.0250	0	0.5137	0.5148	0.7188	407	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Mar	13	0.0968	0.0968	0.0968	0	0.5224	0.5599	0.9357	477	0.5210	0.5584	0.9338	476	0.4051	0.4000	0.4122	5	0.1543	0.1511	0.1774	68	0.9070	0.7326	1.1530	438	0.0250	0.0250	0.0250	0	0.4620	0.4930	0.8089	389	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Apr	13	0.0943	0.0943	0.0943	0	0.4980	0.5166	0.7001	459	0.5902	0.5696	0.7808	519	0.4061	0.4009	0.4140	5	0.1671	0.1643	0.1936	72	0.9089	0.7443	1.1670	435	8.1210	7.1736	11.5000	28594	0.5037	0.4879	0.6598	399	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	May	13	0.0250	0.0250	0.0250	-21	0.1952	0.1964	0.2686	473	0.2105	0.2015	0.2766	467	0.0915	0.0849	0.1030	43	0.1602	0.1581	0.1870	75	0.8551	0.7108	1.1090	437	1.8020	1.5924	2.5190	6270	0.1573	0.1516	0.1988	216	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Jun	13	0.0250	0.0250	0.0250	0	0.0500	0.0502	0.0600	101	0.0522	0.0517	0.0620	107	0.0424	0.0396	0.0479	42	0.1041	0.1032	0.1206	68	0.8087	0.6802	1.0560	435	1.5270	1.3534	2.1240	5314	0.0553	0.0549	0.0620	50	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Jul	13	0.0250	0.0250	0.0250	0	0.0408	0.0411	0.0475	65	0.0420	0.0421	0.0487	68	0.0383	0.0362	0.0425	33	0.0588	0.0585	0.0666	52	0.8140	0.6905	1.0680	427	0.9167	0.8097	1.2360	3139	0.0383	0.0383	0.0435	53	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Aug	13	0.0250	0.0250	0.0250	0	0.0476	0.0480	0.0570	92	0.0491	0.0495	0.0591	98	0.0410	0.0386	0.0462	38	0.0463	0.0462	0.0525	53	0.8022	0.6861	1.0570	421	1.1090	0.9808	1.5140	3823	0.0440	0.0443	0.0519	77	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Sep	13	0.0250	0.0250	0.0250	0	0.0523	0.0538	0.0695	115	0.0556	0.0559	0.0725	124	0.0488	0.0454	0.0567	54	0.0450	0.0450	0.0520	62	0.7609	0.6569	1.0070	413	1.3660	1.2079	1.8720	4732	0.0483	0.0486	0.0611	94	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Oct	13	0.0250	0.0250	0.0250	0	0.0666	0.0648	0.0842	159	0.0744	0.0698	0.0915	179	0.0564	0.0523	0.0672	70	0.0459	0.0461	0.0558	72	0.7242	0.6332	0.9657	406	2.8020	2.4679	3.8700	9772	0.0587	0.0555	0.0707	122	0.0250	0.0250	0.0250	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality Median	AQM4 Mean	AQM4 Max	AQM4 Change	AQM7 Predicted Project Water Quality Median	AQM7 Mean	AQM7 Max	AQM7 Change	AQM8 Predicted Project Water Quality Median	AQM8 Mean	AQM8 Max	AQM8 Change	AQM10 Predicted Project Water Quality Median	AQM10 Mean	AQM10 Max	AQM10 Change	AQM11 Predicted Water Quality Median	AQM11 Mean	AQM11 Max	AQM11 Change	AQM16 Predicted Project Water Quality Median	AQM16 Mean	AQM16 Max	AQM16 Change	AQM18 Predicted Project Water Quality Median	AQM18 Mean	AQM18 Max	AQM18 Change	AQM29 Predicted Project Water Quality Median	AQM29 Mean	AQM29 Max	AQM29 Change	AQM31 Predicted Project Water Quality Median	AQM31 Mean	AQM31 Max	AQM31 Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
N_NO3_NO2	Operations	Nov	13	0.0969	0.0969	0.0969	0	0.1501	0.1482	0.1669	54	0.1595	0.1545	0.1764	62	0.3960	0.3925	0.4076	7	0.0632	0.0626	0.0724	56	0.7178	0.6420	0.9761	412	12.6800	10.3163	16.9300	41165	0.1444	0.1413	0.1548	35	0.0250	0.0250	0.0250	0
N_NO3_NO2	Operations	Dec	13	0.0969	0.0969	0.0969	0	0.1721	0.1681	0.2012	73	0.1719	0.1679	0.2009	73	0.4038	0.4006	0.4137	6	0.0858	0.0855	0.0958	41	0.7611	0.6743	1.0230	429	0.0285	0.0279	0.0298	12	0.1538	0.1512	0.1726	44	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Jan	6	0.0969	0.0969	0.0969	0	0.0969	0.0971	0.0979	0	0.0968	0.0970	0.0978	0	0.3867	0.3879	0.3953	2	0.0759	0.0769	0.0823	4	0.2825	0.3205	0.5553	176	0.0250	0.0250	0.0250	0	0.1032	0.1033	0.1039	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Feb	6	0.0968	0.0968	0.0968	0	0.0969	0.0969	0.0969	0	0.0967	0.0967	0.0967	0	0.3870	0.3880	0.3947	2	0.0848	0.0858	0.0910	3	0.2829	0.3205	0.5527	171	0.0250	0.0250	0.0250	0	0.1013	0.1013	0.1013	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Mar	6	0.0968	0.0968	0.0968	0	0.0968	0.0968	0.0968	0	0.0966	0.0966	0.0966	0	0.3871	0.3881	0.3945	2	0.0915	0.0925	0.0974	3	0.2836	0.3208	0.5506	167	0.0250	0.0250	0.0250	0	0.1005	0.1005	0.1005	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Apr	6	0.0943	0.0943	0.0943	0	0.0917	0.0916	0.0917	-1	0.1200	0.1201	0.1217	31	0.3870	0.3880	0.3946	2	0.0969	0.0979	0.1027	3	0.2839	0.3207	0.5478	162	2.8295	2.8460	2.9890	11284	0.1199	0.1200	0.1212	23	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	May	6	0.0250	0.0250	0.0250	-21	0.0250	0.0250	0.0250	-27	0.0342	0.0342	0.0345	-4	0.0645	0.0660	0.0754	13	0.0921	0.0930	0.0973	3	0.2677	0.3017	0.5117	160	0.7424	0.7421	0.7560	2868	0.0458	0.0459	0.0460	-4	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Jun	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0259	0.0259	0.0259	4	0.0300	0.0307	0.0350	12	0.0629	0.0634	0.0657	3	0.2546	0.2862	0.4818	157	0.7893	0.7889	0.8038	3056	0.0373	0.0373	0.0373	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Jul	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0257	0.0257	0.0257	3	0.0288	0.0293	0.0325	9	0.0392	0.0393	0.0402	3	0.2575	0.2890	0.4836	153	0.5375	0.5373	0.5473	2049	0.0255	0.0255	0.0255	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Aug	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0260	0.0260	0.0260	4	0.0296	0.0302	0.0340	10	0.0309	0.0310	0.0314	3	0.2555	0.2862	0.4757	150	0.6058	0.6055	0.6170	2322	0.0258	0.0258	0.0258	3	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Sep	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0264	0.0264	0.0264	6	0.0319	0.0328	0.0384	14	0.0286	0.0287	0.0291	3	0.2448	0.2735	0.4506	146	0.7166	0.7163	0.7300	2765	0.0261	0.0261	0.0261	4	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Oct	6	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0274	0.0274	0.0275	10	0.0342	0.0354	0.0427	19	0.0279	0.0280	0.0285	4	0.2347	0.2614	0.4268	141	1.1275	1.1270	1.1490	4408	0.0266	0.0266	0.0267	7	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Nov	6	0.0968	0.0968	0.0968	0	0.0967	0.0967	0.0967	0	0.0975	0.0975	0.0976	2	0.3742	0.3753	0.3823	3	0.0417	0.0418	0.0425	4	0.2303	0.2561	0.4151	136	0.8413	0.8408	0.8566	3263	0.1061	0.1061	0.1061	2	0.0250	0.0250	0.0250	0
N_NO3_NO2	Closure	Dec	6	0.0969	0.0969	0.0969	0	0.0969	0.0969	0.0969	0	0.0969	0.0969	0.0969	0	0.3842	0.3851	0.3908	2	0.0622	0.0623	0.0631	3	0.2299	0.2552	0.4111	132	0.0251	0.0251	0.0251	1	0.1051	0.1051	0.1051	0	0.0250	0.0250	0.0250	0
N_NO3_NO2	Post-Closure	Jan	109	0.0969	0.0969	0.0969	0	0.0969	0.0969	0.0969	0	0.0996	0.1001	0.1043	3	0.3821	0.3822	0.3830	1	0.0760	0.0762	0.0777	3	0.1384	0.1393	0.1657	31	0.2522	0.2728	0.5190	991	0.1052	0.1056	0.1086	2	0.0250	0.0255	0.0268	2
N_NO3_NO2	Post-Closure	Feb	109	0.0968	0.0968	0.0968	0	0.0969	0.0969	0.0969	0	0.1009	0.1017	0.1079	5	0.3829	0.3829	0.3837	0	0.0850	0.0852	0.0869	2	0.1406	0.1414	0.1676	30	0.2551	0.2777	0.5254	1011	0.1046	0.1053	0.1102	4	0.0250	0.0255	0.0268	2
N_NO3_NO2	Post-Closure	Mar	109	0.0968	0.0968	0.0968	0	0.0968	0.0968	0.0968	0	0.1150	0.1183	0.1451	22	0.3832	0.3832	0.3839	0	0.0921	0.0924	0.0947	3	0.1429	0.1438	0.1698	29	0.2705	0.2919	0.5520	1068	0.1158	0.1186	0.1414	18	0.0250	0.0255	0.0268	2
N_NO3_NO2	Post-Closure	Apr	109	0.0943	0.0946	0.0951	0	0.0917	0.0919	0.0924	-1	0.1264	0.1339	0.1737	46	0.3829	0.3829	0.3837	0	0.0978	0.0982	0.1012	3	0.1452	0.1461	0.1718	29	0.4126	0.6998	2.8310	2699	0.1253	0.1315	0.1645	35	0.0250	0.0251	0.0255	1
N_NO3_NO2	Post-Closure	May	109	0.0250	0.0251	0.0253	-20	0.0250	0.0251	0.0253	-27	0.0393	0.0414	0.0546	16	0.0589	0.0589	0.0599	1	0.0929	0.0934	0.0966	4	0.1396	0.1404	0.1643	30	0.2848	0.3374	0.7407	1249	0.0484	0.0497	0.0575	4	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	Jun	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0265	0.0268	0.0282	7	0.0274	0.0274	0.0279	1	0.0633	0.0636	0.0656	4	0.1356	0.1363	0.1587	31	0.3428	0.3946	0.7923	1478	0.0377	0.0378	0.0388	3	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	Jul	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0264	0.0266	0.0280	7	0.0269	0.0269	0.0272	0	0.0394	0.0396	0.0407	3	0.1394	0.1402	0.1625	31	0.3180	0.3436	0.5407	1274	0.0261	0.0263	0.0273	5	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	Aug	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0269	0.0271	0.0288	8	0.0273	0.0273	0.0278	0	0.0312	0.0314	0.0324	4	0.1408	0.1416	0.1634	32	0.3291	0.3615	0.6090	1346	0.0265	0.0267	0.0280	7	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	Sep	109	0.0250	0.0250	0.0250	0	0.0250	0.0250	0.0250	0	0.0278	0.0282	0.0309	13	0.0286	0.0286	0.0292	0	0.0290	0.0292	0.0304	5	0.1379	0.1387	0.1591	33	0.3358	0.3812	0.7199	1425	0.0272	0.0274	0.0295	10	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	Oct	109	0.0250	0.0250	0.0251	0	0.0250	0.0250	0.0251	0	0.0289	0.0295	0.0331	18	0.0299	0.0299	0.0307	1	0.0283	0.0285	0.0299	6	0.1351	0.1358	0.1550	32	0.3777	0.4669	1.1290	1768	0.0277	0.0281	0.0305	12	0.0250	0.0250	0.0251	0
N_NO3_NO2	Post-Closure	Nov	109	0.0968	0.0968	0.0969	0	0.0967	0.0967	0.0968	1	0.0987	0.0991	0.1016	4	0.3699	0.3699	0.3707	1	0.0421	0.0423	0.0438	6	0.1348	0.1354	0.1540	32	0.3865	0.4412	0.8371	1665	0.1067	0.1069	0.1085	3	0.0250	0.0253	0.0263	1
N_NO3_NO2	Post-Closure	Dec	109	0.0969	0.0969	0.0969	0	0.0969	0.0969	0.0969	0	0.0985	0.0988	0.1011	2	0.3807	0.3807	0.3814	1	0.0625	0.0627	0.0642	3	0.1363	0.1369	0.1552	31	0.2572	0.2795	0.5287	1018	0.1061	0.1063	0.1078	1	0.0250	0.0255	0.0268	2
CN, Tot	Construction	Jan	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00096	0.00096	0.00097	0	0.00053	0.00053	0.00053	0	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Feb	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00097	0.00097	0.00097	0	0.00053	0.00053	0.00053	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Mar	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00097	0.00097	0.00097	0	0.00054	0.00054	0.00054	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Apr	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00050	1	0.00097	0.00097	0.00097	0	0.00054	0.00054	0.00054	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0
CN, Tot	Construction	May	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00051	0.00051	0.00051	-1	0.00054	0.00054	0.00054	0	0.00054	0.00054	0.00054	0	0.00050	0.00050	0.00051	-1	0.00087	0.00087	0.00087	-1	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Jun	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00051	0.00051	0.00051	-1	0.00088	0.00088	0.00088	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Jul	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	-1	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Aug	2	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00054	4	0.00052	0.00052	0.00054	4	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00054	4	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Sep	2	0.00050	0.00050	0.00050	0	0.00076	0.00076	0.00101	51	0.00075	0.00075	0.00101	51	0.00050	0.00050	0.00050	0	0.00058	0.00058	0.00065	14	0.00054	0.00054	0.00054	-1	0.00050	0.00050	0.00050	0	0.00070	0.00070	0.00090	40	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Oct	2	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00056	6	0.00053	0.00053	0.00056	6	0.00050	0.00050	0.00050	0	0.00057	0.00057	0.00063	13	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00054	4	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Nov	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00052	2	0.00051	0.00051	0.00052	2	0.00095	0.00095	0.00095	0	0.00056	0.00056	0.00061	10	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Tot	Construction	Dec	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.00051	0.00051	0.00051	1	0.00096	0.00096	0.00096	0	0.00056	0.00056	0.00060	8	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Jan	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00053	1	0.00050	0.00050	0.00053	0	0.00102	0.00103	0.00111	6	0.00109	0.00097	0.00117	85	0.00219	0.00238	0.00486	349	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00052	0	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Feb	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00054	1	0.00050	0.00051	0.00054	1	0.00102	0.00102	0.00110	6	0.00104	0.00094	0.00111	76	0.00233	0.00246	0.00497	366	0.00050	0.00050	0.00050	0	0.00050	0.00051	0.00053	1	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Mar	13	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	4	0.00052	0.00052	0.00053	4	0.00102	0.00103	0.00110	6	0.00101	0.00091	0.00108	70	0.00248	0.00253	0.00508	382	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	3	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Apr	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	1	0.02311	0.02082	0.03036	4064	0.00103	0.00103	0.00111	7	0.00116	0.00104	0.00124	93	0.00262	0.00261	0.00519	400	2.46100	2.19485	3.18600	438869	0.01898	0.01709	0.02482	3319	0.00050	0.00050	0.00050	0
CN, Tot	Operations	May	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00760	0.00686	0.00976	1225	0.00063	0.00063	0.00074	17	0.00147	0.00133	0.00161	147	0.00262	0.00255	0.00499	391	0.60270	0.53623	0.76910	60835	0.00488	0.00441	0.00619	767	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Jun	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00124	0.00116	0.00143	130	0.00055	0.00054	0.00060	9	0.00124	0.00114	0.00135	119	0.00263	0.00251	0.00484	379	0.64240	0.56930	0.80480	64594	0.00101	0.00095	0.00114	90	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Jul	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00105	0.00099	0.00118	97	0.00054	0.00054	0.00058	7	0.00096	0.00090	0.00103	77	0.00280	0.00261	0.00500	386	0.43100	0.38032	0.53060	75965	0.00093	0.00088	0.00103	76	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Aug	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00133	0.00123	0.00151	146	0.00055	0.00054	0.00059	9	0.00096	0.00090	0.00103	77	0.00291	0.00267	0.00505	387	0.48870	0.42942	0.59110	85783	0.00116	0.00108	0.00129	115	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Sep	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00167	0.00152	0.00189	205	0.00058	0.00057	0.00064	13	0.00104	0.00097	0.00114	92	0.00292	0.00263	0.00492	377	0.58220	0.50960	0.69350	101820	0.00139	0.00128	0.00156	156	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Oct	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00251	0.00226	0.00287	351	0.00061	0.00059	0.00069	18	0.00119	0.00110	0.00130	118	0.00291	0.00258	0.00478	373	0.92840	0.80957	1.09000	161814	0.00188	0.00170	0.00212	240	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Nov	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00123	0.00114	0.00136	128	0.00106	0.00104	0.00114	10	0.00128	0.00118	0.00140	132	0.00297	0.00259	0.00476	381	0.79460	0.69148	0.92640	138197	0.00097	0.00091	0.00105	82	0.00050	0.00050	0.00050	0
CN, Tot	Operations	Dec	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00106	0.00104	0.00113	9	0.00116	0.00108	0.00126	108	0.00308	0.00265	0.00483	396	0.00068	0.00066	0.00071	31	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Jan	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00107	0.00108	0.00111	12	0.00089	0.00092	0.00109	75	0.00401	0.00413	0.00491	693	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Feb	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00107	0.00107	0.00110	11	0.00086	0.00089	0.00105	68	0.00408	0.00419	0.00497	710	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Mar	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00107	0.00107	0.00109	11	0.00085	0.00087	0.00102	63	0.00414	0.00425	0.00503	727	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Apr	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.01567	0.01576	0.01676	3052	0.00107	0.00108	0.00110	11	0.00093	0.00096	0.00110	78	0.00420	0.00431	0.00508	744	1.48300	1.49250	1.58100	298400	0.01270	0.01278	0.01357	2456	0.00050	0.00050	0.00050	0
CN, Tot	Closure	May	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00535	0.00537	0.00554	938	0.00069	0.00070	0.00073	30	0.00113	0.00115	0.00128	114	0.00402	0.00412	0.00484	712	0.37985	0.37985	0.39040	43065	0.00344	0.00344	0.00355	577	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Jun	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00097	0.00097	0.00098	93	0.00057	0.00058	0.00059	15	0.00098	0.00099	0.00106	90	0.00388	0.00398	0.00465	676	0.40455	0.40452	0.41580	45868	0.00082	0.00082	0.00083	64	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Jul	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00085	0.00085	0.00086	70	0.00056	0.00056	0.00057	12	0.00080	0.00080	0.00083	57	0.00398	0.00408	0.00475	677	0.27110	0.27113	0.27870	54127	0.00077	0.00077	0.00078	54	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Aug	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00103	0.00103	0.00104	105	0.00057	0.00057	0.00058	14	0.00079	0.00079	0.00081	56	0.00401	0.00410	0.00476	667	0.30710	0.30708	0.31570	61317	0.00091	0.00091	0.00093	83	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Sep	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00124	0.00124	0.00126	148	0.00061	0.00061	0.00063	21	0.00085	0.00085	0.00086	67	0.00389	0.00397	0.00459	637	0.36545	0.36547	0.37570	72993	0.00106	0.00106	0.00108	112	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Oct	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00177	0.00177	0.00181	254	0.00064	0.00065	0.00067	29	0.00093	0.00093	0.00095	86	0.00376	0.00384	0.00442	619	0.58210	0.58210	0.59840	116320	0.00137	0.00137	0.00139	173	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Nov	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00096	0.00096	0.00097	92	0.00109	0.00109	0.00112	16	0.00099	0.00100	0.00101	96	0.00373	0.00381	0.00436	623	0.43140	0.43142	0.44350	86183	0.00080	0.00080	0.00080	59	0.00050	0.00050	0.00050	0
CN, Tot	Closure	Dec	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00108	0.00108	0.00111	13	0.00093	0.00093	0.00094	79	0.00377	0.00384	0.00439	636	0.00057	0.00057	0.00057	15	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Tot	Post-Closure	Jan	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00112	0.00111	0.00151	121	0.00101	0.00102	0.00106	6	0.00087	0.00091	0.00110	74	0.00200	0.00219	0.00355	326	0.03562	0.03496	0.05796	6893	0.00095	0.00094	0.00124	88	0.00050	0.00080	0.00144	60
CN, Tot	Post-Closure	Feb	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00142	0.00140	0.00200	181	0.00101	0.00102	0.00106	5	0.00088	0.00092	0.00111	73	0.00203	0.00223	0.00361	336	0.03606	0.03555	0.05870	7011	0.00124	0.00123	0.00171	146	0.00050	0.00080	0.00144	60
CN, Tot	Post-Closure	Mar	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00448	0.00441	0.00703	782	0.00101	0.00102	0.00105	5	0.00096	0.00100	0.00124	86	0.00207	0.00226	0.00368	345	0.03789	0.03748	0.06173	7395	0.00388	0.00382	0.00604	664	0.00050	0.00080	0.00144	60
CN, Tot	Post-Closure	Apr	109	0.00050	0.00067	0.00094	33	0.00050	0.00066	0.00091	31	0.01284	0.01300	0.01844	2499	0.00101	0.00102	0.00106	5	0.00110	0.00115	0.00146	112	0.00210	0.00230	0.00374	356	0.09042	0.24754	1.42600	49409	0.01053	0.01081	0.01534	2062	0.00050	0.00058	0.00076	17
CN, Tot	Post-Closure	May	109	0.00050	0.00056	0.00065	12	0.00050	0.00055	0.00063	10	0.00447	0.00452	0.00621	773	0.00060	0.00061	0.00067	14	0.00121	0.00127	0.00164	137	0.00202	0.00222	0.00359	341	0.06287	0.09788	0.36510	11022	0.00290	0.00294	0.00397	478	0.00050	0.00051	0.00053	2
CN, Tot	Post-Closure	Jun	109	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00091	0.00093	0.00112	86	0.00053	0.00054	0.00056	7	0.00098	0.00103	0.00127	98	0.00197	0.00216	0.00348	325	0.07375	0.10999	0.38880	12399	0.00078	0.00080	0.00093	59	0.00050	0.00051	0.00054	2
CN, Tot	Post-Closure	Jul	109	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00083	0.00087	0.00103	73	0.00052	0.00053	0.00055	6	0.00078	0.00081	0.00095	59	0.00203	0.00222	0.00358	327	0.06302	0.08521	0.26060	16943	0.00076	0.00079	0.00092	57	0.00050	0.00051	0.00052	2
CN, Tot	Post-Closure	Aug	109	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00097	0.00100	0.00123	101	0.00053	0.00053	0.00056	7	0.00077	0.00080	0.00093	57	0.00205	0.00225	0.00361	323	0.06875	0.09454	0.29520	18807	0.00087	0.00090	0.00108	80	0.00050	0.00051	0.00053	2
CN, Tot	Post-Closure	Sep	109	0.00050	0.00051	0.00052	1	0.00050	0.00051	0.00052	1	0.00118	0.00124	0.00158	148	0.00055	0.00055	0.00060	10	0.00082	0.00084	0.00100	66	0.00200	0.00219	0.00351	310	0.06857	0.10099	0.35120	20097	0.00102	0.00106	0.00132	113	0.00050	0.00051	0.00053	2
CN, Tot	Post-Closure	Oct	109	0.00050	0.00051	0.00053	2	0.00050	0.00051	0.00053	2	0.00158	0.00163	0.00213	227	0.00056	0.00057	0.00063	14	0.00089	0.00092	0.00110	82	0.00195	0.00213	0.00341	303	0.08391	0.13941	0.55940	27782	0.00124	0.00128	0.00161	155	0.00050	0.00052	0.00055	3
CN, Tot	Post-Closure	Nov	109	0.00050	0.00051	0.00052	1	0.00050	0.00051	0.00052	1	0.00105	0.00110	0.00139	120	0.00101	0.00102	0.00108	8	0.00094	0.00096	0.00117	90	0.00194	0.00212	0.00339	306	0.07852	0.11711	0.41460	23321	0.00085	0.00088	0.00106	75	0.00050	0.00072	0.00119	44
CN, Tot	Post-Closure	Dec	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00085	0.00085	0.00107	69	0.00102	0.00102	0.00107	7	0.00090	0.00093	0.00112	79	0.00196	0.00214	0.00343	313	0.03627	0.03586	0.05900	7071	0.00073	0.00072	0.00087	45	0.00050	0.00080	0.00144	60
CN, Free	Construction	Jan	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	0	0.00118	0.00118	0.00118	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Feb	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00049	0.00049	0.00049	0	0.00117	0.00117	0.00117	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Mar	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00051	0.00051	0.00051	2	0.00052	0.00052	0.00052	0	0.00049	0.00049	0.00049	0	0.00116	0.00116	0.00117	-1	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0
CN, Free	Construction	Apr	2	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	5	0.00052	0.00052	0.00052	5	0.00052	0.00052	0.00052	0	0.00049	0.00049	0.00049	0	0.00116	0.00116	0.00116	-1	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	4	0.00050	0.00050	0.00050	0
CN, Free	Construction	May	2	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00052	0.00052	0.00052	0	0.00053	0.00053	0.00053	-1	0.00049	0.00049	0.00049	0	0.00111	0.00111	0.00111	0	0.00087	0.00087	0.00087	-1	0.00051	0.00051	0.00051	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Jun	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00107	0.00107	0.00107	1	0.00088	0.00088	0.00088	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Jul	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	0	0.00051	0.00051	0.00051	0	0.00108	0.00108	0.00109	1	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Aug	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00051	0.00051	0.00051	0	0.00108	0.00108	0.00108	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Sep	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00050	0.00050	0.00051	1	0.00052	0.00052	0.00052	-1	0.00051	0.00051	0.00051	0	0.00113	0.00113	0.00113	1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0
CN, Free	Construction	Oct	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-2	0.00051	0.00051	0.00051	0	0.00121	0.00121	0.00121	-1	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Nov	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00121	0.00121	0.00121	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Construction	Dec	2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00119	0.00119	0.00119	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Jan	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00119	0.00119	0.00120	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Feb	13	0.00050	0.00050	0.00050	0	0.00053	0.00052	0.00053	5	0.00053	0.00052	0.00053	5	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	0	0.00118	0.00118	0.00119	-2	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00053	4	0.00050	0.00050	0.00050	0
CN, Free	Operations	Mar	13	0.00050	0.00050	0.00050	0	0.00060	0.00059	0.00061	17	0.00060	0.00059	0.00060	17	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	1	0.00117	0.00117	0.00118	-3	0.00050	0.00050	0.00050	0	0.00058	0.00057	0.00059	15	0.00050	0.00050	0.00050	0
CN, Free	Operations	Apr	13	0.00050	0.00050	0.00050	0	0.00054	0.00054	0.00055	8	0.00063	0.00061	0.00063	22	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	1	0.00116	0.00116	0.00117	-3	*0.00947*	*0.00793*	*0.00964*	1485	0.00060	0.00059	0.00061	18	0.00050	0.00050	0.00050	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
CN, Free	Operations	May	13	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00054	0.00054	0.00055	4	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	1	0.00111	0.00111	0.00112	-1	0.00301	0.00264	0.00306	200	0.00053	0.00052	0.00053	3	0.00050	0.00050	0.00050	0
CN, Free	Operations	Jun	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00051	0.00051	0.00051	1	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00051	1	0.00108	0.00108	0.00109	0	0.00314	0.00275	0.00320	212	0.00051	0.00050	0.00051	1	0.00050	0.00050	0.00050	0
CN, Free	Operations	Jul	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00051	0.00050	0.00051	1	0.00051	0.00051	0.00051	-1	0.00051	0.00051	0.00051	1	0.00109	0.00109	0.00110	0	0.00207	0.00180	0.00211	260	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0
CN, Free	Operations	Aug	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00051	0.00051	0.00051	1	0.00051	0.00051	0.00051	-1	0.00051	0.00051	0.00051	1	0.00109	0.00109	0.00110	1	0.00227	0.00197	0.00232	294	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Free	Operations	Sep	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	1	0.00051	0.00051	0.00051	2	0.00052	0.00052	0.00052	-1	0.00051	0.00051	0.00051	1	0.00114	0.00114	0.00115	0	0.00261	0.00226	0.00266	352	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Free	Operations	Oct	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	0	0.00051	0.00051	0.00051	2	0.00053	0.00053	0.00053	-2	0.00051	0.00051	0.00051	1	0.00121	0.00121	0.00122	-2	0.00388	0.00333	0.00395	566	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Free	Operations	Nov	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00053	0.00053	0.00053	-2	0.00050	0.00050	0.00051	1	0.00121	0.00121	0.00122	-2	0.00336	0.00290	0.00342	480	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Operations	Dec	13	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	1	0.00120	0.00120	0.00121	-2	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Jan	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	-1	0.00050	0.00050	0.00050	0	0.00119	0.00119	0.00120	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Feb	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00050	0.00050	0.00050	0	0.00118	0.00118	0.00119	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Mar	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	0	0.00049	0.00049	0.00049	0	0.00118	0.00118	0.00118	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Apr	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00059	0.00059	0.00059	18	0.00052	0.00052	0.00052	0	0.00049	0.00049	0.00049	0	0.00117	0.00117	0.00117	0	0.00921	0.00927	0.00956	1753	0.00057	0.00057	0.00058	14	0.00050	0.00050	0.00050	0
CN, Free	Closure	May	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00054	0.00054	0.00054	3	0.00053	0.00053	0.00053	-1	0.00049	0.00049	0.00049	0	0.00112	0.00112	0.00112	1	0.00304	0.00304	0.00305	245	0.00052	0.00052	0.00052	2	0.00050	0.00050	0.00050	0
CN, Free	Closure	Jun	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00050	0.00050	0.00050	0	0.00108	0.00109	0.00109	2	0.00318	0.00318	0.00320	262	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Jul	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	-1	0.00051	0.00051	0.00051	0	0.00110	0.00110	0.00110	3	0.00211	0.00211	0.00212	322	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Aug	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00051	0.00051	0.00051	-1	0.00051	0.00051	0.00051	0	0.00110	0.00110	0.00110	3	0.00231	0.00231	0.00232	362	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Sep	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00052	0.00052	0.00052	-1	0.00051	0.00051	0.00051	0	0.00114	0.00114	0.00115	2	0.00266	0.00266	0.00267	432	0.00050	0.00050	0.00050	1	0.00050	0.00050	0.00050	0
CN, Free	Closure	Oct	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00051	2	0.00053	0.00053	0.00053	-2	0.00051	0.00051	0.00051	0	0.00122	0.00122	0.00122	0	0.00395	0.00395	0.00397	689	0.00051	0.00051	0.00051	1	0.00050	0.00050	0.00050	0
CN, Free	Closure	Nov	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	1	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00122	0.00122	0.00122	0	0.00304	0.00304	0.00306	508	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Closure	Dec	6	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	-1	0.00050	0.00050	0.00050	0	0.00120	0.00120	0.00120	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Jan	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00054	0.00054	0.00055	8	0.00052	0.00052	0.00052	0	0.00051	0.00051	0.00051	3	0.00120	0.00120	0.00121	2	0.00306	0.00278	0.00347	455	0.00053	0.00053	0.00054	6	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Feb	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00057	0.00056	0.00058	12	0.00052	0.00052	0.00052	0	0.00051	0.00051	0.00051	3	0.00120	0.00120	0.00120	2	0.00310	0.00282	0.00351	463	0.00055	0.00055	0.00056	10	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Mar	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00079	0.00076	0.00084	52	0.00052	0.00052	0.00052	0	0.00051	0.00051	0.00052	4	0.00119	0.00119	0.00119	2	0.00324	0.00295	0.00368	490	0.00075	0.00072	0.00079	44	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Apr	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00051	0	0.00093	0.00089	0.00101	79	0.00052	0.00052	0.00052	0	0.00052	0.00052	0.00052	6	0.00118	0.00118	0.00119	2	0.00370	0.00442	0.00953	783	0.00086	0.00083	0.00092	66	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	May	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00065	0.00064	0.00067	23	0.00053	0.00053	0.00053	-1	0.00052	0.00052	0.00053	6	0.00113	0.00113	0.00114	3	0.00275	0.00279	0.00311	217	0.00059	0.00058	0.00060	14	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Jun	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00051	0.00052	3	0.00051	0.00051	0.00051	-1	0.00052	0.00052	0.00052	4	0.00110	0.00110	0.00110	4	0.00319	0.00318	0.00352	261	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Jul	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00051	0.00051	0.00052	3	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	2	0.00111	0.00111	0.00111	5	0.00290	0.00287	0.00330	474	0.00051	0.00051	0.00051	2	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Aug	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00052	0.00052	0.00052	3	0.00051	0.00051	0.00051	-1	0.00052	0.00052	0.00052	2	0.00111	0.00111	0.00111	5	0.00295	0.00295	0.00337	489	0.00051	0.00051	0.00052	3	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Sep	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	5	0.00052	0.00052	0.00052	-1	0.00052	0.00052	0.00052	2	0.00116	0.00115	0.00116	4	0.00303	0.00307	0.00346	513	0.00052	0.00052	0.00053	4	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Oct	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00054	0.00054	0.00054	7	0.00053	0.00053	0.00053	-2	0.00052	0.00052	0.00052	3	0.00123	0.00123	0.00123	2	0.00343	0.00349	0.00407	598	0.00053	0.00052	0.00053	5	0.00050	0.00050	0.00050	0
CN, Free	Post-Closure	Nov	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00053	0.00053	5	0.00053	0.00053	0.00053	-1	0.00052	0.00051	0.00052	3	0.00123	0.00123	0.00123	1	0.00350	0.00354	0.00401	608	0.00052	0.00052	0.00052	3	0.00050	0.00050	0.00051	1
CN, Free	Post-Closure	Dec	109	0.00050	0.00050	0.00050	0	0.00050	0.00050	0.00050	0	0.00053	0.00052	0.00053	5	0.00053	0.00053	0.00053	-1	0.00051	0.00051	0.00052	3	0.00121	0.00121	0.00122	2	0.00313	0.00285	0.00354	471	0.00052	0.00051	0.00052	3	0.00050	0.00050	0.00051	1
Al, Tot	Construction	Jan	2	0.017	0.017	0.017	0	0.018	0.018	0.018	4	0.018	0.018	0.018	4	0.170	0.170	0.170	0	0.102	0.102	0.102	0	0.156	0.156	0.157	0	0.022	0.022	0.022	0	0.073	0.073	0.073	0	0.083	0.083	0.083	0
Al, Tot	Construction	Feb	2	0.017	0.017	0.017	0	0.019	0.019	0.020	10	0.019	0.019	0.020	10	0.170	0.170	0.170	0	0.101	0.101	0.101	0	0.155	0.155	0.156	-1	0.022	0.022	0.022	0	0.058	0.058	0.059	0	0.083	0.083	0.083	0
Al, Tot	Construction	Mar	2	0.017	0.017	0.017	0	0.028	0.028	0.029	63	0.028	0.028	0.029	63	0.170	0.170	0.170	0	0.100	0.100	0.100	0	0.154	0.154	0.155	-1	0.022	0.022	0.022	0	0.058	0.058	0.059	14	0.083	0.083	0.083	0
Al, Tot	Construction	Apr	2	0.019	0.019	0.019	1	0.039	0.039	0.040	82	0.038	0.038	0.039	85	0.170	0.170	0.170	0	0.099	0.099	0.100	0	0.153	0.153	0.154	-1	0.022	0.022	0.022	0	0.069	0.069	0.070	23	0.083	0.083	0.083	0
Al, Tot	Construction	May	2	0.043	0.043	0.043	5	0.057	0.057	0.057	19	0.057	0.057	0.057	24	0.187	0.187	0.187	0	0.111	0.111	0.111	1	0.151	0.151	0.152	0	0.012	0.012	0.012	3	0.212	0.212	0.212	8	0.038	0.038	0.038	4
Al, Tot	Construction	Jun	2	0.044	0.044	0.044	0	0.045	0.045	0.045	1	0.045	0.045	0.045	2	0.189	0.189	0.189	0	0.141	0.141	0.141	0	0.151	0.151	0.152	0	0.012	0.012	0.012	0	0.169	0.169	0.169	0	0.036	0.036	0.036	0
Al, Tot	Construction	Jul	2	0.047	0.047	0.047	0	0.048	0.048	0.048	1	0.048	0.048	0.048	1	0.102	0.102	0.102	0	0.123	0.123	0.124	0	0.155	0.155	0.156	-1	0.013	0.013	0.013	0	0.093	0.093	0.093	1	0.098	0.098	0.098	-2
Al, Tot	Construction	Aug	2	0.047	0.047	0.047	0	0.049	0.049	0.049	2	0.048	0.048	0.049	2	0.101	0.101	0.101	0	0.100	0.100	0.100	0	0.162	0.162	0.163	-1	0.013	0.013	0.013	0	0.091	0.091	0.091	1	0.100	0.100	0.100	0
Al, Tot	Construction	Sep	2	0.029	0.029	0.029	0	0.031	0.031	0.031	3	0.031	0.031	0.031	3	0.121	0.121	0.121	-1	0.096	0.096	0.096	0	0.165	0.165	0.166	-1	0.009	0.009	0.009	2	0.096	0.096	0.096	1	0.058	0.058	0.058	3
Al, Tot	Construction	Oct	2	0.029	0.029	0.029	0	0.031	0.031	0.031	3	0.031	0.031	0.031	3	0.122	0.122	0.122	-1	0.100	0.100	0.100	0	0.163	0.163	0.164	-1	0.009	0.009	0.009	0	0.118	0.118	0.118	1	0.057	0.057	0.057	0
Al, Tot	Construction	Nov	2	0.017	0.017	0.017	0	0.018	0.018	0.018	2	0.018	0.018	0.018	2	0.168	0.168	0.168	0	0.103	0.103	0.103	0	0.160	0.160	0.161	-1	0.022	0.022	0.022	-2	0.094	0.094	0.094	0	0.082	0.082	0.082	-1
Al, Tot	Construction	Dec	2	0.017	0.017	0.017	0	0.018	0.018	0.018	3	0.018	0.018	0.018	3	0.170	0.170	0.170	0	0.103	0.103	0.103	0	0.158	0.158	0.159	-1	0.022	0.022	0.022	0	0.089	0.089	0.089	0	0.083	0.083	0.083	0
Al, Tot	Operations	Jan	13	0.017	0.017	0.017	1	0.020	0.020	0.020	16	0.020	0.020	0.020	15	0.170	0.170	0.170	0	0.103	0.103	0.103	1	0.162	0.161	0.164	0	0.022	0.022	0.022	0	0.075	0.075	0.075	2	0.083	0.083	0.083	0
Al, Tot	Operations	Feb	13	0.017	0.017	0.017	1	0.030	0.030	0.033	74	0.030	0.030	0.033	74	0.170	0.170	0.170	0	0.102	0.102	0.102	1	0.162	0.160	0.163	0	0.022	0.022	0.022	0	0.067	0.066	0.069	15	0.083	0.083	0.083	0
Al, Tot	Operations	Mar	13	0.017	0.017	0.017	1	0.052	0.052	0.059	205	0.052	0.052	0.059	204	0.170	0.170	0.170	0	0.101	0.101	0.102	2	0.161	0.160	0.162	0	0.022	0.022	0.022	0	0.077	0.077	0.083	52	0.083	0.083	0.083	0
Al, Tot	Operations	Apr	13	0.019	0.019	0.020	1	0.051	0.048	0.053	124	0.051	0.048	0.053	131	0.170	0.170	0.170	0	0.101	0.101	0.102	2	0.160	0.159	0.161	0	0.141	0.122	0.141	456	0.081	0.079	0.083	39	0.083	0.083	0.083	0
Al, Tot	Operations	May	13	0.043	0.043	0.043	5	0.060	0.060	0.061	25	0.060	0.060	0.061	30	0.187	0.187	0.187	0	0.113	0.113	0.113	2	0.157	0.156	0.159	0	0.042	0.037	0.042	212	0.215	0.214	0.215	9	0.038	0.038	0.038	4
Al, Tot	Operations	Jun	13	0.044	0.044	0.044	0	0.046	0.046	0.047	4	0.046	0.046	0.047	4	0.189	0.189	0.189	0	0.142	0.142	0.143	1	0.157	0.156	0.159	1	0.044	0.039	0.044	228	0.170	0.170	0.170	1	0.036	0.036	0.036	0
Al, Tot	Operations	Jul	13	0.047	0.047	0.047	0	0.049	0.049	0.049	3	0.049	0.049	0.049	4	0.102	0.102	0.102	0	0.124	0.124	0.124	1	0.161	0.160	0.163	1	0.035	0.031	0.035	140	0.093	0.093	0.093	1	0.098	0.098	0.098	-2
Al, Tot	Operations	Aug	13	0.047	0.047	0.047	0	0.050	0.050	0.050	4	0.050	0.050	0.050	5	0.101	0.101	0.101	-1	0.101	0.101	0.101	1	0.168	0.167	0.169	0	0.038	0.034	0.038	160	0.092	0.092	0.092	2	0.100	0.100	0.100	0
Al, Tot	Operations	Sep	13	0.029	0.029	0.029	0	0.032	0.032	0.033	8	0.033	0.032	0.033	8	0.121	0.121	0.121	-1	0.096	0.096	0.097	1	0.171	0.170	0.172	0	0.039	0.034	0.039	296	0.097	0.097	0.098	2	0.058	0.058	0.058	3
Al, Tot	Operations	Oct	13	0.029	0.029	0.029	0	0.032	0.032	0.032	7	0.032	0.032	0.033	8	0.122	0.122	0.122	-1	0.101	0.101	0.101	1	0.169	0.168	0.170	0	0.056	0.049	0.056	469	0.119	0.119	0.119	1	0.057	0.057	0.057	0
Al, Tot	Operations	Nov	13	0.017	0.017	0.017	0	0.019	0.019	0.019	8	0.019	0.019	0.019	8	0.169	0.169	0.169	0	0.104	0.104	0.104	1	0.166	0.165	0.167	0	0.076	0.066	0.077	199	0.095	0.095	0.095	1	0.082	0.082	0.082	-1
Al, Tot	Operations	Dec	13	0.017	0.017	0.017	0	0.019	0.018	0.019	8	0.018	0.018	0.019	8	0.170	0.170	0.170	0	0.104	0.104	0.104	1	0.164	0.163	0.165	0	0.022	0.022	0.022	0	0.090	0.090	0.090	1	0.083	0.083	0.083	0
Al, Tot	Closure	Jan	6	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.170	0.170	0.170	0	0.102	0.102	0.103	0	0.163	0.163	0.164	3	0.022	0.022	0.022	0	0.073	0.073	0.073	0	0.083	0.083	0.083	0
Al, Tot	Closure	Feb	6	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.170	0.170	0.170	0	0.101	0.101	0.102	0	0.162	0.162	0.163	4	0.022	0.022	0.022	0	0.057	0.057	0.057	0	0.083	0.083	0.083	0
Al, Tot	Closure	Mar	6	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.170	0.170	0.170	0	0.100	0.100	0.101	0	0.162	0.162	0.163	4	0.022	0.022	0.022	0	0.051	0.051	0.051	1	0.083	0.083	0.083	0
Al, Tot	Closure	Apr	6	0.019	0.019	0.020	1	0.022	0.022	0.023	5	0.024	0.024	0.024	15	0.170	0.170	0.170	0	0.099	0.099	0.100	0	0.161	0.161	0.162	4	0.163	0.159	0.163	624	0.061	0.061	0.061	8	0.083	0.083	0.083	0
Al, Tot	Closure	May	6	0.043	0.043	0.043	5	0.051	0.051	0.051	8	0.052	0.052	0.052	14	0.187	0.187	0.187	0	0.110	0.111	0.111	1	0.158	0.158	0.159	4	0.049	0.048	0.050	303	0.212	0.212	0.212	8	0.038	0.038	0.038	4
Al, Tot	Closure	Jun	6	0.044	0.044	0.044	0	0.044	0.044	0.044	0	0.045	0.045	0.045	0	0.189	0.189	0.189	0	0.141	0.141	0.141	0	0.158	0.158	0.159	4	0.053	0.051	0.053	327	0.169	0.169	0.169	0	0.036	0.036	0.036	0
Al, Tot	Closure	Jul	6	0.047	0.047	0.047	0	0.048	0.048	0.048	0	0.048	0.048	0.048	0	0.102	0.102	0.102	0	0.123	0.123	0.123	0	0.162	0.162	0.163	4	0.040	0.039	0.040	201	0.092	0.092	0.092	0	0.098	0.098	0.098	-2
Al, Tot	Closure	Aug	6	0.047	0.047	0.047	0	0.048	0.048	0.048	0	0.048	0.048	0.048	0	0.101	0.101	0.101	0	0.100	0.100	0.100	0	0.169	0.169	0.170	3	0.044	0.043	0.044	228	0.091	0.091	0.091	0	0.100	0.100	0.100	0
Al, Tot	Closure	Sep	6	0.029	0.029	0.029	0	0.030	0.030	0.030	0	0.030	0.030	0.030	0	0.121	0.121	0.121	0	0.095	0.095	0.095	0	0.172	0.172	0.173	3	0.046	0.045	0.046	423	0.096	0.096	0.096	0	0.058	0.058	0.058	3
Al, Tot	Closure	Oct	6	0.029	0.029	0.029	0	0.030	0.030	0.030	0	0.030	0.030	0.030	1	0.122	0.122	0.122	0	0.100	0.100	0.100	0	0.169	0.169	0.170	3	0.068	0.066	0.068	672	0.118	0.117	0.118	0	0.057	0.057	0.057	0
Al, Tot	Closure	Nov	6	0.017	0.017	0.017	0	0.017	0.017	0.017	-1	0.017	0.017	0.017	-1	0.169	0.169	0.169	0	0.103	0.103	0.103	0	0.166	0.166	0.167	4	0.073	0.072	0.073	228	0.094	0.094	0.094	0	0.082	0.082	0.082	-1
Al, Tot	Closure	Dec	6	0.017	0.017	0.017	0	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.170	0.170	0.170	0	0.103	0.103	0.103	0	0.164	0.165	0.165	4	0.022	0.022	0.022	0	0.089	0.089	0.089	0	0.083	0.083	0.083	0
Al, Tot	Post-Closure	Jan	109	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.020	0.020	0.020	16	0.170	0.170	0.170	0	0.103	0.103	0.103	0	0.165	0.165	0.165	6	0.187	0.164	0.187	645	0.075	0.074	0.075	2	0.083	0.083	0.083	0
Al, Tot	Post-Closure	Feb	109	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.022	0.021	0.022	23	0.170	0.170	0.170	0	0.102	0.102	0.102	1	0.164	0.164	0.164	6	0.189	0.167	0.189	659	0.060	0.060	0.060	4	0.083	0.083	0.083	0
Al, Tot	Post-Closure	Mar	109	0.017	0.017	0.017	1	0.017	0.017	0.017	1	0.036	0.034	0.036	99	0.170	0.170	0.170	0	0.101	0.100	0.101	1	0.163	0.163	0.164	6	0.198	0.176	0.198	698	0.064	0.062	0.064	23	0.083	0.083	0.083	0
Al, Tot	Post-Closure	Apr	109	0.020	0.020	0.020	2	0.022	0.022	0.023	5	0.047	0.044	0.048	113	0.170	0.170	0.170	0	0.100	0.100	0.100	1	0.163	0.163	0.163	6	0.202	0.197	0.202	794	0.076	0.074	0.077	32	0.083	0.083	0.083	0
Al, Tot	Post-Closure	May	109	0.043	0.043	0.043	6	0.051	0.051	0.051	8	0.059	0.058	0.059	26	0.187	0.187	0.187	0	0.112	0.111	0.112	1	0.160	0.160	0.160	6	0.136	0.125	0.136	942	0.211	0.211	0.212	7	0.038	0.038	0.038	4
Al, Tot	Post-Closure	Jun	109	0.044	0.044	0.044	0	0.044	0.044	0.044	0	0.045	0.045	0.045	2	0.189	0.189	0.189	0	0.142	0.141	0.142	1	0.160	0.160	0.160	6	0.168	0.153	0.168	1177	0.169	0.169	0.169	0	0.036	0.036	0.036	0
Al, Tot	Post-Closure	Jul	109	0.047	0.047	0.047	0	0.048	0.048	0.048	0	0.048	0.048	0.048	2	0.102	0.102	0.102	0	0.124	0.123	0.124	0	0.164	0.164	0.164	6	0.163	0.147	0.163	1034	0.093	0.093	0.093	1	0.098	0.098	0.098	-2
Al, Tot	Post-Closure	Aug	109	0.047	0.047	0.047	0	0.048	0.048	0.048	0	0.049	0.048	0.049	2	0.101	0.101	0.101	0	0.100	0.100	0.100	1	0.170	0.170	0.170	5	0.164	0.148	0.164	1042	0.091	0.091	0.091	1	0.100	0.100	0.100	0
Al, Tot	Post-Closure	Sep	109	0.029	0.029	0.029	0	0.030	0.030	0.030	0	0.031	0.031	0.031	5	0.121	0.121	0.121	0	0.096	0.096	0.096	1	0.173	0.173	0.173	5	0.169	0.154	0.169	1685	0.096	0.096	0.096	1	0.058	0.058	0.058	3
Al, Tot	Post-Closure	Oct	109	0.029	0.029	0.029	0	0.030	0.030	0.030	0	0.032	0.032	0.032	7	0.122	0.122	0.122	0	0.101	0.100	0.101	1	0.171	0.171	0.171	5	0.182	0.168	0.182	1849	0.118	0.118	0.118	1	0.057	0.057	0.057	0
Al, Tot	Post-Closure	Nov	109	0.017	0.017	0.017	0	0.017	0.017	0.017	-1	0.019	0.019	0.019	7	0.169	0.169	0.169	0	0.103	0.103	0.103	1	0.168	0.168	0.168	5	0.201	0.185	0.201	739	0.095	0.095	0.095	0	0.082	0.082	0.082	-1
Al, Tot	Post-Closure	Dec	109	0.017	0.017	0.017	0	0.017	0.017	0.017	1	0.019	0.019	0.019	9	0.170	0.170	0.170	0	0.104	0.103	0.104	1	0.166	0.166	0.166	6	0.190	0.169	0.190	666	0.090	0.090	0.090	1	0.083	0.083	0.083	0
Sb, Diss	Construction	Jan	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000094	0	0.000105	0.000105	0.000105	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Feb	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000103	2	0.000102	0.000102	0.000103	2	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000094	0	0.000104	0.000104	0.000104	0	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000103	1	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Mar	2	0.000100	0.000100	0.000100	0	0.000109	0.000109	0.000118	9	0.000109	0.000109	0.000118	9	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000095	0	0.000103	0.000103	0.000104	-1	0.000100	0.000100	0.000100	0	0.000108	0.000108	0.000115	8	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Apr	2	0.000100	0.000100	0.000100	0	0.000114	0.000114	0.000126	14	0.000113	0.000113	0.000125	13	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000095	1	0.000103	0.000103	0.000103	-1	0.000100	0.000100	0.000100	0	0.000111	0.000111	0.000121	11	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	May	2	0.000100	0.000100	0.000100	0	0.000108	0.000108	0.000115	8	0.000107	0.000107	0.000114	7	0.000100	0.000100	0.000100	0	0.000095	0.000095	0.000095	1	0.000102	0.000102	0.000103	-1	0.000100	0.000100	0.000100	0	0.000105	0.000105	0.000109	5	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Jun	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0	0.000098	0.000098	0.000099	1	0.000103	0.000103	0.000104	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Jul	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	0	0.000106	0.000106	0.000106	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Aug	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	2	0.000102	0.000102	0.000103	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000102	1	0.000108	0.000108	0.000108	-1	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000103	2	0.000100	0.000100	0.000100	0
Sb, Diss	Construction	Sep	2	0.000100	0.000100	0.000100	0	0.000106	0.000106	0.000112	6	0.000106	0.000106	0.000112	6	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000103	2	0.000109	0.000109	0.000109	-1	0.000100	0.000100	0.000100	0	0.000093	0.000093	0.000098	6	0.000052	0.000052	0.000052	3
Sb, Diss	Construction	Oct	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	2	0.000102	0.000102	0.000104	2	0.000100	0.000100	0.000100	0	0.000097	0.000097	0.000098	2	0.000108	0.000108	0.000108	-1	0.000100	0.000100	0.000100	0	0.000086	0.000086	0.000087	2	0.000050	0.000050	0.000050	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Sb, Diss	Construction	Nov	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0	0.000095	0.000095	0.000097	2	0.000107	0.000107	0.000107	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000098	0.000098	0.000098	-2
Sb, Diss	Construction	Dec	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0	0.000095	0.000095	0.000097	2	0.000106	0.000106	0.000106	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Jan	13	0.000100	0.000100	0.000100	0	0.000184	0.000193	0.000259	93	0.000184	0.000192	0.000259	92	0.000126	0.000124	0.000154	24	0.000140	0.000140	0.000178	49	0.000901	0.000851	0.001758	691	0.000100	0.000100	0.000100	0	0.000161	0.000167	0.000216	67	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Feb	13	0.000100	0.000100	0.000100	0	0.000356	0.000395	0.000617	295	0.000355	0.000394	0.000616	294	0.000125	0.000123	0.000151	23	0.000145	0.000146	0.000188	55	0.000927	0.000872	0.001793	714	0.000100	0.000100	0.000100	0	0.000306	0.000338	0.000518	238	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Mar	13	0.000100	0.000100	0.000100	0	0.000779	0.000774	0.001248	674	0.000777	0.000772	0.001244	672	0.000125	0.000123	0.000151	23	0.000162	0.000162	0.000216	73	0.000960	0.000901	0.001840	744	0.000100	0.000100	0.000100	0	0.000680	0.000673	0.001077	573	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Apr	13	0.000100	0.000100	0.000100	0	0.000843	0.000800	0.001336	700	0.001343	0.001242	0.001863	1142	0.000128	0.000126	0.000155	25	0.000180	0.000179	0.000244	91	0.001001	0.000934	0.001893	780	0.059190	0.050792	0.062790	50692	0.001120	0.001035	0.001545	935	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	May	13	0.000100	0.000100	0.000100	0	0.000390	0.000379	0.000586	279	0.000530	0.000501	0.000722	401	0.000140	0.000137	0.000179	36	0.000191	0.000188	0.000256	100	0.000980	0.000911	0.001826	764	0.014190	0.012187	0.015010	12087	0.000366	0.000348	0.000484	248	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Jun	13	0.000100	0.000100	0.000100	0	0.000155	0.000153	0.000193	53	0.000172	0.000168	0.000211	68	0.000119	0.000118	0.000137	17	0.000167	0.000165	0.000211	69	0.000969	0.000897	0.001778	744	0.015420	0.013258	0.016230	13158	0.000150	0.000147	0.000177	47	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Jul	13	0.000100	0.000100	0.000100	0	0.000149	0.000147	0.000184	47	0.000162	0.000159	0.000197	59	0.000116	0.000114	0.000129	14	0.000146	0.000144	0.000173	44	0.001022	0.000942	0.001847	765	0.010470	0.008992	0.011020	8892	0.000148	0.000146	0.000176	46	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Aug	13	0.000100	0.000100	0.000100	0	0.000165	0.000162	0.000208	62	0.000184	0.000178	0.000228	78	0.000120	0.000118	0.000137	18	0.000149	0.000146	0.000176	44	0.001057	0.000969	0.001881	773	0.011890	0.010182	0.012500	10082	0.000166	0.000162	0.000201	62	0.000100	0.000100	0.000100	0
Sb, Diss	Operations	Sep	13	0.000100	0.000100	0.000100	0	0.000178	0.000174	0.000226	74	0.000206	0.000197	0.000255	98	0.000131	0.000128	0.000156	27	0.000153	0.000149	0.000182	51	0.001050	0.000958	0.001838	758	0.014150	0.012094	0.014830	11994	0.000169	0.000162	0.000206	85	0.000052	0.000052	0.000052	3
Sb, Diss	Operations	Oct	13	0.000100	0.000100	0.000100	0	0.000181	0.000180	0.000239	80	0.000228	0.000220	0.000289	121	0.000142	0.000138	0.000176	37	0.000155	0.000150	0.000185	59	0.001041	0.000946	0.001796	756	0.022250	0.019110	0.023560	19010	0.000172	0.000166	0.000213	98	0.000050	0.000050	0.000050	0
Sb, Diss	Operations	Nov	13	0.000100	0.000100	0.000100	0	0.000159	0.000160	0.000207	60	0.000177	0.000176	0.000228	76	0.000143	0.000139	0.000177	38	0.000156	0.000152	0.000189	63	0.001052	0.000952	0.001796	772	0.021290	0.018498	0.024050	18398	0.000148	0.000147	0.000180	47	0.000098	0.000098	0.000098	-2
Sb, Diss	Operations	Dec	13	0.000100	0.000100	0.000100	0	0.000161	0.000152	0.000183	52	0.000161	0.000152	0.000182	52	0.000137	0.000133	0.000165	32	0.000152	0.000148	0.000183	58	0.001071	0.000966	0.001816	793	0.000106	0.000105	0.000107	5	0.000139	0.000134	0.000153	34	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Jan	6	0.000100	0.000100	0.000100	0	0.000100	0.000101	0.000108	1	0.000100	0.000101	0.000108	1	0.000158	0.000163	0.000179	63	0.000121	0.000129	0.000176	38	0.001964	0.002111	0.002618	1901	0.000100	0.000100	0.000100	0	0.000100	0.000101	0.000105	1	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Feb	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000154	0.000159	0.000173	58	0.000120	0.000128	0.000170	36	0.002013	0.002158	0.002675	1958	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Mar	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000154	0.000158	0.000173	58	0.000119	0.000126	0.000165	35	0.002077	0.002222	0.002751	2030	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Apr	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000830	0.000813	0.000837	713	0.000159	0.000163	0.000179	63	0.000123	0.000130	0.000166	39	0.002151	0.002294	0.002840	2114	0.072000	0.070200	0.072470	70100	0.000688	0.000674	0.000693	574	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	May	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000330	0.000325	0.000336	225	0.000187	0.000193	0.000216	93	0.000134	0.000139	0.000168	48	0.002086	0.002217	0.002743	2054	0.017780	0.017417	0.018350	17317	0.000240	0.000236	0.000242	136	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Jun	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000123	0.000122	0.000123	22	0.000142	0.000145	0.000156	45	0.000128	0.000130	0.000142	33	0.002042	0.002164	0.002673	1984	0.019900	0.019308	0.020010	19208	0.000116	0.000115	0.000116	15	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Jul	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000117	0.000117	0.000117	17	0.000133	0.000135	0.000144	35	0.000118	0.000119	0.000121	18	0.002134	0.002256	0.002784	2022	0.013580	0.013155	0.013630	13055	0.000114	0.000113	0.000114	13	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Aug	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000126	0.000125	0.000126	25	0.000141	0.000144	0.000155	43	0.000118	0.000118	0.000118	16	0.002185	0.002304	0.002841	2025	0.015355	0.014897	0.015460	14797	0.000121	0.000120	0.000121	20	0.000100	0.000100	0.000100	0
Sb, Diss	Closure	Sep	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000136	0.000135	0.000136	36	0.000165	0.000168	0.000185	67	0.000119	0.000118	0.000120	20	0.002145	0.002256	0.002780	1969	0.018200	0.017657	0.018320	17557	0.000116	0.000115	0.000116	31	0.000052	0.000052	0.000052	3
Sb, Diss	Closure	Oct	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000162	0.000160	0.000162	61	0.000188	0.000193	0.000215	92	0.000121	0.000120	0.000122	28	0.002105	0.002207	0.002719	1943	0.028755	0.027785	0.028960	27685	0.000127	0.000125	0.000127	49	0.000050	0.000050	0.000050	0
Sb, Diss	Closure	Nov	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000125	0.000123	0.000125	23	0.000189	0.000193	0.000216	93	0.000124	0.000124	0.000127	33	0.002113	0.002207	0.002722	1972	0.022170	0.021510	0.022320	21410	0.000116	0.000115	0.000116	15	0.000098	0.000098	0.000098	-2
Sb, Diss	Closure	Dec	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000175	0.000178	0.000197	77	0.000122	0.000122	0.000125	30	0.002141	0.002232	0.002753	2014	0.000105	0.000104	0.000105	4	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Sb, Diss	Post-Closure	Jan	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000304	0.000287	0.000364	187	0.000153	0.000154	0.000184	54	0.000175	0.000171	0.000197	82	0.001806	0.001833	0.002776	1662	0.011750	0.010777	0.015160	10677	0.000249	0.000237	0.000293	137	0.000100	0.000109	0.000132	9
Sb, Diss	Post-Closure	Feb	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000404	0.000379	0.000493	279	0.000149	0.000150	0.000176	50	0.000181	0.000176	0.000204	88	0.001826	0.001854	0.002787	1693	0.011900	0.010953	0.015350	10853	0.000345	0.000326	0.000418	226	0.000100	0.000109	0.000133	9
Sb, Diss	Post-Closure	Mar	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.001414	0.001310	0.001810	1210	0.000148	0.000149	0.000175	49	0.000209	0.000202	0.000241	116	0.001865	0.001892	0.002817	1739	0.012520	0.011547	0.016150	11447	0.001215	0.001127	0.001552	1027	0.000100	0.000109	0.000133	9
Sb, Diss	Post-Closure	Apr	109	0.000100	0.000116	0.000147	16	0.000100	0.000115	0.000144	15	0.002092	0.002018	0.002725	1918	0.000152	0.000153	0.000180	53	0.000244	0.000235	0.000286	152	0.001914	0.001941	0.002856	1799	0.015410	0.020720	0.059770	20620	0.001756	0.001692	0.002278	1592	0.000100	0.000102	0.000109	2
Sb, Diss	Post-Closure	May	109	0.000100	0.000106	0.000119	6	0.000100	0.000105	0.000115	5	0.000755	0.000729	0.000955	629	0.000176	0.000177	0.000215	77	0.000258	0.000249	0.000303	165	0.001839	0.001864	0.002712	1733	0.010290	0.010786	0.015270	10686	0.000491	0.000475	0.000609	375	0.000100	0.000100	0.000101	0
Sb, Diss	Post-Closure	Jun	109	0.000100	0.000100	0.000102	0	0.000100	0.000100	0.000102	0	0.000171	0.000168	0.000192	68	0.000137	0.000137	0.000154	37	0.000202	0.000197	0.000232	102	0.001788	0.001811	0.002602	1664	0.012800	0.013202	0.016870	13102	0.000149	0.000147	0.000163	47	0.000100	0.000100	0.000101	0
Sb, Diss	Post-Closure	Jul	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000168	0.000165	0.000188	65	0.000129	0.000129	0.000142	29	0.000159	0.000156	0.000175	56	0.001858	0.001882	0.002670	1691	0.011470	0.011934	0.014730	11834	0.000153	0.000151	0.000169	51	0.000100	0.000100	0.000101	0
Sb, Diss	Post-Closure	Aug	109	0.000100	0.000101	0.000102	1	0.000100	0.000101	0.000102	1	0.000187	0.000183	0.000212	83	0.000136	0.000136	0.000151	36	0.000155	0.000153	0.000171	51	0.001894	0.001917	0.002686	1687	0.012230	0.012389	0.015120	12289	0.000168	0.000165	0.000188	65	0.000100	0.000100	0.000101	0
Sb, Diss	Post-Closure	Sep	109	0.000100	0.000100	0.000102	1	0.000100	0.000100	0.000102	1	0.000232	0.000226	0.000271	127	0.000155	0.000156	0.000179	55	0.000161	0.000158	0.000178	60	0.001851	0.001873	0.002593	1633	0.012750	0.013006	0.015570	12906	0.000189	0.000184	0.000218	109	0.000052	0.000052	0.000053	4
Sb, Diss	Post-Closure	Oct	109	0.000100	0.000101	0.000103	1	0.000100	0.000101	0.000103	1	0.000278	0.000272	0.000332	173	0.000175	0.000176	0.000206	75	0.000169	0.000167	0.000190	76	0.001804	0.001824	0.002498	1603	0.014110	0.015222	0.023860	15122	0.000206	0.000202	0.000243	140	0.000050	0.000050	0.000052	1
Sb, Diss	Post-Closure	Nov	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000226	0.000219	0.000264	119	0.000175	0.000176	0.000205	75	0.000175	0.000172	0.000198	85	0.001790	0.001809	0.002460	1612	0.014770	0.014875	0.018090	14775	0.000179	0.000174	0.000202	74	0.000098	0.000105	0.000122	5
Sb, Diss	Post-Closure	Dec	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000216	0.000208	0.000250	108	0.000162	0.000163	0.000186	62	0.000174	0.000171	0.000195	82	0.001794	0.001813	0.002452	1631	0.011960	0.011070	0.015430	10970	0.000175	0.000170	0.000197	70	0.000100	0.000109	0.000132	9
Sb, Tot	Construction	Jan	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000094	0	0.000105	0.000105	0.000105	0	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	0	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Feb	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	2	0.000102	0.000102	0.000104	2	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000094	0	0.000104	0.000104	0.000104	0	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000103	2	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Mar	2	0.000100	0.000100	0.000100	0	0.000110	0.000110	0.000117	10	0.000110	0.000110	0.000117	10	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000095	0	0.000103	0.000103	0.000104	-1	0.000100	0.000100	0.000100	0	0.000108	0.000108	0.000115	8	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Apr	2	0.000100	0.000100	0.000100	0	0.000116	0.000116	0.000128	16	0.000116	0.000116	0.000127	16	0.000100	0.000100	0.000100	0	0.000094	0.000094	0.000095	1	0.000103	0.000103	0.000103	-1	0.000100	0.000100	0.000100	0	0.000113	0.000113	0.000123	13	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	May	2	0.000100	0.000100	0.000100	0	0.000109	0.000109	0.000116	9	0.000108	0.000108	0.000115	8	0.000100	0.000100	0.000100	0	0.000095	0.000095	0.000096	1	0.000102	0.000102	0.000103	-1	0.000100	0.000100	0.000100	0	0.000105	0.000105	0.000109	5	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Jun	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0	0.000098	0.000098	0.000099	1	0.000103	0.000103	0.000104	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Jul	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	1	0.000106	0.000106	0.000106	-1	0.000158	0.000158	0.000158	-1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Aug	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	2	0.000102	0.000102	0.000104	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000103	1	0.000108	0.000108	0.000108	-1	0.000160	0.000160	0.000160	0	0.000102	0.000102	0.000103	2	0.000100	0.000100	0.000100	0
Sb, Tot	Construction	Sep	2	0.000100	0.000100	0.000100	0	0.000107	0.000107	0.000113	7	0.000107	0.000107	0.000113	7	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000103	2	0.000109	0.000109	0.000109	-1	0.000102	0.000102	0.000102	2	0.000093	0.000093	0.000098	6	0.000052	0.000052	0.000052	3
Sb, Tot	Construction	Oct	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	3	0.000102	0.000102	0.000104	3	0.000100	0.000100	0.000100	0	0.000097	0.000097	0.000099	2	0.000108	0.000108	0.000108	-1	0.000100	0.000100	0.000100	0	0.000086	0.000086	0.000087	2	0.000050	0.000050	0.000050	0
Sb, Tot	Construction	Nov	2	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000103	2	0.000102	0.000102	0.000103	2	0.000100	0.000100	0.000100	0	0.000095	0.000095	0.000097	2	0.000107	0.000107	0.000107	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000098	0.000098	0.000098	-2
Sb, Tot	Construction	Dec	2	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0	0.000096	0.000096	0.000097	2	0.000106	0.000106	0.000106	-1	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000102	1	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Jan	13	0.000100	0.000100	0.000100	0	0.000185	0.000193	0.000259	93	0.000184	0.000193	0.000259	93	0.000126	0.000124	0.000154	24	0.000139	0.000140	0.000178	49	0.000898	0.000848	0.001751	688	0.000100	0.000100	0.000100	0	0.000161	0.000168	0.000216	68	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Feb	13	0.000100	0.000100	0.000100	0	0.000356	0.000395	0.000617	295	0.000356	0.000395	0.000617	295	0.000125	0.000123	0.000150	23	0.000144	0.000145	0.000187	55	0.000923	0.000869	0.001786	711	0.000100	0.000100	0.000100	0	0.000306	0.000339	0.000518	239	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Mar	13	0.000100	0.000100	0.000100	0	0.000780	0.000775	0.001248	675	0.000778	0.000773	0.001245	673	0.000125	0.000123	0.000150	23	0.000161	0.000162	0.000216	73	0.000957	0.000897	0.001832	741	0.000100	0.000100	0.000100	0	0.000679	0.000674	0.001078	574	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Apr	13	0.000100	0.000100	0.000100	0	0.000843	0.000800	0.001336	700	0.001306	0.001209	0.001828	1109	0.000128	0.000126	0.000155	25	0.000179	0.000178	0.000243	91	0.000997	0.000931	0.001886	776	0.054890	0.047177	0.058760	47077	0.001089	0.001008	0.001516	908	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	May	13	0.000100	0.000100	0.000100	0	0.000390	0.000380	0.000586	280	0.000519	0.000491	0.000711	391	0.000140	0.000137	0.000178	36	0.000190	0.000187	0.000254	99	0.000976	0.000907	0.001819	761	0.013130	0.011305	0.013850	11205	0.000358	0.000342	0.000478	242	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Jun	13	0.000100	0.000100	0.000100	0	0.000155	0.000153	0.000193	53	0.000171	0.000167	0.000210	67	0.000119	0.000118	0.000137	17	0.000166	0.000164	0.000210	68	0.000966	0.000894	0.001771	741	0.014360	0.012324	0.015210	12224	0.000149	0.000146	0.000176	46	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Jul	13	0.000100	0.000100	0.000100	0	0.000149	0.000147	0.000184	47	0.000161	0.000158	0.000196	58	0.000115	0.000114	0.000129	14	0.000145	0.000143	0.000173	43	0.001018	0.000938	0.001840	762	0.009793	0.008420	0.010380	5162	0.000148	0.000145	0.000175	45	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Aug	13	0.000100	0.000100	0.000100	0	0.000165	0.000162	0.000208	62	0.000183	0.000177	0.000227	77	0.000120	0.000118	0.000137	17	0.000148	0.000145	0.000175	44	0.001053	0.000966	0.001874	770	0.011060	0.009531	0.011770	5857	0.000165	0.000161	0.000200	61	0.000100	0.000100	0.000100	0
Sb, Tot	Operations	Sep	13	0.000100	0.000100	0.000100	0	0.000179	0.000174	0.000226	74	0.000204	0.000196	0.000253	96	0.000131	0.000128	0.000156	27	0.000152	0.000148	0.000181	50	0.001045	0.000955	0.001831	755	0.013070	0.011260	0.013910	11160	0.000167	0.000161	0.000205	83	0.000052	0.000052	0.000052	3
Sb, Tot	Operations	Oct	13	0.000100	0.000100	0.000100	0	0.000181	0.000180	0.000239	80	0.000224	0.000217	0.000286	118	0.000142	0.000138	0.000176	37	0.000154	0.000149	0.000184	58	0.001037	0.000943	0.001790	753	0.020580	0.017778	0.022090	17678	0.000170	0.000164	0.000211	95	0.000050	0.000050	0.000050	0
Sb, Tot	Operations	Nov	13	0.000100	0.000100	0.000100	0	0.000159	0.000160	0.000207	60	0.000176	0.000175	0.000227	75	0.000143	0.000138	0.000176	38	0.000155	0.000151	0.000188	62	0.001048	0.000948	0.001790	769	0.019960	0.017362	0.022730	17262	0.000148	0.000147	0.000179	47	0.000098	0.000098	0.000098	-2
Sb, Tot	Operations	Dec	13	0.000100	0.000100	0.000100	0	0.000161	0.000152	0.000183	52	0.000161	0.000152	0.000182	52	0.000136	0.000132	0.000164	32	0.000151	0.000147	0.000182	57	0.001067	0.000963	0.001809	789	0.000106	0.000105	0.000107	5	0.000139	0.000134	0.000153	34	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Jan	6	0.000100	0.000100	0.000100	0	0.000100	0.000101	0.000108	1	0.000100	0.000101	0.000108	1	0.000158	0.000163	0.000178	62	0.000120	0.000129	0.000176	37	0.001956	0.002103	0.002611	1894	0.000100	0.000100	0.000100	0	0.000100	0.000101	0.000105	1	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Feb	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000154	0.000158	0.000173	58	0.000119	0.000127	0.000169	35	0.002005	0.002151	0.002668	1951	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Mar	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000154	0.000158	0.000172	58	0.000118	0.000126	0.000165	34	0.002069	0.002214	0.002743	2022	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Apr	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000792	0.000775	0.000799	675	0.000159	0.000163	0.000179	63	0.000122	0.000129	0.000165	38	0.002143	0.002286	0.002832	2106	0.068345	0.066492	0.068760	66392	0.000658	0.000644	0.000662	544	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	May	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000318	0.000313	0.000324	213	0.000187	0.000193	0.000215	92	0.000132	0.000137	0.000166	46	0.002079	0.002210	0.002735	2047	0.016840	0.016473	0.017410	16373	0.000232	0.000229	0.000235	129	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Jun	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000122	0.000121	0.000122	21	0.000142	0.000145	0.000156	44	0.000127	0.000129	0.000141	32	0.002034	0.002157	0.002666	1977	0.018900	0.018307	0.019020	18207	0.000115	0.000115	0.000115	15	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Jul	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000117	0.000116	0.000117	16	0.000133	0.000135	0.000144	35	0.000118	0.000118	0.000120	18	0.002126	0.002248	0.002777	2015	0.012965	0.012533	0.013000	7733	0.000113	0.000112	0.000113	12	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Aug	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000125	0.000124	0.000125	24	0.000141	0.000144	0.000154	43	0.000117	0.000117	0.000118	16	0.002177	0.002296	0.002834	2018	0.014650	0.014183	0.014740	8765	0.000120	0.000119	0.000120	19	0.000100	0.000100	0.000100	0
Sb, Tot	Closure	Sep	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000134	0.000133	0.000135	34	0.000164	0.000168	0.000184	67	0.000118	0.000118	0.000119	19	0.002138	0.002249	0.002772	1962	0.017295	0.016747	0.017400	16647	0.000114	0.000114	0.000115	29	0.000052	0.000052	0.000052	3
Sb, Tot	Closure	Oct	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000159	0.000157	0.000159	57	0.000188	0.000192	0.000215	92	0.000120	0.000119	0.000121	26	0.002098	0.002200	0.002712	1937	0.027315	0.026335	0.027500	26235	0.000125	0.000123	0.000125	46	0.000050	0.000050	0.000050	0
Sb, Tot	Closure	Nov	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000124	0.000122	0.000124	22	0.000189	0.000193	0.000216	92	0.000123	0.000123	0.000125	32	0.002106	0.002200	0.002715	1965	0.021105	0.020435	0.021240	20335	0.000115	0.000114	0.000115	14	0.000098	0.000098	0.000098	-2
Sb, Tot	Closure	Dec	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000174	0.000178	0.000197	77	0.000121	0.000121	0.000124	29	0.002133	0.002225	0.002746	2007	0.000104	0.000104	0.000104	4	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Sb, Tot	Post-Closure	Jan	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000303	0.000285	0.000359	185	0.000153	0.000154	0.000183	54	0.000174	0.000170	0.000195	81	0.001802	0.001829	0.002768	1658	0.011670	0.010661	0.014870	10561	0.000248	0.000235	0.000289	135	0.000100	0.000108	0.000130	8
Sb, Tot	Post-Closure	Feb	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000402	0.000376	0.000485	276	0.000149	0.000150	0.000176	49	0.000180	0.000175	0.000202	87	0.001823	0.001849	0.002779	1688	0.011820	0.010837	0.015050	10737	0.000344	0.000323	0.000411	223	0.000100	0.000108	0.000130	8
Sb, Tot	Post-Closure	Mar	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.001405	0.001297	0.001777	1197	0.000148	0.000149	0.000174	49	0.000208	0.000201	0.000238	114	0.001861	0.001888	0.002809	1735	0.012430	0.011424	0.015840	11324	0.001208	0.001116	0.001524	1016	0.000100	0.000108	0.000130	8
Sb, Tot	Post-Closure	Apr	109	0.000100	0.000116	0.000146	16	0.000100	0.000115	0.000143	15	0.002069	0.001983	0.002658	1883	0.000152	0.000153	0.000179	53	0.000243	0.000233	0.000282	150	0.001910	0.001937	0.002848	1795	0.015080	0.020064	0.056160	19964	0.001734	0.001663	0.002223	1563	0.000100	0.000102	0.000108	2
Sb, Tot	Post-Closure	May	109	0.000100	0.000106	0.000118	6	0.000100	0.000105	0.000115	5	0.000747	0.000718	0.000934	618	0.000176	0.000177	0.000214	77	0.000256	0.000247	0.000299	162	0.001836	0.001860	0.002705	1729	0.010120	0.010522	0.014360	10422	0.000486	0.000469	0.000596	369	0.000100	0.000100	0.000101	0
Sb, Tot	Post-Closure	Jun	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000170	0.000167	0.000189	67	0.000137	0.000137	0.000154	37	0.000201	0.000196	0.000229	101	0.001784	0.001807	0.002595	1660	0.012600	0.012903	0.015880	12803	0.000148	0.000146	0.000162	46	0.000100	0.000100	0.000101	0
Sb, Tot	Post-Closure	Jul	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000167	0.000164	0.000186	63	0.000129	0.000129	0.000142	29	0.000158	0.000155	0.000174	55	0.001855	0.001878	0.002663	1687	0.011220	0.011715	0.014390	7222	0.000153	0.000150	0.000167	50	0.000100	0.000100	0.000101	0
Sb, Tot	Post-Closure	Aug	109	0.000100	0.000101	0.000102	1	0.000100	0.000101	0.000102	1	0.000186	0.000182	0.000209	81	0.000136	0.000136	0.000151	36	0.000155	0.000152	0.000169	50	0.001890	0.001913	0.002679	1683	0.011870	0.012147	0.014760	7492	0.000167	0.000164	0.000186	64	0.000100	0.000100	0.000101	0
Sb, Tot	Post-Closure	Sep	109	0.000100	0.000100	0.000102	1	0.000100	0.000100	0.000102	1	0.000230	0.000224	0.000267	125	0.000155	0.000156	0.000178	55	0.000160	0.000157	0.000176	59	0.001848	0.001869	0.002585	1629	0.012570	0.012730	0.015190	12630	0.000188	0.000183	0.000215	108	0.000052	0.000052	0.000053	4
Sb, Tot	Post-Closure	Oct	109	0.000100	0.000101	0.000103	1	0.000100	0.000101	0.000103	1	0.000276	0.000269	0.000326	170	0.000175	0.000176	0.000205	75	0.000168	0.000165	0.000188	75	0.001801	0.001820	0.002491	1599	0.013890	0.014847	0.022440	14747	0.000205	0.000200	0.000239	138	0.000050	0.000050	0.000052	1
Sb, Tot	Post-Closure	Nov	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000225	0.000217	0.000260	117	0.000175	0.000175	0.000204	75	0.000174	0.000171	0.000195	83	0.001787	0.001805	0.002453	1608	0.014430	0.014553	0.017660	14453	0.000178	0.000173	0.000200	73	0.000098	0.000104	0.000120	4
Sb, Tot	Post-Closure	Dec	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000216	0.000206	0.000247	106	0.000162	0.000162	0.000186	62	0.000173	0.000169	0.000193	81	0.001791	0.001809	0.002445	1627	0.011880	0.010953	0.015130	10853	0.000175	0.000169	0.000195	69	0.000100	0.000108	0.000130	8
As, Diss	Construction	Jan	2	0.000150	0.000150	0.000150	0	0.000153	0.000153	0.000157	2	0.000153	0.000153	0.000157	2	0.000434	0.000434	0.000434	0	0.000209	0.000209	0.000209	0	0.000825	0.000825	0.000849	1	0.001300	0.001300	0.001300	0	0.000172	0.000172	0.000174	1	0.000340	0.000340	0.000340	0
As, Diss	Construction	Feb	2	0.000150	0.000150	0.000150	0	0.000161	0.000161	0.000172	8	0.000161	0.000161	0.000172	8	0.000433	0.000433	0.000433	0	0.000211	0.000211	0.000211	0	0.000831	0.000831	0.000854	1	0.001300	0.001300	0.001300	0	0.000173	0.000173	0.000182	5	0.000340	0.000340	0.000340	0
As, Diss	Construction	Mar	2	0.000150	0.000150	0.000150	0	0.000234	0.000234	0.000267	56	0.000234	0.000234	0.000267	56	0.000432	0.000432	0.000433	0	0.000214	0.000214	0.000215	1	0.000836	0.000836	0.000860	1	0.001300	0.001300	0.001300	0	0.000232	0.000232	0.000260	43	0.000340	0.000340	0.000340	0
As, Diss	Construction	Apr	2	0.000157	0.000157	0.000157	0	0.000308	0.000308	0.000349	90	0.000312	0.000312	0.000352	70	0.000433	0.000433	0.000434	0	0.000217	0.000217	0.000220	2	0.000841	0.000841	0.000864	0	0.001300	0.001300	0.001300	0	0.000297	0.000297	0.000330	58	0.000340	0.000340	0.000340	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
As, Diss	Construction	May	2	0.000138	0.000138	0.000138	-1	0.000208	0.000208	0.000228	40	0.000221	0.000221	0.000239	13	0.000351	0.000351	0.000352	-1	0.000219	0.000219	0.000222	2	0.000832	0.000832	0.000854	1	0.001106	0.001106	0.001106	1	0.000225	0.000225	0.000237	9	0.000127	0.000127	0.000127	6
As, Diss	Construction	Jun	2	0.000140	0.000140	0.000140	0	0.000146	0.000146	0.000148	4	0.000147	0.000147	0.000150	3	0.000331	0.000331	0.000332	-1	0.000206	0.000206	0.000208	1	0.000835	0.000835	0.000854	1	0.001100	0.001100	0.001100	0	0.000173	0.000173	0.000174	2	0.000120	0.000120	0.000120	0
As, Diss	Construction	Jul	2	0.000160	0.000160	0.000160	0	0.000167	0.000167	0.000169	4	0.000168	0.000168	0.000170	2	0.000436	0.000436	0.000437	0	0.000200	0.000200	0.000201	1	0.000859	0.000859	0.000878	1	0.001003	0.001003	0.001003	0	0.000181	0.000181	0.000183	2	0.000197	0.000197	0.000197	-1
As, Diss	Construction	Aug	2	0.000160	0.000160	0.000160	0	0.000170	0.000170	0.000175	6	0.000172	0.000172	0.000176	4	0.000439	0.000439	0.000440	-1	0.000202	0.000202	0.000203	1	0.000876	0.000876	0.000895	1	0.001000	0.001000	0.001000	0	0.000184	0.000184	0.000188	3	0.000200	0.000200	0.000200	0
As, Diss	Construction	Sep	2	0.000150	0.000150	0.000150	0	0.000171	0.000171	0.000186	13	0.000173	0.000173	0.000188	10	0.000321	0.000321	0.000321	-2	0.000205	0.000205	0.000211	3	0.000875	0.000875	0.000892	2	0.001097	0.001097	0.001097	0	0.000196	0.000196	0.000208	7	0.000190	0.000190	0.000190	0
As, Diss	Construction	Oct	2	0.000150	0.000150	0.000150	0	0.000161	0.000161	0.000166	6	0.000163	0.000163	0.000169	3	0.000325	0.000325	0.000326	-2	0.000206	0.000206	0.000211	3	0.000863	0.000863	0.000879	2	0.001100	0.001100	0.001100	0	0.000197	0.000197	0.000200	2	0.000190	0.000190	0.000190	0
As, Diss	Construction	Nov	2	0.000150	0.000150	0.000150	0	0.000156	0.000156	0.000159	4	0.000157	0.000157	0.000160	3	0.000437	0.000437	0.000438	-1	0.000208	0.000208	0.000212	2	0.000857	0.000857	0.000873	2	0.001293	0.001293	0.001293	-1	0.000181	0.000181	0.000182	1	0.000335	0.000335	0.000335	-1
As, Diss	Construction	Dec	2	0.000150	0.000150	0.000150	0	0.000155	0.000155	0.000158	4	0.000155	0.000155	0.000158	3	0.000437	0.000437	0.000437	0	0.000210	0.000210	0.000214	2	0.000860	0.000860	0.000875	2	0.001300	0.001300	0.001300	0	0.000178	0.000178	0.000180	2	0.000340	0.000340	0.000340	0
As, Diss	Operations	Jan	13	0.000150	0.000150	0.000150	0	0.000381	0.000394	0.000580	163	0.000382	0.000395	0.000580	163	0.000503	0.000498	0.000574	14	0.000318	0.000320	0.000420	53	0.002985	0.002836	0.005170	223	0.001300	0.001300	0.001300	0	0.000338	0.000348	0.000483	105	0.000340	0.000340	0.000340	0
As, Diss	Operations	Feb	13	0.000150	0.000150	0.000150	0	0.000880	0.000991	0.001633	561	0.000880	0.000990	0.001632	560	0.000499	0.000494	0.000565	14	0.000337	0.000338	0.000450	60	0.003052	0.002896	0.005266	227	0.001300	0.001300	0.001300	0	0.000756	0.000846	0.001366	416	0.000340	0.000340	0.000340	0
As, Diss	Operations	Mar	13	0.000151	0.000151	0.000151	0	0.002268	0.002217	0.003570	1378	0.002263	0.002212	0.003562	1375	0.000499	0.000494	0.000565	14	0.000392	0.000391	0.000538	84	0.003143	0.002975	0.005393	234	0.001300	0.001300	0.001300	0	0.001965	0.001919	0.003074	1087	0.000340	0.000340	0.000340	0
As, Diss	Operations	Apr	13	0.000157	0.000157	0.000157	1	0.002264	0.002156	0.003615	1234	0.002799	0.002631	0.004292	1326	0.000507	0.000502	0.000578	16	0.000443	0.000438	0.000616	105	0.003251	0.003067	0.005538	242	0.067720	0.059764	0.088030	4497	0.002338	0.002196	0.003560	1073	0.000340	0.000340	0.000340	0
As, Diss	Operations	May	13	0.000138	0.000138	0.000138	-1	0.000936	0.000912	0.001446	514	0.001073	0.001031	0.001596	427	0.000458	0.000449	0.000557	25	0.000458	0.000451	0.000634	110	0.003180	0.002993	0.005353	241	0.016400	0.014648	0.020700	1232	0.000751	0.000727	0.001078	253	0.000127	0.000127	0.000127	6
As, Diss	Operations	Jun	13	0.000140	0.000140	0.000140	0	0.000298	0.000294	0.000402	110	0.000319	0.000313	0.000428	118	0.000383	0.000378	0.000429	13	0.000373	0.000368	0.000493	81	0.003146	0.002953	0.005225	238	0.018460	0.016397	0.023250	1391	0.000291	0.000286	0.000366	68	0.000120	0.000120	0.000120	0
As, Diss	Operations	Jul	13	0.000160	0.000160	0.000160	0	0.000302	0.000298	0.000396	86	0.000318	0.000312	0.000416	91	0.000477	0.000474	0.000513	8	0.000310	0.000306	0.000386	55	0.003297	0.003085	0.005422	244	0.012950	0.011523	0.016160	1052	0.000299	0.000295	0.000375	65	0.000197	0.000197	0.000197	-1
As, Diss	Operations	Aug	13	0.000160	0.000160	0.000160	0	0.000349	0.000341	0.000466	112	0.000373	0.000362	0.000495	119	0.000491	0.000486	0.000535	10	0.000316	0.000311	0.000391	56	0.003397	0.003167	0.005520	248	0.014680	0.013012	0.018230	1201	0.000343	0.000334	0.000439	87	0.000200	0.000200	0.000200	0
As, Diss	Operations	Sep	13	0.000150	0.000150	0.000150	0	0.000377	0.000364	0.000504	140	0.000411	0.000393	0.000545	150	0.000401	0.000394	0.000467	20	0.000332	0.000325	0.000411	63	0.003368	0.003131	0.005402	248	0.017430	0.015450	0.021550	1305	0.000377	0.000363	0.000479	98	0.000190	0.000190	0.000190	0
As, Diss	Operations	Oct	13	0.000150	0.000150	0.000150	0	0.000374	0.000372	0.000531	145	0.000430	0.000421	0.000600	167	0.000436	0.000425	0.000523	27	0.000344	0.000335	0.000426	67	0.003327	0.003082	0.005274	250	0.026810	0.023572	0.033070	2043	0.000379	0.000373	0.000494	93	0.000190	0.000190	0.000190	0
As, Diss	Operations	Nov	13	0.000150	0.000150	0.000150	0	0.000307	0.000313	0.000442	108	0.000331	0.000335	0.000475	120	0.000550	0.000538	0.000636	22	0.000347	0.000341	0.000438	67	0.003346	0.003091	0.005266	254	0.029900	0.027273	0.043710	1998	0.000289	0.000291	0.000379	64	0.000335	0.000335	0.000335	-1
As, Diss	Operations	Dec	13	0.000150	0.000150	0.000150	0	0.000309	0.000290	0.000373	94	0.000310	0.000291	0.000373	94	0.000532	0.000522	0.000604	19	0.000342	0.000335	0.000427	62	0.003397	0.003131	0.005319	257	0.001310	0.001308	0.001313	1	0.000278	0.000266	0.000319	52	0.000340	0.000340	0.000340	0
As, Diss	Closure	Jan	6	0.000150	0.000150	0.000150	0	0.000150	0.000154	0.000171	3	0.000152	0.000155	0.000172	3	0.000583	0.000597	0.000638	37	0.000260	0.000284	0.000414	36	0.005665	0.006064	0.007395	629	0.001300	0.001300	0.001300	0	0.000171	0.000173	0.000184	2	0.000340	0.000340	0.000340	0
As, Diss	Closure	Feb	6	0.000150	0.000150	0.000150	0	0.000151	0.000151	0.000151	0	0.000152	0.000152	0.000152	1	0.000573	0.000584	0.000622	35	0.000261	0.000283	0.000400	34	0.005796	0.006191	0.007548	642	0.001300	0.001300	0.001300	0	0.000166	0.000166	0.000166	1	0.000340	0.000340	0.000340	0
As, Diss	Closure	Mar	6	0.000151	0.000151	0.000151	0	0.000151	0.000151	0.000151	0	0.000153	0.000153	0.000153	2	0.000572	0.000583	0.000621	35	0.000262	0.000282	0.000391	33	0.005967	0.006360	0.007751	660	0.001300	0.001300	0.001300	0	0.000164	0.000164	0.000164	2	0.000340	0.000340	0.000340	0
As, Diss	Closure	Apr	6	0.000157	0.000157	0.000157	1	0.000164	0.000164	0.000165	2	0.001357	0.001304	0.001368	607	0.000586	0.000597	0.000639	38	0.000272	0.000290	0.000391	36	0.006166	0.006553	0.007987	681	0.118400	0.112702	0.119000	8569	0.001136	0.001093	0.001142	484	0.000340	0.000340	0.000340	0
As, Diss	Closure	May	6	0.000138	0.000138	0.000138	-1	0.000146	0.000146	0.000146	-2	0.000526	0.000514	0.000549	163	0.000576	0.000592	0.000652	67	0.000288	0.000302	0.000382	41	0.005987	0.006343	0.007725	671	0.028900	0.028015	0.030820	2447	0.000410	0.000401	0.000420	95	0.000127	0.000127	0.000127	6
As, Diss	Closure	Jun	6	0.000140	0.000140	0.000140	0	0.000140	0.000140	0.000140	0	0.000179	0.000177	0.000180	23	0.000440	0.000448	0.000477	34	0.000258	0.000264	0.000298	30	0.005870	0.006202	0.007542	657	0.033395	0.031877	0.034030	2798	0.000195	0.000193	0.000195	14	0.000120	0.000120	0.000120	0
As, Diss	Closure	Jul	6	0.000160	0.000160	0.000160	0	0.000161	0.000161	0.000161	0	0.000191	0.000189	0.000191	15	0.000522	0.000527	0.000550	20	0.000230	0.000230	0.000237	17	0.006126	0.006457	0.007849	669	0.023275	0.022152	0.023470	2115	0.000199	0.000198	0.000199	11	0.000197	0.000197	0.000197	-1
As, Diss	Closure	Aug	6	0.000160	0.000160	0.000160	0	0.000161	0.000161	0.000161	0	0.000206	0.000204	0.000206	23	0.000546	0.000552	0.000581	25	0.000227	0.000227	0.000229	14	0.006269	0.006591	0.008008	675	0.026255	0.024933	0.026350	2393	0.000211	0.000209	0.000211	17	0.000200	0.000200	0.000200	0
As, Diss	Closure	Sep	6	0.000150	0.000150	0.000150	0	0.000152	0.000152	0.000152	0	0.000214	0.000211	0.000214	34	0.000487	0.000497	0.000540	52	0.000234	0.000233	0.000237	17	0.006161	0.006467	0.007842	667	0.031015	0.029453	0.031130	2578	0.000227	0.000225	0.000227	22	0.000190	0.000190	0.000190	0
As, Diss	Closure	Oct	6	0.000150	0.000150	0.000150	0	0.000152	0.000152	0.000152	0	0.000255	0.000250	0.000256	58	0.000553	0.000565	0.000624	71	0.000247	0.000246	0.000251	22	0.006039	0.006317	0.007665	666	0.047295	0.044840	0.047510	3976	0.000259	0.000255	0.000260	33	0.000190	0.000190	0.000190	0
As, Diss	Closure	Nov	6	0.000150	0.000150	0.000150	0	0.000151	0.000151	0.000151	0	0.000193	0.000189	0.000193	24	0.000666	0.000678	0.000737	54	0.000259	0.000258	0.000265	27	0.006048	0.006309	0.007660	672	0.041085	0.038285	0.041240	2845	0.000204	0.000202	0.000204	13	0.000335	0.000335	0.000335	-1
As, Diss	Closure	Dec	6	0.000150	0.000150	0.000150	0	0.000150	0.000150	0.000150	0	0.000151	0.000151	0.000151	1	0.000628	0.000637	0.000687	46	0.000260	0.000259	0.000267	26	0.006121	0.006376	0.007741	681	0.001308	0.001308	0.001308	1	0.000176	0.000176	0.000176	0	0.000340	0.000340	0.000340	0
As, Diss	Post-Closure	Jan	109	0.000150	0.000150	0.000150	0	0.000150	0.000150	0.000150	0	0.000463	0.000436	0.000549	191	0.000539	0.000542	0.000650	25	0.000335	0.000328	0.000365	58	0.004226	0.004321	0.007791	440	0.017970	0.016575	0.022880	1175	0.000398	0.000378	0.000461	123	0.000340	0.000355	0.000391	4
As, Diss	Post-Closure	Feb	109	0.000150	0.000150	0.000151	0	0.000151	0.000151	0.000151	0	0.000617	0.000579	0.000746	286	0.000529	0.000532	0.000630	23	0.000347	0.000339	0.000378	61	0.004270	0.004364	0.007796	443	0.018280	0.016933	0.023280	1203	0.000541	0.000510	0.000646	211	0.000340	0.000355	0.000391	4
As, Diss	Post-Closure	Mar	109	0.000151	0.000151	0.000151	0	0.000151	0.000151	0.000151	1	0.002188	0.002026	0.002773	1250	0.000528	0.000530	0.000624	23	0.000392	0.000380	0.000436	80	0.004352	0.004445	0.007841	451	0.019430	0.018044	0.024770	1288	0.001891	0.001753	0.002388	985	0.000340	0.000355	0.000391	4
As, Diss	Post-Closure	Apr	109	0.000157	0.000188	0.000248	20	0.000165	0.000193	0.000249	20	0.003347	0.003183	0.004207	1626	0.000536	0.000539	0.000636	25	0.000449	0.000434	0.000508	104	0.004452	0.004543	0.007901	462	0.024070	0.030976	0.077540	2283	0.002815	0.002679	0.003528	1331	0.000340	0.000344	0.000354	1
As, Diss	Post-Closure	May	109	0.000138	0.000150	0.000173	7	0.000146	0.000155	0.000175	4	0.001209	0.001155	0.001485	490	0.000502	0.000506	0.000642	43	0.000470	0.000455	0.000534	112	0.004292	0.004376	0.007482	450	0.016430	0.016985	0.020760	1444	0.000812	0.000780	0.000974	278	0.000127	0.000128	0.000129	6
As, Diss	Post-Closure	Jun	109	0.000140	0.000141	0.000143	1	0.000140	0.000141	0.000143	1	0.000254	0.000248	0.000281	72	0.000404	0.000406	0.000469	22	0.000367	0.000358	0.000407	76	0.004186	0.004265	0.007158	437	0.020010	0.020521	0.024060	1766	0.000246	0.000242	0.000265	42	0.000120	0.000121	0.000122	0
As, Diss	Post-Closure	Jul	109	0.000160	0.000161	0.000162	0	0.000161	0.000162	0.000163	0	0.000269	0.000262	0.000296	60	0.000493	0.000494	0.000541	13	0.000289	0.000284	0.000312	44	0.004344	0.004422	0.007302	443	0.018010	0.018576	0.022620	1758	0.000260	0.000255	0.000281	43	0.000197	0.000198	0.000199	-1
As, Diss	Post-Closure	Aug	109	0.000160	0.000161	0.000164	1	0.000161	0.000162	0.000164	1	0.000299	0.000291	0.000332	76	0.000509	0.000511	0.000567	16	0.000284	0.000279	0.000304	40	0.004425	0.004502	0.007307	445	0.018440	0.019211	0.023120	1821	0.000284	0.000278	0.000311	55	0.000200	0.000200	0.000202	0
As, Diss	Post-Closure	Sep	109	0.000150	0.000152	0.000155	1	0.000152	0.000153	0.000156	1	0.000360	0.000348	0.000412	121	0.000430	0.000432	0.000514	33	0.000296	0.000291	0.000319	46	0.004333	0.004405	0.007027	437	0.019690	0.019974	0.023640	1716	0.000338	0.000329	0.000377	79	0.000190	0.000191	0.000192	0
As, Diss	Post-Closure	Oct	109	0.000150	0.000153	0.000157	2	0.000152	0.000154	0.000159	2	0.000431	0.000417	0.000500	164	0.000473	0.000476	0.000584	44	0.000317	0.000311	0.000345	55	0.004226	0.004292	0.006743	433	0.021580	0.022980	0.031720	1989	0.000379	0.000370	0.000427	92	0.000190	0.000191	0.000193	0
As, Diss	Post-Closure	Nov	109	0.000150	0.000151	0.000153	1	0.000151	0.000151	0.000153	1	0.000344	0.000332	0.000396	118	0.000584	0.000587	0.000691	34	0.000331	0.000325	0.000360	60	0.004192	0.004256	0.006615	434	0.021860	0.022326	0.026990	1617	0.000297	0.000290	0.000330	63	0.000335	0.000346	0.000372	2
As, Diss	Post-Closure	Dec	109	0.000150	0.000150	0.000150	0	0.000150	0.000150	0.000150	0	0.000328	0.000314	0.000376	109	0.000558	0.000560	0.000645	28	0.000331	0.000325	0.000360	58	0.004200	0.004264	0.006579	434	0.018240	0.016960	0.023210	1205	0.000290	0.000281	0.000321	61	0.000340	0.000355	0.000391	4
As, Tot	Construction	Jan	2	0.000150	0.000150	0.000150	0	0.000174	0.000174	0.000197	16	0.000174	0.000174	0.000197	16	0.000445	0.000445	0.000445	0	0.000250	0.000250	0.000257	3	0.000876	0.000876	0.000899	1	0.001400	0.001400	0.001400	0	0.000203	0.000203	0.000220	9	0.000350	0.000350	0.000350	0
As, Tot	Construction	Feb	2	0.000150	0.000150	0.000150	0	0.000215	0.000215	0.000279	43	0.000215	0.000215	0.000279	43	0.000444	0.000444	0.000444	0	0.000251	0.000251	0.000259	3	0.000880	0.000880	0.000904	1	0.001400	0.001400	0.001400	0	0.000228	0.000228	0.000280	30	0.000350	0.000350	0.000350	0
As, Tot	Construction	Mar	2	0.000150	0.000150	0.000150	0	0.000515	0.000515	0.000557	243	0.000514	0.000514	0.000557	243	0.000444	0.000444	0.000444	0	0.000258	0.000258	0.000268	6	0.000886	0.000886	0.000908	0	0.001400	0.001400	0.001400	0	0.000478	0.000478	0.000514	179	0.000350	0.000350	0.000350	0
As, Tot	Construction	Apr	2	0.000157	0.000157	0.000157	0	0.000710	0.000710	0.000717	329	0.000704	0.000704	0.000712	271	0.000444	0.000444	0.000445	0	0.000268	0.000268	0.000278	10	0.000890	0.000890	0.000912	0	0.001400	0.001400	0.001400	0	0.000632	0.000632	0.000638	213	0.000350	0.000350	0.000350	0
As, Tot	Construction	May	2	0.000147	0.000147	0.000147	-1	0.000356	0.000356	0.000369	126	0.000361	0.000361	0.000373	72	0.000380	0.000380	0.000381	-1	0.000270	0.000270	0.000279	12	0.000879	0.000879	0.000900	1	0.001206	0.001206	0.001206	1	0.000317	0.000317	0.000324	45	0.000205	0.000205	0.000205	2
As, Tot	Construction	Jun	2	0.000140	0.000140	0.000140	0	0.000163	0.000163	0.000164	16	0.000164	0.000164	0.000166	14	0.000362	0.000362	0.000362	-1	0.000239	0.000239	0.000244	9	0.000880	0.000880	0.000900	1	0.001200	0.001200	0.001200	0	0.000188	0.000188	0.000188	8	0.000200	0.000200	0.000200	0
As, Tot	Construction	Jul	2	0.000180	0.000180	0.000180	0	0.000204	0.000204	0.000205	13	0.000205	0.000205	0.000206	12	0.000467	0.000467	0.000467	0	0.000224	0.000224	0.000226	6	0.000906	0.000906	0.000925	1	0.001006	0.001006	0.001006	1	0.000211	0.000211	0.000212	9	0.000219	0.000219	0.000219	0
As, Tot	Construction	Aug	2	0.000180	0.000180	0.000180	0	0.000213	0.000213	0.000217	18	0.000215	0.000215	0.000218	16	0.000470	0.000470	0.000470	-1	0.000228	0.000228	0.000229	7	0.000929	0.000929	0.000947	1	0.001000	0.001000	0.001000	0	0.000218	0.000218	0.000221	12	0.000220	0.000220	0.000220	0
As, Tot	Construction	Sep	2	0.000230	0.000230	0.000230	0	0.000276	0.000276	0.000289	20	0.000278	0.000278	0.000290	18	0.000409	0.000409	0.000409	-1	0.000247	0.000247	0.000252	9	0.000929	0.000929	0.000947	2	0.001097	0.001097	0.001097	0	0.000281	0.000281	0.000291	13	0.000259	0.000259	0.000259	0
As, Tot	Construction	Oct	2	0.000230	0.000230	0.000230	0	0.000265	0.000265	0.000269	15	0.000267	0.000267	0.000270	13	0.000414	0.000414	0.000414	-1	0.000261	0.000261	0.000265	8	0.000916	0.000916	0.000932	2	0.001100	0.001100	0.001100	0	0.000274	0.000274	0.000276	8	0.000260	0.000260	0.000260	0
As, Tot	Construction	Nov	2	0.000150	0.000150	0.000150	0	0.000173	0.000173	0.000175	14	0.000173	0.000173	0.000175	13	0.000451	0.000451	0.000451	-1	0.000262	0.000262	0.000266	7	0.000909	0.000909	0.000924	2	0.001390	0.001390	0.001390	-1	0.000213	0.000213	0.000215	6	0.000347	0.000347	0.000347	-1
As, Tot	Construction	Dec	2	0.000150	0.000150	0.000150	0	0.000170	0.000170	0.000172	13	0.000170	0.000170	0.000172	13	0.000448	0.000448	0.000449	0	0.000260	0.000260	0.000263	6	0.000910	0.000910	0.000926	2	0.001400	0.001400	0.001400	0	0.000209	0.000209	0.000211	7	0.000350	0.000350	0.000350	0
As, Tot	Operations	Jan	13	0.000150	0.000150	0.000150	0	0.000394	0.000413	0.000591	175	0.000395	0.000413	0.000591	175	0.000514	0.000510	0.000585	14	0.000357	0.000360	0.000459	48	0.003034	0.002885	0.005220	210	0.001400	0.001400	0.001400	0	0.000364	0.000378	0.000508	103	0.000350	0.000350	0.000350	0
As, Tot	Operations	Feb	13	0.000150	0.000150	0.000150	0	0.000924	0.001041	0.001669	594	0.000924	0.001041	0.001667	594	0.000510	0.000505	0.000576	13	0.000375	0.000378	0.000488	55	0.003101	0.002944	0.005316	215	0.001400	0.001400	0.001400	0	0.000804	0.000898	0.001406	411	0.000350	0.000350	0.000350	0
As, Tot	Operations	Mar	13	0.000151	0.000151	0.000151	0	0.002345	0.002318	0.003642	1445	0.002340	0.002313	0.003633	1442	0.000510	0.000505	0.000576	14	0.000430	0.000431	0.000575	77	0.003191	0.003023	0.005442	221	0.001400	0.001400	0.001400	0	0.002039	0.002013	0.003144	1074	0.000350	0.000350	0.000350	0
As, Tot	Operations	Apr	13	0.000158	0.000158	0.000158	1	0.002362	0.002274	0.003706	1276	0.002905	0.002754	0.004389	1350	0.000519	0.000513	0.000589	15	0.000482	0.000480	0.000654	97	0.003298	0.003114	0.005586	229	0.068820	0.060722	0.089050	4237	0.002435	0.002308	0.003651	1043	0.000350	0.000350	0.000350	0
As, Tot	Operations	May	13	0.000147	0.000147	0.000147	-1	0.000984	0.000970	0.001492	517	0.001124	0.001091	0.001644	421	0.000487	0.000479	0.000586	23	0.000495	0.000490	0.000670	102	0.003226	0.003039	0.005400	228	0.016750	0.014957	0.021020	1146	0.000786	0.000767	0.001111	252	0.000205	0.000205	0.000205	2
As, Tot	Operations	Jun	13	0.000140	0.000140	0.000140	0	0.000305	0.000303	0.000409	115	0.000326	0.000322	0.000435	123	0.000413	0.000409	0.000459	12	0.000397	0.000393	0.000516	78	0.003191	0.002998	0.005270	226	0.018820	0.016719	0.023590	1293	0.000299	0.000296	0.000374	70	0.000200	0.000200	0.000200	0
As, Tot	Operations	Jul	13	0.000180	0.000180	0.000180	0	0.000328	0.000325	0.000421	80	0.000344	0.000339	0.000441	85	0.000508	0.000504	0.000543	7	0.000328	0.000325	0.000403	54	0.003344	0.003132	0.005469	232	0.013140	0.011683	0.016340	1068	0.000319	0.000315	0.000395	63	0.000219	0.000219	0.000219	0
As, Tot	Operations	Aug	13	0.000180	0.000180	0.000180	0	0.000376	0.000369	0.000493	104	0.000400	0.000390	0.000522	111	0.000522	0.000517	0.000565	9	0.000335	0.000331	0.000409	55	0.003448	0.003219	0.005573	234	0.014890	0.013191	0.018420	1219	0.000364	0.000356	0.000460	83	0.000220	0.000220	0.000220	0
As, Tot	Operations	Sep	13	0.000230	0.000230	0.000230	0	0.000464	0.000453	0.000591	96	0.000498	0.000482	0.000631	104	0.000489	0.000481	0.000555	16	0.000364	0.000358	0.000443	58	0.003422	0.003185	0.005457	233	0.017680	0.015662	0.021780	1324	0.000448	0.000436	0.000550	76	0.000259	0.000259	0.000259	0
As, Tot	Operations	Oct	13	0.000230	0.000230	0.000230	0	0.000461	0.000461	0.000619	100	0.000518	0.000511	0.000688	116	0.000524	0.000513	0.000611	22	0.000390	0.000381	0.000471	58	0.003380	0.003135	0.005328	235	0.027210	0.023910	0.033440	2074	0.000446	0.000441	0.000561	74	0.000260	0.000260	0.000260	0
As, Tot	Operations	Nov	13	0.000150	0.000150	0.000150	0	0.000313	0.000322	0.000449	112	0.000338	0.000343	0.000483	123	0.000563	0.000552	0.000650	21	0.000393	0.000388	0.000484	58	0.003397	0.003142	0.005318	239	0.030310	0.027638	0.044100	1874	0.000316	0.000319	0.000406	58	0.000347	0.000347	0.000347	-1
As, Tot	Operations	Dec	13	0.000150	0.000150	0.000150	0	0.000316	0.000298	0.000378	99	0.000316	0.000299	0.000379	99	0.000544	0.000533	0.000616	18	0.000384	0.000378	0.000469	55	0.003447	0.003181	0.005370	243	0.001410	0.001408	0.001413	1	0.000304	0.000292	0.000344	49	0.000350	0.000350	0.000350	0
As, Tot	Closure	Jan	6	0.000150	0.000150	0.000150	0	0.000150	0.000154	0.000171	3	0.000152	0.000155	0.000173	4	0.000595	0.000608	0.000649	36	0.000295	0.000320	0.000453	31	0.005716	0.006115	0.007447	592	0.001400	0.001400	0.001400	0	0.000187	0.000190	0.000201	2	0.000350	0.000350	0.000350	0
As, Tot	Closure	Feb	6	0.000151	0.000151	0.000151	0	0.000151	0.000151	0.000151	0	0.000152	0.000152	0.000152	2	0.000584	0.000595	0.000634	34	0.000294	0.000316	0.000436	30	0.005847	0.006242	0.007599	605	0.001400	0.001400	0.001400	0	0.000178	0.000178	0.000178	1	0.000350	0.000350	0.000350	0
As, Tot	Closure	Mar	6	0.000151	0.000151	0.000151	0	0.000151	0.000151	0.000151	1	0.000154	0.000154	0.000154	2	0.000583	0.000594	0.000632	34	0.000293	0.000314	0.000425	29	0.006017	0.006410	0.007802	623	0.001400	0.001400	0.001400	0	0.000175	0.000175	0.000175	2	0.000350	0.000350	0.000350	0
As, Tot	Closure	Apr	6	0.000158	0.000158	0.000158	1	0.000168	0.000168	0.000169	2	0.001370	0.001318	0.001382	594	0.000597	0.000608	0.000650	37	0.000302	0.000321	0.000424	32	0.006216	0.006602	0.008037	643	0.119350	0.113653	0.119900	8018	0.001158	0.001115	0.001165	452	0.000350	0.000350	0.000350	0
As, Tot	Closure	May	6	0.000147	0.000147	0.000147	-1	0.000156	0.000156	0.000156	-1	0.000541	0.000529	0.000565	153	0.000605	0.000621	0.000682	62	0.000315	0.000330	0.000413	36	0.006035	0.006391	0.007773	634	0.029220	0.028335	0.031140	2261	0.000422	0.000414	0.000433	90	0.000205	0.000205	0.000205	2
As, Tot	Closure	Jun	6	0.000140	0.000140	0.000140	0	0.000141	0.000141	0.000141	0	0.000180	0.000178	0.000181	23	0.000471	0.000478	0.000507	31	0.000276	0.000282	0.000317	28	0.005917	0.006249	0.007590	622	0.033730	0.032212	0.034360	2584	0.000198	0.000197	0.000199	13	0.000200	0.000200	0.000200	0
As, Tot	Closure	Jul	6	0.000180	0.000180	0.000180	0	0.000181	0.000181	0.000181	0	0.000211	0.000209	0.000211	14	0.000552	0.000558	0.000580	19	0.000243	0.000244	0.000251	16	0.006174	0.006505	0.007898	633	0.023455	0.022325	0.023640	2133	0.000215	0.000214	0.000215	10	0.000219	0.000219	0.000219	0
As, Tot	Closure	Aug	6	0.000180	0.000180	0.000180	0	0.000181	0.000181	0.000181	0	0.000226	0.000224	0.000226	21	0.000577	0.000583	0.000611	23	0.000241	0.000241	0.000244	13	0.006322	0.006644	0.008062	635	0.026445	0.025127	0.026540	2413	0.000227	0.000225	0.000227	16	0.000220	0.000220	0.000220	0
As, Tot	Closure	Sep	6	0.000230	0.000230	0.000230	0	0.000231	0.000231	0.000231	0	0.000294	0.000290	0.000294	23	0.000575	0.000584	0.000628	41	0.000261	0.000261	0.000264	15	0.006217	0.006517	0.007899	625	0.031240	0.029680	0.031350	2598	0.000292	0.000290	0.000293	17	0.000259	0.000259	0.000259	0
As, Tot	Closure	Oct	6	0.000230	0.000230	0.000230	0	0.000231	0.000231	0.000231	0	0.000335	0.000329	0.000335	39	0.000641	0.000653	0.000713	56	0.000288	0.000287	0.000292	19	0.006094	0.006372	0.007720	624	0.047660	0.045205	0.047870	4010	0.000320	0.000316	0.000321	25	0.000260	0.000260	0.000260	0
As, Tot	Closure	Nov	6	0.000150	0.000150	0.000150	0	0.000151	0.000151	0.000151	0	0.000194	0.000190	0.000194	23	0.000680	0.000692	0.000751	53	0.000301	0.000300	0.000307	22	0.006100	0.006362	0.007713	632	0.041430	0.038630	0.041580	2659	0.000227	0.000225	0.000227	11	0.000347	0.000347	0.000347	-1
As, Tot	Closure	Dec	6	0.000150	0.000150	0.000150	0	0.000150	0.000150	0.000150	0	0.000151	0.000151	0.000151	1	0.000640	0.000649	0.000699	45	0.000297	0.000297	0.000305	22	0.006173	0.006428	0.007793	640	0.001408	0.001408	0.001408	1	0.000197	0.000197	0.000197	0	0.000350	0.000350	0.000350	0
As, Tot	Post-Closure	Jan	109	0.000150	0.000150	0.000150	0	0.000150	0.000150	0.000151	0	0.000477	0.000447	0.000560	198	0.000550	0.000553	0.000661	24	0.000374	0.000367	0.000403	51	0.004277	0.004372	0.007842	413	0.018780	0.017244	0.023500	1132	0.000425	0.000403	0.000485	117	0.000350	0.000365	0.000401	4
As, Tot	Post-Closure	Feb	109	0.000151	0.000151	0.000151	0	0.000151	0.000151	0.000151	0	0.000639	0.000596	0.000762	297	0.000540	0.000543	0.000641	23	0.000384	0.000375	0.000415	54	0.004321	0.004415	0.007847	417	0.019100	0.017615	0.023910	1158	0.000570	0.000536	0.000670	205	0.000350	0.000365	0.000401	4
As, Tot	Post-Closure	Mar	109	0.000151	0.000151	0.000151	0	0.000151	0.000151	0.000151	1	0.002280	0.002101	0.002843	1300	0.000539	0.000541	0.000635	22	0.000430	0.000417	0.000472	72	0.004402	0.004494	0.007892	425	0.020310	0.018768	0.025440	1241	0.001978	0.001826	0.002457	965	0.000350	0.000365	0.000401	4
As, Tot	Post-Closure	Apr	109	0.000158	0.000189	0.000248	20	0.000169	0.000198	0.000254	20	0.003476	0.003288	0.004309	1631	0.000548	0.000550	0.000647	24	0.000488	0.000471	0.000544	94	0.004501	0.004592	0.007951	435	0.024930	0.031808	0.078450	2172	0.002932	0.002776	0.003623	1275	0.000350	0.000354	0.000364	1
As, Tot	Post-Closure	May	109	0.000147	0.000158	0.000182	7	0.000156	0.000165	0.000184	5	0.001261	0.001200	0.001529	473	0.000531	0.000535	0.000671	40	0.000507	0.000490	0.000569	103	0.004339	0.004424	0.007531	425	0.017030	0.017524	0.021070	1360	0.000846	0.000810	0.001004	271	0.000205	0.000205	0.000207	3
As, Tot	Post-Closure	Jun	109	0.000140	0.000141	0.000143	1	0.000141	0.000142	0.000144	1	0.000258	0.000252	0.000286	74	0.000434	0.000436	0.000499	20	0.000390	0.000380	0.000429	72	0.004233	0.004312	0.007205	413	0.020730	0.021162	0.024650	1664	0.000252	0.000248	0.000271	42	0.000200	0.000201	0.000202	0
As, Tot	Post-Closure	Jul	109	0.000180	0.000181	0.000182	0	0.000181	0.000181	0.000183	0	0.000293	0.000286	0.000319	55	0.000523	0.000524	0.000571	12	0.000306	0.000300	0.000328	43	0.004392	0.004471	0.007351	419	0.018710	0.019167	0.023170	1817	0.000279	0.000274	0.000299	41	0.000219	0.000220	0.000221	0
As, Tot	Post-Closure	Aug	109	0.000180	0.000181	0.000184	1	0.000181	0.000182	0.000184	1	0.000324	0.000315	0.000356	70	0.000540	0.000541	0.000597	15	0.000301	0.000296	0.000321	39	0.004478	0.004555	0.007361	417	0.019140	0.019803	0.023660	1880	0.000304	0.000297	0.000329	53	0.000220	0.000220	0.000222	0
As, Tot	Post-Closure	Sep	109	0.000230	0.000232	0.000235	1	0.000231	0.000232	0.000235	1	0.000446	0.000433	0.000496	84	0.000517	0.000520	0.000602	26	0.000327	0.000321	0.000349	42	0.004389	0.004461	0.007083	409	0.020390	0.020593	0.024210	1772	0.000408	0.000399	0.000446	60	0.000259	0.000259	0.000261	0
As, Tot	Post-Closure	Oct	109	0.000230	0.000233	0.000237	1	0.000231	0.000233	0.000238	1	0.000519	0.000503	0.000586	113	0.000561	0.000564	0.000672	35	0.000362	0.000356	0.000389	47	0.004279	0.004346	0.006798	406	0.022330	0.023653	0.032070	2050	0.000447	0.000436	0.000492	72	0.000260	0.000261	0.000263	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
As, Tot	Post-Closure	Nov	109	0.000150	0.000151	0.000153	0	0.000151	0.000152	0.000153	0	0.000352	0.000338	0.000402	120	0.000598	0.000601	0.000705	33	0.000377	0.000370	0.000405	51	0.004244	0.004308	*0.006669*	407	*0.022380*	*0.023065*	*0.027650*	1547	0.000325	0.000317	0.000356	57	0.000347	0.000358	0.000385	2
As, Tot	Post-Closure	Dec	109	0.000150	0.000150	0.000150	0	0.000150	0.000150	0.000150	0	0.000336	0.000320	0.000383	114	0.000570	0.000572	0.000657	28	0.000373	0.000366	0.000401	50	0.004252	0.004315	*0.006631*	408	*0.019060*	*0.017647*	*0.023840*	1160	0.000316	0.000306	0.000347	56	0.000350	0.000365	0.000401	4
Ba, Tot	Construction	Jan	2	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0161	0	0.0160	0.0160	0.0161	0	0.0178	0.0178	0.0178	0	0.0098	0.0098	0.0098	0	0.0120	0.0120	0.0125	1	0.0810	0.0810	0.0810	0	0.0147	0.0147	0.0147	0	0.0190	0.0190	0.0190	0
Ba, Tot	Construction	Feb	2	0.0160	0.0160	0.0160	0	0.0162	0.0162	0.0164	1	0.0162	0.0162	0.0164	1	0.0178	0.0178	0.0178	0	0.0102	0.0102	0.0103	0	0.0122	0.0122	0.0126	1	0.0810	0.0810	0.0810	0	0.0152	0.0152	0.0153	1	0.0190	0.0190	0.0190	0
Ba, Tot	Construction	Mar	2	0.0160	0.0160	0.0160	0	0.0173	0.0173	0.0175	8	0.0173	0.0173	0.0175	8	0.0178	0.0178	0.0179	0	0.0106	0.0106	0.0106	0	0.0123	0.0123	0.0128	1	0.0810	0.0810	0.0810	0	0.0163	0.0163	0.0165	8	0.0190	0.0190	0.0190	0
Ba, Tot	Construction	Apr	2	0.0161	0.0161	0.0161	0	0.0183	0.0183	0.0186	15	0.0186	0.0186	0.0189	8	0.0178	0.0178	0.0178	0	0.0108	0.0108	0.0108	1	0.0125	0.0125	0.0129	1	0.0810	0.0810	0.0810	0	0.0173	0.0173	0.0176	9	0.0190	0.0190	0.0190	0
Ba, Tot	Construction	May	2	0.0059	0.0059	0.0059	-14	0.0072	0.0072	0.0074	-3	0.0082	0.0082	0.0083	-20	0.0092	0.0092	0.0093	0	0.0105	0.0105	0.0105	0	0.0122	0.0122	0.0126	2	0.0597	0.0597	0.0597	1	0.0084	0.0084	0.0084	-14	0.0049	0.0049	0.0049	11
Ba, Tot	Construction	Jun	2	0.0061	0.0061	0.0061	0	0.0062	0.0062	0.0062	2	0.0063	0.0063	0.0063	0	0.0084	0.0084	0.0084	0	0.0088	0.0088	0.0088	0	0.0121	0.0121	0.0125	3	0.0590	0.0590	0.0590	0	0.0070	0.0070	0.0070	0	0.0044	0.0044	0.0044	0
Ba, Tot	Construction	Jul	2	0.0060	0.0060	0.0060	0	0.0061	0.0061	0.0061	2	0.0062	0.0062	0.0062	0	0.0085	0.0085	0.0085	0	0.0075	0.0075	0.0075	0	0.0125	0.0125	0.0128	3	0.0493	0.0493	0.0493	1	0.0066	0.0066	0.0066	0	0.0067	0.0067	0.0067	-1
Ba, Tot	Construction	Aug	2	0.0060	0.0060	0.0060	0	0.0061	0.0061	0.0062	2	0.0062	0.0062	0.0062	0	0.0085	0.0085	0.0085	0	0.0070	0.0070	0.0071	0	0.0128	0.0128	0.0132	3	0.0490	0.0490	0.0490	0	0.0067	0.0067	0.0067	0	0.0068	0.0068	0.0068	0
Ba, Tot	Construction	Sep	2	0.0059	0.0059	0.0059	0	0.0061	0.0061	0.0061	3	0.0062	0.0062	0.0062	-1	0.0082	0.0082	0.0082	0	0.0070	0.0070	0.0070	0	0.0128	0.0128	0.0131	3	0.0567	0.0567	0.0567	0	0.0069	0.0069	0.0070	0	0.0063	0.0063	0.0063	0
Ba, Tot	Construction	Oct	2	0.0059	0.0059	0.0059	0	0.0060	0.0060	0.0061	2	0.0061	0.0061	0.0062	-1	0.0082	0.0082	0.0082	0	0.0070	0.0070	0.0070	0	0.0125	0.0125	0.0129	4	0.0570	0.0570	0.0570	0	0.0071	0.0071	0.0072	-1	0.0063	0.0063	0.0063	0
Ba, Tot	Construction	Nov	2	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0161	1	0.0161	0.0161	0.0161	1	0.0175	0.0175	0.0175	0	0.0079	0.0079	0.0079	0	0.0125	0.0125	0.0128	4	0.0802	0.0802	0.0802	-1	0.0142	0.0142	0.0142	1	0.0186	0.0186	0.0186	-2
Ba, Tot	Construction	Dec	2	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0161	0	0.0160	0.0160	0.0161	0	0.0178	0.0178	0.0178	0	0.0090	0.0090	0.0091	0	0.0127	0.0127	0.0130	4	0.0810	0.0810	0.0810	0	0.0143	0.0143	0.0143	0	0.0190	0.0190	0.0190	0
Ba, Tot	Operations	Jan	13	0.0160	0.0160	0.0160	0	0.0171	0.0171	0.0179	7	0.0171	0.0171	0.0179	7	0.0181	0.0181	0.0184	2	0.0103	0.0103	0.0107	5	0.0223	0.0216	0.0311	66	0.0810	0.0810	0.0810	0	0.0154	0.0154	0.0160	6	0.0190	0.0190	0.0190	0
Ba, Tot	Operations	Feb	13	0.0160	0.0160	0.0160	0	0.0203	0.0205	0.0234	28	0.0204	0.0205	0.0234	28	0.0181	0.0181	0.0184	2	0.0109	0.0108	0.0113	6	0.0227	0.0219	0.0315	67	0.0810	0.0810	0.0810	0	0.0186	0.0187	0.0211	25	0.0190	0.0190	0.0190	0
Ba, Tot	Operations	Mar	13	0.0160	0.0160	0.0160	0	0.0291	0.0283	0.0345	77	0.0291	0.0283	0.0345	77	0.0182	0.0181	0.0184	1	0.0115	0.0115	0.0121	9	0.0232	0.0224	0.0321	68	0.0810	0.0810	0.0810	0	0.0265	0.0257	0.0310	70	0.0190	0.0190	0.0190	0
Ba, Tot	Operations	Apr	13	0.0161	0.0161	0.0161	0	0.0269	0.0262	0.0322	65	0.0278	0.0270	0.0335	57	0.0182	0.0181	0.0185	2	0.0120	0.0119	0.0127	11	0.0237	0.0228	0.0328	70	0.1780	0.1714	0.2419	112	0.0248	0.0242	0.0295	52	0.0190	0.0190	0.0190	0
Ba, Tot	Operations	May	13	0.0059	0.0059	0.0059	-14	0.0102	0.0100	0.0123	35	0.0112	0.0110	0.0133	7	0.0097	0.0097	0.0101	4	0.0117	0.0116	0.0124	10	0.0230	0.0222	0.0317	71	0.0834	0.0819	0.0963	39	0.0102	0.0101	0.0115	4	0.0049	0.0049	0.0049	11
Ba, Tot	Operations	Jun	13	0.0061	0.0061	0.0061	0	0.0070	0.0070	0.0074	14	0.0071	0.0071	0.0075	12	0.0086	0.0086	0.0088	2	0.0096	0.0096	0.0101	8	0.0227	0.0218	0.0310	72	0.0888	0.0865	0.1034	47	0.0076	0.0076	0.0079	8	0.0044	0.0044	0.0044	0
Ba, Tot	Operations	Jul	13	0.0060	0.0060	0.0060	0	0.0068	0.0068	0.0072	13	0.0069	0.0068	0.0073	11	0.0087	0.0086	0.0088	2	0.0080	0.0080	0.0083	6	0.0235	0.0226	0.0320	74	0.0716	0.0697	0.0813	42	0.0072	0.0072	0.0075	8	0.0067	0.0067	0.0067	-1
Ba, Tot	Operations	Aug	13	0.0060	0.0060	0.0060	0	0.0071	0.0070	0.0075	17	0.0072	0.0071	0.0077	14	0.0087	0.0087	0.0089	2	0.0076	0.0076	0.0079	7	0.0242	0.0231	0.0326	74	0.0748	0.0724	0.0855	48	0.0074	0.0074	0.0078	11	0.0068	0.0068	0.0068	0
Ba, Tot	Operations	Sep	13	0.0059	0.0059	0.0059	0	0.0071	0.0070	0.0076	19	0.0073	0.0072	0.0078	16	0.0085	0.0085	0.0088	3	0.0076	0.0075	0.0079	8	0.0239	0.0229	0.0320	75	0.0864	0.0837	0.0987	47	0.0078	0.0077	0.0081	11	0.0063	0.0063	0.0063	0
Ba, Tot	Operations	Oct	13	0.0059	0.0059	0.0059	0	0.0070	0.0070	0.0076	18	0.0072	0.0072	0.0079	15	0.0087	0.0086	0.0090	4	0.0076	0.0076	0.0079	8	0.0235	0.0225	0.0313	76	0.1038	0.0989	0.1234	74	0.0079	0.0078	0.0083	9	0.0063	0.0063	0.0063	0
Ba, Tot	Operations	Nov	13	0.0160	0.0160	0.0160	0	0.0167	0.0167	0.0173	5	0.0168	0.0168	0.0174	6	0.0180	0.0180	0.0184	3	0.0085	0.0084	0.0088	8	0.0236	0.0225	0.0312	77	0.1354	0.1303	0.1680	61	0.0146	0.0146	0.0150	4	0.0186	0.0186	0.0186	-2
Ba, Tot	Operations	Dec	13	0.0160	0.0160	0.0160	0	0.0167	0.0166	0.0170	4	0.0167	0.0167	0.0170	4	0.0182	0.0182	0.0185	2	0.0096	0.0096	0.0100	6	0.0239	0.0227	0.0316	77	0.0810	0.0810	0.0810	0	0.0147	0.0147	0.0149	3	0.0190	0.0190	0.0190	0
Ba, Tot	Closure	Jan	6	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0161	0	0.0161	0.0161	0.0162	1	0.0184	0.0185	0.0187	4	0.0099	0.0100	0.0106	3	0.0322	0.0339	0.0388	180	0.0810	0.0810	0.0810	0	0.0147	0.0147	0.0147	1	0.0190	0.0190	0.0190	0
Ba, Tot	Closure	Feb	6	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0161	0.0161	0.0161	1	0.0184	0.0185	0.0186	4	0.0104	0.0105	0.0110	3	0.0328	0.0345	0.0395	183	0.0810	0.0810	0.0810	0	0.0151	0.0151	0.0151	1	0.0190	0.0190	0.0190	0
Ba, Tot	Closure	Mar	6	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0162	0.0162	0.0162	1	0.0184	0.0185	0.0186	4	0.0107	0.0108	0.0113	2	0.0335	0.0352	0.0404	187	0.0810	0.0810	0.0810	0	0.0153	0.0153	0.0153	1	0.0190	0.0190	0.0190	0
Ba, Tot	Closure	Apr	6	0.0161	0.0161	0.0161	0	0.0159	0.0159	0.0159	0	0.0191	0.0189	0.0192	10	0.0185	0.0185	0.0187	4	0.0109	0.0110	0.0115	3	0.0344	0.0360	0.0414	192	0.3583	0.3360	0.3590	315	0.0176	0.0174	0.0176	9	0.0190	0.0190	0.0190	0
Ba, Tot	Closure	May	6	0.0059	0.0059	0.0059	-14	0.0061	0.0061	0.0061	-19	0.0080	0.0080	0.0081	-23	0.0102	0.0102	0.0105	11	0.0106	0.0107	0.0111	2	0.0333	0.0349	0.0400	193	0.1268	0.1234	0.1337	109	0.0083	0.0082	0.0083	-16	0.0049	0.0049	0.0049	11
Ba, Tot	Closure	Jun	6	0.0061	0.0061	0.0061	0	0.0061	0.0061	0.0061	0	0.0063	0.0062	0.0063	0	0.0088	0.0089	0.0090	6	0.0089	0.0089	0.0091	1	0.0326	0.0341	0.0391	193	0.1414	0.1356	0.1435	130	0.0070	0.0070	0.0070	0	0.0044	0.0044	0.0044	0
Ba, Tot	Closure	Jul	6	0.0060	0.0060	0.0060	0	0.0060	0.0060	0.0060	0	0.0061	0.0061	0.0061	-1	0.0088	0.0088	0.0089	4	0.0075	0.0075	0.0076	0	0.0339	0.0353	0.0405	196	0.1082	0.1039	0.1088	112	0.0066	0.0066	0.0066	0	0.0067	0.0067	0.0067	-1
Ba, Tot	Closure	Aug	6	0.0060	0.0060	0.0060	0	0.0060	0.0060	0.0060	0	0.0062	0.0062	0.0062	-1	0.0089	0.0089	0.0091	5	0.0071	0.0071	0.0071	0	0.0347	0.0360	0.0414	196	0.1160	0.1109	0.1161	126	0.0066	0.0066	0.0066	0	0.0068	0.0068	0.0068	0
Ba, Tot	Closure	Sep	6	0.0059	0.0059	0.0059	0	0.0059	0.0059	0.0059	0	0.0062	0.0062	0.0062	-1	0.0088	0.0089	0.0090	8	0.0070	0.0070	0.0070	0	0.0341	0.0354	0.0406	194	0.1342	0.1282	0.1343	125	0.0069	0.0069	0.0069	-1	0.0063	0.0063	0.0063	0
Ba, Tot	Closure	Oct	6	0.0059	0.0059	0.0059	0	0.0059	0.0059	0.0059	0	0.0063	0.0063	0.0063	0	0.0091	0.0092	0.0094	12	0.0070	0.0070	0.0071	1	0.0334	0.0346	0.0397	196	0.1784	0.1676	0.1786	194	0.0072	0.0072	0.0072	0	0.0063	0.0063	0.0063	0
Ba, Tot	Closure	Nov	6	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	1	0.0162	0.0161	0.0162	2	0.0184	0.0185	0.0187	6	0.0080	0.0080	0.0080	2	0.0334	0.0346	0.0397	197	0.1718	0.1642	0.1719	103	0.0142	0.0142	0.0142	1	0.0186	0.0186	0.0186	-2
Ba, Tot	Closure	Dec	6	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0161	0.0161	0.0161	0	0.0186	0.0186	0.0188	5	0.0092	0.0092	0.0092	2	0.0338	0.0349	0.0401	197	0.0810	0.0810	0.0810	0	0.0143	0.0143	0.0143	0	0.0190	0.0190	0.0190	0
Ba, Tot	Post-Closure	Jan	109	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0206	0.0199	0.0208	24	0.0193	0.0193	0.0193	8	0.0115	0.0113	0.0116	16	0.0589	0.0584	0.0591	408	0.2792	0.2458	0.2902	204	0.0180	0.0175	0.0182	20	0.0190	0.0190	0.0191	0
Ba, Tot	Post-Closure	Feb	109	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0229	0.0218	0.0231	36	0.0192	0.0192	0.0192	8	0.0121	0.0119	0.0122	16	0.0596	0.0591	0.0597	410	0.2820	0.2485	0.2932	207	0.0206	0.0197	0.0208	31	0.0190	0.0190	0.0191	0
Ba, Tot	Post-Closure	Mar	109	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0453	0.0407	0.0468	155	0.0192	0.0192	0.0192	8	0.0131	0.0128	0.0132	21	0.0607	0.0603	0.0609	416	0.2935	0.2584	0.3052	219	0.0401	0.0362	0.0414	139	0.0190	0.0190	0.0191	0
Ba, Tot	Post-Closure	Apr	109	0.0161	0.0164	0.0171	2	0.0159	0.0162	0.0168	2	0.0567	0.0513	0.0596	198	0.0193	0.0193	0.0193	8	0.0141	0.0136	0.0143	27	0.0622	0.0617	0.0623	424	0.3172	0.3282	0.4999	305	0.0490	0.0445	0.0513	179	0.0190	0.0190	0.0190	0
Ba, Tot	Post-Closure	May	109	0.0059	0.0061	0.0063	-12	0.0061	0.0062	0.0064	-17	0.0209	0.0190	0.0217	85	0.0113	0.0113	0.0113	22	0.0140	0.0135	0.0142	28	0.0598	0.0594	0.0599	421	0.2270	0.2142	0.2340	263	0.0158	0.0148	0.0163	52	0.0049	0.0049	0.0049	11
Ba, Tot	Post-Closure	Jun	109	0.0061	0.0061	0.0061	0	0.0061	0.0061	0.0061	0	0.0077	0.0075	0.0077	19	0.0094	0.0094	0.0094	12	0.0110	0.0107	0.0111	21	0.0582	0.0578	0.0583	418	0.2706	0.2544	0.2791	331	0.0080	0.0078	0.0080	12	0.0044	0.0044	0.0044	0
Ba, Tot	Post-Closure	Jul	109	0.0060	0.0060	0.0060	0	0.0060	0.0060	0.0060	0	0.0075	0.0073	0.0076	19	0.0092	0.0092	0.0092	9	0.0087	0.0085	0.0087	14	0.0604	0.0600	0.0605	423	0.2599	0.2395	0.2684	389	0.0077	0.0075	0.0078	14	0.0067	0.0067	0.0067	-1
Ba, Tot	Post-Closure	Aug	109	0.0060	0.0060	0.0060	0	0.0060	0.0060	0.0060	0	0.0079	0.0077	0.0080	24	0.0095	0.0094	0.0095	11	0.0081	0.0080	0.0082	13	0.0616	0.0612	0.0617	422	0.2637	0.2446	0.2723	399	0.0080	0.0078	0.0081	17	0.0068	0.0068	0.0068	0
Ba, Tot	Post-Closure	Sep	109	0.0059	0.0059	0.0060	0	0.0059	0.0059	0.0060	0	0.0089	0.0085	0.0090	36	0.0097	0.0096	0.0097	18	0.0082	0.0080	0.0083	16	0.0603	0.0599	0.0604	416	0.2719	0.2547	0.2808	347	0.0089	0.0087	0.0091	25	0.0063	0.0063	0.0063	0
Ba, Tot	Post-Closure	Oct	109	0.0059	0.0059	0.0060	0	0.0059	0.0059	0.0060	0	0.0098	0.0093	0.0100	49	0.0102	0.0102	0.0102	25	0.0085	0.0083	0.0086	19	0.0588	0.0584	0.0589	416	0.2927	0.2793	0.3023	390	0.0096	0.0093	0.0098	29	0.0063	0.0063	0.0063	0
Ba, Tot	Post-Closure	Nov	109	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	1	0.0187	0.0183	0.0189	15	0.0195	0.0195	0.0196	12	0.0096	0.0093	0.0096	19	0.0583	0.0580	0.0585	414	0.3087	0.2850	0.3207	252	0.0158	0.0156	0.0159	11	0.0186	0.0186	0.0186	-2
Ba, Tot	Post-Closure	Dec	109	0.0160	0.0160	0.0160	0	0.0160	0.0160	0.0160	0	0.0187	0.0183	0.0188	14	0.0195	0.0195	0.0195	10	0.0107	0.0105	0.0108	17	0.0585	0.0582	0.0587	411	0.2859	0.2531	0.2968	212	0.0160	0.0157	0.0160	10	0.0190	0.0190	0.0191	0
B, Tot	Construction	Jan	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	3	0.0051	0.0051	0.0051	3	0.0273	0.0273	0.0273	0	0.0066	0.0066	0.0066	0	0.0076	0.0076	0.0077	0	0.0230	0.0230	0.0230	0	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0
B, Tot	Construction	Feb	2	0.0050	0.0050	0.0050	0	0.0052	0.0052	0.0053	4	0.0052	0.0052	0.0053	4	0.0274	0.0274	0.0274	0	0.0070	0.0070	0.0070	0	0.0076	0.0076	0.0077	0	0.0230	0.0230	0.0230	0	0.0052	0.0052	0.0052	3	0.0050	0.0050	0.0050	0
B, Tot	Construction	Mar	2	0.0050	0.0050	0.0050	0	0.0057	0.0057	0.0058	14	0.0057	0.0057	0.0058	14	0.0274	0.0274	0.0274	0	0.0073	0.0073	0.0073	0	0.0076	0.0076	0.0077	0	0.0230	0.0230	0.0230	0	0.0056	0.0056	0.0057	12	0.0050	0.0050	0.0050	0
B, Tot	Construction	Apr	2	0.0050	0.0050	0.0050	0	0.0070	0.0070	0.0071	21	0.0071	0.0071	0.0072	18	0.0274	0.0274	0.0274	0	0.0076	0.0076	0.0076	1	0.0076	0.0076	0.0077	0	0.0230	0.0230	0.0230	0	0.0067	0.0067	0.0068	18	0.0050	0.0050	0.0050	0
B, Tot	Construction	May	2	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0053	4	0.0053	0.0053	0.0053	2	0.0069	0.0069	0.0069	0	0.0074	0.0074	0.0074	1	0.0075	0.0075	0.0076	0	0.0056	0.0056	0.0056	12	0.0052	0.0052	0.0052	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Jun	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0062	0.0062	0.0062	1	0.0074	0.0074	0.0075	1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Jul	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0054	0	0.0076	0.0076	0.0077	1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Aug	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	1	0.0051	0.0051	0.0051	0	0.0052	0.0052	0.0052	0	0.0077	0.0077	0.0078	1	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Sep	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	1	0.0051	0.0051	0.0051	0	0.0051	0.0051	0.0052	0	0.0076	0.0076	0.0077	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Oct	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	0	0.0051	0.0051	0.0051	0	0.0075	0.0075	0.0076	2	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Construction	Nov	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0051	0.0051	0.0051	1	0.0265	0.0265	0.0265	1	0.0054	0.0054	0.0054	0	0.0076	0.0076	0.0077	2	0.0224	0.0224	0.0224	-3	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Construction	Dec	2	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	2	0.0051	0.0051	0.0051	2	0.0272	0.0272	0.0272	0	0.0061	0.0061	0.0061	0	0.0077	0.0077	0.0078	1	0.0230	0.0230	0.0230	0	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Operations	Jan	13	0.0050	0.0050	0.0050	0	0.0055	0.0055	0.0059	10	0.0055	0.0055	0.0059	10	0.0275	0.0275	0.0276	1	0.0068	0.0068	0.0070	3	0.0121	0.0118	0.0165	50	0.0230	0.0230	0.0230	0	0.0054	0.0054	0.0057	7	0.0050	0.0050	0.0050	0
B, Tot	Operations	Feb	13	0.0050	0.0050	0.0050	0	0.0068	0.0070	0.0084	39	0.0069	0.0070	0.0084	39	0.0275	0.0275	0.0277	1	0.0072	0.0072	0.0074	4	0.0123	0.0119	0.0167	51	0.0230	0.0230	0.0230	0	0.0065	0.0066	0.0077	32	0.0050	0.0050	0.0050	0
B, Tot	Operations	Mar	13	0.0050	0.0050	0.0050	0	0.0105	0.0102	0.0132	104	0.0105	0.0102	0.0132	104	0.0276	0.0275	0.0277	0	0.0077	0.0076	0.0079	5	0.0125	0.0121	0.0169	53	0.0230	0.0230	0.0230	0	0.0097	0.0094	0.0120	89	0.0050	0.0050	0.0050	0
B, Tot	Operations	Apr	13	0.0050	0.0050	0.0050	0	0.0106	0.0103	0.0133	79	0.0111	0.0108	0.0140	80	0.0275	0.0275	0.0277	0	0.0080	0.0080	0.0084	7	0.0127	0.0123	0.0172	55	0.0864	0.0809	0.1182	252	0.0100	0.0098	0.0124	71	0.0050	0.0050	0.0050	0
B, Tot	Operations	May	13	0.0050	0.0050	0.0050	0	0.0067	0.0067	0.0078	31	0.0068	0.0067	0.0079	29	0.0071	0.0071	0.0073	2	0.0079	0.0079	0.0082	7	0.0124	0.0120	0.0167	56	0.0219	0.0205	0.0283	310	0.0061	0.0061	0.0068	17	0.0050	0.0050	0.0050	0
B, Tot	Operations	Jun	13	0.0050	0.0050	0.0050	0	0.0054	0.0053	0.0056	7	0.0054	0.0054	0.0056	7	0.0052	0.0052	0.0053	2	0.0065	0.0065	0.0068	6	0.0122	0.0118	0.0164	56	0.0248	0.0230	0.0321	359	0.0053	0.0053	0.0054	5	0.0050	0.0050	0.0050	0
B, Tot	Operations	Jul	13	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0055	6	0.0053	0.0053	0.0055	6	0.0051	0.0051	0.0052	1	0.0056	0.0056	0.0058	4	0.0126	0.0122	0.0169	57	0.0189	0.0175	0.0237	251	0.0053	0.0053	0.0054	5	0.0050	0.0050	0.0050	0
B, Tot	Operations	Aug	13	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0057	8	0.0055	0.0054	0.0057	9	0.0052	0.0052	0.0053	1	0.0055	0.0054	0.0056	5	0.0129	0.0124	0.0171	59	0.0210	0.0193	0.0263	287	0.0054	0.0053	0.0055	7	0.0050	0.0050	0.0050	0
B, Tot	Operations	Sep	13	0.0050	0.0050	0.0050	0	0.0055	0.0055	0.0058	9	0.0055	0.0055	0.0058	10	0.0053	0.0052	0.0054	2	0.0054	0.0054	0.0056	5	0.0128	0.0123	0.0168	59	0.0241	0.0221	0.0302	342	0.0054	0.0054	0.0056	8	0.0050	0.0050	0.0050	0
B, Tot	Operations	Oct	13	0.0050	0.0050	0.0050	0	0.0055	0.0055	0.0058	9	0.0055	0.0055	0.0059	10	0.0053	0.0053	0.0055	3	0.0054	0.0054	0.0055	6	0.0126	0.0121	0.0165	60	0.0353	0.0318	0.0450	536	0.0054	0.0054	0.0056	7	0.0050	0.0050	0.0050	0
B, Tot	Operations	Nov	13	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0056	7	0.0054	0.0054	0.0057	7	0.0268	0.0267	0.0269	1	0.0057	0.0057	0.0059	5	0.0127	0.0122	0.0165	59	0.0558	0.0524	0.0721	128	0.0052	0.0053	0.0054	4	0.0050	0.0050	0.0050	0
B, Tot	Operations	Dec	13	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0055	6	0.0053	0.0053	0.0055	6	0.0274	0.0274	0.0276	1	0.0063	0.0063	0.0065	4	0.0129	0.0124	0.0168	59	0.0230	0.0230	0.0230	0	0.0052	0.0052	0.0053	4	0.0050	0.0050	0.0050	0
B, Tot	Closure	Jan	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0051	1	0.0277	0.0277	0.0278	2	0.0067	0.0067	0.0070	2	0.0173	0.0181	0.0207	140	0.0230	0.0230	0.0230	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Feb	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0277	0.0277	0.0278	1	0.0070	0.0071	0.0073	2	0.0175	0.0184	0.0210	143	0.0230	0.0230	0.0230	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Closure	Mar	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0277	0.0277	0.0278	1	0.0073	0.0074	0.0076	2	0.0179	0.0187	0.0214	147	0.0230	0.0230	0.0230	0	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Apr	6	0.0050	0.0050	0.0050	0	0.0058	0.0058	0.0059	1	0.0075	0.0074	0.0075	23	0.0277	0.0277	0.0278	1	0.0076	0.0077	0.0079	2	0.0183	0.0190	0.0218	152	0.1786	0.1670	0.1788	626	0.0070	0.0070	0.0070	21	0.0050	0.0050	0.0050	0
B, Tot	Closure	May	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	-2	0.0055	0.0055	0.0056	6	0.0074	0.0074	0.0075	7	0.0075	0.0075	0.0077	2	0.0177	0.0185	0.0212	152	0.0445	0.0427	0.0479	753	0.0053	0.0053	0.0053	2	0.0050	0.0050	0.0050	0
B, Tot	Closure	Jun	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0053	0.0053	0.0053	4	0.0063	0.0063	0.0063	2	0.0174	0.0181	0.0207	151	0.0522	0.0491	0.0532	882	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Jul	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	1	0.0052	0.0052	0.0053	3	0.0054	0.0054	0.0055	1	0.0181	0.0187	0.0214	154	0.0377	0.0355	0.0381	610	0.0050	0.0050	0.0050	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Aug	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0053	0.0053	0.0053	4	0.0052	0.0052	0.0053	1	0.0184	0.0191	0.0218	156	0.0422	0.0395	0.0423	691	0.0051	0.0050	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Sep	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	2	0.0054	0.0054	0.0055	6	0.0052	0.0052	0.0052	1	0.0181	0.0188	0.0215	155	0.0489	0.0458	0.0490	816	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Oct	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0052	0.0051	0.0052	3	0.0056	0.0056	0.0057	9	0.0051	0.0051	0.0052	2	0.0178	0.0184	0.0210	155	0.0740	0.0684	0.0741	1268	0.0051	0.0051	0.0051	2	0.0050	0.0050	0.0050	0
B, Tot	Closure	Nov	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0051	0.0051	0.0051	1	0.0270	0.0270	0.0271	3	0.0055	0.0055	0.0055	2	0.0179	0.0184	0.0211	153	0.0735	0.0696	0.0735	203	0.0051	0.0051	0.0051	1	0.0050	0.0050	0.0050	0
B, Tot	Closure	Dec	6	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0276	0.0277	0.0278	2	0.0062	0.0062	0.0062	1	0.0181	0.0187	0.0214	151	0.0230	0.0230	0.0230	0	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Jan	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0060	0.0059	0.0061	18	0.0277	0.0277	0.0278	1	0.0069	0.0069	0.0070	5	0.0168	0.0169	0.0215	130	0.0620	0.0579	0.0701	152	0.0057	0.0056	0.0058	13	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Feb	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0065	0.0063	0.0067	26	0.0277	0.0277	0.0278	1	0.0073	0.0073	0.0074	5	0.0169	0.0170	0.0216	131	0.0626	0.0584	0.0707	154	0.0062	0.0061	0.0064	21	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Mar	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0113	0.0106	0.0123	113	0.0277	0.0277	0.0278	1	0.0078	0.0077	0.0079	7	0.0171	0.0172	0.0217	134	0.0650	0.0606	0.0735	163	0.0104	0.0098	0.0112	96	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Apr	109	0.0050	0.0051	0.0052	1	0.0058	0.0059	0.0060	2	0.0146	0.0138	0.0159	128	0.0277	0.0277	0.0278	1	0.0082	0.0082	0.0083	8	0.0173	0.0175	0.0219	137	0.0705	0.0762	0.1184	231	0.0130	0.0123	0.0141	114	0.0050	0.0050	0.0050	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
B, Tot	Post-Closure	May	109	0.0050	0.0050	0.0051	0	0.0050	0.0050	0.0051	-2	0.0079	0.0076	0.0083	47	0.0073	0.0073	0.0075	6	0.0081	0.0080	0.0082	9	0.0168	0.0169	0.0210	136	0.0472	0.0460	0.0530	819	0.0067	0.0066	0.0070	27	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Jun	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0054	6	0.0052	0.0052	0.0053	4	0.0066	0.0066	0.0067	7	0.0164	0.0165	0.0204	134	0.0581	0.0565	0.0654	1031	0.0052	0.0052	0.0052	4	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Jul	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0053	0.0053	0.0053	6	0.0052	0.0052	0.0053	3	0.0057	0.0056	0.0057	5	0.0170	0.0170	0.0209	136	0.0560	0.0535	0.0631	969	0.0052	0.0052	0.0053	4	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Aug	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0054	0.0054	0.0054	7	0.0052	0.0052	0.0053	4	0.0054	0.0054	0.0055	4	0.0172	0.0173	0.0211	137	0.0569	0.0546	0.0640	991	0.0053	0.0053	0.0053	6	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Sep	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0056	0.0055	0.0057	11	0.0054	0.0054	0.0055	6	0.0054	0.0054	0.0054	5	0.0169	0.0170	0.0205	136	0.0586	0.0568	0.0661	1035	0.0055	0.0054	0.0055	8	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Oct	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0058	0.0057	0.0059	14	0.0055	0.0055	0.0057	8	0.0054	0.0054	0.0054	6	0.0165	0.0166	0.0199	136	0.0635	0.0628	0.0715	1157	0.0055	0.0055	0.0056	10	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Nov	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0056	0.0056	0.0057	10	0.0269	0.0269	0.0271	2	0.0058	0.0058	0.0058	6	0.0165	0.0166	0.0198	132	0.0683	0.0666	0.0774	190	0.0054	0.0054	0.0054	6	0.0050	0.0050	0.0050	0
B, Tot	Post-Closure	Dec	109	0.0050	0.0050	0.0050	0	0.0050	0.0050	0.0050	0	0.0056	0.0055	0.0057	10	0.0276	0.0276	0.0277	2	0.0064	0.0064	0.0065	6	0.0167	0.0167	0.0198	129	0.0635	0.0595	0.0717	159	0.0054	0.0053	0.0054	7	0.0050	0.0050	0.0050	0
Cd, Diss	Construction	Jan	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Feb	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Mar	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000007	21	0.000006	0.000006	0.000007	21	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	11	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Apr	2	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	37	0.000007	0.000007	0.000007	35	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000009	0.000009	0.000010	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	19	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	May	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	16	0.000006	0.000006	0.000006	15	0.000005	0.000005	0.000005	-1	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	2	0.000005	0.000005	0.000005	0	0.000015	0.000015	0.000015	7	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Jun	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	1	0.000009	0.000009	0.000009	3	0.000005	0.000005	0.000005	0	0.000012	0.000012	0.000012	0	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Jul	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	1	0.000009	0.000009	0.000010	3	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Aug	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	-1	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000010	3	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0
Cd, Diss	Construction	Sep	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000008	0.000008	0.000008	0	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	2	0.000003	0.000003	0.000003	3
Cd, Diss	Construction	Oct	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000008	0.000008	0.000008	0	0.000007	0.000007	0.000007	1	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	1	0.000003	0.000003	0.000003	0
Cd, Diss	Construction	Nov	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000010	0	0.000005	0.000005	0.000005	-2
Cd, Diss	Construction	Dec	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	0	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Jan	13	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000012	76	0.000009	0.000009	0.000012	76	0.000006	0.000006	0.000007	20	0.000009	0.000009	0.000011	22	0.000044	0.000041	0.000079	330	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000013	33	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Feb	13	0.000005	0.000005	0.000005	0	0.000016	0.000018	0.000029	260	0.000016	0.000018	0.000028	259	0.000006	0.000006	0.000007	19	0.000009	0.000009	0.000011	26	0.000045	0.000042	0.000080	335	0.000005	0.000005	0.000005	0	0.000017	0.000018	0.000026	142	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Mar	13	0.000005	0.000005	0.000005	0	0.000037	0.000037	0.000059	637	0.000037	0.000037	0.000059	635	0.000006	0.000006	0.000007	19	0.000010	0.000010	0.000013	37	0.000046	0.000044	0.000082	343	0.000005	0.000005	0.000005	0	0.000034	0.000034	0.000053	386	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Apr	13	0.000005	0.000005	0.000005	0	0.000037	0.000036	0.000060	624	0.000041	0.000040	0.000065	692	0.000006	0.000006	0.000007	21	0.000011	0.000011	0.000014	47	0.000048	0.000045	0.000085	353	0.000554	0.000502	0.000818	9945	0.000037	0.000035	0.000057	397	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	May	13	0.000005	0.000005	0.000005	0	0.000017	0.000017	0.000026	243	0.000018	0.000017	0.000027	250	0.000007	0.000007	0.000008	29	0.000012	0.000012	0.000015	45	0.000047	0.000044	0.000082	354	0.000124	0.000114	0.000178	2190	0.000022	0.000022	0.000028	58	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Jun	13	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000009	48	0.000008	0.000008	0.000009	51	0.000006	0.000006	0.000007	14	0.000013	0.000013	0.000015	24	0.000046	0.000043	0.000080	355	0.000148	0.000136	0.000209	2612	0.000014	0.000014	0.000015	14	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Jul	13	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000009	44	0.000007	0.000007	0.000009	46	0.000006	0.000006	0.000006	11	0.000011	0.000011	0.000012	18	0.000049	0.000045	0.000083	363	0.000106	0.000097	0.000146	1832	0.000008	0.000008	0.000010	27	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Aug	13	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000010	57	0.000008	0.000008	0.000010	60	0.000006	0.000006	0.000007	14	0.000010	0.000010	0.000011	22	0.000050	0.000046	0.000084	369	0.000121	0.000110	0.000166	2100	0.000009	0.000009	0.000011	36	0.000005	0.000005	0.000005	0
Cd, Diss	Operations	Sep	13	0.000005	0.000005	0.000005	0	0.000009	0.000008	0.000011	66	0.000009	0.000009	0.000011	71	0.000009	0.000009	0.000010	14	0.000009	0.000009	0.000011	26	0.000050	0.000046	0.000082	371	0.000144	0.000130	0.000195	2507	0.000010	0.000010	0.000011	40	0.000003	0.000003	0.000003	3
Cd, Diss	Operations	Oct	13	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000011	69	0.000009	0.000009	0.000012	77	0.000010	0.000010	0.000011	20	0.000009	0.000009	0.000011	28	0.000049	0.000045	0.000080	375	0.000226	0.000201	0.000307	3925	0.000010	0.000010	0.000012	36	0.000003	0.000003	0.000003	0
Cd, Diss	Operations	Nov	13	0.000005	0.000005	0.000005	0	0.000007	0.000008	0.000010	52	0.000008	0.000008	0.000010	56	0.000007	0.000007	0.000008	30	0.000010	0.000010	0.000011	28	0.000049	0.000045	0.000080	380	0.000297	0.000266	0.000431	5220	0.000011	0.000011	0.000013	18	0.000005	0.000005	0.000005	-2
Cd, Diss	Operations	Dec	13	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000009	44	0.000007	0.000007	0.000009	44	0.000007	0.000007	0.000008	26	0.000010	0.000010	0.000011	26	0.000050	0.000046	0.000081	384	0.000005	0.000005	0.000005	2	0.000011	0.000011	0.000012	15	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Jan	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000008	0.000008	51	0.000008	0.000009	0.000011	15	0.000087	0.000093	0.000115	950	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Feb	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000008	0.000008	48	0.000008	0.000009	0.000010	14	0.000089	0.000095	0.000117	965	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Mar	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000008	0.000008	48	0.000008	0.000008	0.000010	14	0.000092	0.000098	0.000121	987	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Apr	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000018	0.000017	0.000018	249	0.000008	0.000008	0.000008	52	0.000008	0.000008	0.000010	16	0.000095	0.000101	0.000125	1013	0.001337	0.001238	0.001340	24665	0.000018	0.000017	0.000018	142	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	May	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	77	0.000009	0.000009	0.000010	74	0.000009	0.000009	0.000011	16	0.000092	0.000098	0.000120	1008	0.000312	0.000297	0.000340	5835	0.000017	0.000017	0.000017	21	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Jun	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	8	0.000007	0.000007	0.000007	36	0.000011	0.000011	0.000012	9	0.000090	0.000095	0.000117	1000	0.000374	0.000349	0.000382	6874	0.000013	0.000013	0.000013	2	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Jul	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	6	0.000006	0.000007	0.000007	29	0.000010	0.000010	0.000010	5	0.000094	0.000099	0.000122	1017	0.000261	0.000243	0.000264	4758	0.000007	0.000007	0.000007	4	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Aug	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	9	0.000007	0.000007	0.000007	35	0.000008	0.000008	0.000008	5	0.000096	0.000102	0.000125	1027	0.000296	0.000275	0.000297	5391	0.000007	0.000007	0.000007	6	0.000005	0.000005	0.000005	0
Cd, Diss	Closure	Sep	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	13	0.000011	0.000011	0.000011	36	0.000008	0.000008	0.000008	6	0.000095	0.000099	0.000122	1021	0.000349	0.000323	0.000350	6363	0.000007	0.000007	0.000007	7	0.000003	0.000003	0.000003	3
Cd, Diss	Closure	Oct	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	21	0.000012	0.000012	0.000013	49	0.000008	0.000008	0.000008	8	0.000093	0.000097	0.000119	1022	0.000545	0.000499	0.000546	9877	0.000008	0.000008	0.000008	10	0.000003	0.000003	0.000003	0
Cd, Diss	Closure	Nov	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000005	0.000006	9	0.000009	0.000009	0.000010	74	0.000008	0.000008	0.000008	10	0.000093	0.000097	0.000119	1032	0.000441	0.000410	0.000442	8094	0.000010	0.000010	0.000010	3	0.000005	0.000005	0.000005	-2
Cd, Diss	Closure	Dec	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	63	0.000008	0.000008	0.000008	10	0.000094	0.000098	0.000121	1041	0.000005	0.000005	0.000005	2	0.000009	0.000009	0.000009	0	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	Jan	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000012	0.000011	0.000012	114	0.000013	0.000013	0.000013	149	0.000011	0.000011	0.000012	47	0.000257	0.000253	0.000258	2915	0.000388	0.000330	0.000411	6500	0.000013	0.000012	0.000013	50	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Feb	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000015	0.000014	0.000016	173	0.000012	0.000012	0.000012	138	0.000012	0.000011	0.000012	50	0.000260	0.000257	0.000261	2925	0.000400	0.000341	0.000424	6729	0.000016	0.000014	0.000016	95	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Mar	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000051	0.000044	0.000054	783	0.000012	0.000012	0.000012	136	0.000012	0.000012	0.000013	62	0.000266	0.000263	0.000267	2965	0.000440	0.000376	0.000466	7427	0.000046	0.000040	0.000048	476	0.000005	0.000005	0.000005	1
Cd, Diss	Post-Closure	Apr	109	0.000005	0.000007	0.000010	34	0.000005	0.000007	0.000010	32	0.000087	0.000080	0.000095	1494	0.000013	0.000013	0.000013	147	0.000014	0.000013	0.000014	80	0.000273	0.000270	0.000274	3023	0.000611	0.000829	0.002471	16482	0.000075	0.000069	0.000082	866	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	May	109	0.000005	0.000006	0.000007	13	0.000005	0.000006	0.000007	11	0.000032	0.000030	0.000035	493	0.000016	0.000016	0.000016	211	0.000015	0.000015	0.000016	81	0.000262	0.000259	0.000263	2980	0.000416	0.000427	0.000644	8450	0.000031	0.000029	0.000032	107	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	Jun	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000008	0.000008	53	0.000010	0.000010	0.000010	103	0.000015	0.000015	0.000015	42	0.000255	0.000252	0.000255	2932	0.000507	0.000525	0.000771	10395	0.000014	0.000014	0.000015	15	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	Jul	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000007	0.000008	49	0.000009	0.000009	0.000009	81	0.000012	0.000012	0.000012	26	0.000265	0.000262	0.000266	2971	0.000462	0.000459	0.000548	9074	0.000009	0.000009	0.000009	29	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	Aug	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000008	0.000009	63	0.000010	0.000010	0.000010	100	0.000010	0.000010	0.000011	27	0.000270	0.000267	0.000271	2988	0.000477	0.000480	0.000606	9510	0.000009	0.000009	0.000010	38	0.000005	0.000005	0.000005	0
Cd, Diss	Post-Closure	Sep	109	0.000005	0.000005	0.000006	2	0.000005	0.000005	0.000005	2	0.000010	0.000010	0.000011	92	0.000016	0.000016	0.000016	101	0.000010	0.000010	0.000010	34	0.000264	0.000261	0.000264	2955	0.000476	0.000492	0.000706	9748	0.000011	0.000010	0.000011	51	0.000003	0.000003	0.000003	3
Cd, Diss	Post-Closure	Oct	109	0.000005	0.000005	0.000006	3	0.000005	0.000005	0.000005	3	0.000012	0.000011	0.000013	124	0.000019	0.000019	0.000019	136	0.000011	0.000010	0.000011	43	0.000257	0.000254	0.000257	2937	0.000523	0.000573	0.001019	11365	0.000012	0.000012	0.000013	57	0.000003	0.000003	0.000003	0
Cd, Diss	Post-Closure	Nov	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000009	0.000009	0.000010	77	0.000016	0.000016	0.000016	205	0.000011	0.000011	0.000012	48	0.000255	0.000252	0.000256	2939	0.000505	0.000501	0.000616	9927	0.000012	0.000012	0.000012	25	0.000005	0.000005	0.000005	-1
Cd, Diss	Post-Closure	Dec	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000009	0.000008	0.000009	65	0.000014	0.000014	0.000014	173	0.000011	0.000011	0.000012	47	0.000255	0.000253	0.000256	2935	0.000390	0.000335	0.000413	6595	0.000012	0.000011	0.000012	22	0.000005	0.000005	0.000005	1
Cd, Tot	Construction	Jan	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000006	0.000006	0.000006	0	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	1	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Feb	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	12	0.000006	0.000006	0.000006	12	0.000006	0.000006	0.000006	0	0.000008	0.000008	0.000008	1	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	6	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Mar	2	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	73	0.000009	0.000009	0.000009	73	0.000006	0.000006	0.000006	0	0.000008	0.000008	0.000008	2	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	43	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Apr	2	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000011	109	0.000010	0.000010	0.000011	106	0.000006	0.000006	0.000006	0	0.000008	0.000008	0.000008	3	0.000009	0.000009	0.000010	1	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000012	60	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	May	2	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	36	0.000008	0.000008	0.000008	35	0.000010	0.000010	0.000010	0	0.000009	0.000009	0.000009	4	0.000009	0.000009	0.000009	2	0.000005	0.000005	0.000005	0	0.000016	0.000016	0.000016	12	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Jun	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000010	0.000010	0.000010	0	0.000011	0.000011	0.000011	2	0.000009	0.000009	0.000009	3	0.000005	0.000005	0.000005	0	0.000013	0.000013	0.000013	1	0.000005	0.000005	0.000005	0
Cd, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	1	0.000009	0.000009	0.000010	3	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	3	0.000017	0.000017	0.000017	-2
Cd, Tot	Construction	Aug	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	-1	0.000009	0.000009	0.000009	2	0.000010	0.000010	0.000010	3	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000008	4	0.000017	0.000017	0.000017	0
Cd, Tot	Construction	Sep	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	9	0.000006	0.000006	0.000006	8	0.000008	0.000008	0.000008	0	0.000008	0.000008	0.000009	3	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000008	5	0.000003	0.000003	0.000003	19
Cd, Tot	Construction	Oct	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	7	0.000005	0.000005	0.000005	7	0.000008	0.000008	0.000008	0	0.000008	0.000008	0.000008	3	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	3	0.000003	0.000003	0.000003	0
Cd, Tot	Construction	Nov	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000006	0.000006	0.000006	0	0.000008	0.000008	0.000008	2	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000010	1	0.000005	0.000005	0.000005	-2
Cd, Tot	Construction	Dec	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000006	0.000006	0.000006	0	0.000008	0.000008	0.000008	2	0.000009	0.000009	0.000010	4	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000009	1	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Jan	13	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000012	80	0.000009	0.000009	0.000012	80	0.000007	0.000007	0.000008	18	0.000010	0.000010	0.000011	22	0.000044	0.000041	0.000079	329	0.000005	0.000005	0.000005	0	0.000011	0.000011	0.000013	35	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Feb	13	0.000005	0.000005	0.000005	0	0.000017	0.000018	0.000029	270	0.000017	0.000018	0.000029	269	0.000007	0.000007	0.000008	17	0.000010	0.000010	0.000012	25	0.000045	0.000042	0.000080	334	0.000005	0.000005	0.000005	0	0.000017	0.000018	0.000027	148	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Mar	13	0.000005	0.000005	0.000005	0	0.000038	0.000038	0.000060	656	0.000038	0.000038	0.000060	654	0.000007	0.000007	0.000008	17	0.000011	0.000011	0.000013	36	0.000046	0.000044	0.000082	342	0.000005	0.000005	0.000005	0	0.000035	0.000035	0.000053	398	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Apr	13	0.000005	0.000005	0.000005	0	0.000038	0.000037	0.000061	642	0.000042	0.000041	0.000066	709	0.000007	0.000007	0.000008	19	0.000011	0.000011	0.000014	46	0.000048	0.000045	0.000085	351	0.000543	0.000493	0.000807	9765	0.000038	0.000036	0.000057	408	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	May	13	0.000005	0.000005	0.000005	0	0.000018	0.000018	0.000027	219	0.000019	0.000019	0.000028	233	0.000011	0.000011	0.000013	16	0.000012	0.000012	0.000015	43	0.000047	0.000044	0.000082	353	0.000121	0.000112	0.000176	2146	0.000023	0.000023	0.000029	59	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Jun	13	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	49	0.000008	0.000008	0.000009	52	0.000011	0.000011	0.000012	7	0.000014	0.000014	0.000016	23	0.000046	0.000043	0.000080	354	0.000146	0.000133	0.000206	2565	0.000014	0.000014	0.000016	14	0.000005	0.000005	0.000005	0
Cd, Tot	Operations	Jul	13	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000009	44	0.000007	0.000007	0.000009	46	0.000006	0.000006	0.000006	11	0.000012	0.000012	0.000013	17	0.000049	0.000045	0.000083	361	0.000104	0.000095	0.000144	1801	0.000009	0.000009	0.000010	25	0.000017	0.000017	0.000017	-2
Cd, Tot	Operations	Aug	13	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000010	58	0.000008	0.000008	0.000010	61	0.000006	0.000006	0.000007	14	0.000010	0.000010	0.000012	21	0.000050	0.000046	0.000084	368	0.000119	0.000108	0.000164	2065	0.000010	0.000010	0.000011	34	0.000017	0.000017	0.000017	0
Cd, Tot	Operations	Sep	13	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000011	68	0.000009	0.000009	0.000011	73	0.000010	0.000009	0.000011	14	0.000010	0.000010	0.000012	24	0.000050	0.000046	0.000082	370	0.000142	0.000128	0.000193	2465	0.000010	0.000010	0.000012	39	0.000003	0.000003	0.000003	19
Cd, Tot	Operations	Oct	13	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000011	71	0.000009	0.000009	0.000012	79	0.000010	0.000010	0.000012	19	0.000010	0.000010	0.000012	26	0.000049	0.000045	0.000080	374	0.000222	0.000198	0.000303	3858	0.000011	0.000011	0.000012	35	0.000003	0.000003	0.000003	0
Cd, Tot	Operations	Nov	13	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000010	53	0.000008	0.000008	0.000010	57	0.000008	0.000007	0.000009	27	0.000010	0.000010	0.000012	26	0.000049	0.000045	0.000080	379	0.000294	0.000263	0.000428	5163	0.000011	0.000011	0.000013	19	0.000005	0.000005	0.000005	-2
Cd, Tot	Operations	Dec	13	0.000005	0.000005	0.000005	0	0.000008	0.000007	0.000009	46	0.000008	0.000007	0.000009	46	0.000007	0.000007	0.000008	23	0.000010	0.000010	0.000012	25	0.000050	0.000046	0.000081	382	0.000005	0.000005	0.000005	2	0.000011	0.000011	0.000012	16	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Jan	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000008	0.000009	46	0.000009	0.000009	0.000011	14	0.000087	0.000093	0.000115	946	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000008	0	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Feb	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	43	0.000009	0.000009	0.000011	14	0.000089	0.000095	0.000117	961	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Mar	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	43	0.000009	0.000009	0.000011	13	0.000092	0.000098	0.000121	982	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	0	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Apr	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000018	0.000017	0.000018	246	0.000008	0.000008	0.000009	47	0.000009	0.000009	0.000011	15	0.000095	0.000101	0.000125	1008	0.001327	0.001229	0.001331	24471	0.000018	0.000017	0.000018	140	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	May	6	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	0	0.000010	0.000009	0.000010	70	0.000013	0.000014	0.000014	41	0.000010	0.000010	0.000011	15	0.000092	0.000098	0.000120	1004	0.000310	0.000294	0.000338	5786	0.000018	0.000018	0.000018	21	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Jun	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	8	0.000012	0.000012	0.000012	19	0.000012	0.000012	0.000012	8	0.000090	0.000095	0.000117	996	0.000371	0.000346	0.000380	6820	0.000013	0.000013	0.000013	2	0.000005	0.000005	0.000005	0
Cd, Tot	Closure	Jul	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	6	0.000006	0.000007	0.000007	28	0.000010	0.000010	0.000011	5	0.000094	0.000099	0.000122	1013	0.000260	0.000241	0.000262	4723	0.000008	0.000008	0.000008	3	0.000017	0.000017	0.000017	-2
Cd, Tot	Closure	Aug	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	9	0.000007	0.000007	0.000007	35	0.000009	0.000009	0.000009	4	0.000096	0.000102	0.000125	1023	0.000294	0.000273	0.000295	5351	0.000008	0.000008	0.000008	5	0.000017	0.000017	0.000017	0
Cd, Tot	Closure	Sep	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	13	0.000011	0.000011	0.000012	34	0.000009	0.000009	0.000009	6	0.000095	0.000099	0.000122	1018	0.000346	0.000321	0.000347	6315	0.000008	0.000008	0.000008	7	0.000003	0.000003	0.000003	19
Cd, Tot	Closure	Oct	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	21	0.000012	0.000012	0.000013	47	0.000009	0.000009	0.000009	8	0.000093	0.000097	0.000119	1019	0.000541	0.000495	0.000542	9801	0.000009	0.000009	0.000009	9	0.000003	0.000003	0.000003	0

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cd, Tot	Closure	Nov	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000005	0.000006	9	0.000010	0.000010	0.000011	67	0.000009	0.000009	0.000009	9	0.000093	0.000097	0.000119	1028	0.000438	0.000407	0.000439	8036	0.000010	0.000010	0.000010	3	0.000005	0.000005	0.000005	-2
Cd, Tot	Closure	Dec	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000009	0.000009	0.000010	57	0.000009	0.000009	0.000009	9	0.000094	0.000098	0.000121	1037	0.000005	0.000005	0.000005	2	0.000009	0.000009	0.000009	0	0.000005	0.000005	0.000005	0
Cd, Tot	Post-Closure	Jan	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000012	0.000011	0.000012	115	0.000013	0.000013	0.000013	134	0.000012	0.000012	0.000012	44	0.000257	0.000253	0.000258	2901	0.000392	0.000333	0.000416	6566	0.000013	0.000012	0.000013	50	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Feb	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000015	0.000014	0.000016	175	0.000013	0.000013	0.000013	124	0.000012	0.000012	0.000012	47	0.000260	0.000257	0.000261	2911	0.000404	0.000345	0.000428	6797	0.000016	0.000014	0.000016	96	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Mar	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000051	0.000045	0.000055	791	0.000013	0.000013	0.000013	122	0.000013	0.000013	0.000013	59	0.000266	0.000263	0.000267	2951	0.000444	0.000380	0.000471	7502	0.000046	0.000040	0.000049	481	0.000005	0.000005	0.000005	1
Cd, Tot	Post-Closure	Apr	109	0.000005	0.000007	0.000010	34	0.000005	0.000007	0.000010	31	0.000087	0.000080	0.000096	1495	0.000013	0.000013	0.000013	132	0.000014	0.000014	0.000015	76	0.000273	0.000270	0.000274	3010	0.000615	0.000832	0.002462	16530	0.000075	0.000069	0.000082	869	0.000005	0.000005	0.000005	0
Cd, Tot	Post-Closure	May	109	0.000005	0.000006	0.000007	13	0.000006	0.000006	0.000007	9	0.000033	0.000030	0.000036	446	0.000021	0.000021	0.000021	115	0.000016	0.000015	0.000016	76	0.000262	0.000259	0.000263	2967	0.000419	0.000429	0.000641	8489	0.000031	0.000030	0.000033	105	0.000005	0.000005	0.000005	0
Cd, Tot	Post-Closure	Jun	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000008	0.000008	53	0.000015	0.000015	0.000015	53	0.000016	0.000015	0.000016	40	0.000255	0.000252	0.000255	2920	0.000510	0.000527	0.000768	10445	0.000015	0.000014	0.000015	15	0.000005	0.000005	0.000005	0
Cd, Tot	Post-Closure	Jul	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000008	0.000008	0.000008	48	0.000009	0.000009	0.000009	80	0.000013	0.000012	0.000013	24	0.000265	0.000262	0.000266	2960	0.000465	0.000461	0.000546	9125	0.000009	0.000009	0.000010	26	0.000017	0.000017	0.000017	-2
Cd, Tot	Post-Closure	Aug	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000009	0.000008	0.000009	63	0.000010	0.000010	0.000010	100	0.000011	0.000011	0.000011	26	0.000270	0.000267	0.000271	2978	0.000481	0.000483	0.000604	9558	0.000010	0.000010	0.000010	35	0.000017	0.000017	0.000017	0
Cd, Tot	Post-Closure	Sep	109	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000010	0.000010	0.000011	92	0.000016	0.000016	0.000016	96	0.000011	0.000011	0.000011	31	0.000264	0.000261	0.000264	2945	0.000480	0.000495	0.000704	9797	0.000011	0.000011	0.000011	50	0.000003	0.000003	0.000003	19
Cd, Tot	Post-Closure	Oct	109	0.000005	0.000005	0.000006	3	0.000005	0.000005	0.000005	3	0.000012	0.000011	0.000013	125	0.000019	0.000019	0.000019	130	0.000012	0.000011	0.000012	39	0.000257	0.000254	0.000257	2928	0.000526	0.000576	0.001015	11411	0.000013	0.000012	0.000013	55	0.000003	0.000003	0.000003	0
Cd, Tot	Post-Closure	Nov	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000009	0.000009	0.000010	78	0.000017	0.000017	0.000017	185	0.000012	0.000012	0.000012	44	0.000255	0.000252	0.000256	2927	0.000509	0.000504	0.000613	9983	0.000012	0.000012	0.000012	26	0.000005	0.000005	0.000005	-1
Cd, Tot	Post-Closure	Dec	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000009	0.000008	0.000009	65	0.000015	0.000015	0.000015	156	0.000012	0.000012	0.000012	44	0.000255	0.000253	0.000256	2921	0.000394	0.000338	0.000417	6662	0.000012	0.000011	0.000012	23	0.000005	0.000005	0.000005	1
Cr, Diss	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000278	0.000278	0.000278	0	0.000083	0.000083	0.000083	0	0.000218	0.000218	0.000220	0	0.000160	0.000160	0.000160	0	0.000056	0.000056	0.000056	0	0.000290	0.000290	0.000290	0
Cr, Diss	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000052	2	0.000051	0.000051	0.000052	2	0.000278	0.000278	0.000278	0	0.000086	0.000086	0.000086	0	0.000217	0.000217	0.000220	0	0.000160	0.000160	0.000160	0	0.000055	0.000055	0.000056	1	0.000290	0.000290	0.000290	0
Cr, Diss	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000058	0.000058	0.000060	16	0.000058	0.000058	0.000060	16	0.000278	0.000278	0.000278	0	0.000088	0.000088	0.000088	0	0.000217	0.000217	0.000220	0	0.000160	0.000160	0.000160	0	0.000060	0.000060	0.000061	12	0.000290	0.000290	0.000290	0
Cr, Diss	Construction	Apr	2	0.000059	0.000059	0.000059	2	0.000079	0.000079	0.000080	28	0.000080	0.000080	0.000081	28	0.000278	0.000278	0.000278	0	0.000091	0.000091	0.000091	0	0.000217	0.000217	0.000219	0	0.000160	0.000160	0.000160	0	0.000078	0.000078	0.000080	25	0.000290	0.000290	0.000290	0
Cr, Diss	Construction	May	2	0.000058	0.000058	0.000058	0	0.000069	0.000069	0.000070	9	0.000067	0.000067	0.000068	9	0.000181	0.000181	0.000181	0	0.000091	0.000091	0.000091	1	0.000214	0.000214	0.000216	0	0.000054	0.000054	0.000054	7	0.000064	0.000064	0.000064	5	0.000126	0.000126	0.000126	5
Cr, Diss	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000171	0.000171	0.000171	0	0.000083	0.000083	0.000083	1	0.000214	0.000214	0.000216	0	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	1	0.000120	0.000120	0.000120	0
Cr, Diss	Construction	Jul	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000229	0.000229	0.000229	0	0.000072	0.000072	0.000072	0	0.000219	0.000219	0.000221	0	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000054	1	0.000188	0.000188	0.000188	-1
Cr, Diss	Construction	Aug	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000230	0.000230	0.000230	0	0.000066	0.000066	0.000067	0	0.000222	0.000222	0.000224	1	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	1	0.000190	0.000190	0.000190	0
Cr, Diss	Construction	Sep	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000249	0.000249	0.000249	0	0.000068	0.000068	0.000068	0	0.000224	0.000224	0.000226	1	0.000050	0.000050	0.000050	0	0.000059	0.000059	0.000059	1	0.000113	0.000113	0.000113	2
Cr, Diss	Construction	Oct	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000249	0.000249	0.000249	0	0.000073	0.000073	0.000073	0	0.000225	0.000225	0.000227	0	0.000050	0.000050	0.000050	0	0.000061	0.000061	0.000061	0	0.000110	0.000110	0.000110	0
Cr, Diss	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000277	0.000277	0.000277	0	0.000077	0.000077	0.000077	0	0.000223	0.000223	0.000225	0	0.000156	0.000156	0.000156	-2	0.000059	0.000059	0.000059	0	0.000284	0.000284	0.000284	-2
Cr, Diss	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000278	0.000278	0.000278	0	0.000080	0.000080	0.000080	0	0.000223	0.000223	0.000224	0	0.000160	0.000160	0.000160	0	0.000058	0.000058	0.000058	0	0.000290	0.000290	0.000290	0
Cr, Diss	Operations	Jan	13	0.000050	0.000050	0.000050	1	0.000055	0.000055	0.000058	10	0.000055	0.000055	0.000058	10	0.000279	0.000279	0.000280	0	0.000086	0.000086	0.000087	3	0.000259	0.000256	0.000291	13	0.000160	0.000160	0.000160	0	0.000060	0.000060	0.000062	6	0.000290	0.000290	0.000290	0
Cr, Diss	Operations	Feb	13	0.000050	0.000050	0.000050	1	0.000076	0.000075	0.000088	50	0.000076	0.000075	0.000088	50	0.000279	0.000279	0.000280	0	0.000089	0.000089	0.000090	3	0.000260	0.000257	0.000292	13	0.000160	0.000160	0.000160	0	0.000075	0.000075	0.000085	37	0.000290	0.000290	0.000290	0
Cr, Diss	Operations	Mar	13	0.000051	0.000051	0.000051	1	0.000124	0.000124	0.000153	149	0.000124	0.000124	0.000153	148	0.000279	0.000279	0.000280	0	0.000092	0.000093	0.000095	5	0.000261	0.000257	0.000293	13	0.000160	0.000160	0.000160	0	0.000116	0.000116	0.000141	117	0.000290	0.000290	0.000290	0
Cr, Diss	Operations	Apr	13	0.000059	0.000059	0.000059	2	0.000120	0.000114	0.000137	86	0.000123	0.000117	0.000142	88	0.000279	0.000279	0.000280	0	0.000096	0.000096	0.000099	6	0.000262	0.000258	0.000294	14	0.000569	0.000534	0.000804	234	0.000114	0.000109	0.000130	74	0.000290	0.000290	0.000290	0
Cr, Diss	Operations	May	13	0.000058	0.000058	0.000058	0	0.000081	0.000080	0.000089	26	0.000080	0.000079	0.000087	27	0.000183	0.000182	0.000184	1	0.000096	0.000096	0.000099	6	0.000257	0.000253	0.000288	14	0.000156	0.000148	0.000205	197	0.000072	0.000071	0.000076	16	0.000126	0.000126	0.000126	5
Cr, Diss	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000057	8	0.000055	0.000055	0.000057	8	0.000172	0.000172	0.000173	0	0.000087	0.000087	0.000089	5	0.000256	0.000252	0.000286	14	0.000177	0.000166	0.000231	231	0.000057	0.000057	0.000058	5	0.000120	0.000120	0.000120	0
Cr, Diss	Operations	Jul	13	0.000051	0.000051	0.000051	0	0.000055	0.000055	0.000056	7	0.000055	0.000055	0.000056	7	0.000230	0.000230	0.000231	0	0.000075	0.000074	0.000076	4	0.000262	0.000259	0.000293	15	0.000140	0.000131	0.000175	162	0.000056	0.000056	0.000057	5	0.000188	0.000188	0.000188	-1
Cr, Diss	Operations	Aug	13	0.000051	0.000051	0.000051	0	0.000057	0.000056	0.000058	9	0.000057	0.000057	0.000059	10	0.000231	0.000231	0.000231	0	0.000069	0.000069	0.000070	4	0.000266	0.000262	0.000297	15	0.000153	0.000143	0.000193	186	0.000058	0.000057	0.000059	7	0.000190	0.000190	0.000190	0
Cr, Diss	Operations	Sep	13	0.000051	0.000051	0.000051	0	0.000058	0.000057	0.000059	10	0.000058	0.000057	0.000059	10	0.000250	0.000250	0.000251	1	0.000071	0.000071	0.000072	4	0.000267	0.000263	0.000297	15	0.000174	0.000161	0.000219	222	0.000063	0.000062	0.000064	7	0.000113	0.000113	0.000113	2
Cr, Diss	Operations	Oct	13	0.000051	0.000051	0.000051	0	0.000057	0.000056	0.000058	9	0.000057	0.000056	0.000059	9	0.000251	0.000251	0.000252	1	0.000076	0.000075	0.000076	4	0.000268	0.000264	0.000296	15	0.000246	0.000224	0.000318	348	0.000064	0.000064	0.000065	5	0.000110	0.000110	0.000110	0
Cr, Diss	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000056	6	0.000054	0.000054	0.000056	6	0.000279	0.000278	0.000280	1	0.000079	0.000079	0.000081	4	0.000266	0.000262	0.000294	15	0.000382	0.000360	0.000501	125	0.000061	0.000061	0.000062	3	0.000284	0.000284	0.000284	-2
Cr, Diss	Operations	Dec	13	0.000050	0.000050	0.000050	1	0.000053	0.000053	0.000054	6	0.000053	0.000053	0.000054	6	0.000280	0.000279	0.000281	1	0.000083	0.000083	0.000084	3	0.000266	0.000261	0.000293	15	0.000160	0.000160	0.000160	0	0.000060	0.000060	0.000061	3	0.000290	0.000290	0.000290	0
Cr, Diss	Closure	Jan	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000051	1	0.000051	0.000051	0.000051	1	0.000280	0.000281	0.000281	1	0.000084	0.000084	0.000087	1	0.000293	0.000299	0.000315	36	0.000160	0.000160	0.000160	0	0.000056	0.000057	0.000057	1	0.000290	0.000290	0.000290	0
Cr, Diss	Closure	Feb	6	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000280	0.000281	0.000281	1	0.000087	0.000087	0.000089	1	0.000294	0.000300	0.000317	37	0.000160	0.000160	0.000160	0	0.000055	0.000055	0.000055	1	0.000290	0.000290	0.000290	0
Cr, Diss	Closure	Mar	6	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000280	0.000281	0.000281	1	0.000089	0.000089	0.000091	1	0.000296	0.000302	0.000319	38	0.000160	0.000160	0.000160	0	0.000055	0.000055	0.000055	2	0.000290	0.000290	0.000290	0
Cr, Diss	Closure	Apr	6	0.000059	0.000059	0.000059	2	0.000064	0.000064	0.000065	5	0.000077	0.000076	0.000077	22	0.000281	0.000281	0.000281	1	0.000091	0.000091	0.000093	1	0.000298	0.000304	0.000322	39	0.001242	0.001159	0.001245	624	0.000076	0.000075	0.000076	20	0.000290	0.000290	0.000290	0
Cr, Diss	Closure	May	6	0.000058	0.000058	0.000058	0	0.000063	0.000063	0.000064	0	0.000066	0.000065	0.000066	6	0.000184	0.000184	0.000185	2	0.000091	0.000091	0.000093	1	0.000292	0.000297	0.000315	39	0.000321	0.000308	0.000346	515	0.000063	0.000063	0.000063	3	0.000126	0.000126	0.000126	5
Cr, Diss	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	1	0.000173	0.000173	0.000173	1	0.000083	0.000083	0.000084	1	0.000290	0.000295	0.000312	39	0.000375	0.000353	0.000383	606	0.000054	0.000054	0.000054	0	0.000120	0.000120	0.000120	0
Cr, Diss	Closure	Jul	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000231	0.000231	0.000231	1	0.000072	0.000072	0.000072	1	0.000298	0.000302	0.000320	39	0.000276	0.000260	0.000278	420	0.000053	0.000053	0.000053	0	0.000188	0.000188	0.000188	-1
Cr, Diss	Closure	Aug	6	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000052	0.000052	0.000052	1	0.000231	0.000232	0.000232	1	0.000067	0.000067	0.000067	0	0.000302	0.000307	0.000325	40	0.000307	0.000288	0.000308	476	0.000054	0.000054	0.000054	1	0.000190	0.000190	0.000190	0
Cr, Diss	Closure	Sep	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000251	0.000251	0.000252	1	0.000068	0.000068	0.000068	1	0.000302	0.000306	0.000324	39	0.000353	0.000331	0.000354	561	0.000059	0.000059	0.000059	1	0.000113	0.000113	0.000113	2
Cr, Diss	Closure	Oct	6	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000053	0.000052	0.000053	2	0.000252	0.000252	0.000253	2	0.000073	0.000073	0.000073	1	0.000301	0.000305	0.000323	38	0.000526	0.000486	0.000527	871	0.000061	0.000061	0.000061	1	0.000110	0.000110	0.000110	0
Cr, Diss	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	1	0.000280	0.000280	0.000281	2	0.000077	0.000077	0.000077	1	0.000299	0.000303	0.000321	38	0.000513	0.000485	0.000514	203	0.000059	0.000059	0.000059	0	0.000284	0.000284	0.000284	-2
Cr, Diss	Closure	Dec	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000281	0.000281	0.000282	1	0.000081	0.000081	0.000081	1	0.000299	0.000303	0.000321	39	0.000160	0.000160	0.000160	0	0.000058	0.000058	0.000058	0	0.000290	0.000290	0.000290	0
Cr, Diss	Post-Closure	Jan	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000083	0.000077	0.000085	55	0.000290	0.000289	0.000290	4	0.000096	0.000094	0.000097	13	0.000584	0.000577	0.000585	169	0.001892	0.001602	0.002036	901	0.000080	0.000076	0.000082	36	0.000290	0.000290	0.000290	0
Cr, Diss	Post-Closure	Feb	109	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000099	0.000091	0.000102	81	0.000289	0.000289	0.000289	4	0.000099	0.000098	0.000101	14	0.000588	0.000581	0.000589	171	0.001915	0.001625	0.002061	916	0.000094	0.000087	0.000097	60	0.000290	0.000290	0.000290	0
Cr, Diss	Post-Closure	Mar	109	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000258	0.000224	0.000276	349	0.000289	0.000288	0.000289	4	0.000106	0.000104	0.000108	17	0.000596	0.000589	0.000598	176	0.002009	0.001707	0.002163	967	0.000230	0.000201	0.000245	275	0.000290	0.000290	0.000290	0
Cr, Diss	Post-Closure	Apr	109	0.000059	0.000061	0.000067	6	0.000064	0.000067	0.000072	9	0.000355	0.000315	0.000386	406	0.000289	0.000289	0.000289	4	0.000114	0.000110	0.000115	22	0.000606	0.000599	0.000607	181	0.002232	0.002278	0.003589	1324	0.000307	0.000274	0.000332	337	0.000290	0.000290	0.000290	0
Cr, Diss	Post-Closure	May	109	0.000058	0.000059	0.000061	2	0.000063	0.000064	0.000066	1	0.000158	0.000144	0.000167	133	0.000197	0.000197	0.000197	9	0.000115	0.000112	0.000117	24	0.000587	0.000580	0.000588	177	0.001447	0.001337	0.001543	2574	0.000117	0.000110	0.000123	79	0.000126	0.000126	0.000126	5
Cr, Diss	Post-Closure	Jun	109	0.000050	0.000050	0.000051	0	0.000051	0.000051	0.000051	0	0.000061	0.000060	0.000062	18	0.000179	0.000179	0.000179	4	0.000099	0.000096	0.000100	17	0.000575	0.000569	0.000576	173	0.001820	0.001678	0.001937	3257	0.000061	0.000060	0.000061	12	0.000120	0.000120	0.000120	0
Cr, Diss	Post-Closure	Jul	109	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000061	0.000060	0.000062	17	0.000236	0.000235	0.000236	3	0.000081	0.000079	0.000081	11	0.000594	0.000589	0.000596	176	0.001748	0.001579	0.001863	3058	0.000061	0.000060	0.000062	13	0.000188	0.000188	0.000188	-1
Cr, Diss	Post-Closure	Aug	109	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000064	0.000063	0.000066	21	0.000237	0.000237	0.000238	3	0.000074	0.000073	0.000075	11	0.000604	0.000599	0.000605	179	0.001774	0.001616	0.001891	3132	0.000063	0.000062	0.000064	16	0.000190	0.000190	0.000190	0
Cr, Diss	Post-Closure	Sep	109	0.000051	0.000051	0.000051	0	0.000051	0.000052	0.000052	0	0.000071	0.000069	0.000073	33	0.000261	0.000260	0.000261	5	0.000077	0.000076	0.000078	12	0.000597	0.000592	0.000598	173	0.001834	0.001684	0.001955	3269	0.000073	0.000071	0.000074	22	0.000113	0.000113	0.000113	2
Cr, Diss	Post-Closure	Oct	109	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000078	0.000074	0.000080	44	0.000265	0.000265	0.000265	7	0.000083	0.000082	0.000084	14	0.000588	0.000583	0.000589	167	0.001989	0.001874	0.002122	3647	0.000078	0.000076	0.000080	26	0.000110	0.000110	0.000110	0
Cr, Diss	Post-Closure	Nov	109	0.000050	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000070	0.000067	0.000072	32	0.000293	0.000292	0.000293	6	0.000089	0.000087	0.000090	14	0.000583	0.000578	0.000584	167	0.002113	0.001907	0.002266	1092	0.000071	0.000069	0.000072	17	0.000284	0.000284	0.000284	-2
Cr, Diss	Post-Closure	Dec	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000069	0.000066	0.000070	32	0.000291	0.000291	0.000291	5	0.000092	0.000091	0.000093	13	0.000582	0.000578	0.000584	168	0.001934	0.001650	0.002076	931	0.000070	0.000068	0.000071	18	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000286	0.000286	0.000286	0	0.000084	0.000084	0.000084	0	0.000449	0.000449	0.000449	-1	0.000160	0.000160	0.000160	0	0.000055	0.000055	0.000055	0	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000052	2	0.000051	0.000051	0.000052	2	0.000285	0.000285	0.000285	0	0.000087	0.000087	0.000087	0	0.000446	0.000446	0.000446	-1	0.000160	0.000160	0.000160	0	0.000054	0.000054	0.000055	1	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000058	0.000058	0.000060	16	0.000058	0.000058	0.000060	16	0.000285	0.000285	0.000285	0	0.000089	0.000089	0.000089	0	0.000443	0.000443	0.000443	-1	0.000160	0.000160	0.000160	0	0.000060	0.000060	0.000061	13	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Construction	Apr	2	0.000059	0.000059	0.000059	2	0.000079	0.000079	0.000080	28	0.000080	0.000080	0.000081	28	0.000285	0.000285	0.000285	0	0.000091	0.000091	0.000091	0	0.000440	0.000440	0.000440	-1	0.000160	0.000160	0.000160	0	0.000078	0.000078	0.000079	25	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Construction	May	2	0.000058	0.000058	0.000058	0	0.000069	0.000069	0.000070	9	0.000068	0.000068	0.000068	9	0.000190	0.000190	0.000190	-1	0.000092	0.000092	0.000092	1	0.000420	0.000420	0.000420	0	0.000054	0.000054	0.000054	7	0.000064	0.000064	0.000065	5	0.000126	0.000126	0.000126	5
Cr (VI), Diss	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000175	0.000175	0.000175	-1	0.000084	0.000084	0.000084	0	0.000406	0.000406	0.000406	1	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	1	0.000120	0.000120	0.000120	0
Cr (VI), Diss	Construction	Jul	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000213	0.000213	0.000213	0	0.000072	0.000072	0.000072	0	0.000409	0.000409	0.000410	1	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000054	1	0.000188	0.000188	0.000188	-1
Cr (VI), Diss	Construction	Aug	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000214	0.000214	0.000214	-1	0.000066	0.000066	0.000066	0	0.000407	0.000407	0.000408	2	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	1	0.000190	0.000190	0.000190	0
Cr (VI), Diss	Construction	Sep	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000255	0.000255	0.000255	-1	0.000068	0.000068	0.000068	0	0.000426	0.000426	0.000426	1	0.000050	0.000050	0.000050	0	0.000059	0.000059	0.000059	1	0.000113	0.000113	0.000113	2
Cr (VI), Diss	Construction	Oct	2	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000052	0.000052	0.000052	1	0.000259	0.000259	0.000259	-1	0.000073	0.000073	0.000073	0	0.000457	0.000457	0.000458	-1	0.000050	0.000050	0.000050	0	0.000061	0.000061	0.000061	0	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000287	0.000287	0.000287	-1	0.000077	0.000077	0.000077	0	0.000458	0.000458	0.000458	-2	0.000156	0.000156	0.000156	-2	0.000057	0.000057	0.000057	0	0.000284	0.000284	0.000284	-2
Cr (VI), Diss	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000287	0.000287	0.000287	0	0.000081	0.000081	0.000081	0	0.000453	0.000453	0.000453	-2	0.000160	0.000160	0.000160	0	0.000057	0.000057	0.000057	0	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Operations	Jan	13	0.000050	0.000050	0.000050	1	0.000055	0.000055	0.000058	10	0.000055	0.000055	0.000058	10	0.000286	0.000286	0.000287	0	0.000086	0.000086	0.000087	2	0.000478	0.000476	0.000509	3	0.000160	0.000160	0.000160	0	0.000058	0.000058	0.000061	6	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Operations	Feb	13	0.000050	0.000050	0.000050	1	0.000076	0.000075	0.000088	50	0.000076	0.000075	0.000088	50	0.000286	0.000286	0.000287	0	0.000089	0.000089	0.000091	2	0.000475	0.000473	0.000507	3	0.000160	0.000160	0.000160	0	0.000074	0.000074	0.000084	38	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Operations	Mar	13	0.000051	0.000051	0.000051	1	0.000124	0.000124	0.000153	149	0.000124	0.000124	0.000153	148	0.000286	0.000286	0.000287	0	0.000093	0.000093	0.000096	4	0.000474	0.000472	0.000506	3	0.000160	0.000160	0.000160	0	0.000116	0.000116	0.000140	119	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Operations	Apr	13	0.000059	0.000059	0.000059	2	0.000120	0.000114	0.000137	86	0.000123	0.000117	0.000142	88	0.000286	0.000286	0.000287	0	0.000096	0.000097	0.000100	6	0.000472	0.000470	0.000505	3	0.000568	0.000534	0.000804	234	0.000114	0.000108	0.000129	75	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Operations	May	13	0.000058	0.000058	0.000058	0	0.000081	0.000080	0.000089	26	0.000080	0.000079	0.000087	27	0.000192	0.000191	0.000193	-1	0.000097	0.000097	0.000100	6	0.000451	0.000449	0.000482	5	0.000156	0.000148	0.000205	196	0.000072	0.000071	0.000076	16	0.000126	0.000126	0.000126	5
Cr (VI), Diss	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000057	8	0.000055	0.000055	0.000057	8	0.000176	0.000176	0.000177	-1	0.000087	0.000087	0.000089	4	0.000437	0.000434	0.000466	6	0.000177	0.000166	0.000231	231	0.000057	0.000057	0.000058	5	0.000120	0.000120	0.000120	0
Cr (VI), Diss	Operations	Jul	13	0.000051	0.000051	0.000051	0	0.000055	0.000055	0.000056	7	0.000055	0.000055	0.000056	7	0.000214	0.000214	0.000214	0	0.000074	0.000074	0.000075	3	0.000442	0.000439	0.000472	7	0.000140	0.000131	0.000175	162	0.000056	0.000056	0.000057	5	0.000188	0.000188	0.000188	-1
Cr (VI), Diss	Operations	Aug	13	0.000051	0.000051	0.000051	0	0.000057	0.000056	0.000058	9	0.000057	0.000057	0.000059	10	0.000215	0.000215	0.000215	0	0.000068	0.000068	0.000070	4	0.000441	0.000438	0.000472	8	0.000153	0.000143	0.000193	186	0.000058	0.000057	0.000059	7	0.000190	0.000190	0.000190	0
Cr (VI), Diss	Operations	Sep	13	0.000051	0.000051	0.000051	0	0.000058	0.000057	0.000059	10	0.000058	0.000057	0.000059	10	0.000256	0.000256	0.000257	0	0.000071	0.000070	0.000072	4	0.000460	0.000457	0.000489	6	0.000174	0.000161	0.000219	222	0.000063	0.000062	0.000064	7	0.000113	0.000113	0.000113	2
Cr (VI), Diss	Operations	Oct	13	0.000051	0.000051	0.000051	0	0.000057	0.000056	0.000058	9	0.000057	0.000056	0.000059	9	0.000261	0.000261	0.000262	-1	0.000076	0.000075	0.000077	4	0.000491	0.000488	0.000519	4	0.000246	0.000224	0.000318	348	0.000064	0.000064	0.000065	5	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000056	6	0.000054	0.000054	0.000056	6	0.000289	0.000289	0.000290	0	0.000080	0.000080	0.000081	3	0.000492	0.000489	0.000520	3	0.000382	0.000360	0.000501	125	0.000059	0.000059	0.000061	3	0.000284	0.000284	0.000284	-2
Cr (VI), Diss	Operations	Dec	13	0.000050	0.000050	0.000050	1	0.000053	0.000053	0.000054	6	0.000053	0.000053	0.000054	6	0.000288	0.000288	0.000289	0	0.000083	0.000083	0.000084	3	0.000487	0.000484	0.000515	4	0.000160	0.000160	0.000160	0	0.000058	0.000058	0.000059	3	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Closure	Jan	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000051	1	0.000051	0.000051	0.000051	1	0.000287	0.000288	0.000288	0	0.000084	0.000085	0.000087	1	0.000515	0.000520	0.000539	14	0.000160	0.000160	0.000160	0	0.000055	0.000055	0.000056	1	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Closure	Feb	6	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000287	0.000287	0.000287	1	0.000087	0.000087	0.000090	1	0.000513	0.000519	0.000538	15	0.000160	0.000160	0.000160	0	0.000054	0.000054	0.000054	1	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Closure	Mar	6	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000286	0.000287	0.000287	1	0.000089	0.000090	0.000092	1	0.000513	0.000519	0.000538	15	0.000160	0.000160	0.000160	0	0.000054	0.000054	0.000054	2	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Closure	Apr	6	0.000059	0.000059	0.000059	2	0.000064	0.000064	0.000065	5	0.000077	0.000076	0.000077	22	0.000287	0.000287	0.000288	1	0.000092	0.000092	0.000094	1	0.000512	0.000518	0.000538	16	0.001242	0.001159	0.001245	624	0.000075	0.000074	0.000075	20	0.000290	0.000290	0.000290	0

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality Median	AQM4 Mean	AQM4 Max	AQM4 Change	AQM7 Predicted Project Water Quality Median	AQM7 Mean	AQM7 Max	AQM7 Change	AQM8 Predicted Project Water Quality Median	AQM8 Mean	AQM8 Max	AQM8 Change	AQM10 Predicted Project Water Quality Median	AQM10 Mean	AQM10 Max	AQM10 Change	AQM11 Predicted Water Quality Median	AQM11 Mean	AQM11 Max	AQM11 Change	AQM16 Predicted Project Water Quality Median	AQM16 Mean	AQM16 Max	AQM16 Change	AQM18 Predicted Project Water Quality Median	AQM18 Mean	AQM18 Max	AQM18 Change	AQM29 Predicted Project Water Quality Median	AQM29 Mean	AQM29 Max	AQM29 Change	AQM31 Predicted Project Water Quality Median	AQM31 Mean	AQM31 Max	AQM31 Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cr (VI), Diss	Closure	May	6	0.000058	0.000058	0.000058	0	0.000063	0.000063	0.000064	0	0.000066	0.000065	0.000066	6	0.000193	0.000193	0.000194	0	0.000092	0.000092	0.000094	1	0.000490	0.000495	0.000515	18	0.000321	0.000308	0.000346	515	0.000063	0.000063	0.000063	3	0.000126	0.000126	0.000126	5
Cr (VI), Diss	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	1	0.000177	0.000177	0.000177	0	0.000084	0.000084	0.000085	1	0.000474	0.000479	0.000498	20	0.000375	0.000353	0.000383	606	0.000054	0.000054	0.000054	0	0.000120	0.000120	0.000120	0
Cr (VI), Diss	Closure	Jul	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000214	0.000214	0.000215	0	0.000072	0.000072	0.000072	0	0.000481	0.000486	0.000506	21	0.000276	0.000260	0.000278	420	0.000053	0.000053	0.000053	0	0.000188	0.000188	0.000188	-1
Cr (VI), Diss	Closure	Aug	6	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000052	0.000052	0.000052	1	0.000215	0.000215	0.000216	0	0.000066	0.000066	0.000066	0	0.000481	0.000486	0.000505	22	0.000307	0.000288	0.000308	476	0.000054	0.000054	0.000054	1	0.000190	0.000190	0.000190	0
Cr (VI), Diss	Closure	Sep	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	1	0.000257	0.000257	0.000258	0	0.000068	0.000068	0.000068	0	0.000498	0.000503	0.000522	19	0.000353	0.000331	0.000354	561	0.000059	0.000059	0.000059	1	0.000113	0.000113	0.000113	2
Cr (VI), Diss	Closure	Oct	6	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000053	0.000052	0.000053	2	0.000262	0.000262	0.000263	0	0.000073	0.000073	0.000073	0	0.000528	0.000532	0.000551	15	0.000526	0.000486	0.000527	871	0.000061	0.000061	0.000061	1	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	1	0.000290	0.000290	0.000291	0	0.000077	0.000077	0.000077	0	0.000530	0.000533	0.000553	15	0.000513	0.000485	0.000514	203	0.000058	0.000058	0.000058	0	0.000284	0.000284	0.000284	-2
Cr (VI), Diss	Closure	Dec	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000289	0.000289	0.000290	0	0.000081	0.000081	0.000081	0	0.000525	0.000529	0.000548	16	0.000160	0.000160	0.000160	0	0.000057	0.000057	0.000057	0	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Post-Closure	Jan	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000083	0.000077	0.000085	55	0.000297	0.000296	0.000297	4	0.000096	0.000095	0.000097	12	0.000808	0.000802	0.000810	78	0.001892	0.001602	0.002036	901	0.000079	0.000075	0.000081	36	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Post-Closure	Feb	109	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000099	0.000091	0.000102	81	0.000295	0.000295	0.000295	3	0.000100	0.000098	0.000101	13	0.000810	0.000803	0.000811	80	0.001915	0.001625	0.002061	916	0.000093	0.000086	0.000096	61	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Post-Closure	Mar	109	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000258	0.000224	0.000276	349	0.000295	0.000294	0.000295	3	0.000107	0.000104	0.000108	17	0.000815	0.000809	0.000817	82	0.002009	0.001707	0.002163	967	0.000229	0.000201	0.000244	279	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Post-Closure	Apr	109	0.000059	0.000061	0.000067	6	0.000064	0.000067	0.000072	9	0.000355	0.000315	0.000386	406	0.000296	0.000296	0.000296	4	0.000114	0.000111	0.000116	22	0.000823	0.000816	0.000824	85	0.002232	0.002278	0.003589	1324	0.000307	0.000273	0.000332	342	0.000290	0.000290	0.000290	0
Cr (VI), Diss	Post-Closure	May	109	0.000058	0.000059	0.000061	2	0.000063	0.000064	0.000066	1	0.000158	0.000144	0.000167	133	0.000206	0.000206	0.000206	7	0.000116	0.000112	0.000118	23	0.000787	0.000781	0.000788	88	0.001447	0.001337	0.001543	2574	0.000117	0.000110	0.000123	79	0.000126	0.000126	0.000126	5
Cr (VI), Diss	Post-Closure	Jun	109	0.000050	0.000050	0.000051	0	0.000051	0.000051	0.000051	0	0.000061	0.000060	0.000062	18	0.000183	0.000183	0.000183	4	0.000099	0.000097	0.000101	16	0.000762	0.000756	0.000763	91	0.001820	0.001678	0.001937	3257	0.000061	0.000060	0.000061	12	0.000120	0.000120	0.000120	0
Cr (VI), Diss	Post-Closure	Jul	109	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000061	0.000060	0.000062	17	0.000219	0.000219	0.000219	2	0.000080	0.000079	0.000081	11	0.000780	0.000775	0.000781	94	0.001748	0.001579	0.001863	3058	0.000061	0.000060	0.000062	13	0.000188	0.000188	0.000188	-1
Cr (VI), Diss	Post-Closure	Aug	109	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000064	0.000063	0.000066	21	0.000221	0.000221	0.000222	3	0.000074	0.000073	0.000074	11	0.000785	0.000780	0.000786	98	0.001774	0.001616	0.001891	3132	0.000063	0.000062	0.000064	16	0.000190	0.000190	0.000190	0
Cr (VI), Diss	Post-Closure	Sep	109	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000052	0	0.000071	0.000069	0.000073	33	0.000267	0.000266	0.000267	4	0.000077	0.000076	0.000078	12	0.000795	0.000790	0.000796	89	0.001834	0.001684	0.001955	3269	0.000073	0.000071	0.000074	22	0.000113	0.000113	0.000113	2
Cr (VI), Diss	Post-Closure	Oct	109	0.000051	0.000051	0.000051	0	0.000052	0.000052	0.000052	0	0.000078	0.000074	0.000080	44	0.000275	0.000275	0.000275	5	0.000084	0.000082	0.000085	13	0.000817	0.000812	0.000818	77	0.001989	0.001874	0.002122	3647	0.000078	0.000076	0.000080	26	0.000110	0.000110	0.000110	0
Cr (VI), Diss	Post-Closure	Nov	109	0.000050	0.000051	0.000051	0	0.000051	0.000051	0.000051	0	0.000070	0.000067	0.000072	32	0.000303	0.000303	0.000303	5	0.000089	0.000088	0.000090	14	0.000815	0.000810	0.000816	76	0.002113	0.001907	0.002266	1092	0.000069	0.000067	0.000070	18	0.000284	0.000284	0.000284	-2
Cr (VI), Diss	Post-Closure	Dec	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000069	0.000066	0.000070	32	0.000299	0.000299	0.000299	4	0.000093	0.000091	0.000094	13	0.000810	0.000805	0.000811	77	0.001934	0.001650	0.002076	931	0.000069	0.000067	0.000069	18	0.000290	0.000290	0.000290	0
Cr, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000058	9	0.000054	0.000054	0.000058	9	0.000409	0.000409	0.000409	0	0.000233	0.000233	0.000234	0	0.000387	0.000387	0.000389	0	0.000230	0.000230	0.000230	0	0.000184	0.000184	0.000187	1	0.000300	0.000300	0.000300	0
Cr, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000061	0.000061	0.000071	22	0.000061	0.000061	0.000071	22	0.000409	0.000409	0.000409	0	0.000232	0.000232	0.000233	0	0.000385	0.000385	0.000386	0	0.000230	0.000230	0.000230	0	0.000152	0.000152	0.000160	4	0.000300	0.000300	0.000300	0
Cr, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000111	0.000111	0.000120	122	0.000111	0.000111	0.000119	122	0.000409	0.000409	0.000409	0	0.000231	0.000231	0.000233	1	0.000383	0.000383	0.000384	-1	0.000230	0.000230	0.000230	0	0.000176	0.000176	0.000183	36	0.000300	0.000300	0.000300	0
Cr, Tot	Construction	Apr	2	0.000059	0.000059	0.000059	2	0.000162	0.000162	0.000166	136	0.000162	0.000162	0.000167	128	0.000409	0.000409	0.000409	0	0.000232	0.000232	0.000233	1	0.000380	0.000380	0.000382	-1	0.000230	0.000230	0.000230	0	0.000225	0.000225	0.000228	48	0.000300	0.000300	0.000300	0
Cr, Tot	Construction	May	2	0.000109	0.000109	0.000109	5	0.000167	0.000167	0.000169	29	0.000165	0.000165	0.000167	29	0.000514	0.000514	0.000514	0	0.000243	0.000243	0.000245	2	0.000384	0.000384	0.000386	-1	0.000162	0.000162	0.000162	1	0.000289	0.000289	0.000289	11	0.000203	0.000203	0.000203	2
Cr, Tot	Construction	Jun	2	0.000098	0.000098	0.000098	0	0.000104	0.000104	0.000104	3	0.000104	0.000104	0.000104	3	0.000527	0.000527	0.000527	0	0.000263	0.000263	0.000264	1	0.000394	0.000394	0.000395	-2	0.000160	0.000160	0.000160	0	0.000219	0.000219	0.000219	1	0.000200	0.000200	0.000200	0
Cr, Tot	Construction	Jul	2	0.000142	0.000142	0.000142	0	0.000146	0.000146	0.000146	2	0.000146	0.000146	0.000147	2	0.000333	0.000333	0.000333	0	0.000246	0.000246	0.000247	1	0.000404	0.000404	0.000405	-2	0.000054	0.000054	0.000054	7	0.000204	0.000204	0.000205	1	0.000529	0.000529	0.000529	-2
Cr, Tot	Construction	Aug	2	0.000143	0.000143	0.000143	0	0.000148	0.000148	0.000149	3	0.000149	0.000149	0.000149	3	0.000332	0.000332	0.000332	0	0.000230	0.000230	0.000231	1	0.000412	0.000412	0.000413	-2	0.000050	0.000050	0.000050	0	0.000204	0.000204	0.000204	2	0.000540	0.000540	0.000540	0
Cr, Tot	Construction	Sep	2	0.000141	0.000141	0.000141	0	0.000147	0.000147	0.000148	4	0.000147	0.000147	0.000148	4	0.000304	0.000304	0.000304	0	0.000225	0.000225	0.000225	1	0.000412	0.000412	0.000413	-1	0.000050	0.000050	0.000050	0	0.000201	0.000201	0.000202	2	0.000269	0.000269	0.000269	4
Cr, Tot	Construction	Oct	2	0.000141	0.000141	0.000141	0	0.000147	0.000147	0.000147	3	0.000146	0.000146	0.000147	4	0.000305	0.000305	0.000305	-1	0.000224	0.000224	0.000224	1	0.000404	0.000404	0.000405	-1	0.000050	0.000050	0.000050	0	0.000219	0.000219	0.000219	2	0.000260	0.000260	0.000260	0
Cr, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	-1	0.000055	0.000055	0.000055	5	0.000055	0.000055	0.000055	3	0.000407	0.000407	0.000407	0	0.000228	0.000228	0.000228	1	0.000396	0.000396	0.000397	-1	0.000224	0.000224	0.000224	-3	0.000234	0.000234	0.000234	0	0.000299	0.000299	0.000299	0
Cr, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000054	7	0.000053	0.000053	0.000054	7	0.000409	0.000409	0.000409	0	0.000233	0.000233	0.000233	1	0.000392	0.000392	0.000394	-1	0.000230	0.000230	0.000230	0	0.000222	0.000222	0.000222	1	0.000300	0.000300	0.000300	0
Cr, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	1	0.000066	0.000066	0.000069	32	0.000066	0.000066	0.000069	32	0.000410	0.000410	0.000412	0	0.000238	0.000238	0.000240	2	0.000424	0.000421	0.000455	6	0.000230	0.000230	0.000230	0	0.000194	0.000194	0.000196	6	0.000300	0.000300	0.000300	0
Cr, Tot	Operations	Feb	13	0.000051	0.000051	0.000051	1	0.000111	0.000109	0.000125	117	0.000111	0.000109	0.000125	117	0.000410	0.000410	0.000411	0	0.000238	0.000237	0.000240	3	0.000422	0.000420	0.000454	6	0.000230	0.000230	0.000230	0	0.000191	0.000190	0.000202	31	0.000300	0.000300	0.000300	0
Cr, Tot	Operations	Mar	13	0.000051	0.000051	0.000051	1	0.000203	0.000195	0.000227	290	0.000203	0.000195	0.000227	289	0.000410	0.000410	0.000411	0	0.000239	0.000239	0.000242	4	0.000421	0.000419	0.000454	6	0.000230	0.000230	0.000230	0	0.000251	0.000245	0.000271	89	0.000300	0.000300	0.000300	0
Cr, Tot	Operations	Apr	13	0.000059	0.000059	0.000060	2	0.000212	0.000203	0.000234	197	0.000217	0.000208	0.000240	191	0.000410	0.000410	0.000411	0	0.000241	0.000241	0.000244	5	0.000420	0.000417	0.000453	6	0.000876	0.000807	0.001104	251	0.000271	0.000265	0.000291	74	0.000300	0.000300	0.000300	0
Cr, Tot	Operations	May	13	0.000109	0.000109	0.000109	5	0.000186	0.000185	0.000197	44	0.000185	0.000184	0.000195	44	0.000516	0.000516	0.000517	0	0.000253	0.000252	0.000256	5	0.000423	0.000420	0.000454	6	0.000318	0.000302	0.000365	89	0.000301	0.000300	0.000307	15	0.000203	0.000203	0.000203	2
Cr, Tot	Operations	Jun	13	0.000098	0.000098	0.000098	0	0.000110	0.000110	0.000112	10	0.000110	0.000110	0.000112	9	0.000528	0.000528	0.000529	0	0.000269	0.000269	0.000271	3	0.000432	0.000429	0.000462	5	0.000342	0.000323	0.000395	102	0.000223	0.000223	0.000225	3	0.000200	0.000200	0.000200	0
Cr, Tot	Operations	Jul	13	0.000142	0.000142	0.000142	0	0.000151	0.000150	0.000153	6	0.000151	0.000151	0.000153	6	0.000333	0.000333	0.000334	0	0.000250	0.000250	0.000251	2	0.000444	0.000440	0.000474	5	0.000192	0.000177	0.000227	253	0.000208	0.000208	0.000210	3	0.000529	0.000529	0.000529	-2
Cr, Tot	Operations	Aug	13	0.000143	0.000143	0.000143	0	0.000154	0.000154	0.000156	7	0.000155	0.000154	0.000157	8	0.000333	0.000332	0.000333	0	0.000234	0.000234	0.000235	3	0.000453	0.000449	0.000483	5	0.000210	0.000191	0.000248	282	0.000209	0.000209	0.000211	4	0.000540	0.000540	0.000540	0
Cr, Tot	Operations	Sep	13	0.000141	0.000141	0.000141	0	0.000155	0.000154	0.000157	8	0.000155	0.000154	0.000157	9	0.000305	0.000305	0.000306	0	0.000229	0.000228	0.000230	3	0.000452	0.000448	0.000481	6	0.000241	0.000218	0.000285	336	0.000207	0.000207	0.000209	5	0.000269	0.000269	0.000269	4
Cr, Tot	Operations	Oct	13	0.000141	0.000141	0.000141	0	0.000154	0.000154	0.000157	8	0.000154	0.000154	0.000157	9	0.000306	0.000306	0.000308	0	0.000228	0.000228	0.000229	3	0.000443	0.000439	0.000471	6	0.000353	0.000315	0.000423	530	0.000224	0.000224	0.000227	4	0.000260	0.000260	0.000260	0
Cr, Tot	Operations	Nov	13	0.000051	0.000051	0.000051	0	0.000059	0.000060	0.000063	16	0.000060	0.000060	0.000064	14	0.000409	0.000408	0.000410	0	0.000232	0.000231	0.000233	3	0.000436	0.000432	0.000464	7	0.000523	0.000489	0.000639	113	0.000238	0.000238	0.000240	2	0.000299	0.000299	0.000299	0
Cr, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	1	0.000059	0.000058	0.000060	17	0.000059	0.000058	0.000060	17	0.000411	0.000411	0.000412	0	0.000237	0.000237	0.000238	2	0.000433	0.000428	0.000460	7	0.000230	0.000230	0.000230	0	0.000226	0.000226	0.000227	2	0.000300	0.000300	0.000300	0
Cr, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	1	0.000050	0.000051	0.000051	1	0.000051	0.000051	0.000052	2	0.000412	0.000412	0.000412	1	0.000233	0.000234	0.000239	1	0.000461	0.000467	0.000485	19	0.000230	0.000230	0.000230	0	0.000183	0.000183	0.000184	0	0.000300	0.000300	0.000300	0
Cr, Tot	Closure	Feb	6	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	2	0.000411	0.000412	0.000412	1	0.000232	0.000233	0.000237	1	0.000460	0.000466	0.000485	20	0.000230	0.000230	0.000230	0	0.000146	0.000145	0.000146	0	0.000300	0.000300	0.000300	0
Cr, Tot	Closure	Mar	6	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000411	0.000412	0.000412	1	0.000230	0.000231	0.000235	1	0.000460	0.000466	0.000485	21	0.000230	0.000230	0.000230	0	0.000131	0.000131	0.000131	1	0.000300	0.000300	0.000300	0
Cr, Tot	Closure	Apr	6	0.000059	0.000059	0.000060	2	0.000072	0.000072	0.000073	5	0.000089	0.000088	0.000089	24	0.000411	0.000412	0.000412	1	0.000229	0.000230	0.000234	1	0.000460	0.000466	0.000486	22	0.001517	0.001437	0.001518	525	0.000172	0.000172	0.000173	13	0.000300	0.000300	0.000300	0
Cr, Tot	Closure	May	6	0.000109	0.000109	0.000109	5	0.000136	0.000136	0.000136	5	0.000141	0.000141	0.000141	10	0.000518	0.000518	0.000519	1	0.000240	0.000241	0.000245	1	0.000461	0.000466	0.000486	20	0.000476	0.000463	0.000500	189	0.000275	0.000275	0.000275	6	0.000203	0.000203	0.000203	2
Cr, Tot	Closure	Jun	6	0.000098	0.000098	0.000098	0	0.000100	0.000100	0.000100	0	0.000101	0.000101	0.000101	0	0.000529	0.000529	0.000529	0	0.000261	0.000261	0.000263	0	0.000469	0.000474	0.000493	19	0.000533	0.000512	0.000540	220	0.000217	0.000217	0.000217	0	0.000200	0.000200	0.000200	0
Cr, Tot	Closure	Jul	6	0.000142	0.000142	0.000142	0	0.000142	0.000142	0.000142	0	0.000143	0.000143	0.000143	0	0.000334	0.000334	0.000334	0	0.000245	0.000245	0.000245	0	0.000482	0.000487	0.000507	19	0.000327	0.000311	0.000329	522	0.000202	0.000202	0.000202	0	0.000529	0.000529	0.000529	-2
Cr, Tot	Closure	Aug	6	0.000143	0.000143	0.000143	0	0.000143	0.000143	0.000143	0	0.000145	0.000144	0.000145	1	0.000333	0.000333	0.000334	0	0.000228	0.000228	0.000228	0	0.000492	0.000497	0.000516	19	0.000361	0.000342	0.000362	584	0.000201	0.000201	0.000201	0	0.000540	0.000540	0.000540	0
Cr, Tot	Closure	Sep	6	0.000141	0.000141	0.000141	0	0.000142	0.000142	0.000142	0	0.000142	0.000142	0.000142	1	0.000307	0.000307	0.000307	0	0.000223	0.000223	0.000223	0	0.000490	0.000494	0.000513	19	0.000418	0.000395	0.000418	691	0.000198	0.000198	0.000198	1	0.000269	0.000269	0.000269	4
Cr, Tot	Closure	Oct	6	0.000141	0.000141	0.000141	0	0.000142	0.000142	0.000142	0	0.000143	0.000143	0.000143	1	0.000308	0.000308	0.000309	1	0.000222	0.000222	0.000222	0	0.000480	0.000484	0.000503	20	0.000629	0.000589	0.000630	1077	0.000217	0.000217	0.000217	1	0.000260	0.000260	0.000260	0
Cr, Tot	Closure	Nov	6	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	-2	0.000052	0.000052	0.000052	-2	0.000410	0.000410	0.000411	1	0.000226	0.000226	0.000226	0	0.000473	0.000477	0.000496	20	0.000640	0.000612	0.000640	166	0.000233	0.000233	0.000233	0	0.000299	0.000299	0.000299	0
Cr, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000412	0.000412	0.000413	1	0.000231	0.000231	0.000232	0	0.000470	0.000474	0.000493	21	0.000230	0.000230	0.000230	0	0.000221	0.000221	0.000221	0	0.000300	0.000300	0.000300	0
Cr, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000111	0.000101	0.000116	102	0.000421	0.000421	0.000421	3	0.000253	0.000250	0.000254	8	0.000754	0.000747	0.000755	94	0.003520	0.002966	0.003784	1190	0.000226	0.000219	0.000229	19	0.000300	0.000300	0.000300	0
Cr, Tot	Post-Closure	Feb	109	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000141	0.000126	0.000148	152	0.000420	0.000420	0.000420	3	0.000254	0.000250	0.000255	8	0.000756	0.000749	0.000757	95	0.003564	0.003008	0.003830	1208	0.000216	0.000205	0.000222	41	0.000300	0.000300	0.000300	0
Cr, Tot	Post-Closure	Mar	109	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000441	0.000377	0.000474	654	0.000420	0.000419	0.000420	3	0.000260	0.000255	0.000262	11	0.000762	0.000756	0.000764	98	0.003742	0.003162	0.004023	1275	0.000455	0.000401	0.000482	210	0.000300	0.000300	0.000300	0
Cr, Tot	Post-Closure	Apr	109	0.000060	0.000062	0.000067	6	0.000072	0.000074	0.000080	9	0.000596	0.000519	0.000647	627	0.000420	0.000420	0.000420	3	0.000269	0.000262	0.000272	15	0.000770	0.000763	0.000771	102	0.003856	0.003714	0.004105	1515	0.000585	0.000522	0.000627	243	0.000300	0.000300	0.000300	0
Cr, Tot	Post-Closure	May	109	0.000109	0.000110	0.000112	6	0.000136	0.000137	0.000139	6	0.000306	0.000280	0.000321	119	0.000531	0.000530	0.000531	3	0.000282	0.000276	0.000286	15	0.000758	0.000752	0.000759	96	0.002579	0.002303	0.002750	1339	0.000369	0.000355	0.000378	36	0.000203	0.000203	0.000203	2
Cr, Tot	Post-Closure	Jun	109	0.000098	0.000099	0.000099	0	0.000100	0.000100	0.000100	0	0.000119	0.000116	0.000120	15	0.000535	0.000535	0.000535	2	0.000287	0.000283	0.000289	9	0.000756	0.000751	0.000757	90	0.003225	0.002873	0.003437	1696	0.000229	0.000227	0.000230	5	0.000200	0.000200	0.000200	0
Cr, Tot	Post-Closure	Jul	109	0.000142	0.000142	0.000142	0	0.000142	0.000142	0.000143	0	0.000161	0.000158	0.000162	11	0.000339	0.000339	0.000339	2	0.000259	0.000257	0.000261	5	0.000781	0.000775	0.000782	91	0.003112	0.002726	0.003322	5352	0.000216	0.000214	0.000217	6	0.000529	0.000529	0.000529	-2
Cr, Tot	Post-Closure	Aug	109	0.000143	0.000143	0.000143	0	0.000143	0.000143	0.000144	0	0.000166	0.000163	0.000168	14	0.000339	0.000339	0.000339	2	0.000242	0.000240	0.000243	5	0.000796	0.000790	0.000797	91	0.003135	0.002762	0.003346	5424	0.000218	0.000215	0.000219	8	0.000540	0.000540	0.000540	0
Cr, Tot	Post-Closure	Sep	109	0.000141	0.000141	0.000141	0	0.000142	0.000142	0.000142	0	0.000176	0.000171	0.000179	21	0.000316	0.000316	0.000316	3	0.000238	0.000236	0.000239	6	0.000786	0.000781	0.000787	90	0.003260	0.002886	0.003479	5673	0.000224	0.000220	0.000226	12	0.000269	0.000269	0.000269	4
Cr, Tot	Post-Closure	Oct	109	0.000141	0.000141	0.000142	0	0.000142	0.000142	0.000143	0	0.000187	0.000181	0.000191	28	0.000321	0.000320	0.000321	5	0.000240	0.000237	0.000242	7	0.000768	0.000763	0.000769	90	0.003504	0.003159	0.003744	6218	0.000247	0.000242	0.000249	12	0.000260	0.000260	0.000260	0
Cr, Tot	Post-Closure	Nov	109	0.000051	0.000051	0.000051	0	0.000051	0.000051	0.000051	-1	0.000087	0.000081	0.000089	53	0.000423	0.000423	0.000423	4	0.000246	0.000243	0.000247	8	0.000758	0.000753	0.000759	91	0.003807	0.003343	0.004077	1354	0.000254	0.000250	0.000255	7	0.000299	0.000299	0.000299	0
Cr, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	1	0.000085	0.000080	0.000088	59	0.000423	0.000422	0.000423	3	0.000251	0.000248	0.000253	8	0.000754	0.000750	0.000756	93	0.003598	0.003054	0.003857	1228	0.000243	0.000239	0.000244	8	0.000300	0.000300	0.000300	0
Cu, Diss	Construction	Jan	2	0.00037	0.00037	0.00037	0	0.00038	0.00038	0.00038	1	0.00037	0.00037	0.00038	1	0.00083	0.00083	0.00083	0	0.00214	0.00214	0.00214	0	0.00204	0.00204	0.00216	2	0.00066	0.00066	0.00066	0	0.00161	0.00161	0.00161	-1	0.00032	0.00032	0.00032	0
Cu, Diss	Construction	Feb	2	0.00037	0.00037	0.00037	0	0.00039	0.00039	0.00041	6	0.00039	0.00039	0.00041	6	0.00083	0.00083	0.00083	0	0.00205	0.00205	0.00205	0	0.00208	0.00208	0.00220	2	0.00066	0.00066	0.00066	0	0.00126	0.00126	0.00128	-1	0.00032	0.00032	0.00032	0
Cu, Diss	Construction	Mar	2	0.00037	0.00037	0.00037	0	0.00059	0.00059	0.00062	59	0.00059	0.00059	0.00062	58	0.00083	0.00083	0.00083	0	0.00197	0.00197	0.00198	0	0.00213	0.00213	0.00224	2	0.00066	0.00066	0.00066	0	0.00126	0.00126	0.00129	12	0.00032	0.00032	0.00032	0
Cu, Diss	Construction	Apr	2	0.00037	0.00037	0.00037	0	0.00082	0.00082	0.00086	113	0.00081	0.00081	0.00085	108	0.00083	0.00083	0.00084	0	0.00192	0.00192	0.00193	0	0.00217	0.00217	0.00229	2	0.00066	0.00066	0.00066	0	0.00150	0.00150	0.00153	25	0.00032	0.00032	0.00032	0
Cu, Diss	Construction	May	2	0.00048	0.00048	0.00048	2	0.00069	0.00069	0.00070	39	0.00067	0.00067	0.00068	39	0.00121	0.00121	0.00121	0	0.00298	0.00298	0.00299	1	0.00211	0.00211	0.00222	3	0.00031	0.00031	0.00031	4	0.01385	0.01385	0.01385	7	0.00027	0.00027	0.00027	1
Cu, Diss	Construction	Jun	2	0.00051	0.00051	0.00051	0	0.00053	0.00053	0.00053	3	0.00053	0.00053	0.00053	3	0.00122	0.00122	0.00122	0	0.00621	0.00621	0.00621	0	0.00207	0.00207	0.00218	4	0.00030	0.00030	0.00030	0	0.01078	0.01078	0.01078	0	0.00027	0.00027	0.00027	0
Cu, Diss	Construction	Jul	2	0.00033	0.00033	0.00033	0	0.00035	0.00035	0.00035	4	0.00035	0.00035	0.00035	4	0.00229	0.00229	0.00229	0	0.00493	0.00493	0.00493	0	0.00215	0.00215	0.00225	4	0.00025	0.00025	0.00025	1	0.00166	0.00166	0.00166	1	0.00041	0.00041	0.00041	-1
Cu, Diss	Construction	Aug	2	0.00033	0.00033	0.00033	0	0.00035	0.00035	0.00036	5	0.00035	0.00035	0.00036	5	0.00230	0.00230	0.00230	0	0.00293	0.00293	0.00293	0	0.00219	0.00219	0.00229	5	0.00025	0.00025	0.00025	0	0.00161	0.00161	0.00162	1	0.00041	0.00041	0.00041	0
Cu, Diss	Construction	Sep	2	0.00063	0.00063	0.00063	0	0.00065	0.00065	0.00066	4	0.00065	0.00065	0.00066	4	0.00104	0.00104	0.00104	-1	0.00245	0.00245	0.00245	1	0.00218	0.00218	0.00227	6	0.00011	0.00011	0.00011	5	0.00223	0.00223	0.00224	1	0.00011	0.00011	0.00011	10
Cu, Diss	Construction	Oct	2	0.00063	0.00063	0.00063	0	0.00064	0.00064	0.00064	2	0.00063	0.00063	0.00064	2	0.00103	0.00103	0.00104	-1	0.00241	0.00241	0.00241	1	0.00217	0.00217	0.00225	6	0.00010	0.00010	0.00010	0	0.00274	0.00274	0.00274	0	0.00010	0.00010	0.00010	0
Cu, Diss	Construction	Nov	2	0.00037	0.00037	0.00037	0	0.00038	0.00038	0.00038	1	0.00038	0.00038	0.00038	0	0.00086	0.00086	0.00086	-1	0.00235	0.00235	0.00235	0	0.00217	0.00217	0.00225	6	0.00064	0.00064	0.00064	-3	0.00208	0.00208	0.00208	0	0.00031	0.00031	0.00031	-2
Cu, Diss	Construction	Dec	2	0.00037	0.00037	0.00037	0	0.00038	0.00038	0.00038	2	0.00038	0.00038	0.00038	2	0.00084	0.00084	0.00085	0	0.00224	0.00224	0.00224	0	0.00220	0.00220	0.00228	6	0.00066	0.00066	0.00066	0	0.00198	0.00198	0.00198	0	0.00032	0.00032	0.00032	0
Cu, Diss	Operations	Jan	13	0.00037	0.00037	0.00037	0	0.00044	0.00043	0.00046	18	0.00044	0.00043	0.00046	17	0.00086	0.00086	0.00087	2	0.00219	0.00218	0.00220	2	0.00286	0.00280	0.00317	23	0.00066	0.00066	0.00066	0	0.00167	0.00166	0.00169	2	0.00032	0.00032	0.00032	0
Cu, Diss	Operations	Feb	13	0.00037	0.00037	0.00037	0	0.00097	0.00092	0.00112	148	0.00097	0.00092	0.00112	148	0.00085	0.00085	0.00086	2	0.00210	0.00210	0.00212	2	0.00291	0.00284	0.00321	23	0.00066	0.00066	0.00066	0	0.00173	0.00169	0.00185	33	0.00032	0.00032	0.00032	0
Cu, Diss	Operations	Mar	13	0.00037	0.00037	0.00037	0	0.00226	0.00215	0.00263	480	0.00226	0.00214	0.00262	479	0.00085	0.00085	0.00086	2	0.00206	0.00206	0.00210	4	0.00296	0.00289	0.00327	23	0.00066	0.00066	0.00066	0	0.00265	0.00255	0.00295	128	0.00032	0.00032	0.00032	0
Cu, Diss	Operations	Apr	13	0.00037	0.00037	0.00037	0	0.00157	0.00141	0.00168	266	0.00171	0.00152	0.00182	292	0.00086	0.00086	0.00087	2	0.00203	0.00203	0.00208	6	0.00301	0.00294	0.00332	23	0.01851	0.01596	0.02011	2318	0.00227	0.00213	0.00236	76	0.00032	0.00032	0.00032	0
Cu, Diss	Operations	May	13	0.00048	0.00048	0.00048	2	0.00087	0.00083	0.00091	66	0.00089	0.00084	0.00093	74	0.00125	0.00124	0.00126	1	0.00310	0.00310	0.00314	5	0.00290	0.00284	0.00320	24	0.00462	0.00400	0.00493	1233	0.01402	0.01401	0.01406	8	0.00027	0.00027	0.00027	1
Cu, Diss	Operations	Jun	13	0.00051	0.00051	0.00051	0	0.00061	0.00060	0.00061	17	0.00061	0.00060	0.00062	18	0.00124	0.00123	0.00124	0	0.00629	0.00628	0.00631	1	0.00283	0.00277	0.00311	25	0.00502	0.00435	0.00537	1351	0.01081	0.01081	0.01082	0	0.00027	0.00027	0.00027	0
Cu, Diss	Operations	Jul	13	0.00033	0.00033	0.00033	0	0.00041	0.00041	0.00042	23	0.00042	0.00041	0.00043	24	0.00230	0.00230	0.00231	0	0.00498	0.00498	0.00499	1	0.00291	0.00285	0.00320	26	0.00346	0.00301	0.00368	1102	0.00171	0.00171	0.00172	4	0.00041	0.00041	0.00041	-1
Cu, Diss	Operations	Aug	13	0.00033	0.00033	0.00033	0	0.00045	0.00044	0.00046	31	0.00045	0.00044	0.00046	32	0.00231	0.00231	0.00232	1	0.00298	0.00297	0.00299	2	0.00296	0.00289	0.00324	26	0.00391	0.00338	0.00415	1252	0.00169	0.00168	0.00170	5	0.00041	0.00041	0.00041	0
Cu, Diss	Operations	Sep	13	0.00063	0.00063	0.00063	0	0.00074	0.00073	0.00077	16	0.00075	0.00073	0.00077	18	0.00107	0.00106	0.00107	1	0.00250	0.00250	0.00251	3	0.00292	0.00285	0.00319	27	0.00449	0.00386	0.00477	3755	0.00230	0.00229	0.00232	4	0.00011	0.00011	0.00011	10
Cu, Diss	Operations	Oct	13	0.00063	0.00063	0.00063	0	0.00071	0.00070	0.00075	12	0.00072	0.00071	0.00076	14	0.00107	0.00106	0.00108	1	0.00247	0.00246	0.00247	3	0.00287	0.00281	0.00313	27	0.00700	0.00600	0.00747	5900	0.00280	0.00279	0.00283	2	0.00010	0.00010	0.00010	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Cu, Diss	Operations	Nov	13	0.00037	0.00037	0.00037	0	0.00042	0.00042	0.00045	13	0.00042	0.00042	0.00045	13	0.00089	0.00089	0.00090	2	0.00240	0.00239	0.00241	2	0.00286	0.00280	0.00312	27	0.00711	0.00622	0.00793	843	0.00211	0.00212	0.00213	1	0.00031	0.00031	0.00031	-2
Cu, Diss	Operations	Dec	13	0.00037	0.00037	0.00037	0	0.00041	0.00041	0.00042	10	0.00041	0.00041	0.00042	10	0.00087	0.00087	0.00088	2	0.00229	0.00228	0.00230	2	0.00289	0.00283	0.00315	26	0.00066	0.00066	0.00066	0	0.00201	0.00200	0.00201	1	0.00032	0.00032	0.00032	0
Cu, Diss	Closure	Jan	6	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00086	0.00086	0.00087	3	0.00215	0.00216	0.00220	1	0.00306	0.00306	0.00318	49	0.00066	0.00066	0.00066	0	0.00162	0.00162	0.00162	0	0.00032	0.00032	0.00032	0
Cu, Diss	Closure	Feb	6	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00086	0.00086	0.00086	3	0.00206	0.00207	0.00210	1	0.00310	0.00310	0.00322	49	0.00066	0.00066	0.00066	0	0.00127	0.00126	0.00127	0	0.00032	0.00032	0.00032	0
Cu, Diss	Closure	Mar	6	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00085	0.00085	0.00086	3	0.00199	0.00199	0.00202	1	0.00315	0.00315	0.00326	49	0.00066	0.00066	0.00066	0	0.00112	0.00112	0.00112	0	0.00032	0.00032	0.00032	0
Cu, Diss	Closure	Apr	6	0.00037	0.00037	0.00037	0	0.00039	0.00039	0.00039	1	0.00062	0.00062	0.00063	59	0.00086	0.00086	0.00086	3	0.00193	0.00193	0.00196	1	0.00320	0.00320	0.00330	49	0.02354	0.02290	0.02354	3370	0.00143	0.00143	0.00144	18	0.00032	0.00032	0.00032	0
Cu, Diss	Closure	May	6	0.00048	0.00048	0.00048	2	0.00052	0.00052	0.00052	4	0.00058	0.00058	0.00058	20	0.00125	0.00125	0.00125	3	0.00300	0.00300	0.00302	2	0.00308	0.00308	0.00317	51	0.00595	0.00585	0.00621	1849	0.01400	0.01401	0.01403	8	0.00027	0.00027	0.00027	1
Cu, Diss	Closure	Jun	6	0.00051	0.00051	0.00051	0	0.00051	0.00051	0.00051	0	0.00052	0.00052	0.00052	1	0.00124	0.00124	0.00124	1	0.00622	0.00622	0.00624	1	0.00299	0.00299	0.00307	52	0.00662	0.00643	0.00671	2044	0.01080	0.01080	0.01080	0	0.00027	0.00027	0.00027	0
Cu, Diss	Closure	Jul	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00034	2	0.00230	0.00230	0.00231	1	0.00494	0.00494	0.00494	0	0.00308	0.00308	0.00315	53	0.00455	0.00441	0.00456	1663	0.00165	0.00165	0.00165	0	0.00041	0.00041	0.00041	-1
Cu, Diss	Closure	Aug	6	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00034	2	0.00232	0.00232	0.00232	1	0.00293	0.00293	0.00293	0	0.00311	0.00311	0.00319	54	0.00514	0.00498	0.00514	1890	0.00161	0.00161	0.00161	1	0.00041	0.00041	0.00041	0
Cu, Diss	Closure	Sep	6	0.00063	0.00063	0.00063	0	0.00062	0.00062	0.00062	0	0.00064	0.00063	0.00064	2	0.00107	0.00107	0.00107	2	0.00245	0.00245	0.00245	1	0.00306	0.00306	0.00315	54	0.00596	0.00576	0.00596	5663	0.00223	0.00223	0.00223	1	0.00011	0.00011	0.00011	10
Cu, Diss	Closure	Oct	6	0.00063	0.00063	0.00063	0	0.00062	0.00062	0.00062	0	0.00064	0.00064	0.00064	3	0.00107	0.00107	0.00107	3	0.00241	0.00241	0.00241	1	0.00302	0.00301	0.00309	53	0.00925	0.00896	0.00930	8859	0.00275	0.00275	0.00275	1	0.00010	0.00010	0.00010	0
Cu, Diss	Closure	Nov	6	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	-1	0.00038	0.00038	0.00038	1	0.00089	0.00089	0.00090	4	0.00236	0.00235	0.00236	1	0.00300	0.00299	0.00308	53	0.00716	0.00711	0.00724	977	0.00209	0.00209	0.00209	0	0.00031	0.00031	0.00031	-2
Cu, Diss	Closure	Dec	6	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00087	0.00087	0.00087	4	0.00225	0.00225	0.00225	1	0.00302	0.00301	0.00310	53	0.00066	0.00066	0.00066	0	0.00198	0.00198	0.00198	0	0.00032	0.00032	0.00032	0
Cu, Diss	Post-Closure	Jan	109	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00047	0.00046	0.00049	24	0.00087	0.00087	0.00087	5	0.00217	0.00217	0.00218	2	0.00329	0.00328	0.00329	71	0.00594	0.00543	0.00713	722	0.00168	0.00167	0.00169	3	0.00032	0.00032	0.00034	2
Cu, Diss	Post-Closure	Feb	109	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00052	0.00050	0.00055	36	0.00086	0.00086	0.00086	4	0.00209	0.00208	0.00209	2	0.00334	0.00334	0.00335	72	0.00606	0.00557	0.00728	744	0.00137	0.00136	0.00139	7	0.00032	0.00032	0.00034	2
Cu, Diss	Post-Closure	Mar	109	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00102	0.00096	0.00116	159	0.00086	0.00086	0.00086	4	0.00202	0.00202	0.00203	2	0.00340	0.00339	0.00340	72	0.00649	0.00597	0.00779	805	0.00160	0.00156	0.00172	40	0.00032	0.00032	0.00034	2
Cu, Diss	Post-Closure	Apr	109	0.00037	0.00038	0.00040	3	0.00039	0.00040	0.00042	3	0.00142	0.00135	0.00163	247	0.00087	0.00087	0.00087	5	0.00197	0.00197	0.00199	3	0.00345	0.00345	0.00346	72	0.00809	0.01011	0.02400	1432	0.00200	0.00196	0.00219	63	0.00032	0.00032	0.00033	0
Cu, Diss	Post-Closure	May	109	0.00048	0.00049	0.00049	3	0.00052	0.00052	0.00052	4	0.00084	0.00082	0.00091	69	0.00126	0.00126	0.00126	4	0.00304	0.00304	0.00306	3	0.00332	0.00332	0.00333	73	0.00547	0.00553	0.00632	1743	0.01384	0.01386	0.01403	7	0.00027	0.00027	0.00027	1
Cu, Diss	Post-Closure	Jun	109	0.00051	0.00051	0.00051	0	0.00051	0.00051	0.00051	0	0.00054	0.00054	0.00055	6	0.00124	0.00124	0.00124	2	0.00625	0.00625	0.00626	1	0.00323	0.00322	0.00323	74	0.00658	0.00658	0.00752	2092	0.01078	0.01078	0.01080	0	0.00027	0.00027	0.00027	0
Cu, Diss	Post-Closure	Jul	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00037	0.00036	0.00037	9	0.00231	0.00231	0.00231	1	0.00495	0.00495	0.00495	0	0.00332	0.00332	0.00333	74	0.00588	0.00592	0.00702	2266	0.00167	0.00167	0.00168	1	0.00041	0.00041	0.00041	-1
Cu, Diss	Post-Closure	Aug	109	0.00033	0.00033	0.00033	0	0.00033	0.00033	0.00033	0	0.00038	0.00037	0.00039	12	0.00232	0.00232	0.00232	1	0.00294	0.00294	0.00295	1	0.00336	0.00335	0.00336	75	0.00600	0.00610	0.00716	2338	0.00163	0.00163	0.00164	2	0.00041	0.00041	0.00041	0
Cu, Diss	Post-Closure	Sep	109	0.00063	0.00063	0.00063	0	0.00062	0.00063	0.00063	0	0.00069	0.00068	0.00070	10	0.00108	0.00108	0.00108	3	0.00246	0.00246	0.00247	1	0.00330	0.00329	0.00330	74	0.00610	0.00629	0.00728	6190	0.00225	0.00225	0.00226	2	0.00011	0.00011	0.00011	10
Cu, Diss	Post-Closure	Oct	109	0.00063	0.00063	0.00063	0	0.00062	0.00063	0.00063	0	0.00071	0.00070	0.00072	13	0.00108	0.00108	0.00108	5	0.00243	0.00243	0.00244	1	0.00324	0.00323	0.00324	72	0.00701	0.00730	0.00944	7201	0.00278	0.00278	0.00279	2	0.00010	0.00010	0.00010	0
Cu, Diss	Post-Closure	Nov	109	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	-1	0.00043	0.00043	0.00044	14	0.00090	0.00090	0.00090	6	0.00237	0.00237	0.00238	2	0.00322	0.00322	0.00323	72	0.00726	0.00729	0.00836	1005	0.00211	0.00211	0.00212	1	0.00031	0.00032	0.00033	-1
Cu, Diss	Post-Closure	Dec	109	0.00037	0.00037	0.00037	0	0.00037	0.00037	0.00037	0	0.00043	0.00042	0.00044	14	0.00088	0.00088	0.00088	5	0.00227	0.00227	0.00228	2	0.00325	0.00324	0.00325	72	0.00601	0.00553	0.00721	739	0.00201	0.00201	0.00202	1	0.00032	0.00032	0.00034	2
Cu, Tot	Construction	Jan	2	0.00078	0.00078	0.00078	0	0.00079	0.00079	0.00080	1	0.00079	0.00079	0.00080	1	0.00152	0.00152	0.00152	0	0.00256	0.00256	0.00257	0	0.00203	0.00203	0.00215	2	0.00066	0.00066	0.00066	0	0.00194	0.00194	0.00195	0	0.00034	0.00034	0.00034	0
Cu, Tot	Construction	Feb	2	0.00078	0.00078	0.00078	0	0.00081	0.00081	0.00084	4	0.00081	0.00081	0.00084	4	0.00152	0.00152	0.00152	0	0.00247	0.00247	0.00248	0	0.00207	0.00207	0.00219	2	0.00066	0.00066	0.00066	0	0.00162	0.00162	0.00164	0	0.00034	0.00034	0.00034	0
Cu, Tot	Construction	Mar	2	0.00078	0.00078	0.00078	0	0.00103	0.00103	0.00107	32	0.00103	0.00103	0.00107	32	0.00152	0.00152	0.00152	0	0.00240	0.00240	0.00240	0	0.00212	0.00212	0.00224	2	0.00066	0.00066	0.00066	0	0.00165	0.00165	0.00168	12	0.00034	0.00034	0.00034	0
Cu, Tot	Construction	Apr	2	0.00076	0.00076	0.00076	0	0.00127	0.00127	0.00131	61	0.00124	0.00124	0.00128	60	0.00152	0.00152	0.00152	0	0.00234	0.00234	0.00235	0	0.00216	0.00216	0.00228	2	0.00066	0.00066	0.00066	0	0.00188	0.00188	0.00191	22	0.00034	0.00034	0.00034	0
Cu, Tot	Construction	May	2	0.00051	0.00051	0.00051	-5	0.00074	0.00074	0.00076	27	0.00073	0.00073	0.00075	24	0.00144	0.00144	0.00145	0	0.00347	0.00347	0.00348	1	0.00210	0.00210	0.00221	3	0.00049	0.00049	0.00049	1	0.01508	0.01508	0.01508	7	0.00027	0.00027	0.00027	1
Cu, Tot	Construction	Jun	2	0.00054	0.00054	0.00054	0	0.00056	0.00056	0.00056	3	0.00056	0.00056	0.00056	3	0.00142	0.00142	0.00142	0	0.00687	0.00687	0.00688	0	0.00207	0.00207	0.00217	4	0.00048	0.00048	0.00048	0	0.01172	0.01172	0.01172	0	0.00027	0.00027	0.00027	0
Cu, Tot	Construction	Jul	2	0.00033	0.00033	0.00033	0	0.00035	0.00035	0.00035	4	0.00035	0.00035	0.00035	4	0.00249	0.00249	0.00249	0	0.00551	0.00551	0.00551	0	0.00214	0.00214	0.00224	4	0.00027	0.00027	0.00027	3	0.00197	0.00197	0.00197	1	0.00098	0.00098	0.00098	-2
Cu, Tot	Construction	Aug	2	0.00033	0.00033	0.00033	0	0.00036	0.00036	0.00037	6	0.00036	0.00036	0.00037	7	0.00249	0.00249	0.00250	0	0.00338	0.00338	0.00339	0	0.00218	0.00218	0.00228	5	0.00026	0.00026	0.00026	0	0.00192	0.00192	0.00192	1	0.00100	0.00100	0.00100	0
Cu, Tot	Construction	Sep	2	0.00065	0.00065	0.00065	0	0.00069	0.00069	0.00071	6	0.00069	0.00069	0.00071	7	0.00106	0.00106	0.00107	-1	0.00288	0.00288	0.00289	1	0.00217	0.00217	0.00226	6	0.00032	0.00032	0.00032	-1	0.00271	0.00271	0.00273	1	0.00035	0.00035	0.00035	7
Cu, Tot	Construction	Oct	2	0.00065	0.00065	0.00065	0	0.00066	0.00066	0.00067	3	0.00066	0.00066	0.00067	3	0.00105	0.00105	0.00106	-1	0.00286	0.00286	0.00287	1	0.00214	0.00214	0.00223	6	0.00032	0.00032	0.00032	0	0.00335	0.00335	0.00336	0	0.00033	0.00033	0.00033	0
Cu, Tot	Construction	Nov	2	0.00078	0.00078	0.00078	0	0.00079	0.00079	0.00079	2	0.00079	0.00079	0.00079	2	0.00152	0.00152	0.00152	0	0.00280	0.00280	0.00280	1	0.00215	0.00215	0.00223	6	0.00065	0.00065	0.00065	-2	0.00238	0.00238	0.00238	0	0.00034	0.00034	0.00034	0
Cu, Tot	Construction	Dec	2	0.00078	0.00078	0.00078	0	0.00079	0.00079	0.00079	1	0.00079	0.00079	0.00079	1	0.00153	0.00153	0.00153	0	0.00267	0.00267	0.00268	1	0.00219	0.00219	0.00227	6	0.00066	0.00066	0.00066	0	0.00228	0.00228	0.00228	0	0.00034	0.00034	0.00034	0
Cu, Tot	Operations	Jan	13	0.00078	0.00078	0.00078	0	0.00085	0.00085	0.00088	9	0.00085	0.00085	0.00088	9	0.00154	0.00154	0.00155	1	0.00261	0.00261	0.00262	2	0.00285	0.00279	0.00315	24	0.00066	0.00066	0.00066	0	0.00199	0.00199	0.00201	2	0.00034	0.00034	0.00034	0
Cu, Tot	Operations	Feb	13	0.00078	0.00078	0.00078	0	0.00138	0.00133	0.00154	71	0.00138	0.00133	0.00153	71	0.00154	0.00154	0.00155	1	0.00252	0.00252	0.00254	2	0.00290	0.00283	0.00320	23	0.00066	0.00066	0.00066	0	0.00208	0.00204	0.00220	26	0.00034	0.00034	0.00034	0
Cu, Tot	Operations	Mar	13	0.00078	0.00078	0.00078	0	0.00266	0.00255	0.00302	227	0.00265	0.00254	0.00302	226	0.00154	0.00154	0.00155	1	0.00248	0.00248	0.00252	4	0.00295	0.00288	0.00326	23	0.00066	0.00066	0.00066	0	0.00300	0.00291	0.00331	97	0.00034	0.00034	0.00034	0
Cu, Tot	Operations	Apr	13	0.00076	0.00076	0.00076	0	0.00200	0.00183	0.00210	132	0.00212	0.00193	0.00223	148	0.00155	0.00154	0.00156	1	0.00246	0.00246	0.00250	5	0.00300	0.00293	0.00331	23	0.01851	0.01596	0.02011	2318	0.00263	0.00248	0.00272	61	0.00034	0.00034	0.00034	0
Cu, Tot	Operations	May	13	0.00051	0.00051	0.00051	-5	0.00093	0.00088	0.00097	51	0.00096	0.00091	0.00100	54	0.00148	0.00147	0.00149	1	0.00359	0.00359	0.00363	4	0.00289	0.00283	0.00319	24	0.00477	0.00415	0.00508	765	0.01525	0.01524	0.01529	8	0.00027	0.00027	0.00027	1
Cu, Tot	Operations	Jun	13	0.00054	0.00054	0.00054	0	0.00064	0.00063	0.00065	17	0.00065	0.00064	0.00066	18	0.00143	0.00143	0.00144	1	0.00695	0.00695	0.00697	1	0.00282	0.00276	0.00310	26	0.00517	0.00451	0.00552	839	0.01175	0.01175	0.01176	0	0.00027	0.00027	0.00027	0
Cu, Tot	Operations	Jul	13	0.00033	0.00033	0.00033	0	0.00042	0.00042	0.00043	24	0.00043	0.00042	0.00044	24	0.00250	0.00250	0.00250	0	0.00555	0.00555	0.00557	1	0.00290	0.00284	0.00319	26	0.00348	0.00302	0.00370	1061	0.00202	0.00202	0.00203	3	0.00098	0.00098	0.00098	-2
Cu, Tot	Operations	Aug	13	0.00033	0.00033	0.00033	0	0.00046	0.00045	0.00047	32	0.00046	0.00045	0.00047	33	0.00251	0.00251	0.00252	1	0.00343	0.00343	0.00344	2	0.00295	0.00288	0.00323	26	0.00392	0.00339	0.00416	1203	0.00199	0.00198	0.00200	4	0.00100	0.00100	0.00100	0
Cu, Tot	Operations	Sep	13	0.00065	0.00065	0.00065	0	0.00077	0.00075	0.00079	17	0.00077	0.00076	0.00080	18	0.00109	0.00109	0.00110	1	0.00293	0.00292	0.00294	2	0.00290	0.00283	0.00317	27	0.00467	0.00404	0.00495	1162	0.00277	0.00276	0.00278	3	0.00035	0.00035	0.00035	7
Cu, Tot	Operations	Oct	13	0.00065	0.00065	0.00065	0	0.00073	0.00073	0.00078	12	0.00075	0.00074	0.00079	14	0.00108	0.00108	0.00109	1	0.00291	0.00290	0.00292	2	0.00285	0.00278	0.00311	27	0.00716	0.00617	0.00763	1829	0.00341	0.00340	0.00343	2	0.00033	0.00033	0.00033	0
Cu, Tot	Operations	Nov	13	0.00078	0.00078	0.00078	0	0.00083	0.00083	0.00086	7	0.00083	0.00084	0.00086	8	0.00155	0.00155	0.00156	1	0.00285	0.00284	0.00286	2	0.00284	0.00278	0.00310	27	0.00711	0.00623	0.00793	843	0.00241	0.00241	0.00243	1	0.00034	0.00034	0.00034	0
Cu, Tot	Operations	Dec	13	0.00078	0.00078	0.00078	0	0.00082	0.00082	0.00083	5	0.00082	0.00082	0.00083	5	0.00155	0.00155	0.00156	1	0.00272	0.00271	0.00273	2	0.00288	0.00281	0.00313	27	0.00066	0.00066	0.00066	0	0.00231	0.00231	0.00231	1	0.00034	0.00034	0.00034	0
Cu, Tot	Closure	Jan	6	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00155	0.00155	0.00155	2	0.00257	0.00258	0.00262	1	0.00304	0.00304	0.00317	49	0.00066	0.00066	0.00066	0	0.00194	0.00194	0.00195	0	0.00034	0.00034	0.00034	0
Cu, Tot	Closure	Feb	6	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00155	0.00155	0.00155	2	0.00248	0.00249	0.00252	1	0.00309	0.00309	0.00321	49	0.00066	0.00066	0.00066	0	0.00161	0.00161	0.00161	0	0.00034	0.00034	0.00034	0
Cu, Tot	Closure	Mar	6	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00154	0.00154	0.00155	2	0.00241	0.00241	0.00244	1	0.00313	0.00314	0.00325	49	0.00066	0.00066	0.00066	0	0.00148	0.00148	0.00148	0	0.00034	0.00034	0.00034	0
Cu, Tot	Closure	Apr	6	0.00076	0.00076	0.00076	0	0.00079	0.00079	0.00079	0	0.00101	0.00100	0.00101	29	0.00155	0.00155	0.00155	2	0.00235	0.00235	0.00238	1	0.00318	0.00318	0.00329	49	0.02354	0.02290	0.02354	3370	0.00176	0.00176	0.00177	14	0.00034	0.00034	0.00034	0
Cu, Tot	Closure	May	6	0.00051	0.00051	0.00051	-5	0.00055	0.00055	0.00055	-6	0.00063	0.00063	0.00063	6	0.00148	0.00148	0.00149	3	0.00348	0.00349	0.00351	1	0.00306	0.00307	0.00316	51	0.00610	0.00599	0.00636	1148	0.01524	0.01525	0.01527	8	0.00027	0.00027	0.00027	1
Cu, Tot	Closure	Jun	6	0.00054	0.00054	0.00054	0	0.00054	0.00054	0.00054	0	0.00055	0.00055	0.00055	1	0.00143	0.00143	0.00144	1	0.00688	0.00689	0.00690	0	0.00298	0.00298	0.00306	52	0.00676	0.00657	0.00685	1270	0.01174	0.01174	0.01174	0	0.00027	0.00027	0.00027	0
Cu, Tot	Closure	Jul	6	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00034	0	0.00034	0.00034	0.00034	2	0.00250	0.00250	0.00250	1	0.00551	0.00551	0.00552	0	0.00307	0.00307	0.00314	53	0.00456	0.00442	0.00458	1600	0.00197	0.00197	0.00197	0	0.00098	0.00098	0.00098	-2
Cu, Tot	Closure	Aug	6	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00034	0	0.00035	0.00035	0.00035	2	0.00251	0.00251	0.00251	1	0.00339	0.00339	0.00339	0	0.00310	0.00310	0.00318	54	0.00515	0.00498	0.00515	1817	0.00191	0.00191	0.00191	1	0.00100	0.00100	0.00100	0
Cu, Tot	Closure	Sep	6	0.00065	0.00065	0.00065	0	0.00065	0.00065	0.00065	0	0.00066	0.00066	0.00066	2	0.00109	0.00109	0.00109	2	0.00287	0.00287	0.00288	1	0.00305	0.00305	0.00313	54	0.00613	0.00594	0.00613	1755	0.00269	0.00269	0.00269	1	0.00035	0.00035	0.00035	7
Cu, Tot	Closure	Oct	6	0.00065	0.00065	0.00065	0	0.00065	0.00065	0.00065	0	0.00067	0.00067	0.00067	3	0.00109	0.00109	0.00109	3	0.00286	0.00286	0.00286	1	0.00299	0.00298	0.00307	54	0.00940	0.00911	0.00945	2748	0.00336	0.00336	0.00336	1	0.00033	0.00033	0.00033	0
Cu, Tot	Closure	Nov	6	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00079	0.00079	0.00079	1	0.00155	0.00155	0.00156	3	0.00280	0.00280	0.00280	1	0.00298	0.00297	0.00306	54	0.00717	0.00711	0.00725	978	0.00238	0.00238	0.00238	0	0.00034	0.00034	0.00034	0
Cu, Tot	Closure	Dec	6	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00156	0.00155	0.00156	2	0.00268	0.00268	0.00268	1	0.00300	0.00300	0.00309	53	0.00066	0.00066	0.00066	0	0.00228	0.00228	0.00228	0	0.00034	0.00034	0.00034	0
Cu, Tot	Post-Closure	Jan	109	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00089	0.00088	0.00094	13	0.00156	0.00156	0.00156	3	0.00260	0.00260	0.00261	2	0.00328	0.00328	0.00328	72	0.00690	0.00656	0.00966	893	0.00201	0.00201	0.00205	3	0.00034	0.00035	0.00036	2
Cu, Tot	Post-Closure	Feb	109	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00094	0.00093	0.00101	20	0.00155	0.00155	0.00155	3	0.00251	0.00251	0.00253	2	0.00333	0.00333	0.00333	72	0.00704	0.00674	0.00986	921	0.00173	0.00172	0.00179	6	0.00034	0.00035	0.00036	2
Cu, Tot	Post-Closure	Mar	109	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00149	0.00146	0.00182	87	0.00155	0.00155	0.00155	3	0.00245	0.00244	0.00247	2	0.00339	0.00339	0.00339	72	0.00756	0.00723	0.01056	995	0.00202	0.00200	0.00230	36	0.00034	0.00035	0.00036	2
Cu, Tot	Post-Closure	Apr	109	0.00076	0.00077	0.00079	1	0.00079	0.00080	0.00082	1	0.00193	0.00188	0.00235	142	0.00156	0.00156	0.00156	3	0.00240	0.00240	0.00243	3	0.00344	0.00344	0.00345	73	0.00951	0.01149	0.02400	1641	0.00245	0.00242	0.00280	57	0.00034	0.00034	0.00035	1
Cu, Tot	Post-Closure	May	109	0.00051	0.00052	0.00052	-4	0.00055	0.00055	0.00056	-5	0.00094	0.00093	0.00108	57	0.00149	0.00149	0.00149	4	0.00354	0.00354	0.00357	3	0.00331	0.00331	0.00332	74	0.00627	0.00651	0.00805	1257	0.01508	0.01510	0.01527	7	0.00027	0.00027	0.00027	1
Cu, Tot	Post-Closure	Jun	109	0.00054	0.00054	0.00054	0	0.00054	0.00054	0.00054	0	0.00058	0.00058	0.00060	7	0.00144	0.00144	0.00144	2	0.00692	0.00691	0.00694	1	0.00322	0.00322	0.00322	75	0.00736	0.00774	0.00976	1512	0.01173	0.01173	0.01174	0	0.00027	0.00027	0.00027	0
Cu, Tot	Post-Closure	Jul	109	0.00033	0.00033	0.00033	0	0.00034	0.00034	0.00034	0	0.00038	0.00038	0.00039	11	0.00251	0.00250	0.00251	1	0.00553	0.00553	0.00554	0	0.00331	0.00331	0.00332	75	0.00684	0.00698	0.00918	2585	0.00199	0.00199	0.00200	1	0.00098	0.00098	0.00098	-2
Cu, Tot	Post-Closure	Aug	109	0.00033	0.00033	0.00034	0	0.00034	0.00034	0.00034	0	0.00039	0.00039	0.00041	14	0.00252	0.00252	0.00252	1	0.00340	0.00340	0.00341	1	0.00335	0.00335	0.00335	75	0.00697	0.00717	0.00929	2657	0.00194	0.00194	0.00195	2	0.00100	0.00100	0.00100	0
Cu, Tot	Post-Closure	Sep	109	0.00065	0.00065	0.00065	0	0.00065	0.00065	0.00065	0	0.00072	0.00072	0.00075	11	0.00110	0.00110	0.00110	3	0.00289	0.00289	0.00290	1	0.00328	0.00328	0.00329	75	0.00712	0.00744	0.00953	2225	0.00272	0.00272	0.00274	2	0.00035	0.00035	0.00035	7
Cu, Tot	Post-Closure	Oct	109	0.00065	0.00065	0.00065	0	0.00065	0.00065	0.00065	0	0.00074	0.00074	0.00078	15	0.00110	0.00110	0.00110	5	0.00288	0.00288	0.00289	1	0.00321	0.00321	0.00322	74	0.00825	0.00853	0.01038	2567	0.00340	0.00340	0.00342	2	0.00033	0.00033	0.00033	0
Cu, Tot	Post-Closure	Nov	109	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00085	0.00084	0.00087	9	0.00156	0.00156	0.00156	4	0.00282	0.00282	0.00284	2	0.00320	0.00320	0.00320	73	0.00814	0.00857	0.01094	1198	0.00241	0.00241	0.00243	1	0.00034	0.00035	0.00036	2
Cu, Tot	Post-Closure	Dec	109	0.00078	0.00078	0.00078	0	0.00078	0.00078	0.00078	0	0.00084	0.00084	0.00087	7	0.00156	0.00156	0.00156	3	0.00270	0.00270	0.00272	2	0.00323	0.00323	0.00324	73	0.00698	0.00669	0.00977	913	0.00231	0.00231	0.00233	1	0.00034	0.00035	0.00036	2
Fe, Tot	Construction	Jan	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Construction	Feb	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Construction	Mar	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Construction	Apr	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Construction	May	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Construction	Jun	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Construction	Jul	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Construction	Aug	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Construction	Sep	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Construction	Oct	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Construction	Nov	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Construction	Dec	2	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Operations	Jan	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Operations	Feb	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Operations	Mar	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Operations	Apr	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Fe, Tot	Operations	May	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Operations	Jun	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Operations	Jul	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Operations	Aug	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Operations	Sep	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Operations	Oct	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Operations	Nov	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Operations	Dec	13	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Closure	Jan	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Closure	Feb	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Closure	Mar	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Closure	Apr	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Closure	May	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Closure	Jun	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Closure	Jul	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Closure	Aug	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Closure	Sep	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Closure	Oct	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Closure	Nov	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Closure	Dec	6	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Post-Closure	Jan	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Post-Closure	Feb	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Post-Closure	Mar	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Post-Closure	Apr	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Post-Closure	May	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Post-Closure	Jun	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-35	0.200	0.200	0.200	0	0.200	0.200	0.200	-85
Fe, Tot	Post-Closure	Jul	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Post-Closure	Aug	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	25	0.200	0.200	0.200	0	0.200	0.200	0.200	-78
Fe, Tot	Post-Closure	Sep	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Post-Closure	Oct	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	190	0.200	0.200	0.200	0	0.200	0.200	0.200	-75
Fe, Tot	Post-Closure	Nov	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Fe, Tot	Post-Closure	Dec	109	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	0	0.200	0.200	0.200	-52	0.200	0.200	0.200	0	0.200	0.200	0.200	-97
Pb, Diss	Construction	Jan	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	0	0.000166	0.000166	0.000168	0	0.000045	0.000045	0.000045	0	0.000038	0.000038	0.000038	0	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Feb	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000046	1	0.000045	0.000045	0.000046	1	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	0	0.000166	0.000166	0.000168	0	0.000045	0.000045	0.000045	0	0.000040	0.000040	0.000041	1	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Mar	2	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000050	9	0.000049	0.000049	0.000050	9	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	0	0.000165	0.000165	0.000167	0	0.000045	0.000045	0.000045	0	0.000044	0.000044	0.000045	9	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Apr	2	0.000045	0.000045	0.000045	0	0.000054	0.000054	0.000055	19	0.000053	0.000053	0.000054	19	0.000049	0.000049	0.000049	0	0.000039	0.000039	0.000039	1	0.000165	0.000165	0.000167	0	0.000045	0.000045	0.000045	0	0.000047	0.000047	0.000048	18	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	May	2	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000049	8	0.000048	0.000048	0.000049	7	0.000064	0.000064	0.000064	-2	0.000039	0.000039	0.000040	1	0.000169	0.000169	0.000171	-1	0.000045	0.000045	0.000045	0	0.000036	0.000036	0.000037	5	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Jun	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000045	0.000045	0.000045	1	0.000063	0.000063	0.000063	-1	0.000040	0.000040	0.000040	1	0.000176	0.000176	0.000178	-2	0.000045	0.000045	0.000045	0	0.000037	0.000037	0.000037	1	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Jul	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000045	0.000045	0.000045	1	0.000056	0.000056	0.000056	-1	0.000041	0.000041	0.000041	0	0.000181	0.000181	0.000182	-2	0.000045	0.000045	0.000045	0	0.000039	0.000039	0.000039	1	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Aug	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000046	1	0.000045	0.000045	0.000046	1	0.000057	0.000057	0.000057	-2	0.000042	0.000042	0.000042	0	0.000180	0.000180	0.000182	-1	0.000045	0.000045	0.000045	0	0.000040	0.000040	0.000040	1	0.000045	0.000045	0.000045	0
Pb, Diss	Construction	Sep	2	0.000045	0.000045	0.000045	0	0.000046	0.000046	0.000046	2	0.000046	0.000046	0.000046	2	0.000053	0.000053	0.000053	-3	0.000042	0.000042	0.000042	1	0.000177	0.000177	0.000179	0	0.000045	0.000045	0.000045	0	0.000040	0.000040	0.000040	2	0.000026	0.000026	0.000026	3
Pb, Diss	Construction	Oct	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000045	0.000045	0.000045	1	0.000055	0.000055	0.000055	-3	0.000041	0.000041	0.000041	0	0.000175	0.000175	0.000176	0	0.000045	0.000045	0.000045	0	0.000037	0.000037	0.000037	1	0.000025	0.000025	0.000025	0
Pb, Diss	Construction	Nov	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000051	0.000051	0.000051	-2	0.000040	0.000040	0.000040	0	0.000172	0.000172	0.000173	0	0.000045	0.000045	0.000045	0	0.000035	0.000035	0.000035	0	0.000044	0.000044	0.000044	-1
Pb, Diss	Construction	Dec	2	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000050	0.000050	0.000050	-1	0.000040	0.000040	0.000040	0	0.000170	0.000170	0.000172	0	0.000045	0.000045	0.000045	0	0.000036	0.000036	0.000036	0	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Jan	13	0.000045	0.000045	0.000045	0	0.000047	0.000047	0.000048	5	0.000047	0.000047	0.000048	5	0.000050	0.000050	0.000050	0	0.000041	0.000040	0.000041	3	0.000188	0.000187	0.000203	8	0.000045	0.000045	0.000045	0	0.000039	0.000039	0.000040	4	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Feb	13	0.000045	0.000045	0.000045	0	0.000059	0.000059	0.000065	31	0.000059	0.000059	0.000065	30	0.000049	0.000049	0.000050	1	0.000041	0.000041	0.000041	3	0.000188	0.000186	0.000203	8	0.000045	0.000045	0.000045	0	0.000051	0.000051	0.000056	29	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Mar	13	0.000045	0.000045	0.000045	0	0.000088	0.000087	0.000101	94	0.000087	0.000087	0.000101	93	0.000049	0.000049	0.000050	1	0.000042	0.000042	0.000043	6	0.000188	0.000186	0.000203	8	0.000045	0.000045	0.000045	0	0.000077	0.000077	0.000089	89	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Apr	13	0.000045	0.000045	0.000045	0	0.000076	0.000072	0.000082	60	0.000083	0.000077	0.000090	72	0.000049	0.000049	0.000050	1	0.000042	0.000043	0.000044	9	0.000188	0.000186	0.000203	9	0.000872	0.000745	0.001000	1556	0.000071	0.000067	0.000077	67	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	May	13	0.000045	0.000045	0.000045	0	0.000055	0.000054	0.000058	20	0.000057	0.000055	0.000059	23	0.000065	0.000065	0.000065	-1	0.000042	0.000043	0.000044	9	0.000191	0.000190	0.000206	7	0.000241	0.000211	0.000269	370	0.000041	0.000041	0.000043	17	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Jun	13	0.000045	0.000045	0.000045	0	0.000047	0.000047	0.000048	5	0.000048	0.000047	0.000048	6	0.000063	0.000063	0.000063	-1	0.000042	0.000042	0.000043	6	0.000198	0.000196	0.000211	6	0.000260	0.000227	0.000291	405	0.000039	0.000038	0.000039	5	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Jul	13	0.000045	0.000045	0.000045	0	0.000047	0.000047	0.000048	4	0.000047	0.000047	0.000048	5	0.000057	0.000057	0.000057	-1	0.000042	0.000042	0.000043	4	0.000203	0.000201	0.000217	6	0.000191	0.000169	0.000212	276	0.000041	0.000041	0.000041	4	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Aug	13	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000049	6	0.000048	0.000048	0.000049	6	0.000057	0.000057	0.000057	-1	0.000043	0.000043	0.000044	4	0.000203	0.000201	0.000217	7	0.000212	0.000187	0.000235	316	0.000042	0.000042	0.000042	6	0.000045	0.000045	0.000045	0
Pb, Diss	Operations	Sep	13	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000049	6	0.000049	0.000048	0.000049	7	0.000054	0.000054	0.000054	-2	0.000044	0.000043	0.000044	4	0.000199	0.000197	0.000213	8	0.000245	0.000216	0.000270	381	0.000042	0.000041	0.000042	6	0.000026	0.000026	0.000026	3
Pb, Diss	Operations	Oct	13	0.000045	0.000045	0.000045	0	0.000048	0.000047	0.000048	5	0.000048	0.000048	0.000049	6	0.000056	0.000056	0.000056	-2	0.000043	0.000043	0.000043	4	0.000196	0.000194	0.000209	9	0.000365	0.000319	0.000404	608	0.000039	0.000039	0.000040	5	0.000025	0.000025	0.000025	0
Pb, Diss	Operations	Nov	13	0.000045	0.000045	0.000045	0	0.000046	0.000047	0.000048	3	0.000047	0.000047	0.000048	4	0.000052	0.000052	0.000052	-1	0.000042	0.000042	0.000042	4	0.000193	0.000191	0.000206	9	0.000356	0.000313	0.000414	596	0.000036	0.000036	0.000037	3	0.000044	0.000044	0.000044	-1
Pb, Diss	Operations	Dec	13	0.000045	0.000045	0.000045	0	0.000046	0.000046	0.000047	3	0.000046	0.000046	0.000047	3	0.000051	0.000050	0.000051	0	0.000041	0.000041	0.000041	3	0.000192	0.000190	0.000205	9	0.000045	0.000045	0.000045	0	0.000036	0.000036	0.000037	2	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Jan	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000050	0.000050	0.000050	1	0.000040	0.000040	0.000041	1	0.000204	0.000206	0.000212	22	0.000045	0.000045	0.000045	0	0.000038	0.000038	0.000038	0	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Feb	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000050	0.000050	0.000050	2	0.000039	0.000040	0.000041	1	0.000203	0.000206	0.000213	23	0.000045	0.000045	0.000045	0	0.000040	0.000040	0.000040	0	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Mar	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000050	2	0.000039	0.000040	0.000041	1	0.000204	0.000206	0.000213	24	0.000045	0.000045	0.000045	0	0.000041	0.000041	0.000041	0	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Apr	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000056	0.000056	0.000057	25	0.000050	0.000050	0.000050	2	0.000039	0.000040	0.000041	1	0.000204	0.000207	0.000214	24	0.001168	0.001137	0.001175	2427	0.000049	0.000049	0.000049	22	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	May	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000049	8	0.000065	0.000065	0.000066	1	0.000040	0.000040	0.000041	2	0.000207	0.000209	0.000216	22	0.000320	0.000315	0.000332	599	0.000036	0.000036	0.000036	5	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Jun	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000063	0.000063	0.000064	0	0.000040	0.000040	0.000041	1	0.000213	0.000214	0.000222	20	0.000354	0.000345	0.000358	667	0.000037	0.000037	0.000037	1	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Jul	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000057	0.000057	0.000057	0	0.000041	0.000041	0.000041	1	0.000218	0.000220	0.000228	20	0.000256	0.000249	0.000258	454	0.000039	0.000039	0.000039	0	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Aug	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000057	0.000057	0.000057	-1	0.000042	0.000042	0.000042	0	0.000218	0.000220	0.000228	22	0.000285	0.000276	0.000286	514	0.000040	0.000040	0.000040	1	0.000045	0.000045	0.000045	0
Pb, Diss	Closure	Sep	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000054	0.000054	0.000055	-1	0.000042	0.000042	0.000042	1	0.000214	0.000216	0.000224	22	0.000329	0.000320	0.000331	610	0.000039	0.000039	0.000039	1	0.000026	0.000026	0.000026	3
Pb, Diss	Closure	Oct	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000046	0.000046	0.000046	2	0.000056	0.000056	0.000057	0	0.000041	0.000041	0.000041	1	0.000211	0.000213	0.000220	23	0.000495	0.000478	0.000497	962	0.000038	0.000038	0.000038	2	0.000025	0.000025	0.000025	0
Pb, Diss	Closure	Nov	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	1	0.000052	0.000052	0.000053	1	0.000040	0.000040	0.000041	1	0.000208	0.000209	0.000217	23	0.000391	0.000380	0.000393	743	0.000035	0.000035	0.000035	1	0.000044	0.000044	0.000044	-1
Pb, Diss	Closure	Dec	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000051	0.000051	0.000051	1	0.000040	0.000040	0.000040	1	0.000206	0.000208	0.000216	24	0.000045	0.000045	0.000045	0	0.000035	0.000035	0.000035	0	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	Jan	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000056	0.000055	0.000056	21	0.000052	0.000052	0.000052	5	0.000043	0.000043	0.000043	9	0.000266	0.000265	0.000267	61	0.000685	0.000587	0.000692	1205	0.000046	0.000045	0.000046	19	0.000045	0.000045	0.000046	0
Pb, Diss	Post-Closure	Feb	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000062	0.000059	0.000062	32	0.000051	0.000051	0.000051	5	0.000044	0.000043	0.000044	10	0.000266	0.000265	0.000267	62	0.000693	0.000596	0.000701	1225	0.000053	0.000051	0.000053	29	0.000045	0.000045	0.000046	0
Pb, Diss	Post-Closure	Mar	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000117	0.000106	0.000119	137	0.000051	0.000051	0.000051	5	0.000045	0.000045	0.000045	14	0.000268	0.000267	0.000269	63	0.000728	0.000627	0.000736	1294	0.000102	0.000093	0.000103	130	0.000045	0.000045	0.000046	0
Pb, Diss	Post-Closure	Apr	109	0.000045	0.000046	0.000047	2	0.000045	0.000046	0.000047	2	0.000148	0.000136	0.000151	202	0.000052	0.000051	0.000052	6	0.000047	0.000046	0.000047	18	0.000270	0.000269	0.000271	65	0.000791	0.000881	0.001611	1859	0.000126	0.000116	0.000129	189	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	May	109	0.000045	0.000045	0.000046	1	0.000045	0.000045	0.000046	1	0.000079	0.000075	0.000080	66	0.000068	0.000068	0.000068	5	0.000048	0.000047	0.000048	19	0.000270	0.000269	0.000270	60	0.000536	0.000517	0.000548	1049	0.000055	0.000052	0.000055	50	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	Jun	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000049	0.000048	0.000049	7	0.000065	0.000065	0.000065	2	0.000045	0.000045	0.000045	12	0.000273	0.000272	0.000274	54	0.000662	0.000635	0.000677	1311	0.000039	0.000039	0.000039	6	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	Jul	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000049	0.000048	0.000049	7	0.000058	0.000058	0.000058	2	0.000044	0.000043	0.000044	7	0.000282	0.000281	0.000282	55	0.000636	0.000594	0.000648	1220	0.000042	0.000042	0.000042	6	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	Aug	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000050	0.000049	0.000050	9	0.000059	0.000059	0.000059	2	0.000044	0.000044	0.000044	6	0.000283	0.000282	0.000283	58	0.000647	0.000609	0.000659	1254	0.000043	0.000042	0.000043	8	0.000045	0.000045	0.000045	0
Pb, Diss	Post-Closure	Sep	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000052	0.000051	0.000052	14	0.000056	0.000056	0.000056	3	0.000045	0.000044	0.000045	7	0.000277	0.000276	0.000278	59	0.000667	0.000635	0.000680	1310	0.000044	0.000044	0.000044	12	0.000026	0.000026	0.000026	3
Pb, Diss	Post-Closure	Oct	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000054	0.000053	0.000054	18	0.000059	0.000059	0.000059	5	0.000045	0.000044	0.000045	8	0.000272	0.000271	0.000272	58	0.000724	0.000712	0.000741	1482	0.000043	0.000043	0.000044	15	0.000025	0.000025	0.000025	0
Pb, Diss	Post-Closure	Nov	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000052	0.000051	0.000052	13	0.000055	0.000055	0.000055	6	0.000044	0.000044	0.000044	9	0.000268	0.000267	0.000269	59	0.000767	0.000719	0.000785	1498	0.000039	0.000038	0.000039	11	0.000044	0.000044	0.000045	-1
Pb, Diss	Post-Closure	Dec	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000051	0.000050	0.000051	12	0.000053	0.000053	0.000053	6	0.000044	0.000043	0.000044	9	0.000266	0.000265	0.000267	60	0.000698	0.000604	0.000705	1243	0.000040	0.000039	0.000040	10	0.000045	0.000045	0.000046	0
Pb, Tot	Construction	Jan	2	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000053	9	0.000049	0.000049	0.000053	9	0.000210	0.000210	0.000210	0	0.000065	0.000065	0.000066	2	0.000205	0.000205	0.000207	0	0.000045	0.000045	0.000045	0	0.000041	0.000041	0.000043	8	0.000045	0.000045	0.000045	0
Pb, Tot	Construction	Feb	2	0.000045	0.000045	0.000045	0	0.000056	0.000056	0.000066	24	0.000056	0.000056	0.000066	24	0.000210	0.000210	0.000210	0	0.000066	0.000066	0.000068	2	0.000204	0.000204	0.000206	0	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000057	22	0.000045	0.000045	0.000045	0
Pb, Tot	Construction	Mar	2	0.000045	0.000045	0.000045	0	0.000105	0.000105	0.000109	133	0.000105	0.000105	0.000109	133	0.000210	0.000210	0.000210	0	0.000069	0.000069	0.000071	4	0.000204	0.000204	0.000205	0	0.000045	0.000045	0.000045	0	0.000091	0.000091	0.000094	125	0.000045	0.000045	0.000045	0
Pb, Tot	Construction	Apr	2	0.000045	0.000045	0.000045	0	0.000131	0.000131	0.000136	191	0.000128	0.000128	0.000133	185	0.000210	0.000210	0.000210	0	0.000072	0.000072	0.000074	6	0.000203	0.000203	0.000204	-1	0.000045	0.000045	0.000045	0	0.000110	0.000110	0.000114	173	0.000045	0.000045	0.000045	0
Pb, Tot	Construction	May	2	0.000045	0.000045	0.000045	0	0.000085	0.000085	0.000086	57	0.000084	0.000084	0.000086	43	0.000112	0.000112	0.000112	-1	0.000071	0.000071	0.000073	7	0.000205	0.000205	0.000206	-1	0.000195	0.000195	0.000195	-3	0.000058	0.000058	0.000059	38	0.000045	0.000045	0.000045	0
Pb, Tot	Construction	Jun	2	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000049	8	0.000049	0.000049	0.000049	7	0.000101	0.000101	0.000101	-1	0.000059	0.000059	0.000059	6	0.000210	0.000210	0.000211	-1	0.000200	0.000200	0.000200	0	0.000040	0.000040	0.000040	6	0.000045	0.000045	0.000045	0
Pb, Tot	Construction	Jul	2	0.000046	0.000046	0.000046	0	0.000050	0.000050	0.000050	8	0.000050	0.000050	0.000050	8	0.000239	0.000239	0.000239	0	0.000063	0.000063	0.000064	4	0.000216	0.000216	0.000217	-2	0.000055	0.000055	0.000055	10	0.000067	0.000067	0.000067	4	0.000214	0.000214	0.000214	-3
Pb, Tot	Construction	Aug	2	0.000046	0.000046	0.000046	0	0.000051	0.000051	0.000051	10	0.000051	0.000051	0.000051	10	0.000240	0.000240	0.000240	0	0.000071	0.000071	0.000071	4	0.000222	0.000222	0.000223	-2	0.000050	0.000050	0.000050	0	0.000067	0.000067	0.000067	6	0.000220	0.000220	0.000220	0
Pb, Tot	Construction	Sep	2	0.000046	0.000046	0.000046	0	0.000052	0.000052	0.000052	13	0.000052	0.000052	0.000052	13	0.000144	0.000144	0.000144	-1	0.000069	0.000069	0.000069	4	0.000222	0.000222	0.000223	-1	0.000045	0.000045	0.000045	0	0.000049	0.000049	0.000049	10	0.000181	0.000181	0.000181	1
Pb, Tot	Construction	Oct	2	0.000046	0.000046	0.000046	0	0.000051	0.000051	0.000052	11	0.000051	0.000051	0.000051	11	0.000143	0.000143	0.000143	-1	0.000065	0.000065	0.000065	5	0.000216	0.000216	0.000217	-1	0.000045	0.000045	0.000045	0	0.000047	0.000047	0.000047	8	0.000180	0.000180	0.000180	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Pb, Tot	Construction	Nov	2	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000048	7	0.000048	0.000048	0.000048	7	0.000208	0.000208	0.000208	0	0.000063	0.000063	0.000064	4	0.000211	0.000211	0.000212	0	0.000045	0.000045	0.000045	0	0.000037	0.000037	0.000037	6	0.000050	0.000050	0.000050	10
Pb, Tot	Construction	Dec	2	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000048	7	0.000048	0.000048	0.000048	7	0.000210	0.000210	0.000210	0	0.000064	0.000064	0.000064	4	0.000209	0.000209	0.000210	0	0.000045	0.000045	0.000045	0	0.000037	0.000037	0.000037	6	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	Jan	13	0.000045	0.000045	0.000045	0	0.000051	0.000051	0.000055	14	0.000051	0.000051	0.000055	14	0.000211	0.000210	0.000211	0	0.000066	0.000066	0.000066	4	0.000226	0.000225	0.000241	6	0.000045	0.000045	0.000045	0	0.000042	0.000042	0.000045	12	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	Feb	13	0.000045	0.000045	0.000045	0	0.000070	0.000070	0.000074	55	0.000070	0.000070	0.000074	55	0.000211	0.000210	0.000211	0	0.000068	0.000068	0.000068	4	0.000225	0.000224	0.000241	6	0.000045	0.000045	0.000045	0	0.000060	0.000060	0.000063	51	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	Mar	13	0.000045	0.000045	0.000045	0	0.000108	0.000109	0.000118	143	0.000108	0.000109	0.000118	143	0.000210	0.000210	0.000211	0	0.000071	0.000071	0.000072	7	0.000225	0.000224	0.000240	6	0.000045	0.000045	0.000045	0	0.000096	0.000096	0.000104	136	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	Apr	13	0.000045	0.000045	0.000045	0	0.000100	0.000097	0.000103	116	0.000108	0.000106	0.000114	135	0.000211	0.000210	0.000211	0	0.000074	0.000074	0.000075	8	0.000225	0.000223	0.000240	6	0.001362	0.001162	0.001476	2483	0.000092	0.000090	0.000097	125	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	May	13	0.000045	0.000045	0.000045	0	0.000075	0.000074	0.000078	38	0.000078	0.000078	0.000080	32	0.000113	0.000113	0.000113	0	0.000072	0.000072	0.000073	9	0.000226	0.000224	0.000241	6	0.000489	0.000445	0.000514	122	0.000054	0.000054	0.000055	28	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	Jun	13	0.000045	0.000045	0.000045	0	0.000050	0.000050	0.000051	9	0.000050	0.000050	0.000051	9	0.000101	0.000101	0.000101	-1	0.000059	0.000059	0.000060	7	0.000230	0.000229	0.000245	5	0.000515	0.000468	0.000544	134	0.000040	0.000040	0.000041	8	0.000045	0.000045	0.000045	0
Pb, Tot	Operations	Jul	13	0.000046	0.000046	0.000046	0	0.000049	0.000049	0.000050	7	0.000050	0.000050	0.000050	8	0.000239	0.000239	0.000239	0	0.000064	0.000064	0.000064	4	0.000237	0.000235	0.000251	5	0.000285	0.000250	0.000304	401	0.000067	0.000067	0.000067	4	0.000214	0.000214	0.000214	-3
Pb, Tot	Operations	Aug	13	0.000046	0.000046	0.000046	0	0.000051	0.000051	0.000051	10	0.000051	0.000051	0.000052	10	0.000240	0.000240	0.000240	0	0.000072	0.000072	0.000072	4	0.000244	0.000242	0.000258	5	0.000312	0.000274	0.000333	448	0.000068	0.000067	0.000068	6	0.000220	0.000220	0.000220	0
Pb, Tot	Operations	Sep	13	0.000046	0.000046	0.000046	0	0.000051	0.000051	0.000052	11	0.000052	0.000052	0.000052	12	0.000145	0.000145	0.000146	0	0.000069	0.000069	0.000070	4	0.000243	0.000241	0.000257	5	0.000360	0.000314	0.000383	598	0.000048	0.000048	0.000049	10	0.000181	0.000181	0.000181	1
Pb, Tot	Operations	Oct	13	0.000046	0.000046	0.000046	0	0.000051	0.000051	0.000051	10	0.000052	0.000052	0.000053	12	0.000144	0.000144	0.000145	0	0.000065	0.000065	0.000065	5	0.000237	0.000235	0.000250	6	0.000548	0.000474	0.000583	954	0.000047	0.000047	0.000048	9	0.000180	0.000180	0.000180	0
Pb, Tot	Operations	Nov	13	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000049	8	0.000049	0.000049	0.000050	8	0.000209	0.000209	0.000210	0	0.000064	0.000064	0.000064	5	0.000232	0.000230	0.000245	7	0.000513	0.000446	0.000567	891	0.000037	0.000037	0.000038	7	0.000050	0.000050	0.000050	10
Pb, Tot	Operations	Dec	13	0.000045	0.000045	0.000045	0	0.000048	0.000048	0.000049	7	0.000048	0.000048	0.000049	7	0.000211	0.000211	0.000211	0	0.000064	0.000064	0.000065	4	0.000230	0.000228	0.000243	7	0.000045	0.000045	0.000045	0	0.000037	0.000037	0.000038	6	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	Jan	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000211	0.000211	0.000211	1	0.000064	0.000064	0.000066	1	0.000242	0.000245	0.000252	18	0.000045	0.000045	0.000045	0	0.000038	0.000038	0.000038	0	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	Feb	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000211	0.000211	0.000211	1	0.000065	0.000066	0.000068	1	0.000242	0.000244	0.000252	18	0.000045	0.000045	0.000045	0	0.000040	0.000040	0.000040	0	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	Mar	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000211	0.000211	0.000211	1	0.000067	0.000067	0.000069	1	0.000242	0.000244	0.000252	19	0.000045	0.000045	0.000045	0	0.000041	0.000041	0.000041	0	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	Apr	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000061	0.000061	0.000061	35	0.000211	0.000211	0.000211	1	0.000069	0.000069	0.000071	1	0.000242	0.000244	0.000252	20	0.001619	0.001589	0.001620	3431	0.000053	0.000053	0.000053	31	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	May	6	0.000045	0.000045	0.000045	0	0.000055	0.000055	0.000055	2	0.000061	0.000061	0.000061	4	0.000113	0.000113	0.000114	1	0.000067	0.000067	0.000069	1	0.000242	0.000245	0.000252	18	0.000558	0.000554	0.000569	177	0.000043	0.000043	0.000043	3	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	Jun	6	0.000045	0.000045	0.000045	0	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000101	0.000101	0.000101	1	0.000056	0.000056	0.000057	0	0.000246	0.000248	0.000256	17	0.000598	0.000590	0.000601	195	0.000038	0.000038	0.000038	0	0.000045	0.000045	0.000045	0
Pb, Tot	Closure	Jul	6	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	1	0.000239	0.000239	0.000239	0	0.000061	0.000061	0.000062	0	0.000254	0.000256	0.000263	17	0.000347	0.000340	0.000347	579	0.000064	0.000064	0.000064	0	0.000214	0.000214	0.000214	-3
Pb, Tot	Closure	Aug	6	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000047	0.000047	0.000047	1	0.000240	0.000240	0.000241	0	0.000069	0.000069	0.000069	0	0.000260	0.000262	0.000270	17	0.000382	0.000374	0.000382	647	0.000064	0.000064	0.000064	1	0.000220	0.000220	0.000220	0
Pb, Tot	Closure	Sep	6	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000047	0.000047	0.000047	2	0.000145	0.000146	0.000146	0	0.000067	0.000067	0.000067	0	0.000259	0.000261	0.000269	17	0.000440	0.000431	0.000441	857	0.000045	0.000045	0.000045	1	0.000181	0.000181	0.000181	1
Pb, Tot	Closure	Oct	6	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000048	0.000047	0.000048	3	0.000145	0.000145	0.000145	0	0.000062	0.000062	0.000062	1	0.000252	0.000254	0.000262	18	0.000672	0.000655	0.000672	1355	0.000044	0.000044	0.000044	2	0.000180	0.000180	0.000180	0
Pb, Tot	Closure	Nov	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000046	0.000046	0.000046	1	0.000210	0.000210	0.000210	1	0.000061	0.000061	0.000061	1	0.000248	0.000249	0.000257	19	0.000522	0.000510	0.000523	1034	0.000035	0.000035	0.000035	1	0.000050	0.000050	0.000050	10
Pb, Tot	Closure	Dec	6	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000211	0.000211	0.000212	1	0.000062	0.000062	0.000062	1	0.000246	0.000247	0.000255	19	0.000045	0.000045	0.000045	0	0.000035	0.000035	0.000035	0	0.000045	0.000045	0.000045	0
Pb, Tot	Post-Closure	Jan	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000062	0.000060	0.000063	32	0.000213	0.000213	0.000213	1	0.000069	0.000068	0.000069	8	0.000305	0.000304	0.000306	49	0.001037	0.000875	0.001046	1846	0.000050	0.000048	0.000050	29	0.000045	0.000045	0.000046	1
Pb, Tot	Post-Closure	Feb	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000071	0.000067	0.000071	48	0.000213	0.000213	0.000213	1	0.000072	0.000071	0.000072	9	0.000305	0.000304	0.000306	50	0.001050	0.000889	0.001059	1875	0.000061	0.000057	0.000061	45	0.000045	0.000045	0.000046	1
Pb, Tot	Post-Closure	Mar	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000157	0.000139	0.000159	209	0.000213	0.000213	0.000213	1	0.000076	0.000074	0.000076	11	0.000306	0.000305	0.000307	51	0.001103	0.000935	0.001117	1979	0.000136	0.000121	0.000138	198	0.000045	0.000045	0.000046	1
Pb, Tot	Post-Closure	Apr	109	0.000045	0.000046	0.000047	2	0.000045	0.000046	0.000047	2	0.000200	0.000179	0.000205	298	0.000213	0.000213	0.000213	1	0.000080	0.000078	0.000080	15	0.000308	0.000307	0.000309	53	0.001165	0.001245	0.002050	2666	0.000169	0.000152	0.000173	279	0.000045	0.000045	0.000045	0
Pb, Tot	Post-Closure	May	109	0.000045	0.000045	0.000046	1	0.000055	0.000055	0.000055	2	0.000107	0.000100	0.000108	70	0.000116	0.000116	0.000116	3	0.000079	0.000077	0.000079	16	0.000305	0.000304	0.000306	49	0.000837	0.000797	0.000841	299	0.000070	0.000066	0.000071	58	0.000045	0.000045	0.000045	0
Pb, Tot	Post-Closure	Jun	109	0.000045	0.000045	0.000045	0	0.000046	0.000046	0.000046	0	0.000051	0.000050	0.000051	9	0.000103	0.000102	0.000103	1	0.000063	0.000062	0.000063	12	0.000307	0.000306	0.000308	46	0.000999	0.000944	0.001004	372	0.000041	0.000040	0.000041	8	0.000045	0.000045	0.000045	0
Pb, Tot	Post-Closure	Jul	109	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000051	0.000051	0.000051	10	0.000240	0.000240	0.000240	1	0.000066	0.000065	0.000066	6	0.000317	0.000316	0.000318	46	0.000942	0.000857	0.000945	1613	0.000068	0.000068	0.000068	6	0.000214	0.000214	0.000214	-3
Pb, Tot	Post-Closure	Aug	109	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000053	0.000052	0.000053	12	0.000242	0.000242	0.000242	1	0.000073	0.000072	0.000073	5	0.000325	0.000324	0.000325	46	0.000952	0.000873	0.000956	1645	0.000069	0.000068	0.000069	7	0.000220	0.000220	0.000220	0
Pb, Tot	Post-Closure	Sep	109	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000057	0.000055	0.000057	19	0.000148	0.000147	0.000148	2	0.000071	0.000070	0.000071	6	0.000322	0.000321	0.000323	45	0.000985	0.000910	0.000989	1923	0.000052	0.000051	0.000052	16	0.000181	0.000181	0.000181	1
Pb, Tot	Post-Closure	Oct	109	0.000046	0.000046	0.000046	0	0.000046	0.000046	0.000046	0	0.000060	0.000058	0.000060	26	0.000148	0.000148	0.000148	2	0.000067	0.000066	0.000067	8	0.000313	0.000312	0.000314	46	0.001065	0.001015	0.001072	2156	0.000053	0.000052	0.000053	19	0.000180	0.000180	0.000180	0
Pb, Tot	Post-Closure	Nov	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000055	0.000054	0.000055	20	0.000213	0.000213	0.000213	2	0.000067	0.000066	0.000067	9	0.000308	0.000307	0.000309	47	0.001138	0.001045	0.001151	2222	0.000041	0.000040	0.000041	16	0.000050	0.000050	0.000050	10
Pb, Tot	Post-Closure	Dec	109	0.000045	0.000045	0.000045	0	0.000045	0.000045	0.000045	0	0.000055	0.000053	0.000055	19	0.000214	0.000213	0.000214	2	0.000068	0.000067	0.000068	8	0.000306	0.000305	0.000307	48	0.001057	0.000901	0.001065	1902	0.000042	0.000041	0.000042	16	0.000045	0.000045	0.000046	1
Mn, Diss	Construction	Jan	2	0.013	0.013	0.013	0	0.014	0.014	0.014	5	0.014	0.014	0.014	5	0.176	0.176	0.177	0	0.027	0.027	0.027	0	0.070	0.070	0.076	3	1.100	1.100	1.100	0	0.017	0.017	0.017	2	0.280	0.280	0.280	0
Mn, Diss	Construction	Feb	2	0.013	0.013	0.013	0	0.015	0.015	0.018	18	0.015	0.015	0.018	18	0.177	0.177	0.177	0	0.030	0.030	0.030	0	0.073	0.073	0.078	3	1.100	1.100	1.100	0	0.017	0.017	0.019	12	0.280	0.280	0.280	0
Mn, Diss	Construction	Mar	2	0.013	0.013	0.013	0	0.034	0.034	0.037	162	0.034	0.034	0.037	162	0.177	0.177	0.177	0	0.032	0.032	0.033	1	0.075	0.075	0.080	3	1.100	1.100	1.100	0	0.033	0.033	0.035	117	0.280	0.280	0.280	0
Mn, Diss	Construction	Apr	2	0.023	0.023	0.023	4	0.063	0.063	0.066	153	0.071	0.071	0.073	54	0.177	0.177	0.177	0	0.035	0.035	0.036	3	0.077	0.077	0.082	2	1.100	1.100	1.100	0	0.063	0.063	0.065	62	0.280	0.280	0.280	0
Mn, Diss	Construction	May	2	0.012	0.012	0.012	-9	0.027	0.027	0.028	73	0.040	0.040	0.040	-23	0.105	0.105	0.105	0	0.037	0.037	0.038	1	0.074	0.074	0.079	4	0.732	0.732	0.732	2	0.043	0.043	0.043	-12	0.016	0.016	0.016	126
Mn, Diss	Construction	Jun	2	0.012	0.012	0.012	0	0.013	0.013	0.013	10	0.014	0.014	0.014	-2	0.099	0.099	0.099	0	0.035	0.035	0.035	-1	0.072	0.072	0.077	6	0.720	0.720	0.720	0	0.024	0.024	0.025	-1	0.007	0.007	0.007	0
Mn, Diss	Construction	Jul	2	0.004	0.004	0.004	0	0.005	0.005	0.005	20	0.006	0.006	0.006	5	0.077	0.077	0.077	0	0.024	0.024	0.024	0	0.075	0.075	0.080	6	0.285	0.285	0.285	5	0.008	0.008	0.008	2	0.006	0.006	0.006	1
Mn, Diss	Construction	Aug	2	0.004	0.004	0.004	0	0.006	0.006	0.006	24	0.006	0.006	0.006	3	0.077	0.077	0.077	0	0.017	0.017	0.017	0	0.076	0.076	0.081	7	0.270	0.270	0.270	5	0.008	0.008	0.009	2	0.006	0.006	0.006	0
Mn, Diss	Construction	Sep	2	0.003	0.003	0.003	0	0.004	0.004	0.004	35	0.004	0.004	0.005	19	0.057	0.057	0.057	0	0.015	0.015	0.015	1	0.075	0.075	0.079	9	0.106	0.106	0.106	6	0.008	0.008	0.008	8	0.005	0.005	0.005	1
Mn, Diss	Construction	Oct	2	0.003	0.003	0.003	0	0.004	0.004	0.004	22	0.004	0.004	0.004	7	0.057	0.057	0.057	0	0.014	0.014	0.014	1	0.073	0.073	0.077	10	0.100	0.100	0.100	0	0.008	0.008	0.009	2	0.005	0.005	0.005	0
Mn, Diss	Construction	Nov	2	0.013	0.013	0.013	-1	0.014	0.014	0.014	3	0.014	0.014	0.015	-3	0.172	0.172	0.172	1	0.018	0.018	0.018	1	0.075	0.075	0.078	9	1.067	1.067	1.067	-3	0.019	0.019	0.019	-1	0.271	0.271	0.271	-3
Mn, Diss	Construction	Dec	2	0.013	0.013	0.013	0	0.014	0.014	0.014	4	0.014	0.014	0.014	4	0.176	0.176	0.176	1	0.023	0.023	0.023	0	0.077	0.077	0.081	9	1.100	1.100	1.100	0	0.018	0.018	0.018	2	0.280	0.280	0.280	0
Mn, Diss	Operations	Jan	13	0.013	0.013	0.013	3	0.018	0.018	0.019	36	0.019	0.019	0.020	43	0.178	0.178	0.178	1	0.029	0.029	0.030	7	0.109	0.106	0.125	33	1.100	1.100	1.100	0	0.021	0.021	0.022	24	0.280	0.280	0.280	0
Mn, Diss	Operations	Feb	13	0.014	0.014	0.014	4	0.045	0.043	0.052	229	0.046	0.044	0.053	236	0.178	0.178	0.178	1	0.032	0.032	0.033	8	0.111	0.108	0.127	32	1.100	1.100	1.100	0	0.043	0.041	0.048	162	0.280	0.280	0.280	0
Mn, Diss	Operations	Mar	13	0.014	0.014	0.014	6	0.110	0.106	0.127	713	0.111	0.107	0.128	722	0.178	0.178	0.179	0	0.037	0.037	0.039	15	0.114	0.111	0.130	32	1.100	1.100	1.100	0	0.099	0.095	0.113	529	0.280	0.280	0.280	0
Mn, Diss	Operations	Apr	13	0.023	0.023	0.023	5	0.095	0.087	0.100	248	0.097	0.091	0.103	96	0.178	0.178	0.179	0	0.041	0.041	0.043	19	0.116	0.113	0.133	31	0.658	0.705	1.100	-36	0.084	0.079	0.089	103	0.280	0.280	0.280	0
Mn, Diss	Operations	May	13	0.012	0.012	0.012	-9	0.035	0.033	0.037	107	0.046	0.044	0.048	-14	0.107	0.107	0.108	1	0.042	0.043	0.044	14	0.112	0.109	0.127	33	0.677	0.682	0.732	-5	0.046	0.045	0.048	-6	0.016	0.016	0.016	126
Mn, Diss	Operations	Jun	13	0.012	0.012	0.012	0	0.017	0.017	0.018	39	0.018	0.018	0.018	22	0.100	0.100	0.101	1	0.038	0.038	0.039	8	0.108	0.105	0.123	36	0.677	0.680	0.720	-6	0.027	0.027	0.027	9	0.007	0.007	0.007	0
Mn, Diss	Operations	Jul	13	0.004	0.004	0.004	0	0.008	0.008	0.009	84	0.009	0.009	0.009	57	0.078	0.078	0.078	1	0.027	0.026	0.027	8	0.111	0.108	0.127	36	0.302	0.302	0.319	12	0.011	0.011	0.011	30	0.006	0.006	0.006	1
Mn, Diss	Operations	Aug	13	0.004	0.004	0.004	0	0.010	0.010	0.011	112	0.010	0.010	0.011	72	0.078	0.078	0.078	1	0.019	0.019	0.020	13	0.113	0.110	0.128	37	0.293	0.292	0.312	8	0.012	0.012	0.012	40	0.006	0.006	0.006	0
Mn, Diss	Operations	Sep	13	0.003	0.003	0.003	0	0.009	0.008	0.010	164	0.009	0.008	0.010	128	0.058	0.058	0.059	1	0.018	0.017	0.018	17	0.110	0.107	0.124	39	0.159	0.154	0.180	54	0.011	0.011	0.012	51	0.005	0.005	0.005	1
Mn, Diss	Operations	Oct	13	0.003	0.003	0.003	0	0.007	0.007	0.009	121	0.008	0.007	0.010	92	0.058	0.058	0.059	2	0.017	0.017	0.017	17	0.107	0.104	0.121	40	0.186	0.177	0.220	77	0.011	0.011	0.012	28	0.005	0.005	0.005	0
Mn, Diss	Operations	Nov	13	0.013	0.013	0.013	0	0.016	0.016	0.018	21	0.017	0.017	0.018	14	0.174	0.174	0.174	1	0.020	0.020	0.021	13	0.108	0.105	0.121	39	0.930	0.936	1.067	-15	0.020	0.020	0.021	7	0.271	0.271	0.271	-3
Mn, Diss	Operations	Dec	13	0.013	0.013	0.013	2	0.016	0.016	0.016	20	0.016	0.016	0.017	25	0.177	0.177	0.178	1	0.025	0.025	0.026	9	0.110	0.107	0.124	38	1.100	1.100	1.100	0	0.020	0.020	0.020	12	0.280	0.280	0.280	0
Mn, Diss	Closure	Jan	6	0.013	0.013	0.013	4	0.013	0.014	0.014	4	0.015	0.015	0.015	14	0.178	0.178	0.178	1	0.027	0.027	0.030	2	0.121	0.121	0.126	72	1.100	1.100	1.100	0	0.018	0.018	0.018	8	0.280	0.280	0.280	0
Mn, Diss	Closure	Feb	6	0.014	0.014	0.014	5	0.014	0.014	0.014	5	0.015	0.015	0.015	18	0.178	0.178	0.179	1	0.030	0.030	0.032	2	0.123	0.123	0.128	71	1.100	1.100	1.100	0	0.017	0.017	0.017	12	0.280	0.280	0.280	0
Mn, Diss	Closure	Mar	6	0.014	0.014	0.014	7	0.014	0.014	0.014	7	0.016	0.016	0.016	26	0.179	0.179	0.179	1	0.032	0.033	0.035	2	0.126	0.126	0.130	71	1.100	1.100	1.100	0	0.018	0.018	0.018	19	0.280	0.280	0.280	0
Mn, Diss	Closure	Apr	6	0.023	0.023	0.023	5	0.028	0.028	0.029	13	0.035	0.035	0.035	-25	0.179	0.179	0.179	1	0.035	0.035	0.037	2	0.128	0.128	0.133	71	0.804	0.789	0.809	-28	0.033	0.033	0.033	-15	0.280	0.280	0.280	0
Mn, Diss	Closure	May	6	0.012	0.012	0.012	-9	0.014	0.014	0.014	-14	0.027	0.027	0.027	-47	0.107	0.107	0.108	2	0.036	0.037	0.038	-1	0.123	0.123	0.127	74	0.717	0.715	0.729	-1	0.035	0.035	0.035	-28	0.016	0.016	0.016	126
Mn, Diss	Closure	Jun	6	0.012	0.012	0.012	0	0.012	0.012	0.012	0	0.013	0.013	0.013	-11	0.100	0.100	0.101	1	0.034	0.034	0.035	-3	0.119	0.118	0.123	77	0.733	0.727	0.737	1	0.024	0.024	0.024	-4	0.007	0.007	0.007	0
Mn, Diss	Closure	Jul	6	0.004	0.004	0.004	0	0.004	0.004	0.004	0	0.005	0.005	0.005	-10	0.078	0.078	0.078	1	0.024	0.024	0.024	-3	0.122	0.122	0.127	78	0.360	0.354	0.361	31	0.008	0.008	0.008	-5	0.006	0.006	0.006	1
Mn, Diss	Closure	Aug	6	0.004	0.004	0.004	0	0.004	0.004	0.004	0	0.005	0.005	0.005	-12	0.078	0.078	0.078	2	0.016	0.016	0.017	-3	0.123	0.123	0.129	80	0.358	0.351	0.359	30	0.008	0.008	0.008	-7	0.006	0.006	0.006	0
Mn, Diss	Closure	Sep	6	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.004	0.004	0.004	-3	0.058	0.058	0.059	3	0.014	0.014	0.014	-2	0.120	0.120	0.125	83	0.242	0.232	0.243	132	0.007	0.007	0.007	-1	0.005	0.005	0.005	1
Mn, Diss	Closure	Oct	6	0.003	0.003	0.003	0	0.003	0.003	0.003	0	0.004	0.004	0.004	1	0.059	0.059	0.059	4	0.014	0.014	0.014	-1	0.116	0.116	0.122	84	0.315	0.297	0.317	197	0.008	0.008	0.008	0	0.005	0.005	0.005	0
Mn, Diss	Closure	Nov	6	0.013	0.013	0.013	1	0.014	0.014	0.014	1	0.015	0.015	0.015	-2	0.174	0.174	0.174	2	0.018	0.018	0.018	0	0.117	0.117	0.122	82	0.993	0.983	0.994	-11	0.019	0.019	0.019	-1	0.271	0.271	0.271	-3
Mn, Diss	Closure	Dec	6	0.013	0.013	0.013	3	0.013	0.013	0.013	3	0.014	0.014	0.014	10	0.178	0.178	0.178	2	0.023	0.023	0.023	0	0.119	0.119	0.125	80	1.100	1.100	1.100	0	0.018	0.018	0.018	5	0.280	0.280	0.280	0
Mn, Diss	Post-Closure	Jan	109	0.013	0.013	0.013	4	0.013	0.013	0.013	4	0.029	0.027	0.030	109	0.180	0.180	0.180	2	0.032	0.031	0.032	17	0.177	0.175	0.177	173	0.932	0.936	1.100	-15	0.028	0.027	0.029	63	0.280	0.280	0.280	0
Mn, Diss	Post-Closure	Feb	109	0.014	0.014	0.014	5	0.014	0.014	0.014	5	0.037	0.034	0.037	160	0.180	0.180	0.180	2	0.035	0.035	0.036	17	0.179	0.178	0.180	171	0.932	0.933	1.100	-15	0.035	0.032	0.035	108	0.280	0.280	0.280	0
Mn, Diss	Post-Closure	Mar	109	0.014	0.014	0.014	7	0.014	0.014	0.014	7	0.110	0.097	0.113	643	0.180	0.180	0.180	2	0.040	0.039	0.040	21	0.183	0.182	0.184	170	0.936	0.935	1.100	-15	0.098	0.086	0.100	470	0.280	0.280	0.280	0
Mn, Diss	Post-Closure	Apr	109	0.023	0.024	0.025	8	0.028	0.029	0.031	15	0.155	0.139	0.161	200	0.180	0.180	0.180	2	0.044	0.043	0.045	26	0.188	0.186	0.188	170	0.956	0.970	1.246	-12	0.133	0.120	0.138	208	0.280	0.280	0.280	0
Mn, Diss	Post-Closure	May	109	0.012	0.012	0.013	-7	0.014	0.014	0.014	-13	0.067	0.062	0.069	20	0.110	0.110	0.110	5	0.047	0.045	0.047	22	0.180	0.178	0.180	174	0.877	0.861	0.888	20	0.058	0.055	0.059	14	0.016	0.016	0.016	126
Mn, Diss	Post-Closure	Jun	109	0.012	0.012	0.012	0	0.012	0.012	0.012	0	0.017	0.017	0.017	16	0.102	0.102	0.102	3	0.041	0.040	0.041	12	0.174	0.173	0.174	179	0.904	0.889	0.918	24	0.027	0.026	0.027	6	0.007	0.007	0.007	0
Mn, Diss	Post-Closure	Jul	109	0.004	0.004	0.004	0	0.004	0.004	0.005	0	0.009	0.009	0.009	59	0.079	0.079	0.079	3	0.027	0.027	0.027	10	0.180	0.179	0.180	181	0.812	0.757	0.825	180	0.011	0.011	0.011	31	0.006	0.006	0.006	1
Mn, Diss	Post-Closure	Aug	109	0.004	0.004	0.004	1	0.004	0.004	0.005	0	0.011	0.010	0.011	69	0.079	0.079	0.079	3	0.020	0.019	0.020	14	0.182	0.181	0.183	185	0.819	0.764	0.832	183	0.012	0.011	0.012	38	0.006	0.006	0.006	0
Mn, Diss	Post-Closure	Sep	109	0.003	0.003	0.003	1	0.003	0.003	0.003	1	0.012	0.011	0.012	196	0.060	0.060	0.060	6	0.018	0.018	0.018	20	0.178	0.177	0.178	188	0.811	0.744	0.825	644	0.013	0.013	0.014	77	0.005	0.005	0.005	1
Mn, Diss	Post-Closure	Oct	109	0.003	0.003	0.003	2	0.003	0.003	0.003	2	0.015	0.013	0.015	259	0.061	0.061	0.061	9	0.018	0.018	0.019	27	0.173	0.172	0.173	190	0.870	0.810	0.885	710	0.016	0.015	0.016	79	0.005	0.005	0.005	0
Mn, Diss	Post-Closure	Nov	109	0.013	0.013	0.014	1	0.014	0.014	0.014	1	0.023	0.022	0.023	47	0.177	0.177	0.177	4	0.022	0.022	0.023	24	0.173	0.172	0.173	185	0.992	0.982	1.058	-11	0.024	0.023	0.024	23	0.271	0.271	0.271	-3
Mn, Diss	Post-Closure	Dec	109	0.013	0.013	0.013	3	0.013	0.013	0.013	3	0.023	0.021	0.023	65	0.180	0.180	0.180	3	0.028	0.027	0.028	19	0.174	0.174	0.175	179	0.966	0.964	1.100	-12	0.024	0.023	0.024	31	0.280	0.280	0.280	0
Hg, Diss	Construction	Jan	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000050	0.0000050	0.0000051	0	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Construction	Feb	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000008	2	0.0000007	0.0000007	0.0000008	2	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000050	0.0000050	0.0000051	0	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	1	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Construction	Mar	2	0.0000007	0.0000007	0.0000007	0	0.0000009	0.0000009	0.0000009	19	0.0000009	0.0000009	0.0000009	19	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000050	0.0000050	0.0000051	-1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	15	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Construction	Apr	2	0.0000008	0.0000008	0.0000008	1	0.0000011	0.0000011	0.0000011	35	0.0000011	0.0000011	0.0000011	33	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000050	0.0000050	0.0000050	-1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	28	0.0000020	0.0000020	0.0000020	0

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Hg, Diss	Construction	May	2	0.0000012	0.0000012	0.0000012	3	0.0000014	0.0000014	0.0000014	14	0.0000014	0.0000014	0.0000014	13	0.0000028	0.0000028	0.0000028	-1	0.0000011	0.0000011	0.0000011	1	0.0000048	0.0000048	0.0000049	0	0.0000018	0.0000018	0.0000018	0	0.000002	0.000002	0.000002	9	0.0000017	0.0000017	0.0000017	1
Hg, Diss	Construction	Jun	2	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	1	0.0000011	0.0000011	0.0000011	1	0.0000028	0.0000028	0.0000028	0	0.0000014	0.0000014	0.0000014	0	0.0000047	0.0000047	0.0000048	1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Construction	Jul	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000010	0.0000010	0.0000010	1	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	0	0.0000048	0.0000048	0.0000048	1	0.0000014	0.0000014	0.0000014	1	0.000001	0.000001	0.000001	1	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Construction	Aug	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000010	0.0000010	0.0000010	1	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	0	0.0000048	0.0000048	0.0000049	2	0.0000014	0.0000014	0.0000014	0	0.000001	0.000001	0.000001	1	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Construction	Sep	2	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	2	0.0000010	0.0000010	0.0000010	1	0.0000020	0.0000020	0.0000020	-2	0.0000013	0.0000013	0.0000013	0	0.0000050	0.0000050	0.0000050	1	0.0000018	0.0000018	0.0000018	-1	0.000001	0.000001	0.000001	1	0.0000012	0.0000012	0.0000012	2
Hg, Diss	Construction	Oct	2	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	1	0.0000010	0.0000010	0.0000010	0	0.0000020	0.0000020	0.0000020	-2	0.0000012	0.0000012	0.0000012	0	0.0000052	0.0000052	0.0000052	-1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Construction	Nov	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000017	0.0000017	0.0000017	-2	0.0000011	0.0000011	0.0000011	0	0.0000052	0.0000052	0.0000052	-1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	-1
Hg, Diss	Construction	Dec	2	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000016	0.0000016	0.0000016	-1	0.0000011	0.0000011	0.0000011	0	0.0000051	0.0000051	0.0000052	-1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	Jan	13	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	5	0.0000008	0.0000008	0.0000008	5	0.0000016	0.0000016	0.0000016	-1	0.0000011	0.0000011	0.0000011	1	0.0000053	0.0000053	0.0000054	1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	3	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	Feb	13	0.0000007	0.0000007	0.0000007	0	0.0000011	0.0000010	0.0000011	42	0.0000011	0.0000010	0.0000011	42	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	2	0.0000053	0.0000053	0.0000054	1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	33	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	Mar	13	0.0000007	0.0000007	0.0000007	1	0.0000018	0.0000017	0.0000020	138	0.0000018	0.0000017	0.0000020	137	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	4	0.0000053	0.0000053	0.0000054	1	0.0000018	0.0000018	0.0000018	0	0.000002	0.000002	0.000002	113	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	Apr	13	0.0000008	0.0000008	0.0000008	1	0.0000014	0.0000014	0.0000015	71	0.0000015	0.0000014	0.0000015	72	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	6	0.0000053	0.0000052	0.0000054	1	0.0000071	0.0000062	0.0000081	247	0.000001	0.000001	0.000001	60	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	May	13	0.0000012	0.0000012	0.0000012	3	0.0000014	0.0000014	0.0000014	18	0.0000014	0.0000014	0.0000014	18	0.0000028	0.0000028	0.0000028	-1	0.0000012	0.0000012	0.0000012	6	0.0000051	0.0000051	0.0000052	2	0.0000031	0.0000029	0.0000033	59	0.000002	0.000002	0.000002	11	0.0000017	0.0000017	0.0000017	1
Hg, Diss	Operations	Jun	13	0.0000011	0.0000011	0.0000011	0	0.0000012	0.0000012	0.0000012	4	0.0000012	0.0000012	0.0000012	4	0.0000028	0.0000028	0.0000029	0	0.0000014	0.0000014	0.0000014	3	0.0000050	0.0000049	0.0000051	3	0.0000032	0.0000030	0.0000034	65	0.000001	0.000001	0.000001	2	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Operations	Jul	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	4	0.0000010	0.0000010	0.0000010	4	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	2	0.0000050	0.0000050	0.0000051	3	0.0000024	0.0000022	0.0000026	61	0.000001	0.000001	0.000001	3	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	Aug	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	5	0.0000010	0.0000010	0.0000010	5	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	2	0.0000051	0.0000051	0.0000052	3	0.0000025	0.0000024	0.0000027	69	0.000001	0.000001	0.000001	4	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Operations	Sep	13	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	6	0.0000010	0.0000010	0.0000010	6	0.0000020	0.0000020	0.0000020	-2	0.0000013	0.0000013	0.0000013	2	0.0000052	0.0000052	0.0000053	2	0.0000031	0.0000029	0.0000033	61	0.000001	0.000001	0.000001	4	0.0000012	0.0000012	0.0000012	2
Hg, Diss	Operations	Oct	13	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	4	0.0000010	0.0000010	0.0000010	4	0.0000021	0.0000021	0.0000021	-2	0.0000012	0.0000012	0.0000012	2	0.0000054	0.0000054	0.0000055	1	0.0000039	0.0000036	0.0000042	99	0.000001	0.000001	0.000001	3	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Operations	Nov	13	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	3	0.0000008	0.0000008	0.0000008	3	0.0000017	0.0000017	0.0000017	-2	0.0000012	0.0000012	0.0000012	2	0.0000054	0.0000054	0.0000055	1	0.0000037	0.0000035	0.0000041	92	0.000001	0.000001	0.000001	2	0.0000020	0.0000020	0.0000020	-1
Hg, Diss	Operations	Dec	13	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	3	0.0000008	0.0000008	0.0000008	3	0.0000016	0.0000016	0.0000016	-1	0.0000011	0.0000011	0.0000011	2	0.0000054	0.0000053	0.0000054	1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	2	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	Jan	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000054	0.0000054	0.0000054	5	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	Feb	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	1	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000053	0.0000053	0.0000054	5	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	Mar	6	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000053	0.0000053	0.0000054	5	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	1	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	Apr	6	0.0000008	0.0000008	0.0000008	1	0.0000008	0.0000008	0.0000008	2	0.0000009	0.0000009	0.0000009	11	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	0	0.0000053	0.0000053	0.0000054	5	0.0000091	0.0000090	0.0000095	399	0.000001	0.000001	0.000001	10	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	May	6	0.0000012	0.0000012	0.0000012	3	0.0000013	0.0000013	0.0000013	5	0.0000013	0.0000013	0.0000013	7	0.0000028	0.0000028	0.0000028	0	0.0000011	0.0000011	0.0000011	0	0.0000051	0.0000051	0.0000052	6	0.0000036	0.0000036	0.0000037	99	0.000002	0.000002	0.000002	6	0.0000017	0.0000017	0.0000017	1
Hg, Diss	Closure	Jun	6	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	0	0.0000028	0.0000028	0.0000028	0	0.0000014	0.0000014	0.0000014	0	0.0000050	0.0000050	0.0000050	7	0.0000038	0.0000038	0.0000039	110	0.000001	0.000001	0.000001	0	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Closure	Jul	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	0	0.0000051	0.0000051	0.0000051	8	0.0000029	0.0000028	0.0000029	101	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	Aug	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	0	0.0000051	0.0000051	0.0000052	8	0.0000030	0.0000030	0.0000031	114	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Closure	Sep	6	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	0	0.0000020	0.0000020	0.0000020	-1	0.0000013	0.0000013	0.0000013	0	0.0000053	0.0000053	0.0000053	7	0.0000037	0.0000036	0.0000038	101	0.000001	0.000001	0.000001	0	0.0000012	0.0000012	0.0000012	2
Hg, Diss	Closure	Oct	6	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000021	0.0000021	-2	0.0000012	0.0000012	0.0000012	0	0.0000055	0.0000055	0.0000055	5	0.0000048	0.0000047	0.0000049	160	0.000001	0.000001	0.000001	0	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Closure	Nov	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000017	0.0000017	0.0000017	-2	0.0000011	0.0000011	0.0000011	0	0.0000054	0.0000054	0.0000055	5	0.0000040	0.0000040	0.0000042	121	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	-1
Hg, Diss	Closure	Dec	6	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000016	0.0000016	0.0000016	-1	0.0000011	0.0000011	0.0000011	0	0.0000054	0.0000054	0.0000054	5	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	Jan	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000009	0.0000009	0.0000009	18	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	3	0.0000055	0.0000055	0.0000055	10	0.0000094	0.0000084	0.0000101	368	0.000001	0.000001	0.000001	13	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	Feb	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000010	0.0000009	0.0000010	27	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	4	0.0000055	0.0000055	0.0000055	10	0.0000095	0.0000085	0.0000102	374	0.000001	0.000001	0.000001	21	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	Mar	109	0.0000007	0.0000007	0.0000007	1	0.0000007	0.0000007	0.0000007	1	0.0000017	0.0000016	0.0000018	117	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	6	0.0000055	0.0000055	0.0000055	10	0.0000099	0.0000089	0.0000107	396	0.000002	0.000001	0.000002	96	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	Apr	109	0.0000008	0.0000008	0.0000008	1	0.0000008	0.0000008	0.0000008	3	0.0000021	0.0000020	0.0000023	147	0.0000016	0.0000016	0.0000016	1	0.0000011	0.0000011	0.0000012	8	0.0000055	0.0000055	0.0000055	11	0.0000105	0.0000106	0.0000121	487	0.000002	0.000002	0.000002	123	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	May	109	0.0000012	0.0000012	0.0000012	4	0.0000013	0.0000013	0.0000013	6	0.0000017	0.0000016	0.0000017	36	0.0000028	0.0000028	0.0000028	0	0.0000012	0.0000012	0.0000012	8	0.0000053	0.0000053	0.0000053	12	0.0000075	0.0000071	0.0000079	293	0.000002	0.000002	0.000002	19	0.0000017	0.0000017	0.0000017	1
Hg, Diss	Post-Closure	Jun	109	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	0	0.0000012	0.0000011	0.0000012	3	0.0000029	0.0000029	0.0000029	0	0.0000014	0.0000014	0.0000014	4	0.0000052	0.0000052	0.0000052	13	0.0000089	0.0000084	0.0000094	365	0.000001	0.000001	0.000001	2	0.0000017	0.0000017	0.0000017	0
Hg, Diss	Post-Closure	Jul	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	4	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	2	0.0000053	0.0000053	0.0000053	13	0.0000085	0.0000079	0.0000091	466	0.000001	0.000001	0.000001	3	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	Aug	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	5	0.0000030	0.0000030	0.0000030	0	0.0000014	0.0000014	0.0000014	2	0.0000053	0.0000053	0.0000053	14	0.0000086	0.0000081	0.0000092	475	0.000001	0.000001	0.000001	3	0.0000020	0.0000020	0.0000020	0
Hg, Diss	Post-Closure	Sep	109	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	0	0.0000010	0.0000010	0.0000010	8	0.0000020	0.0000020	0.0000020	-1	0.0000013	0.0000013	0.0000013	2	0.0000054	0.0000054	0.0000055	12	0.0000089	0.0000084	0.0000096	369	0.000001	0.000001	0.000001	6	0.0000012	0.0000012	0.0000012	2
Hg, Diss	Post-Closure	Oct	109	0.0000009	0.0000009	0.0000009	0	0.0000009	0.0000009	0.0000009	0	0.0000011	0.0000011	0.0000011	10	0.0000021	0.0000021	0.0000021	-1	0.0000012	0.0000012	0.0000012	3	0.0000056	0.0000056	0.0000056	10	0.0000096	0.0000092	0.0000103	412	0.000001	0.000001	0.000001	7	0.0000012	0.0000012	0.0000012	0
Hg, Diss	Post-Closure	Nov	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	10	0.0000017	0.0000017	0.0000017	-1	0.0000012	0.0000012	0.0000012	3	0.0000056	0.0000056	0.0000056	10	0.0000103	0.0000096	0.0000110	434	0.000001	0.000001	0.000001	6	0.0000020	0.0000020	0.0000020	-1
Hg, Diss	Post-Closure	Dec	109	0.0000007	0.0000007	0.0000007	0	0.0000007	0.0000007	0.0000007	0	0.0000008	0.0000008	0.0000008	11	0.0000016	0.0000016	0.0000016	0	0.0000011	0.0000011	0.0000011	3	0.0000056	0.0000056	0.0000056	10	0.0000096	0.0000087	0.0000103	381	0.000001	0.000001	0.000001	6	0.0000020	0.0000020	0.0000020	0
Hg, Tot	Construction	Jan	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000027	0.0000027	0.0000027	0	0.0000013	0.0000013	0.0000013	0	0.0000036	0.0000036	0.0000037	0	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Construction	Feb	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	2	0.0000010	0.0000010	0.0000010	2	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	0	0.0000036	0.0000036	0.0000037	0	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	1	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Construction	Mar	2	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000011	0.0000011	16	0.0000011	0.0000011	0.0000011	16	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	0	0.0000036	0.0000036	0.0000037	0	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	12	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Construction	Apr	2	0.0000010	0.0000010	0.0000010	0	0.0000013	0.0000013	0.0000014	29	0.0000013	0.0000013	0.0000014	25	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	1	0.0000036	0.0000036	0.0000037	0	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	20	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Construction	May	2	0.0000012	0.0000012	0.0000012	2	0.0000015	0.0000015	0.0000015	12	0.0000016	0.0000016	0.0000016	9	0.0000032	0.0000032	0.0000032	0	0.0000015	0.0000015	0.0000015	1	0.0000036	0.0000036	0.0000037	0	0.0000029	0.0000029	0.0000029	0	0.000002	0.000002	0.000002	6	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Construction	Jun	2	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	1	0.0000011	0.0000011	0.0000011	1	0.0000032	0.0000032	0.0000032	0	0.0000017	0.0000017	0.0000017	0	0.0000037	0.0000037	0.0000037	0	0.0000029	0.0000029	0.0000029	0	0.000002	0.000002	0.000002	0	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Construction	Jul	2	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	1	0.0000012	0.0000012	0.0000012	0	0.0000033	0.0000033	0.0000033	0	0.0000017	0.0000017	0.0000017	0	0.0000038	0.0000038	0.0000038	0	0.0000019	0.0000019	0.0000019	2	0.000001	0.000001	0.000001	0	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Construction	Aug	2	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	1	0.0000012	0.0000012	0.0000012	1	0.0000033	0.0000033	0.0000033	0	0.0000016	0.0000016	0.0000016	0	0.0000038	0.0000038	0.0000039	0	0.0000019	0.0000019	0.0000019	0	0.000001	0.000001	0.000001	0	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Construction	Sep	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	2	0.0000010	0.0000010	0.0000010	1	0.0000026	0.0000026	0.0000026	-1	0.0000015	0.0000015	0.0000015	0	0.0000039	0.0000039	0.0000039	0	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	1	0.0000012	0.0000012	0.0000012	3
Hg, Tot	Construction	Oct	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000010	0.0000010	0.0000010	0	0.0000026	0.0000026	0.0000026	-1	0.0000013	0.0000013	0.0000013	0	0.0000038	0.0000038	0.0000039	1	0.0000018	0.0000018	0.0000018	0	0.000001	0.000001	0.000001	0	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Construction	Nov	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000027	0.0000027	0.0000027	0	0.0000013	0.0000013	0.0000013	0	0.0000038	0.0000038	0.0000038	1	0.0000033	0.0000033	0.0000033	-2	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	-2
Hg, Tot	Construction	Dec	2	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000027	0.0000027	0.0000027	0	0.0000013	0.0000013	0.0000013	0	0.0000037	0.0000037	0.0000038	1	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Operations	Jan	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	4	0.0000010	0.0000010	0.0000010	4	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	1	0.0000040	0.0000040	0.0000041	4	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	2	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Operations	Feb	13	0.0000010	0.0000010	0.0000010	0	0.0000013	0.0000013	0.0000014	31	0.0000013	0.0000013	0.0000014	31	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	2	0.0000040	0.0000040	0.0000041	4	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	23	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Operations	Mar	13	0.0000010	0.0000010	0.0000010	0	0.0000021	0.0000020	0.0000022	103	0.0000021	0.0000020	0.0000022	102	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	3	0.0000040	0.0000040	0.0000041	4	0.0000033	0.0000033	0.0000033	0	0.000002	0.000002	0.000002	81	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Operations	Apr	13	0.0000010	0.0000010	0.0000010	1	0.0000017	0.0000016	0.0000017	55	0.0000017	0.0000016	0.0000017	52	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000015	5	0.0000040	0.0000040	0.0000041	4	0.0000076	0.0000069	0.0000085	109	0.000002	0.000002	0.000002	42	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Operations	May	13	0.0000012	0.0000012	0.0000012	2	0.0000016	0.0000016	0.0000016	15	0.0000016	0.0000016	0.0000017	12	0.0000032	0.0000032	0.0000032	0	0.0000015	0.0000015	0.0000016	4	0.0000040	0.0000039	0.0000041	4	0.0000040	0.0000038	0.0000042	32	0.000002	0.000002	0.000002	8	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Operations	Jun	13	0.0000011	0.0000011	0.0000011	0	0.0000012	0.0000012	0.0000012	4	0.0000012	0.0000012	0.0000012	4	0.0000032	0.0000032	0.0000032	0	0.0000018	0.0000018	0.0000018	2	0.0000040	0.0000039	0.0000041	4	0.0000041	0.0000039	0.0000043	35	0.000002	0.000002	0.000002	2	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Operations	Jul	13	0.0000012	0.0000012	0.0000012	0	0.0000013	0.0000013	0.0000013	3	0.0000013	0.0000013	0.0000013	3	0.0000033	0.0000033	0.0000033	0	0.0000017	0.0000017	0.0000017	2	0.0000041	0.0000040	0.0000042	4	0.0000029	0.0000027	0.0000030	43	0.000001	0.000001	0.000001	2	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Operations	Aug	13	0.0000012	0.0000012	0.0000012	0	0.0000013	0.0000013	0.0000013	4	0.0000013	0.0000013	0.0000013	4	0.0000033	0.0000033	0.0000033	0	0.0000017	0.0000017	0.0000017	2	0.0000042	0.0000041	0.0000043	4	0.0000030	0.0000028	0.0000031	48	0.000001	0.000001	0.000001	3	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Operations	Sep	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	6	0.0000010	0.0000010	0.0000010	5	0.0000026	0.0000026	0.0000026	0	0.0000015	0.0000015	0.0000015	2	0.0000042	0.0000041	0.0000042	4	0.0000031	0.0000029	0.0000033	62	0.000001	0.000001	0.000001	4	0.0000012	0.0000012	0.0000012	3
Hg, Tot	Operations	Oct	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	4	0.0000010	0.0000010	0.0000010	4	0.0000026	0.0000026	0.0000026	0	0.0000014	0.0000014	0.0000014	2	0.0000041	0.0000041	0.0000042	4	0.0000039	0.0000036	0.0000042	99	0.000001	0.000001	0.000001	3	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Operations	Nov	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	3	0.0000010	0.0000010	0.0000010	2	0.0000028	0.0000028	0.0000028	0	0.0000013	0.0000013	0.0000014	2	0.0000040	0.0000040	0.0000041	4	0.0000048	0.0000046	0.0000052	39	0.000001	0.000001	0.000001	1	0.0000024	0.0000024	0.0000024	-2
Hg, Tot	Operations	Dec	13	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	2	0.0000010	0.0000010	0.0000010	2	0.0000028	0.0000027	0.0000028	0	0.0000014	0.0000014	0.0000014	2	0.0000040	0.0000040	0.0000041	4	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	1	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Closure	Jan	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000027	0.0000027	0.0000027	0	0.0000013	0.0000013	0.0000013	0	0.0000040	0.0000040	0.0000041	10	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Closure	Feb	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	0	0.0000040	0.0000040	0.0000041	10	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Closure	Mar	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000010	0.0000010	0.0000010	1	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	0	0.0000040	0.0000040	0.0000041	10	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	1	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Closure	Apr	6	0.0000010	0.0000010	0.0000010	1	0.0000011	0.0000011	0.0000011	2	0.0000011	0.0000011	0.0000011	5	0.0000027	0.0000027	0.0000027	0	0.0000014	0.0000014	0.0000014	0	0.0000040	0.0000040	0.0000041	10	0.0000094	0.0000093	0.0000098	182	0.000001	0.000001	0.000001	5	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Closure	May	6	0.0000012	0.0000012	0.0000012	2	0.0000014	0.0000014	0.0000014	4	0.0000015	0.0000015	0.0000015	3	0.0000032	0.0000032	0.0000032	0	0.0000015	0.0000015	0.0000015	0	0.0000040	0.0000040	0.0000040	10	0.0000045	0.0000045	0.0000046	54	0.000002	0.000002	0.000002	4	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Closure	Jun	6	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	0	0.0000032	0.0000032	0.0000032	0	0.0000017	0.0000017	0.0000017	0	0.0000040	0.0000040	0.0000040	10	0.0000047	0.0000047	0.0000048	61	0.000002	0.000002	0.000002	0	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Closure	Jul	6	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	0	0.0000033	0.0000033	0.0000033	0	0.0000017	0.0000017	0.0000017	0	0.0000041	0.0000041	0.0000041	10	0.0000033	0.0000033	0.0000034	72	0.000001	0.000001	0.000001	0	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Closure	Aug	6	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	0	0.0000033	0.0000033	0.0000033	0	0.0000016	0.0000016	0.0000016	0	0.0000042	0.0000042	0.0000042	10	0.0000035	0.0000034	0.0000035	80	0.000001	0.000001	0.000001	0	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Closure	Sep	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000026	0.0000026	0.0000026	0	0.0000015	0.0000015	0.0000015	0	0.0000042	0.0000042	0.0000042	10	0.0000037	0.0000036	0.0000038	102	0.000001	0.000001	0.000001	0	0.0000012	0.0000012	0.0000012	3
Hg, Tot	Closure	Oct	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000026	0.0000026	0.0000026	0	0.0000013	0.0000013	0.0000013	0	0.0000041	0.0000041	0.0000041	10	0.0000048	0.0000047	0.0000049	160	0.000001	0.000001	0.000001	0	0.0000012	0.0000012	0.0000012	0
Hg, Tot	Closure	Nov	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000028	0.0000028	0.0000028	0	0.0000013	0.0000013	0.0000013	0	0.0000041	0.0000041	0.0000041	10	0.0000051	0.0000051	0.0000052	54	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	-2
Hg, Tot	Closure	Dec	6	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000027	0.0000027	0.0000028	0	0.0000013	0.0000013	0.0000013	0	0.0000040	0.0000040	0.0000041	10	0.0000033	0.0000033	0.0000033	0	0.000001	0.000001	0.000001	0	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Post-Closure	Jan	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000011	0.0000011	14	0.0000027	0.0000027	0.0000027	1	0.0000014	0.0000014	0.0000014	3	0.0000042	0.0000042	0.0000042	16	0.0000098	0.0000090	0.0000105	173	0.000001	0.000001	0.000001	9	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Post-Closure	Feb	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000012	0.0000012	0.0000012	21	0.0000027	0.0000027	0.0000027	1	0.0000014	0.0000014	0.0000014	3	0.0000042	0.0000042	0.0000042	17	0.0000099	0.0000091	0.0000106	176	0.000001	0.000001	0.000001	16	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Post-Closure	Mar	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	1	0.0000020	0.0000018	0.0000020	90	0.0000027	0.0000027	0.0000027	1	0.0000014	0.0000014	0.0000014	5	0.0000042	0.0000042	0.0000042	17	0.0000103	0.0000095	0.0000110	186	0.000002	0.000002	0.000002	70	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Post-Closure	Apr	109	0.0000010	0.0000010	0.0000010	1	0.0000011	0.0000011	0.0000011	2	0.0000024	0.0000022	0.0000025	109	0.0000027	0.0000027	0.0000027	1	0.0000015	0.0000015	0.0000015	6	0.0000042	0.0000042	0.0000042	17	0.0000109	0.0000109	0.0000124	231	0.000002	0.000002	0.000002	88	0.0000024	0.0000024	0.0000024	0
Hg, Tot	Post-Closure	May	109	0.0000012	0.0000012	0.0000012	2	0.0000014	0.0000014	0.0000014	4	0.0000019	0.0000018	0.0000019	27	0.0000032	0.0000032	0.0000032	1	0.0000016	0.0000016	0.0000016	6	0.0000041	0.0000041	0.0000041	17	0.0000081	0.0000077	0.0000085	167	0.000002	0.000002	0.000002	14	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Post-Closure	Jun	109	0.0000011	0.0000011	0.0000011	0	0.0000011	0.0000011	0.0000011	0	0.0000012	0.0000012	0.0000012	3	0.0000032	0.0000032	0.0000032	0	0.0000018	0.0000018	0.0000018	3	0.0000042	0.0000041	0.0000042	16	0.0000094	0.0000089	0.0000099	207	0.000002	0.000002	0.000002	2	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Post-Closure	Jul	109	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	0	0.0000013	0.0000013	0.0000013	3	0.0000033	0.0000033	0.0000033	0	0.0000017	0.0000017	0.0000017	2	0.0000043	0.0000043	0.0000043	16	0.0000089	0.0000083	0.0000094	338	0.000001	0.000001	0.000001	2	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Post-Closure	Aug	109	0.0000012	0.0000012	0.0000012	0	0.0000012	0.0000012	0.0000012	0	0.0000013	0.0000013	0.0000013	4	0.0000033	0.0000033	0.0000033	0	0.0000017	0.0000017	0.0000017	2	0.0000043	0.0000043	0.0000044	16	0.0000090	0.0000084	0.0000095	344	0.000001	0.000001	0.000001	3	0.0000022	0.0000022	0.0000022	0
Hg, Tot	Post-Closure	Sep	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000010	0.0000011	8	0.0000026	0.0000026	0.0000026	0	0.0000015	0.0000015	0.0000015	2	0.0000043	0.0000043	0.0000043	16	0.0000093	0.0000087	0.0000098	383	0.000001	0.000001	0.000001	6	0.0000012	0.0000012	0.0000012	3
Hg, Tot	Post-Closure	Oct	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000011	0.0000011	11	0.0000026	0.0000026	0.0000026	0	0.0000014	0.0000014	0.0000014	3	0.0000043	0.0000043	0.0000043	16	0.0000100	0.0000095	0.0000105	427	0.000001	0.000001	0.000001	7	0.0000012	0.0000012	0.0000012	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Hg, Tot	Post-Closure	Nov	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000011	0.0000011	8	0.0000028	0.0000028	0.0000028	1	0.0000014	0.0000014	0.0000014	3	0.0000042	0.0000042	0.0000042	16	0.0000107	0.0000101	0.0000114	207	0.000001	0.000001	0.000001	4	0.0000024	0.0000024	0.0000024	-2
Hg, Tot	Post-Closure	Dec	109	0.0000010	0.0000010	0.0000010	0	0.0000010	0.0000010	0.0000010	0	0.0000011	0.0000011	0.0000011	8	0.0000028	0.0000028	0.0000028	1	0.0000014	0.0000014	0.0000014	3	0.0000042	0.0000042	0.0000042	16	0.0000100	0.0000093	0.0000107	181	0.000001	0.000001	0.000001	5	0.0000024	0.0000024	0.0000024	0
Mo, Tot	Construction	Jan	2	0.000100	0.000100	0.000100	0	0.000103	0.000103	0.000105	3	0.000103	0.000103	0.000105	3	0.000204	0.000204	0.000205	0	0.000111	0.000111	0.000112	1	0.000597	0.000597	0.000648	3	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	2	0.000100	0.000100	0.000100	0
Mo, Tot	Construction	Feb	2	0.000100	0.000100	0.000100	0	0.000111	0.000111	0.000122	11	0.000111	0.000111	0.000122	11	0.000203	0.000203	0.000204	0	0.000112	0.000112	0.000113	1	0.000616	0.000616	0.000667	3	0.000100	0.000100	0.000100	0	0.000109	0.000109	0.000118	9	0.000100	0.000100	0.000100	0
Mo, Tot	Construction	Mar	2	0.000100	0.000100	0.000100	0	0.000199	0.000199	0.000224	99	0.000199	0.000199	0.000224	99	0.000203	0.000203	0.000204	0	0.000115	0.000115	0.000117	3	0.000636	0.000636	0.000686	3	0.000100	0.000100	0.000100	0	0.000183	0.000183	0.000205	83	0.000100	0.000100	0.000100	0
Mo, Tot	Construction	Apr	2	0.000100	0.000100	0.000100	0	0.000290	0.000290	0.000322	190	0.000284	0.000284	0.000315	184	0.000205	0.000205	0.000206	1	0.000118	0.000118	0.000121	5	0.000656	0.000656	0.000706	3	0.000100	0.000100	0.000100	0	0.000253	0.000253	0.000278	153	0.000100	0.000100	0.000100	0
Mo, Tot	Construction	May	2	0.000100	0.000100	0.000100	0	0.000177	0.000177	0.000188	77	0.000171	0.000171	0.000182	71	0.000132	0.000132	0.000134	-2	0.000120	0.000120	0.000122	8	0.000639	0.000639	0.000685	4	0.000100	0.000100	0.000100	0	0.000145	0.000145	0.000152	45	0.000100	0.000100	0.000100	0
Mo, Tot	Construction	Jun	2	0.000100	0.000100	0.000100	0	0.000108	0.000108	0.000109	8	0.000108	0.000108	0.000109	8	0.000112	0.000112	0.000113	-2	0.000113	0.000113	0.000115	6	0.000628	0.000628	0.000671	6	0.000100	0.000100	0.000100	0	0.000105	0.000105	0.000106	5	0.000100	0.000100	0.000100	0
Mo, Tot	Construction	Jul	2	0.000100	0.000100	0.000100	0	0.000106	0.000106	0.000108	6	0.000106	0.000106	0.000108	6	0.000256	0.000256	0.000256	0	0.000111	0.000111	0.000113	4	0.000654	0.000654	0.000696	6	0.000100	0.000100	0.000100	0	0.000105	0.000105	0.000106	5	0.000027	0.000027	0.000027	10
Mo, Tot	Construction	Aug	2	0.000099	0.000099	0.000099	0	0.000109	0.000109	0.000112	9	0.000109	0.000109	0.000112	9	0.000259	0.000259	0.000260	-1	0.000113	0.000113	0.000115	4	0.000668	0.000668	0.000709	7	0.000100	0.000100	0.000100	0	0.000107	0.000107	0.000109	7	0.000025	0.000025	0.000025	0
Mo, Tot	Construction	Sep	2	0.000099	0.000099	0.000099	0	0.000112	0.000112	0.000118	12	0.000112	0.000112	0.000118	12	0.000130	0.000130	0.000131	-3	0.000114	0.000114	0.000117	6	0.000658	0.000658	0.000696	8	0.000100	0.000100	0.000100	0	0.000109	0.000109	0.000114	10	0.000025	0.000025	0.000025	0
Mo, Tot	Construction	Oct	2	0.000099	0.000099	0.000099	0	0.000107	0.000107	0.000110	8	0.000107	0.000107	0.000110	8	0.000134	0.000134	0.000136	-3	0.000111	0.000111	0.000114	5	0.000645	0.000645	0.000681	9	0.000100	0.000100	0.000100	0	0.000104	0.000104	0.000107	5	0.000025	0.000025	0.000025	0
Mo, Tot	Construction	Nov	2	0.000100	0.000100	0.000100	0	0.000104	0.000104	0.000106	4	0.000104	0.000104	0.000106	4	0.000209	0.000209	0.000210	-1	0.000111	0.000111	0.000113	5	0.000648	0.000648	0.000682	10	0.000100	0.000100	0.000100	0	0.000103	0.000103	0.000104	3	0.000098	0.000098	0.000098	-3
Mo, Tot	Construction	Dec	2	0.000100	0.000100	0.000100	0	0.000104	0.000104	0.000106	4	0.000104	0.000104	0.000106	4	0.000208	0.000208	0.000209	0	0.000112	0.000112	0.000115	4	0.000662	0.000662	0.000696	9	0.000100	0.000100	0.000100	0	0.000102	0.000102	0.000104	2	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	Jan	13	0.000100	0.000100	0.000100	0	0.000230	0.000232	0.000334	132	0.000230	0.000231	0.000334	131	0.000246	0.000243	0.000283	17	0.000182	0.000177	0.000231	61	0.001911	0.001821	0.003076	166	0.000100	0.000100	0.000100	0	0.000195	0.000196	0.000270	96	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	Feb	13	0.000100	0.000100	0.000100	0	0.000626	0.000650	0.001032	550	0.000625	0.000649	0.001030	549	0.000243	0.000240	0.000278	17	0.000193	0.000187	0.000249	68	0.001961	0.001867	0.003141	165	0.000100	0.000100	0.000100	0	0.000528	0.000547	0.000857	447	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	Mar	13	0.000100	0.000100	0.000100	0	0.001698	0.001588	0.002408	1488	0.001693	0.001584	0.002401	1484	0.000243	0.000240	0.000278	17	0.000230	0.000226	0.000309	101	0.002024	0.001924	0.003223	165	0.000100	0.000100	0.000100	0	0.001461	0.001365	0.002065	1265	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	Apr	13	0.000100	0.000100	0.000100	0	0.001427	0.001339	0.002138	1239	0.001733	0.001612	0.002506	1512	0.000249	0.000246	0.000287	19	0.000270	0.000259	0.000360	129	0.002096	0.001988	0.003314	167	0.038860	0.034495	0.048290	34395	0.001442	0.001340	0.002075	1240	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	May	13	0.000100	0.000100	0.000100	0	0.000569	0.000555	0.000857	455	0.000639	0.000615	0.000929	515	0.000195	0.000190	0.000248	36	0.000276	0.000264	0.000367	136	0.002034	0.001924	0.003190	172	0.009124	0.008110	0.011060	8010	0.000434	0.000420	0.000614	320	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	Jun	13	0.000100	0.000100	0.000100	0	0.000202	0.000200	0.000257	100	0.000213	0.000209	0.000271	109	0.000142	0.000139	0.000167	20	0.000219	0.000212	0.000282	98	0.001992	0.001881	0.003097	176	0.010210	0.009072	0.012420	8972	0.000178	0.000175	0.000218	75	0.000100	0.000100	0.000100	0
Mo, Tot	Operations	Jul	13	0.000100	0.000100	0.000100	0	0.000190	0.000188	0.000241	89	0.000199	0.000196	0.000251	96	0.000280	0.000278	0.000299	7	0.000181	0.000177	0.000220	65	0.002084	0.001962	0.003213	179	0.007028	0.006238	0.008501	6138	0.000177	0.000175	0.000218	75	0.000027	0.000027	0.000027	10
Mo, Tot	Operations	Aug	13	0.000099	0.000099	0.000099	0	0.000222	0.000216	0.000284	117	0.000235	0.000227	0.000299	129	0.000289	0.000286	0.000312	9	0.000185	0.000182	0.000224	67	0.002138	0.002007	0.003266	184	0.008013	0.007089	0.009656	6989	0.000207	0.000200	0.000257	101	0.000025	0.000025	0.000025	0
Mo, Tot	Operations	Sep	13	0.000099	0.000099	0.000099	0	0.000242	0.000232	0.000307	133	0.000260	0.000248	0.000328	149	0.000177	0.000172	0.000212	25	0.000194	0.000189	0.000235	74	0.002103	0.001969	0.003184	189	0.009543	0.008430	0.011440	8330	0.000222	0.000212	0.000274	114	0.000025	0.000025	0.000025	0
Mo, Tot	Operations	Oct	13	0.000099	0.000099	0.000099	0	0.000229	0.000227	0.000310	128	0.000260	0.000254	0.000347	156	0.000198	0.000192	0.000244	35	0.000197	0.000190	0.000238	79	0.002069	0.001931	0.003104	193	0.015110	0.013261	0.018130	13161	0.000209	0.000205	0.000268	107	0.000025	0.000025	0.000025	0
Mo, Tot	Operations	Nov	13	0.000100	0.000100	0.000100	0	0.000186	0.000192	0.000263	92	0.000200	0.000204	0.000281	104	0.000274	0.000267	0.000320	25	0.000195	0.000191	0.000242	79	0.002082	0.001938	0.003103	195	0.016290	0.014369	0.020950	14269	0.000162	0.000165	0.000213	65	0.000098	0.000098	0.000098	-3
Mo, Tot	Operations	Dec	13	0.000100	0.000100	0.000100	0	0.000185	0.000177	0.000222	77	0.000185	0.000177	0.000222	77	0.000263	0.000257	0.000301	22	0.000191	0.000187	0.000236	72	0.002119	0.001970	0.003141	194	0.000105	0.000105	0.000107	5	0.000155	0.000150	0.000179	50	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	Jan	6	0.000100	0.000100	0.000100	0	0.000100	0.000102	0.000111	2	0.000100	0.000102	0.000111	2	0.000286	0.000293	0.000313	43	0.000138	0.000152	0.000228	39	0.003255	0.003476	0.004133	478	0.000100	0.000100	0.000100	0	0.000100	0.000101	0.000108	1	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	Feb	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000279	0.000286	0.000305	41	0.000139	0.000152	0.000220	37	0.003335	0.003554	0.004225	478	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	Mar	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000279	0.000285	0.000304	40	0.000139	0.000151	0.000214	35	0.003436	0.003654	0.004344	481	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	Apr	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000745	0.000717	0.000749	617	0.000287	0.000293	0.000314	44	0.000145	0.000155	0.000214	38	0.003552	0.003766	0.004479	486	0.063970	0.060935	0.064060	60835	0.000620	0.000597	0.000622	497	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	May	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000301	0.000293	0.000309	193	0.000253	0.000262	0.000292	94	0.000152	0.000161	0.000208	45	0.003434	0.003631	0.004319	495	0.015365	0.014860	0.016240	14760	0.000222	0.000217	0.000225	117	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	Jun	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000121	0.000120	0.000121	20	0.000171	0.000175	0.000189	53	0.000138	0.000141	0.000162	33	0.003350	0.003534	0.004203	505	0.017715	0.016890	0.017950	16790	0.000114	0.000113	0.000114	13	0.000100	0.000100	0.000100	0
Mo, Tot	Closure	Jul	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000115	0.000114	0.000115	15	0.000302	0.000305	0.000316	19	0.000125	0.000126	0.000130	18	0.003492	0.003676	0.004372	512	0.012200	0.011602	0.012270	11502	0.000112	0.000111	0.000112	12	0.000027	0.000027	0.000027	10
Mo, Tot	Closure	Aug	6	0.000099	0.000099	0.000099	0	0.000100	0.000100	0.000100	0	0.000123	0.000122	0.000123	22	0.000316	0.000319	0.000334	23	0.000125	0.000125	0.000126	15	0.003566	0.003745	0.004455	521	0.013835	0.013133	0.013860	13033	0.000118	0.000117	0.000118	18	0.000025	0.000025	0.000025	0
Mo, Tot	Closure	Sep	6	0.000099	0.000099	0.000099	0	0.000099	0.000099	0.000099	0	0.000132	0.000131	0.000132	31	0.000219	0.000224	0.000246	69	0.000128	0.000127	0.000129	18	0.003491	0.003657	0.004351	530	0.016350	0.015530	0.016380	15430	0.000124	0.000123	0.000124	24	0.000025	0.000025	0.000025	0
Mo, Tot	Closure	Oct	6	0.000099	0.000099	0.000099	0	0.000099	0.000099	0.000099	0	0.000155	0.000152	0.000155	53	0.000256	0.000262	0.000292	93	0.000132	0.000131	0.000134	24	0.003417	0.003570	0.004250	539	0.025745	0.024272	0.025800	24172	0.000137	0.000135	0.000137	36	0.000025	0.000025	0.000025	0
Mo, Tot	Closure	Nov	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000124	0.000121	0.000124	21	0.000331	0.000337	0.000368	62	0.000138	0.000137	0.000141	29	0.003425	0.003567	0.004252	541	0.020280	0.019267	0.020310	19167	0.000115	0.000114	0.000115	14	0.000098	0.000098	0.000098	-3
Mo, Tot	Closure	Dec	6	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000310	0.000315	0.000340	53	0.000138	0.000138	0.000142	27	0.003471	0.003610	0.004304	539	0.000104	0.000104	0.000105	4	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0
Mo, Tot	Post-Closure	Jan	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000308	0.000296	0.000396	196	0.000255	0.000257	0.000320	27	0.000189	0.000186	0.000218	70	0.002268	0.002323	0.004340	326	0.011930	0.011259	0.016980	11159	0.000252	0.000243	0.000317	143	0.000100	0.000105	0.000120	5
Mo, Tot	Post-Closure	Feb	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000408	0.000393	0.000540	293	0.000250	0.000251	0.000308	25	0.000196	0.000193	0.000228	75	0.002301	0.002355	0.004351	321	0.012080	0.011469	0.017200	11369	0.000349	0.000336	0.000455	236	0.000100	0.000105	0.000120	5
Mo, Tot	Post-Closure	Mar	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.001436	0.001368	0.002008	1268	0.000249	0.000251	0.000305	25	0.000226	0.000221	0.000270	99	0.002351	0.002406	0.004380	319	0.012710	0.012098	0.018100	11998	0.001234	0.001177	0.001721	1077	0.000100	0.000105	0.000120	5
Mo, Tot	Post-Closure	Apr	109	0.000100	0.000114	0.000140	14	0.000100	0.000113	0.000138	13	0.002038	0.001987	0.002856	1887	0.000254	0.000256	0.000312	27	0.000262	0.000256	0.000321	129	0.002411	0.002464	0.004417	319	0.015180	0.018325	0.040380	18225	0.001710	0.001667	0.002387	1567	0.000100	0.000102	0.000106	2
Mo, Tot	Post-Closure	May	109	0.000100	0.000105	0.000116	5	0.000100	0.000104	0.000113	4	0.000736	0.000721	0.001000	621	0.000204	0.000206	0.000286	56	0.000273	0.000267	0.000336	141	0.002315	0.002364	0.004170	322	0.009768	0.010102	0.013110	10002	0.000478	0.000469	0.000635	369	0.000100	0.000100	0.000101	0
Mo, Tot	Post-Closure	Jun	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000168	0.000167	0.000196	67	0.000147	0.000148	0.000184	31	0.000209	0.000206	0.000249	94	0.002245	0.002291	0.003974	325	0.011660	0.012516	0.016420	12416	0.000147	0.000146	0.000166	46	0.000100	0.000100	0.000101	0
Mo, Tot	Post-Closure	Jul	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000166	0.000164	0.000193	65	0.000283	0.000283	0.000311	11	0.000164	0.000163	0.000187	52	0.002330	0.002376	0.004051	327	0.011120	0.011570	0.015700	11470	0.000152	0.000150	0.000173	51	0.000027	0.000028	0.000028	10
Mo, Tot	Post-Closure	Aug	109	0.000099	0.000100	0.000101	1	0.000100	0.000100	0.000101	1	0.000184	0.000181	0.000218	82	0.000292	0.000293	0.000325	13	0.000162	0.000160	0.000183	47	0.002369	0.002414	0.004046	331	0.011380	0.011887	0.015970	11787	0.000166	0.000164	0.000193	65	0.000025	0.000025	0.000026	1
Mo, Tot	Post-Closure	Sep	109	0.000099	0.000100	0.000101	1	0.000099	0.000100	0.000101	1	0.000229	0.000225	0.000281	126	0.000182	0.000183	0.000231	40	0.000168	0.000167	0.000192	54	0.002309	0.002351	0.003877	335	0.011750	0.012450	0.016520	12350	0.000198	0.000195	0.000238	96	0.000025	0.000025	0.000026	1
Mo, Tot	Post-Closure	Oct	109	0.000099	0.000100	0.000103	1	0.000099	0.000100	0.000103	1	0.000272	0.000268	0.000343	170	0.000204	0.000206	0.000269	54	0.000179	0.000177	0.000206	67	0.002247	0.002286	0.003712	337	0.013870	0.014187	0.018080	14087	0.000218	0.000215	0.000266	116	0.000025	0.000025	0.000026	1
Mo, Tot	Post-Closure	Nov	109	0.000100	0.000100	0.000101	0	0.000100	0.000100	0.000101	0	0.000225	0.000220	0.000278	120	0.000278	0.000280	0.000341	36	0.000185	0.000183	0.000215	73	0.002232	0.002269	0.003642	335	0.013570	0.014264	0.019280	14164	0.000178	0.000175	0.000211	75	0.000098	0.000101	0.000112	1
Mo, Tot	Post-Closure	Dec	109	0.000100	0.000100	0.000100	0	0.000100	0.000100	0.000100	0	0.000218	0.000212	0.000269	112	0.000265	0.000266	0.000316	30	0.000186	0.000184	0.000215	71	0.002244	0.002281	0.003628	330	0.012150	0.011558	0.017290	11458	0.000177	0.000173	0.000209	73	0.000100	0.000105	0.000120	5
Ni, Diss	Construction	Jan	2	0.000200	0.000200	0.000200	0	0.000203	0.000203	0.000207	2	0.000203	0.000203	0.000207	2	0.000884	0.000884	0.000886	0	0.035300	0.035300	0.035340	0	0.000725	0.000725	0.000755	1	0.000800	0.000800	0.000800	0	0.032925	0.032925	0.032950	-1	0.000440	0.000440	0.000440	0
Ni, Diss	Construction	Feb	2	0.000200	0.000200	0.000200	0	0.000212	0.000212	0.000224	6	0.000212	0.000212	0.000224	6	0.000885	0.000885	0.000886	0	0.033805	0.033805	0.033840	0	0.000734	0.000734	0.000765	1	0.000800	0.000800	0.000800	0	0.023310	0.023310	0.023370	-3	0.000440	0.000440	0.000440	0
Ni, Diss	Construction	Mar	2	0.000200	0.000200	0.000200	0	0.000291	0.000291	0.000330	46	0.000291	0.000291	0.000329	46	0.000886	0.000886	0.000887	0	0.032315	0.032315	0.032340	0	0.000744	0.000744	0.000775	1	0.000800	0.000800	0.000800	0	0.018950	0.018950	0.018980	-5	0.000440	0.000440	0.000440	0
Ni, Diss	Construction	Apr	2	0.000209	0.000209	0.000209	0	0.000403	0.000403	0.000453	70	0.000401	0.000401	0.000450	66	0.000886	0.000886	0.000887	0	0.031090	0.031090	0.031110	-1	0.000754	0.000754	0.000784	1	0.000800	0.000800	0.000800	0	0.020645	0.020645	0.020660	-6	0.000440	0.000440	0.000440	0
Ni, Diss	Construction	May	2	0.000201	0.000201	0.000201	0	0.000318	0.000318	0.000347	31	0.000333	0.000333	0.000360	22	0.000559	0.000559	0.000560	0	0.038185	0.038185	0.038200	0	0.000730	0.000730	0.000758	2	0.000616	0.000616	0.000616	1	0.118850	0.118850	0.118900	6	0.000208	0.000208	0.000208	4
Ni, Diss	Construction	Jun	2	0.000200	0.000200	0.000200	0	0.000209	0.000209	0.000212	3	0.000211	0.000211	0.000213	3	0.000524	0.000524	0.000525	0	0.059295	0.059295	0.059300	0	0.000715	0.000715	0.000741	3	0.000610	0.000610	0.000610	0	0.092040	0.092040	0.092050	0	0.000200	0.000200	0.000200	0
Ni, Diss	Construction	Jul	2	0.000200	0.000200	0.000200	0	0.000209	0.000209	0.000212	3	0.000211	0.000211	0.000214	3	0.001773	0.001773	0.001773	0	0.050140	0.050140	0.050140	0	0.000734	0.000734	0.000760	4	0.000687	0.000687	0.000687	0	0.030970	0.030970	0.030970	0	0.000200	0.000200	0.000200	0
Ni, Diss	Construction	Aug	2	0.000200	0.000200	0.000200	0	0.000213	0.000213	0.000218	5	0.000215	0.000215	0.000220	4	0.001779	0.001779	0.001779	1	0.036200	0.036200	0.036200	0	0.000742	0.000742	0.000767	4	0.000690	0.000690	0.000690	0	0.029830	0.029830	0.029830	0	0.000200	0.000200	0.000200	0
Ni, Diss	Construction	Sep	2	0.000240	0.000240	0.000240	0	0.000259	0.000259	0.000269	6	0.000262	0.000262	0.000271	6	0.000977	0.000977	0.000978	0	0.033265	0.033265	0.033270	0	0.000747	0.000747	0.000770	5	0.000555	0.000555	0.000555	1	0.037690	0.037690	0.037700	0	0.000248	0.000248	0.000248	-1
Ni, Diss	Construction	Oct	2	0.000240	0.000240	0.000240	0	0.000254	0.000254	0.000260	4	0.000257	0.000257	0.000262	3	0.000960	0.000960	0.000961	0	0.035430	0.035430	0.035430	0	0.000757	0.000757	0.000779	4	0.000550	0.000550	0.000550	0	0.049985	0.049985	0.049990	0	0.000250	0.000250	0.000250	0
Ni, Diss	Construction	Nov	2	0.000200	0.000200	0.000200	0	0.000208	0.000208	0.000211	3	0.000208	0.000208	0.000212	2	0.000886	0.000886	0.000887	0	0.036665	0.036665	0.036670	0	0.000760	0.000760	0.000781	4	0.000792	0.000792	0.000792	-1	0.045390	0.045390	0.045390	0	0.000434	0.000434	0.000434	-1
Ni, Diss	Construction	Dec	2	0.000200	0.000200	0.000200	0	0.000206	0.000206	0.000209	3	0.000206	0.000206	0.000209	3	0.000885	0.000885	0.000886	0	0.036405	0.036405	0.036410	0	0.000767	0.000767	0.000787	4	0.000800	0.000800	0.000800	0	0.042615	0.042615	0.042620	-1	0.000440	0.000440	0.000440	0
Ni, Diss	Operations	Jan	13	0.000200	0.000200	0.000200	0	0.000480	0.000487	0.000723	143	0.000479	0.000486	0.000723	143	0.000970	0.000964	0.001057	9	0.035480	0.035494	0.035610	0	0.003371	0.003187	0.006033	304	0.000800	0.000800	0.000800	0	0.033390	0.033396	0.033560	0	0.000440	0.000440	0.000440	0
Ni, Diss	Operations	Feb	13	0.000201	0.000201	0.000201	0	0.001086	0.001183	0.001995	492	0.001085	0.001182	0.001993	491	0.000967	0.000961	0.001047	8	0.033980	0.034009	0.034140	0	0.003454	0.003262	0.006153	309	0.000800	0.000800	0.000800	0	0.023880	0.023945	0.024460	0	0.000440	0.000440	0.000440	0
Ni, Diss	Operations	Mar	13	0.000201	0.000201	0.000201	0	0.002670	0.002637	0.004348	1219	0.002664	0.002631	0.004336	1215	0.000968	0.000962	0.001048	8	0.032460	0.032501	0.032650	0	0.003567	0.003361	0.006308	316	0.000800	0.000800	0.000800	0	0.019770	0.020118	0.021230	0	0.000440	0.000440	0.000440	0
Ni, Diss	Operations	Apr	13	0.000209	0.000209	0.000209	0	0.002695	0.002615	0.004435	1006	0.002970	0.002865	0.004830	1082	0.000977	0.000970	0.001063	9	0.031250	0.031303	0.031480	0	0.003700	0.003475	0.006488	325	0.040810	0.037225	0.060600	4553	0.023610	0.023794	0.025210	8	0.000440	0.000440	0.000440	0
Ni, Diss	Operations	May	13	0.000201	0.000201	0.000201	0	0.001159	0.001161	0.001859	377	0.001212	0.001206	0.001907	343	0.000689	0.000679	0.000810	21	0.038400	0.038456	0.038640	1	0.003600	0.003372	0.006248	333	0.009280	0.008632	0.013320	1315	0.119800	0.119815	0.120200	6	0.000208	0.000208	0.000208	4
Ni, Diss	Operations	Jun	13	0.000200	0.000200	0.000200	0	0.000389	0.000387	0.000521	91	0.000402	0.000399	0.000539	95	0.000587	0.000582	0.000643	10	0.059440	0.059475	0.059600	0	0.003538	0.003304	0.006071	341	0.011110	0.010212	0.015650	1574	0.091980	0.091974	0.092050	0	0.000200	0.000200	0.000200	0
Ni, Diss	Operations	Jul	13	0.000200	0.000200	0.000200	0	0.000372	0.000369	0.000490	83	0.000382	0.000379	0.000504	85	0.001823	0.001819	0.001866	3	0.050190	0.050202	0.050280	0	0.003712	0.003454	0.006301	351	0.008081	0.007421	0.011090	975	0.031050	0.031052	0.031140	0	0.000200	0.000200	0.000200	0
Ni, Diss	Operations	Aug	13	0.000200	0.000200	0.000200	0	0.000429	0.000421	0.000577	107	0.000445	0.000435	0.000597	111	0.001842	0.001836	0.001895	4	0.036250	0.036258	0.036340	0	0.003818	0.003540	0.006407	362	0.009216	0.008405	0.012550	1118	0.029930	0.029943	0.030060	0	0.000200	0.000200	0.000200	0
Ni, Diss	Operations	Sep	13	0.000240	0.000240	0.000240	0	0.000514	0.000501	0.000675	105	0.000535	0.000520	0.000702	110	0.001075	0.001066	0.001155	9	0.033340	0.033348	0.033440	0	0.003789	0.003502	0.006269	358	0.010770	0.009776	0.014600	1767	0.037820	0.037837	0.037970	0	0.000248	0.000248	0.000248	-1
Ni, Diss	Operations	Oct	13	0.000240	0.000240	0.000240	0	0.000509	0.000510	0.000708	109	0.000544	0.000542	0.000755	118	0.001095	0.001082	0.001202	13	0.035540	0.035545	0.035650	0	0.003767	0.003472	0.006146	349	0.016720	0.014968	0.022810	2622	0.050180	0.050192	0.050330	0	0.000250	0.000250	0.000250	0
Ni, Diss	Operations	Nov	13	0.000200	0.000200	0.000200	0	0.000386	0.000398	0.000558	96	0.000404	0.000413	0.000584	103	0.001024	0.001010	0.001130	14	0.036800	0.036812	0.036920	0	0.003803	0.003494	0.006150	350	0.022380	0.020109	0.032480	2414	0.045600	0.045600	0.045680	0	0.000434	0.000434	0.000434	-1
Ni, Diss	Operations	Dec	13	0.000200	0.000200	0.000200	0	0.000385	0.000367	0.000470	83	0.000385	0.000367	0.000470	83	0.001002	0.000990	0.001090	12	0.036560	0.036565	0.036660	0	0.003867	0.003545	0.006216	353	0.000809	0.000808	0.000813	1	0.042890	0.042881	0.042940	0	0.000440	0.000440	0.000440	0
Ni, Diss	Closure	Jan	6	0.000200	0.000200	0.000200	0	0.000201	0.000205	0.000225	2	0.000201	0.000205	0.000226	3	0.001069	0.001085	0.001135	23	0.035525	0.035535	0.035600	0	0.006631	0.007124	0.008756	874	0.000800	0.000800	0.000800	0	0.033280	0.033282	0.033290	0	0.000440	0.000440	0.000440	0
Ni, Diss	Closure	Feb	6	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.000202	0.000202	0.000202	1	0.001058	0.001072	0.001119	21	0.034040	0.034045	0.034090	0	0.006793	0.007281	0.008945	888	0.000800	0.000800	0.000800	0	0.023820	0.023820	0.023860	-1	0.000440	0.000440	0.000440	0
Ni, Diss	Closure	Mar	6	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.000202	0.000202	0.000202	1	0.001058	0.001071	0.001118	21	0.032580	0.032578	0.032600	0	0.007004	0.007490	0.009195	908	0.000800	0.000800	0.000800	0	0.020080	0.020083	0.020090	0	0.000440	0.000440	0.000440	0
Ni, Diss	Closure	Apr	6	0.000209	0.000209	0.000209	0	0.000243	0.000244	0.000244	3	0.001244	0.001174	0.001249	384	0.001073	0.001087	0.001138	23	0.031400	0.031405	0.031440	0	0.007249	0.007727	0.009486	932	0.099945	0.092617	0.100600	11477	0.023675	0.023700	0.023920	8	0.000440	0.000440	0.000440	0
Ni, Diss	Closure	May	6	0.000201	0.000201	0.000201	0	0.000244	0.000244	0.000244	0	0.000571	0.000553	0.000590	103	0.000834	0.000854	0.000928	53	0.038550	0.038555	0.038580	1	0.007017	0.007457	0.009152	948	0.023510	0.022348	0.025660	3564	0.120800	0.120883	0.121100	7	0.000208	0.000208	0.000208	4
Ni, Diss	Closure	Jun	6	0.000200	0.000200	0.000200	0	0.000202	0.000202	0.000202	0	0.000236	0.000234	0.000237	14	0.000657	0.000666	0.000702	27	0.059570	0.059572	0.059580	0	0.006855	0.007266	0.008910	962	0.028155	0.026255	0.028840	4204	0.092260	0.092258	0.092260	0	0.000200	0.000200	0.000200	0
Ni, Diss	Closure	Jul	6	0.000200	0.000200	0.000200	0	0.000202	0.000202	0.000202	0	0.000229	0.000227	0.000229	11	0.001878	0.001884	0.001912	7	0.050300	0.050297	0.050300	0	0.007157	0.007566	0.009274	985	0.019825	0.018440	0.020060	2572	0.031060	0.031058	0.031060	0	0.000200	0.000200	0.000200	0
Ni, Diss	Closure	Aug	6	0.000200	0.000200	0.000200	0	0.000203	0.000203	0.000203	0	0.000242	0.000240	0.000243	16	0.001910	0.001918	0.001952	8	0.036320	0.036322	0.036330	0	0.007318	0.007716	0.009455	1010	0.022435	0.020803	0.022570	2915	0.029950	0.029948	0.029950	0	0.000200	0.000200	0.000200	0
Ni, Diss	Closure	Sep	6	0.000240	0.000240	0.000240	0	0.000244	0.000244	0.000244	0	0.000299	0.000295	0.000299	19	0.001181	0.001192	0.001246	23	0.033395	0.033395	0.033400	0	0.007192	0.007564	0.009259	989	0.026245	0.024323	0.026380	4322	0.037870	0.037867	0.037870	0	0.000248	0.000248	0.000248	-1
Ni, Diss	Closure	Oct	6	0.000240	0.000240	0.000240	0	0.000245	0.000245	0.000245	0	0.000334	0.000327	0.000335	32	0.001239	0.001254	0.001327	31	0.035580	0.035580	0.035590	1	0.007079	0.007420	0.009079	951	0.040870	0.037430	0.041120	6705	0.050230	0.050223	0.050230	1	0.000250	0.000250	0.000250	0
Ni, Diss	Closure	Nov	6	0.000201	0.000201	0.000201	0	0.000202	0.000202	0.000202	0	0.000242	0.000236	0.000242	16	0.001167	0.001181	0.001255	34	0.036840	0.036838	0.036850	1	0.007106	0.007423	0.009091	950	0.033345	0.030987	0.033530	3773	0.045580	0.045575	0.045580	0	0.000434	0.000434	0.000434	-1
Ni, Diss	Closure	Dec	6	0.000200	0.000200	0.000200	0	0.000200	0.000200	0.000200	0	0.000201	0.000201	0.000201	0	0.001120	0.001132	0.001193	28	0.036585	0.036583	0.036590	1	0.007198	0.007507	0.009195	958	0.000808	0.000808	0.000808	1	0.042830	0.042827	0.042830	0	0.000440	0.000440	0.000440	0
Ni, Diss	Post-Closure	Jan	109	0.000200	0.000200	0.000201	0	0.000201	0.000201	0.000201	0	0.001682	0.001437	0.001767	618	0.001375	0.001369	0.001377	55	0.035870	0.035818	0.035900	1	0.016450	0.016272	0.016510	2250	0.084650	0.075719	0.089490	8745	0.033970	0.033846	0.034030	1	0.000440	0.000446	0.000460	1
Ni, Diss	Post-Closure	Feb	109	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.002403	0.002042	0.002527	921	0.001337	0.001332	0.001339	51	0.034410	0.034353	0.034450	1	0.016650	0.016472	0.016720	2257	0.085740	0.071844	0.090630	8880	0.025140	0.024922	0.025280	4	0.000440	0.000446	0.000460	1
Ni, Diss	Post-Closure	Mar	109	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.009717	0.008175	0.010330	3988	0.001331	0.001327	0.001333	50	0.033070	0.032994	0.033130	2	0.017020	0.016847	0.017100	2288	0.090200	0.075719	0.095370	9365	0.026400	0.025312	0.026910	26	0.000440	0.000446	0.000460	1
Ni, Diss	Post-Closure	Apr	109	0.000209	0.000317	0.000544	53	0.000244	0.000345	0.000557	46	0.013640	0.011813	0.014790	4772	0.001369	0.001364	0.001371	54	0.032070	0.031961	0.032140	2	0.017490	0.017313	0.017550	2333	0.099530	0.102028	0.158800	12653	0.031580	0.030385	0.032660	38	0.000440	0.000442	0.000446	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Ni, Diss	Post-Closure	May	109	0.000201	0.000243	0.000335	21	0.000244	0.000278	0.000354	14	0.004684	0.004077	0.005036	1396	0.001262	0.001265	0.001265	125	0.039260	0.039150	0.039330	3	0.016780	0.016616	0.016830	2351	0.064510	0.059373	0.067780	9633	0.120400	0.120335	0.121200	7	0.000208	0.000208	0.000209	4
Ni, Diss	Post-Closure	Jun	109	0.000200	0.000203	0.000211	2	0.000202	0.000206	0.000213	2	0.000683	0.000618	0.000717	202	0.000862	0.000859	0.000863	64	0.059990	0.059925	0.060040	1	0.016280	0.016125	0.016330	2367	0.081520	0.074918	0.085480	12182	0.092280	0.092262	0.092290	0	0.000200	0.000200	0.000201	0
Ni, Diss	Post-Closure	Jul	109	0.000200	0.000203	0.000209	1	0.000202	0.000205	0.000211	1	0.000672	0.000607	0.000704	196	0.002037	0.002034	0.002038	15	0.050500	0.050468	0.050530	1	0.016930	0.016782	0.016980	2415	0.078250	0.070436	0.082140	10108	0.031290	0.031255	0.031320	1	0.000200	0.000200	0.000201	0
Ni, Diss	Post-Closure	Aug	109	0.000200	0.000204	0.000213	2	0.000203	0.000207	0.000216	2	0.000795	0.000716	0.000837	246	0.002107	0.002104	0.002108	19	0.036520	0.036493	0.036550	1	0.017250	0.017104	0.017300	2468	0.079420	0.072092	0.083380	10348	0.030260	0.030211	0.030290	1	0.000200	0.000200	0.000201	0
Ni, Diss	Post-Closure	Sep	109	0.000240	0.000246	0.000258	2	0.000244	0.000250	0.000262	2	0.001153	0.001029	0.001215	315	0.001485	0.001481	0.001487	53	0.033640	0.033608	0.033670	1	0.016850	0.016712	0.016890	2402	0.082150	0.075196	0.086240	13572	0.038260	0.038200	0.038310	1	0.000248	0.000249	0.000249	-1
Ni, Diss	Post-Closure	Oct	109	0.000240	0.000249	0.000267	4	0.000245	0.000253	0.000271	4	0.001448	0.001290	0.001536	420	0.001651	0.001645	0.001652	73	0.035890	0.035845	0.035920	1	0.016430	0.016299	0.016470	2292	0.089280	0.083803	0.093770	15137	0.050590	0.050532	0.050650	1	0.000250	0.000250	0.000251	0
Ni, Diss	Post-Closure	Nov	109	0.000201	0.000203	0.000209	1	0.000202	0.000204	0.000210	1	0.001083	0.000953	0.001139	368	0.001574	0.001569	0.001577	78	0.037180	0.037129	0.037210	1	0.016300	0.016185	0.016360	2268	0.094720	0.084833	0.099950	10504	0.045850	0.045798	0.045880	1	0.000434	0.000438	0.000448	0
Ni, Diss	Post-Closure	Dec	109	0.000200	0.000200	0.000200	0	0.000200	0.000200	0.000200	0	0.001045	0.000912	0.001092	356	0.001454	0.001450	0.001457	65	0.036920	0.036871	0.036950	1	0.016340	0.016226	0.016400	2263	0.086380	0.072844	0.091120	9005	0.043120	0.043070	0.043150	0	0.000440	0.000446	0.000460	1
Ni, Tot	Construction	Jan	2	0.000200	0.000200	0.000200	0	0.000208	0.000208	0.000216	4	0.000208	0.000208	0.000216	4	0.000965	0.000965	0.000966	0	0.036645	0.036645	0.036690	0	0.000831	0.000831	0.000861	1	0.000910	0.000910	0.000910	0	0.032930	0.032930	0.032950	-1	0.000520	0.000520	0.000520	0
Ni, Tot	Construction	Feb	2	0.000200	0.000200	0.000200	0	0.000224	0.000224	0.000248	12	0.000224	0.000224	0.000248	12	0.000966	0.000966	0.000967	0	0.035025	0.035025	0.035060	0	0.000840	0.000840	0.000869	1	0.000910	0.000910	0.000910	0	0.023320	0.023320	0.023370	-3	0.000520	0.000520	0.000520	0
Ni, Tot	Construction	Mar	2	0.000200	0.000200	0.000200	0	0.000359	0.000359	0.000406	79	0.000359	0.000359	0.000406	79	0.000966	0.000966	0.000967	0	0.033445	0.033445	0.033470	0	0.000849	0.000849	0.000878	1	0.000910	0.000910	0.000910	0	0.019005	0.019005	0.019030	-5	0.000520	0.000520	0.000520	0
Ni, Tot	Construction	Apr	2	0.000212	0.000212	0.000212	1	0.000501	0.000501	0.000553	109	0.000498	0.000498	0.000549	101	0.000966	0.000966	0.000967	0	0.032165	0.032165	0.032190	-1	0.000857	0.000857	0.000886	1	0.000910	0.000910	0.000910	0	0.020725	0.020725	0.020740	-5	0.000520	0.000520	0.000520	0
Ni, Tot	Construction	May	2	0.000236	0.000236	0.000236	1	0.000380	0.000380	0.000403	37	0.000394	0.000394	0.000414	29	0.000832	0.000832	0.000833	0	0.039190	0.039190	0.039210	0	0.000825	0.000825	0.000852	2	0.000649	0.000649	0.000649	1	0.118850	0.118850	0.118900	5	0.000210	0.000210	0.000210	5
Ni, Tot	Construction	Jun	2	0.000240	0.000240	0.000240	0	0.000253	0.000253	0.000256	4	0.000254	0.000254	0.000257	4	0.000820	0.000820	0.000820	0	0.060075	0.060075	0.060080	0	0.000803	0.000803	0.000828	3	0.000640	0.000640	0.000640	0	0.092070	0.092070	0.092080	0	0.000200	0.000200	0.000200	0
Ni, Tot	Construction	Jul	2	0.000250	0.000250	0.000250	0	0.000264	0.000264	0.000267	4	0.000266	0.000266	0.000269	4	0.002167	0.002167	0.002167	0	0.051475	0.051475	0.051480	0	0.000826	0.000826	0.000850	3	0.000747	0.000747	0.000747	0	0.033215	0.033215	0.033220	0	0.000200	0.000200	0.000200	0
Ni, Tot	Construction	Aug	2	0.000250	0.000250	0.000250	0	0.000270	0.000270	0.000276	6	0.000273	0.000273	0.000279	6	0.002173	0.002173	0.002173	1	0.038000	0.038000	0.038000	0	0.000847	0.000847	0.000871	4	0.000750	0.000750	0.000750	0	0.031995	0.031995	0.032000	0	0.000200	0.000200	0.000200	0
Ni, Tot	Construction	Sep	2	0.000243	0.000243	0.000243	0	0.000271	0.000271	0.000283	9	0.000274	0.000274	0.000286	9	0.001016	0.001016	0.001017	0	0.035145	0.035145	0.035150	0	0.000861	0.000861	0.000883	4	0.000615	0.000615	0.000615	1	0.040045	0.040045	0.040050	0	0.000577	0.000577	0.000577	-2
Ni, Tot	Construction	Oct	2	0.000243	0.000243	0.000243	0	0.000264	0.000264	0.000270	6	0.000267	0.000267	0.000273	6	0.000994	0.000994	0.000995	0	0.037480	0.037480	0.037480	0	0.000868	0.000868	0.000889	3	0.000610	0.000610	0.000610	0	0.053100	0.053100	0.053110	0	0.000590	0.000590	0.000590	0
Ni, Tot	Construction	Nov	2	0.000201	0.000201	0.000201	0	0.000212	0.000212	0.000216	5	0.000212	0.000212	0.000216	4	0.000966	0.000966	0.000967	0	0.038565	0.038565	0.038570	0	0.000868	0.000868	0.000888	3	0.000900	0.000900	0.000900	-1	0.045395	0.045395	0.045400	0	0.000522	0.000522	0.000522	0
Ni, Tot	Construction	Dec	2	0.000200	0.000200	0.000200	0	0.000209	0.000209	0.000213	5	0.000209	0.000209	0.000213	5	0.000966	0.000966	0.000967	0	0.037960	0.037960	0.037960	0	0.000873	0.000873	0.000892	3	0.000910	0.000910	0.000910	0	0.042620	0.042620	0.042620	-1	0.000520	0.000520	0.000520	0
Ni, Tot	Operations	Jan	13	0.000201	0.000201	0.000201	0	0.000492	0.000500	0.000737	150	0.000492	0.000500	0.000736	150	0.001051	0.001045	0.001137	8	0.036830	0.036840	0.036950	0	0.003474	0.003291	0.006139	267	0.000910	0.000910	0.000910	0	0.033400	0.033406	0.033570	0	0.000520	0.000520	0.000520	0
Ni, Tot	Operations	Feb	13	0.000201	0.000201	0.000201	0	0.001127	0.001223	0.002038	511	0.001126	0.001222	0.002035	511	0.001047	0.001042	0.001128	8	0.035210	0.035232	0.035360	0	0.003557	0.003365	0.006258	272	0.000910	0.000910	0.000910	0	0.023910	0.023977	0.024500	0	0.000520	0.000520	0.000520	0
Ni, Tot	Operations	Mar	13	0.000201	0.000201	0.000201	0	0.002751	0.002720	0.004434	1260	0.002744	0.002713	0.004422	1257	0.001049	0.001043	0.001128	8	0.033600	0.033635	0.033790	0	0.003669	0.003463	0.006413	279	0.000910	0.000910	0.000910	0	0.019840	0.020188	0.021320	1	0.000520	0.000520	0.000520	0
Ni, Tot	Operations	Apr	13	0.000212	0.000212	0.000212	1	0.002796	0.002714	0.004542	1034	0.003095	0.002985	0.004961	1105	0.001057	0.001050	0.001144	8	0.032320	0.032374	0.032550	0	0.003801	0.003576	0.006591	288	0.043740	0.039739	0.063470	4267	0.023710	0.023893	0.025320	9	0.000520	0.000520	0.000520	0
Ni, Tot	Operations	May	13	0.000236	0.000236	0.000236	1	0.001236	0.001239	0.001939	347	0.001295	0.001288	0.001992	321	0.000963	0.000952	0.001083	14	0.039400	0.039457	0.039640	1	0.003693	0.003465	0.006343	297	0.010020	0.009260	0.014040	1347	0.119900	0.119862	0.120200	6	0.000210	0.000210	0.000210	5
Ni, Tot	Operations	Jun	13	0.000240	0.000240	0.000240	0	0.000435	0.000434	0.000568	79	0.000449	0.000446	0.000586	82	0.000882	0.000877	0.000938	7	0.060220	0.060255	0.060380	0	0.003625	0.003391	0.006160	306	0.011890	0.010879	0.016410	1600	0.092010	0.092007	0.092080	0	0.000200	0.000200	0.000200	0
Ni, Tot	Operations	Jul	13	0.000250	0.000250	0.000250	0	0.000429	0.000426	0.000547	68	0.000440	0.000436	0.000562	70	0.002217	0.002213	0.002260	2	0.051530	0.051540	0.051620	0	0.003802	0.003544	0.006393	314	0.008639	0.007902	0.011630	954	0.033290	0.033294	0.033380	0	0.000200	0.000200	0.000200	0
Ni, Tot	Operations	Aug	13	0.000250	0.000250	0.000250	0	0.000488	0.000480	0.000636	88	0.000505	0.000495	0.000657	91	0.002235	0.002230	0.002289	3	0.038050	0.038063	0.038150	0	0.003922	0.003644	0.006513	317	0.009841	0.008944	0.013160	1092	0.032100	0.032105	0.032220	0	0.000200	0.000200	0.000200	0
Ni, Tot	Operations	Sep	13	0.000243	0.000243	0.000243	0	0.000526	0.000513	0.000688	107	0.000549	0.000533	0.000717	112	0.001114	0.001105	0.001194	9	0.035220	0.035232	0.035320	0	0.003902	0.003615	0.006384	310	0.011510	0.010406	0.015310	1606	0.040170	0.040186	0.040320	0	0.000577	0.000577	0.000577	-2
Ni, Tot	Operations	Oct	13	0.000243	0.000243	0.000243	0	0.000521	0.000523	0.000722	111	0.000559	0.000557	0.000772	120	0.001129	0.001116	0.001236	12	0.037590	0.037598	0.037700	0	0.003877	0.003581	0.006257	303	0.017850	0.015935	0.023920	2512	0.053300	0.053318	0.053460	0	0.000590	0.000590	0.000590	0
Ni, Tot	Operations	Nov	13	0.000201	0.000201	0.000201	0	0.000392	0.000405	0.000566	100	0.000411	0.000421	0.000593	106	0.001104	0.001090	0.001210	13	0.038700	0.038714	0.038820	0	0.003910	0.003601	0.006259	306	0.023390	0.020977	0.033460	2205	0.045610	0.045606	0.045690	0	0.000522	0.000522	0.000522	0
Ni, Tot	Operations	Dec	13	0.000200	0.000200	0.000200	0	0.000392	0.000374	0.000477	87	0.000392	0.000373	0.000477	87	0.001083	0.001071	0.001171	11	0.038110	0.038119	0.038220	0	0.003972	0.003650	0.006324	310	0.000919	0.000918	0.000923	1	0.042900	0.042887	0.042950	0	0.000520	0.000520	0.000520	0
Ni, Tot	Closure	Jan	6	0.000201	0.000201	0.000201	0	0.000201	0.000205	0.000226	2	0.000201	0.000206	0.000226	3	0.001150	0.001166	0.001216	21	0.036875	0.036885	0.036950	0	0.006740	0.007232	0.008865	762	0.000910	0.000910	0.000910	0	0.033280	0.033282	0.033290	0	0.000520	0.000520	0.000520	0
Ni, Tot	Closure	Feb	6	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.000202	0.000202	0.000202	1	0.001138	0.001152	0.001199	19	0.035260	0.035268	0.035310	0	0.006901	0.007389	0.009053	776	0.000910	0.000910	0.000910	0	0.023860	0.023820	0.023860	-1	0.000520	0.000520	0.000520	0
Ni, Tot	Closure	Mar	6	0.000201	0.000201	0.000201	1	0.000201	0.000201	0.000201	1	0.000203	0.000203	0.000203	1	0.001138	0.001152	0.001198	19	0.033710	0.033713	0.033740	0	0.007110	0.007596	0.009302	795	0.000910	0.000910	0.000910	0	0.020080	0.020083	0.020090	0	0.000520	0.000520	0.000520	0
Ni, Tot	Closure	Apr	6	0.000212	0.000212	0.000212	1	0.000247	0.000247	0.000248	3	0.001276	0.001206	0.001280	386	0.001154	0.001168	0.001219	21	0.032480	0.032482	0.032510	0	0.007355	0.007833	0.009593	818	0.102650	0.095320	0.103200	10375	0.023700	0.023725	0.023950	8	0.000520	0.000520	0.000520	0
Ni, Tot	Closure	May	6	0.000236	0.000236	0.000236	1	0.000282	0.000282	0.000282	2	0.000618	0.000600	0.000637	96	0.001108	0.001127	0.001201	36	0.039555	0.039560	0.039580	1	0.007116	0.007555	0.009251	837	0.024210	0.023053	0.026360	3502	0.120900	0.120950	0.121100	7	0.000210	0.000210	0.000210	5
Ni, Tot	Closure	Jun	6	0.000240	0.000240	0.000240	0	0.000242	0.000242	0.000242	0	0.000277	0.000275	0.000277	12	0.000953	0.000962	0.000998	17	0.060350	0.060353	0.060360	0	0.006947	0.007357	0.009002	855	0.028910	0.027007	0.029580	4120	0.092290	0.092288	0.092290	0	0.000200	0.000200	0.000200	0
Ni, Tot	Closure	Jul	6	0.000250	0.000250	0.000250	0	0.000253	0.000253	0.000253	0	0.000281	0.000279	0.000281	9	0.002272	0.002279	0.002307	6	0.051630	0.051633	0.051640	0	0.007251	0.007660	0.009369	874	0.020365	0.018978	0.020600	2430	0.033300	0.033298	0.033300	0	0.000200	0.000200	0.000200	0
Ni, Tot	Closure	Aug	6	0.000250	0.000250	0.000250	0	0.000255	0.000255	0.000255	0	0.000295	0.000293	0.000296	13	0.002304	0.002312	0.002346	7	0.038130	0.038128	0.038130	0	0.007427	0.007825	0.009564	875	0.023045	0.021405	0.023160	2754	0.032120	0.032118	0.032120	0	0.000200	0.000200	0.000200	0
Ni, Tot	Closure	Sep	6	0.000243	0.000243	0.000243	0	0.000247	0.000247	0.000247	0	0.000304	0.000300	0.000304	19	0.001220	0.001231	0.001285	22	0.035280	0.035278	0.035280	0	0.007310	0.007681	0.009377	845	0.026945	0.025027	0.027080	4003	0.040230	0.040225	0.040230	1	0.000577	0.000577	0.000577	-2
Ni, Tot	Closure	Oct	6	0.000243	0.000243	0.000243	0	0.000248	0.000248	0.000248	0	0.000341	0.000334	0.000341	32	0.001273	0.001288	0.001361	30	0.037635	0.037633	0.037640	1	0.007193	0.007533	0.009193	819	0.041970	0.038523	0.042200	6215	0.053360	0.053353	0.053360	1	0.000590	0.000590	0.000590	0
Ni, Tot	Closure	Nov	6	0.000201	0.000201	0.000201	0	0.000202	0.000202	0.000202	0	0.000243	0.000238	0.000244	17	0.001247	0.001261	0.001335	31	0.038745	0.038743	0.038750	1	0.007217	0.007535	0.009204	821	0.034210	0.031848	0.034380	3400	0.045580	0.045575	0.045580	0	0.000522	0.000522	0.000522	0
Ni, Tot	Closure	Dec	6	0.000200	0.000200	0.000200	0	0.000200	0.000200	0.000200	0	0.000201	0.000201	0.000201	0	0.001201	0.001213	0.001274	26	0.038140	0.038142	0.038150	1	0.007308	0.007617	0.009305	830	0.000918	0.000918	0.000918	1	0.042830	0.042830	0.042830	0	0.000520	0.000520	0.000520	0
Ni, Tot	Post-Closure	Jan	109	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.001716	0.001466	0.001803	633	0.001456	0.001450	0.001458	50	0.037220	0.037167	0.037250	1	0.016560	0.016379	0.016620	1946	0.086620	0.072418	0.091530	7858	0.034000	0.033867	0.034060	1	0.000520	0.000527	0.000541	1
Ni, Tot	Post-Closure	Feb	109	0.000201	0.000201	0.000201	0	0.000201	0.000201	0.000201	0	0.002454	0.002085	0.002581	943	0.001418	0.001413	0.001420	46	0.035630	0.035579	0.035680	1	0.016760	0.016580	0.016820	1958	0.087740	0.073527	0.092690	7980	0.025180	0.024957	0.025320	4	0.000520	0.000527	0.000541	1
Ni, Tot	Post-Closure	Mar	109	0.000201	0.000201	0.000201	1	0.000201	0.000201	0.000201	1	0.009939	0.008361	0.010560	4081	0.001412	0.001407	0.001414	46	0.034210	0.034136	0.034270	2	0.017120	0.016952	0.017200	1990	0.092300	0.077488	0.097540	8415	0.026580	0.025470	0.027110	27	0.000520	0.000527	0.000541	1
Ni, Tot	Post-Closure	Apr	109	0.000212	0.000321	0.000547	52	0.000248	0.000349	0.000561	46	0.013940	0.012066	0.015100	4769	0.001450	0.001445	0.001451	50	0.033150	0.033044	0.033220	2	0.017590	0.017417	0.017650	2034	0.101700	0.104111	0.161100	11341	0.031820	0.030595	0.032920	39	0.000520	0.000522	0.000526	0
Ni, Tot	Post-Closure	May	109	0.000236	0.000279	0.000371	19	0.000282	0.000316	0.000393	14	0.004818	0.004197	0.005171	1273	0.001535	0.001528	0.001538	84	0.040270	0.040159	0.040350	3	0.016870	0.016710	0.016920	2063	0.065900	0.060621	0.069180	9372	0.120500	0.120412	0.121200	7	0.000210	0.000211	0.000211	5
Ni, Tot	Post-Closure	Jun	109	0.000240	0.000243	0.000251	1	0.000242	0.000246	0.000253	1	0.000733	0.000666	0.000767	172	0.001157	0.001154	0.001158	41	0.060780	0.060711	0.060820	1	0.016370	0.016215	0.016410	2092	0.083270	0.076471	0.087250	11849	0.092310	0.092295	0.092330	0	0.000200	0.000200	0.000201	0
Ni, Tot	Post-Closure	Jul	109	0.000250	0.000252	0.000258	1	0.000253	0.000256	0.000262	1	0.000733	0.000667	0.000765	160	0.002431	0.002429	0.002432	12	0.051840	0.051809	0.051870	1	0.017020	0.016873	0.017080	2131	0.079960	0.071931	0.083870	9491	0.033540	0.033501	0.033560	1	0.000200	0.000200	0.000201	0
Ni, Tot	Post-Closure	Aug	109	0.000250	0.000254	0.000262	2	0.000255	0.000259	0.000267	2	0.000859	0.000778	0.000901	201	0.002501	0.002498	0.002502	16	0.038330	0.038301	0.038360	1	0.017360	0.017210	0.017400	2126	0.081140	0.073602	0.085110	9714	0.032420	0.032377	0.032460	1	0.000200	0.000200	0.000201	0
Ni, Tot	Post-Closure	Sep	109	0.000243	0.000248	0.000260	2	0.000247	0.000253	0.000265	2	0.001176	0.001049	0.001239	316	0.001524	0.001520	0.001526	50	0.035530	0.035493	0.035560	1	0.016970	0.016828	0.017010	2040	0.083940	0.076781	0.088050	12487	0.040610	0.040554	0.040660	1	0.000577	0.000577	0.000578	-2
Ni, Tot	Post-Closure	Oct	109	0.000243	0.000252	0.000270	4	0.000248	0.000257	0.000275	3	0.001478	0.001316	0.001566	421	0.001684	0.001678	0.001686	70	0.037940	0.037900	0.037980	1	0.016540	0.016411	0.016590	1964	0.091200	0.085546	0.095700	13924	0.053710	0.053652	0.053770	1	0.000590	0.000590	0.000591	0
Ni, Tot	Post-Closure	Nov	109	0.000201	0.000203	0.000209	1	0.000202	0.000205	0.000211	1	0.001104	0.000970	0.001160	376	0.001654	0.001649	0.001657	72	0.039080	0.039033	0.039120	1	0.016410	0.016294	0.016470	1951	0.096830	0.086706	0.102100	9428	0.045860	0.045809	0.045900	1	0.000522	0.000527	0.000538	1
Ni, Tot	Post-Closure	Dec	109	0.000200	0.000200	0.000200	0	0.000200	0.000200	0.000201	0	0.001065	0.000929	0.001113	364	0.001536	0.001531	0.001538	59	0.038480	0.038430	0.038510	1	0.016450	0.016335	0.016510	1952	0.088390	0.074552	0.093200	8092	0.043140	0.043081	0.043170	0	0.000520	0.000527	0.000541	1
Se, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000052	0.000052	0.000052	0	0.000055	0.000055	0.000055	0	0.000112	0.000112	0.000117	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000050	0
Se, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000053	3	0.000052	0.000052	0.000053	3	0.000052	0.000052	0.000052	0	0.000054	0.000054	0.000054	0	0.000114	0.000114	0.000119	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000053	2	0.000050	0.000050	0.000050	0
Se, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000063	0.000063	0.000066	25	0.000063	0.000063	0.000066	25	0.000052	0.000052	0.000052	0	0.000054	0.000054	0.000054	1	0.000116	0.000116	0.000121	1	0.000050	0.000050	0.000050	0	0.000061	0.000061	0.000063	21	0.000050	0.000050	0.000050	0
Se, Tot	Construction	Apr	2	0.000050	0.000050	0.000050	0	0.000074	0.000074	0.000077	47	0.000073	0.000073	0.000076	46	0.000052	0.000052	0.000052	0	0.000054	0.000054	0.000054	1	0.000117	0.000117	0.000123	1	0.000050	0.000050	0.000050	0	0.000069	0.000069	0.000072	38	0.000050	0.000050	0.000050	0
Se, Tot	Construction	May	2	0.000050	0.000050	0.000050	0	0.000060	0.000060	0.000061	19	0.000059	0.000059	0.000060	18	0.000053	0.000053	0.000053	-1	0.000054	0.000054	0.000054	2	0.000115	0.000115	0.000120	2	0.000050	0.000050	0.000050	0	0.000056	0.000056	0.000057	11	0.000050	0.000050	0.000050	0
Se, Tot	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000052	-1	0.000052	0.000052	0.000053	2	0.000114	0.000114	0.000118	3	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000050	0
Se, Tot	Construction	Jul	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000052	0.000052	0.000052	0	0.000052	0.000052	0.000052	1	0.000117	0.000117	0.000122	3	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000053	1	0.000055	0.000055	0.000055	0
Se, Tot	Construction	Aug	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000052	2	0.000051	0.000051	0.000052	2	0.000052	0.000052	0.000053	-1	0.000053	0.000053	0.000053	1	0.000120	0.000120	0.000124	4	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000053	2	0.000055	0.000055	0.000055	0
Se, Tot	Construction	Sep	2	0.000067	0.000067	0.000067	0	0.000068	0.000068	0.000069	2	0.000068	0.000068	0.000069	3	0.000060	0.000060	0.000060	-1	0.000056	0.000056	0.000056	2	0.000120	0.000120	0.000124	5	0.000050	0.000050	0.000050	0	0.000066	0.000066	0.000066	2	0.000051	0.000051	0.000051	0
Se, Tot	Construction	Oct	2	0.000067	0.000067	0.000067	0	0.000068	0.000068	0.000068	2	0.000068	0.000068	0.000068	2	0.000061	0.000061	0.000061	-1	0.000059	0.000059	0.000059	1	0.000119	0.000119	0.000123	5	0.000050	0.000050	0.000050	0	0.000064	0.000064	0.000065	1	0.000051	0.000051	0.000051	0
Se, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000053	0.000053	0.000053	-1	0.000058	0.000058	0.000058	1	0.000118	0.000118	0.000122	5	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000050	0
Se, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000053	0.000053	0.000053	0	0.000056	0.000056	0.000057	1	0.000119	0.000119	0.000123	5	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	0	0.000067	0.000067	0.000080	34	0.000067	0.000067	0.000080	34	0.000057	0.000057	0.000062	9	0.000064	0.000063	0.000070	15	0.000279	0.000267	0.000431	118	0.000050	0.000050	0.000050	0	0.000062	0.000062	0.000072	25	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Feb	13	0.000050	0.000050	0.000050	0	0.000115	0.000118	0.000167	136	0.000114	0.000118	0.000167	136	0.000057	0.000057	0.000062	8	0.000064	0.000064	0.000072	18	0.000285	0.000273	0.000439	119	0.000050	0.000050	0.000050	0	0.000103	0.000105	0.000145	111	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Mar	13	0.000050	0.000050	0.000050	0	0.000244	0.000232	0.000337	364	0.000243	0.000231	0.000336	363	0.000057	0.000057	0.000062	9	0.000068	0.000068	0.000079	26	0.000292	0.000280	0.000449	121	0.000050	0.000050	0.000050	0	0.000215	0.000205	0.000294	309	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Apr	13	0.000050	0.000050	0.000050	0	0.000215	0.000206	0.000309	311	0.000254	0.000240	0.000356	380	0.000058	0.000057	0.000063	9	0.000073	0.000071	0.000084	34	0.000301	0.000287	0.000460	124	0.004959	0.004416	0.006189	8732	0.000218	0.000206	0.000301	312	0.000050	0.000050	0.000050	0
Se, Tot	Operations	May	13	0.000050	0.000050	0.000050	0	0.000109	0.000108	0.000147	115	0.000118	0.000115	0.000156	130	0.000061	0.000060	0.000068	12	0.000073	0.000071	0.000085	36	0.000293	0.000279	0.000444	126	0.001192	0.001065	0.001443	2031	0.000092	0.000090	0.000116	81	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000063	0.000062	0.000070	25	0.000064	0.000064	0.000072	27	0.000055	0.000055	0.000058	6	0.000065	0.000065	0.000074	25	0.000288	0.000274	0.000433	128	0.001330	0.001189	0.001618	2278	0.000060	0.000059	0.000065	19	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Jul	13	0.000050	0.000050	0.000050	0	0.000061	0.000061	0.000068	22	0.000062	0.000062	0.000069	24	0.000055	0.000055	0.000058	4	0.000061	0.000061	0.000066	17	0.000301	0.000285	0.000448	130	0.000928	0.000830	0.001120	1560	0.000061	0.000061	0.000067	18	0.000055	0.000055	0.000055	0
Se, Tot	Operations	Aug	13	0.000050	0.000050	0.000050	0	0.000065	0.000065	0.000073	29	0.000067	0.000066	0.000075	32	0.000056	0.000056	0.000059	5	0.000062	0.000061	0.000067	17	0.000308	0.000291	0.000456	133	0.001053	0.000938	0.001267	1776	0.000065	0.000064	0.000072	24	0.000055	0.000055	0.000055	0
Se, Tot	Operations	Sep	13	0.000067	0.000067	0.000067	0	0.000084	0.000083	0.000093	25	0.000087	0.000085	0.000096	28	0.000066	0.000065	0.000070	7	0.000066	0.000065	0.000071	18	0.000305	0.000288	0.000446	133	0.001248	0.001108	0.001494	2116	0.000080	0.000079	0.000087	22	0.000051	0.000051	0.000051	0
Se, Tot	Operations	Oct	13	0.000067	0.000067	0.000067	0	0.000083	0.000083	0.000094	24	0.000087	0.000086	0.000098	30	0.000069	0.000068	0.000075	10	0.000069	0.000069	0.000075	18	0.000301	0.000284	0.000437	134	0.001953	0.001721	0.002347	3342	0.000078	0.000077	0.000085	21	0.000051	0.000051	0.000051	0
Se, Tot	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000061	0.000062	0.000071	23	0.000063	0.000063	0.000073	26	0.000062	0.000061	0.000068	12	0.000069	0.000068	0.000075	18	0.000303	0.000284	0.000436	136	0.002113	0.001871	0.002723	3643	0.000058	0.000058	0.000064	16	0.000050	0.000050	0.000050	0
Se, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000061	0.000060	0.000066	20	0.000061	0.000060	0.000066	20	0.000060	0.000059	0.000065	11	0.000066	0.000066	0.000072	18	0.000307	0.000288	0.000440	137	0.000051	0.000051	0.000051	1	0.000057	0.000056	0.000060	13	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	0	0.000063	0.000064	0.000066	22	0.000058	0.000060	0.000070	10	0.000457	0.000485	0.000573	330	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Feb	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000062	0.000063	0.000065	21	0.000058	0.000059	0.000068	10	0.000467	0.000495	0.000584	334	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Mar	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000062	0.000063	0.000065	20	0.000057	0.000059	0.000067	9	0.000479	0.000508	0.000599	341	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Apr	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000133	0.000129	0.000133	158	0.000063	0.000064	0.000066	22	0.000057	0.000059	0.000066	10	0.000494	0.000522	0.000616	348	0.008244	0.007846	0.008256	15592	0.000117	0.000114	0.000117	127	0.000050	0.000050	0.000050	0
Se, Tot	Closure	May	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000076	0.000075	0.000077	50	0.000069	0.000070	0.000074	31	0.000058	0.000059	0.000065	12	0.000478	0.000504	0.000595	350	0.002006	0.001940	0.002120	3780	0.000066	0.000065	0.000066	30	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000053	5	0.000059	0.000060	0.000062	15	0.000056	0.000056	0.000059	9	0.000468	0.000492	0.000580	351	0.002310	0.002203	0.002341	4305	0.000052	0.000052	0.000052	3	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Jul	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	4	0.000058	0.000058	0.000060	12	0.000054	0.000054	0.000055	5	0.000487	0.000511	0.000603	357	0.001604	0.001525	0.001612	2950	0.000053	0.000053	0.000053	3	0.000055	0.000055	0.000055	0
Se, Tot	Closure	Aug	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000053	6	0.000060	0.000060	0.000062	14	0.000054	0.000054	0.000055	4	0.000498	0.000521	0.000615	361	0.001814	0.001722	0.001817	3343	0.000054	0.000054	0.000054	4	0.000055	0.000055	0.000055	0
Se, Tot	Closure	Sep	6	0.000067	0.000067	0.000067	0	0.000067	0.000067	0.000067	0	0.000071	0.000071	0.000071	6	0.000071	0.000072	0.000075	20	0.000058	0.000058	0.000058	5	0.000489	0.000511	0.000602	359	0.002136	0.002029	0.002140	3958	0.000068	0.000067	0.000068	5	0.000051	0.000051	0.000051	0
Se, Tot	Closure	Oct	6	0.000067	0.000067	0.000067	0	0.000067	0.000067	0.000067	0	0.000074	0.000073	0.000074	10	0.000077	0.000077	0.000081	27	0.000061	0.000061	0.000062	6	0.000480	0.000500	0.000590	357	0.003342	0.003149	0.003348	6197	0.000068	0.000068	0.000068	7	0.000051	0.000051	0.000051	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Se, Tot	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000053	5	0.000069	0.000070	0.000074	31	0.000061	0.000061	0.000062	7	0.000481	0.000499	0.000590	360	*0.002642*	*0.002509*	*0.002647*	4919	0.000052	0.000052	0.000052	3	0.000050	0.000050	0.000050	0
Se, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000066	0.000067	0.000070	27	0.000060	0.000060	0.000060	7	0.000486	0.000504	0.000596	362	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Se, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000123	0.000111	0.000123	121	0.000075	0.000075	0.000076	45	0.000083	0.000080	0.000084	45	0.000866	0.000859	0.000869	709	*0.004188*	*0.003511*	*0.004236*	6921	0.000103	0.000094	0.000104	89	0.000050	0.000051	0.000052	1
Se, Tot	Post-Closure	Feb	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000158	0.000140	0.000159	181	0.000073	0.000073	0.000074	41	0.000085	0.000081	0.000085	49	0.000876	0.000869	0.000880	710	*0.004242*	*0.003564*	*0.004290*	7029	0.000137	0.000123	0.000138	146	0.000050	0.000051	0.000052	1
Se, Tot	Post-Closure	Mar	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000516	0.000442	0.000526	784	0.000073	0.000073	0.000073	41	0.000094	0.000089	0.000095	66	0.000894	0.000888	0.000899	717	*0.004462*	*0.003756*	*0.004513*	7413	0.000446	0.000383	0.000454	665	0.000050	0.000051	0.000052	1
Se, Tot	Post-Closure	Apr	109	0.000050	0.000055	0.000066	11	0.000050	0.000055	0.000065	10	0.000714	0.000629	0.000740	1158	0.000075	0.000075	0.000075	44	0.000106	0.000099	0.000107	86	0.000917	0.000911	0.000921	729	*0.004869*	*0.005389*	*0.010160*	10678	0.000602	0.000531	0.000623	961	0.000050	0.000050	0.000051	0
Se, Tot	Post-Closure	May	109	0.000050	0.000052	0.000057	4	0.000050	0.000052	0.000055	3	0.000269	0.000241	0.000276	381	0.000086	0.000086	0.000087	62	0.000110	0.000102	0.000111	94	0.000881	0.000875	0.000884	725	*0.003240*	*0.003060*	*0.003252*	6021	0.000180	0.000163	0.000184	227	0.000050	0.000050	0.000050	0
Se, Tot	Post-Closure	Jun	109	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000051	0	0.000074	0.000071	0.000074	41	0.000067	0.000067	0.000068	31	0.000088	0.000083	0.000089	62	0.000856	0.000851	0.000859	721	*0.004074*	*0.003832*	*0.004089*	7564	0.000066	0.000064	0.000067	28	0.000050	0.000050	0.000050	0
Se, Tot	Post-Closure	Jul	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000073	0.000070	0.000074	40	0.000065	0.000065	0.000065	24	0.000072	0.000069	0.000072	34	0.000890	0.000884	0.000893	730	*0.003903*	*0.003573*	*0.003918*	7046	0.000070	0.000067	0.000070	30	0.000055	0.000055	0.000055	0
Se, Tot	Post-Closure	Aug	109	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000051	0	0.000079	0.000075	0.000080	51	0.000068	0.000068	0.000068	29	0.000071	0.000069	0.000071	31	0.000906	0.000901	0.000910	736	*0.003970*	*0.003668*	*0.003982*	7235	0.000075	0.000072	0.000075	39	0.000055	0.000055	0.000055	0
Se, Tot	Post-Closure	Sep	109	0.000067	0.000067	0.000068	0	0.000067	0.000067	0.000068	0	0.000111	0.000105	0.000112	59	0.000084	0.000084	0.000084	40	0.000077	0.000074	0.000077	34	0.000886	0.000881	0.000889	726	*0.004102*	*0.003832*	*0.004115*	7563	0.000098	0.000094	0.000099	46	0.000051	0.000051	0.000051	0
Se, Tot	Post-Closure	Oct	109	0.000067	0.000067	0.000068	1	0.000067	0.000067	0.000068	1	0.000126	0.000119	0.000128	78	0.000093	0.000093	0.000094	54	0.000084	0.000081	0.000084	39	0.000864	0.000859	0.000867	717	*0.004451*	*0.004314*	*0.004487*	8528	0.000104	0.000099	0.000105	56	0.000051	0.000051	0.000051	0
Se, Tot	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000093	0.000087	0.000094	73	0.000086	0.000086	0.000086	61	0.000086	0.000082	0.000086	43	0.000857	0.000853	0.000861	716	*0.004688*	*0.004329*	*0.004763*	8558	0.000077	0.000073	0.000078	46	0.000050	0.000051	0.000052	1
Se, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000091	0.000085	0.000092	70	0.000080	0.000079	0.000080	52	0.000084	0.000080	0.000084	44	0.000860	0.000855	0.000863	714	*0.004266*	*0.003612*	*0.004313*	7124	0.000077	0.000073	0.000077	45	0.000050	0.000051	0.000052	1
Ag, Tot	Construction	Jan	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Feb	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Mar	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	26	0.000006	0.000006	0.000006	26	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	22	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Apr	2	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	37	0.000007	0.000007	0.000007	37	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	32	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	May	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	13	0.000006	0.000006	0.000006	11	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	7	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Jun	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000006	0.000006	0.000006	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Aug	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Sep	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Oct	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Nov	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Construction	Dec	2	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000007	0.000007	0.000007	1	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Jan	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	2	0.000008	0.000008	0.000010	21	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Feb	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000007	23	0.000006	0.000006	0.000007	22	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000008	0.000008	0.000010	21	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	18	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Mar	13	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	62	0.000008	0.000008	0.000009	62	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	4	0.000008	0.000008	0.000010	22	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	53	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Apr	13	0.000005	0.000005	0.000005	0	0.000008	0.000008	0.000009	46	0.000008	0.000008	0.000009	49	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	6	0.000008	0.000008	0.000010	22	0.000031	0.000028	0.000040	468	0.000007	0.000007	0.000008	42	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	May	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	16	0.000006	0.000006	0.000006	16	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	6	0.000008	0.000008	0.000010	22	0.000011	0.000010	0.000013	106	0.000006	0.000006	0.000006	10	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Jun	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000008	0.000008	0.000009	22	0.000012	0.000011	0.000014	123	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Jul	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000008	0.000008	0.000010	23	0.000010	0.000009	0.000011	86	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Aug	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000009	0.000008	0.000010	23	0.000011	0.000010	0.000012	98	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Sep	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000009	0.000008	0.000010	23	0.000012	0.000011	0.000013	117	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Oct	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000008	0.000008	0.000010	23	0.000015	0.000014	0.000018	183	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Nov	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000008	0.000008	0.000010	24	0.000018	0.000016	0.000022	222	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Operations	Dec	13	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000008	0.000008	0.000010	24	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Jan	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	55	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Feb	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	56	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Mar	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	58	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Apr	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000006	0.000006	0.000006	11	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	60	0.000054	0.000050	0.000055	909	0.000006	0.000006	0.000006	9	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	May	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	-1	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	59	0.000016	0.000016	0.000017	215	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Jun	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	58	0.000019	0.000018	0.000019	254	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Jul	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000011	58	0.000014	0.000014	0.000015	176	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Aug	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000011	59	0.000016	0.000015	0.000016	200	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Sep	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	2	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000011	58	0.000018	0.000017	0.000018	236	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Oct	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	0	0.000010	0.000010	0.000011	58	0.000025	0.000023	0.000025	366	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Nov	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	58	0.000021	0.000020	0.000021	298	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Closure	Dec	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	1	0.000010	0.000010	0.000011	59	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Jan	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	17	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	7	0.000016	0.000015	0.000016	151	0.000063	0.000054	0.000066	973	0.000006	0.000006	0.000006	12	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Feb	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000006	0.000007	25	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	7	0.000016	0.000016	0.000016	152	0.000064	0.000054	0.000067	988	0.000006	0.000006	0.000006	21	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Mar	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000012	0.000011	0.000012	110	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	10	0.000016	0.000016	0.000016	156	0.000067	0.000057	0.000070	1042	0.000011	0.000010	0.000011	93	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Apr	109	0.000005	0.000005	0.000005	1	0.000005	0.000005	0.000006	2	0.000014	0.000013	0.000015	150	0.000005	0.000005	0.000005	6	0.000006	0.000005	0.000006	13	0.000016	0.000016	0.000016	160	0.000072	0.000072	0.000096	1340	0.000013	0.000012	0.000013	127	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	May	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	-1	0.000008	0.000008	0.000008	50	0.000005	0.000005	0.000005	8	0.000006	0.000006	0.000006	14	0.000016	0.000016	0.000016	156	0.000049	0.000044	0.000051	790	0.000007	0.000007	0.000007	29	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Jun	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	9	0.000015	0.000015	0.000015	151	0.000060	0.000055	0.000062	998	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Jul	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	3	0.000005	0.000005	0.000005	5	0.000016	0.000016	0.000016	153	0.000058	0.000052	0.000060	943	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Aug	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	7	0.000005	0.000005	0.000005	4	0.000005	0.000005	0.000005	4	0.000016	0.000016	0.000016	154	0.000059	0.000053	0.000061	964	0.000005	0.000005	0.000005	5	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Sep	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	11	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	5	0.000016	0.000016	0.000016	151	0.000061	0.000055	0.000063	1006	0.000005	0.000005	0.000005	8	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Oct	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	14	0.000005	0.000005	0.000005	8	0.000005	0.000005	0.000005	6	0.000016	0.000016	0.000016	149	0.000066	0.000061	0.000068	1117	0.000006	0.000005	0.000006	10	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Nov	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	10	0.000005	0.000005	0.000005	8	0.000005	0.000005	0.000005	7	0.000016	0.000015	0.000016	149	0.000070	0.000062	0.000073	1148	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	0
Ag, Tot	Post-Closure	Dec	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000005	0.000006	10	0.000005	0.000005	0.000005	7	0.000005	0.000005	0.000005	7	0.000016	0.000015	0.000016	150	0.000065	0.000055	0.000067	1004	0.000005	0.000005	0.000005	6	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000040	0.000040	0.000040	0	0.000050	0.000050	0.000050	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000050	0	0.000040	0.000040	0.000040	0	0.000050	0.000050	0.000050	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	3	0.000052	0.000052	0.000052	3	0.000050	0.000050	0.000050	0	0.000041	0.000041	0.000041	0	0.000049	0.000049	0.000049	-1	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	3	0.000050	0.000050	0.000050	0
Tl, Tot	Construction	Apr	2	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	4	0.000052	0.000052	0.000052	4	0.000050	0.000050	0.000050	0	0.000041	0.000041	0.000041	0	0.000049	0.000049	0.000049	-1	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	4	0.000050	0.000050	0.000050	0
Tl, Tot	Construction	May	2	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	0	0.000049	0.000049	0.000049	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	1	0.000050	0.000050	0.000050	0
Tl, Tot	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000046	0.000046	0.000046	0	0.000049	0.000049	0.000049	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Construction	Jul	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	3	0.000006	0.000006	0.000006	1	0.000050	0.000050	0.000050	0	0.000037	0.000037	0.000037	0	0.000050	0.000050	0.000050	-1	0.000050	0.000050	0.000050	0	0.000015	0.000015	0.000015	0	0.000006	0.000006	0.000006	29
Tl, Tot	Construction	Aug	2	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	4	0.000006	0.000006	0.000006	2	0.000050	0.000050	0.000050	0	0.000028	0.000028	0.000028	0	0.000051	0.000051	0.000051	-1	0.000050	0.000050	0.000050	0	0.000015	0.000015	0.000015	0	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Sep	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000031	0.000031	0.000031	1	0.000052	0.000052	0.000052	-1	0.000050	0.000050	0.000050	0	0.000039	0.000039	0.000039	1	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Oct	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000034	0.000034	0.000034	0	0.000052	0.000052	0.000052	-1	0.000050	0.000050	0.000050	0	0.000036	0.000036	0.000036	0	0.000005	0.000005	0.000005	0
Tl, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000036	0.000036	0.000036	0	0.000051	0.000051	0.000051	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	-3
Tl, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000038	0.000038	0.000038	0	0.000050	0.000050	0.000050	-1	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000052	2	0.000051	0.000051	0.000051	2	0.000050	0.000050	0.000051	0	0.000040	0.000040	0.000040	1	0.000058	0.000057	0.000066	12	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	Feb	13	0.000050	0.000050	0.000050	0	0.000052	0.000053	0.000055	5	0.000052	0.000053	0.000055	5	0.000050	0.000050	0.000050	0	0.000041	0.000041	0.000041	1	0.000057	0.000057	0.000066	12	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000054	4	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	Mar	13	0.000050	0.000050	0.000050	0	0.000056	0.000056	0.000061	12	0.000056	0.000056	0.000061	12	0.000050	0.000050	0.000050	0	0.000041	0.000041	0.000042	2	0.000057	0.000057	0.000066	13	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000059	10	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	Apr	13	0.000050	0.000050	0.000050	0	0.000057	0.000057	0.000062	13	0.000057	0.000057	0.000063	14	0.000050	0.000050	0.000050	0	0.000042	0.000042	0.000042	2	0.000057	0.000057	0.000066	13	0.000137	0.000131	0.000198	163	0.000056	0.000056	0.000060	12	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	May	13	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000055	5	0.000053	0.000053	0.000055	5	0.000050	0.000050	0.000051	1	0.000043	0.000043	0.000043	2	0.000057	0.000056	0.000065	13	0.000068	0.000067	0.000081	35	0.000052	0.000052	0.000053	3	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000050	0	0.000047	0.000047	0.000047	1	0.000057	0.000057	0.000065	12	0.000073	0.000072	0.000087	44	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000050	0
Tl, Tot	Operations	Jul	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	13	0.000006	0.000006	0.000007	10	0.000050	0.000050	0.000050	0	0.000037	0.000037	0.000038	1	0.000059	0.000058	0.000067	13	0.000067	0.000066	0.000076	31	0.000016	0.000016	0.000016	3	0.000006	0.000006	0.000006	29
Tl, Tot	Operations	Aug	13	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000007	16	0.000007	0.000007	0.000007	13	0.000050	0.000050	0.000050	0	0.000028	0.000028	0.000028	1	0.000060	0.000060	0.000068	13	0.000069	0.000068	0.000080	36	0.000016	0.000016	0.000016	4	0.000005	0.000005	0.000005	0
Tl, Tot	Operations	Sep	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	2	0.000050	0.000050	0.000051	2	0.000050	0.000050	0.000051	0	0.000031	0.000031	0.000031	2	0.000061	0.000060	0.000068	13	0.000073	0.000071	0.000085	43	0.000040	0.000040	0.000040	2	0.000005	0.000005	0.000005	0
Tl, Tot	Operations	Oct	13	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	2	0.000050	0.000050	0.000051	2	0.000050	0.000050	0.000051	1	0.000035	0.000034	0.000035	2	0.000060	0.000060	0.000068	13	0.000087	0.000083	0.000105	66	0.000036	0.000036	0.000037	2	0.000005	0.000005	0.000005	0
Tl, Tot	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000051	1	0.000037	0.000037	0.000037	1	0.000060	0.000059	0.000067	13	0.000102	0.000097	0.000133	94	0.000050	0.000050	0.000051	1	0.000049	0.000049	0.000049	-3
Tl, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000051	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000039	0.000039	0.000039	1	0.000059	0.000059	0.000067	14	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000050	0
Tl, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000040	0.000040	0.000040	1	0.000068	0.000069	0.000074	37	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Closure	Feb	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000040	0.000040	0.000041	1	0.000068	0.000069	0.000074	38	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Closure	Mar	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000051	0.000051	1	0.000041	0.000041	0.000041	1	0.000068	0.000070	0.000075	40	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Closure	Apr	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000052	0.000053	5	0.000051	0.000051	0.000051	1	0.000041	0.000041	0.000041	1	0.000068	0.000070	0.000075	42	0.000311	0.000290	0.000312	479	0.000052	0.000052	0.000052	4	0.000050	0.000050	0.000050	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4 Predicted Project Water Quality				AQM7 Predicted Project Water Quality				AQM8 Predicted Project Water Quality				AQM10 Predicted Project Water Quality				AQM11 Predicted Water Quality				AQM16 Predicted Project Water Quality				AQM18 Predicted Project Water Quality				AQM29 Predicted Project Water Quality				AQM31 Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Tl, Tot	Closure	May	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000042	0.000042	0.000042	1	0.000068	0.000069	0.000074	40	0.000110	0.000106	0.000116	113	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000050	0
Tl, Tot	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000051	1	0.000046	0.000046	0.000047	0	0.000068	0.000069	0.000074	39	0.000123	0.000117	0.000125	135	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Closure	Jul	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	-1	0.000050	0.000050	0.000050	1	0.000037	0.000037	0.000037	0	0.000070	0.000071	0.000076	40	0.000101	0.000097	0.000102	94	0.000015	0.000015	0.000015	0	0.000006	0.000006	0.000006	29
Tl, Tot	Closure	Aug	6	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000006	0.000006	0.000006	-1	0.000050	0.000050	0.000051	1	0.000028	0.000028	0.000028	0	0.000071	0.000073	0.000078	40	0.000108	0.000103	0.000108	106	0.000015	0.000015	0.000015	0	0.000005	0.000005	0.000005	0
Tl, Tot	Closure	Sep	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000031	0.000031	0.000031	1	0.000071	0.000073	0.000078	39	0.000118	0.000113	0.000119	125	0.000039	0.000039	0.000039	0	0.000005	0.000005	0.000005	0
Tl, Tot	Closure	Oct	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000034	0.000034	0.000034	0	0.000071	0.000072	0.000077	38	0.000157	0.000147	0.000157	194	0.000036	0.000036	0.000036	0	0.000005	0.000005	0.000005	0
Tl, Tot	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000036	0.000036	0.000036	0	0.000070	0.000071	0.000076	39	0.000136	0.000129	0.000137	158	0.000050	0.000050	0.000050	0	0.000049	0.000049	0.000049	-3
Tl, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	1	0.000038	0.000038	0.000038	0	0.000070	0.000071	0.000076	40	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000054	6	0.000051	0.000051	0.000051	3	0.000041	0.000041	0.000041	3	0.000091	0.000091	0.000091	82	0.000247	0.000214	0.000257	328	0.000053	0.000052	0.000053	4	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	Feb	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000055	0.000054	0.000055	9	0.000051	0.000051	0.000051	2	0.000042	0.000042	0.000042	3	0.000091	0.000091	0.000092	83	0.000250	0.000217	0.000260	334	0.000054	0.000053	0.000054	7	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	Mar	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000072	0.000069	0.000074	37	0.000051	0.000051	0.000051	2	0.000043	0.000043	0.000043	4	0.000092	0.000092	0.000092	86	0.000261	0.000226	0.000272	353	0.000069	0.000066	0.000070	32	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	Apr	109	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000081	0.000077	0.000084	54	0.000051	0.000051	0.000051	3	0.000043	0.000043	0.000044	6	0.000093	0.000092	0.000093	89	0.000282	0.000289	0.000425	477	0.000076	0.000072	0.000078	45	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	May	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000060	0.000059	0.000061	18	0.000052	0.000052	0.000052	4	0.000045	0.000044	0.000045	6	0.000091	0.000090	0.000091	86	0.000201	0.000188	0.000207	277	0.000056	0.000055	0.000056	10	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	Jun	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000051	0.000051	0.000051	2	0.000051	0.000051	0.000051	2	0.000048	0.000048	0.000048	3	0.000090	0.000090	0.000090	82	0.000240	0.000225	0.000248	349	0.000051	0.000051	0.000051	1	0.000050	0.000050	0.000050	0
Tl, Tot	Post-Closure	Jul	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000005	0	0.000007	0.000007	0.000007	17	0.000051	0.000051	0.000051	1	0.000038	0.000038	0.000038	2	0.000093	0.000093	0.000093	83	0.000232	0.000214	0.000240	328	0.000016	0.000016	0.000016	5	0.000006	0.000006	0.000006	29
Tl, Tot	Post-Closure	Aug	109	0.000005	0.000005	0.000005	0	0.000005	0.000005	0.000006	0	0.000007	0.000007	0.000007	21	0.000051	0.000051	0.000051	2	0.000028	0.000028	0.000029	3	0.000095	0.000094	0.000095	83	0.000236	0.000218	0.000244	337	0.000016	0.000016	0.000016	6	0.000005	0.000005	0.000005	0
Tl, Tot	Post-Closure	Sep	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000052	0.000051	0.000052	4	0.000051	0.000051	0.000051	3	0.000032	0.000031	0.000032	3	0.000094	0.000094	0.000094	81	0.000242	0.000225	0.000250	351	0.000041	0.000041	0.000041	4	0.000005	0.000005	0.000005	0
Tl, Tot	Post-Closure	Oct	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000053	5	0.000052	0.000052	0.000052	4	0.000035	0.000035	0.000035	3	0.000093	0.000092	0.000093	79	0.000260	0.000247	0.000269	394	0.000038	0.000037	0.000038	5	0.000005	0.000005	0.000005	0
Tl, Tot	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	4	0.000052	0.000052	0.000052	4	0.000037	0.000037	0.000038	4	0.000092	0.000091	0.000092	80	0.000273	0.000249	0.000284	399	0.000051	0.000051	0.000051	2	0.000049	0.000049	0.000049	-3
Tl, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000052	3	0.000052	0.000052	0.000052	3	0.000040	0.000040	0.000040	3	0.000091	0.000091	0.000091	81	0.000253	0.000220	0.000263	341	0.000051	0.000051	0.000051	2	0.000050	0.000050	0.000050	0
U, Tot	Construction	Jan	2	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000057	7	0.000053	0.000053	0.000057	7	0.000078	0.000078	0.000080	0	0.000055	0.000055	0.000057	3	0.000880	0.000880	0.000965	4	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000055	5	0.000050	0.000050	0.000050	0
U, Tot	Construction	Feb	2	0.000050	0.000050	0.000050	0	0.000065	0.000065	0.000079	29	0.000065	0.000065	0.000079	29	0.000077	0.000077	0.000078	1	0.000055	0.000055	0.000058	3	0.000914	0.000914	0.000998	4	0.000050	0.000050	0.000050	0	0.000062	0.000062	0.000074	24	0.000050	0.000050	0.000050	0
U, Tot	Construction	Mar	2	0.000050	0.000050	0.000050	0	0.000195	0.000195	0.000218	290	0.000195	0.000195	0.000218	290	0.000077	0.000077	0.000079	2	0.000058	0.000058	0.000061	8	0.000948	0.000948	0.001032	3	0.000050	0.000050	0.000050	0	0.000172	0.000172	0.000192	245	0.000050	0.000050	0.000050	0
U, Tot	Construction	Apr	2	0.000050	0.000050	0.000050	0	0.000342	0.000342	0.000368	584	0.000333	0.000333	0.000358	566	0.000079	0.000079	0.000081	3	0.000063	0.000063	0.000066	17	0.000982	0.000982	0.001065	3	0.000050	0.000050	0.000050	0	0.000285	0.000285	0.000306	469	0.000050	0.000050	0.000050	0
U, Tot	Construction	May	2	0.000050	0.000050	0.000050	0	0.000169	0.000169	0.000179	237	0.000160	0.000160	0.000169	219	0.000091	0.000091	0.000095	-6	0.000066	0.000066	0.000070	24	0.000954	0.000954	0.001030	5	0.000050	0.000050	0.000050	0	0.000120	0.000120	0.000126	140	0.000050	0.000050	0.000050	0
U, Tot	Construction	Jun	2	0.000050	0.000050	0.000050	0	0.000061	0.000061	0.000062	23	0.000061	0.000061	0.000062	22	0.000070	0.000070	0.000071	-5	0.000063	0.000063	0.000065	18	0.000934	0.000934	0.001005	7	0.000050	0.000050	0.000050	0	0.000058	0.000058	0.000058	15	0.000050	0.000050	0.000050	0
U, Tot	Construction	Jul	2	0.000050	0.000050	0.000050	0	0.000059	0.000059	0.000060	18	0.000059	0.000059	0.000060	17	0.000066	0.000066	0.000067	-4	0.000059	0.000059	0.000060	12	0.000975	0.000975	0.001045	7	0.000050	0.000050	0.000050	0	0.000057	0.000057	0.000058	14	0.000050	0.000050	0.000050	0
U, Tot	Construction	Aug	2	0.000050	0.000050	0.000050	0	0.000062	0.000062	0.000064	24	0.000062	0.000062	0.000064	24	0.000069	0.000069	0.000071	-7	0.000058	0.000058	0.000060	12	0.000996	0.000996	0.001065	8	0.000050	0.000050	0.000050	0	0.000059	0.000059	0.000061	19	0.000050	0.000050	0.000050	0
U, Tot	Construction	Sep	2	0.000050	0.000050	0.000050	0	0.000063	0.000063	0.000067	26	0.000063	0.000063	0.000067	26	0.000080	0.000080	0.000082	-8	0.000060	0.000060	0.000061	14	0.000977	0.000977	0.001041	10	0.000050	0.000050	0.000050	0	0.000060	0.000060	0.000062	20	0.000046	0.000046	0.000046	0
U, Tot	Construction	Oct	2	0.000050	0.000050	0.000050	0	0.000059	0.000059	0.000061	17	0.000058	0.000058	0.000061	17	0.000091	0.000091	0.000093	-7	0.000059	0.000059	0.000061	12	0.000957	0.000957	0.001017	11	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000057	12	0.000046	0.000046	0.000046	0
U, Tot	Construction	Nov	2	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000056	9	0.000055	0.000055	0.000056	9	0.000091	0.000091	0.000094	-4	0.000059	0.000059	0.000061	10	0.000964	0.000964	0.001021	11	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000054	6	0.000050	0.000050	0.000050	0
U, Tot	Construction	Dec	2	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000055	8	0.000054	0.000054	0.000055	8	0.000085	0.000085	0.000087	-2	0.000059	0.000059	0.000060	9	0.000989	0.000989	0.001045	11	0.000050	0.000050	0.000050	0	0.000052	0.000052	0.000053	5	0.000050	0.000050	0.000050	0
U, Tot	Operations	Jan	13	0.000050	0.000050	0.000050	0	0.000102	0.000099	0.000125	99	0.000102	0.000099	0.000125	99	0.000097	0.000096	0.000106	13	0.000092	0.000086	0.000100	56	0.001508	0.001461	0.001778	42	0.000050	0.000050	0.000050	0	0.000088	0.000086	0.000105	72	0.000050	0.000050	0.000050	0
U, Tot	Operations	Feb	13	0.000050	0.000050	0.000050	0	0.000466	0.000438	0.000595	775	0.000465	0.000437	0.000594	774	0.000095	0.000093	0.000103	14	0.000093	0.000091	0.000107	65	0.001544	0.001497	0.001818	41	0.000050	0.000050	0.000050	0	0.000392	0.000368	0.000496	635	0.000050	0.000050	0.000050	0
U, Tot	Operations	Mar	13	0.000050	0.000050	0.000050	0	0.001354	0.001290	0.001656	2480	0.001350	0.001286	0.001651	2473	0.000095	0.000093	0.000103	16	0.000121	0.000123	0.000150	124	0.001584	0.001537	0.001862	41	0.000050	0.000050	0.000050	0	0.001158	0.001104	0.001418	2108	0.000050	0.000050	0.000050	0
U, Tot	Operations	Apr	13	0.000050	0.000050	0.000050	0	0.000912	0.000785	0.001011	1470	0.000931	0.000801	0.001041	1501	0.000099	0.000097	0.000107	18	0.000146	0.000147	0.000182	169	0.001626	0.001577	0.001908	40	0.004750	0.004274	0.006694	8448	0.000776	0.000667	0.000866	1234	0.000050	0.000050	0.000050	0
U, Tot	Operations	May	13	0.000050	0.000050	0.000050	0	0.000312	0.000280	0.000356	460	0.000304	0.000274	0.000350	447	0.000119	0.000117	0.000131	11	0.000145	0.000146	0.000180	165	0.001563	0.001515	0.001830	42	0.001087	0.000996	0.001487	1891	0.000210	0.000190	0.000238	280	0.000050	0.000050	0.000050	0
U, Tot	Operations	Jun	13	0.000050	0.000050	0.000050	0	0.000120	0.000114	0.000128	128	0.000121	0.000115	0.000130	130	0.000083	0.000081	0.000088	5	0.000116	0.000115	0.000136	111	0.001516	0.001469	0.001771	44	0.001280	0.001161	0.001726	2222	0.000099	0.000095	0.000105	90	0.000050	0.000050	0.000050	0
U, Tot	Operations	Jul	13	0.000050	0.000050	0.000050	0	0.000109	0.000105	0.000118	109	0.000110	0.000105	0.000119	111	0.000076	0.000075	0.000080	4	0.000096	0.000094	0.000105	77	0.001569	0.001521	0.001830	44	0.000911	0.000825	0.001205	1550	0.000096	0.000093	0.000104	86	0.000050	0.000050	0.000050	0
U, Tot	Operations	Aug	13	0.000050	0.000050	0.000050	0	0.000131	0.000124	0.000142	147	0.000132	0.000125	0.000144	150	0.000082	0.000081	0.000087	3	0.000098	0.000094	0.000105	80	0.001592	0.001542	0.001852	46	0.001041	0.000937	0.001366	1774	0.000115	0.000109	0.000124	118	0.000050	0.000050	0.000050	0
U, Tot	Operations	Sep	13	0.000050	0.000050	0.000050	0	0.000137	0.000126	0.000152	152	0.000139	0.000127	0.000154	155	0.000098	0.000097	0.000107	5	0.000103	0.000098	0.000110	86	0.001549	0.001501	0.001799	48	0.001235	0.001108	0.001608	2116	0.000118	0.000109	0.000129	119	0.000046	0.000046	0.000046	0
U, Tot	Operations	Oct	13	0.000050	0.000050	0.000050	0	0.000114	0.000107	0.000142	113	0.000118	0.000110	0.000145	120	0.000115	0.000113	0.000126	9	0.000102	0.000096	0.000110	80	0.001508	0.001459	0.001747	49	0.001928	0.001710	0.002522	3320	0.000096	0.000090	0.000115	83	0.000046	0.000046	0.000046	0
U, Tot	Operations	Nov	13	0.000050	0.000050	0.000050	0	0.000084	0.000088	0.000109	75	0.000086	0.000089	0.000112	78	0.000116	0.000114	0.000127	13	0.000100	0.000094	0.000106	73	0.001507	0.001458	0.001743	49	0.002412	0.002149	0.003391	4198	0.000072	0.000074	0.000089	49	0.000050	0.000050	0.000050	0
U, Tot	Operations	Dec	13	0.000050	0.000050	0.000050	0	0.000081	0.000080	0.000091	59	0.000081	0.000079	0.000091	59	0.000106	0.000104	0.000115	14	0.000096	0.000090	0.000102	66	0.001533	0.001483	0.001769	48	0.000051	0.000051	0.000051	2	0.000070	0.000069	0.000077	38	0.000050	0.000050	0.000050	0
U, Tot	Closure	Jan	6	0.000050	0.000050	0.000050	0	0.000050	0.000051	0.000054	1	0.000050	0.000051	0.000054	1	0.000103	0.000103	0.000106	29	0.000059	0.000066	0.000098	22	0.001735	0.001733	0.001806	95	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000052	1	0.000050	0.000050	0.000050	0
U, Tot	Closure	Feb	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000099	0.000099	0.000102	29	0.000059	0.000065	0.000095	21	0.001771	0.001769	0.001845	94	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
U, Tot	Closure	Mar	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000098	0.000098	0.000101	30	0.000060	0.000065	0.000093	20	0.001813	0.001811	0.001892	94	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
U, Tot	Closure	Apr	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000155	0.000148	0.000155	196	0.000102	0.000102	0.000105	32	0.000060	0.000065	0.000091	21	0.001857	0.001855	0.001942	93	0.010455	0.009738	0.010470	19376	0.000134	0.000129	0.000135	158	0.000050	0.000050	0.000050	0
U, Tot	Closure	May	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000082	0.000080	0.000084	61	0.000126	0.000126	0.000130	30	0.000062	0.000066	0.000088	22	0.001780	0.001778	0.001865	97	0.002467	0.002354	0.002670	4608	0.000070	0.000068	0.000070	37	0.000050	0.000050	0.000050	0
U, Tot	Closure	Jun	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000053	0.000053	6	0.000086	0.000086	0.000088	18	0.000059	0.000061	0.000071	14	0.001716	0.001720	0.001807	100	0.002929	0.002745	0.002990	5389	0.000052	0.000052	0.000052	4	0.000050	0.000050	0.000050	0
U, Tot	Closure	Jul	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000053	0.000052	0.000053	5	0.000078	0.000078	0.000080	15	0.000056	0.000056	0.000059	7	0.001770	0.001777	0.001871	101	0.002046	0.001912	0.002066	3723	0.000052	0.000052	0.000052	4	0.000050	0.000050	0.000050	0
U, Tot	Closure	Aug	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	7	0.000085	0.000085	0.000087	15	0.000055	0.000055	0.000056	6	0.001792	0.001799	0.001897	103	0.002319	0.002159	0.002323	4218	0.000053	0.000053	0.000053	6	0.000050	0.000050	0.000050	0
U, Tot	Closure	Sep	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000055	0.000055	0.000055	10	0.000103	0.000104	0.000107	22	0.000056	0.000056	0.000056	6	0.001740	0.001746	0.001845	106	0.002728	0.002541	0.002733	4983	0.000054	0.000053	0.000054	8	0.000046	0.000046	0.000046	0
U, Tot	Closure	Oct	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000059	0.000058	0.000059	17	0.000122	0.000122	0.000127	30	0.000057	0.000057	0.000058	9	0.001689	0.001695	0.001795	109	0.004261	0.003924	0.004268	7748	0.000056	0.000055	0.000056	12	0.000046	0.000046	0.000046	0
U, Tot	Closure	Nov	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000054	0.000054	0.000054	7	0.000122	0.000122	0.000127	34	0.000059	0.000059	0.000060	11	0.001682	0.001689	0.001792	109	0.003434	0.003203	0.003440	6306	0.000053	0.000052	0.000053	5	0.000050	0.000050	0.000050	0
U, Tot	Closure	Dec	6	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000110	0.000111	0.000115	32	0.000059	0.000059	0.000060	10	0.001704	0.001710	0.001816	107	0.000051	0.000051	0.000051	2	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0
U, Tot	Post-Closure	Jan	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000161	0.000149	0.000183	199	0.000108	0.000108	0.000108	42	0.000095	0.000092	0.000102	71	0.001911	0.001910	0.001914	141	0.006362	0.005715	0.007633	11329	0.000131	0.000123	0.000147	145	0.000050	0.000050	0.000052	1
U, Tot	Post-Closure	Feb	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000215	0.000198	0.000248	297	0.000104	0.000104	0.000104	40	0.000098	0.000095	0.000106	77	0.001945	0.001943	0.001948	138	0.006443	0.005811	0.007732	11522	0.000183	0.000170	0.000210	240	0.000050	0.000050	0.000052	1
U, Tot	Post-Closure	Mar	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000761	0.000692	0.000911	1285	0.000103	0.000103	0.000103	41	0.000114	0.000109	0.000125	104	0.001989	0.001988	0.001993	136	0.006779	0.006127	0.008134	12154	0.000654	0.000595	0.000782	1091	0.000050	0.000050	0.000052	1
U, Tot	Post-Closure	Apr	109	0.000050	0.000056	0.000070	13	0.000050	0.000056	0.000068	12	0.001038	0.000954	0.001237	1808	0.000107	0.000107	0.000108	44	0.000133	0.000126	0.000147	136	0.002038	0.002037	0.002042	135	0.007398	0.007760	0.010330	15421	0.000872	0.000801	0.001035	1502	0.000050	0.000050	0.000050	0
U, Tot	Post-Closure	May	109	0.000050	0.000052	0.000058	5	0.000050	0.000052	0.000056	4	0.000376	0.000348	0.000439	596	0.000133	0.000133	0.000134	45	0.000138	0.000131	0.000154	145	0.001954	0.001953	0.001957	138	0.004734	0.004593	0.005608	9085	0.000244	0.000227	0.000280	354	0.000050	0.000050	0.000050	0
U, Tot	Post-Closure	Jun	109	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000051	0	0.000085	0.000082	0.000091	64	0.000090	0.000090	0.000090	27	0.000107	0.000102	0.000117	93	0.001892	0.001891	0.001895	141	0.005966	0.005789	0.007084	11478	0.000074	0.000072	0.000079	44	0.000050	0.000050	0.000050	0
U, Tot	Post-Closure	Jul	109	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000051	0	0.000084	0.000081	0.000091	63	0.000081	0.000081	0.000081	22	0.000082	0.000080	0.000087	53	0.001959	0.001958	0.001962	141	0.005751	0.005486	0.006843	10872	0.000077	0.000075	0.000082	49	0.000050	0.000050	0.000050	0
U, Tot	Post-Closure	Aug	109	0.000050	0.000050	0.000051	0	0.000050	0.000050	0.000051	0	0.000093	0.000090	0.000101	79	0.000089	0.000088	0.000089	23	0.000079	0.000077	0.000084	48	0.001987	0.001986	0.001990	144	0.005834	0.005584	0.006913	11068	0.000084	0.000081	0.000090	63	0.000050	0.000050	0.000050	0
U, Tot	Post-Closure	Sep	109	0.000050	0.000050	0.000051	1	0.000050	0.000050	0.000051	1	0.000117	0.000111	0.000129	122	0.000109	0.000109	0.000110	33	0.000083	0.000081	0.000089	55	0.001932	0.001931	0.001935	147	0.006045	0.005833	0.007174	11566	0.000100	0.000096	0.000110	94	0.000046	0.000046	0.000046	0
U, Tot	Post-Closure	Oct	109	0.000050	0.000050	0.000052	1	0.000050	0.000050	0.000052	1	0.000138	0.000131	0.000154	162	0.000130	0.000130	0.000131	44	0.000090	0.000087	0.000097	66	0.001877	0.001876	0.001878	149	0.006539	0.006449	0.007764	12798	0.000110	0.000105	0.000121	112	0.000046	0.000046	0.000046	0
U, Tot	Post-Closure	Nov	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000115	0.000109	0.000128	119	0.000130	0.000130	0.000131	47	0.000094	0.000091	0.000101	71	0.001866	0.001865	0.001869	148	0.006999	0.006657	0.008367	13214	0.000091	0.000087	0.000098	74	0.000050	0.000050	0.000051	0
U, Tot	Post-Closure	Dec	109	0.000050	0.000050	0.000050	0	0.000050	0.000050	0.000050	0	0.000113	0.000107	0.000126	114	0.000117	0.000117	0.000117	44	0.000094	0.000091	0.000101	70	0.001883	0.001883	0.001886	145	0.006476	0.005873	0.007770	11646	0.000091	0.000087	0.000099	74	0.000050	0.000050	0.000052	1
Zn, Diss	Construction	Jan	2	0.00120	0.00120	0.00120	0	0.00122	0.00122	0.00123	2	0.00122	0.00122	0.00123	2	0.00380	0.00380	0.00381	0	0.00923	0.00923	0.00924	0	0.00661	0.00661	0.00695	2	0.00150	0.00150	0.00150	0	0.01154	0.01154	0.01154	-1	0.00420	0.00420	0.00420	0
Zn, Diss	Construction	Feb	2	0.00120	0.00120	0.00120	0	0.00127	0.00127	0.00133	6	0.00127	0.00127	0.00133	6	0.00379	0.00379	0.00380	0	0.00909	0.00909	0.00911	0	0.00673	0.00673	0.00706	2	0.00150	0.00150	0.00150	0	0.00854	0.00854	0.00857	-2	0.00420	0.00420	0.00420	0
Zn, Diss	Construction	Mar	2	0.00120	0.00120	0.00120	0	0.00182	0.00182	0.00192	52	0.00182	0.00182	0.00192	52	0.00379	0.00379	0.00380	0	0.00887	0.00887	0.00889	0	0.00684	0.00684	0.00717	1	0.00150	0.00150	0.00150	0	0.00762	0.00762	0.00768	2	0.00420	0.00420	0.00420	0
Zn, Diss	Construction	Apr	2	0.00131	0.00131	0.00131	1	0.00260	0.00260	0.00272	95	0.00256	0.00256	0.00267	94	0.00380	0.00380	0.00381	0	0.00868	0.00868	0.00870	0	0.00695	0.00695	0.00728	1	0.00150	0.00150	0.00150	0	0.00873	0.00873	0.00880	7	0.00420	0.00420	0.00420	0
Zn, Diss	Construction	May	2	0.00148	0.00148	0.00148	1	0.00198	0.00198	0.00202	35	0.00193	0.00193	0.00197	33	0.00279	0.00279	0.00280	-1	0.00928	0.00928	0.00929	0	0.00671	0.00671	0.00701	3	0.00150	0.00150	0.00150	0	0.01739	0.01739	0.01741	5	0.00217	0.00217	0.00217	3
Zn, Diss	Construction	Jun	2	0.00140	0.00140	0.00140	0	0.00145	0.00145	0.00146	3	0.00145	0.00145	0.00146	3	0.00259	0.00259	0.00260	-1	0.01079	0.01079	0.01080	0	0.00654	0.00654	0.00682	4	0.00150	0.00150	0.00150	0	0.01357	0.01357	0.01357	0	0.00210	0.00210	0.00210	0
Zn, Diss	Construction	Jul	2	0.00150	0.00150	0.00150	0	0.00154	0.00154	0.00154	2	0.00153	0.00153	0.00154	2	0.00648	0.00648	0.00648	0	0.00873	0.00873	0.00873	0	0.00677	0.00677	0.00705	4	0.00102	0.00102	0.00102	2	0.00582	0.00582	0.00582	1	0.00123	0.00123	0.00123	2
Zn, Diss	Construction	Aug	2	0.00150	0.00150	0.00150	0	0.00155	0.00155	0.00156	3	0.00155	0.00155	0.00156	3	0.00651	0.00651	0.00652	0	0.00665	0.00665	0.00666	0	0.00706	0.00706	0.00733	4	0.00100	0.00100	0.00100	0	0.00567	0.00567	0.00568	1	0.00120	0.00120	0.00120	0
Zn, Diss	Construction	Sep	2	0.00150	0.00150	0.00150	0	0.00155	0.00155	0.00156	4	0.00155	0.00155	0.00156	4	0.00405	0.00405	0.00406	-1	0.00647	0.00647	0.00647	1	0.00712	0.00712	0.00738	4	0.00129	0.00129	0.00129	-1	0.00821	0.00821	0.00822	1	0.00159	0.00159	0.00159	-1
Zn, Diss	Construction	Oct	2	0.00150	0.00150	0.00150	0	0.00153	0.00153	0.00154	2	0.00153	0.00153	0.00154	2	0.00404	0.00404	0.00405	-1	0.00719	0.00719	0.00720	0	0.00702	0.00702	0.00726	5	0.00130	0.00130	0.00130	0	0.01039	0.01039	0.01039	0	0.00160	0.00160	0.00160	0
Zn, Diss	Construction	Nov	2	0.00120	0.00120	0.00120	0	0.00123	0.00123	0.00123	1	0.00123	0.00123	0.00123	1	0.00385	0.00385	0.00386	0	0.00821	0.00821	0.00821	0	0.00700	0.00700	0.00723	5	0.00149	0.00149	0.00149	0	0.01548	0.01548	0.01548	0	0.00411	0.00411	0.00411	-2
Zn, Diss	Construction	Dec	2	0.00120	0.00120	0.00120	0	0.00122	0.00122	0.00123	2	0.00122	0.00122	0.00123	2	0.00383	0.00383	0.00384	0	0.00903	0.00903	0.00904	0	0.00707	0.00707	0.00729	5	0.00150	0.00150	0.00150	0	0.01460	0.01460	0.01460	-1	0.00420	0.00420	0.00420	0
Zn, Diss	Operations	Jan	13	0.00121	0.00120	0.00121	0	0.00140	0.00139	0.00148	16	0.00140	0.00139	0.00148	16	0.00387	0.00386	0.00390	1	0.00939	0.00936	0.00941	1	0.00894	0.00877	0.00984	21	0.00150	0.00150	0.00150	0	0.01175	0.01175	0.01181	1	0.00420	0.00420	0.00420	0
Zn, Diss	Operations	Feb	13	0.00121	0.00121	0.00121	1	0.00292	0.00278	0.00337	132	0.00292	0.00277	0.00337	131	0.00386	0.00385	0.00389	1	0.00926	0.00925	0.00931	1	0.00906	0.00888	0.00997	20	0.00150	0.00150	0.00150	0	0.00983	0.00973	0.01017	12	0.00420	0.00420	0.00420	0
Zn, Diss	Operations	Mar	13	0.00121	0.00121	0.00121	1	0.00660	0.00629	0.00768	424	0.00658	0.00627	0.00766	423	0.00386	0.00385	0.00389	1	0.00913	0.00914	0.00923	3	0.00919	0.00902	0.01012	20	0.00150	0.00150	0.00150	0	0.01136	0.01116	0.01222	50	0.00420	0.00420	0.00420	0
Zn, Diss	Operations	Apr	13	0.00131	0.00131	0.00132	1	0.00479	0.00430	0.00509	221	0.00481	0.00431	0.00514	227	0.00387	0.00387	0.00390	1	0.00902	0.00902	0.00914	4	0.00932	0.00914	0.01026	20	0.01426	0.01320	0.02082	780	0.01087	0.01051	0.01114	29	0.00420	0.00420	0.00420	0
Zn, Diss	Operations	May	13	0.00148	0.00148	0.00148	1	0.00252	0.00239	0.00264	63	0.00247	0.00234	0.00260	61	0.00289	0.00288	0.00293	1	0.00960	0.00960	0.00971	4	0.00895	0.00877	0.00984	22	0.00426	0.00408	0.00561	172	0.01775	0.01770	0.01784	7	0.00217	0.00217	0.00217	3
Zn, Diss	Operations	Jun	13	0.00140	0.00140	0.00140	0	0.00169	0.00166	0.00171	18	0.00169	0.00166	0.00171	18	0.00264	0.00263	0.00266	0	0.01100	0.01099	0.01106	2	0.00867	0.00850	0.00952	23	0.00486	0.00459	0.00636	206	0.01370	0.01369	0.01372	1	0.00210	0.00210	0.00210	0
Zn, Diss	Operations	Jul	13	0.00150	0.00150	0.00150	0	0.00173	0.00172	0.00176	15	0.00173	0.00172	0.00177	15	0.00651	0.00651	0.00653	0	0.00887	0.00886	0.00890	2	0.00894	0.00877	0.00981	23	0.00344	0.00323	0.00444	223	0.00597	0.00595	0.00599	3	0.00123	0.00123	0.00123	2
Zn, Diss	Operations	Aug	13	0.00150	0.00150	0.00150	0	0.00182	0.00179	0.00185	20	0.00182	0.00179	0.00186	20	0.00656	0.00655	0.00657	0	0.00680	0.00678	0.00682	2	0.00923	0.00905	0.01010	23	0.00381	0.00354	0.00490	254	0.00588	0.00585	0.00590	4	0.00120	0.00120	0.00120	0
Zn, Diss	Operations	Sep	13	0.00150	0.00150	0.00150	0	0.00183	0.00179	0.00190	20	0.00183	0.00180	0.00191	20	0.00412	0.00411	0.00414	0	0.00663	0.00661	0.00665	3	0.00921	0.00903	0.01004	23	0.00460	0.00428	0.00586	229	0.00842	0.00840	0.00846	3	0.00159	0.00159	0.00159	-1
Zn, Diss	Operations	Oct	13	0.00150	0.00150	0.00150	0	0.00174	0.00171	0.00186	15	0.00175	0.00172	0.00187	15	0.00413	0.00412	0.00417	1	0.00735	0.00733	0.00738	2	0.00902	0.00884	0.00982	23	0.00655	0.00598	0.00854	360	0.01054	0.01052	0.01061	2	0.00160	0.00160	0.00160	0

Appendix G-5: Summary of water quality model predictions for the receiving environment - upper case

Parameter	Project Phase	Month	# of Years in Phase	AQM4				AQM7				AQM8				AQM10				AQM11				AQM16				AQM18				AQM29				AQM31			
				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality				Predicted Project Water Quality			
				Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change	Median	Mean	Max	Change
Unit				mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)	mg/L	mg/L	mg/L	(%)
Zn, Diss	Operations	Nov	13	0.00121	0.00121	0.00121	0	0.00134	0.00135	0.00143	12	0.00135	0.00136	0.00144	12	0.00394	0.00394	0.00398	1	0.00837	0.00834	0.00839	2	0.00897	0.00879	0.00975	23	0.00836	0.00763	0.01162	409	0.01558	0.01558	0.01562	0	0.00411	0.00411	0.00411	-2
Zn, Diss	Operations	Dec	13	0.00120	0.00120	0.00120	0	0.00132	0.00132	0.00136	10	0.00132	0.00132	0.00136	10	0.00390	0.00389	0.00393	1	0.00918	0.00916	0.00920	2	0.00903	0.00886	0.00982	23	0.00150	0.00150	0.00150	0	0.01471	0.01471	0.01473	0	0.00420	0.00420	0.00420	0
Zn, Diss	Closure	Jan	6	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00122	1	0.00121	0.00121	0.00122	1	0.00388	0.00388	0.00390	2	0.00928	0.00930	0.00941	1	0.00959	0.00959	0.00991	44	0.00150	0.00150	0.00150	0	0.01164	0.01164	0.01165	0	0.00420	0.00420	0.00420	0
Zn, Diss	Closure	Feb	6	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00387	0.00387	0.00388	2	0.00915	0.00917	0.00927	1	0.00970	0.00970	0.01001	44	0.00150	0.00150	0.00150	0	0.00867	0.00866	0.00867	0	0.00420	0.00420	0.00420	0
Zn, Diss	Closure	Mar	6	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00387	0.00387	0.00388	2	0.00893	0.00894	0.00903	1	0.00983	0.00983	0.01012	44	0.00150	0.00150	0.00150	0	0.00748	0.00748	0.00749	0	0.00420	0.00420	0.00420	0
Zn, Diss	Closure	Apr	6	0.00131	0.00131	0.00132	1	0.00137	0.00137	0.00138	3	0.00169	0.00166	0.00169	26	0.00388	0.00388	0.00389	2	0.00873	0.00875	0.00883	1	0.00997	0.00997	0.01022	45	0.03321	0.03088	0.03335	1959	0.00873	0.00874	0.00881	7	0.00420	0.00420	0.00420	0
Zn, Diss	Closure	May	6	0.00148	0.00148	0.00148	1	0.00148	0.00148	0.00148	1	0.00157	0.00157	0.00158	8	0.00290	0.00290	0.00292	3	0.00932	0.00934	0.00941	1	0.00955	0.00955	0.00978	47	0.00882	0.00845	0.00950	463	0.01741	0.01742	0.01744	5	0.00217	0.00217	0.00217	3
Zn, Diss	Closure	Jun	6	0.00140	0.00140	0.00140	0	0.00140	0.00140	0.00140	0	0.00142	0.00141	0.00142	1	0.00265	0.00265	0.00265	2	0.01081	0.01082	0.01085	1	0.00923	0.00923	0.00947	49	0.01031	0.00970	0.01051	547	0.01357	0.01357	0.01357	0	0.00210	0.00210	0.00210	0
Zn, Diss	Closure	Jul	6	0.00150	0.00150	0.00150	0	0.00150	0.00150	0.00150	0	0.00151	0.00151	0.00151	1	0.00652	0.00652	0.00652	1	0.00873	0.00874	0.00875	0	0.00951	0.00951	0.00977	49	0.00721	0.00677	0.00728	577	0.00581	0.00581	0.00581	0	0.00123	0.00123	0.00123	2
Zn, Diss	Closure	Aug	6	0.00150	0.00150	0.00150	0	0.00150	0.00150	0.00150	0	0.00151	0.00151	0.00151	1	0.00657	0.00657	0.00657	1	0.00665	0.00665	0.00665	0	0.00980	0.00979	0.01007	48	0.00804	0.00752	0.00807	652	0.00565	0.00565	0.00565	0	0.00120	0.00120	0.00120	0
Zn, Diss	Closure	Sep	6	0.00150	0.00150	0.00150	0	0.00149	0.00149	0.00149	0	0.00151	0.00151	0.00151	1	0.00413	0.00413	0.00414	2	0.00646	0.00646	0.00646	0	0.00974	0.00974	0.01002	47	0.00953	0.00893	0.00957	587	0.00821	0.00821	0.00821	1	0.00159	0.00159	0.00159	-1
Zn, Diss	Closure	Oct	6	0.00150	0.00150	0.00150	0	0.00149	0.00149	0.00149	0	0.00152	0.00152	0.00152	2	0.00415	0.00415	0.00416	2	0.00720	0.00720	0.00720	1	0.00952	0.00952	0.00981	47	0.01425	0.01315	0.01430	911	0.01042	0.01042	0.01042	1	0.00160	0.00160	0.00160	0
Zn, Diss	Closure	Nov	6	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00121	0	0.00122	0.00122	0.00122	0	0.00396	0.00396	0.00397	3	0.00823	0.00822	0.00823	1	0.00945	0.00944	0.00975	47	0.01189	0.01113	0.01192	642	0.01552	0.01552	0.01552	0	0.00411	0.00411	0.00411	-2
Zn, Diss	Closure	Dec	6	0.00120	0.00120	0.00120	0	0.00120	0.00120	0.00120	0	0.00120	0.00120	0.00120	0	0.00391	0.00391	0.00392	2	0.00905	0.00905	0.00906	0	0.00950	0.00949	0.00980	47	0.00150	0.00150	0.00150	0	0.01465	0.01465	0.01465	0	0.00420	0.00420	0.00420	0
Zn, Diss	Post-Closure	Jan	109	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00121	1	0.00183	0.00175	0.00186	46	0.00399	0.00399	0.00399	5	0.00947	0.00944	0.00947	2	0.01294	0.01286	0.01296	105	0.03706	0.03231	0.03832	2054	0.01198	0.01193	0.01199	2	0.00420	0.00420	0.00421	0
Zn, Diss	Post-Closure	Feb	109	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00214	0.00202	0.00217	69	0.00397	0.00396	0.00397	5	0.00935	0.00933	0.00936	2	0.01308	0.01301	0.01310	105	0.03754	0.03296	0.03881	2098	0.00928	0.00920	0.00931	6	0.00420	0.00420	0.00421	0
Zn, Diss	Post-Closure	Mar	109	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00525	0.00475	0.00543	296	0.00396	0.00396	0.00396	5	0.00920	0.00917	0.00921	3	0.01329	0.01321	0.01332	106	0.03945	0.03474	0.04086	2216	0.01036	0.01000	0.01051	34	0.00420	0.00420	0.00421	0
Zn, Diss	Post-Closure	Apr	109	0.00131	0.00135	0.00144	4	0.00137	0.00141	0.00149	5	0.00700	0.00636	0.00724	383	0.00398	0.00398	0.00398	5	0.00909	0.00905	0.00910	4	0.01353	0.01345	0.01355	107	0.04187	0.04414	0.05954	2842	0.01239	0.01197	0.01264	47	0.00420	0.00420	0.00420	0
Zn, Diss	Post-Closure	May	109	0.00148	0.00149	0.00153	2	0.00148	0.00150	0.00153	2	0.00333	0.00312	0.00340	114	0.00305	0.00305	0.00306	9	0.00970	0.00966	0.00971	4	0.01296	0.01289	0.01298	110	0.02810	0.02657	0.02901	1672	0.01805	0.01798	0.01811	9	0.00217	0.00217	0.00217	3
Zn, Diss	Post-Closure	Jun	109	0.00140	0.00140	0.00141	0	0.00140	0.00141	0.00141	0	0.00161	0.00158	0.00161	13	0.00272	0.00272	0.00272	5	0.01105	0.01102	0.01106	2	0.01256	0.01249	0.01258	112	0.03511	0.03320	0.03631	2113	0.01366	0.01365	0.01366	1	0.00210	0.00210	0.00210	0
Zn, Diss	Post-Closure	Jul	109	0.00150	0.00150	0.00150	0	0.00150	0.00150	0.00150	0	0.00170	0.00167	0.00170	12	0.00658	0.00658	0.00658	2	0.00887	0.00885	0.00887	2	0.01298	0.01292	0.01300	113	0.03375	0.03131	0.03490	3031	0.00594	0.00592	0.00594	2	0.00123	0.00123	0.00123	2
Zn, Diss	Post-Closure	Aug	109	0.00150	0.00150	0.00150	0	0.00150	0.00150	0.00150	0	0.00175	0.00172	0.00175	15	0.00664	0.00663	0.00664	2	0.00678	0.00676	0.00678	2	0.01334	0.01328	0.01336	110	0.03418	0.03187	0.03529	3087	0.00582	0.00580	0.00582	3	0.00120	0.00120	0.00120	0
Zn, Diss	Post-Closure	Sep	109	0.00150	0.00150	0.00151	0	0.00149	0.00149	0.00150	0	0.00187	0.00183	0.00188	23	0.00424	0.00424	0.00424	5	0.00661	0.00659	0.00661	2	0.01321	0.01315	0.01323	107	0.03540	0.03328	0.03656	2460	0.00844	0.00841	0.00845	3	0.00159	0.00159	0.00159	-1
Zn, Diss	Post-Closure	Oct	109	0.00150	0.00150	0.00151	0	0.00149	0.00150	0.00150	0	0.00200	0.00194	0.00201	30	0.00430	0.00429	0.00430	6	0.00737	0.00735	0.00738	3	0.01291	0.01285	0.01292	107	0.03831	0.03673	0.03953	2725	0.01067	0.01064	0.01068	3	0.00160	0.00160	0.00160	0
Zn, Diss	Post-Closure	Nov	109	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00121	0	0.00158	0.00154	0.00159	26	0.00411	0.00411	0.00411	7	0.00841	0.00839	0.00842	3	0.01280	0.01275	0.01282	107	0.04091	0.03768	0.04227	2412	0.01567	0.01565	0.01567	1	0.00411	0.00411	0.00412	-2
Zn, Diss	Post-Closure	Dec	109	0.00120	0.00120	0.00120	0	0.00120	0.00120	0.00120	0	0.00156	0.00152	0.00157	26	0.00403	0.00403	0.00404	6	0.00924	0.00922	0.00924	2	0.01284	0.01279	0.01286	106	0.03773	0.03322	0.03901	2115	0.01481	0.01479	0.01481	1	0.00420	0.00420	0.00421	0
Zn, Tot	Construction	Jan	2	0.00120	0.00120	0.00120	0	0.00123	0.00123	0.00126	3	0.00123	0.00123	0.00126	3	0.00389	0.00389	0.00389	0	0.00944	0.00944	0.00946	0	0.00649	0.00649	0.00683	2	0.00170	0.00170	0.00170	0	0.01155	0.01155	0.01156	-1	0.00420	0.00420	0.00420	0
Zn, Tot	Construction	Feb	2	0.00120	0.00120	0.00120	0	0.00130	0.00130	0.00139	8	0.00130	0.00130	0.00139	8	0.00389	0.00389	0.00389	0	0.00929	0.00929	0.00931	0	0.00660	0.00660	0.00694	2	0.00170	0.00170	0.00170	0	0.00857	0.00857	0.00862	-2	0.00420	0.00420	0.00420	0
Zn, Tot	Construction	Mar	2	0.00120	0.00120	0.00120	0	0.00199	0.00199	0.00210	66	0.00199	0.00199	0.00210	66	0.00389	0.00389	0.00390	0	0.00906	0.00906	0.00908	0	0.00672	0.00672	0.00705	2	0.00170	0.00170	0.00170	0	0.00776	0.00776	0.00783	4	0.00420	0.00420	0.00420	0
Zn, Tot	Construction	Apr	2	0.00131	0.00131	0.00131	1	0.00286	0.00286	0.00296	110	0.00282	0.00282	0.00292	110	0.00390	0.00390	0.00390	0	0.00887	0.00887	0.00889	0	0.00683	0.00683	0.00716	1	0.00170	0.00170	0.00170	0	0.00894	0.00894	0.00901	10	0.00420	0.00420	0.00420	0
Zn, Tot	Construction	May	2	0.00175	0.00175	0.00175	3	0.00227	0.00227	0.00231	38	0.00221	0.00221	0.00224	36	0.00323	0.00323	0.00324	-1	0.00946	0.00946	0.00947	0	0.00660	0.00660	0.00690	3	0.00180	0.00180	0.00180	0	0.01755	0.01755	0.01756	6	0.00468	0.00468	0.00468	0
Zn, Tot	Construction	Jun	2	0.00142	0.00142	0.00142	0	0.00147	0.00147	0.00148	4	0.00147	0.00147	0.00148	4	0.00308	0.00308	0.00308	0	0.01091	0.01091	0.01092	0	0.00644	0.00644	0.00672	4	0.00180	0.00180	0.00180	0	0.01358	0.01358	0.01358	0	0.00470	0.00470	0.00470	0
Zn, Tot	Construction	Jul	2	0.00151	0.00151	0.00151	0	0.00156	0.00156	0.00157	3	0.00156	0.00156	0.00157	3	0.00892	0.00892	0.00892	0	0.00895	0.00895	0.00895	0	0.00667	0.00667	0.00696	4	0.00228	0.00228	0.00228	-1	0.00584	0.00584	0.00584	1	0.00393	0.00393	0.00393	1
Zn, Tot	Construction	Aug	2	0.00152	0.00152	0.00152	0	0.00158	0.00158	0.00159	4	0.00158	0.00158	0.00159	4	0.00896	0.00896	0.00897	0	0.00697	0.00697	0.00698	0	0.00701	0.00701	0.00728	4	0.00230	0.00230	0.00230	0	0.00570	0.00570	0.00570	1	0.00390	0.00390	0.00390	0
Zn, Tot	Construction	Sep	2	0.00150	0.00150	0.00150	0	0.00156	0.00156	0.00158	5	0.00156	0.00156	0.00158	5	0.00428	0.00428	0.00429	0	0.00682	0.00682	0.00682	1	0.00707	0.00707	0.00732	4	0.00153	0.00153	0.00153	2	0.00846	0.00846	0.00847	1	0.00177	0.00177	0.00177	4
Zn, Tot	Construction	Oct	2	0.00150	0.00150	0.00150	0	0.00154	0.00154	0.00155	3	0.00154	0.00154	0.00155	3	0.00423	0.00423	0.00424	0	0.00753	0.00753	0.00754	1	0.00690	0.00690	0.00714	5	0.00150	0.00150	0.00150	0	0.01072	0.01072	0.01072	0	0.00170	0.00170	0.00170	0
Zn, Tot	Construction	Nov	2	0.00120	0.00120	0.00120	0	0.00124	0.00124	0.00124	2	0.00124	0.00124	0.00124	2	0.00395	0.00395	0.00396	0	0.00850	0.00850	0.00851	0	0.00687	0.00687	0.00710	5	0.00169	0.00169	0.00169	0	0.01548	0.01548	0.01548	1	0.00412	0.00412	0.00412	-2
Zn, Tot	Construction	Dec	2	0.00120	0.00120	0.00120	0	0.00123	0.00123	0.00123	2	0.00123	0.00123	0.00123	2	0.00392	0.00392	0.00393	0	0.00928	0.00928	0.00928	0	0.00694	0.00694	0.00717	5	0.00170	0.00170	0.00170	0	0.01460	0.01460	0.01460	0	0.00420	0.00420	0.00420	0
Zn, Tot	Operations	Jan	13	0.00121	0.00120	0.00121	0	0.00141	0.00141	0.00149	17	0.00141	0.00141	0.00149	17	0.00396	0.00396	0.00399	1	0.00960	0.00958	0.00962	1	0.00882	0.00865	0.00973	21	0.00170	0.00170	0.00170	0	0.01176	0.01176	0.01182	1	0.00420	0.00420	0.00420	0
Zn, Tot	Operations	Feb	13	0.00121	0.00121	0.00121	1	0.00296	0.00282	0.00340	135	0.00295	0.00281	0.00340	134	0.00395	0.00395	0.00398	1	0.00946	0.00945	0.00950	1	0.00894	0.00877	0.00986	21	0.00170	0.00170	0.00170	0	0.00986	0.00976	0.01020	12	0.00420	0.00420	0.00420	0
Zn, Tot	Operations	Mar	13	0.00121	0.00121	0.00121	1	0.00667	0.00636	0.00774	430	0.00665	0.00635	0.00772	429	0.00395	0.00395	0.00398	1	0.00931	0.00932	0.00941	3	0.00908	0.00890	0.01001	21	0.00170	0.00170	0.00170	0	0.01141	0.01122	0.01228	51	0.00420	0.00420	0.00420	0
Zn, Tot	Operations	Apr	13	0.00131	0.00131	0.00132	1	0.00489	0.00441	0.00519	224	0.00492	0.00443	0.00525	229	0.00397	0.00396	0.00400	1	0.00920	0.00920	0.00932	4	0.00921	0.00903	0.01015	21	0.01499	0.01375	0.02152	709	0.01095	0.01061	0.01122	30	0.00420	0.00420	0.00420	0
Zn, Tot	Operations	May	13	0.00175	0.00175	0.00176	3	0.00277	0.00264	0.00289	60	0.00269	0.00257	0.00282	58	0.00333	0.00332	0.00337	1	0.00977	0.00977	0.00988	4	0.00884	0.00867	0.00974	22	0.00467	0.00445	0.00602	147	0.01788	0.01783	0.01797	7	0.00468	0.00468	0.00468	0
Zn, Tot	Operations	Jun	13	0.00142	0.00142	0.00142	0	0.00170	0.00168	0.00173	19	0.00171	0.00168	0.00173	19	0.00312	0.00312	0.00314	0	0.01111	0.01111	0.01118	2	0.00857	0.00840	0.00943	24	0.00528	0.00497	0.00678	176	0.01371	0.01370	0.01373	1	0.00470	0.00470	0.00470	0
Zn, Tot	Operations	Jul	13	0.00151	0.00151	0.00151	0	0.00175	0.00174	0.00178	15	0.00175	0.00174	0.00179	15	0.00895	0.00895	0.00897	0	0.00908	0.00907	0.00911	2	0.00886	0.00868	0.00973	24	0.00468	0.00446	0.00567	94	0.00598	0.00597	0.00601	3	0.00393	0.00393	0.00393	1
Zn, Tot	Operations	Aug	13	0.00152	0.00152	0.00152	0	0.00185	0.00182	0.00188	20	0.00185	0.00182	0.00189	20	0.00900	0.00900	0.00902	1	0.00711	0.00710	0.00713	2	0.00919	0.00901	0.01006	23	0.00507	0.00480	0.00616	109	0.00590	0.00588	0.00593	4	0.00390	0.00390	0.00390	0
Zn, Tot	Operations	Sep	13	0.00150	0.00150	0.00150	0	0.00184	0.00180	0.00191	21	0.00184	0.00181	0.00192	21	0.00435	0.00434	0.00437	0	0.00697	0.00695	0.00699	3	0.00916	0.00898	0.00999	23	0.00496	0.00461	0.00621	208	0.00866	0.00864	0.00870	3	0.00177	0.00177	0.00177	4
Zn, Tot	Operations	Oct	13	0.00150	0.00150	0.00150	0	0.00174	0.00172	0.00187	15	0.00175	0.00173	0.00188	16	0.00432	0.00431	0.00435	1	0.00769	0.00767	0.00771	2	0.00891	0.00873	0.00970	24	0.00694	0.00634	0.00893	322	0.01086	0.01084	0.01092	2	0.00170	0.00170	0.00170	0
Zn, Tot	Operations	Nov	13	0.00121	0.00121	0.00121	0	0.00135	0.00136	0.00144	12	0.00135	0.00136	0.00145	12	0.00404	0.00403	0.00407	1	0.00866	0.00864	0.00868	2	0.00884	0.00867	0.00963	24	0.00871	0.00796	0.01197	368	0.01558	0.01559	0.01563	0	0.00412	0.00412	0.00412	-2
Zn, Tot	Operations	Dec	13	0.00120	0.00120	0.00120	0	0.00133	0.00132	0.00136	10	0.00133	0.00132	0.00136	10	0.00399	0.00399	0.00402	1	0.00942	0.00940	0.00944	2	0.00891	0.00874	0.00970	24	0.00170	0.00170	0.00170	0	0.01472	0.01471	0.01474	0	0.00420	0.00420	0.00420	0
Zn, Tot	Closure	Jan	6	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00122	1	0.00121	0.00121	0.00122	1	0.00398	0.00398	0.00399	2	0.00949	0.00951	0.00962	1	0.00947	0.00947	0.00980	45	0.00170	0.00170	0.00170	0	0.01164	0.01164	0.01165	0	0.00420	0.00420	0.00420	0
Zn, Tot	Closure	Feb	6	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00396	0.00396	0.00398	2	0.00934	0.00936	0.00946	1	0.00958	0.00958	0.00989	45	0.00170	0.00170	0.00170	0	0.00867	0.00866	0.00867	0	0.00420	0.00420	0.00420	0
Zn, Tot	Closure	Mar	6	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00396	0.00396	0.00397	2	0.00911	0.00912	0.00922	1	0.00972	0.00972	0.01000	45	0.00170	0.00170	0.00170	0	0.00748	0.00748	0.00749	0	0.00420	0.00420	0.00420	0
Zn, Tot	Closure	Apr	6	0.00131	0.00131	0.00132	1	0.00140	0.00140	0.00141	3	0.00172	0.00170	0.00173	27	0.00397	0.00398	0.00398	2	0.00891	0.00892	0.00901	1	0.00985	0.00985	0.01011	46	0.03386	0.03154	0.03399	1755	0.00876	0.00877	0.00885	7	0.00420	0.00420	0.00420	0
Zn, Tot	Closure	May	6	0.00175	0.00175	0.00176	3	0.00171	0.00171	0.00171	4	0.00178	0.00178	0.00179	9	0.00335	0.00335	0.00336	3	0.00949	0.00950	0.00957	1	0.00944	0.00944	0.00968	48	0.00921	0.00885	0.00989	392	0.01752	0.01753	0.01755	5	0.00468	0.00468	0.00468	0
Zn, Tot	Closure	Jun	6	0.00142	0.00142	0.00142	0	0.00142	0.00142	0.00142	0	0.00143	0.00143	0.00143	1	0.00313	0.00313	0.00314	1	0.01092	0.01093	0.01096	1	0.00914	0.00914	0.00938	50	0.01071	0.01011	0.01091	461	0.01358	0.01358	0.01358	0	0.00470	0.00470	0.00470	0
Zn, Tot	Closure	Jul	6	0.00151	0.00151	0.00151	0	0.00151	0.00151	0.00151	0	0.00152	0.00152	0.00152	0	0.00896	0.00896	0.00897	1	0.00895	0.00895	0.00896	0	0.00942	0.00942	0.00968	50	0.00840	0.00797	0.00847	246	0.00582	0.00582	0.00582	0	0.00393	0.00393	0.00393	1
Zn, Tot	Closure	Aug	6	0.00152	0.00152	0.00152	0	0.00152	0.00152	0.00152	0	0.00153	0.00153	0.00153	1	0.00902	0.00902	0.00902	1	0.00696	0.00696	0.00696	0	0.00976	0.00975	0.01003	48	0.00925	0.00874	0.00928	280	0.00567	0.00567	0.00567	0	0.00390	0.00390	0.00390	0
Zn, Tot	Closure	Sep	6	0.00150	0.00150	0.00150	0	0.00149	0.00149	0.00149	0	0.00151	0.00151	0.00151	1	0.00436	0.00436	0.00437	2	0.00681	0.00681	0.00681	0	0.00969	0.00969	0.00997	47	0.00988	0.00927	0.00991	518	0.00845	0.00845	0.00845	0	0.00177	0.00177	0.00177	4
Zn, Tot	Closure	Oct	6	0.00150	0.00150	0.00150	0	0.00149	0.00149	0.00149	0	0.00152	0.00152	0.00152	2	0.00433	0.00433	0.00435	2	0.00753	0.00753	0.00753	1	0.00941	0.00940	0.00969	48	0.01462	0.01353	0.01467	802	0.01073	0.01073	0.01073	0	0.00170	0.00170	0.00170	0
Zn, Tot	Closure	Nov	6	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00121	0	0.00122	0.00122	0.00122	1	0.00405	0.00405	0.00407	3	0.00852	0.00851	0.00852	1	0.00932	0.00932	0.00962	49	0.01221	0.01145	0.01225	574	0.01552	0.01552	0.01552	0	0.00412	0.00412	0.00412	-2
Zn, Tot	Closure	Dec	6	0.00120	0.00120	0.00120	0	0.00120	0.00120	0.00120	0	0.00120	0.00120	0.00120	0	0.00400	0.00400	0.00402	2	0.00929	0.00929	0.00930	0	0.00938	0.00937	0.00968	49	0.00170	0.00170	0.00170	0	0.01465	0.01465	0.01465	0	0.00420	0.00420	0.00420	0
Zn, Tot	Post-Closure	Jan	109	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00121	1	0.00186	0.00177	0.00187	48	0.00408	0.00408	0.00408	5	0.00968	0.00966	0.00968	2	0.01282	0.01274	0.01284	108	0.03847	0.03347	0.03889	1869	0.01200	0.01195	0.01200	2	0.00420	0.00420	0.00421	0
Zn, Tot	Post-Closure	Feb	109	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00218	0.00205	0.00219	71	0.00406	0.00406	0.00406	5	0.00955	0.00952	0.00955	2	0.01296	0.01289	0.01299	107	0.03897	0.03414	0.03939	1908	0.00931	0.00922	0.00932	6	0.00420	0.00420	0.00421	0
Zn, Tot	Post-Closure	Mar	109	0.00121	0.00121	0.00121	1	0.00121	0.00121	0.00121	1	0.00540	0.00488	0.00549	306	0.00406	0.00405	0.00406	5	0.00939	0.00935	0.00939	3	0.01317	0.01310	0.01320	108	0.04094	0.03596	0.04139	2016	0.01048	0.01011	0.01056	36	0.00420	0.00420	0.00421	0
Zn, Tot	Post-Closure	Apr	109	0.00132	0.00135	0.00144	4	0.00140	0.00144	0.00152	6	0.00722	0.00656	0.00737	387	0.00408	0.00408	0.00408	5	0.00928	0.00923	0.00928	4	0.01341	0.01334	0.01344	109	0.04327	0.04539	0.06015	2570	0.01257	0.01213	0.01274	49	0.00420	0.00420	0.00420	0
Zn, Tot	Post-Closure	May	109	0.00175	0.00177	0.00181	4	0.00171	0.00172	0.00175	4	0.00359	0.00337	0.00362	107	0.00350	0.00349	0.00350	8	0.00988	0.00983	0.00988	4	0.01286	0.01279	0.01288	112	0.02916	0.02748	0.02951	1427	0.01819	0.01812	0.01823	9	0.00468	0.00468	0.00468	0
Zn, Tot	Post-Closure	Jun	109	0.00142	0.00142	0.00142	0	0.00142	0.00142	0.00142	0	0.00162	0.00160	0.00163	13	0.00321	0.00320	0.00321	4	0.01117	0.01114	0.01117	2	0.01246	0.01239	0.01248	115	0.03635	0.03426	0.03681	1803	0.01367	0.01366	0.01367	1	0.00470	0.00470	0.00470	0
Zn, Tot	Post-Closure	Jul	109	0.00151	0.00151	0.00152	0	0.00151	0.00151	0.00152	0	0.00172	0.00169	0.00172	12	0.00902	0.00902	0.00902	1	0.00908	0.00906	0.00908	2	0.01289	0.01283	0.01291	115	0.03516	0.03262	0.03558	1318	0.00595	0.00594	0.00596	2	0.00393	0.00393	0.00393	1
Zn, Tot	Post-Closure	Aug	109	0.00152	0.00152	0.00152	0	0.00152	0.00152	0.00152	0	0.00177	0.00174	0.00178	15	0.00909	0.00908	0.00909	2	0.00709	0.00708	0.00709	2	0.01330	0.01324	0.01332	110	0.03562	0.03321	0.03603	1344	0.00584	0.00582	0.00584	3	0.00390	0.00390	0.00390	0
Zn, Tot	Post-Closure	Sep	109	0.00150	0.00150	0.00151	0	0.00149	0.00150	0.00150	0	0.00189	0.00184	0.00189	23	0.00447	0.00447	0.00447	4	0.00696	0.00694	0.00696	2	0.01316	0.01310	0.01318	107	0.03667	0.03435	0.03710	2190	0.00869	0.00866	0.00869	3	0.00177	0.00177	0.00177	4
Zn, Tot	Post-Closure	Oct	109	0.00150	0.00151	0.00151	0	0.00149	0.00150	0.00150	0	0.00201	0.00195	0.00202	31	0.00448	0.00448	0.00448	6	0.00771	0.00769	0.00771	3	0.01279	0.01273	0.01280	109	0.03965	0.03786	0.04017	2424	0.01099	0.01096	0.01100	3	0.00170	0.00170	0.00170	0
Zn, Tot	Post-Closure	Nov	109	0.00121	0.00121	0.00121	0	0.00121	0.00121	0.00121	0	0.00160	0.00155	0.00160	27	0.00420	0.00420	0.00420	7	0.00871	0.00869	0.00871	3	0.01267	0.01262	0.01269	109	0.04240	0.03891	0.04296	2189	0.01568	0.01566	0.01568	1	0.00412	0.00412	0.00412	-2
Zn, Tot	Post-Closure	Dec	109	0.00120	0.00120	0.00120	0	0.00120	0.00120	0.00120	0	0.00158	0.00153	0.00158	27	0.00413	0.00412	0.00413	6	0.00948	0.00946	0.00949	2	0.01272	0.01267	0.01274	109	0.03917	0.03441	0.03959	1924	0.01481	0.01479	0.01482	1	0.00420	0.00420	0.00421	0

Appendix H PREDICTED SEEPAGE WATER QUALITY

Appendix H-1: Summary of predicted MRSA and TMF seepage water quality - expected case

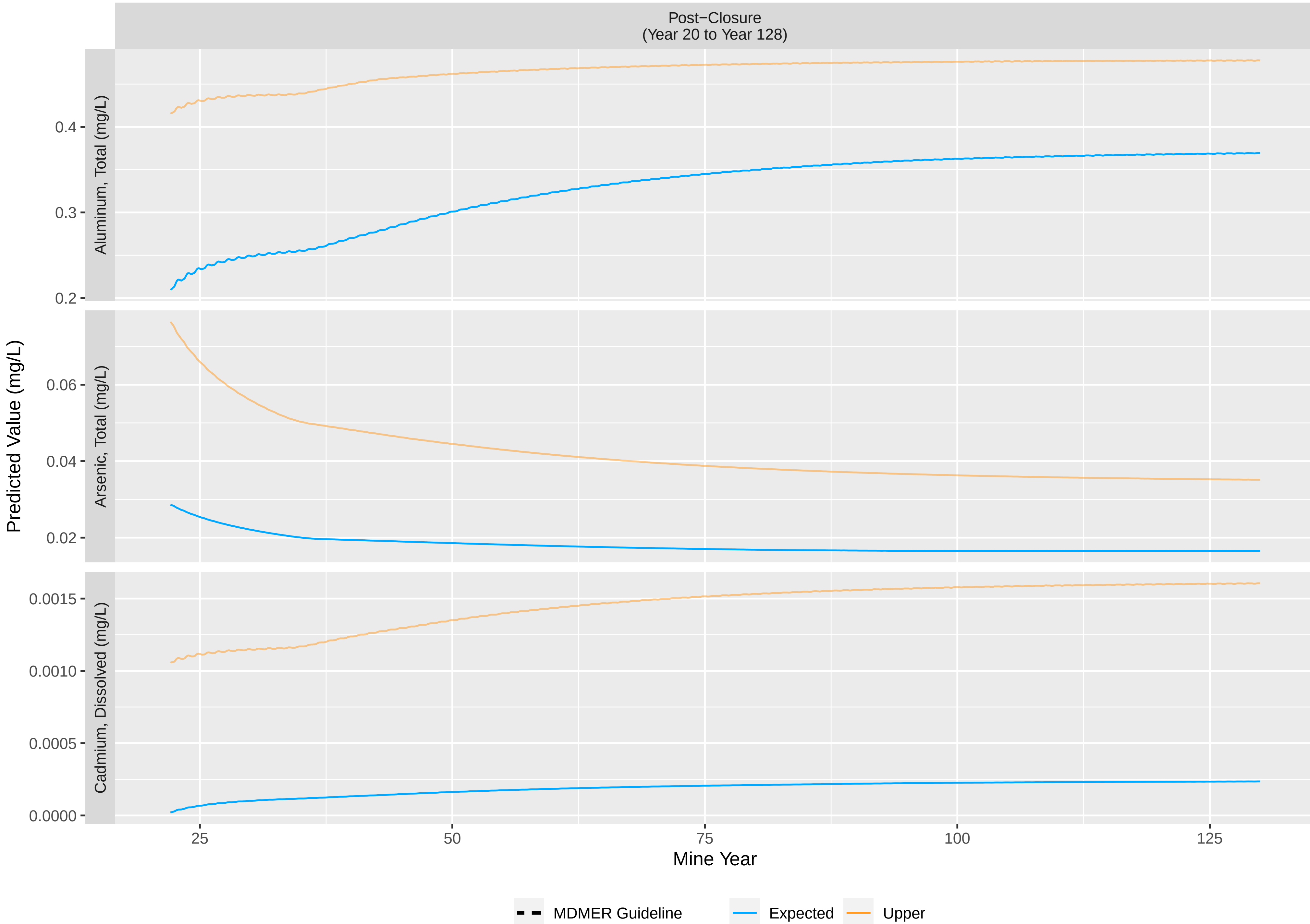
Location	Units	Guidelines/Limits			Observed	MRSA				TMF			
Source		CWQG	MSOG	MDMER	MW11	Construction	Operation	Closure	Post-Closure	Construction	Operation	Closure	Post-Closure
Statistic					Geomean	Average	Average	Average	Average	Average	Average	Average	Average
Parameter													
Temperature, Field	deg C	n/v	n/v	n/v	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Bromide	mg/L	n/v	n/v	n/v	0.152	-	-	-	0.115	-	0.020	0.020	0.015
Chloride	mg/L	120	n/v	n/v	0.76	-	-	-	0.58	0.69	42.21	41.59	22.63
Fluoride	mg/L	0.12	0.12	n/v	0.030	0.053	0.164	0.241	0.359	0.144	0.677	0.717	0.452
Sulfate	mg/L	n/v	n/v	n/v	820	315	977	1431	1797	34	3254	3344	1903
Phosphorus_T	mg/L	Narrative	0.025	n/v	0.009	0.0012	0.0037	0.0054	0.020	0.0034	0.012	0.013	0.012
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.065	**3.7**	1.7	0.000021	0.061	0.086	**7.1**	**7.1**	**3.9**
N_Nitrite	mg/L	0.060	0.060	n/v	0.015	**0.68**	**0.31**	0.0000038	0.010	0.0061	0.057	0.056	0.031
N_Nitrate_Nitrite	mg/L	13	n/v	n/v	0.235	29	13	0.00017	0.27	0.0092	1.0	1.0	0.6
Cyanide_T	mg/L	n/v	n/v	0.5	0.0005	-	-	-	0.0005	1.7	4.8	3.0	1.6
Cyanide_F	mg/L	0.0050	0.0052	n/v	0.0005	-	-	-	0.0005	0.0008	**0.014**	**0.017**	**0.015**
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.0005	-	-	-	0.0005	0.0044	0.23	0.18	0.10
Aluminum_D	mg/L	n/v	n/v	n/v	0.073	0.024	0.072	0.11	0.18	0.012	0.093	0.11	0.10
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	**0.073**	0.024	0.072	**0.11**	**0.18**	0.012	**0.18**	**0.19**	**0.15**
Antimony_D	mg/L	n/v	n/v	n/v	0.00046	0.0030	0.0092	0.013	0.0081	0.0036	0.049	0.050	0.028
Antimony_T	mg/L	n/v	n/v	n/v	0.00046	0.0030	0.0092	0.013	0.0081	0.0036	0.046	0.048	0.027
Arsenic_D	mg/L	n/v	0.15	0.3	0.012	0.023	0.071	0.10	0.044	0.012	0.035	0.055	0.055
Arsenic_T	mg/L	0.005	n/v	0.3	0.012	0.023	0.071	0.10	0.044	0.012	0.035	0.055	0.055
Barium_D	mg/L	n/v	n/v	n/v	0.027	0.033	0.10	0.15	0.15	0.0072	0.066	0.070	0.051
Barium_T	mg/L	n/v	n/v	n/v	0.027	0.033	0.10	0.15	0.15	0.0072	0.068	0.072	0.052
Beryllium_T	mg/L	n/v	n/v	n/v	0.00005	0.00006	0.00018	0.00027	0.00040	0.00000	0.00008	0.00010	0.00017
Boron_D	mg/L	n/v	n/v	n/v	0.0296	0.0267	0.0829	0.1213	0.0699	0.0106	0.0329	0.0363	0.0255
Boron_T	mg/L	1.5	1.5	n/v	0.0296	0.0267	0.0829	0.1213	0.0699	0.0106	0.0349	0.0383	0.0266
Cadmium_D	mg/L	n/v	Equation*	n/v	**0.0020**	0.000011	0.000033	0.000049	**0.0011**	0.000012	0.000055	0.000060	0.000053
Cadmium_T	mg/L	Equation**	n/v	n/v	0.0020	0.000011	0.000033	0.000049	0.0011	0.000012	0.000042	0.000048	0.000046
Calcium_D	mg/L	n/v	n/v	n/v	265	102.7	318.4	466.3	599.6	9.2	192.8	205.0	144.1
Chromium_D	mg/L	n/v	Equation*	n/v	0.00067	0.00006	0.00018	0.00027	0.0014	0.00004	0.00012	0.00010	0.00010
Chromium_D_Hex	mg/L	0.0010	0.011	n/v	0.00067	0.00006	0.00018	0.00027	0.0014	0.00004	0.00012	0.00010	0.00010
Chromium_T	mg/L	0.0089	n/v	n/v	0.00067	0.00006	0.00018	0.00027	0.0014	0.00004	0.00049	0.00050	0.00031
Cobalt_D	mg/L	n/v	n/v	n/v	0.026	0.00065	0.0020	0.0030	0.0168	0.00642	0.05838	0.05894	0.03334
Cobalt_T	mg/L	n/v	n/v	n/v	0.026	0.00065	0.0020	0.0030	0.0168	0.00642	0.05201	0.05256	0.02993
Copper_D	mg/L	n/v	Equation*	0.3	0.0078	0.0011	0.0033	0.0048	0.0111	**0.008**	**0.028**	**0.030**	**0.021**
Copper_T	mg/L	Equation**	n/v	0.3	0.0078	0.0011	0.0033	0.0048	0.0111	0.008	0.028	0.030	0.030
Iron_D	mg/L	n/v	n/v	n/v	0.26	0.00	0.01	0.02	0.18	0.24	0.65	0.62	0.62
Iron_T	mg/L	0.3	0.3	n/v	0.26	0.00	0.01	0.02	0.18	0.24	**0.65**	**0.62**	**0.62**
Lead_D	mg/L	n/v	Equation*	0.1	0.00088	0.00006	0.00018	0.00027	0.00124	0.00006	0.00037	0.00039	0.00031
Lead_T	mg/L	Equation**	n/v	0.1	0.00088	0.00006	0.00018	0.00027	0.00124	0.00006	0.00089	0.00092	0.00059
Magnesium_D	mg/L	n/v	n/v	n/v	50	15.56	48.23	70.62	75.80	1.68	9.28	10.97	10.26
Manganese_D	mg/L	Table 5	n/v	n/v	0.864	0.0238	0.0737	0.1079	0.5255	0.0136	0.1036	0.1089	0.1634
Manganese_T	mg/L	Table 5	n/v	n/v	0.864	0.024	0.074	0.108	0.525	0.014	0.110	0.113	0.170
Mercury_D	mg/L	n/v	n/v	n/v	0.0000006	0.0000003	0.0000010	0.0000015	0.0000018	0.0000015	0.0000093	0.0000116	0.0000174
Mercury_T	mg/L	0.000026	2.6E-05	n/v	0.0000006	0.0000003	0.0000010	0.0000015	0.0000018	0.0000015	0.0000094	0.0000116	0.0000174
Molybdenum_D	mg/L	n/v	n/v	n/v	0.00042	0.011	0.035	0.051	0.011	0.002	0.034	0.037	0.022
Molybdenum_T	mg/L	0.073	0.073	n/v	0.00042	0.011	0.035	0.051	0.011	0.002	0.036	0.039	0.023
Nickel_D	mg/L	n/v	Equation*	0.5	0.089	0.012	0.038	0.056	0.092	0.001	0.010	0.012	0.012
Nickel_T	mg/L	Equation**	n/v	0.5	0.089	0.012	0.038	0.056	0.092	0.001	0.010	0.012	0.012
Potassium_D	mg/L	n/v	n/v	n/v	19.96	27.97	86.67	126.93	155.79	10.55	60.51	65.75	49.26
Selenium_D	mg/L	n/v	n/v	n/v	0.00014	0.00030	0.00092	0.0013	0.0012	0.00011	0.0042	0.0043	0.0025
Selenium_T	mg/L	0.001	0.001	n/v	0.00014	0.00030	0.00092	**0.0013**	**0.0012**	0.00011	**0.0042**	**0.0043**	**0.0025**
Silicon_D	mg/L	n/v	n/v	n/v	8.9	1.5	4.7	6.9	10.8	0.6	1.8	2.2	2.3
Silicon_T	mg/L	n/v	n/v	n/v	8.9	1.5	4.7	6.9	10.8	0.6	1.7	2.2	2.3
Silver_D	mg/L	n/v	n/v	n/v	0.000019	0.000004	0.000014	0.000020	0.000055	0.000009	0.000025	0.000022	0.000023
Silver_T	mg/L	0.00025	0.0001	n/v	0.000019	0.000004	0.000014	0.000020	0.000055	0.000009	0.000025	0.000016	0.000019
Sodium_D	mg/L	n/v	n/v	n/v	9.8	5.6	17.2	25.2	13.6	20.8	1206.5	1206.0	660.8
Sodium_T	mg/L	n/v	n/v	n/v	9.8	5.6	17.2	25.2	13.6	20.8	1212.7	1212.3	664.1
Strontium_D	mg/L	n/v	n/v	n/v	0.280	0.256	0.792	1.160	1.048	0.031	0.370	0.404	0.293
Strontium_T	mg/L	n/v	n/v	n/v	0.280	0.256	0.792	1.160	1.048	0.031	0.376	0.410	0.297
Thallium_D	mg/L	n/v	n/v	n/v	0.00005	0.00002	0.00007	0.00011	0.00015	0.00000	0.00001	0.00002	0.00002
Thallium_T	mg/L	0.0008	0.0008	n/v	0.00005	0.00002	0.00007	0.00011	0.00015	0.00000	0.00002	0.00002	0.00002
Uranium_D	mg/L	n/v	n/v	n/v	0.00080	0.00208	0.0064	0.0094	0.0064	0.00058	0.0016	0.0015	0.0011
Uranium_T	mg/L	0.015	0.015	n/v	0.00080	0.00208	0.0064	0.0094	0.0064	0.00058	0.0016	0.0017	0.0012
Vanadium_T	mg/L	n/v	n/v	n/v	0.00049	0.00053	0.0017	0.0024	0.00074	0.00003	0.0015	0.0017	0.0011
Zinc_D	mg/L	Equation**	Equation*	0.5	0.059	0.00071	0.0022	0.0032	0.037	0.0020	0.0054	0.0056	0.0056
Zinc_T	mg/L	n/v	n/v	0.5	0.059	0.00071	0.0022	0.0032	0.037	0.0020	0.0055	0.0058	0.0059

Appendix H-2: Summary of predicted MRSA and TMF seepage water quality - upper case

Location	Units	Guidelines/Limits			Observed	MRSA				TMF			
Source		CWQG	MSOG	MDMER	MW11	Construction	Operation	Closure	Post-Closure	Construction	Operation	Closure	Post-Closure
Statistic					Geomean	Average	Average	Average	Average	Average	Average	Average	Average
Parameter													
Temperature, Field	deg C	n/v	n/v	n/v	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Bromide	mg/L	n/v	n/v	n/v	0.15	-	-	-	0.10	-	0.036	0.025	0.12
Chloride	mg/L	120	n/v	n/v	0.76	-	-	-	0.52	0.69	44	24	0.58
Fluoride	mg/L	0.12	0.12	n/v	0.030	0.39	0.89	1.4	2.4	0.14	0.95	0.65	0.36
Sulfate	mg/L	n/v	n/v	n/v	820	2475	5596	8828	18124	34	3947	2639	1797
Phosphorus_T	mg/L	Narrative	0.025	n/v	0.009	0.011	0.025	**0.039**	**0.066**	0.0034	**0.044**	**0.035**	0.020
N_Ammonia	mg/L	Table 2	Equation*	n/v	0.065	**6.8**	1.5	0.000007	0.055	0.086	**8.3**	**4.6**	0.1
N_Nitrite	mg/L	0.060	0.060	n/v	0.015	**1.7**	**0.38**	0.0000019	0.009	0.0061	**0.098**	0.054	0.010
N_Nitrate_Nitrite	mg/L	13	n/v	n/v	0.235	160	36	0.00018	0.24	0.0092	6.1	3.1	0.3
Cyanide_T	mg/L	n/v	n/v	0.5	0.0005	-	-	-	0.0005	1.7	4.9	1.7	0.0
Cyanide_F	mg/L	0.0050	0.0052	n/v	0.0005	-	-	-	0.0005	0.0008	**0.016**	**0.016**	0.001
Cyanide_WAD	mg/L	n/v	n/v	n/v	0.0005	-	-	-	0.0005	0.0044	0.40	0.16	0.00
Aluminum_D	mg/L	n/v	n/v	n/v	0.073	0.11	0.17	0.20	0.20	0.012	0.155	0.17	0.18
Aluminum_T	mg/L	0.005/0.1	0.005/0.1	n/v	**0.073**	**0.11**	**0.17**	**0.20**	**0.20**	0.012	**0.19**	**0.20**	**0.18**
Antimony_D	mg/L	n/v	n/v	n/v	0.00046	0.022	0.050	0.078	0.044	0.0036	0.090	0.055	0.008
Antimony_T	mg/L	n/v	n/v	n/v	0.00046	0.022	0.050	0.078	0.044	0.0036	0.083	0.051	0.008
Arsenic_D	mg/L	n/v	0.15	0.3	0.012	0.058	0.13	**0.21**	0.088	0.012	0.073	0.074	0.044
Arsenic_T	mg/L	0.005	n/v	0.3	0.012	0.058	0.13	0.21	0.088	0.012	0.075	0.075	0.044
Barium_D	mg/L	n/v	n/v	n/v	0.027	0.23	0.53	0.83	1.2	0.0072	0.088	0.080	0.15
Barium_T	mg/L	n/v	n/v	n/v	0.027	0.23	0.53	0.83	1.2	0.0072	0.090	0.082	0.15
Beryllium_T	mg/L	n/v	n/v	n/v	0.00005	0.00073	0.0017	0.0026	0.0044	0.0000012	0.00014	0.00024	0.00040
Boron_D	mg/L	n/v	n/v	n/v	0.0296	0.117	0.264	0.417	0.243	0.0106	0.0517	0.0432	0.0699
Boron_T	mg/L	1.5	1.5	n/v	0.0296	0.117	0.264	0.417	0.243	0.0106	0.0507	0.0428	0.0699
Cadmium_D	mg/L	n/v	Equation*	n/v	**0.0020**	0.00095	0.0021	0.0034	**0.0066**	0.000012	**0.00023**	**0.00024**	**0.0011**
Cadmium_T	mg/L	Equation**	n/v	n/v	0.0020	0.00095	0.0021	0.0034	0.0066	0.000012	0.00021	0.00023	0.0011
Calcium_D	mg/L	n/v	n/v	n/v	265	855	1933	3049	6064	9	291	255	600
Chromium_D	mg/L	n/v	Equation*	n/v	0.00067	0.00084	0.0019	0.0030	0.0097	0.000043	0.00026	0.00025	0.0014
Chromium_D_Hex	mg/L	0.0010	0.011	n/v	0.00067	0.00084	0.0019	0.0030	0.0097	0.000043	0.00026	0.00025	0.0014
Chromium_T	mg/L	0.0089	n/v	n/v	0.00067	0.00084	0.0019	0.0030	0.0097	0.000043	0.00081	0.00056	0.0014
Cobalt_D	mg/L	n/v	n/v	n/v	0.026	0.0051	0.0116	0.0183	0.0380	0.0064	0.095	0.055	0.017
Cobalt_T	mg/L	n/v	n/v	n/v	0.026	0.0051	0.0116	0.0183	0.0380	0.0064	0.089	0.052	0.017
Copper_D	mg/L	n/v	Equation*	0.3	0.0078	0.0077	0.017	0.026	0.028	**0.0076**	**0.028**	**0.025**	0.011
Copper_T	mg/L	Equation**	n/v	0.3	0.0078	0.0077	0.017	0.026	0.028	0.0076	0.028	0.030	0.011
Iron_D	mg/L	n/v	n/v	n/v	0.26	0.04	0.08	0.13	0.18	0.24	0.65	0.62	0.18
Iron_T	mg/L	0.3	0.3	n/v	0.26	0.04	0.08	0.13	0.18	0.24	**0.65**	**0.62**	0.18
Lead_D	mg/L	n/v	Equation*	0.1	0.00088	0.00037	0.00083	0.0013	0.0025	0.000061	**0.0013**	0.0011	0.0012
Lead_T	mg/L	Equation**	n/v	0.1	0.00088	0.00037	0.00083	0.0013	0.0025	0.000061	0.0022	0.0016	0.0012
Magnesium_D	mg/L	n/v	n/v	n/v	50	104	234	370	606	2	19	22	76
Manganese_D	mg/L	Table 5	n/v	n/v	0.86	0.40	0.9	1.4	2.7	0.014	0.19	0.27	0.53
Manganese_T	mg/L	Table 5	n/v	n/v	0.86	0.40	0.91	1.4	2.7	0.014	0.19	0.27	0.53
Mercury_D	mg/L	n/v	n/v	n/v	0.0000006	0.0000024	0.0000055	0.0000087	0.0000117	0.0000015	0.0000099	0.0000183	0.0000018
Mercury_T	mg/L	0.000026	2.6E-05	n/v	0.0000006	0.0000024	0.0000055	0.0000087	0.0000117	0.0000015	0.0000099	0.0000184	0.0000018
Molybdenum_D	mg/L	n/v	n/v	n/v	0.00042	0.031	0.069	0.109	0.042	0.002	0.045	0.032	0.011
Molybdenum_T	mg/L	0.073	0.073	n/v	0.00042	0.031	0.069	**0.11**	0.042	0.002	0.046	0.033	0.011
Nickel_D	mg/L	n/v	Equation*	0.5	0.089	0.072	0.16	0.26	**0.42**	0.0012	0.015	0.025	0.092
Nickel_T	mg/L	Equation**	n/v	0.5	0.089	0.072	0.16	0.26	0.42	0.0012	0.021	0.028	0.092
Potassium_D	mg/L	n/v	n/v	n/v	20	194	440	694	1236	11	82	73	156
Selenium_D	mg/L	n/v	n/v	n/v	0.00014	0.0040	0.0091	0.014	0.020	0.00011	0.0062	0.0043	0.0012
Selenium_T	mg/L	0.001	0.001	n/v	0.00014	**0.0040**	**0.0091**	**0.014**	**0.020**	0.00011	**0.0058**	**0.0041**	**0.0012**
Silicon_D	mg/L	n/v	n/v	n/v	8.9	10.6	24.0	37.8	50.0	0.6	2.5	3.2	10.8
Silicon_T	mg/L	n/v	n/v	n/v	8.9	10.6	24.0	37.8	50.0	0.6	2.5	3.2	10.8
Silver_D	mg/L	n/v	n/v	n/v	0.000019	0.000036	0.000082	0.000129	0.000243	0.000009	0.000025	0.000027	0.000055
Silver_T	mg/L	0.00025	0.0001	n/v	0.000019	0.000036	0.000082	**0.000129**	**0.000243**	0.000009	0.000025	0.000023	0.000055
Sodium_D	mg/L	n/v	n/v	n/v	9.8	25.1	56.9	89.7	78.3	20.8	1157.8	641.0	13.6
Sodium_T	mg/L	n/v	n/v	n/v	9.8	25.1	56.9	89.7	78.3	20.8	1165.7	645.2	13.6
Strontium_D	mg/L	n/v	n/v	n/v	0.280	1.681	3.801	5.997	9.294	0.031	0.562	0.514	1.048
Strontium_T	mg/L	n/v	n/v	n/v	0.280	1.681	3.801	5.997	9.294	0.031	0.563	0.516	1.048
Thallium_D	mg/L	n/v	n/v	n/v	0.00005	0.00022	0.00050	0.00078	0.00111	0.00000	0.00004	0.00005	0.00015
Thallium_T	mg/L	0.0008	0.0008	n/v	0.00005	0.00022	0.00050	0.00078	**0.00111**	0.00000	0.00004	0.00005	0.00015
Uranium_D	mg/L	n/v	n/v	n/v	0.00080	0.00694	0.0157	0.0248	0.0243	0.00058	0.0030	0.0027	0.0064
Uranium_T	mg/L	0.015	0.015	n/v	0.00080	0.00694	**0.0157**	**0.0248**	**0.0243**	0.00058	0.0030	0.0027	0.0064
Vanadium_T	mg/L	n/v	n/v	n/v	0.00049	0.00256	0.0058	0.0091	0.00443	0.00003	0.0037	0.0028	0.0007
Zinc_D	mg/L	Equation**	Equation*	0.5	0.059	0.02302	0.0521	0.0821	0.157	0.0020	0.0066	0.0077	0.0373
Zinc_T	mg/L	n/v	n/v	0.5	0.059	0.02302	0.0521	0.0821	0.157	0.0020	0.0077	0.0084	0.0373

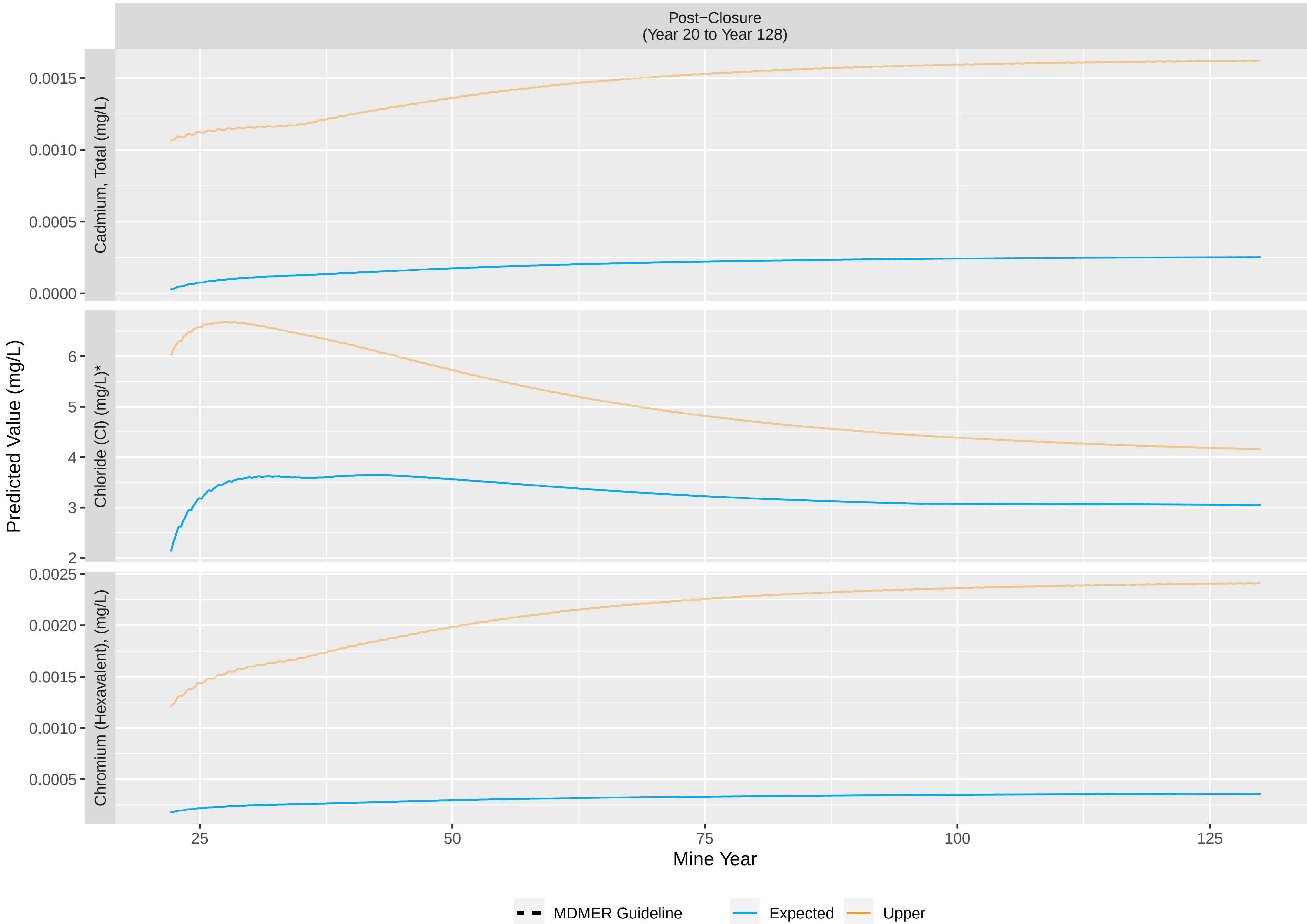
Appendix I TIME SERIES PLOTS

Appendix I-1: MacLellan Open Pit − Predicted Concentrations



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-1: MacLellan Open Pit − Predicted Concentrations



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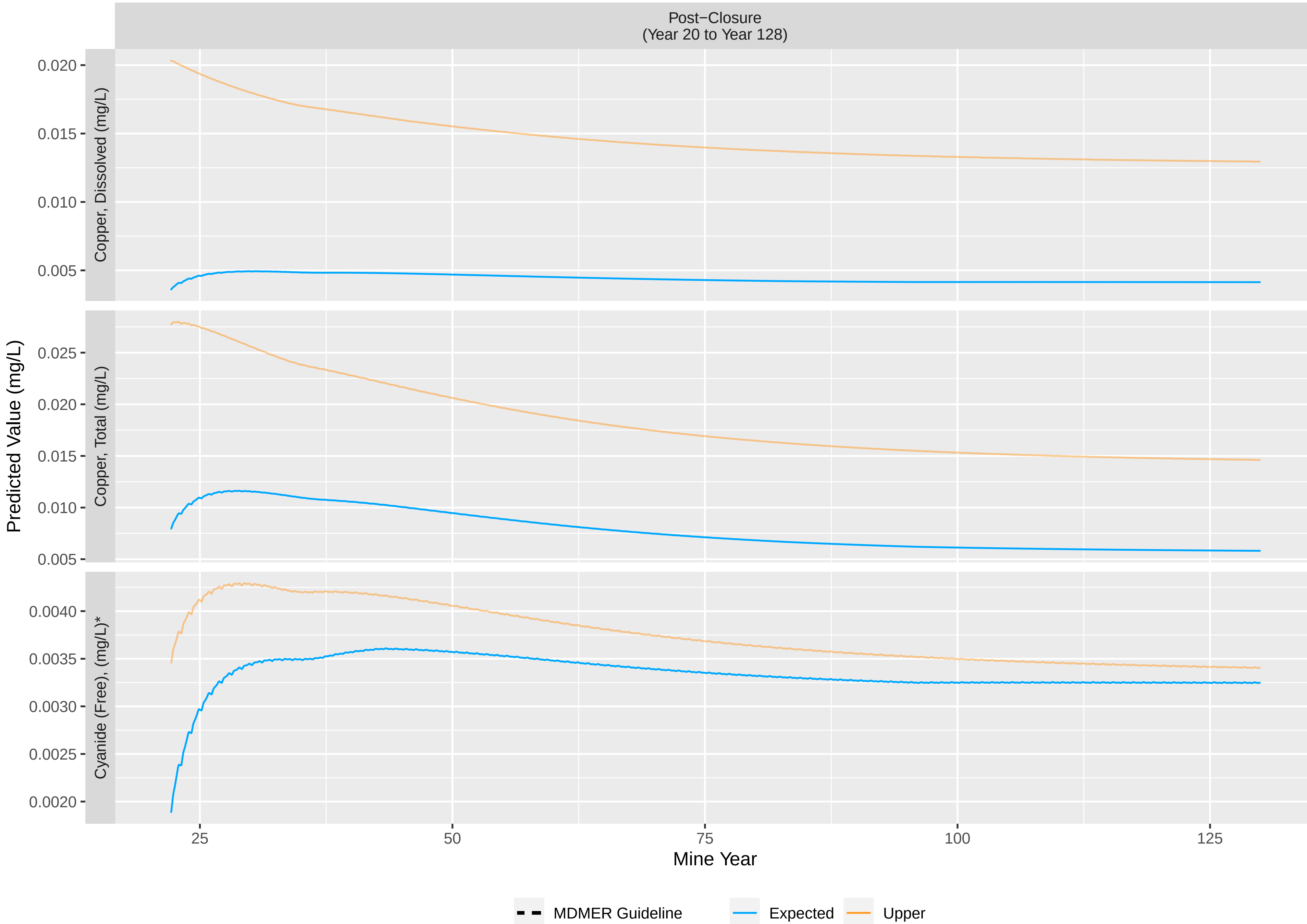
Appendix I-1: MacLellan Open Pit − Predicted Concentrations



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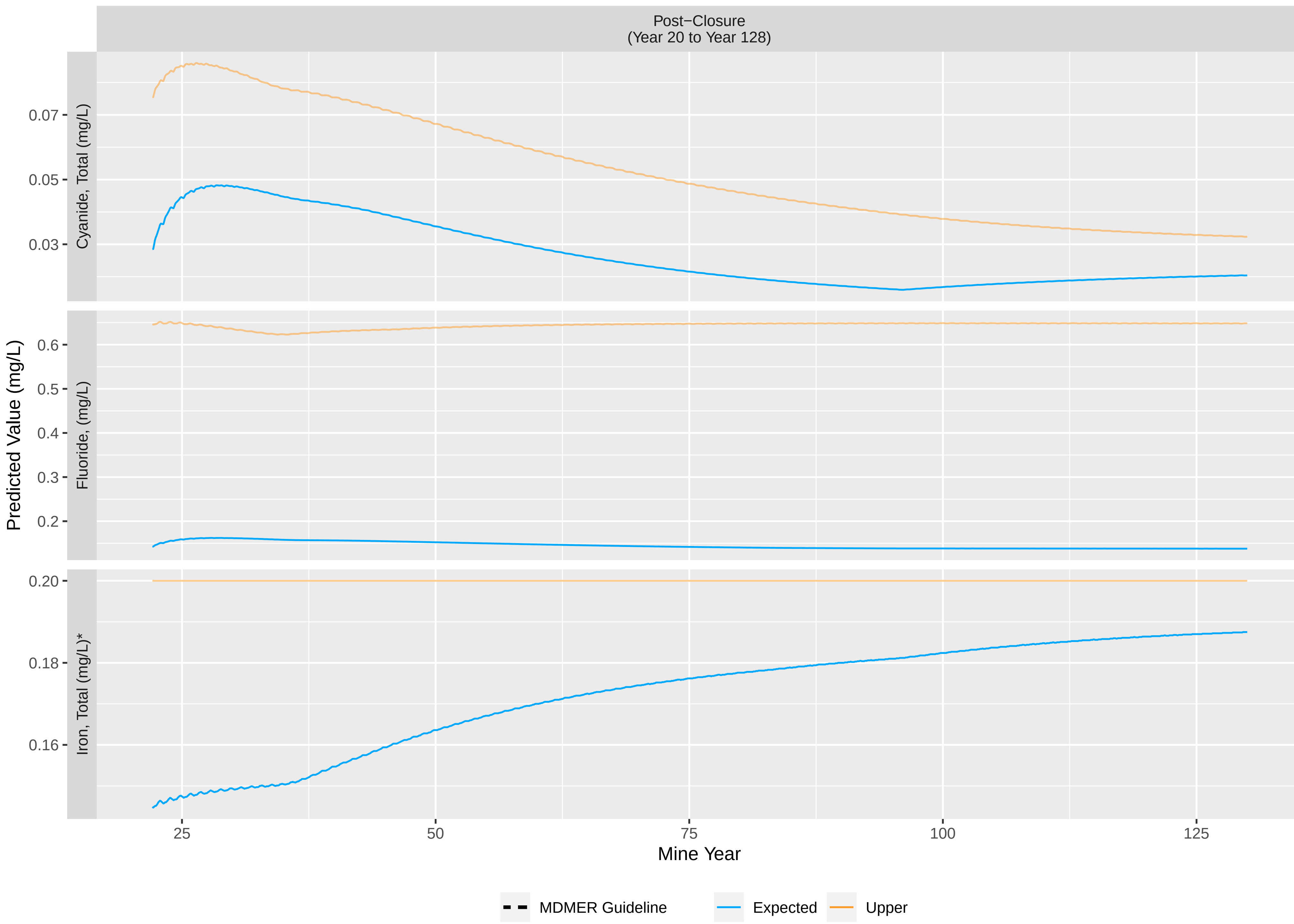
Appendix I-1: MacLellan Open Pit − Predicted Concentrations



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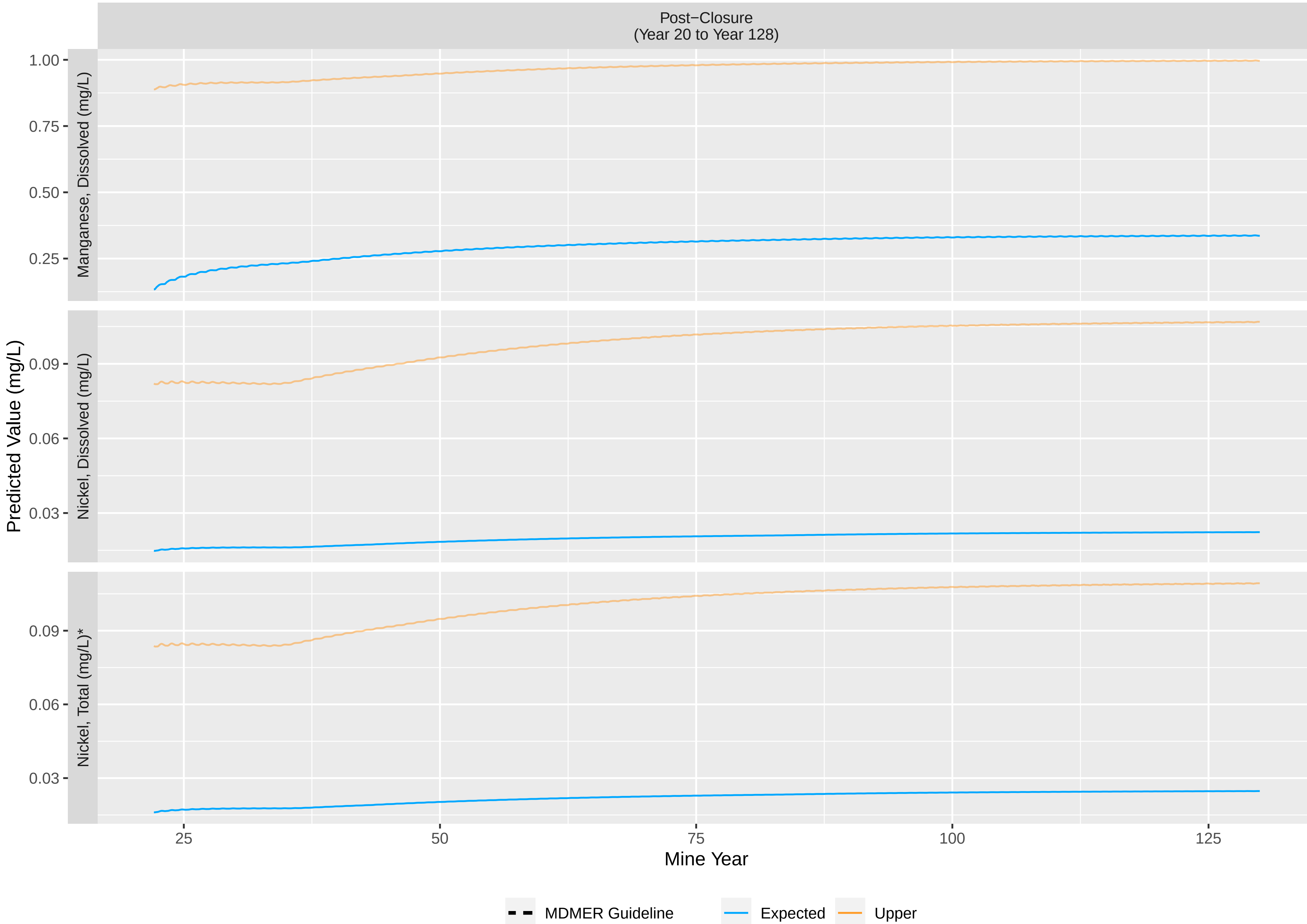
Appendix I-1: MacLellan Open Pit − Predicted Concentrations



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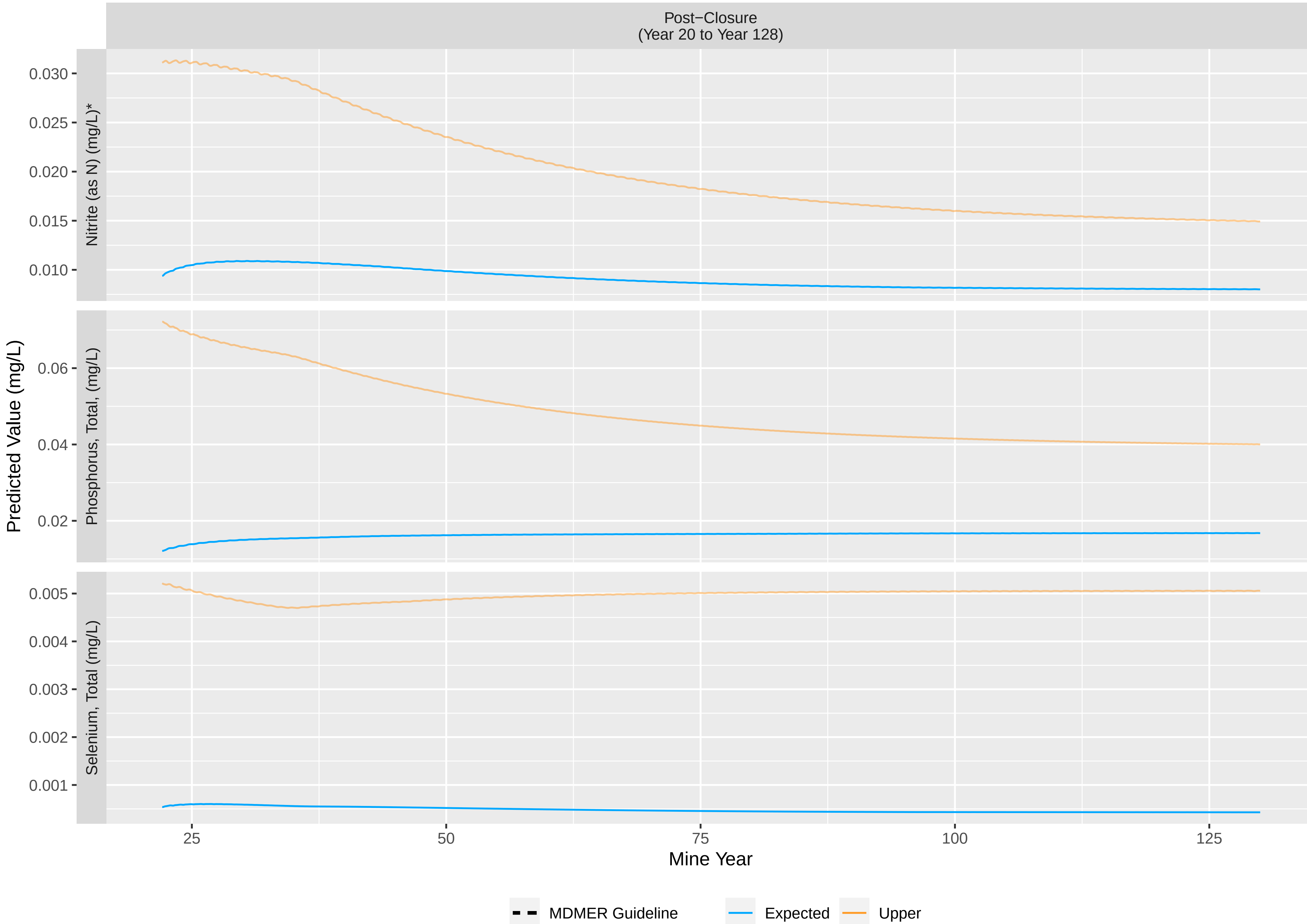
Appendix I-1: MacLellan Open Pit − Predicted Concentrations



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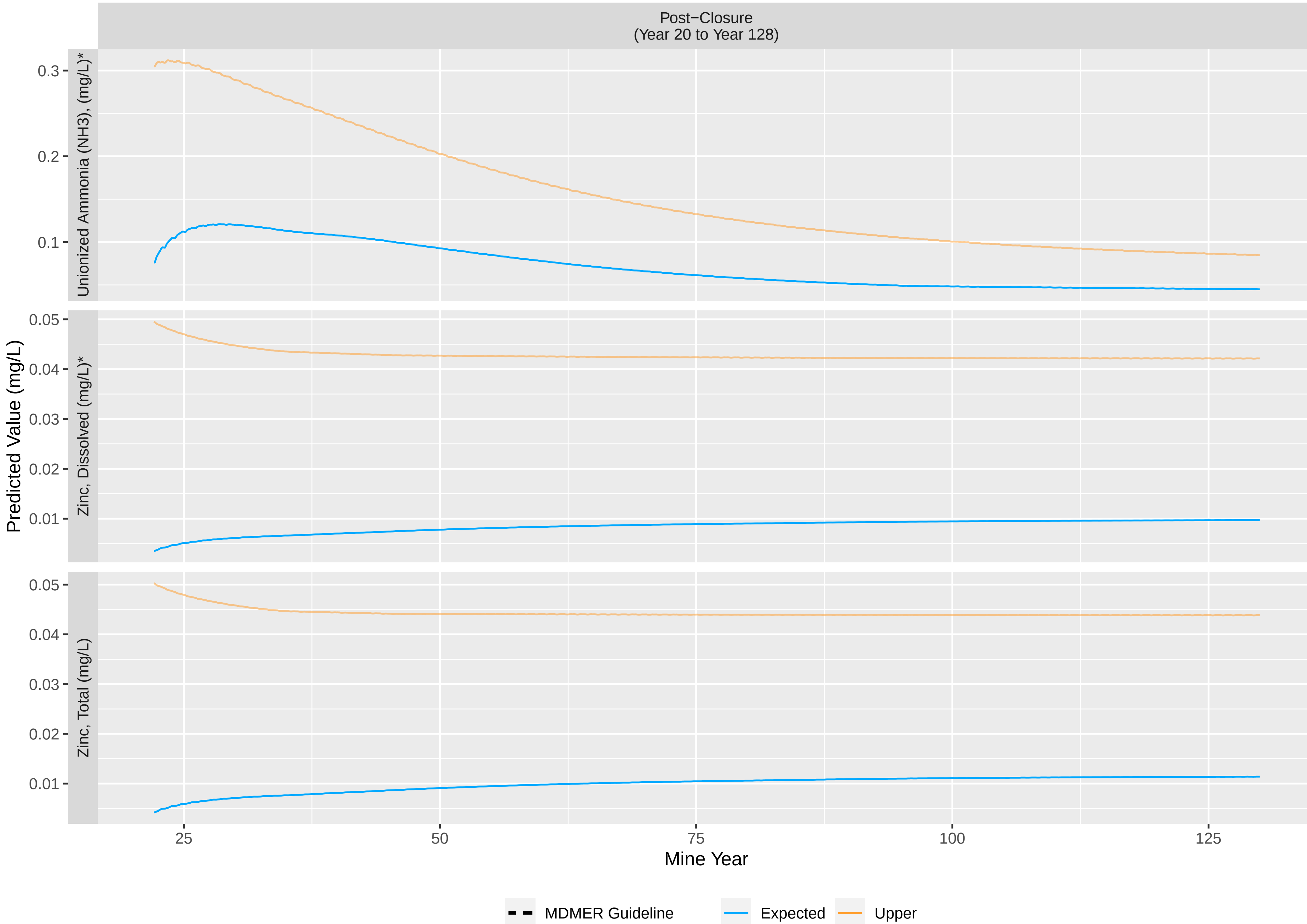
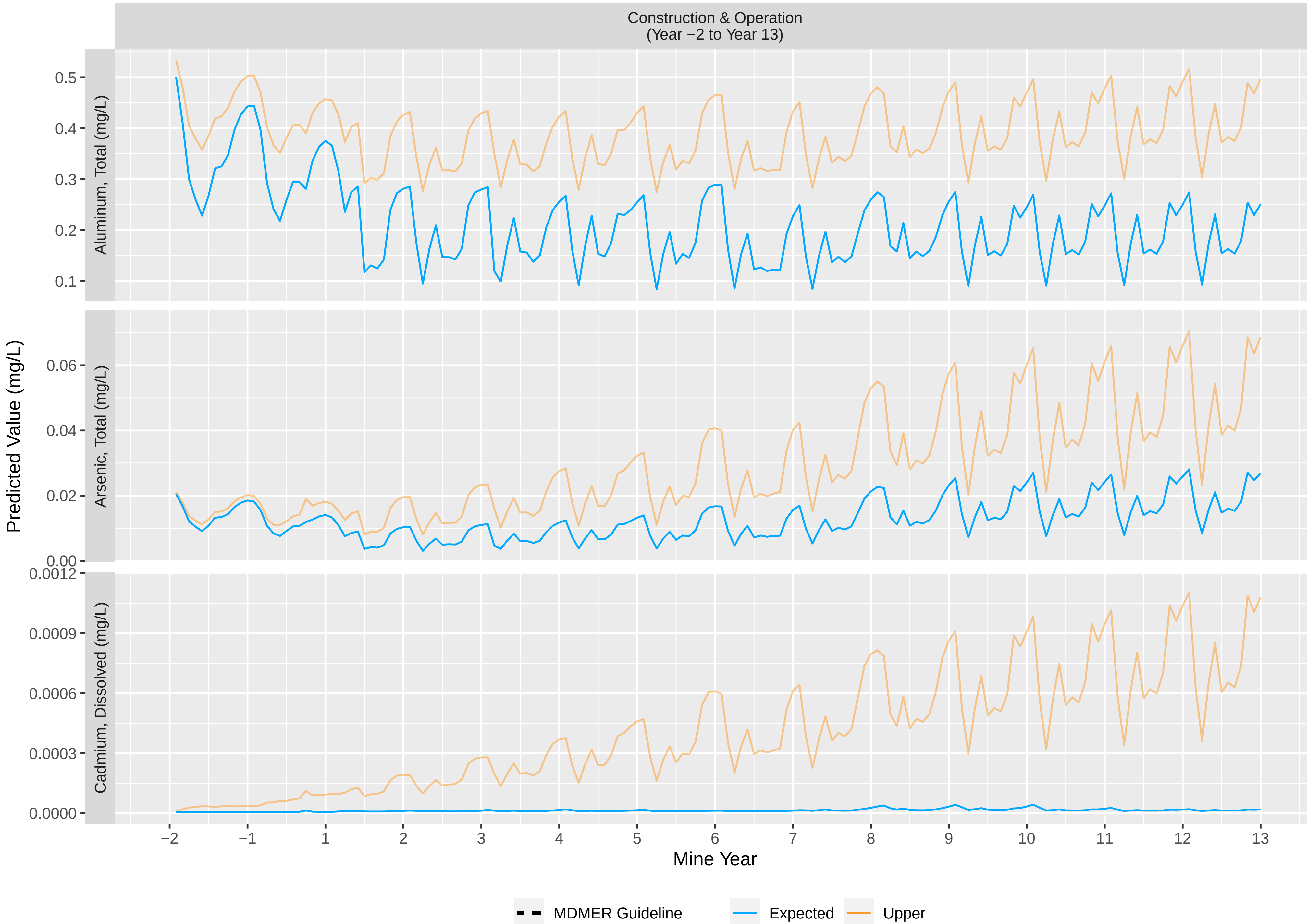
Appendix I-1: MacLellan Open Pit − Predicted Concentrations



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-2: MacLellan Collection Pond − Predicted Concentrations



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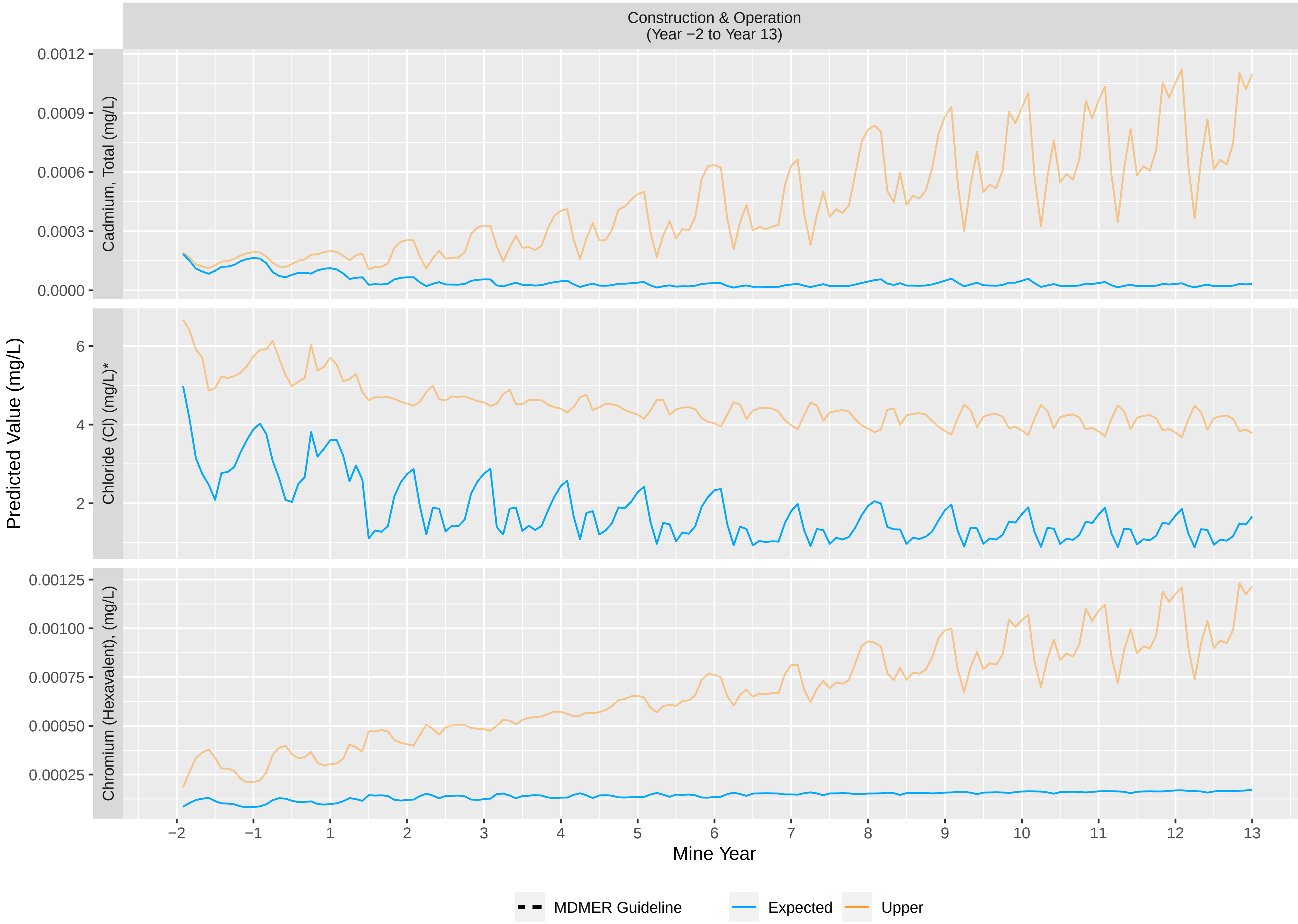
Appendix I-2: MacLellan Collection Pond − Predicted Concentrations



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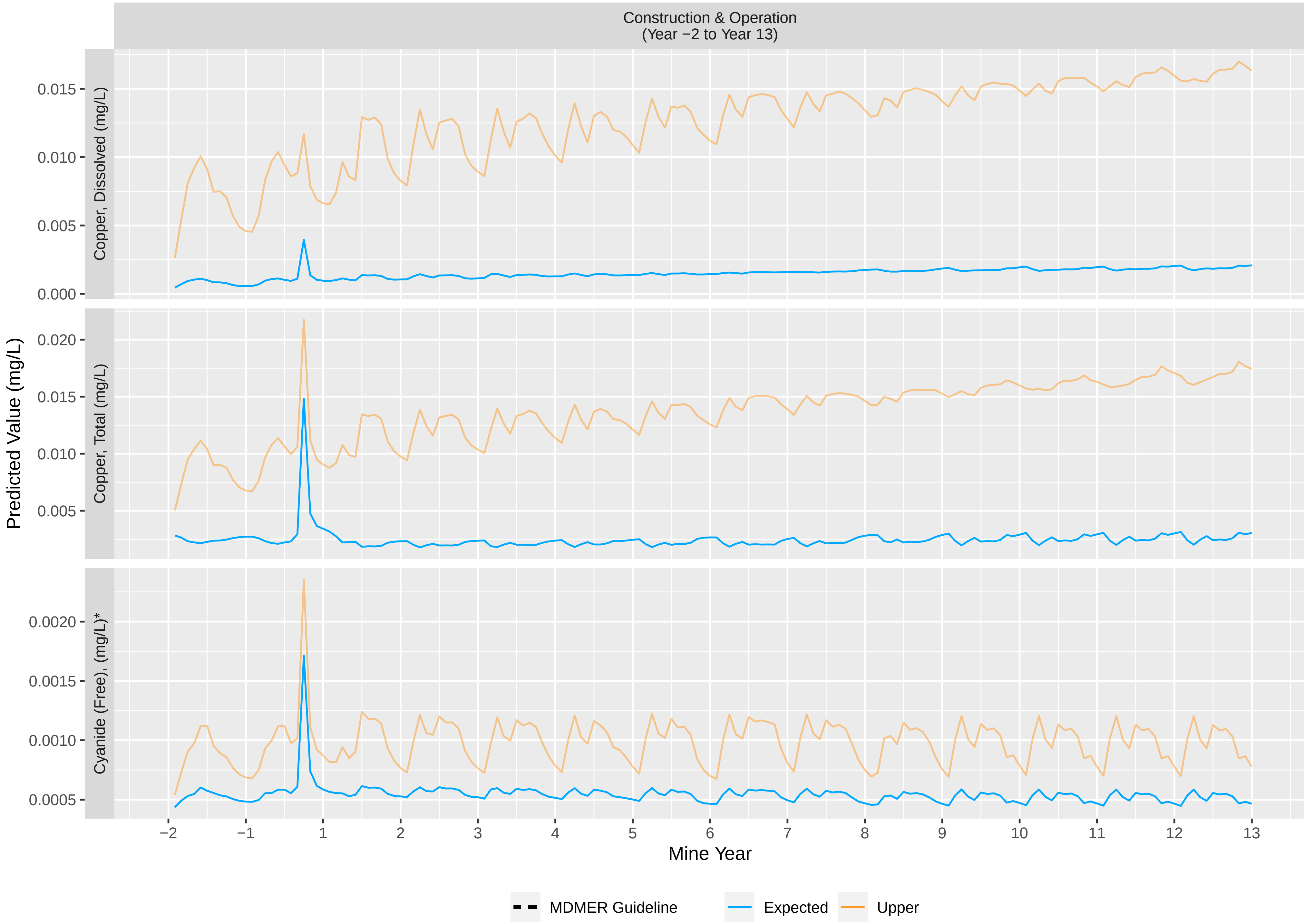
Appendix I-2: MacLellan Collection Pond − Predicted Concentrations



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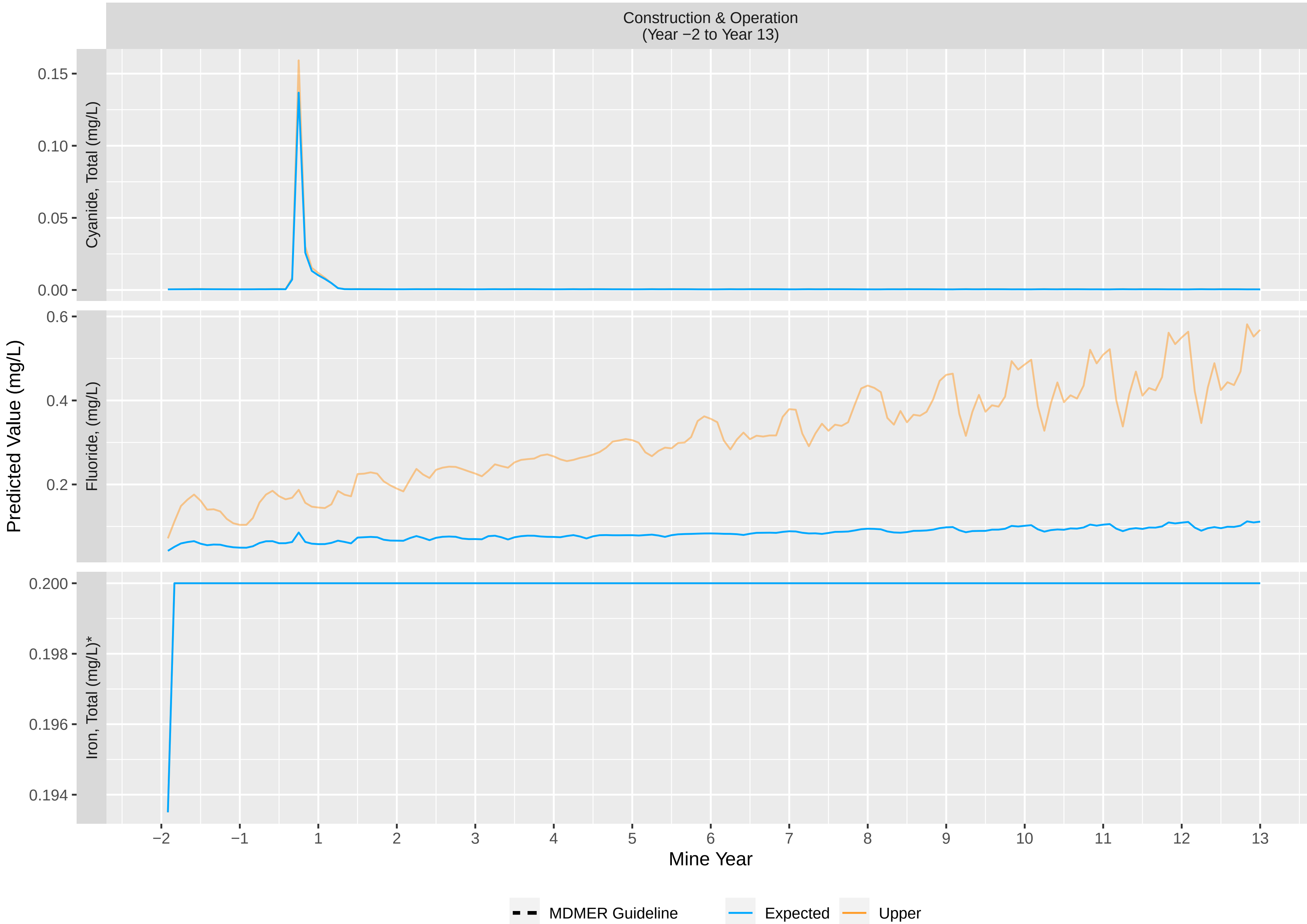
Appendix I-2: MacLellan Collection Pond − Predicted Concentrations



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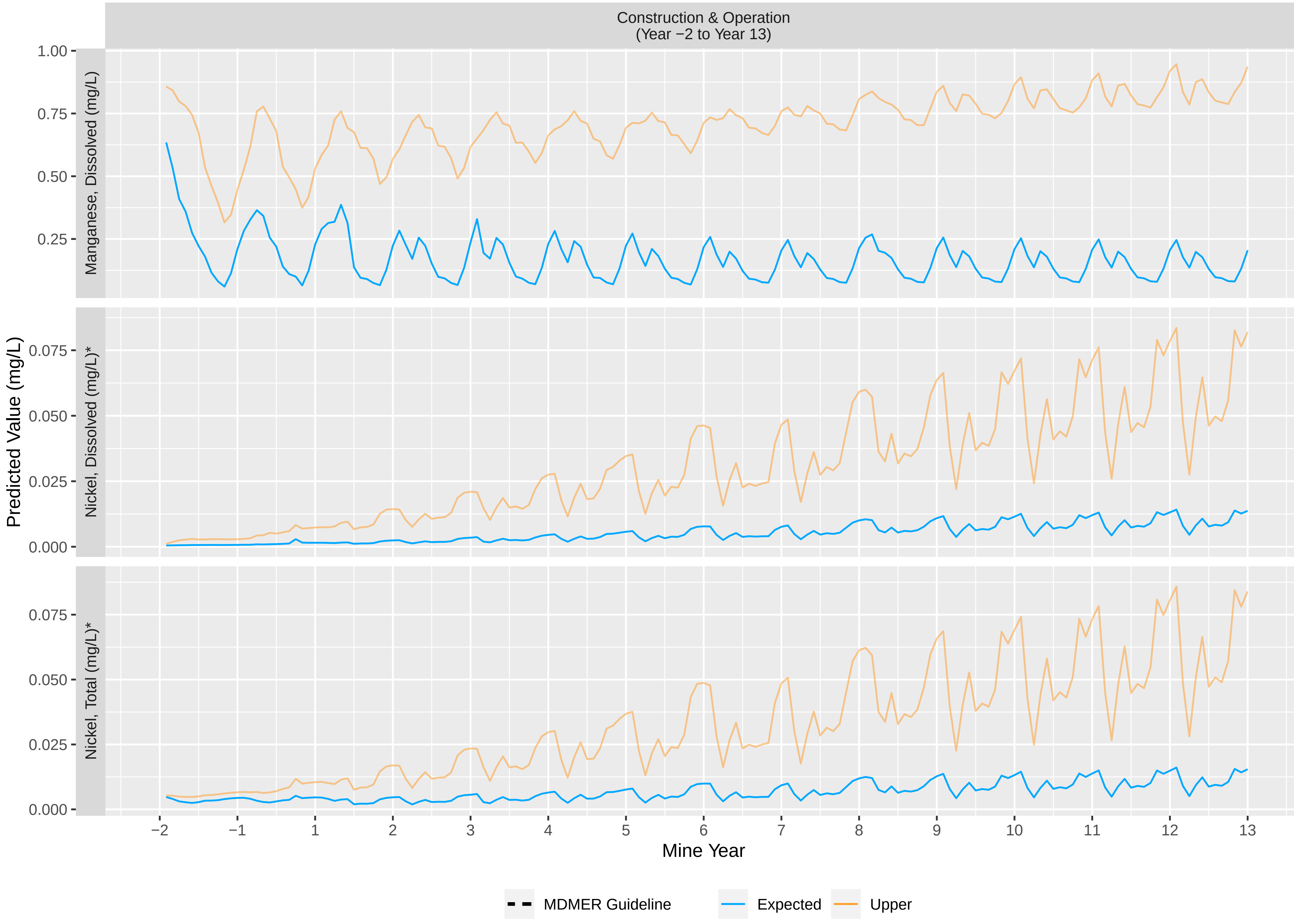
Appendix I-2: MacLellan Collection Pond − Predicted Concentrations



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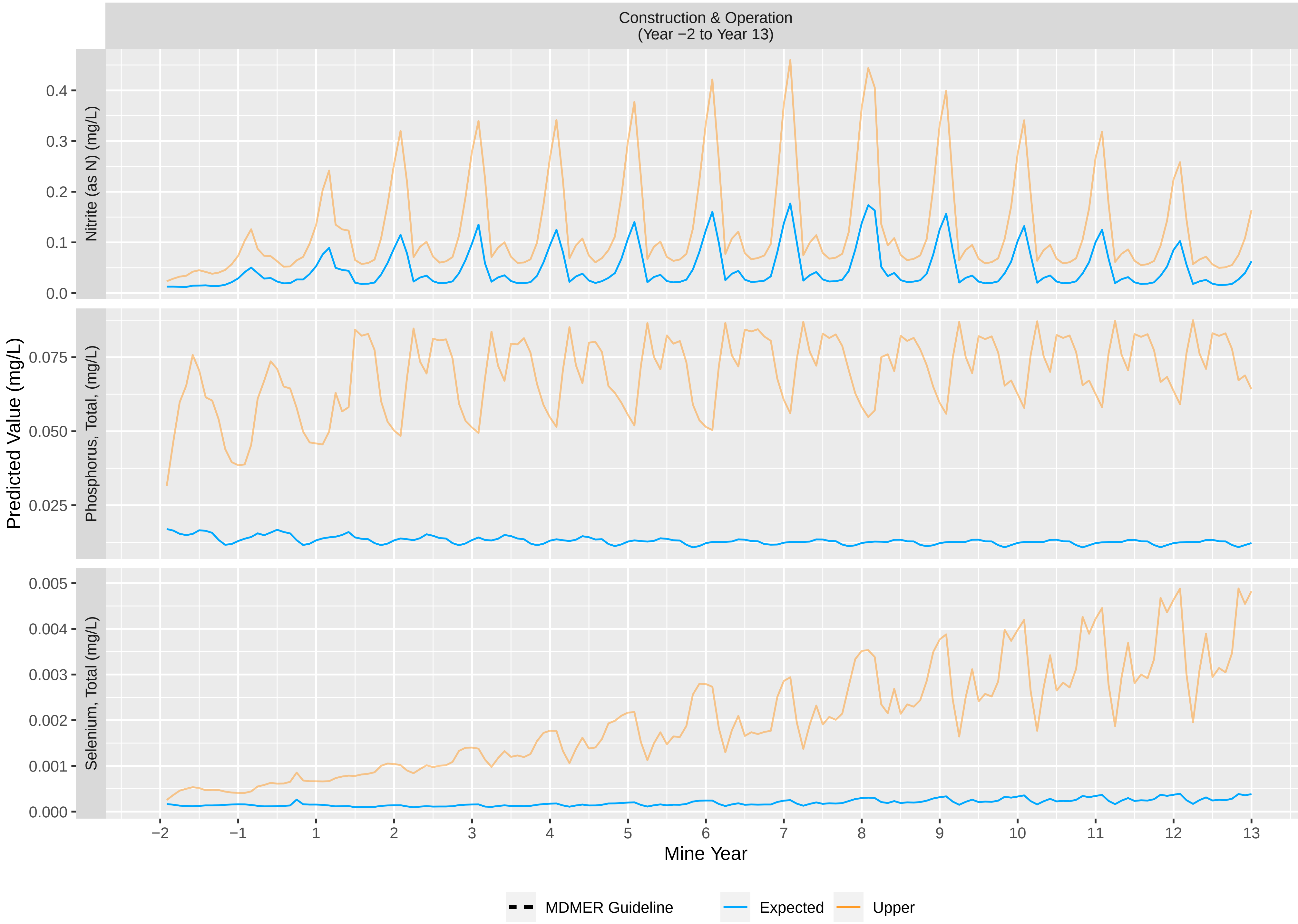

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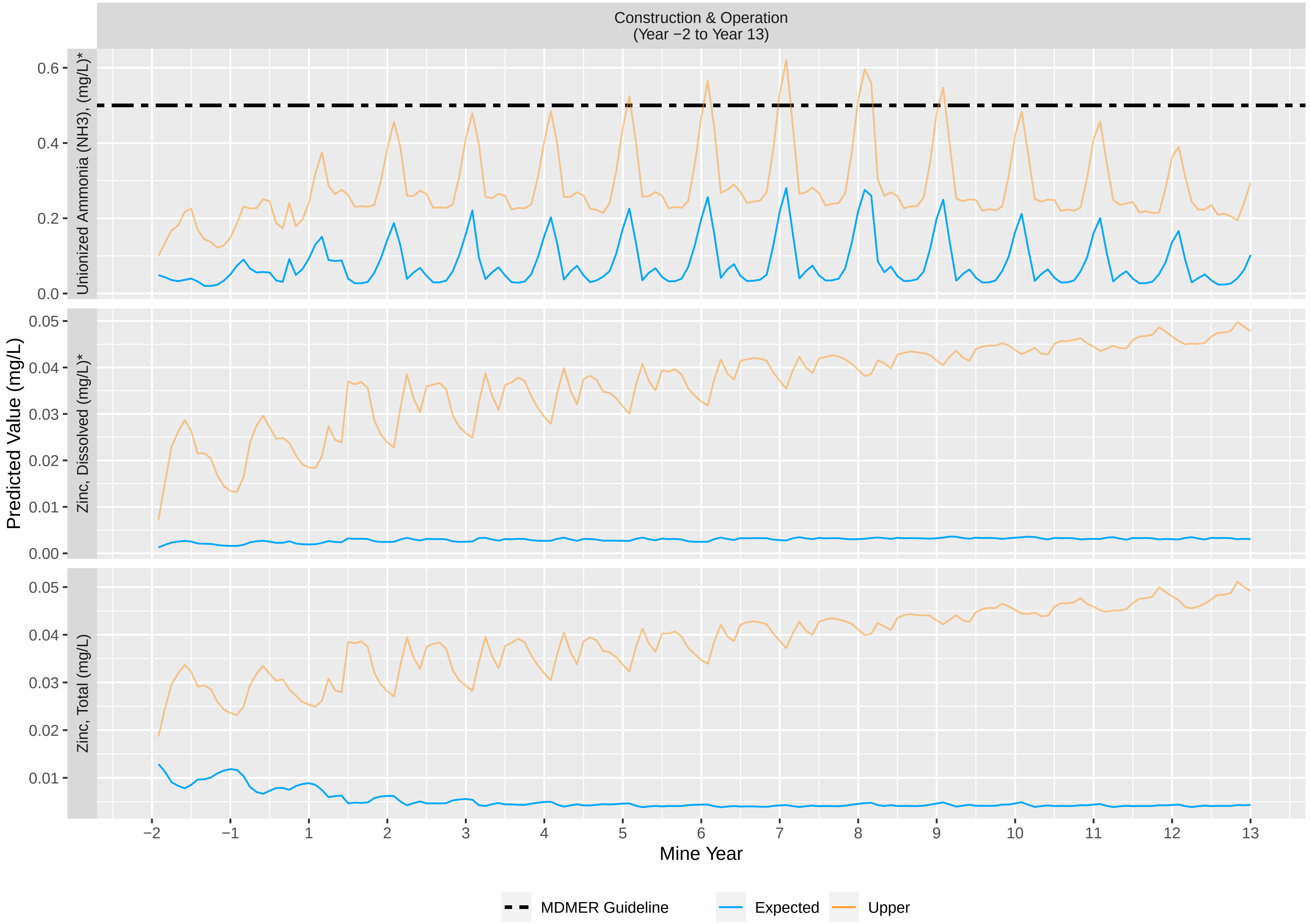
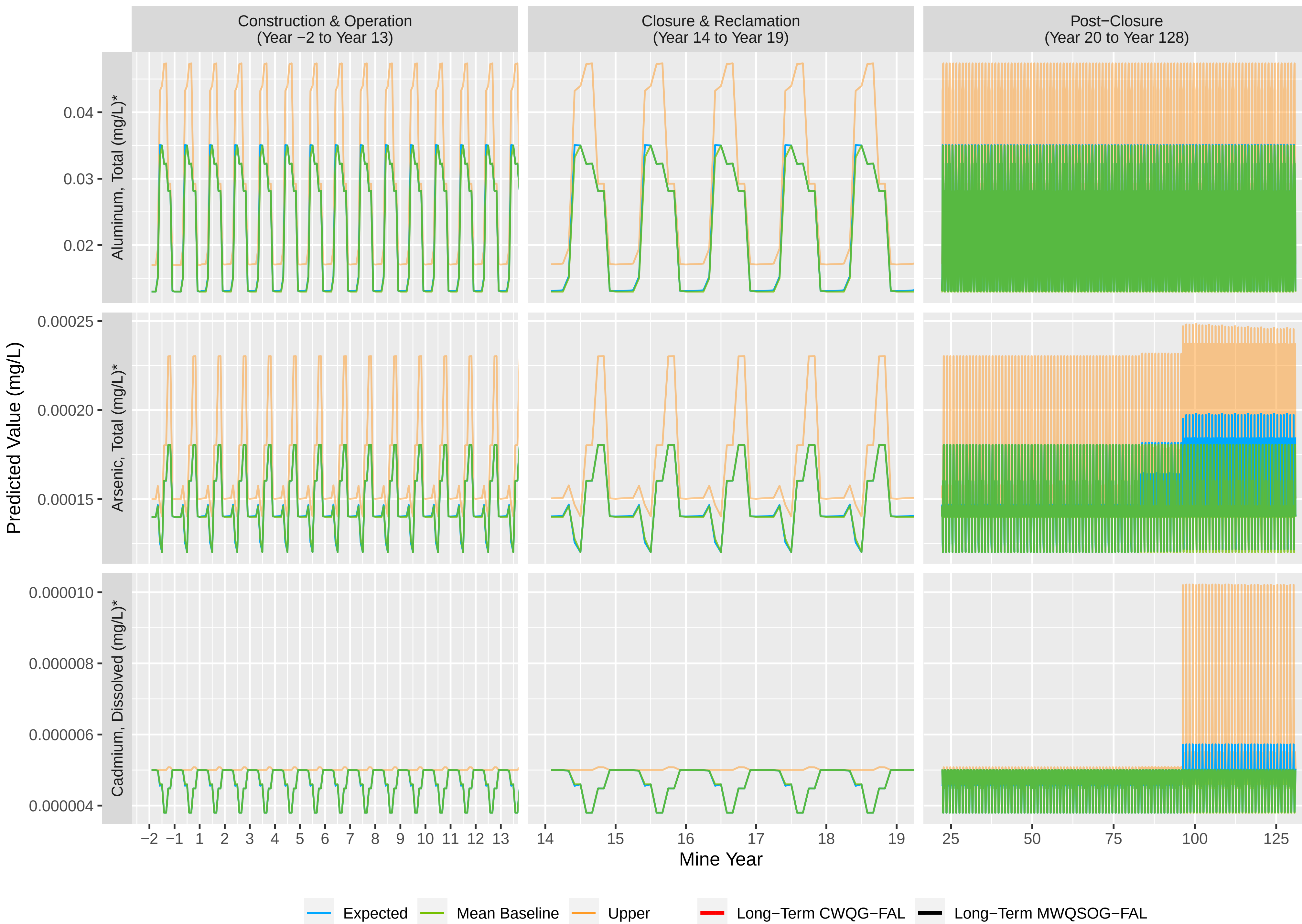


*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-3: QM02 − Predicted Concentrations in Discharges



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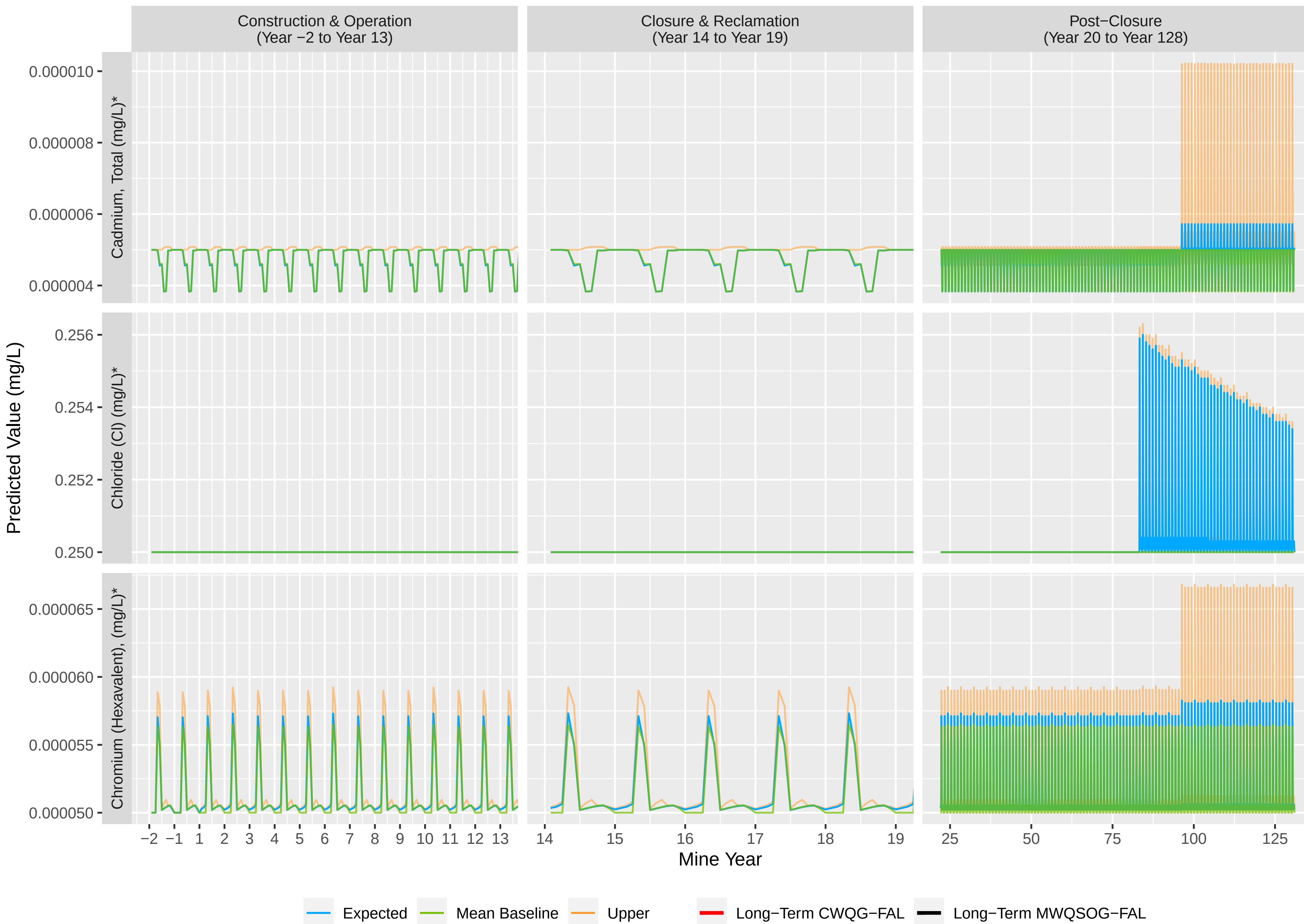
Appendix I-3: QM02 − Predicted Concentrations in Discharges



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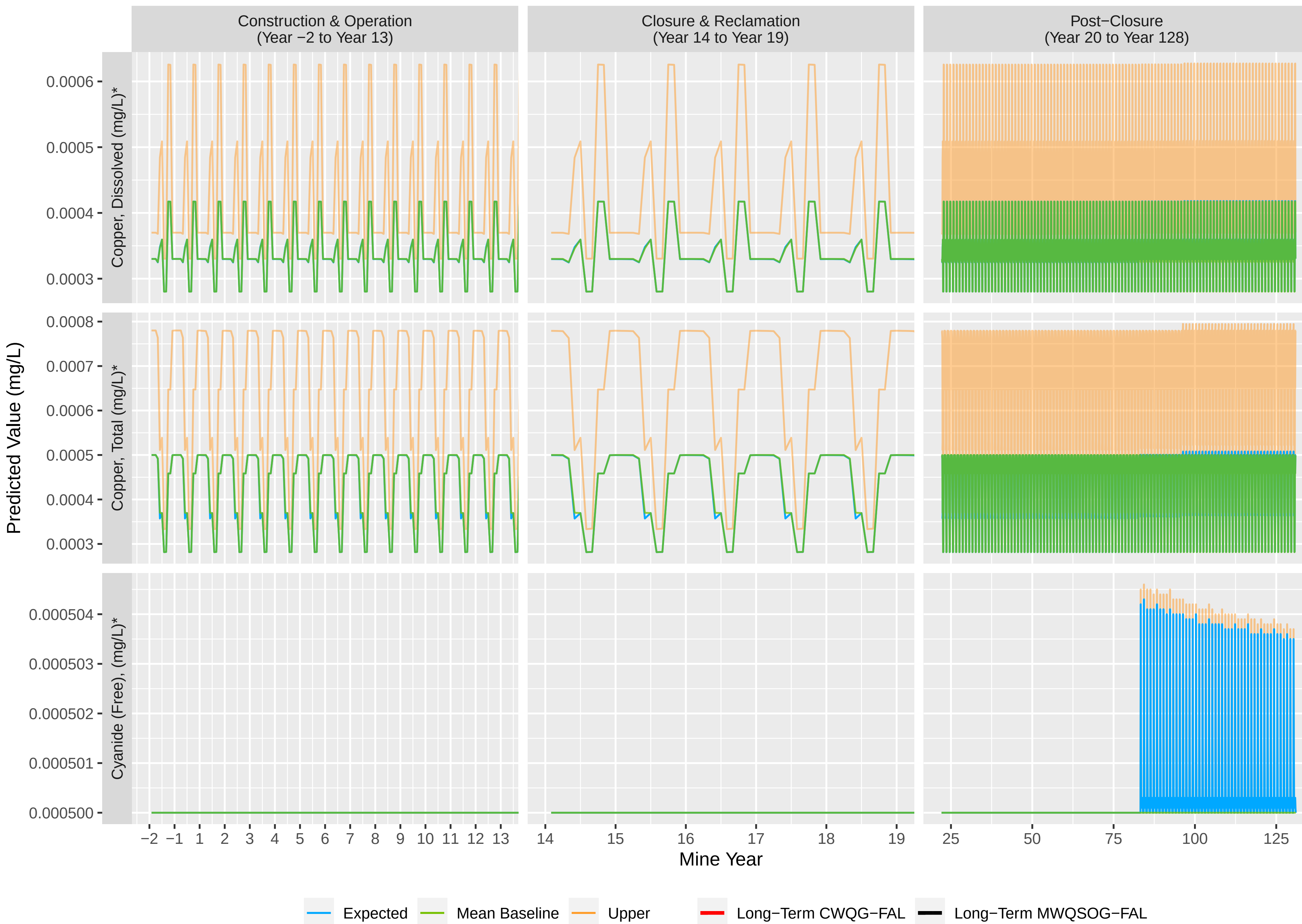
Appendix I-3: QM02 − Predicted Concentrations in Discharges



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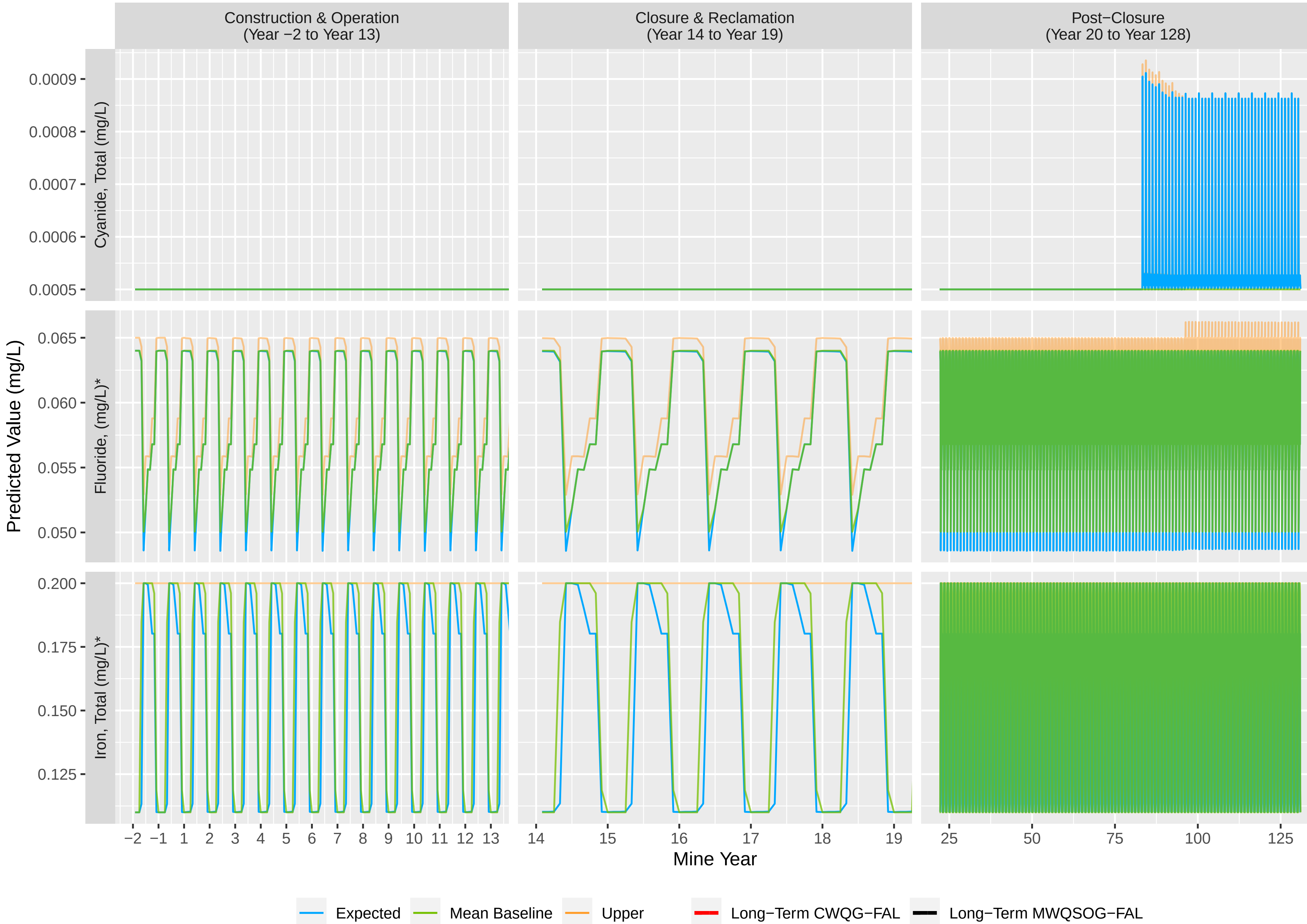

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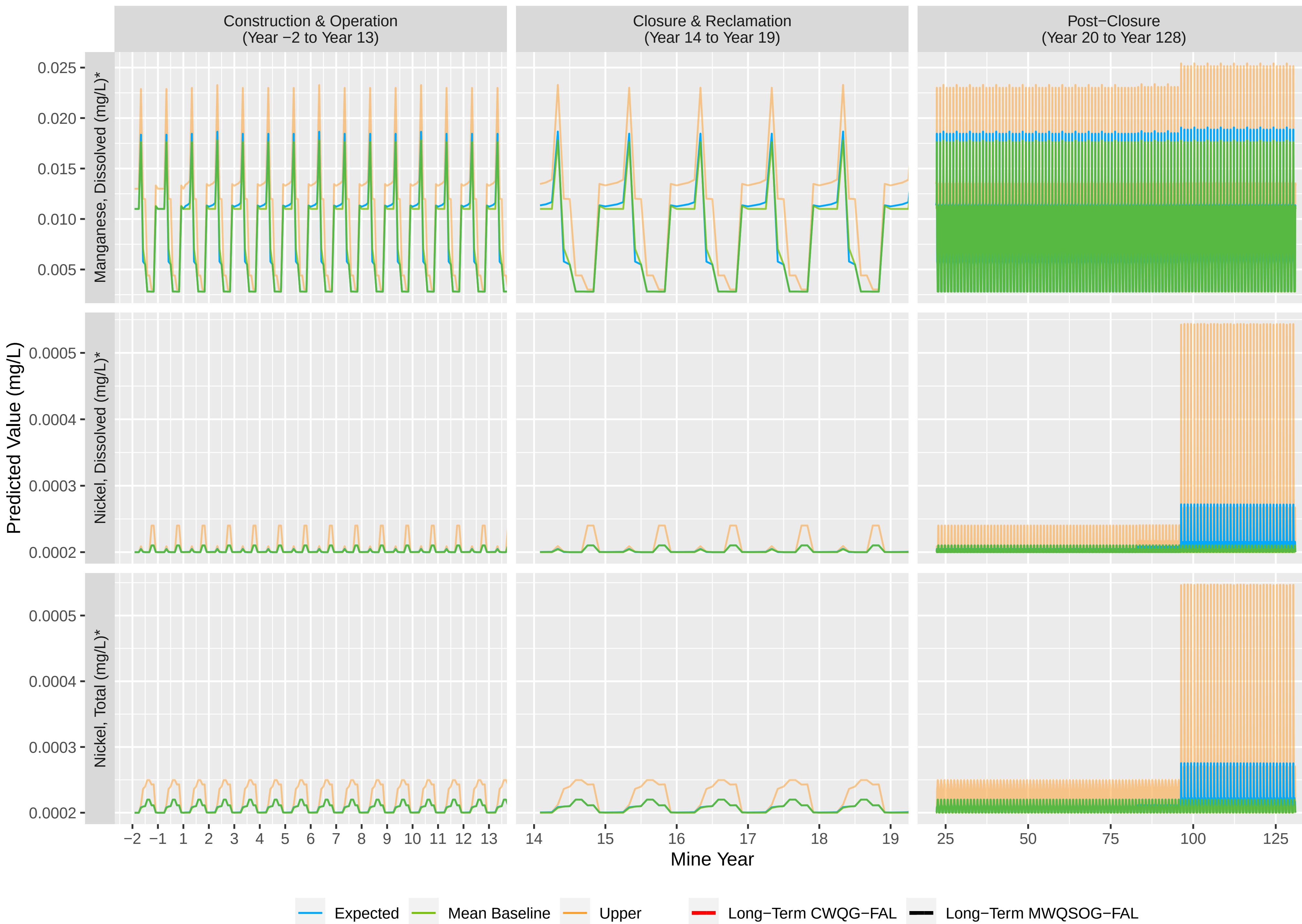
Appendix I-3: QM02 − Predicted Concentrations in Discharges



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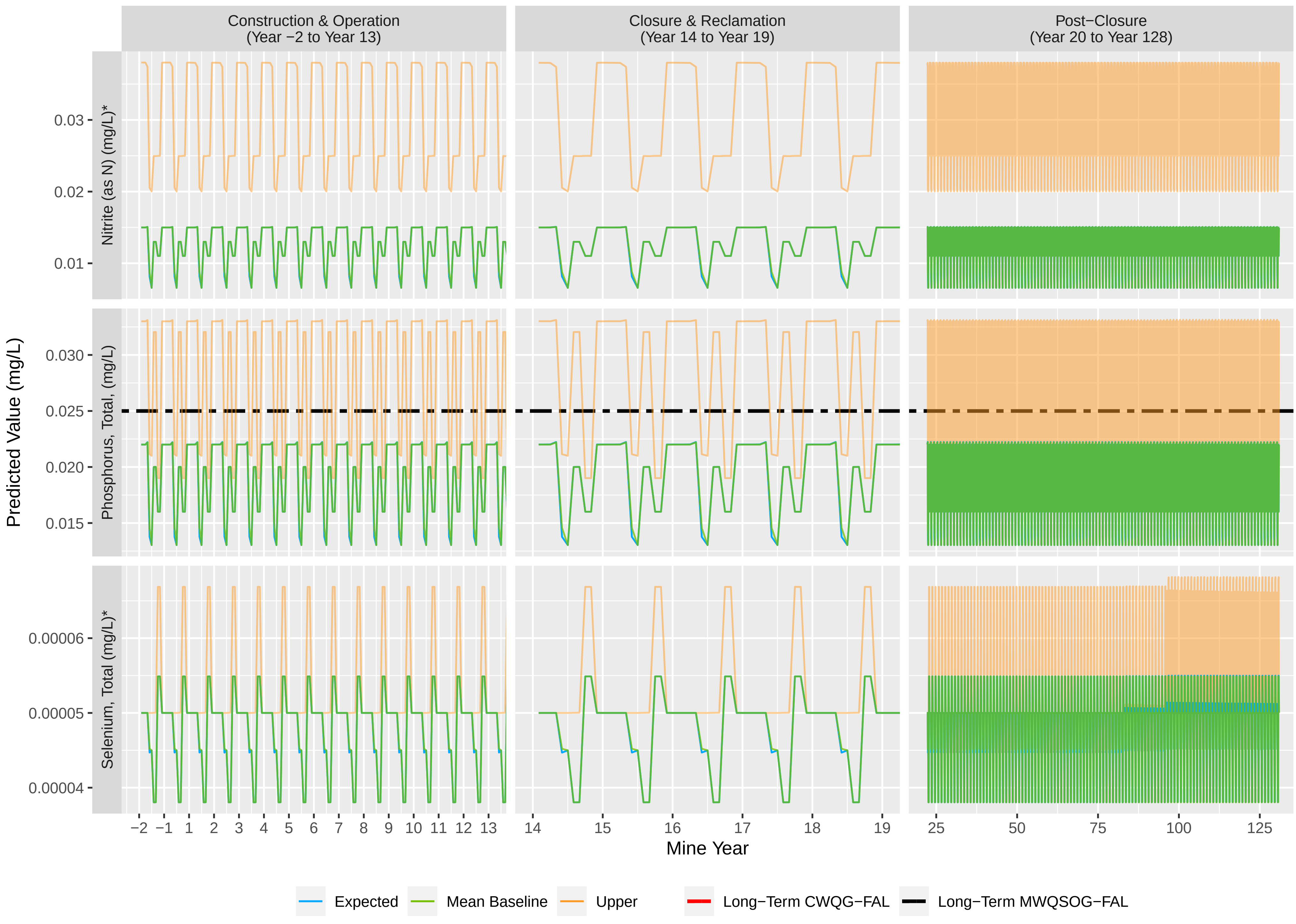

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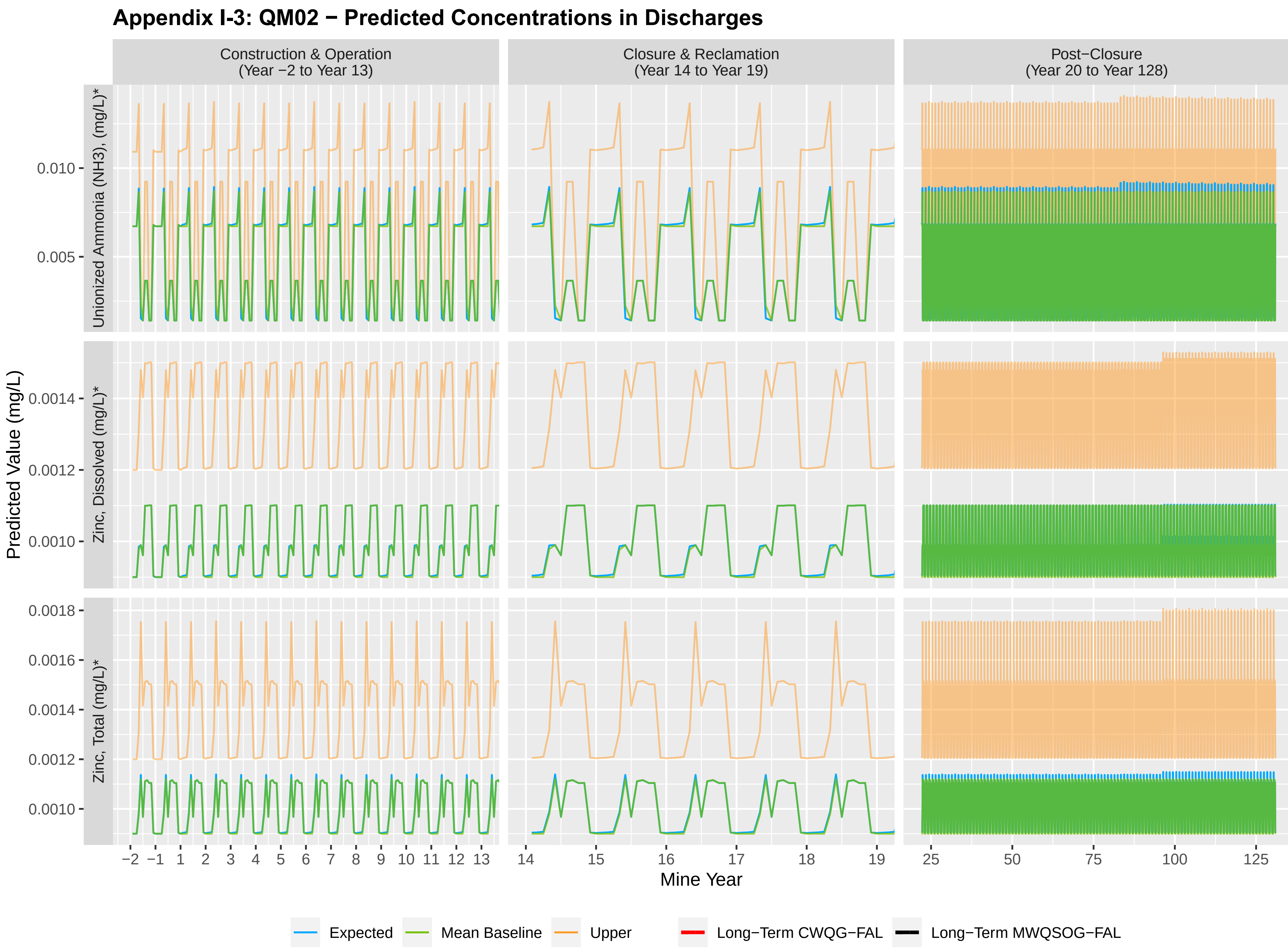
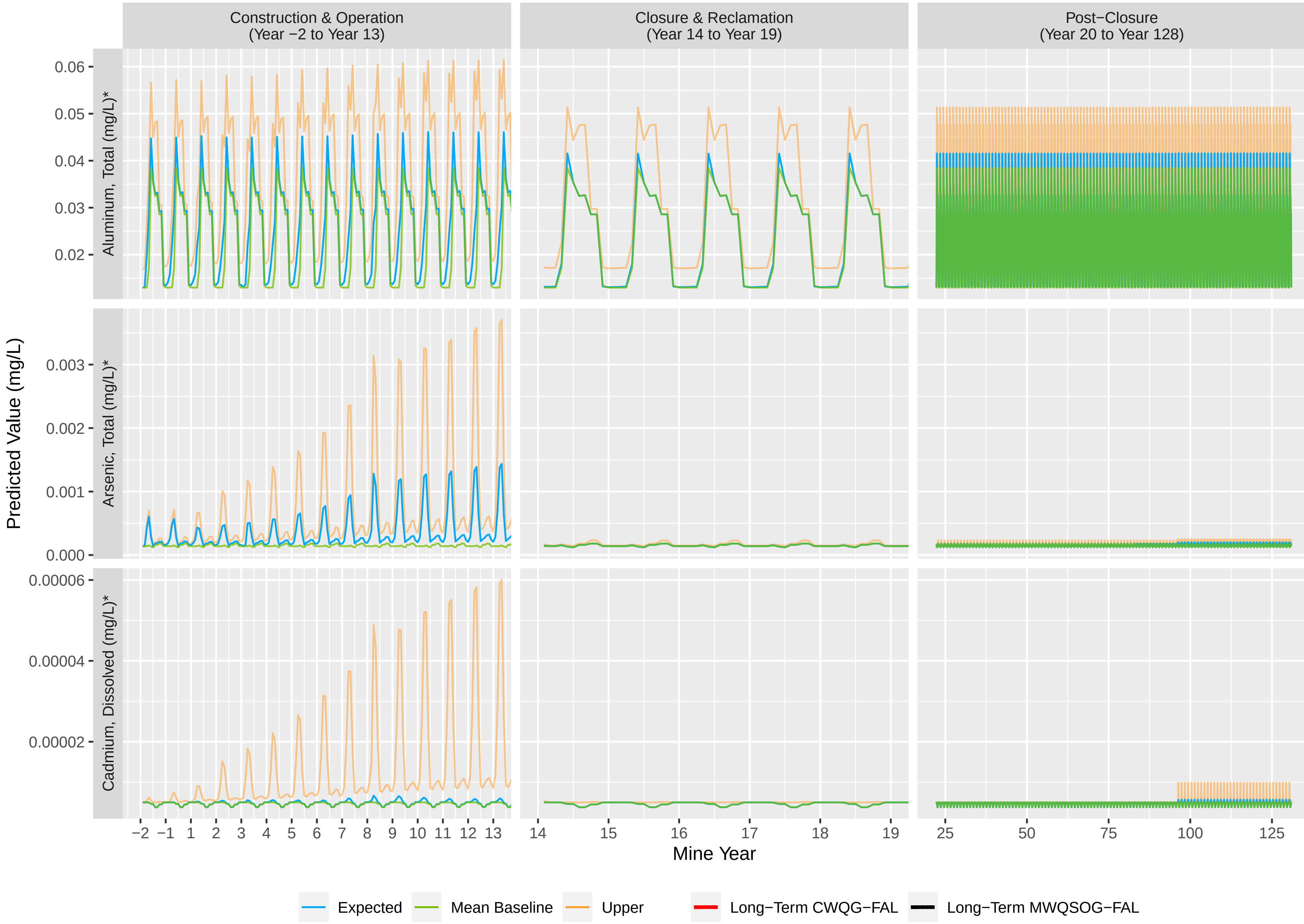


*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-4: QM03 − Predicted Concentrations in Discharges



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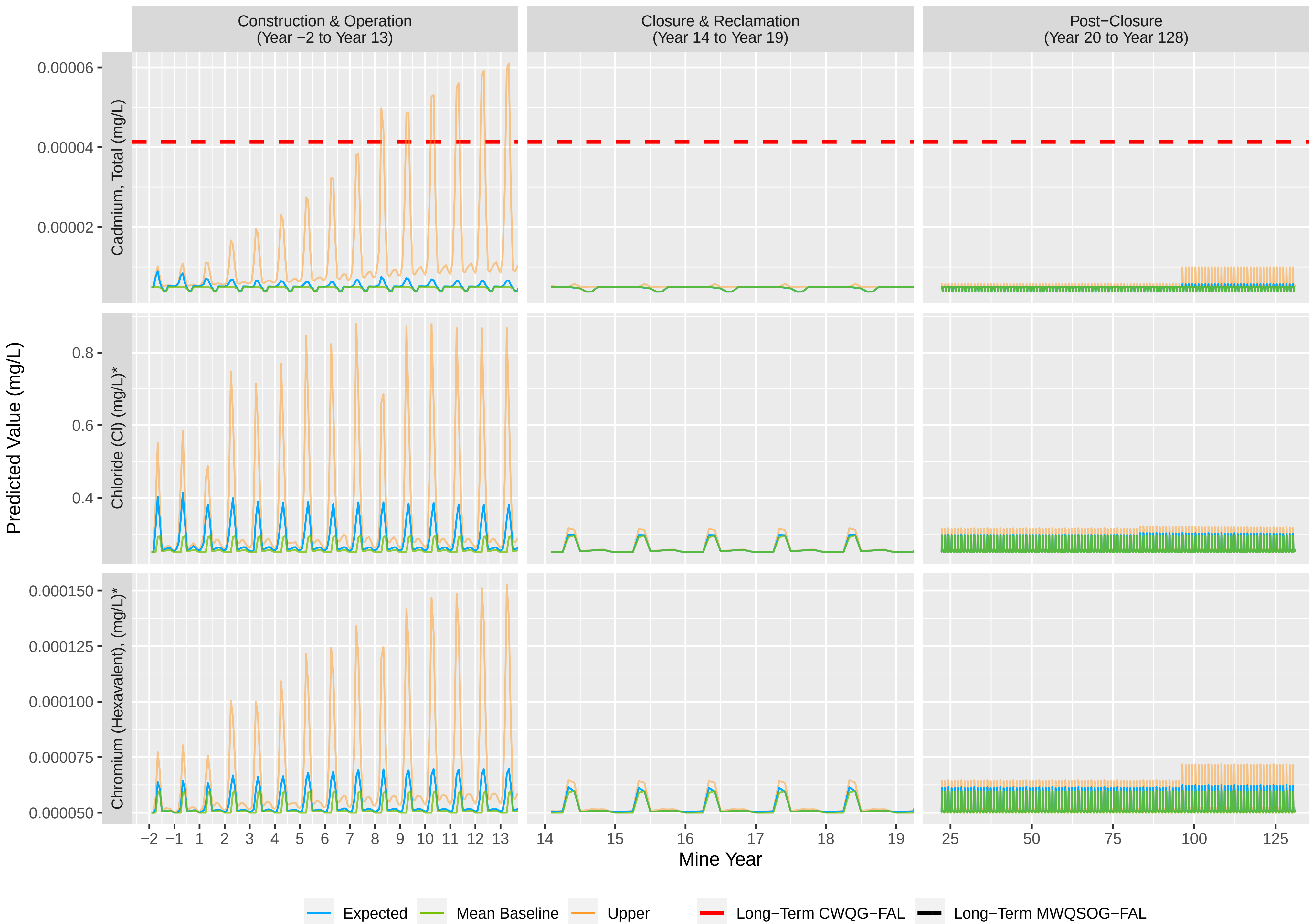
Appendix I-4: QM03 − Predicted Concentrations in Discharges



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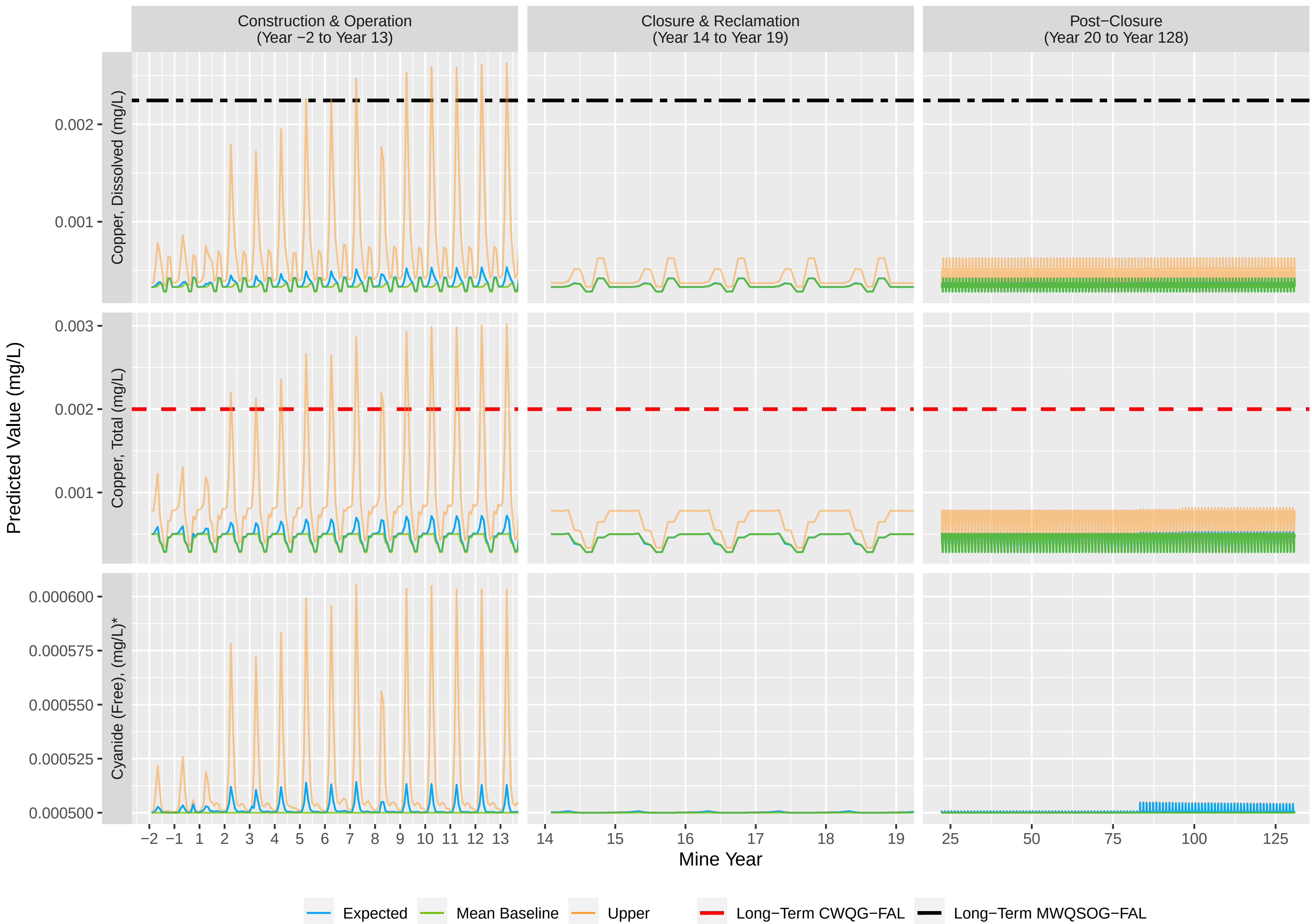
Appendix I-4: QM03 − Predicted Concentrations in Discharges



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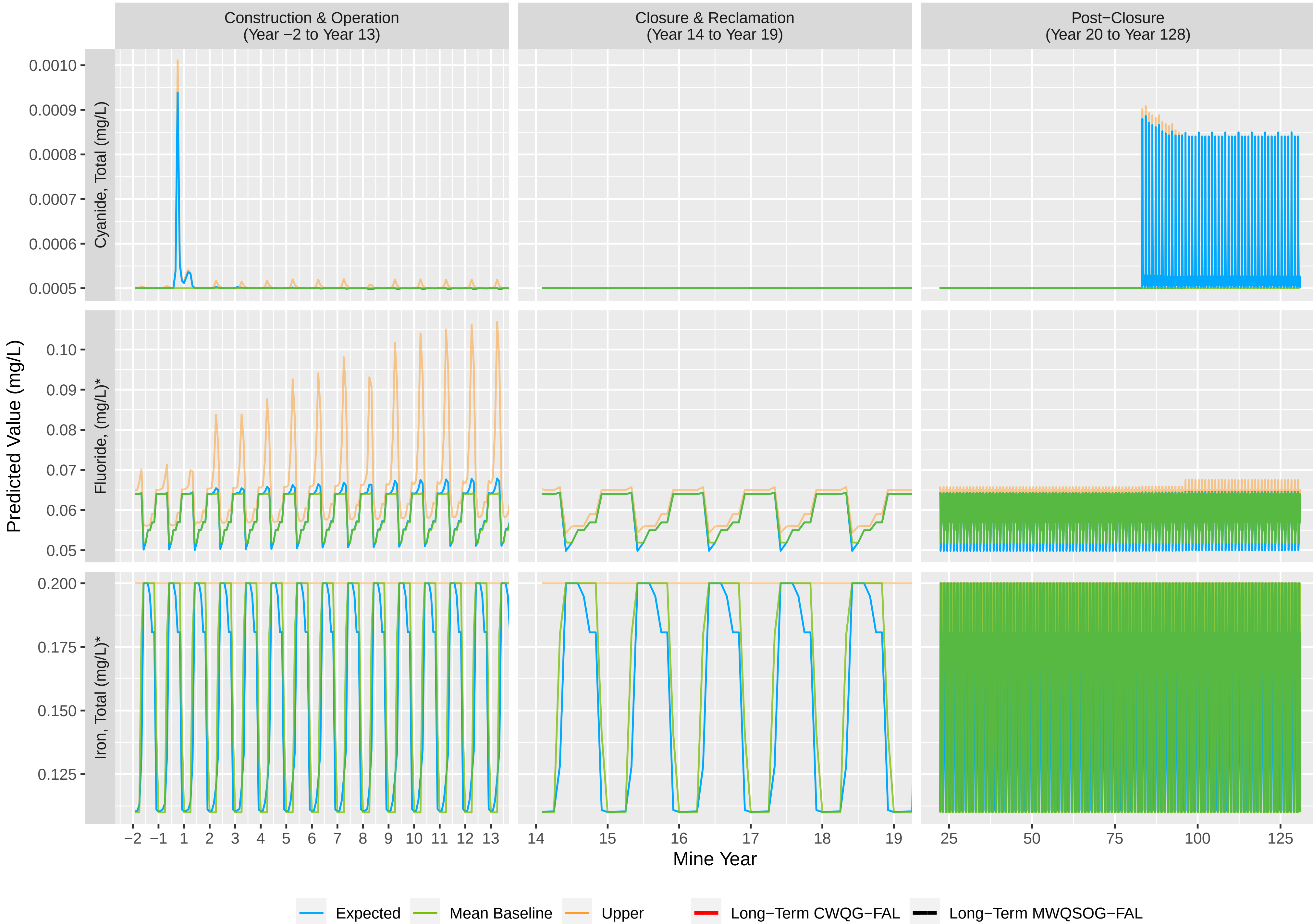
Appendix I-4: QM03 − Predicted Concentrations in Discharges



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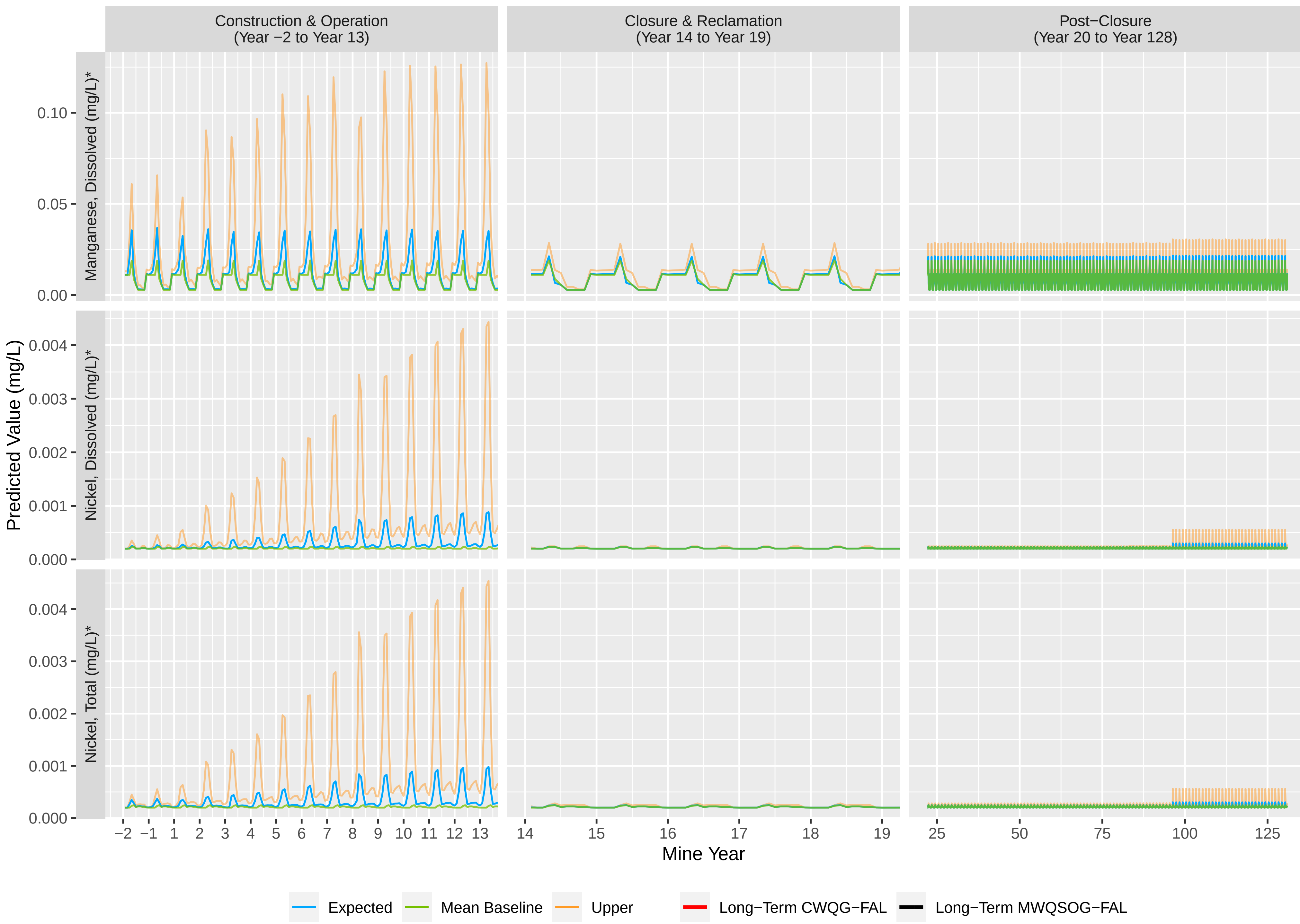
Appendix I-4: QM03 − Predicted Concentrations in Discharges



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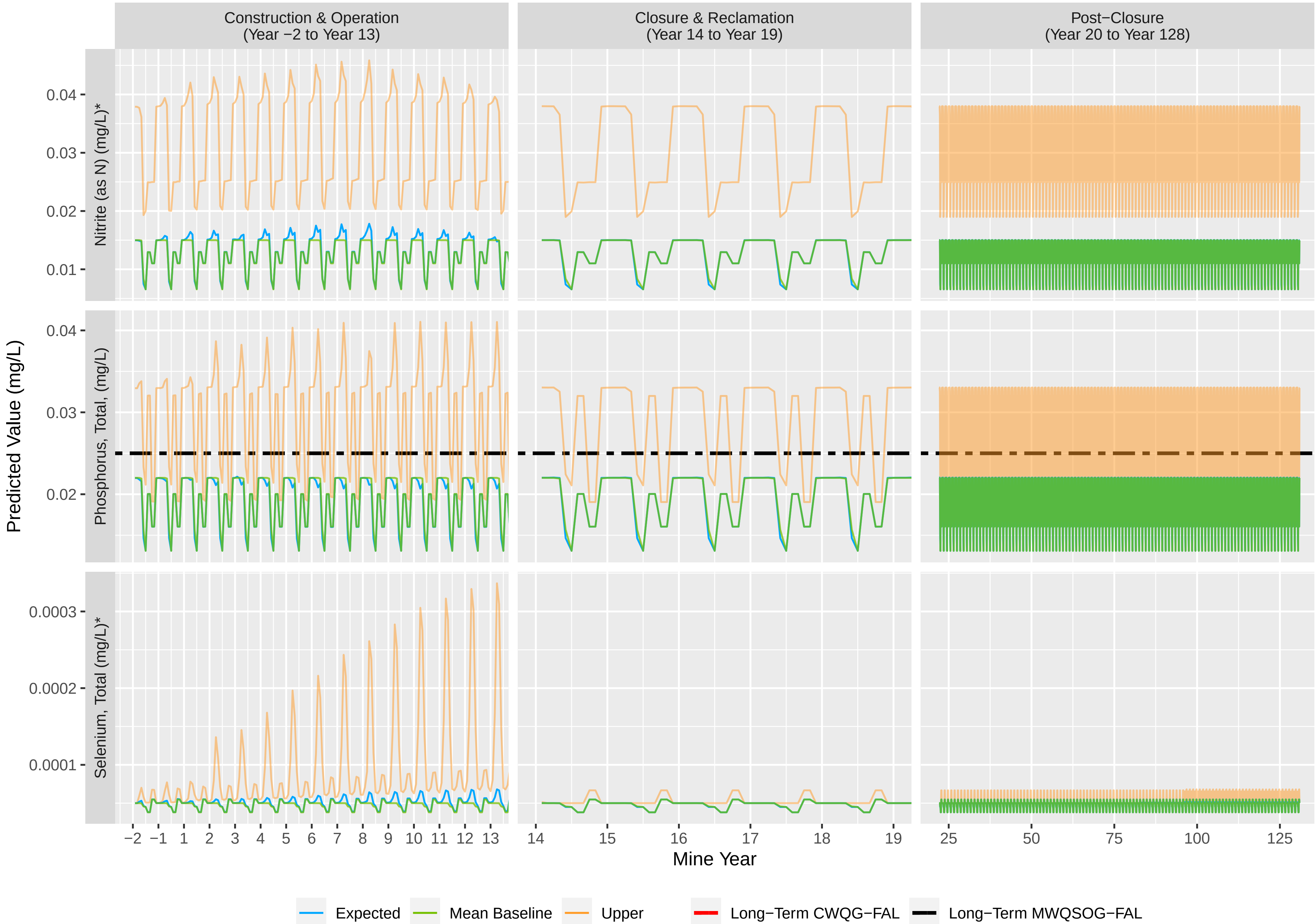

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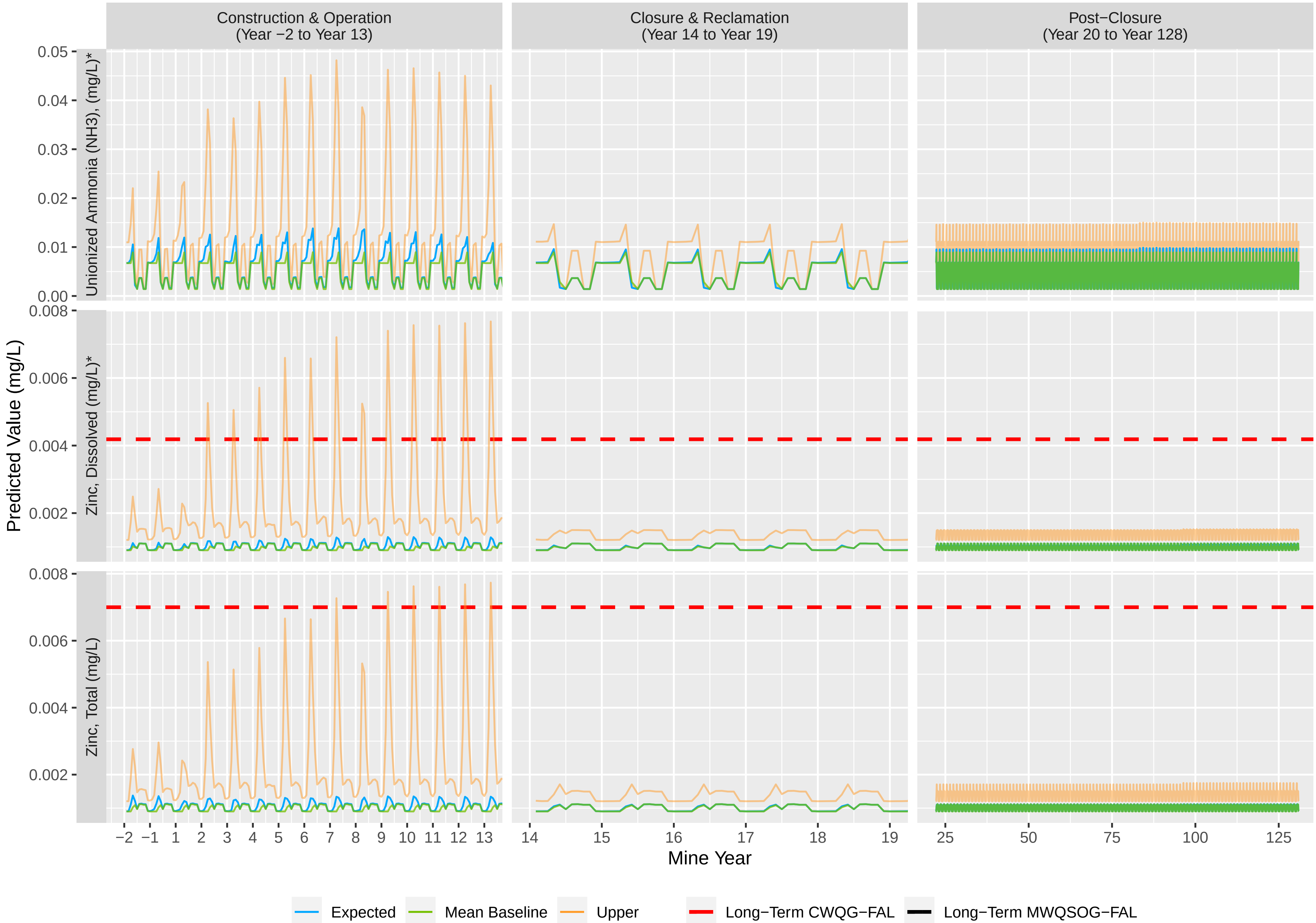
Appendix I-4: QM03 − Predicted Concentrations in Discharges



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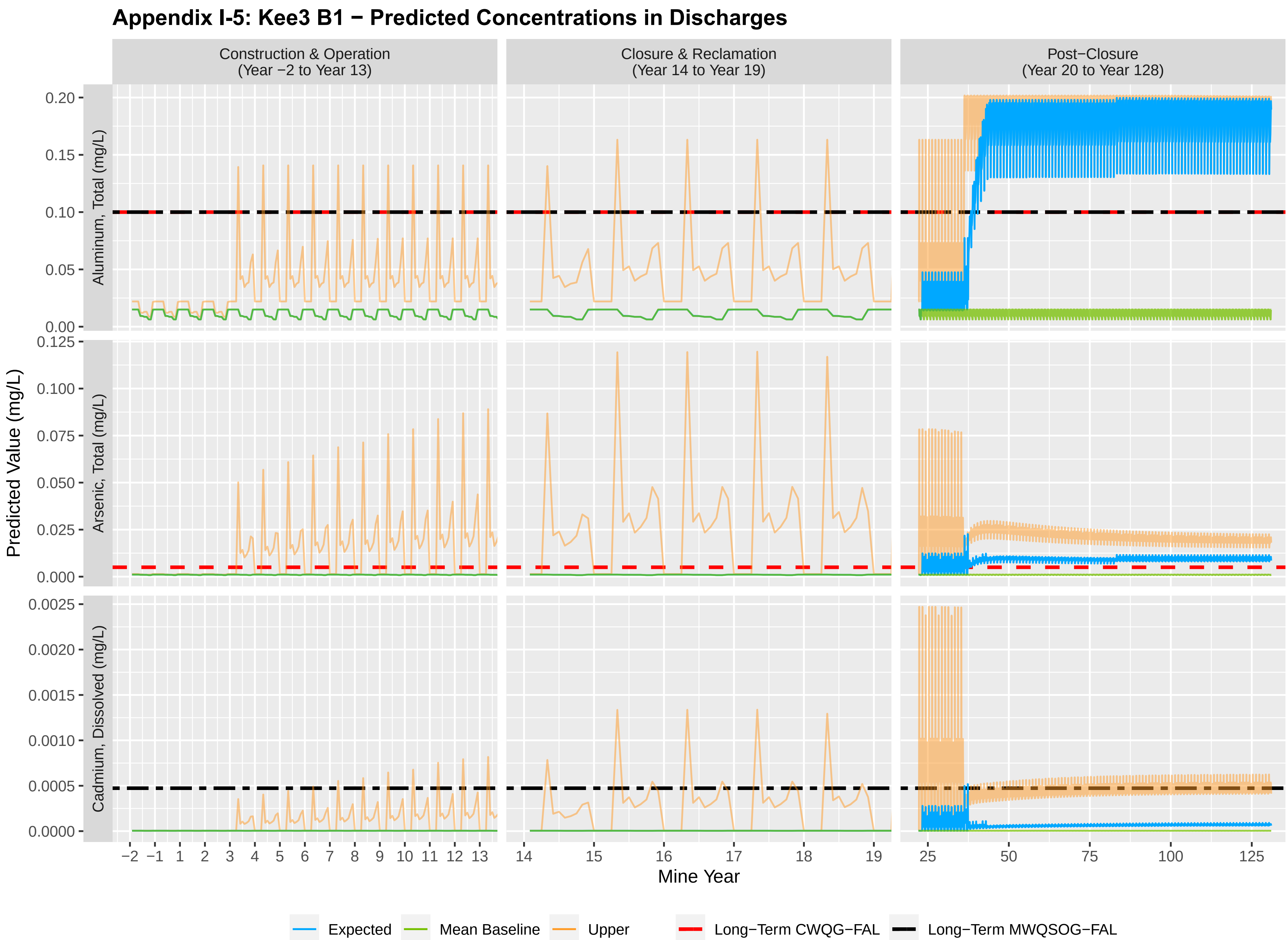

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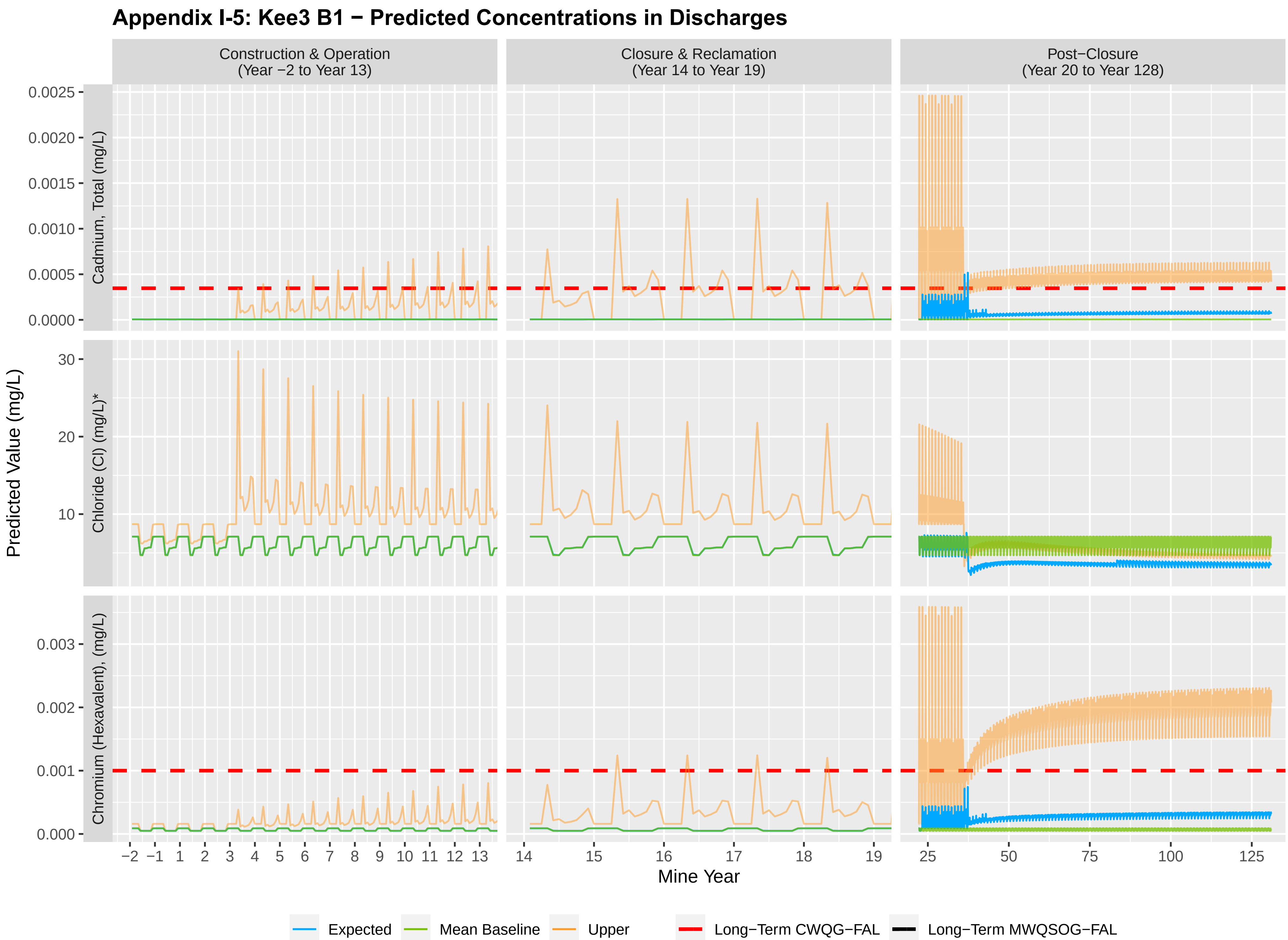

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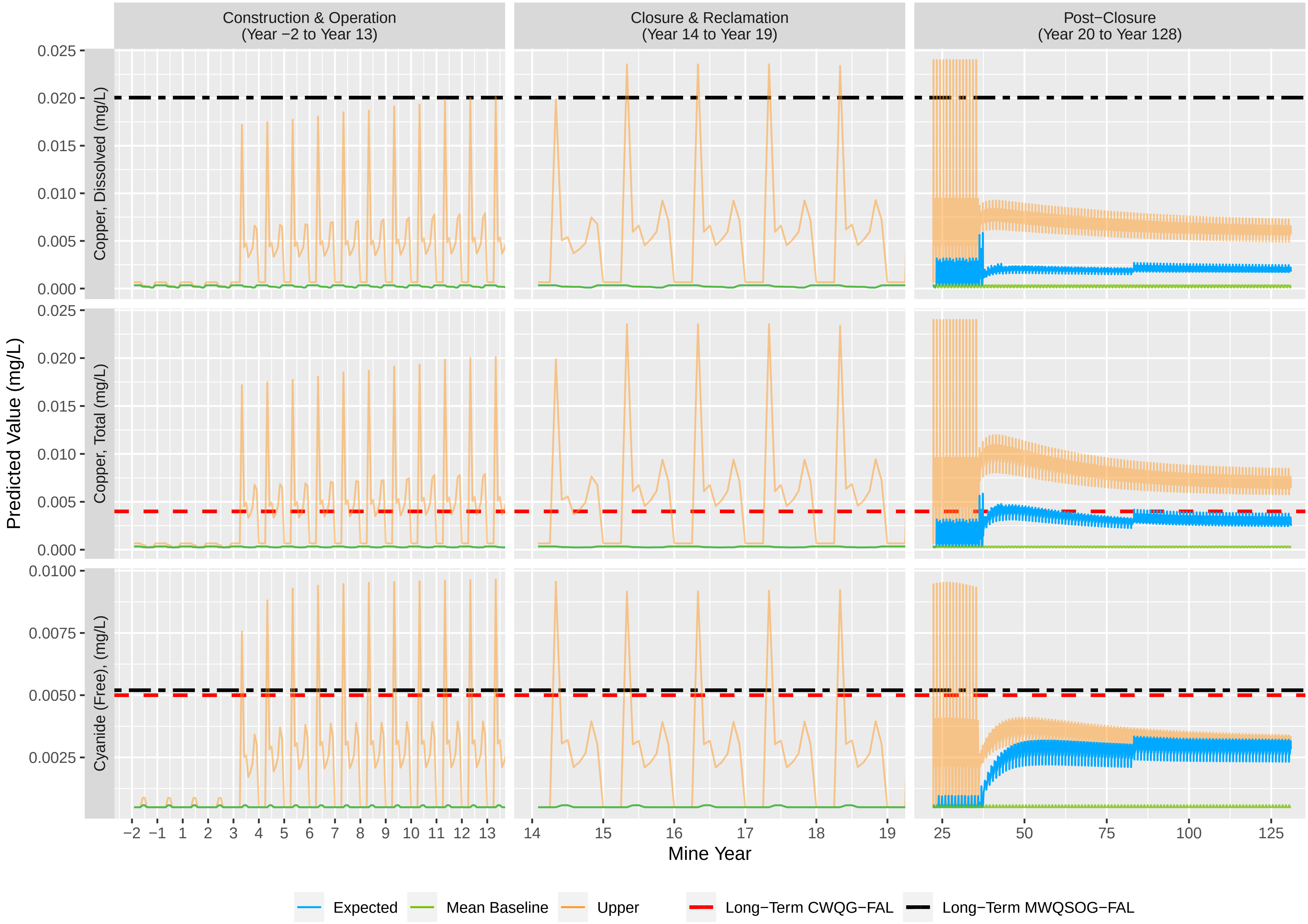
Appendix I-5: Kee3 B1 − Predicted Concentrations in Discharges



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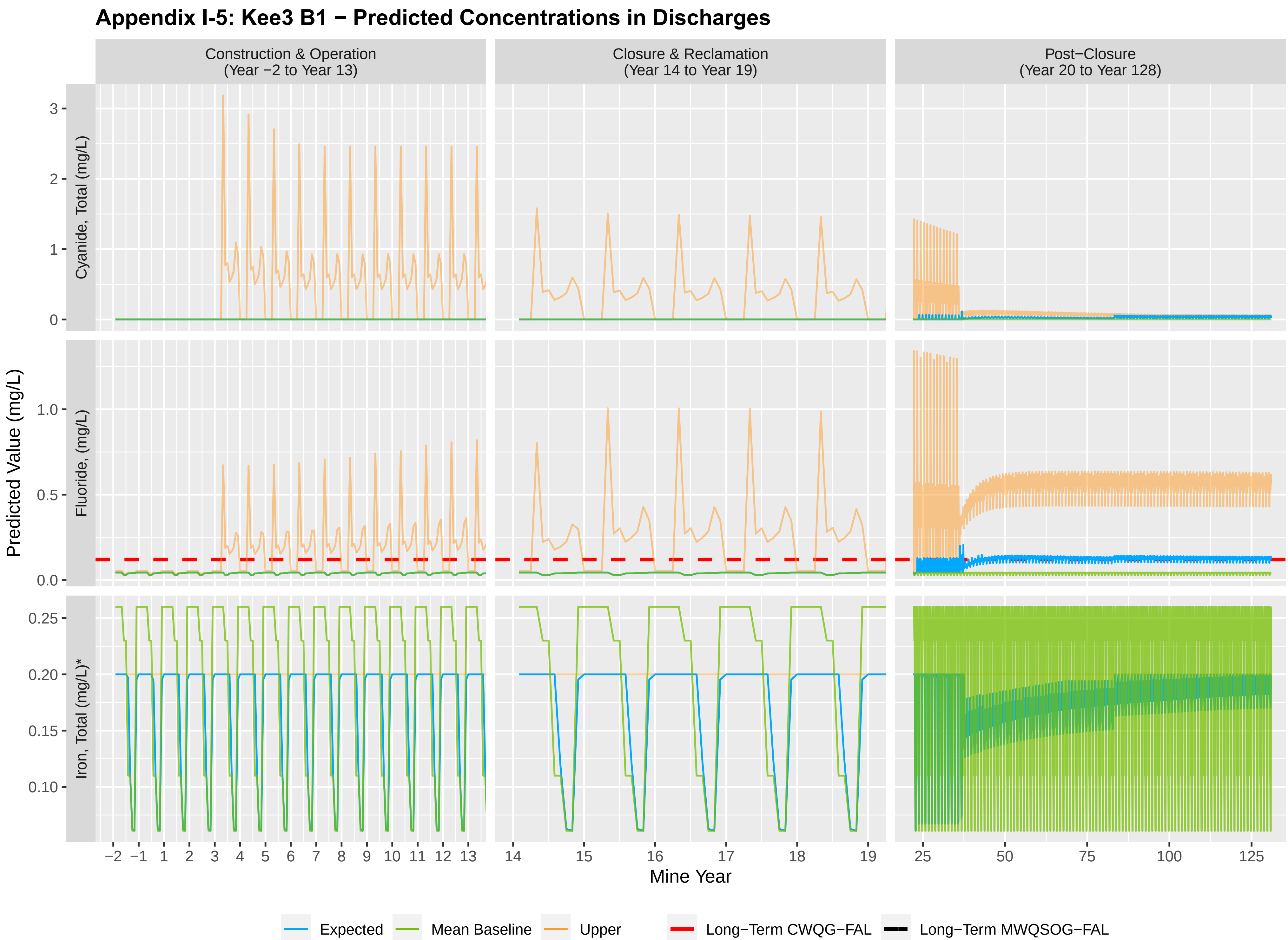

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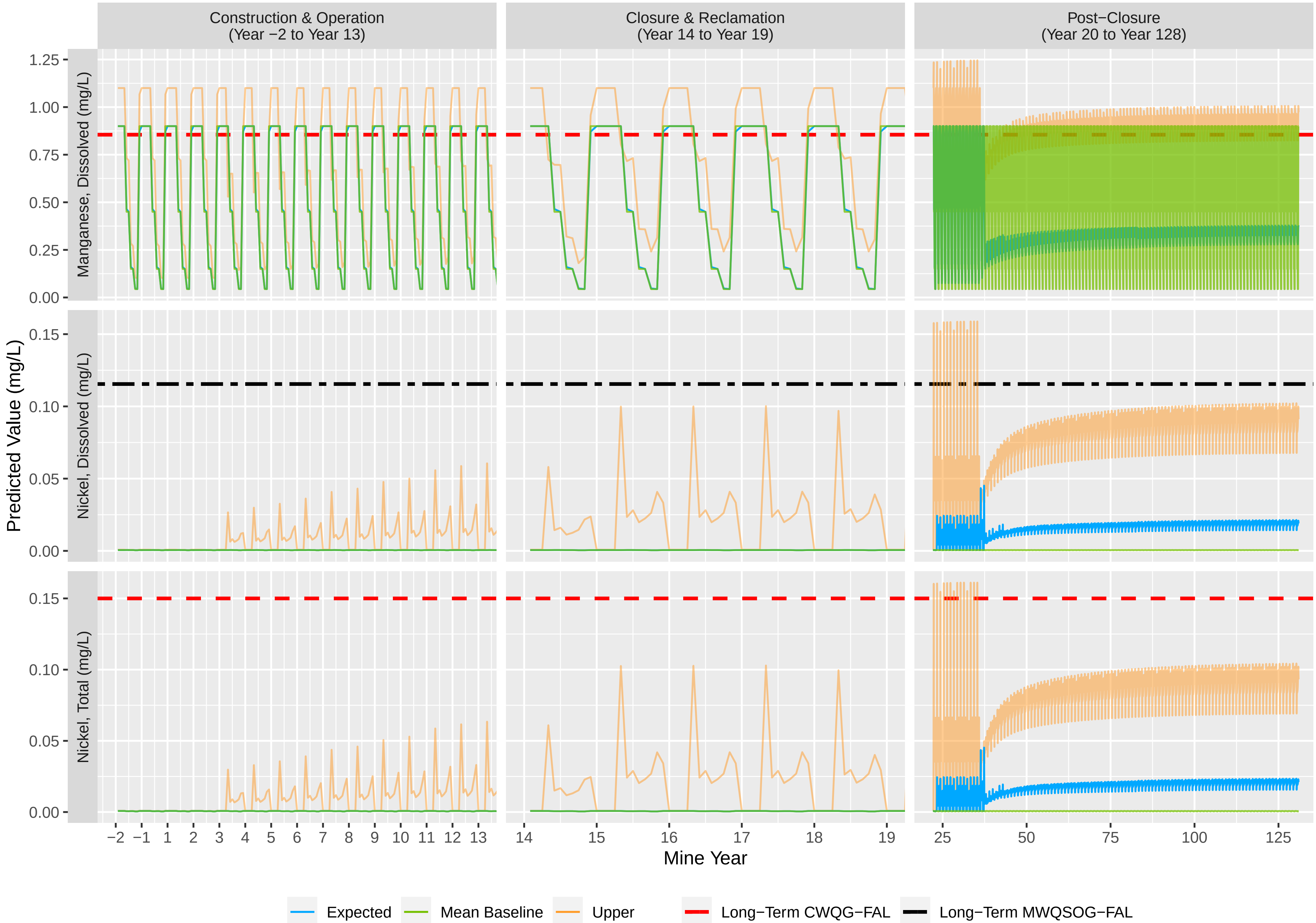
Appendix I-5: Kee3 B1 − Predicted Concentrations in Discharges



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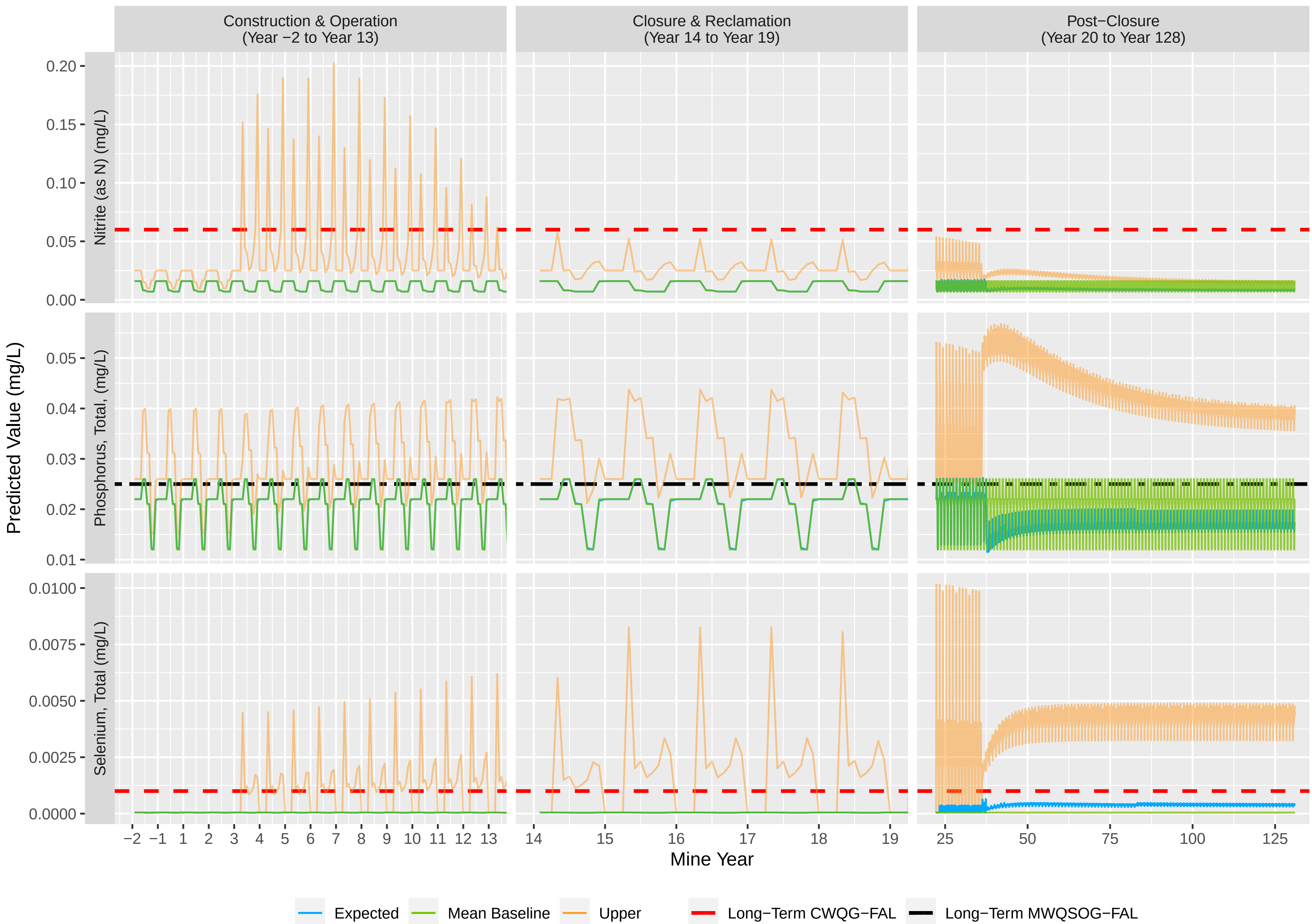
Appendix I-5: Kee3 B1 − Predicted Concentrations in Discharges



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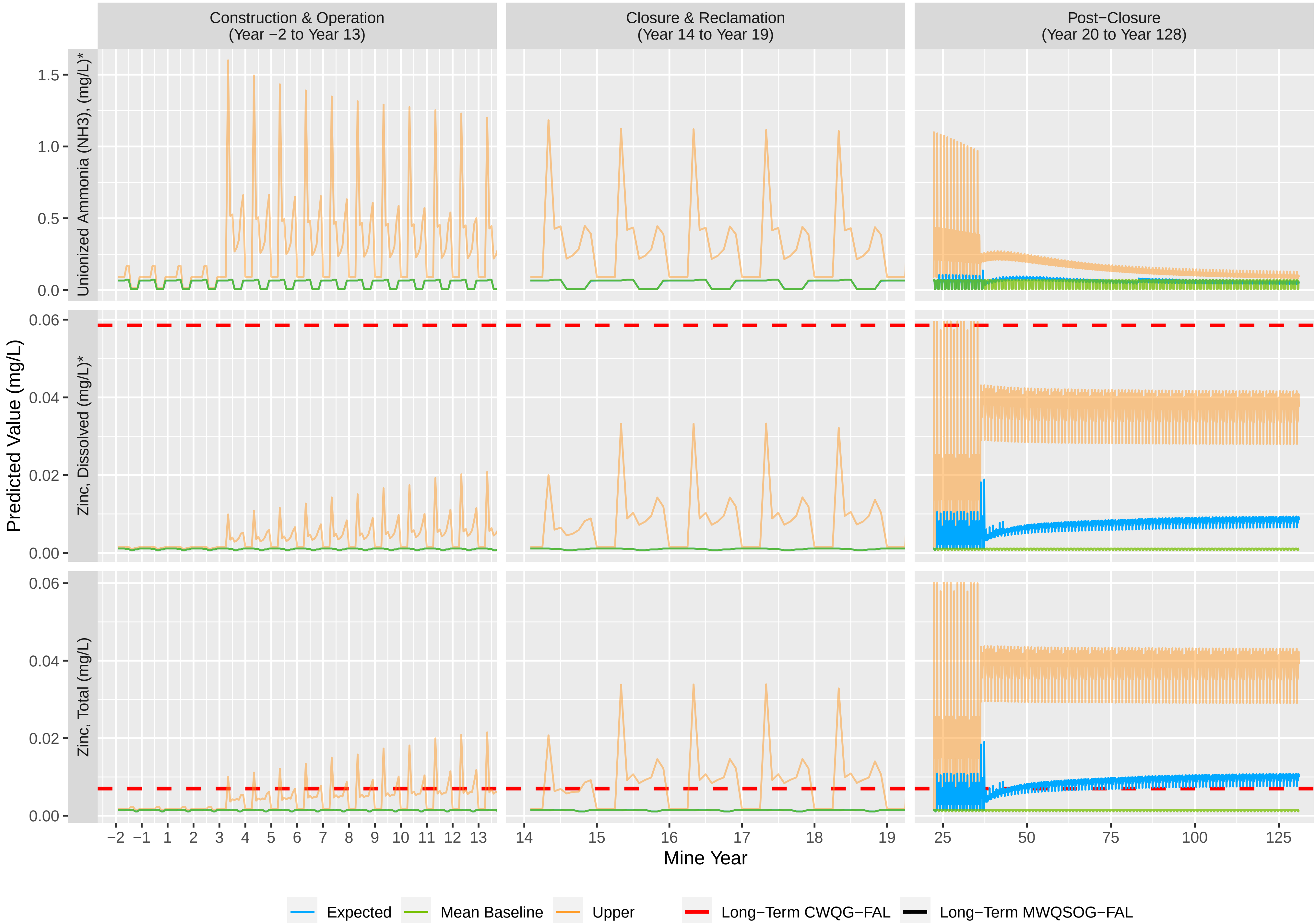
Appendix I-5: Kee3 B1 − Predicted Concentrations in Discharges



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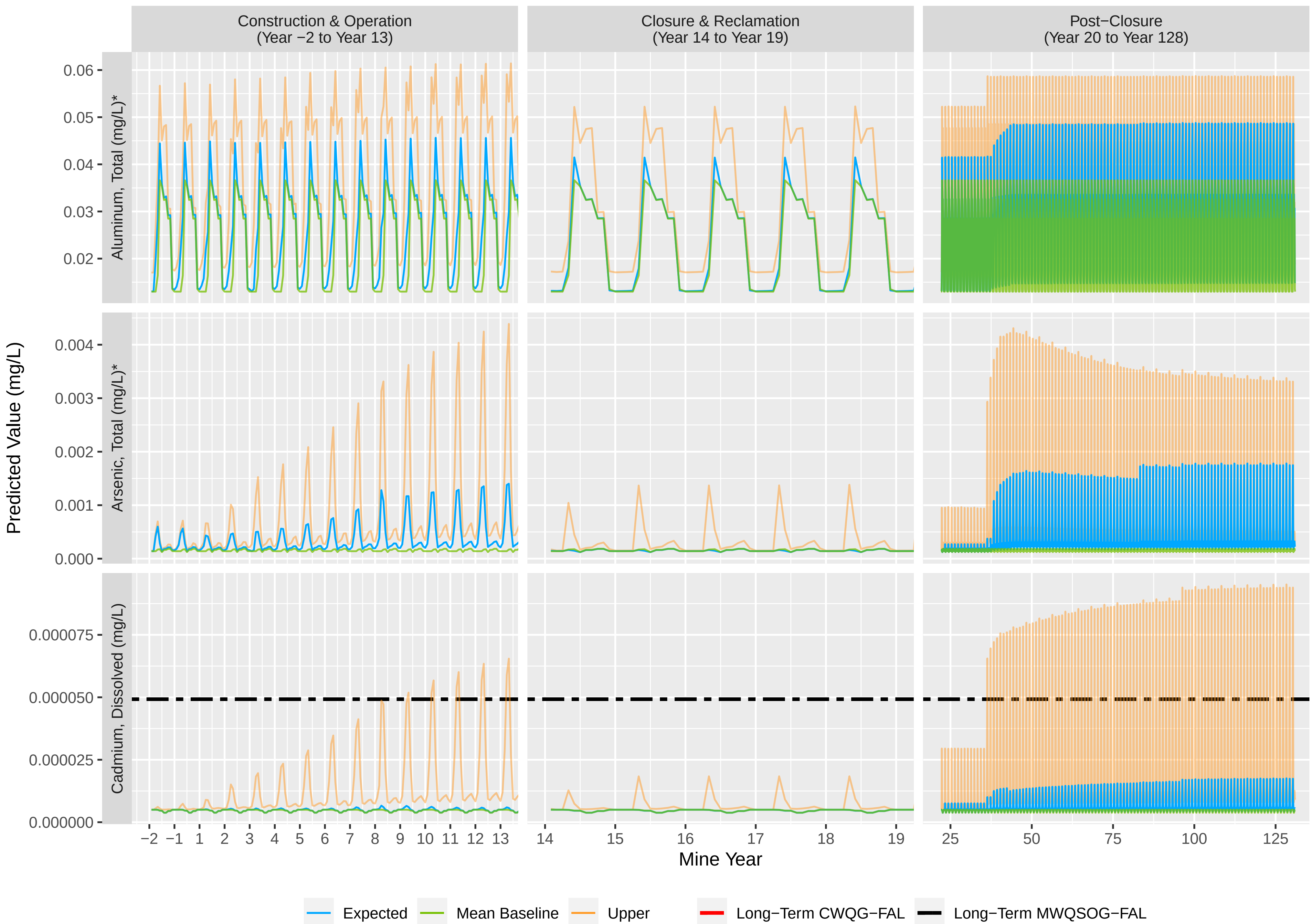
Appendix I-6: QM06 − Predicted Concentrations in Discharges



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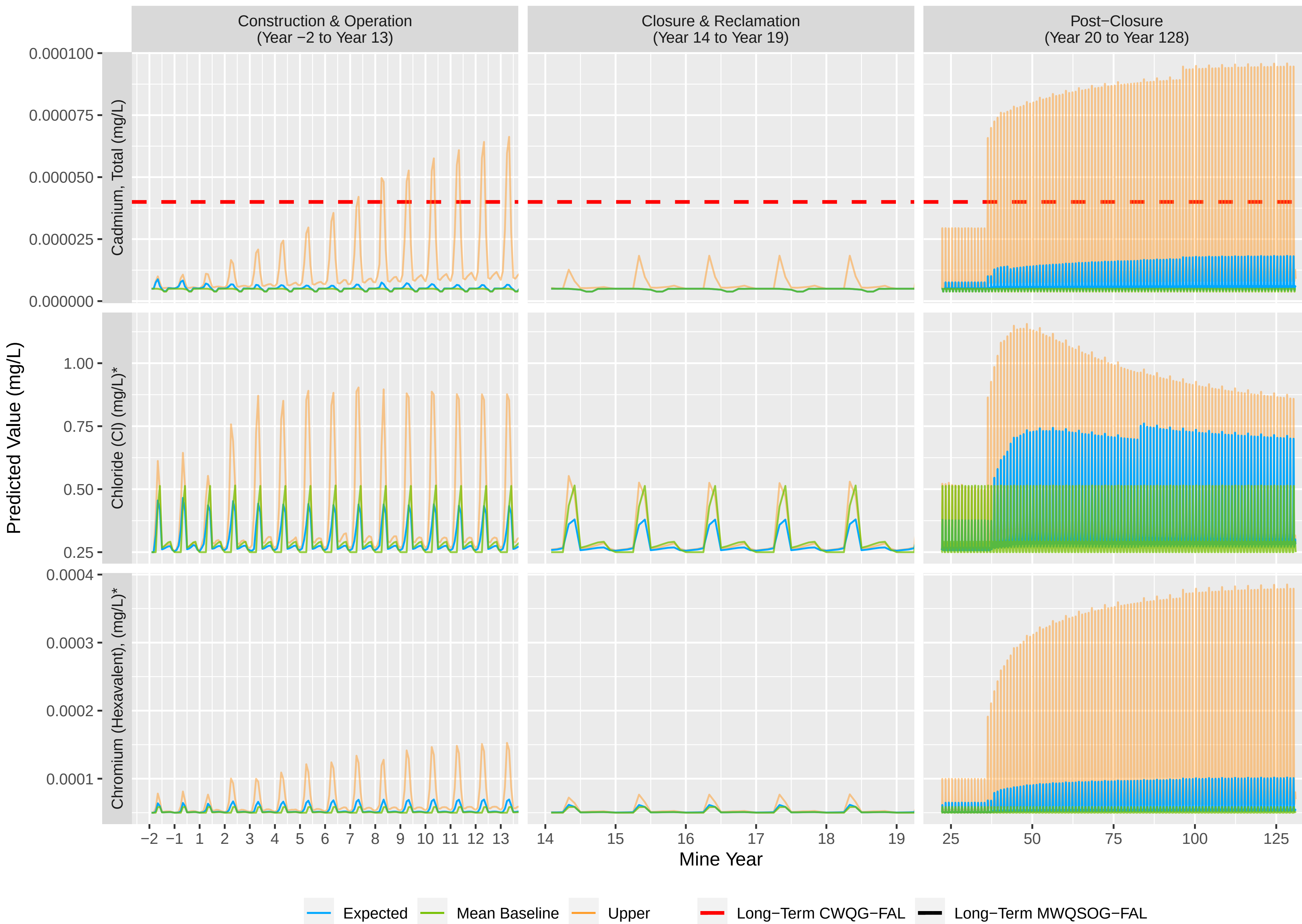
Appendix I-6: QM06 − Predicted Concentrations in Discharges



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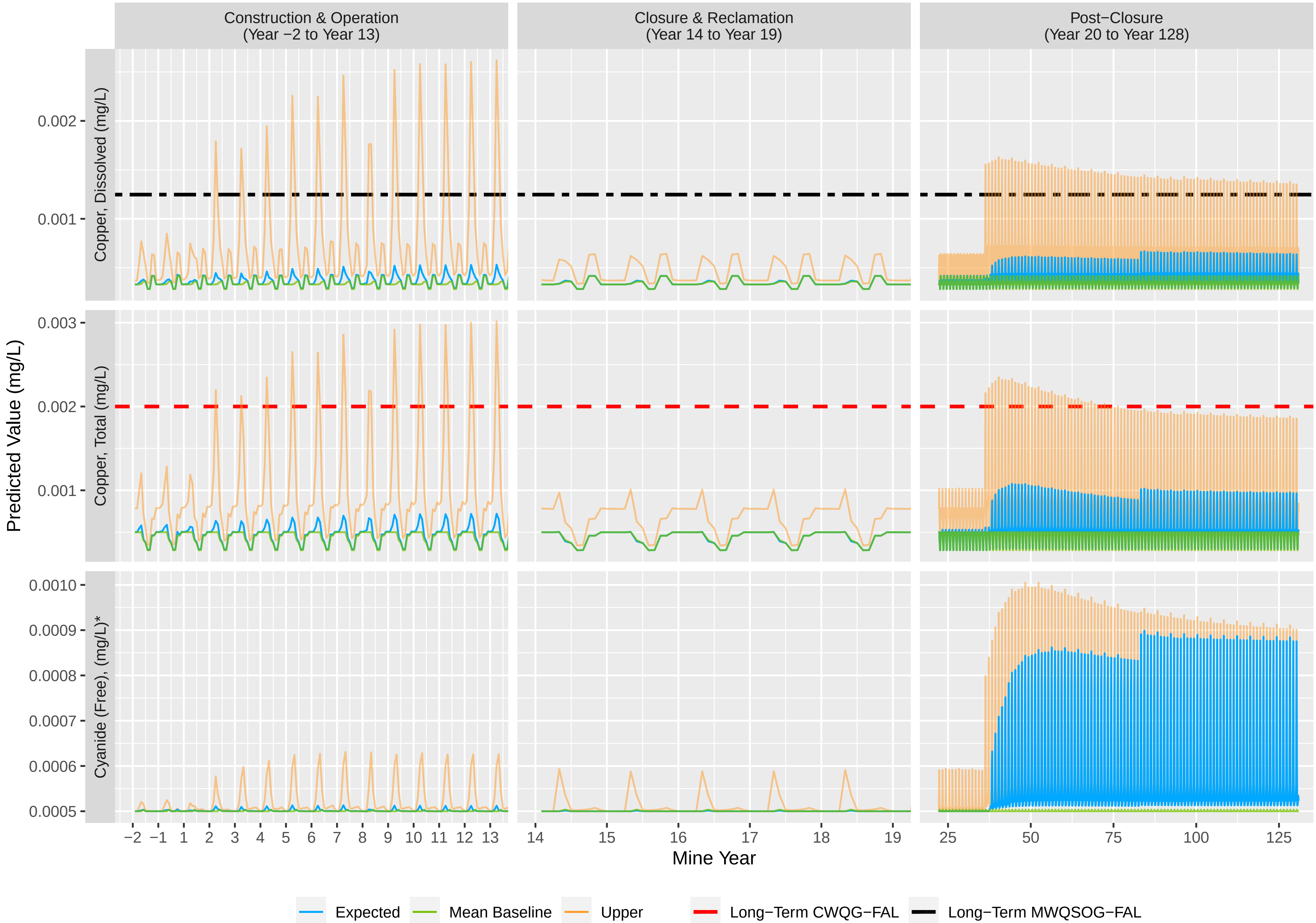
Appendix I-6: QM06 − Predicted Concentrations in Discharges



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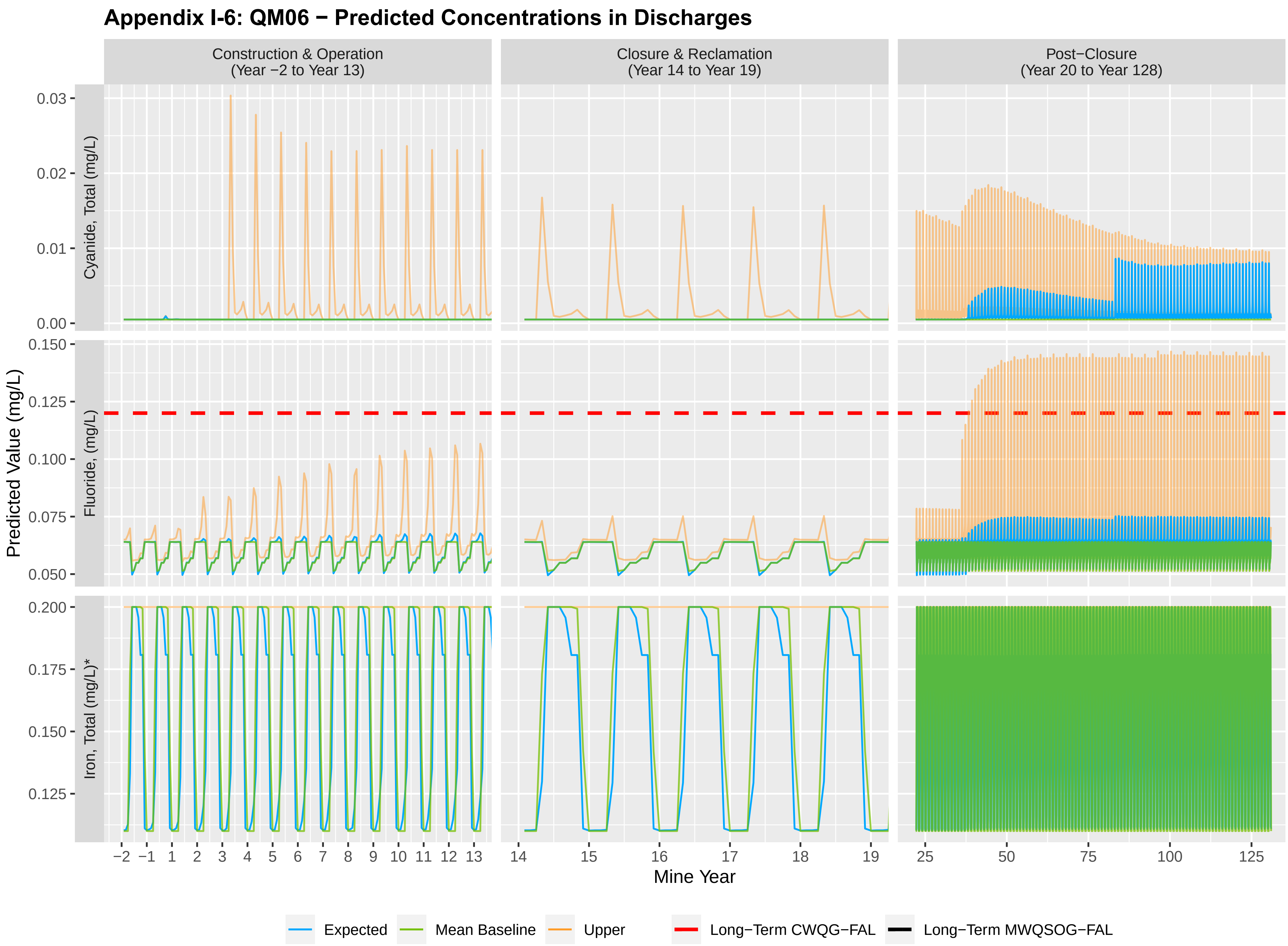

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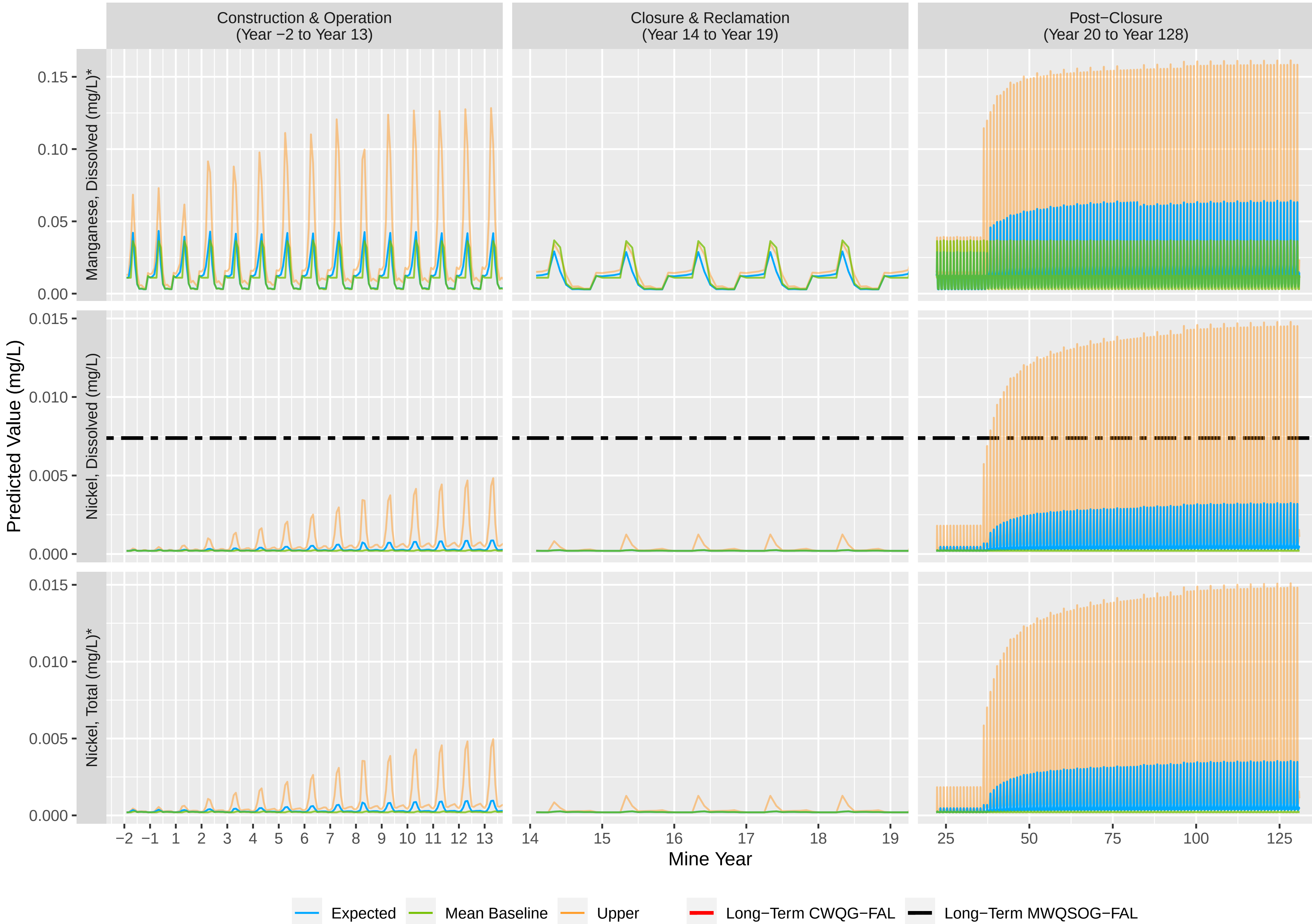

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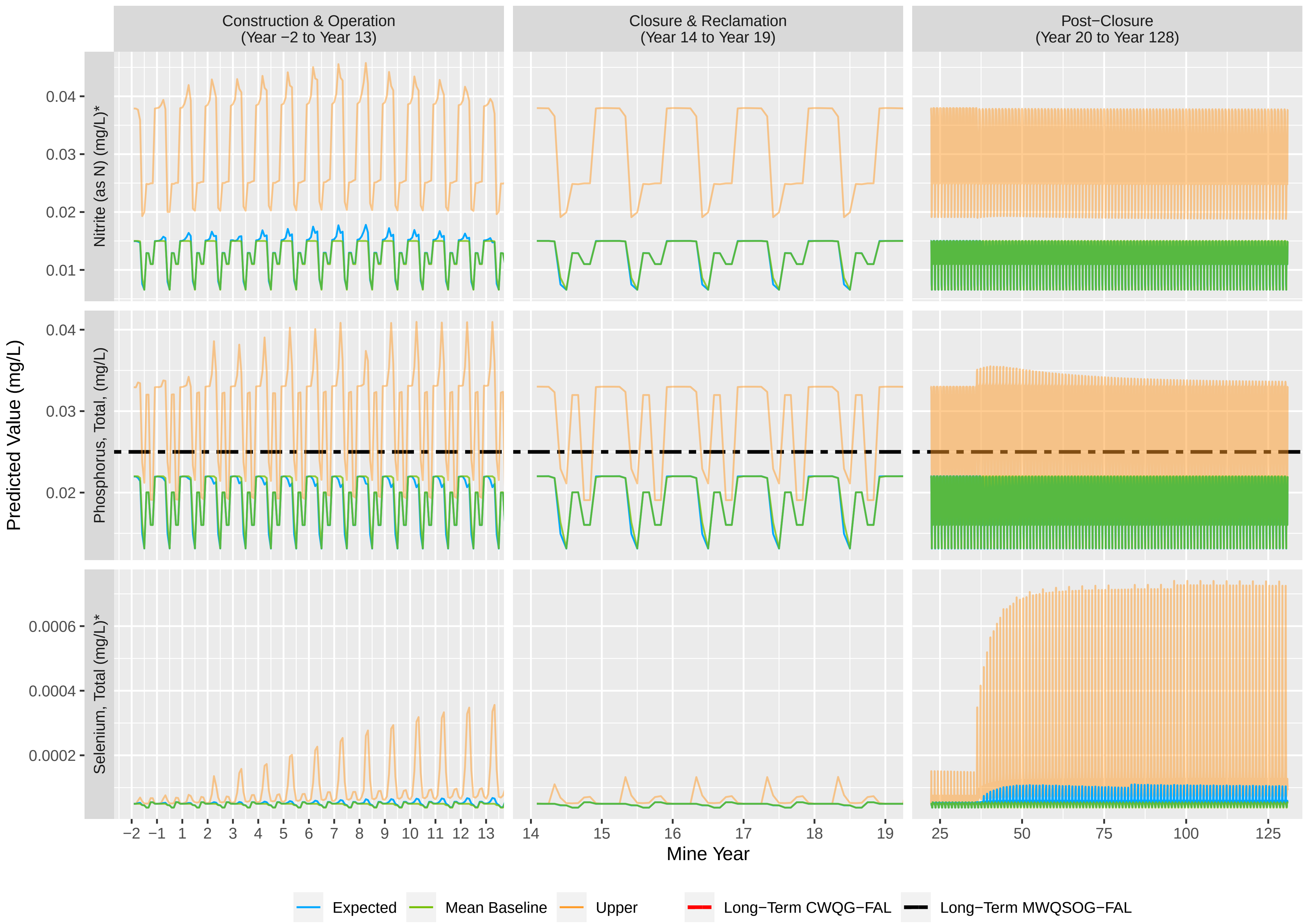
Appendix I-6: QM06 − Predicted Concentrations in Discharges



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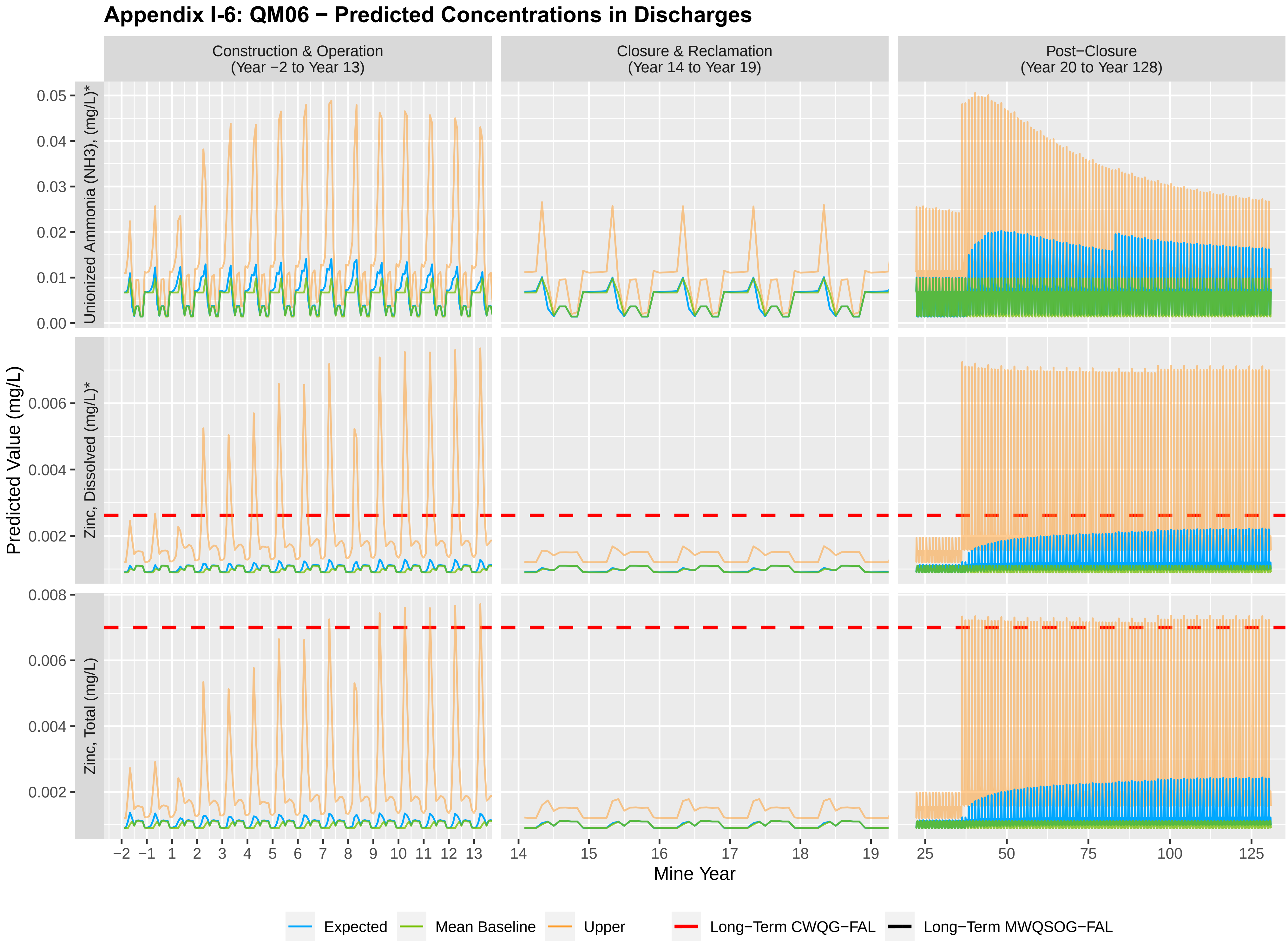
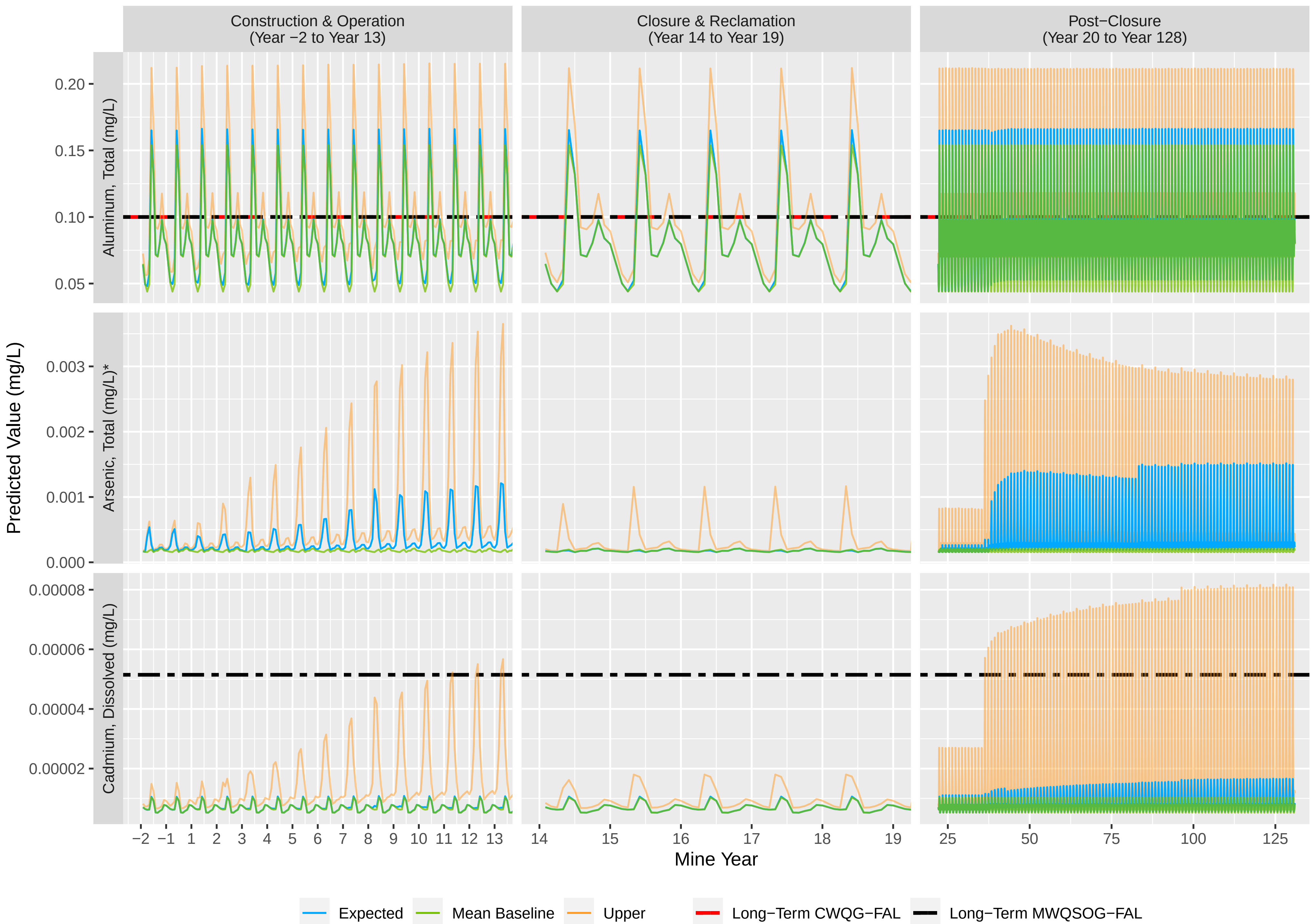


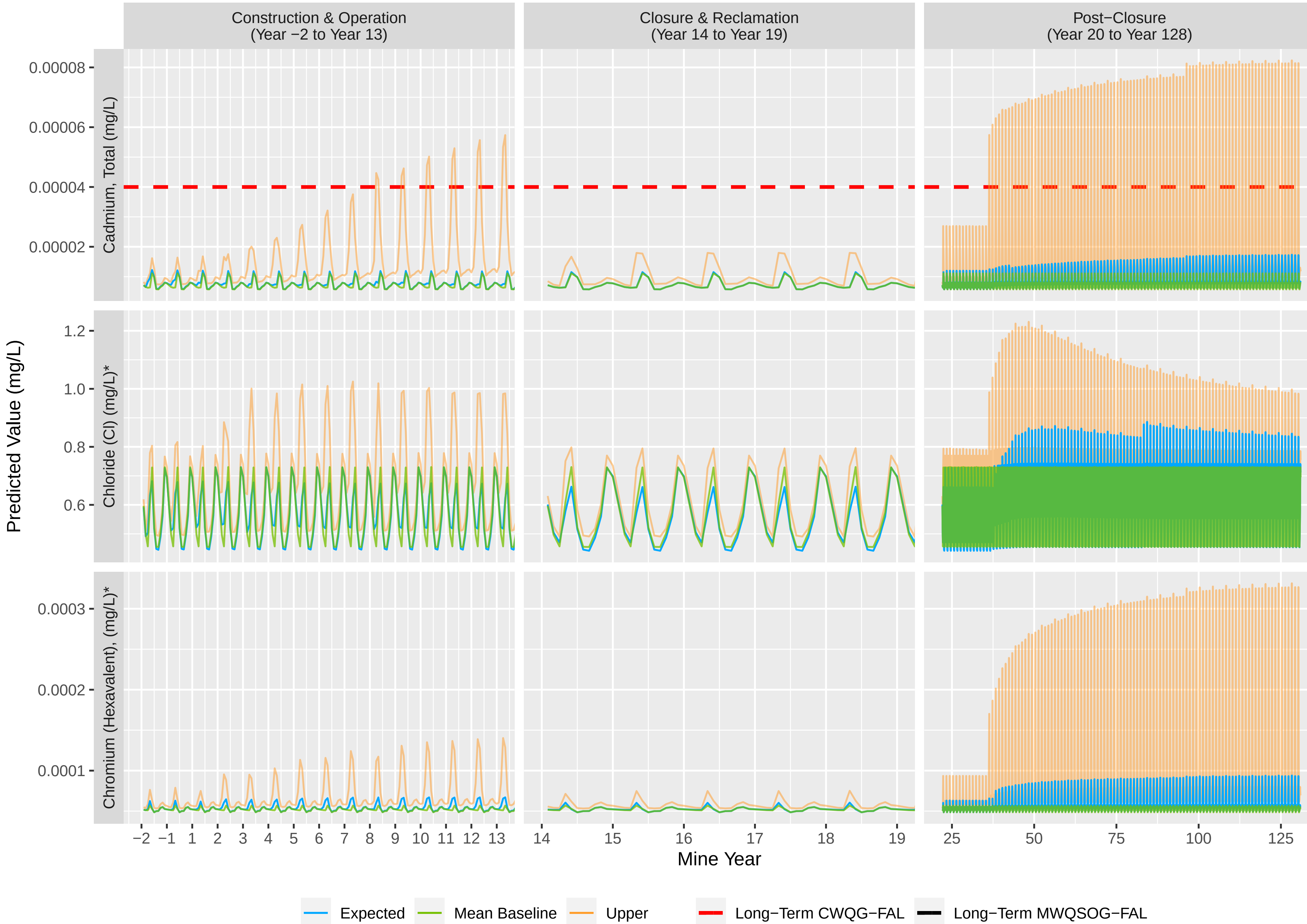
*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-7: QM05 − Predicted Concentrations in Discharges



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-7: QM05 − Predicted Concentrations in Discharges



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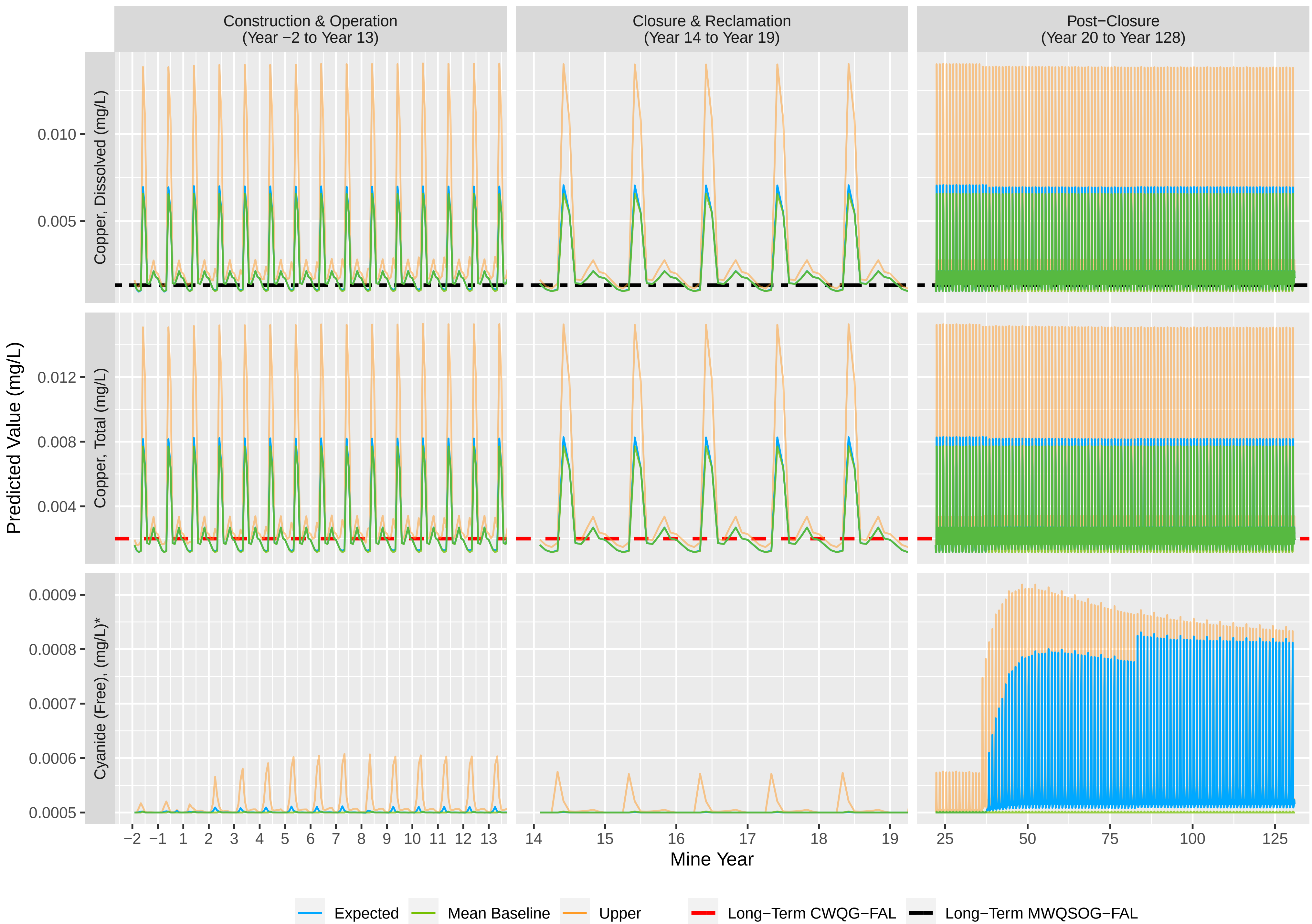
Appendix I-7: QM05 − Predicted Concentrations in Discharges



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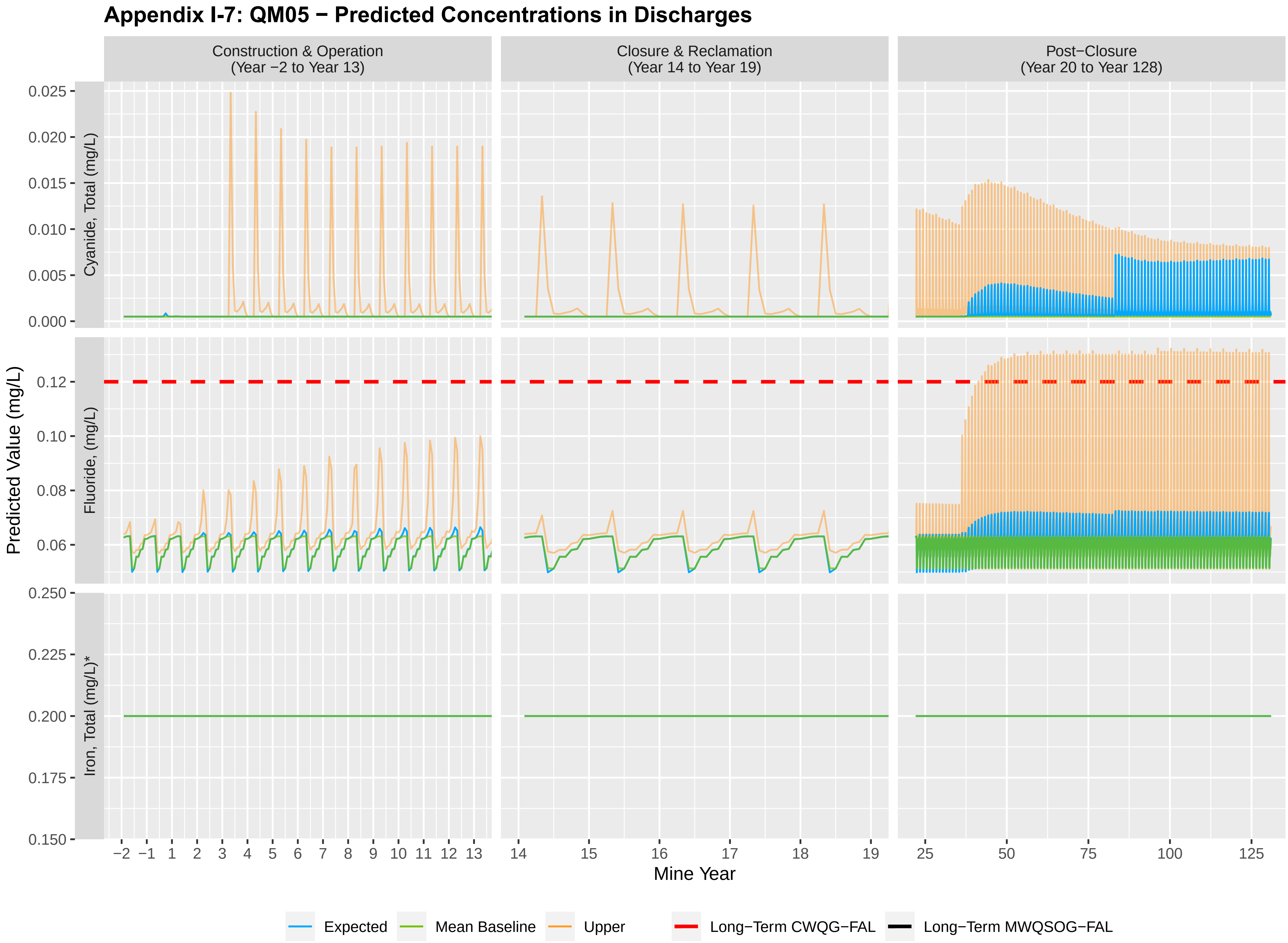

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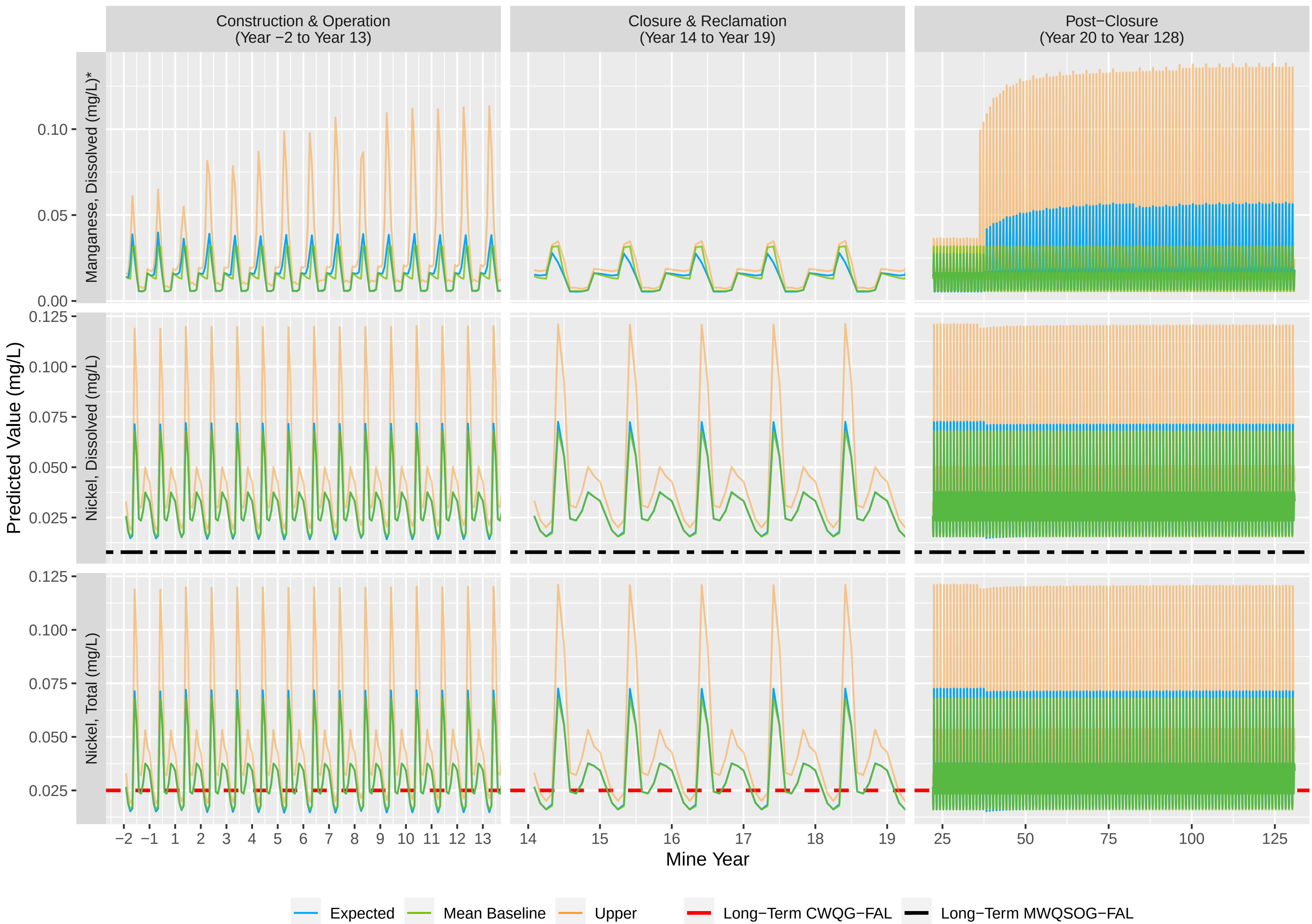

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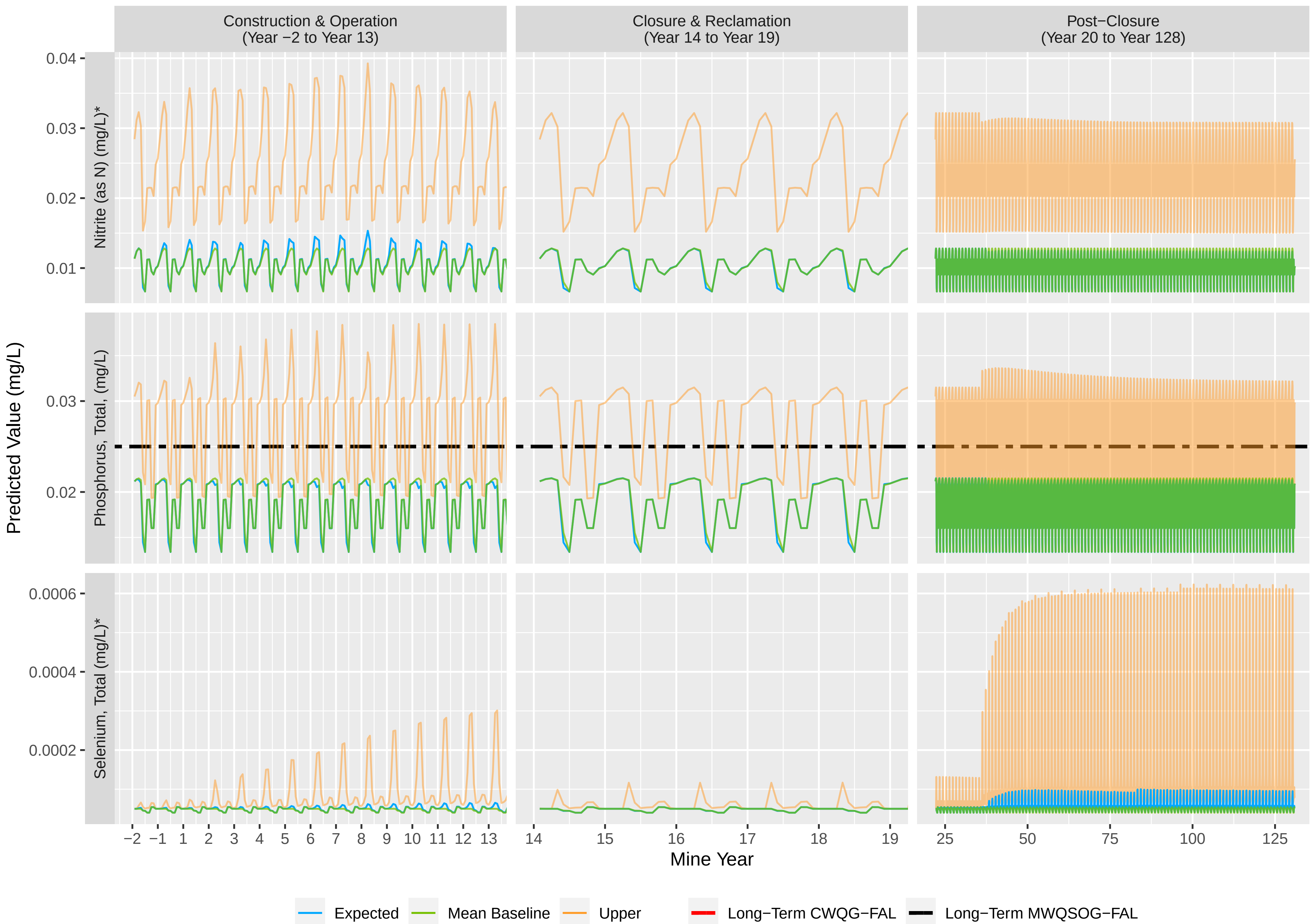

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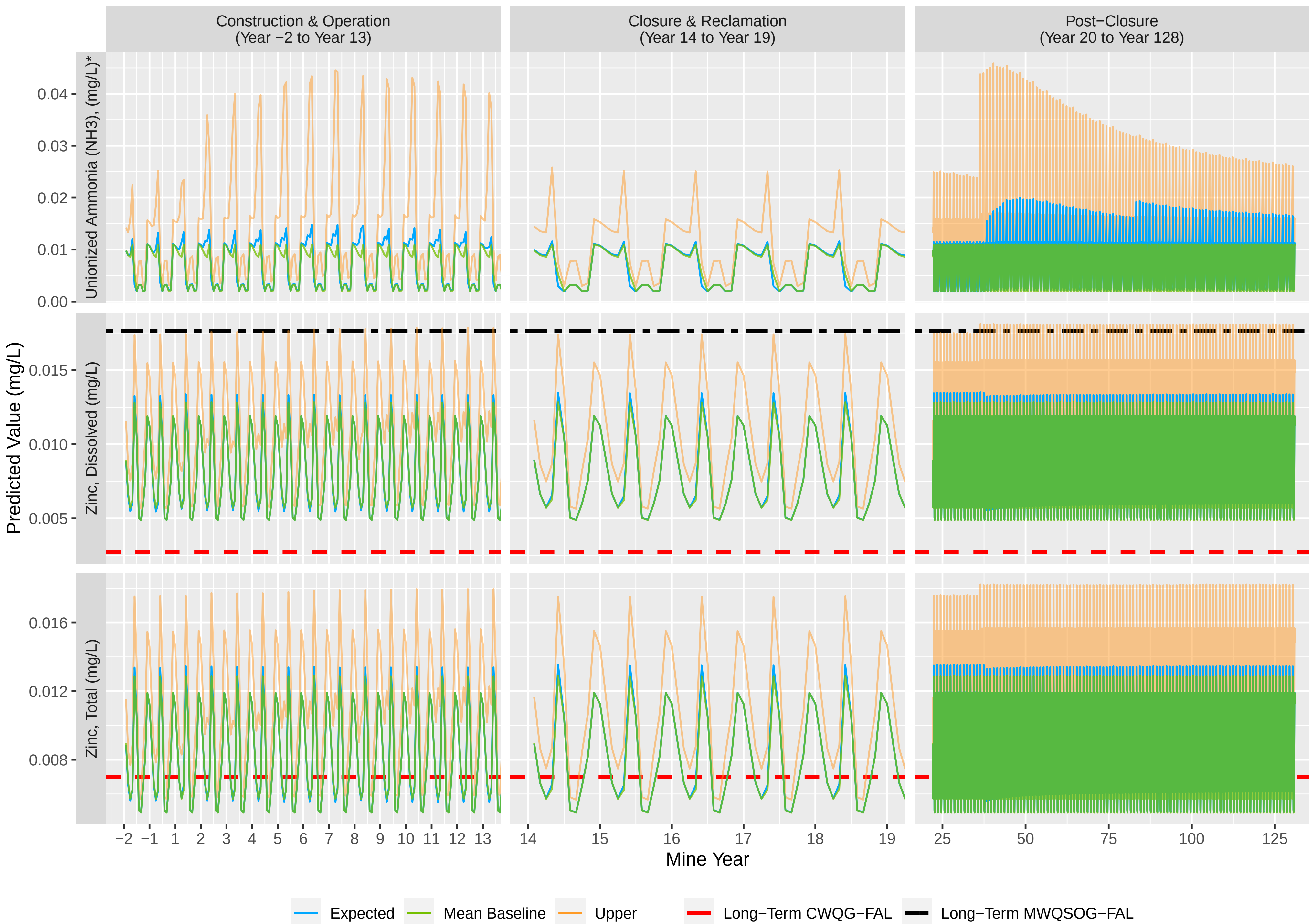
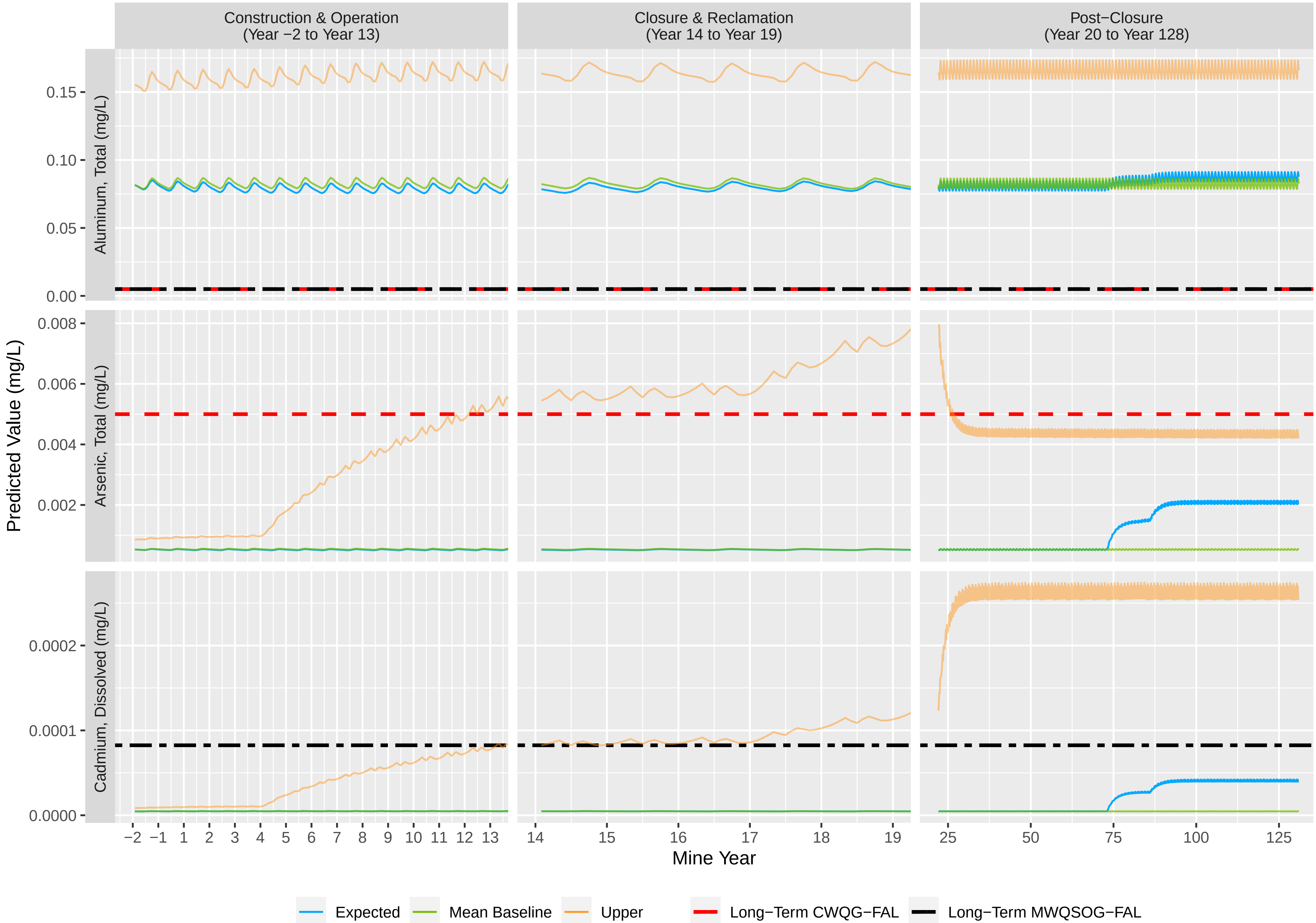
Appendix I-7: QM05 − Predicted Concentrations in Discharges



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-8: Minton Lake − Predicted Concentrations in Discharges



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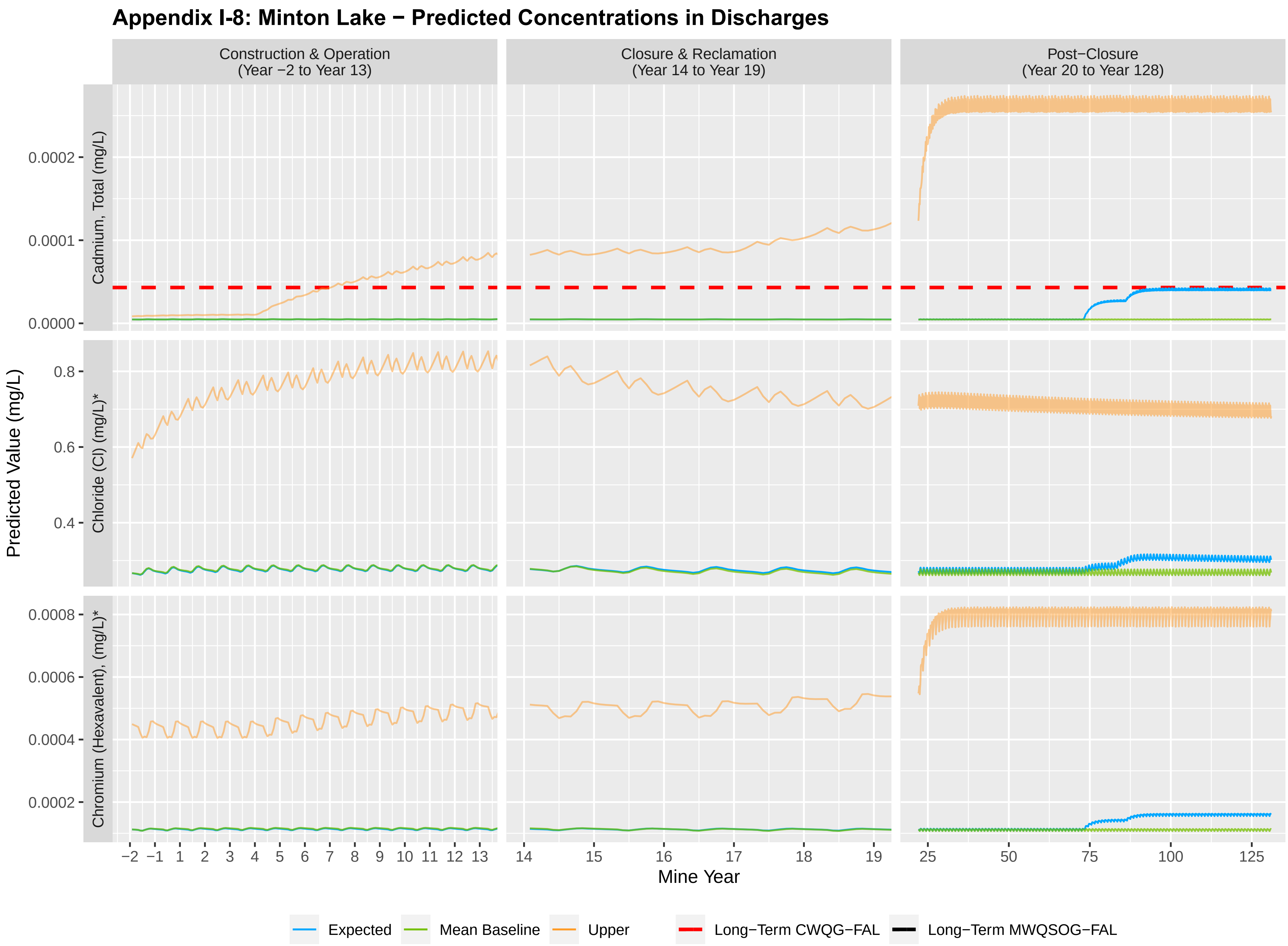

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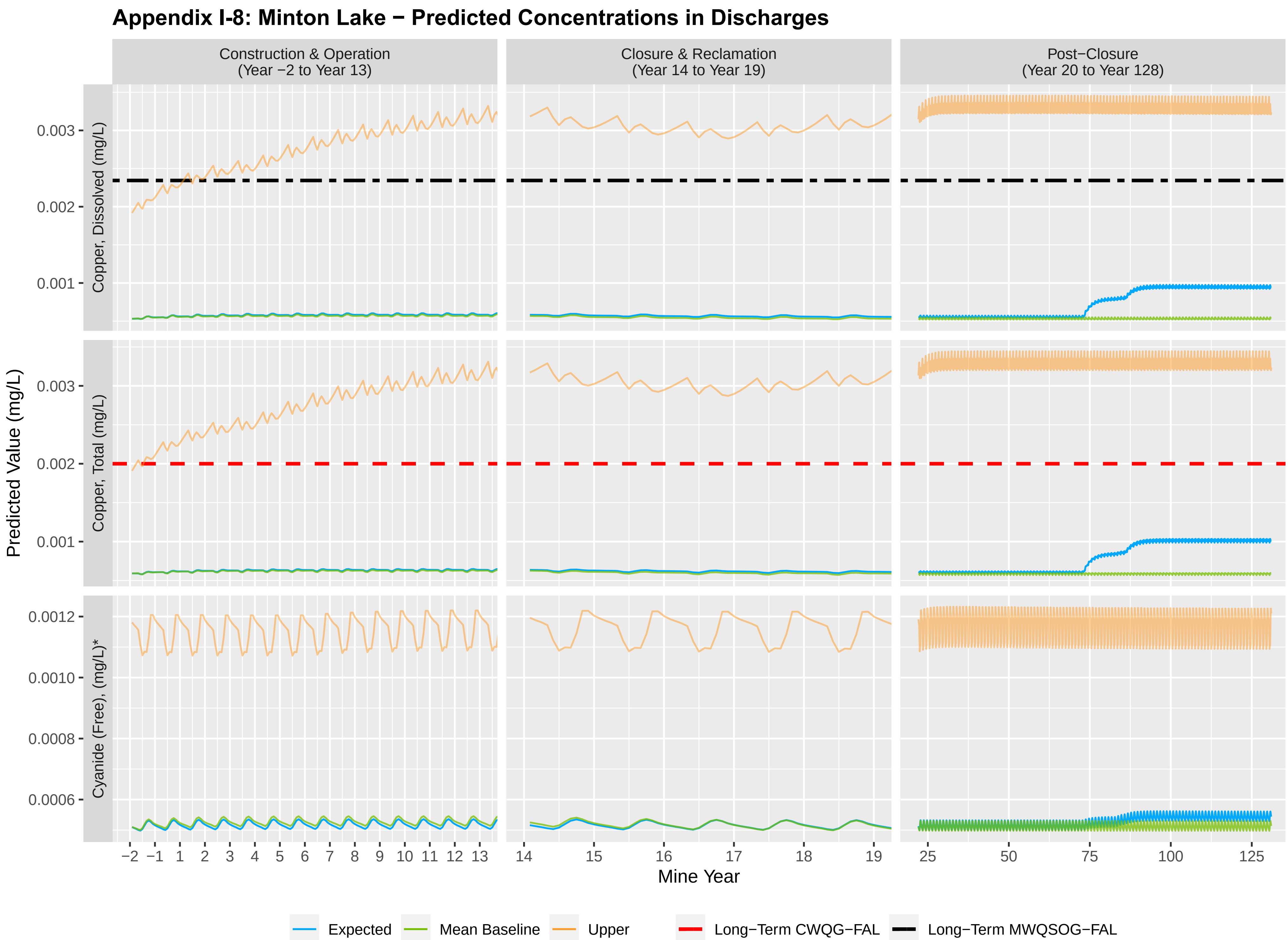
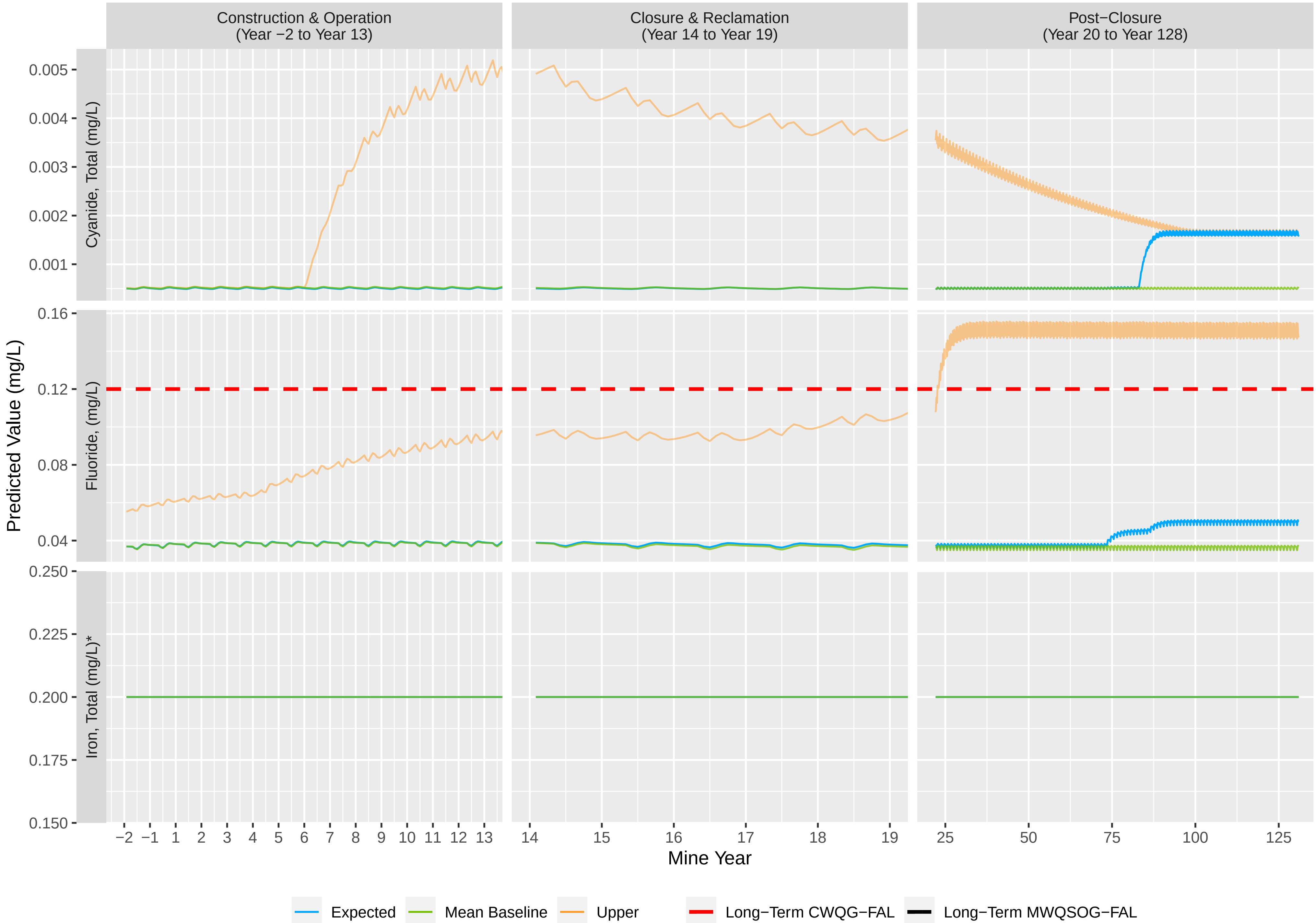


*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-8: Minton Lake − Predicted Concentrations in Discharges



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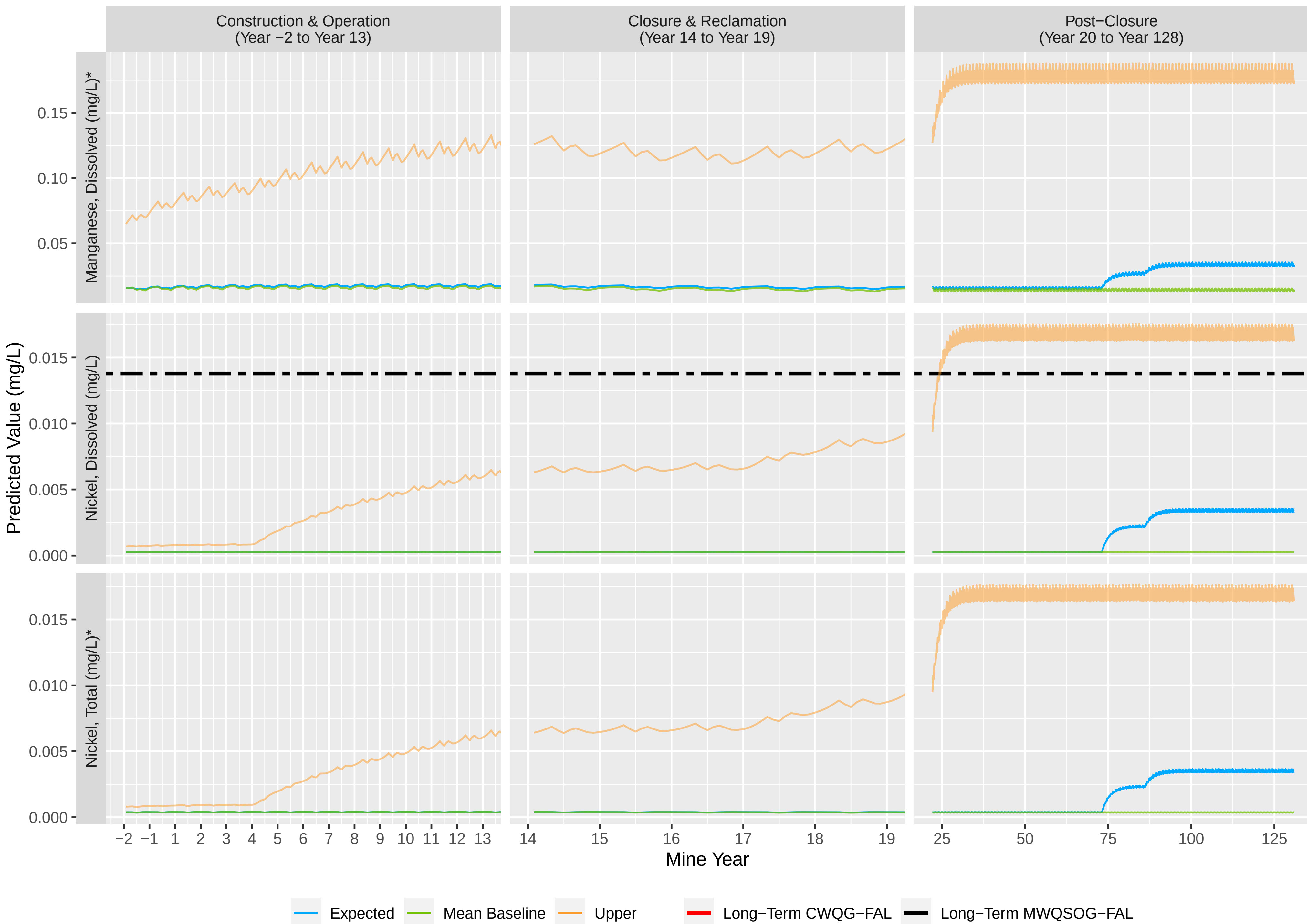
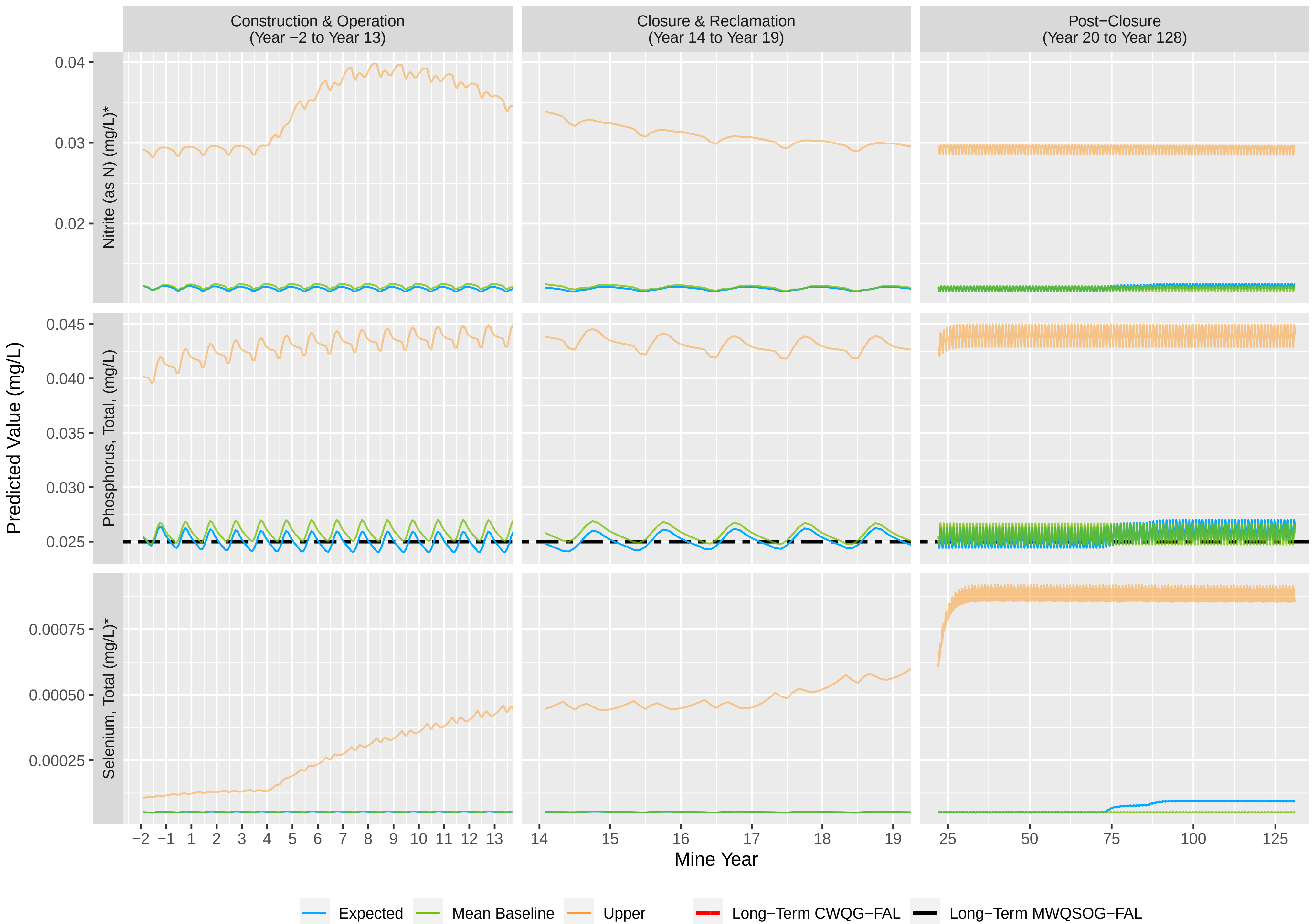
Appendix I-8: Minton Lake − Predicted Concentrations in Discharges



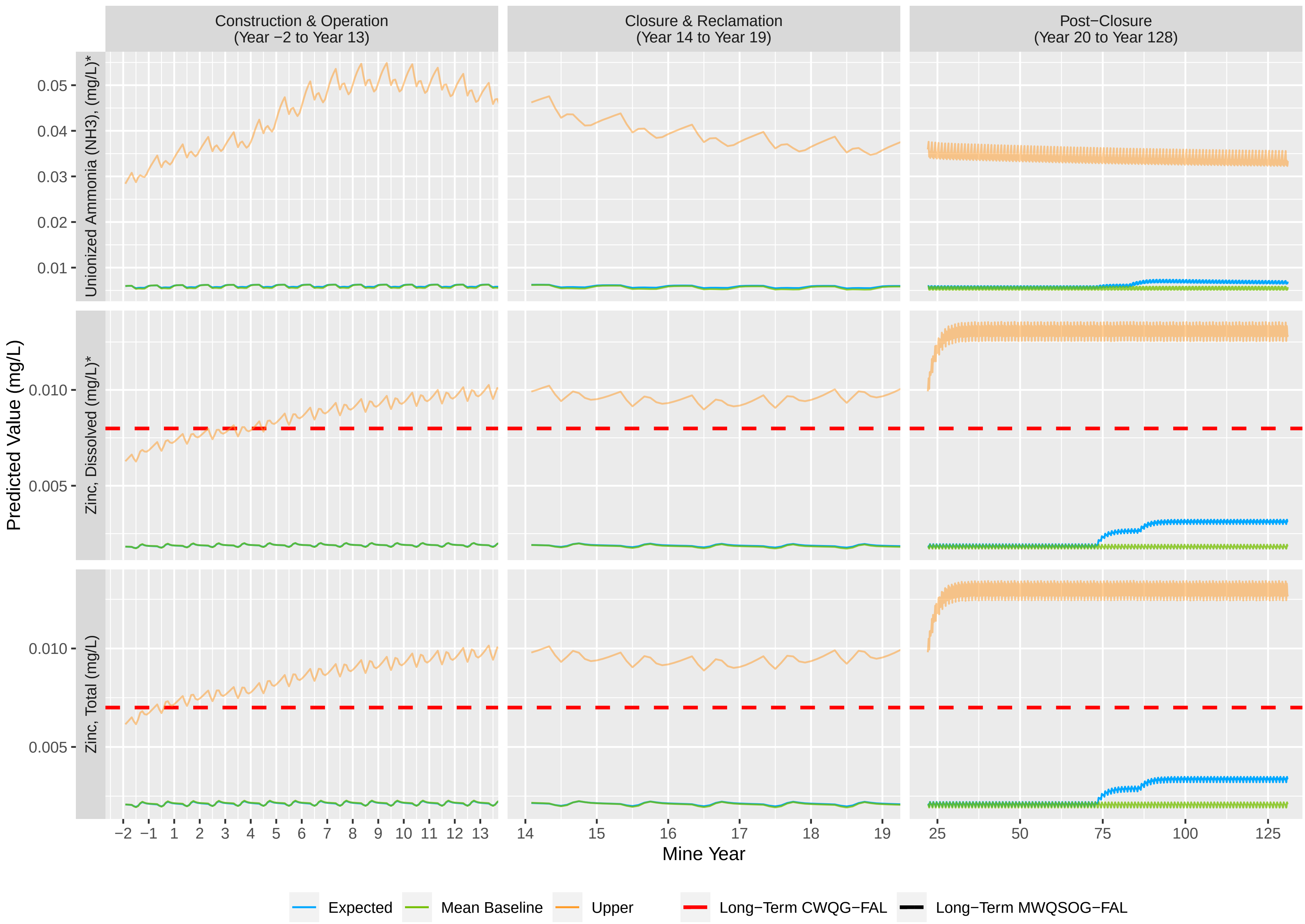
*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-8: Minton Lake − Predicted Concentrations in Discharges



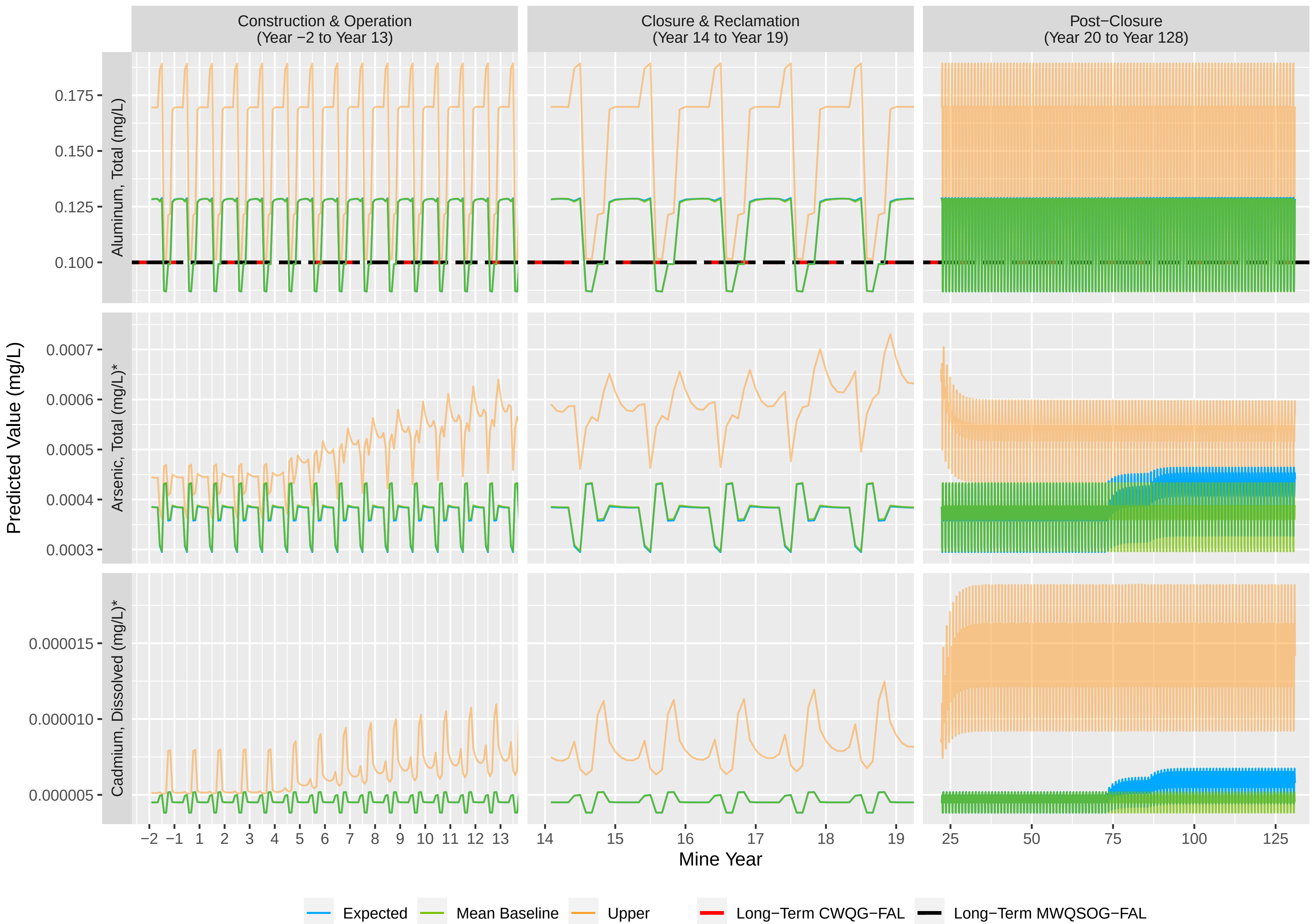
*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-8: Minton Lake − Predicted Concentrations in Discharges



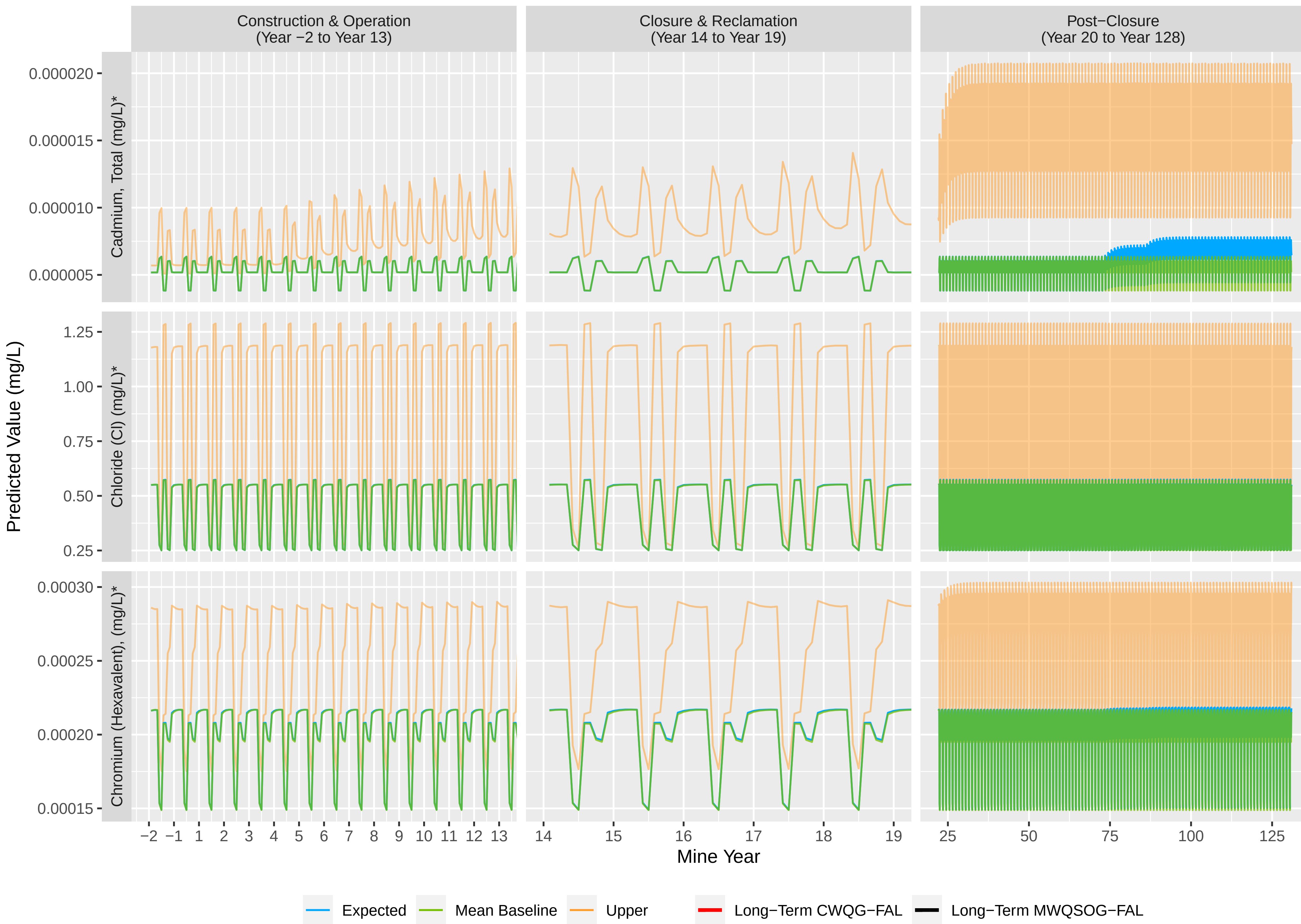
*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-9: QM10 − Predicted Concentrations in Discharges



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

Appendix I-9: QM10 − Predicted Concentrations in Discharges



*Water quality guidelines not shown if >20 percent above maximum value. Calculated guidelines are plotted at the median value for the parameter.

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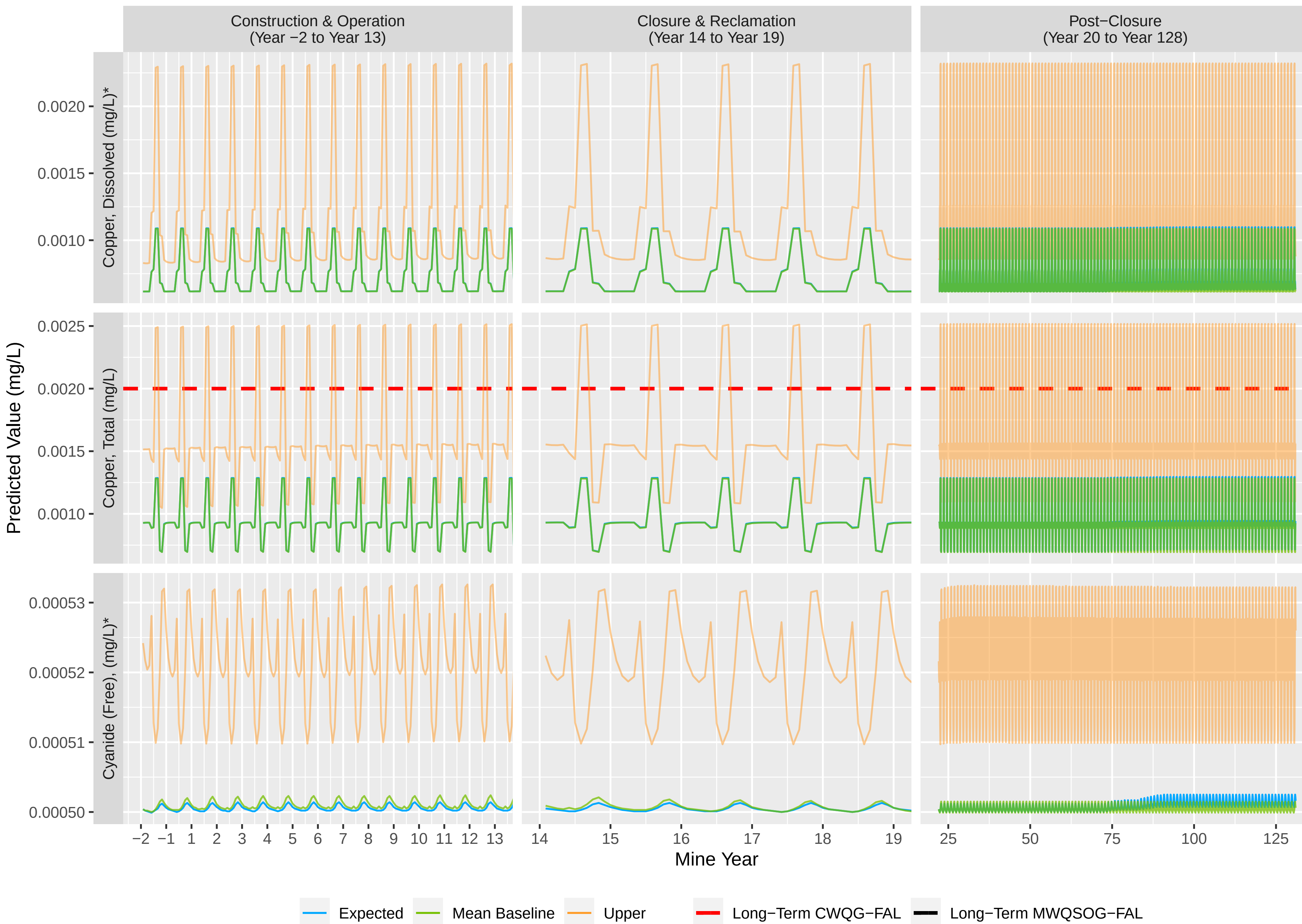

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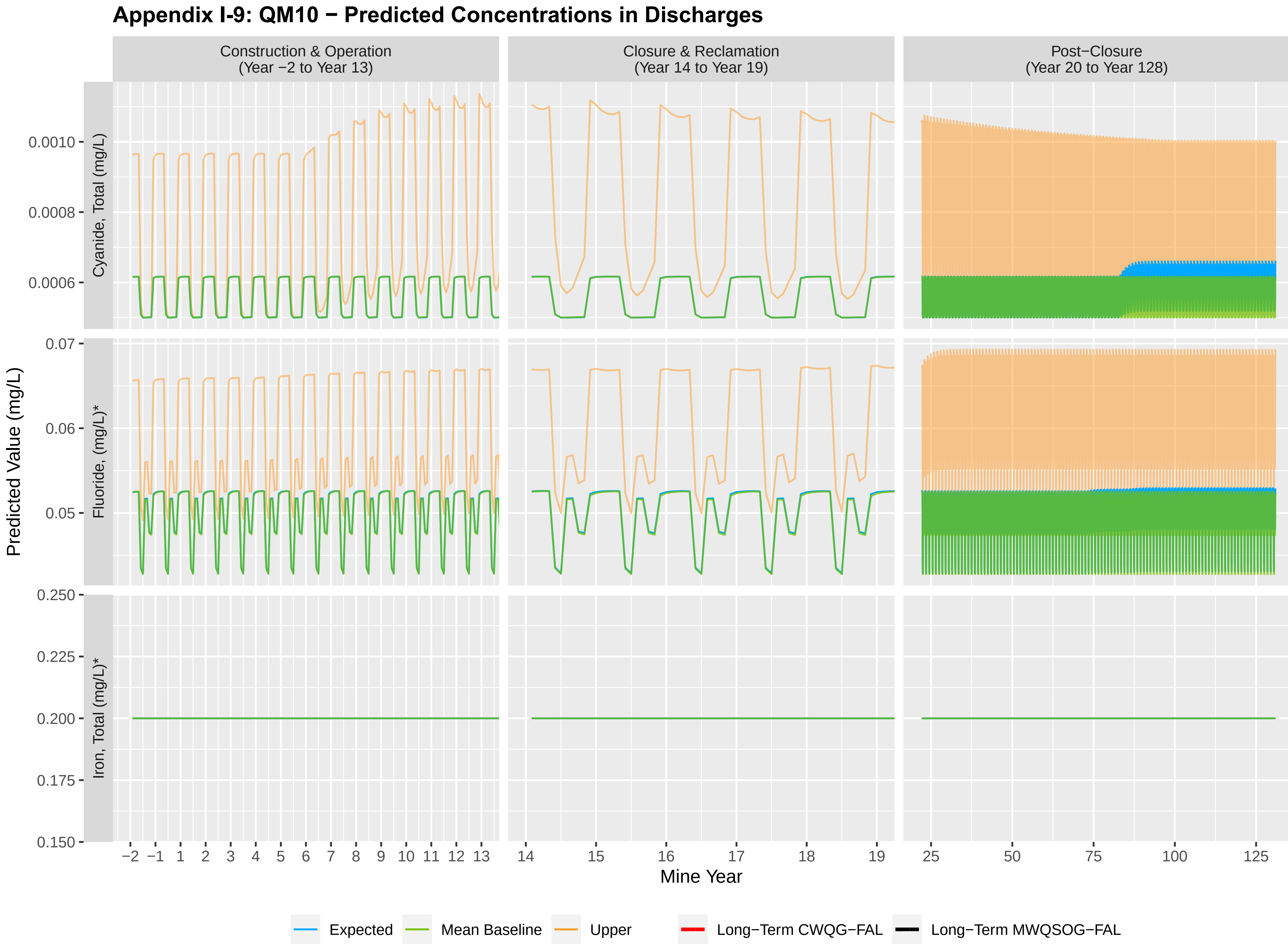

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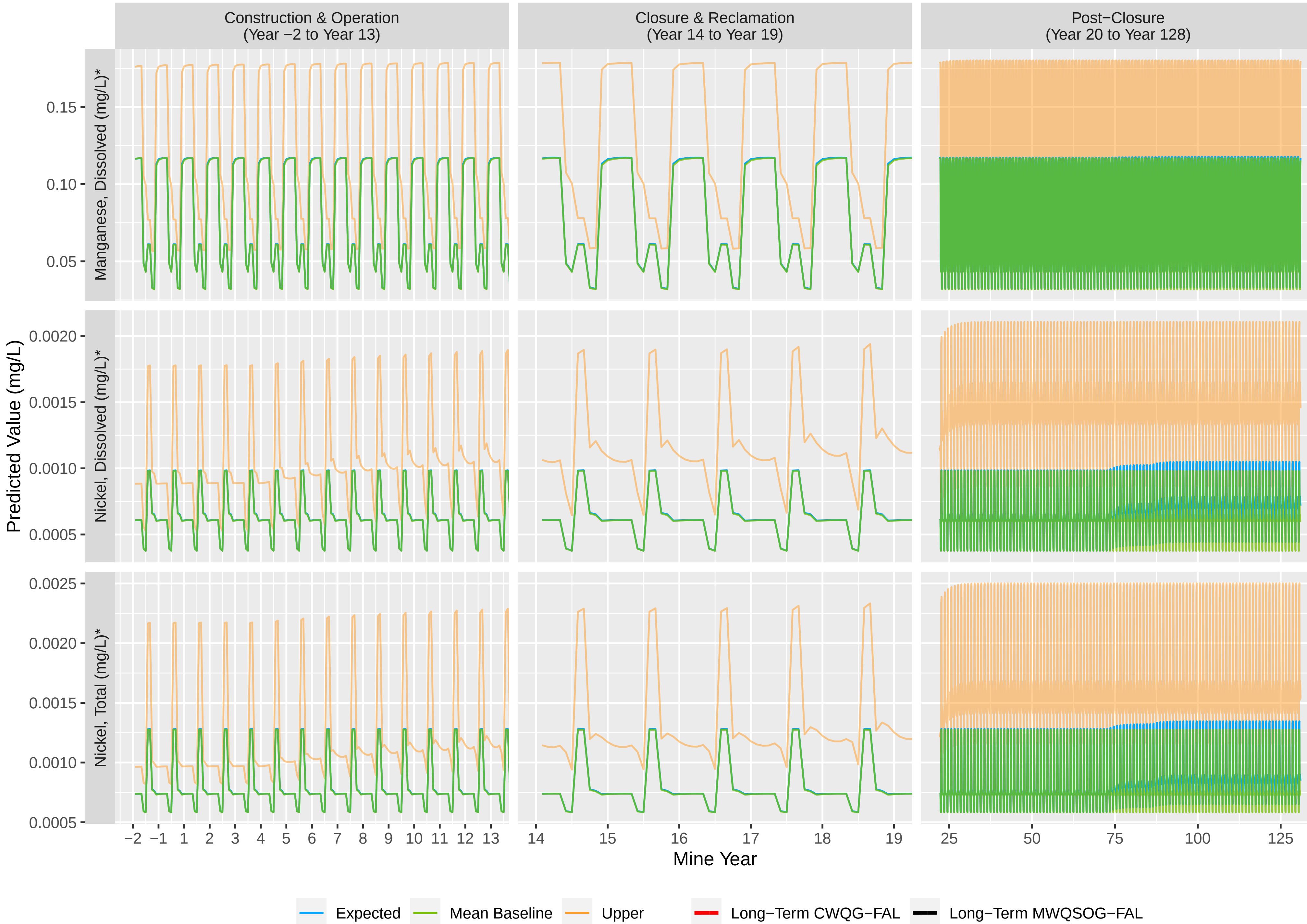

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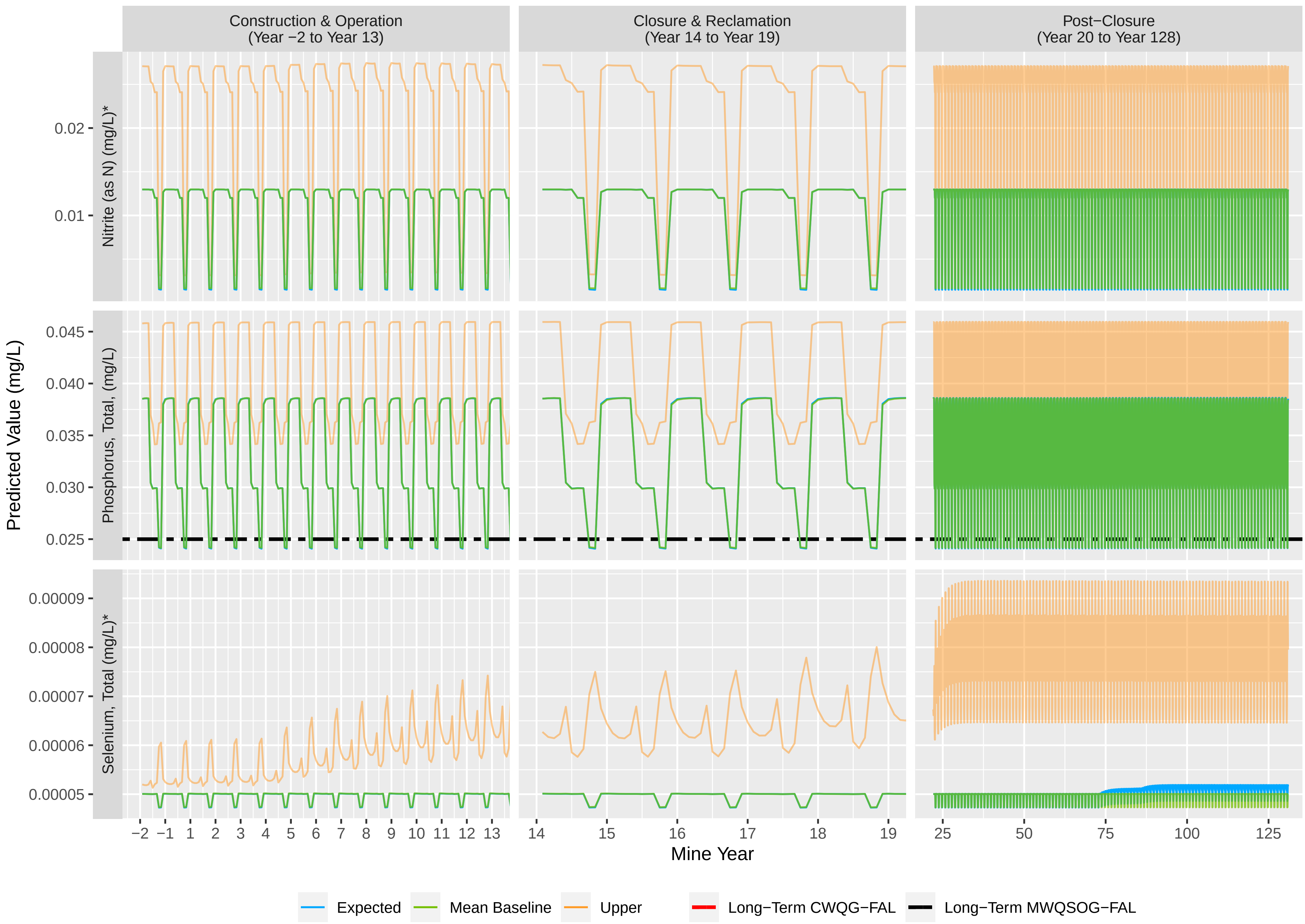

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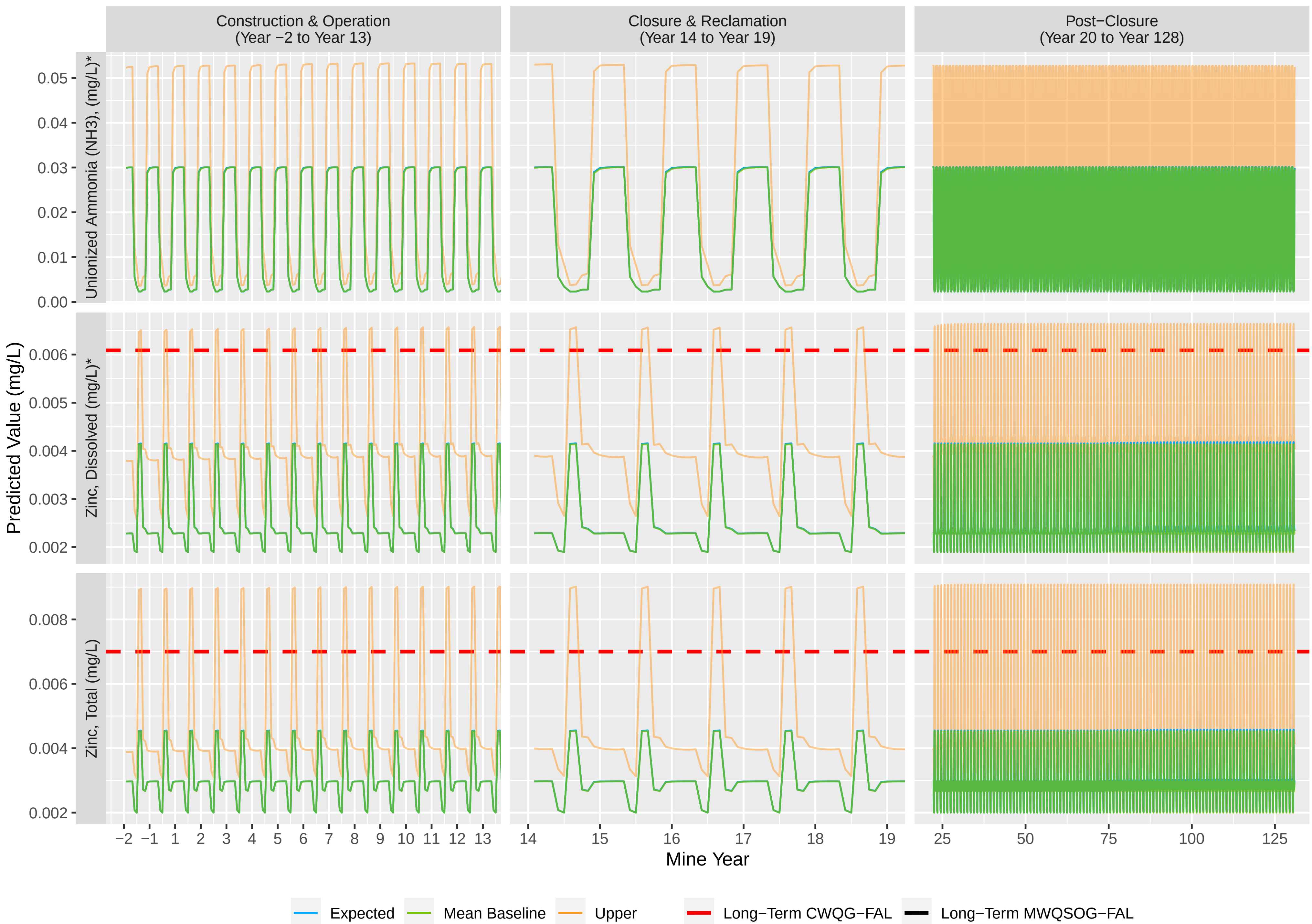

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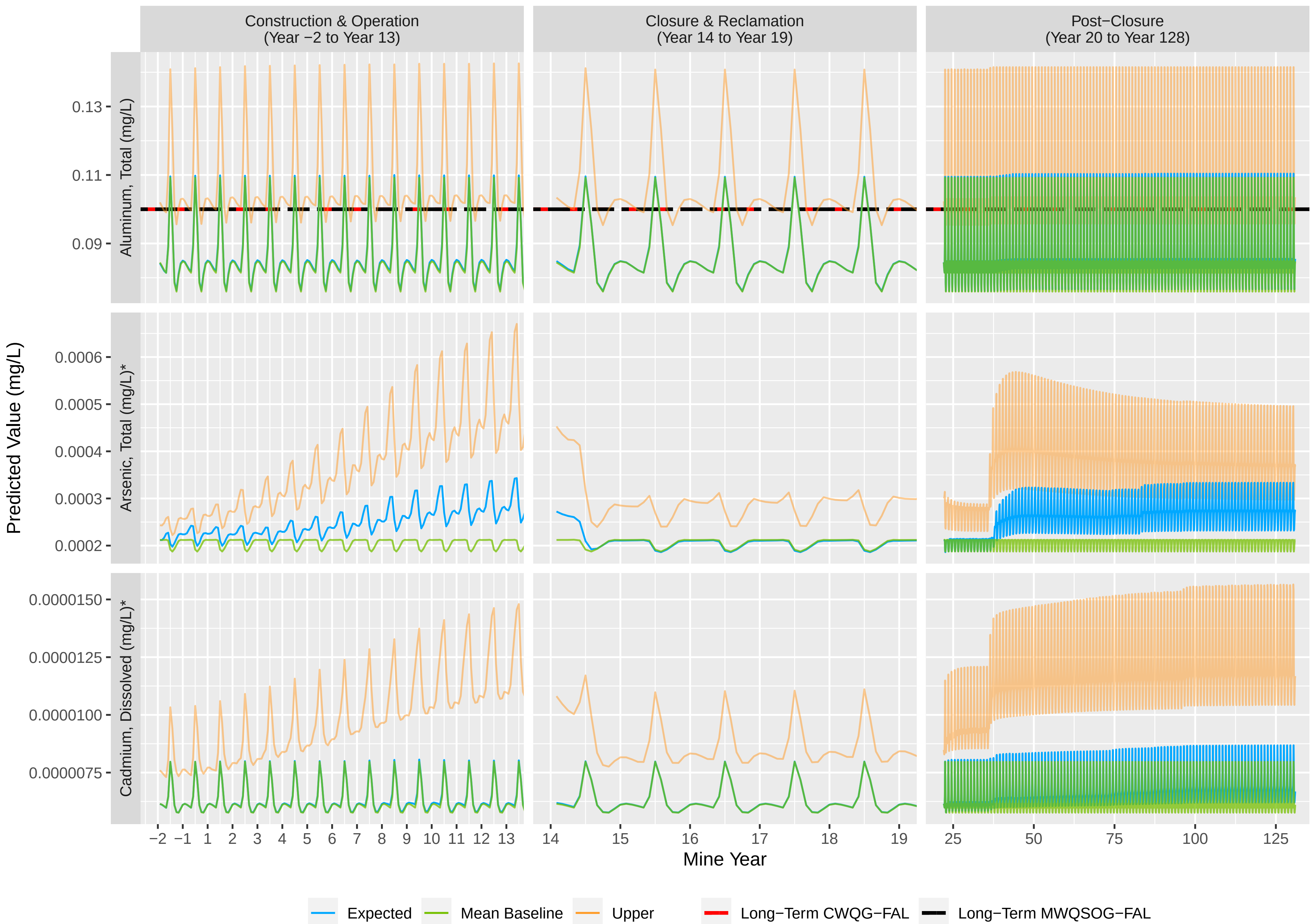
Appendix I-10: QM08 − Predicted Concentrations in Discharges



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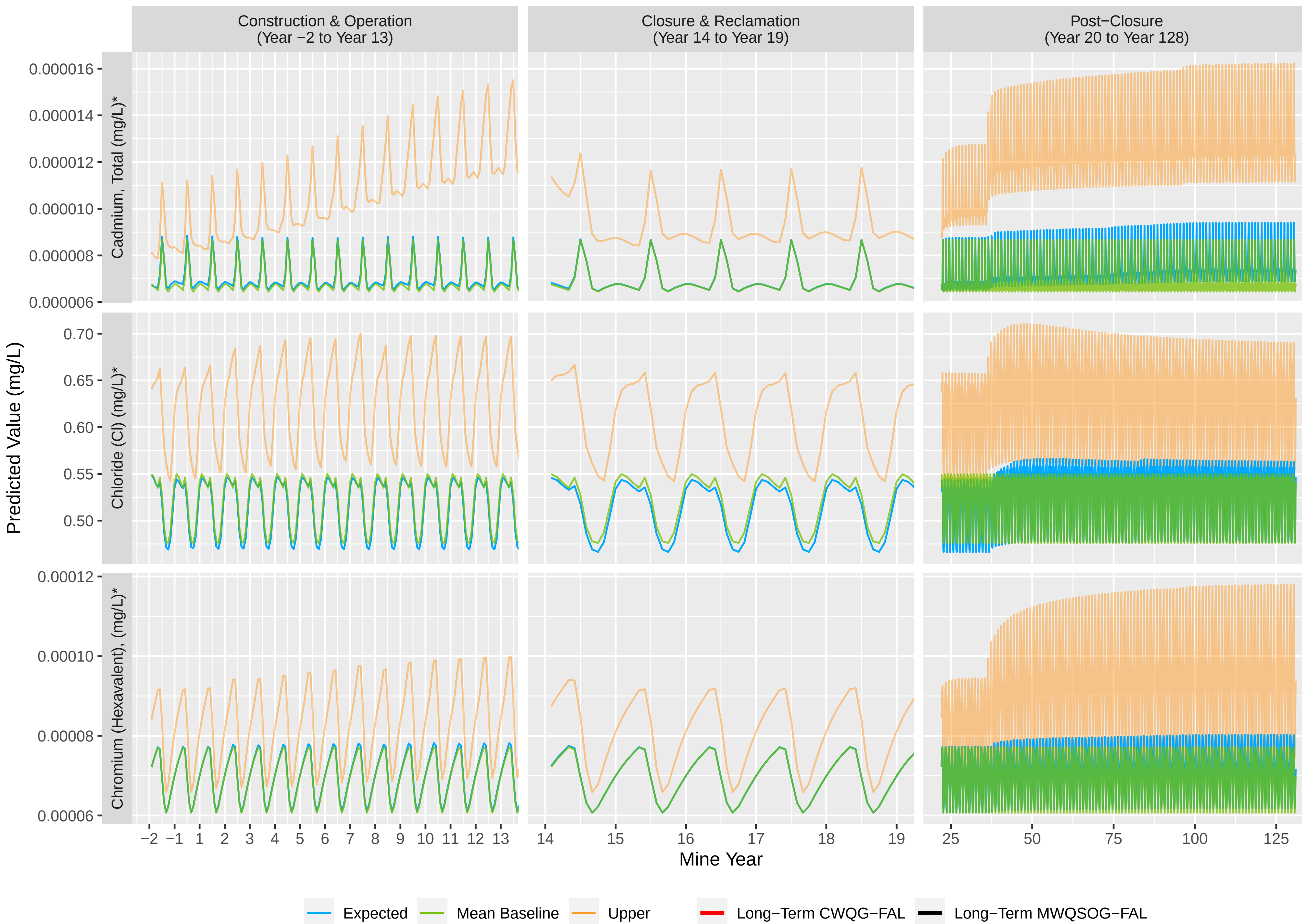

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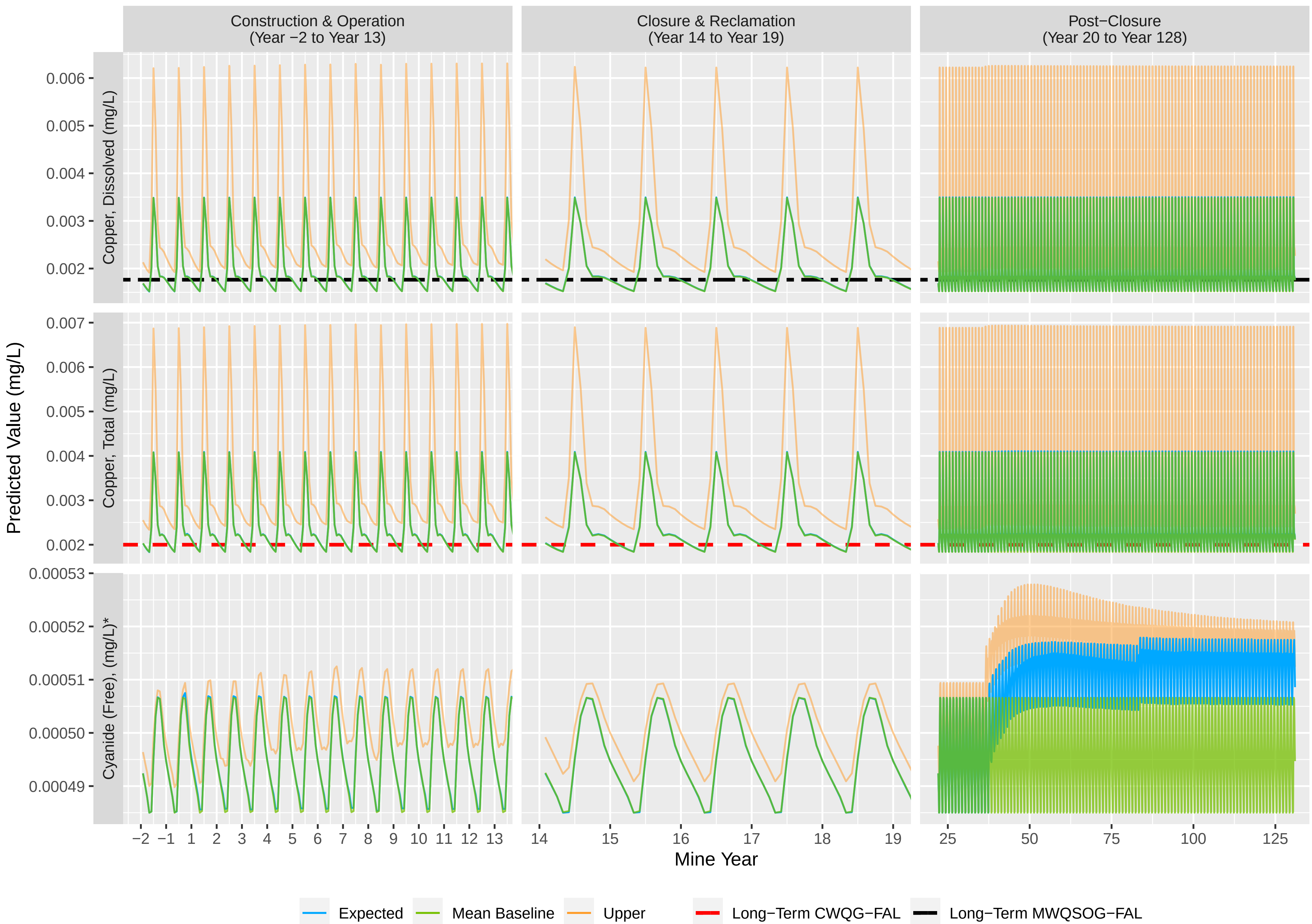

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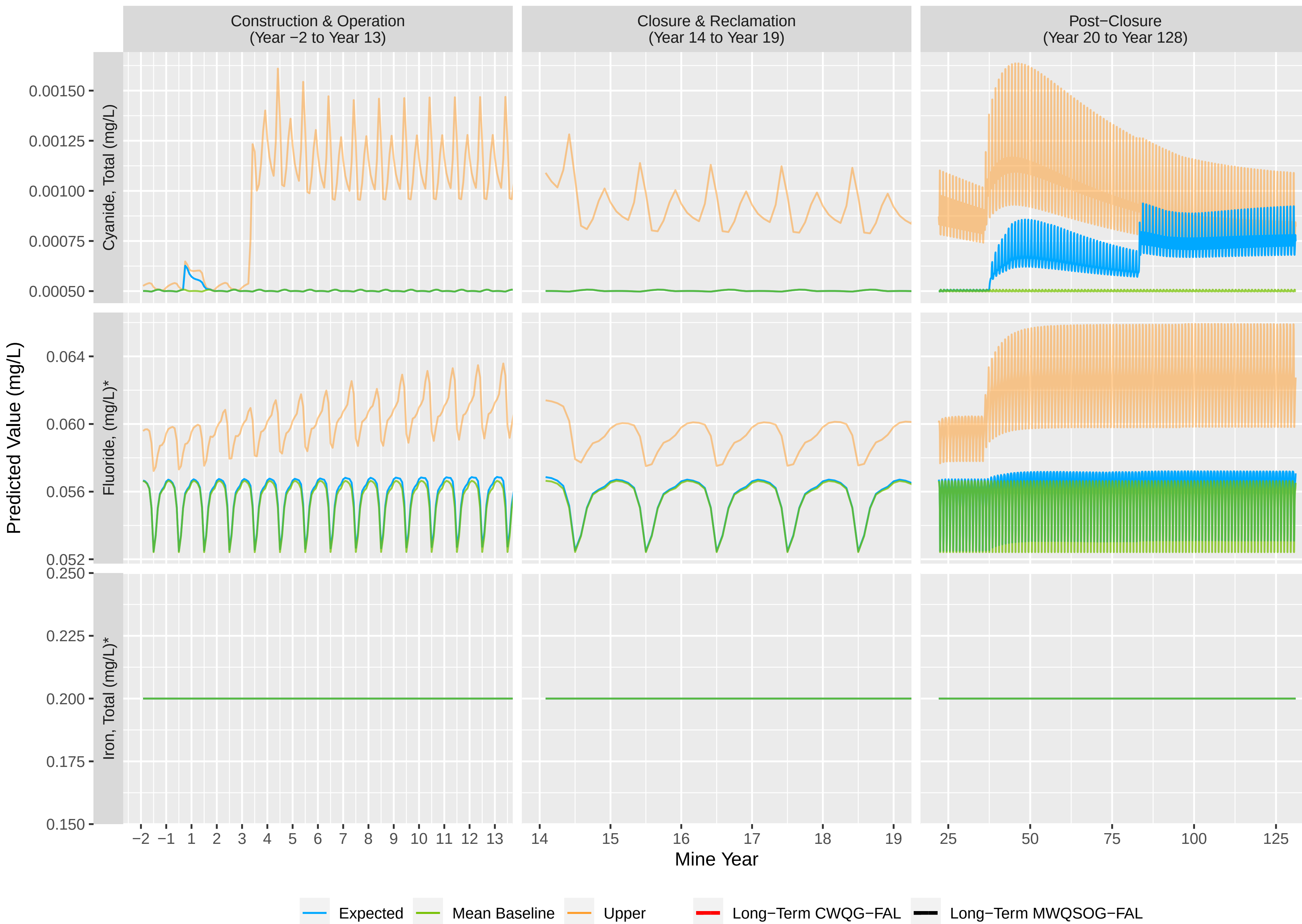

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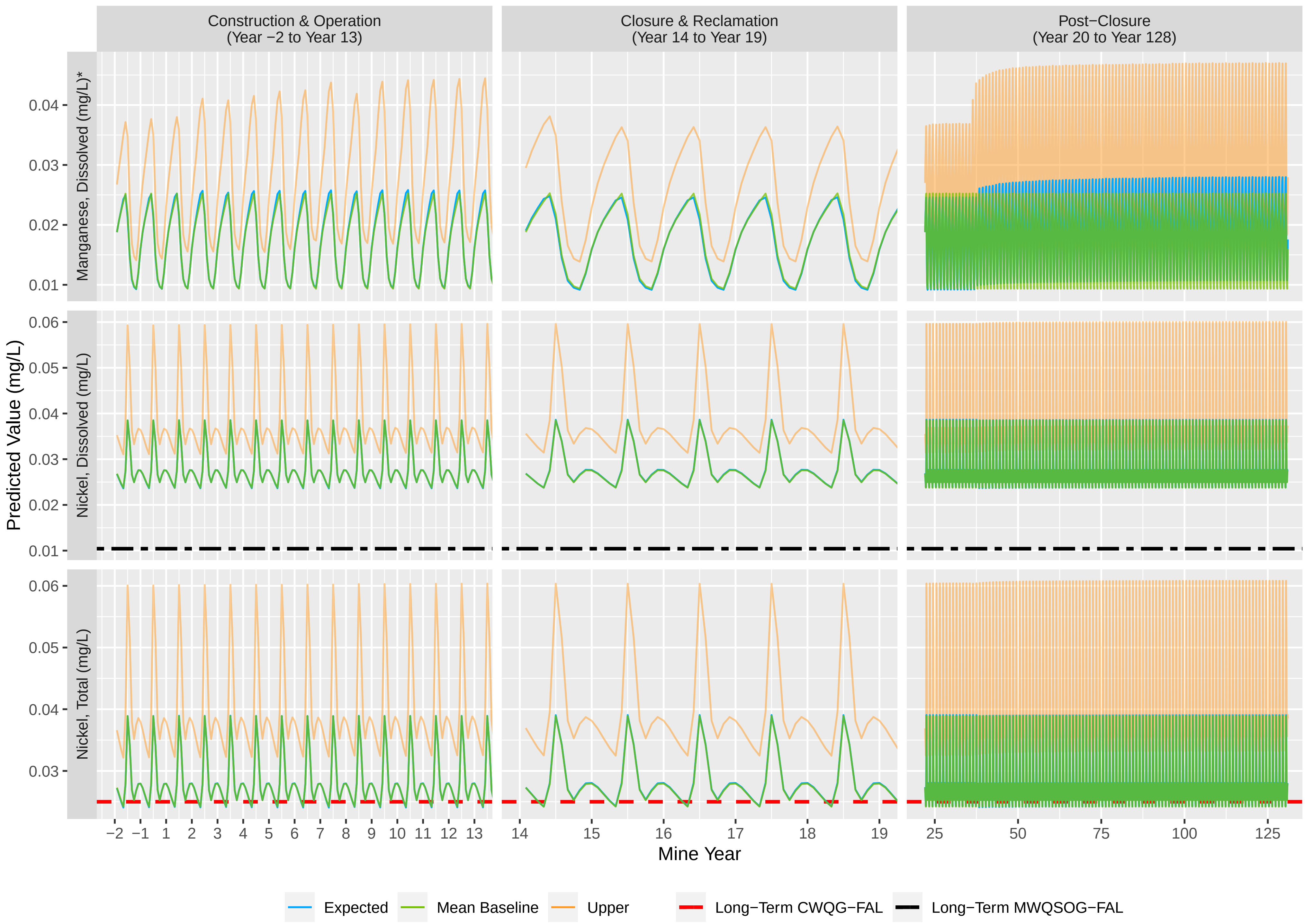

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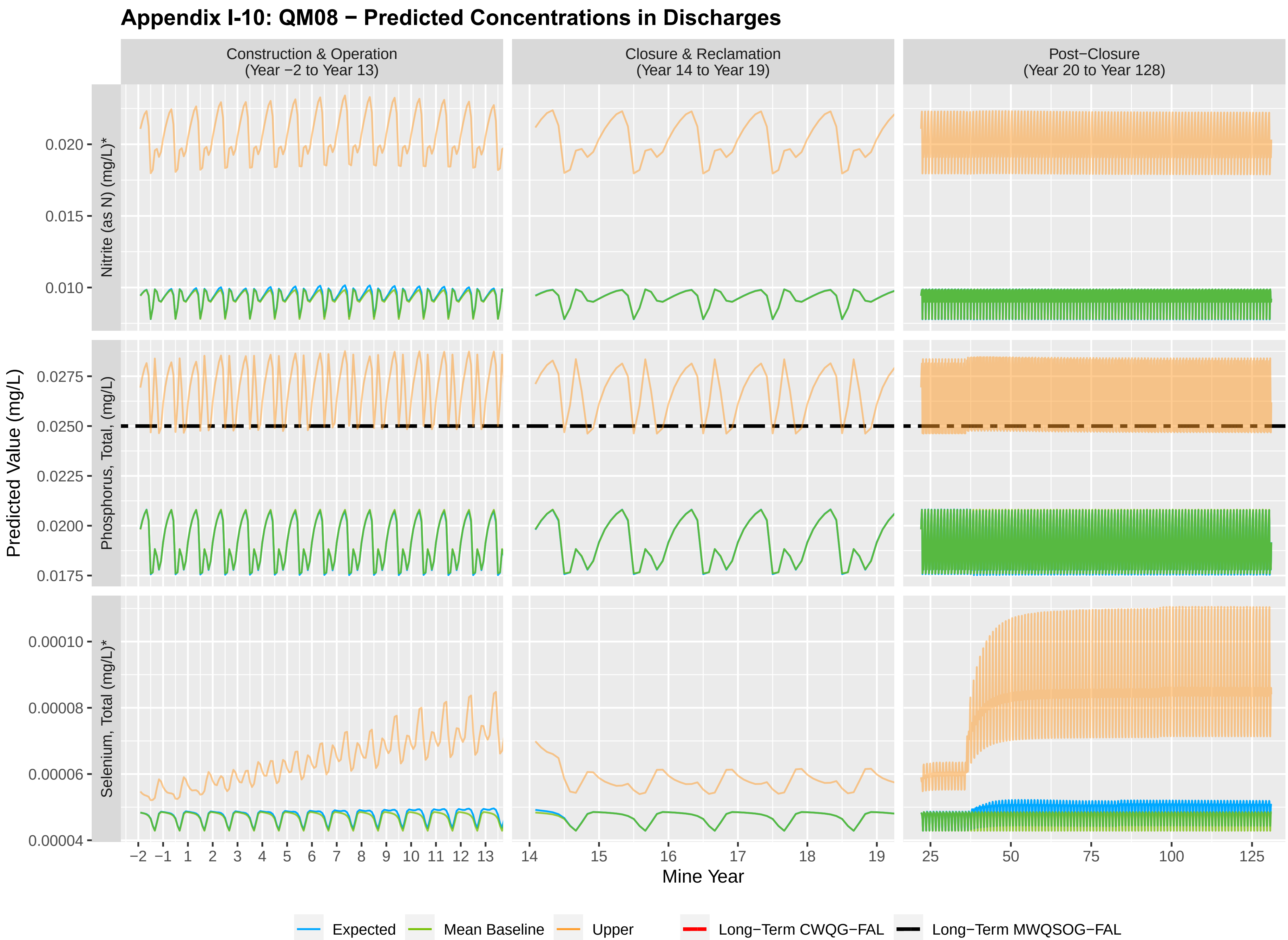

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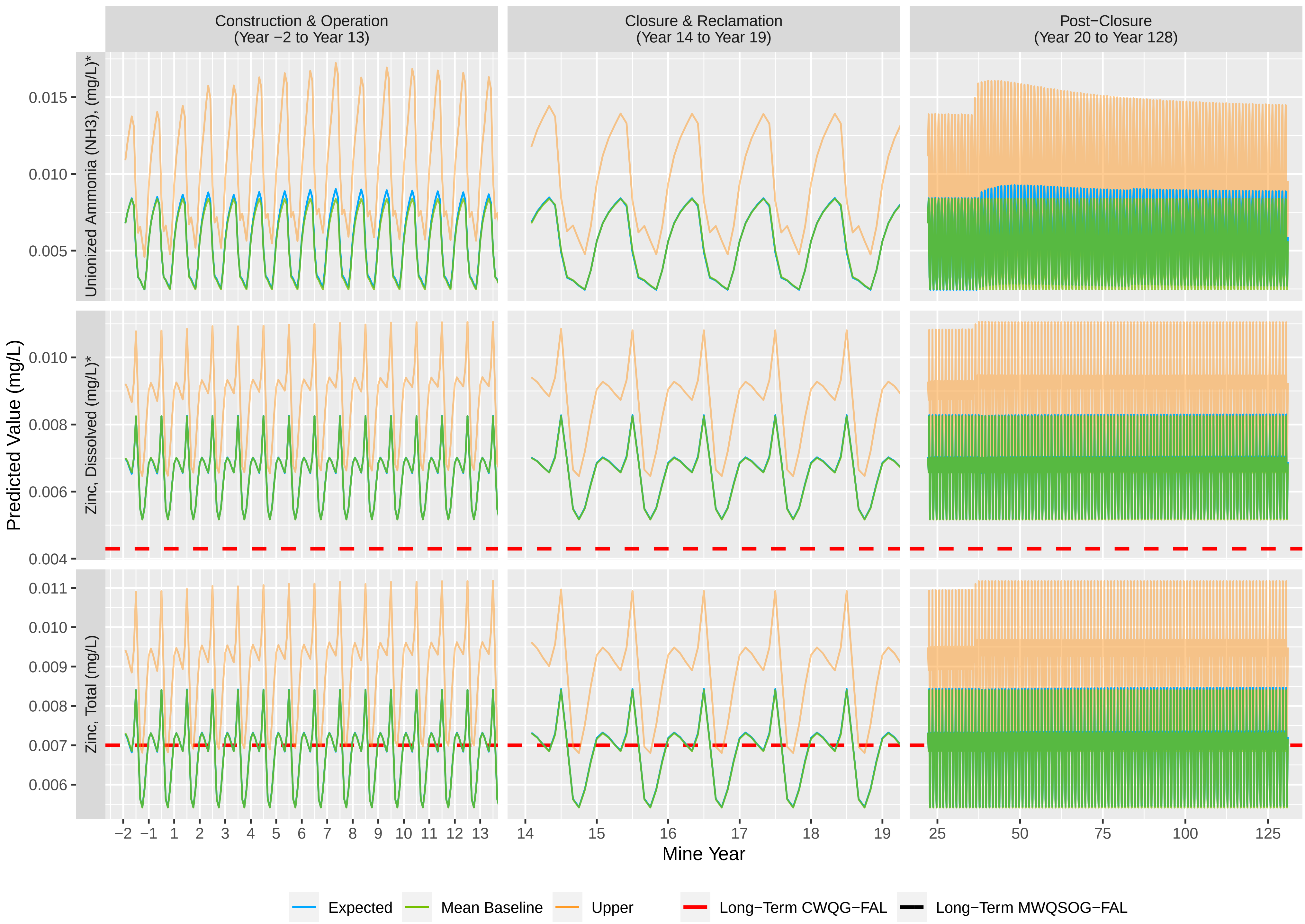

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Lynn Lake Gold Project Hydrogeology Assessment – Gordon Site

Technical Modelling Report

April 8, 2020

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Abbreviations

Alamos	Alamos Gold Inc.
AMSL	above mean sea level
BGS	below ground surface
EA	environmental assessment
EIS	environmental impact statement
EOM	end of mining
EPM	equivalent porous media
FTM	freeze-thaw model plugin for FEFLOW
km	kilometres
LLGP/the Project	Lynn Lake Gold Project
LOM	life of mine
m	metre
mm	millimetre
mm/yr	millimetres per year
m/s	metres per second
m^3/s	cubic metres per second
MRSA	mine rock storage area
PAG	potentially acid generating
PEST	parameter estimation code
RMS	root mean squared
TMR	technical modelling report
TMF	tailings management facility

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: the 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open pit gold mines at both these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle) (Map 1, Appendix A). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Hydrogeology Technical Modeling Report (TMR) for the Gordon site has been prepared to assess the potential effects of the construction, operation, and closure phases of the Project on groundwater resources and the consequent indirect effects on surface water resources at the Gordon site. The TMR considers the Gordon site components of the Project, baseline data collected for the Project since 2015, and comments received from agencies, Indigenous communities, and other stakeholders.

To evaluate the effects of the Project, a groundwater flow model has been developed for the Gordon site to provide estimates of:

- Changes in groundwater levels (drawdown), including changes to water table position and groundwater flow, due to dewatering of the historical East and Wendy pits and the open pit.
- The time to fill the open pit from groundwater inflow for use as an input to the water balance modelling conducted for the Project.
- Groundwater flow and discharge to wetlands, creeks and lakes under baseline, operation, and closure.
- Groundwater recharge and flow pathways from historical mine rock piles, overburden storage area, and MRSAs developed for the Project under operation and closure.
- Evaluation of mitigation options to control groundwater inflow to the open pit.

This TMR, and a companion TMR conducted for the MacLellan site (Stantec 2020b), form part of the supporting documentation for the Environmental Impact Statement (EIS)/Environmental Assessment (EA) completed for the Project.

2.0 BACKGROUND

This section provides an overview of the existing conditions that were used as background for the Gordon site hydrogeology model development. More detailed information is presented in the following reports:

- Hydrogeology Baseline Technical Data Report (Stantec 2017c).
- Hydrology Baseline Technical Data Report (Stantec 2017b).
- Hydrogeology Technical Data Report: Validation Report (Stantec 2020a).
- Hydrology Baseline Technical Data Report: Validation Report (Stantec 2020c).

2.1 HISTORICAL MINING OPERATIONS

Historical mining operations at the Gordon site consisted of the development of two primary ore pits, the Wendy Pit and East Pit (Map 2). The following is a summary of the historical mining operations described by KGS (2014).

The open pits were active between 1996 and 1999 and produced 214,800 oz of gold from 1.7 Mt of ore. The ore was transported to Lynn Lake for processing and smelting. Overburden was placed in two overburden storage areas, one north of the Wendy Pit and one north of the East Pit. Mine rock and low-grade ore not transported to Lynn Lake were placed in two MRSAs, one to the north of Wendy Pit and one to the south of Wendy and East pits. The north MRSA contained mine rock from the East Pit and was not considered potentially acid generating (PAG). Mine rock and low-grade ore from Wendy Pit was placed in the south MRSA. KGS (2014) characterized this material as containing about 10.5% PAG rock.

The historical open pits are located between Gordon and Farley Lakes (Map 2), which were historically connected via Gordon Creek. To allow the development of the open pits, a diversion channel was constructed so that discharge from Gordon Lake was directed through the diversion channel into Farley Lake. The water levels in Gordon and Farley lakes were reduced by 0.9 m as a result of the diversion channel (KGS 2014). Wendy Pit and East Pit were not connected to the diversion channel; however, KGS (2014) concluded that the East Pit and Farley Lake may be hydraulically connected via a historical buried stream channel.

Dewatering for the Wendy and East pits was conducted through a series of wells located between the open pits. Inflow to the open pits was collected and discharged with water from the dewatering wells to adjacent settling ponds, which were ultimately discharged to the southeast corner of Gordon Lake through a drainage channel.

Operation of the mine ceased in 1999 and a mine closure plan was submitted to the Manitoba Mines Branch and received conditional approval in August 1999. At closure, some of the PAG material was placed into Wendy Pit. The open pits were allowed to refill with water, which reduced the potential for oxidation and generation of acidic conditions from the PAG rock.

Reclamation work was completed in 2007 and consisted of ditching and drainage upgrades, berm repairs, and general fill placement. The mine rock storage areas were sloped to maximize runoff and were covered with 0.3 m of overburden from the overburden stockpiles and then hydroseeded in an effort to increase evapotranspiration and minimize infiltration.

Additional reclamation work was completed in 2012 and included installation of rock riffle control structures at the outlets of Gordon and Farley lakes to maintain water levels at pre-development elevations, repair berms around each of the open pits, removal of buildings, and general site cleanup (KGS 2014).

2.2 CLIMATE

The climate and meteorology of the Gordon site are detailed in the Climate and Meteorology Baseline Technical Data Report (Stantec 2017a). The Lynn Lake area has a climate typical of Northern Manitoba.

The nearest permanent weather monitoring stations are Environment and Climate Change Canada stations 5061645 and 5061649, located at the Lynn Lake Airport. The climate normals (1981 to 2010) average temperature, precipitation, and snow on ground statistics for the Lynn Lake Airport are summarized in Table 2-1.

Table 2-1 Climate Normals (1981 to 2010) Statistics at Lynn Lake Airport

Month	Monthly Average Temperature (°C)	Average Total Precipitation (mm)	Average Total Rainfall (mm)	Average Total Snowfall (mm)
January	-24	20	0.2	28
February	-20	16	0.1	24
March	-13	20	1.4	25
April	-3.1	24	4.5	24
May	5.6	37	27	10
June	13	62	61	1.3
July	16	85	85	0.1
August	15	69	69	0.1
September	7.7	61	57	3.5
October	-0.6	38	12	31
November	-13	27	0.8	36
December	-21	19	0.1	26
Annual	-3.2	478	318	208

The average monthly temperature is normally above freezing from May to September. The annual total precipitation for the region is 478 mm using the 1981 to 2000 climate normals, with 34% occurring as snow and 66% as rain. July typically receives the most monthly precipitation and February the least.

2.3 PHYSIOGRAPHY, TOPOGRAPHY, AND DRAINAGE

The Gordon site is surrounded by vegetated land, forest cover, scattered lakes, watercourses, and wetlands and is located within areas of discontinuous permafrost cover.

Regional topography around the Gordon site slopes from a high of 350 m above mean sea level (AMSL) in the west and northwest to a low of 320 m AMSL in the southeast (Map 4). The ground surface is characterized as hummocky with steeply sloping rocky ridges that may extend 30 m to 60 m above lakes and peat-filled depressions. Surface water features and peat deposits generally occupy the topographic lows.

2.4 REGIONAL GEOLOGIC CONTEXT

A summary of the regional geology is provided below. Additional information on the regional and local geology is provided in the Hydrogeology Baseline Technical Data Report (Stantec 2017c) and subsequent validation report (Stantec 2020a).

2.4.1 Overburden Geology

The regional surficial geology has been mapped by the Geological Survey of Canada as shown on Map 5 (Kaszycki et al. 2008). During the Late Wisconsinan period, the advance of the Keewatin ice centre (part of the Laurentide Ice Sheet) deposited glacial diamicton (diamicton) derived from the crystalline bedrock of the Canadian Shield. Meltwaters, resulting from the retreat of glacial ice, eroded and cut through the various glacial deposits and resulted in deposition of glaciofluvial sediments that are typically stratified and sorted to varying degrees. As the ice retreated, glacial Lake Agassiz was formed and resulted in the deposition of glaciolacustrine laminated silt and clay.

2.4.2 Bedrock Geology

The bedrock geology of the area has been described in detail by the Manitoba Geological Survey. The Gordon and MacLellan sites are located within part of the Lynn Lake greenstone belt, which is located in the Churchill Structural Province of the Canadian Shield. Map 6 presents the regional bedrock geology. The Lynn Lake greenstone belt is comprised of metamorphosed volcanic rocks of the Wasekwan Group, metamorphosed sedimentary rocks of the Sickle Group, and plutonic intrusions. The Lynn Lake greenstone belt trends west to east and extends 130 km from the La Ronge greenstone belt in Saskatchewan (MEM 1986). Structural processes altered the Lynn Lake greenstone belt into two belts (north belt and south belt), that are separated by felsic intrusions (Beaumont-Smith and Böhm 2003). The north and south belts differ by stratigraphic sequences, chemistry, and structure (MEM 1986).

The Gordon and MacLellan sites are located within the north belt, which is characterized as a north-dipping homocline comprised of rhyolite, overlain by andesite and sedimentary rocks, and an upper unit of basaltic rocks (MEM 1986). The north belt includes the unique stratigraphic sequence known as the Agassiz Metallotect (also termed “Rainbow Trend”) (Map 6), which consists of picritic flows, iron formation, and felsic volcanic rocks. The metallotect hosts the gold deposits of the Gordon and MacLellan sites. South of the sites lies the south belt, which consists of volcanic and sedimentary rocks and the east-west trending structural feature identified as the Johnson Shear Zone (Map 6). In some areas, these weathered shear zones may have been preferentially eroded because of the orientation of the shear zone relative to the direction of ice movement and the competence of the weathered bedrock in the shear zone relative to the surrounding bedrock units (Machibroda Engineering 1988).

The Gordon site has four zones of mineralization including the Wendy, East, Southeast, and the South zone (KGS 2014). The Wendy and East zones have been mined during historical mining activities. Two northwest trending parallel faults extend across the former Gordon pit areas from Gordon Lake in the west to south of Farley Lake in the east and are called the East and Wendy Faults (Map 6) (KGS 2014).

3.0 CONCEPTUAL MODEL

3.1 MODELLING APPROACH

The development of a conceptual model is the fundamental first step in the preparation of a numerical groundwater model. The conceptual model combines the available hydrologic and hydrogeologic data from a site and allows for the interpretation of the hydrostratigraphy and boundary conditions so they can be entered into a numerical groundwater flow model. The general approach used to develop the conceptual and numerical model was to add complexity as warranted by the available data to achieve the objectives of the numerical modelling (see Section **Error! Reference source not found.**).

The development of the conceptual model was facilitated by the use of the geologic modelling software, Leapfrog Hydro® Version 2.5.2. The software was used to create three-dimensional (3D) volumes for each of the defined hydrostratigraphic units in the conceptual model. Inputs for volume generation included wireframes for the ground surface topography, structural features, historical open pits, as well as contact points for the various lithologies defined from borehole and outcrop data. The Leapfrog Hydro® software can transfer the conceptual model directly to popular hydrogeology modelling software, including MODFLOW and FEFLOW.

3.2 CONCEPTUAL MODEL BOUNDARIES

The conceptual model boundaries were defined to coincide with or extend beyond the proposed limits for the groundwater flow model. Natural hydrologic and hydrogeologic boundaries such as watershed boundaries and surface water bodies were used to define the lateral extent of the conceptual model. The boundaries of the conceptual model correspond with the study area illustrated on Map 3. The model boundaries coincide with watershed boundaries as defined in the Hydrology Baseline Technical Data Report (Stantec 2017b). The boundaries of the conceptual model were constrained vertically by ground surface topography and extended 50 m below the base of the proposed open pit.

The conceptual model and groundwater flow model were developed based on the geologic and hydrogeologic data presented in the Hydrogeology Baseline Technical Data Report (Stantec 2017c).

3.3 HYDROSTRATIGRAPHY

The following hydrostratigraphic units are interpreted within the study area and are incorporated into the conceptual model. Details for each hydrostratigraphic unit are summarized in Sections 3.3.1 to 3.3.5:

- Historical Mine Rock
- Organics
- Glaciolacustrine nearshore
- Glaciolacustrine offshore
- Sand Diamicton
- Bedrock

Cross-sections depicting the geological interpretation of the hydrostratigraphic units across the study area are shown on Maps 7 and 8. The cross-section locations are presented on Map 4. Additional description of the hydrostratigraphic units is presented below, including references to monitoring well locations (Map 4), where appropriate.

3.3.1 Historical Mine Rock Storage Areas

Two historical MRSAs, identified on Map 2 as the historical north MRSA and the historical south MRSA. Both historical MRSAs are capped with native soils and contain surplus mine rock from historical mining operations at the Gordon site. Hydraulic testing of the historical mine rock was not completed due to their expected high hydraulic conductivity values and limited extent below the water table. Typical testing methods are difficult to perform under these conditions. Based on the grain size and material descriptions, hydraulic conductivity values for historical mine rock were estimated to vary between 1×10^{-3} and 1×10^{-2} metres per second (m/s) (Fetter 2000).

3.3.2 Organics

Organic deposits in the form of fibric peat and topsoil were observed at ground surface throughout the study area. Fibric peat is the least decomposed type of peat and generally consists of greater than 30% organic material or greater than 17% organic carbon. Topsoil was observed in upland portions of the landscape and was characterized as mineral soil with minor enrichment of organic material. Typical thicknesses were less than 1 m, but accumulations of up to 2.8 m were observed in low lying areas such as at monitoring well GBHF-06 (Map 4). Organic deposits were found underlying surficial fill in boreholes completed along the access road.

Hydraulic testing of the organic deposits was not completed due to their shallow nature and thickness. Hydraulic conductivity values from literature cover a wide range and are dependent on the texture of the sediments composing the organic deposit. Based on the geology and material descriptions, hydraulic conductivity values for organic deposits were assumed to vary between 1×10^{-8} and 1×10^{-5} m/s during model calibration (Fetter 2000).

3.3.3 Glaciolacustrine

Glaciolacustrine deposits were observed across the study area at either ground surface or underlying organic deposits. The glaciolacustrine deposits were discontinuous (Map 7 and Map 8). The glaciolacustrine deposits consisted of nearshore coarse-grained deposits and offshore fine-grained deposits. Nearshore and offshore deposits were generally observed to grade laterally between the two units; however, in some areas the units were interlayered (Map 7 and Map 8). These variations are interpreted to reflect changes to the level of former glacial Lake Agassiz.

Both nearshore and offshore deposits were observed in areas south of the open pit, including at monitoring wells GBHF-13 and MWF-04 (Map 4). When both deposits were present, the offshore deposits overlaid the nearshore deposits; when only one deposit was observed at a borehole, it was typically the nearshore deposits.

3.3.3.1 Glaciolacustrine Offshore

Offshore glaciolacustrine deposits are described as sandy clayey silt to clay and ranged in thickness from 0.8 m at monitoring well GBHF-13 to 6.2 m at monitoring well GBHF-05 when present. In the area of the proposed open pit, glaciolacustrine offshore deposits were predominant and ranged in thickness from 0.46 m at monitoring well GBHF-02 to 6.2 m at monitoring well GBHF-05.

Hydraulic conductivity estimates from slug tests conducted in the glaciolacustrine offshore deposits ranged from 6×10^{-7} to 1×10^{-6} m/s.

3.3.3.2 Glaciolacustrine Nearshore

The nearshore deposits are described as loose, fine to coarse grained sand to silty sand and gravel and ranged in thickness from 1.1 m at monitoring well MWF-06 to 9.6 m at monitoring well MWF-02 when present. Nearshore deposits of silty sand were observed in boreholes located along the eastern edge of the proposed open pit associated with monitoring wells GBHF-03, GBHF-04, GBHF-06, GPW-01, and GPW-02 ranging in thickness from 0.6 m to 4.5 m.

Hydraulic conductivity estimates from slug tests conducted in the glaciolacustrine nearshore deposits ranges from 3×10^{-7} to 1×10^{-4} m/s.

3.3.4 Sand Diamicton

Sand diamicton was frequently observed throughout the Gordon site. Despite the frequency of encountering the sand diamicton, the unit was interpreted as discontinuous, having been eroded by meltwaters associated with the retreat of glacial ice (Map 7 and Map 8). When present, sand diamicton overlaid bedrock and was overlain by glaciolacustrine or organic deposits. The sand diamicton was generally observed south and east of the proposed open pit but thinned in the area of the topographic and bedrock high located south of the Wendy and East pits. Sand diamicton was comprised of very dense sand to silty sand with trace to some gravel and at times contained trace cobbles and boulders. The thickness of the sand diamicton generally ranged from less than 1 m to about 4 m.

Hydraulic conductivity estimates from slug tests conducted in the glaciolacustrine offshore deposits ranged from 2×10^{-7} to 3×10^{-5} m/s.

3.3.5 Bedrock

Bedrock was defined as a continuous unit throughout the study area and the top of bedrock surface described in Stantec (2017c) was interpreted from the boreholes and test pits installed at the Gordon site, including boreholes drilled for exploration and condemnation purposes. The bedrock topography was interpreted to follow a similar trend to ground surface topography, with a topographic high associated with the area south of the Wendy and East pits (monitoring well GBHF-13; Map 4), which steeply slopes to the south towards Susan Lake (monitoring well MWF-04; Map 4) and gradually slopes to the north toward the Wendy and East pits. Bedrock was observed near surface (less than 1 m below ground surface [BGS]) in areas associated with topographic highs and between 1 and 10 m BGS in areas associated with topographic lows. Local bedrock lows were observed at monitoring wells GBHF-12 and GBHF-09 (Map 4). These bedrock lows were interpreted to be local in extent. Across the Gordon site, the top of bedrock was encountered at elevations ranging from 298 m AMSL at monitoring well GBHF-27 to 342 m AMSL at monitoring well GBHF-13, with a relief of 44 m.

The hydraulic conductivity of the bedrock decreases with depth, with the upper portions being the most transmissive due to increased weathering and/or fracturing. The bedrock was subdivided into four hydrostratigraphic units based on transmissivity data collected from hydraulic testing conducted in the study area (Stantec 2017c). These units include the shallow bedrock, upper bedrock, intermediate bedrock, and deep bedrock units. A comparison of the measured hydraulic conductivity in the bedrock for each of the hydrostratigraphic units is presented on Figure 3-1. The hydraulic conductivity was observed to be variable across each hydrostratigraphic unit, as described below.

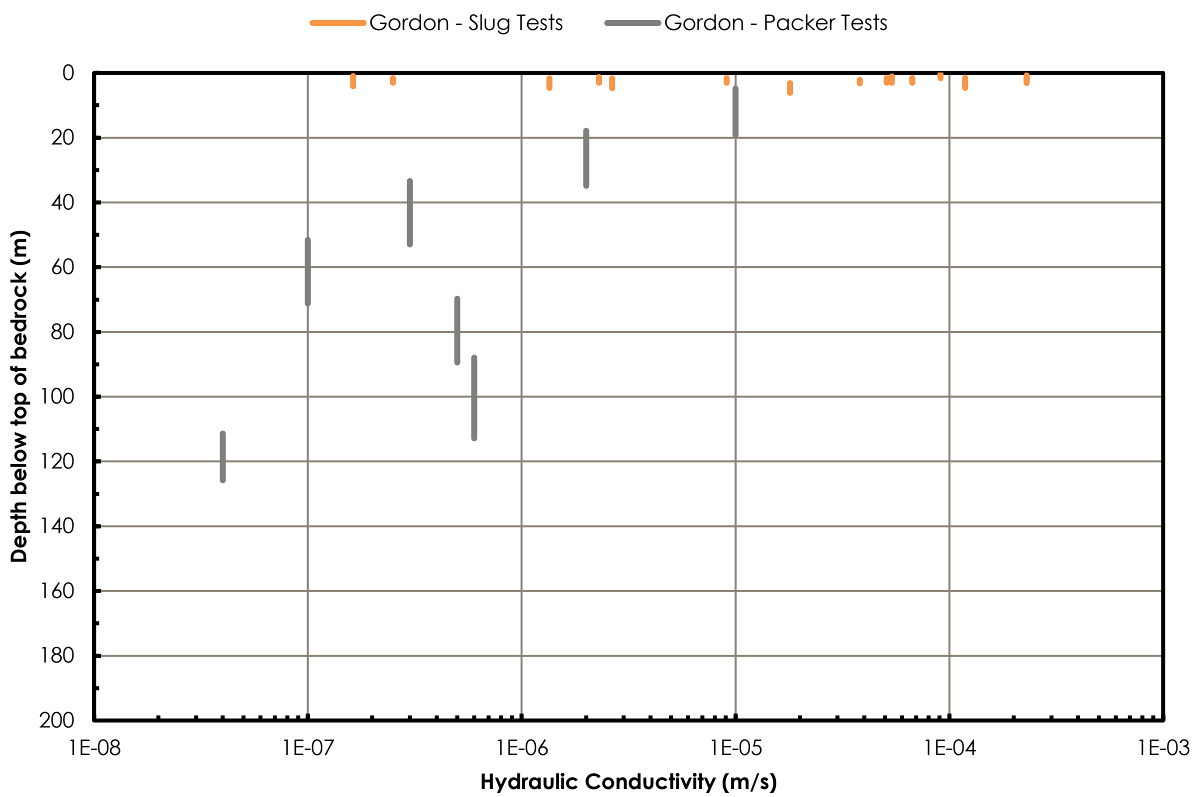


Figure 3-1 Hydraulic Conductivity Distribution in Bedrock with Depth

3.3.5.1 Shallow Bedrock

The shallow bedrock unit consists of a zone of weathered and fractured bedrock that exists below the overburden deposits or at ground surface where bedrock is exposed. The shallow bedrock is estimated to be approximately 50 m thick, with hydraulic conductivity estimates ranging from 2×10^{-7} to 2×10^{-4} m/s (Figure 3-1).

Two mapped faults (East Fault and Wendy Fault) occur in the areas of monitoring wells GPW-01, GPW-02, and GPW-04 (Map 4). The aquifer parameters of shallow bedrock estimated from pumping tests at GPW-01, GPW-02, and GPW-04 are assumed to be reflective of a zone of higher hydraulic conductivity associated with historical blasting and the presence of the fault zones. The faulted shallow bedrock zone relative to shallow bedrock are illustrated on Map 9.

Hydraulic conductivity estimates in the faulted shallow bedrock zone were estimated to be at the higher end of the estimates of hydraulic conductivity of the shallow bedrock. Storativity estimates from pumping tests in the shallow bedrock ranged from 4.5×10^{-5} to 2.2×10^{-3}.

3.3.5.2 Upper Bedrock

The upper bedrock unit underlies the shallow bedrock unit and is estimated to be 50 m thick. The hydraulic conductivity for the upper bedrock is estimated to range from 1×10^{-7} to 6×10^{-7} m/s (Figure 3-1).

3.3.5.3 Intermediate Bedrock

The intermediate bedrock unit underlies the upper bedrock and is estimated to be 50 m thick. The hydraulic conductivity for the intermediate bedrock is estimated to range from 4×10^{-8} to 6×10^{-7} m/s (Figure 3-1).

3.3.5.4 Deep Bedrock

The deep bedrock unit is the deepest bedrock unit and is considered to be relatively impermeable, although discrete fractures may occur that increase the hydraulic conductivity locally. The hydraulic conductivity of this unit is estimated to range from less than 4×10^{-8} m/s (based on the hydraulic conductivity of bedrock with limited to no interconnected fractures) to 6×10^{-7} m/s (where fractures are present) (Figure 3-1).

4.0 MODEL CONSTRUCTION AND CALIBRATION

This section describes the construction of the hydrogeology model using the hydrostratigraphic units of the conceptual model described in Section 3.0. The calibration of the model using available information on water levels and streamflow measurements collected as part of the baseline monitoring programs is also described.

The FEFLOW (version 7) groundwater modelling platform was chosen for this evaluation. It is a common platform for simulating and predicting groundwater flow in mining environments. In addition, it was selected as it is able to simulate heat transport and freeze-thaw processes (through a plug-in module) that affect the near-surface hydraulic conductivity. These processes were considered based on the discontinuous permafrost observed at the site.

An equivalent porous media (EPM) approach was selected to simulate the flow within the overburden and underlying bedrock. The EPM approach assumes that groundwater flow through fractured bedrock can be approximated by a porous medium with equivalent hydrogeologic properties of the bulk of the rock. The shallow weathered bedrock in the study area has the highest hydraulic conductivity reflecting the increased fracturing that is typical of shallow weathered bedrock in the Canadian Shield (see Section 3.3.5). The water level data within the shallow bedrock monitoring wells indicates a similar hydraulic response to the overburden system indicating a high degree of connectivity. Cook (2003) demonstrates regional connectivity occurs within the shallow bedrock zone and decreases with depth due to a decrease in fracture frequency and permeability. Groundwater flow in the bedrock is therefore expected to occur dominantly through the upper portions of this shallow bedrock unit.

As shown in Section 3.3.5, the permeability of the bedrock decreases with increasing depth, due to more discrete fracturing of the bedrock. At the regional scale, the EPM approach remains appropriate for predicting the effective groundwater discharge rates from the deeper bedrock into the open pit but reduces the reliability of predicted travel times through discrete fractures (Wels et al. 2012). Travel times through the discrete fractures using the EPM approach could be under-predicted (due to lower effective fracture porosities in the bedrock), or over-predicted, if there is poor connectivity of fractures at depth. This is appropriate based on the regional scale of the modelling and considering that flow was predicted to occur primarily through the shallow weathered bedrock, which is highly fractured, and therefore behaves like a porous medium.

4.1 MODEL DOMAIN

The extent of the model domain was chosen to correspond to both natural hydrogeologic boundaries and was extended to beyond the area where potential effects from the model predictions may impact on model boundaries. The model domain is presented on Map 10.

The model mesh is simulated to grade from coarser around the limits of the domain, to finer in the vicinity of the surface water features and the area of the proposed open pit. The mesh is composed of a total of 160,764 elements in each model layer with a total of 28 model layers.

The hydrostratigraphic units described in Section 3.0 were transferred to the FEFLOW model via the groundwater flow model output utility in Leapfrog Hydro®, with each hydrostratigraphic unit corresponding to a model layer presented in Table 4-1. Where hydrostratigraphic units were observed to be discontinuous across the study area and "pinch out", the model layer was assigned a minimum thickness of 0.1 m and the hydraulic properties of the underlying hydrostratigraphic unit were assigned. The properties of the model layers are discussed further in Section 4.4.

Table 4-1 Relationship of Hydrostratigraphic Units and Model Layers

Hydrostratigraphic Unit	Model Layers	Thickness (m)
Overburden	1-5	Varies with hydrostratigraphic units
Shallow Bedrock & Faulted Shallow Bedrock	6-12	50
Upper Bedrock	13-19	50
Intermediate Bedrock	20-23	50
Deep Bedrock	24-28	Varies to bottom of model domain (elevation 115 m AMSL)

4.2 DISTRIBUTION OF HYDROGEOLOGIC PARAMETERS

The hydraulic conductivity, porosity, and recharge rate were assigned in the model based on the hydrostratigraphic units as defined in the conceptual model (Section 3.0). The geometric mean hydraulic conductivity values for each unit determined from the field-testing programs or characterized from grain size were used in the initial model set-up. The hydrostratigraphic units were assumed to be uniform and isotropic.

4.3 BOUNDARY CONDITIONS

4.3.1 Model Boundary

The model limits were assigned based on local watershed boundaries but were extended into neighbouring watersheds based on anticipated effects from the presence of the open pit. In all cases the model was extended to natural hydrologic/hydrogeologic boundaries, including watershed boundaries (assumed to be coincident with groundwater flow divides) or surface water features (also assumed to be coincident with groundwater flow divides). The model domain limits are presented on Map 10.

4.3.2 Recharge

The type of soil and vegetation present at surface is an important factor in determining whether precipitation will become runoff or groundwater recharge. Recharge rates were assigned based on the hydrostratigraphic units exposed at the top of the model domain and consideration of the surficial geology mapping for the area. The groundwater recharge rate was adjusted for each of these major groups during the model calibration process.

4.3.3 Lakes and Watercourses

As shown on Map 10, several lakes and watercourses are located within the model domain. Lakes and watercourses were assigned as boundary conditions in the model using a head-dependent flux boundary.

This type of boundary condition determines the flow rate between the boundary condition and the aquifer based on the head assigned to the boundary condition. The vertical extent of the lakes was determined using available bathymetric data collected at the lakes (Stantec 2017c).

The interaction between the surface water in the lakes and watercourses and the groundwater in the underlying aquifers is defined by a “conductance” term. This term represents the presence of a layer of sediment on the lakebed or streambed that can affect the rate of water transferred between the lake or watercourse and the underlying model layer. A review of sediment analyses from lakes and watercourses showed that the sediments are generally fine-grained (Stantec 2017b), and the conductance term was assigned to the model based on an assumed hydraulic conductivity of 1×10^{-7} m/s.

4.4 CALIBRATION

4.4.1 Calibration Methodology

Model calibration was conducted using an iterative approach under steady-state conditions, followed by additional iterations to evaluate transient conditions. This involved a process where a flow simulation was carried out, the resulting groundwater levels and baseflow rates to watercourses were compared to measured values, and the model input parameters were re-adjusted to achieve better agreement with observed (field measured) conditions and the overall interpreted groundwater flow directions. The process of model calibration involves the adjustment of model parameter values to match field-measured values within a pre-established range of error. A hybrid calibration approach was used that combined automated parameter estimation, facilitated using the parameter estimation code PEST (Doherty 2009), together with professional judgement and interpretation of the calibration results.

The calibration was completed using the following steps:

1. Prepare model files and input parameters
2. Run PEST to estimate parameter values that provide the best average fit to the observations
3. Review the model results
4. Adjust insensitive parameters from the PEST calibration (if any can be identified)
5. Repeat steps 2 through 4 until the model is determined to be adequately calibrated within acceptable ranges of error

Several parameters were adjusted during the calibration of the model, including:

- Hydraulic conductivity
- Specific yield
- Specific storage

These parameters were adjusted automatically using PEST over the ranges determined from field observations or literature values. A total of 34 parameters were adjusted during the calibration process. Key areas where manual adjustments in the automated calibration process were required included:

- Annual recharge rate (steady-state)
- Monthly recharge rates (transient)
- Hydraulic conductivity of deep bedrock

4.4.2 Calibration to Water Levels

Model calibration was assessed by comparing model-simulated water levels to observations collected from two water level datasets:

- Average annual water levels calculated from transient water levels
- Continuous water level data collected from onsite monitoring wells using pressure transducers and data recorders

The average annual water level targets at each location were calculated as the mean water level observed during the period of record available for each location and were used for the first calibration to steady-state conditions. Continuous water level observations from wells instrumented with pressure transducers were then used to attempt to fit transient water level targets based on transient recharge rates. The calculated average annual water level targets are presented in Table 4-2. The location of the water level targets is shown on Map 11.

Table 4-2 Water Level Calibration Residuals and Statistics

Location	Average Annual Water Level Target (m AMSL)	Simulated Average Annual Water Level (m AMSL)	Residual (m)	Target Type
MWF-01A	321.75	322.98	-1.23	Steady-state
MWF-02A	317.37	318.83	-1.46	Steady-state
MWF-02B	317.28	318.81	-1.53	Steady-state
MWF-03A	325.42	325.56	-0.14	Steady-state
MWF-03B	325.44	325.63	-0.19	Steady-state
MWF-04A	314.06	314.99	-0.93	Steady-state
MWF-04B	313.73	314.85	-1.12	Steady-state
GBHF-01A	314.85	315.36	-0.51	Steady-state
GBHF-01B	314.85	315.38	-0.53	Steady-state
GBHF-02A	315.48	315.19	0.29	Steady-state
GBHF-04A	314.31	315.40	-1.09	Steady-state
GBHF-04B	314.59	315.43	-0.84	Steady-state
GBHF-05B	314.54	315.78	-1.24	Steady-state
GBHF-07A	317.97	318.60	-0.63	Steady-state
GBHF-07B	318.08	318.59	-0.51	Steady-state
GBHF-09A	317.25	317.30	-0.05	Steady-state
GBHF-09B	317.05	317.25	-0.20	Steady-state
GBHF-10A	326.12	325.49	0.63	Steady-state
GBHF-12B	323.85	324.44	-0.59	Steady-state

Table 4-2 Water Level Calibration Residuals and Statistics

Location	Average Annual Water Level Target (m AMSL)	Simulated Average Annual Water Level (m AMSL)	Residual (m)	Target Type
Residual Statistics				
Sum of Squared Error (m²)			13.7	
Mean Error (m)			0.62	
Absolute Mean Error (m)			0.72	
Root Mean Squared Error (m)			0.85	
Normalized Mean Squared Error (%)			6.8	

A plot of the simulated (modelled) versus observed (measured) average annual groundwater levels is shown in Figure 4-1. A line of perfect fit (e.g., a line having a slope of 1.0) is shown for comparison. Simulated groundwater levels that match the observed groundwater levels exactly will fall on this line. As shown on Figure 4-1 and in Table 4-2, there is generally good agreement with the water level targets; however, there is a slight overprediction bias to the residuals.

The statistical measures of the calibration to the water level data are reported in Table 4-2. These measures include the standard error of the estimate and the root mean squared (RMS) error. In evaluating the fit between the observed and the simulated water levels, the RMS error is usually regarded as the best measure (Anderson and Woessner 1991). The RMS error is essentially a standard deviation calculated as the average of the squared differences between the measured and the simulated water levels. If the ratio of the RMS error to the total water level differential over the model area is small (e.g., less than 10%; Spitz and Moreno 1996), then the errors are only a small part of the overall hydraulic response of the model. In this simulation, the ratio of the RMS error to the total water level differential (6.8%) is less than the recommended 10% threshold. No systematic bias was observed in the residuals considering hydrostratigraphic units or proximity to boundary conditions.

The fit of the model predicted transient water level trends to the observed water level hydrographs are provided in Figure 4-2. As shown, the model is able to produce reasonable matches to the shape of the observed water level trends by varying the recharge on a monthly basis and adjusting the storage parameters (specific yield and specific storage) over the expected ranges during calibration. However, the model was relatively insensitive to the calibration parameters adjusted at monitoring wells with more than 1 m of variability in the transient water level hydrographs.

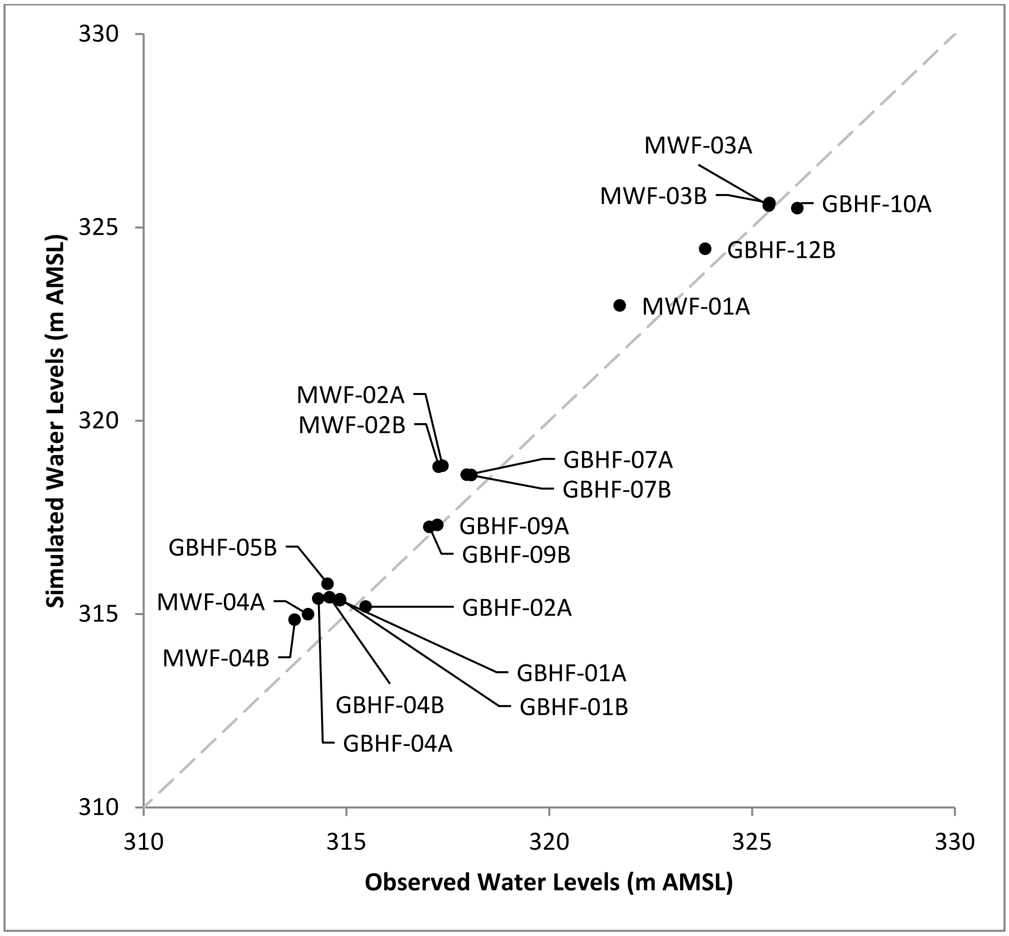
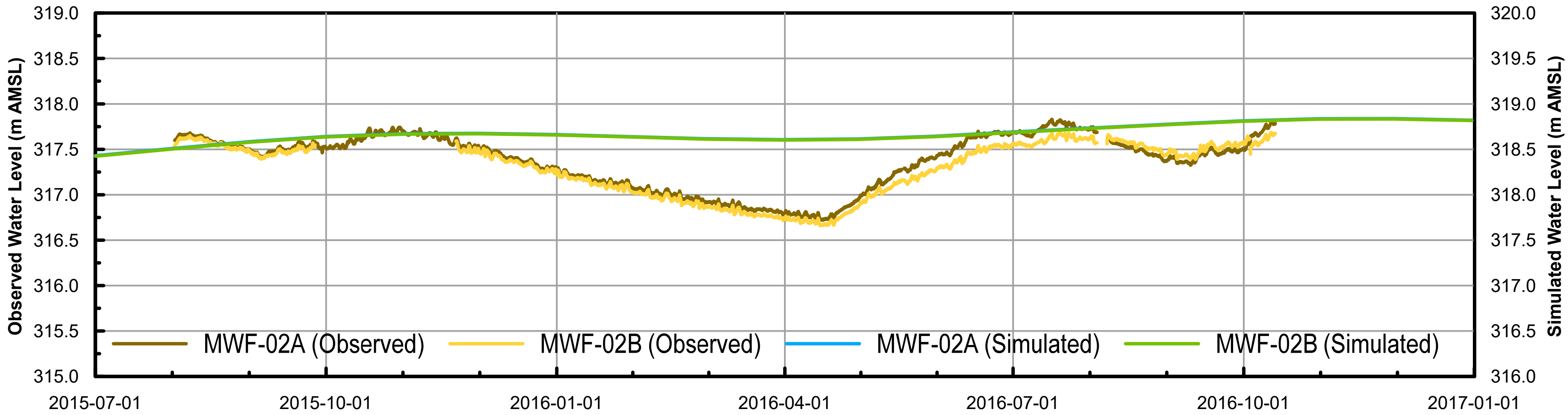
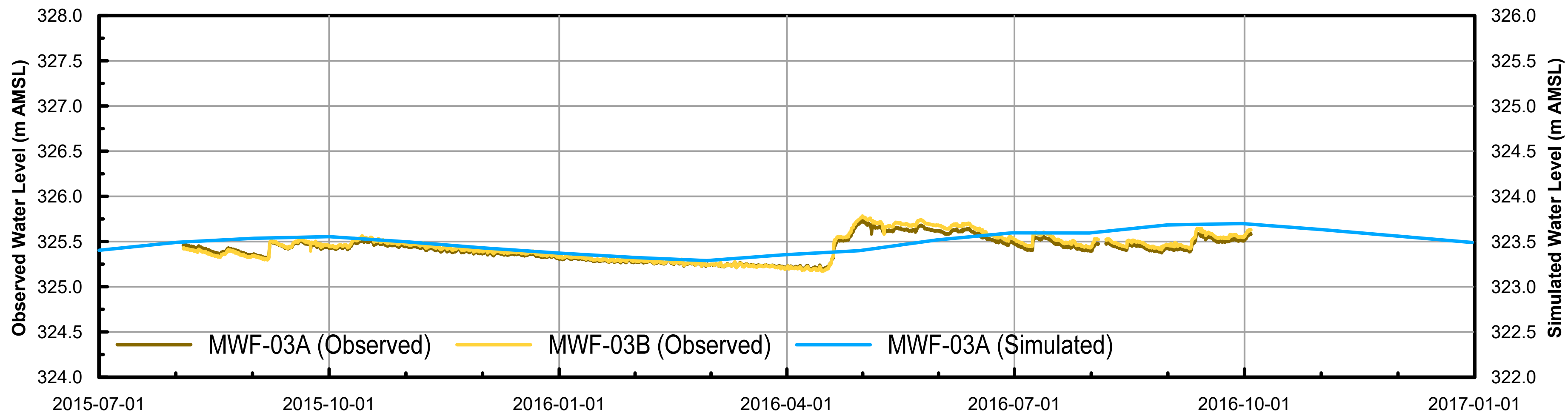
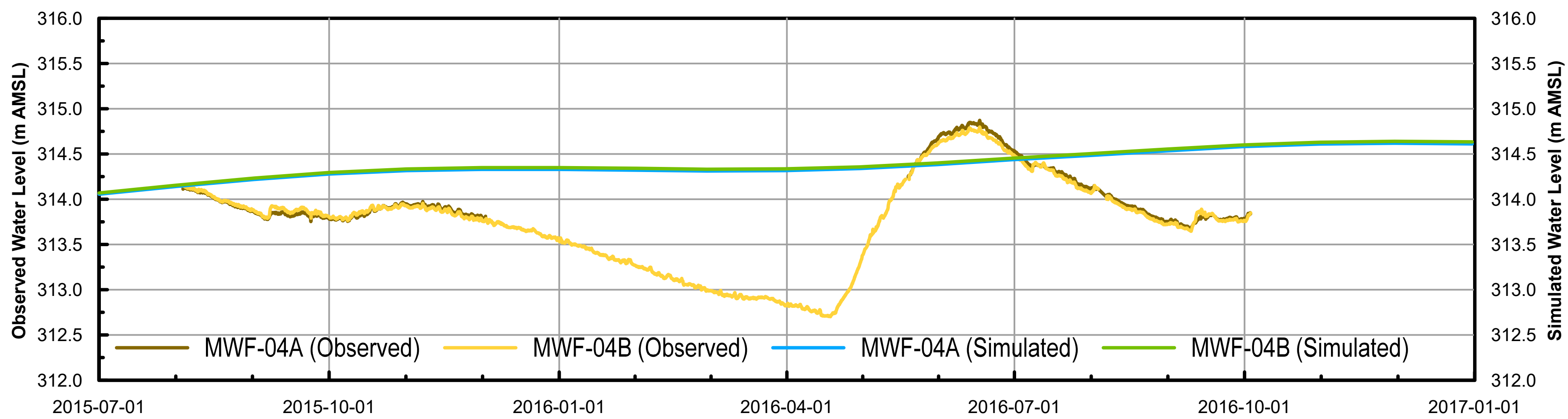
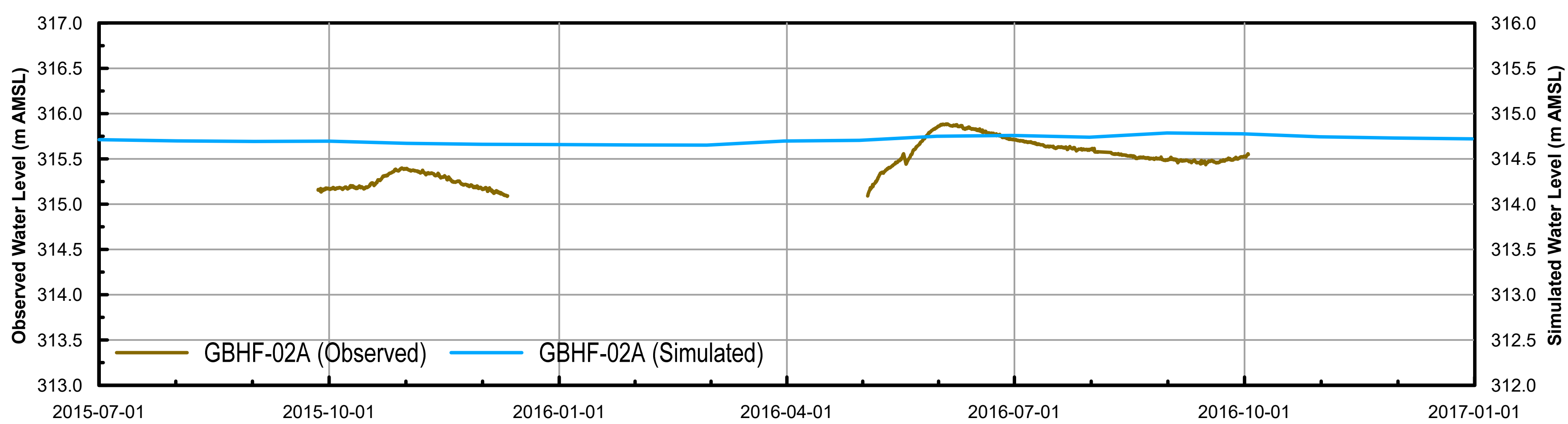


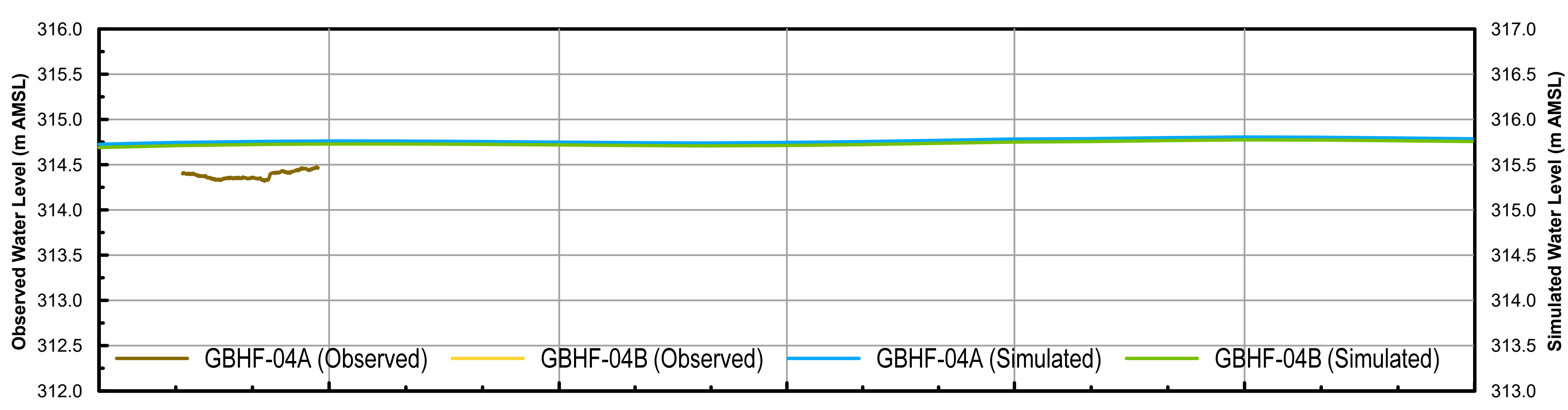
Figure 4-1 Scatterplot of Observed and Simulated Average Annual Water Levels at Calibration











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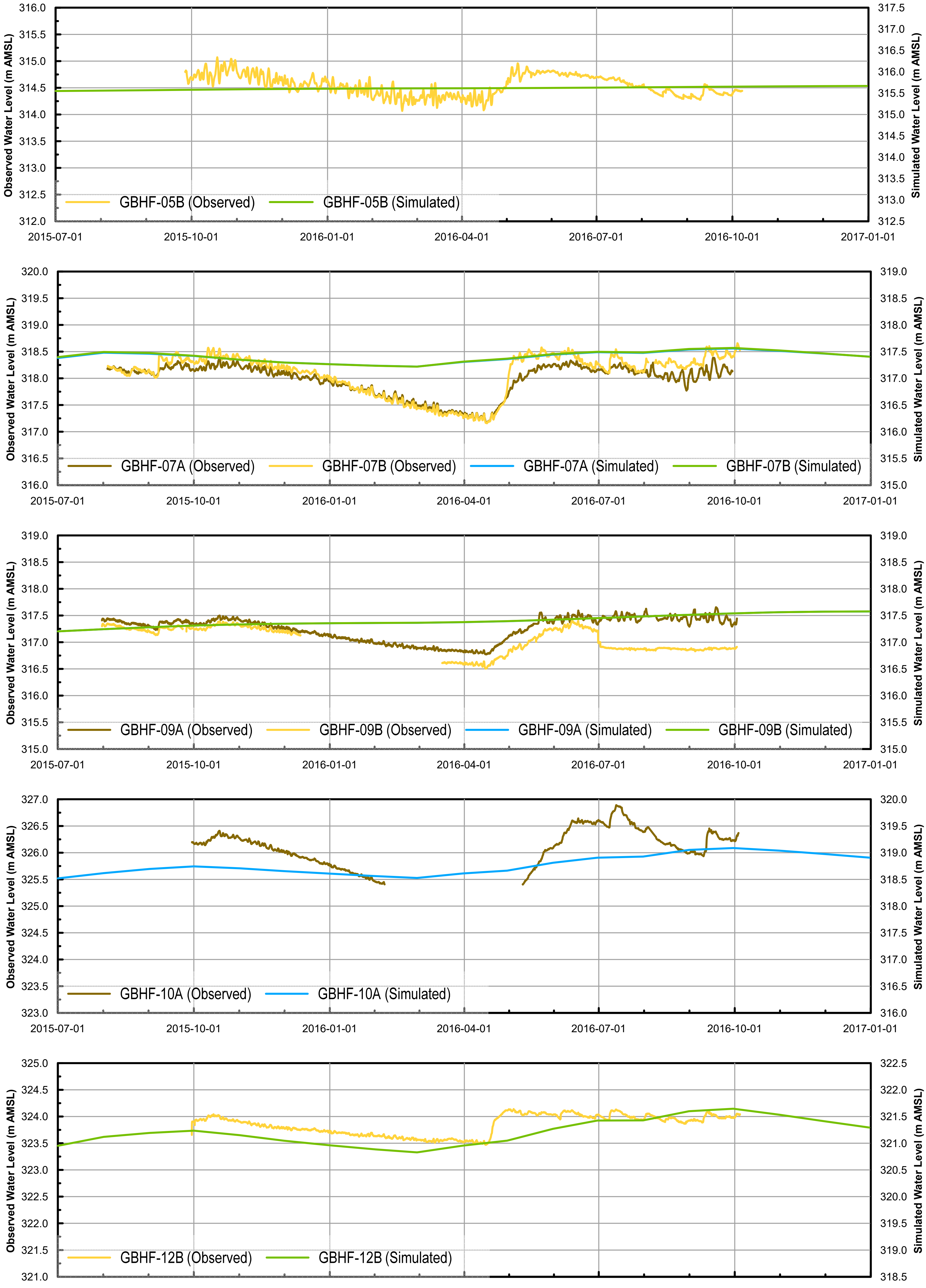
Lynn Lake Gold Project (LLGP)
Hydrogeology Technical Modelling Report - Gordon

Figure No.
4-2A

Title
Transient Groundwater Level Hydrographs Gordon



Client/Project

Lynn Lake Gold Project (LLGP)
Hydrogeology Technical Modelling Report - Gordon

Figure No.

4-2B

Title

Transient Groundwater Level Hydrographs Gordon

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4.4.3 Calibration to Baseflow

The steady-state model calibration also included baseflow targets for a surface water monitoring location at the outlet of Farley Lake (QF05, Map 11). Streamflow data were developed from continuous water level data and flow measurements completed between 2015 and 2016 (Stantec 2017b). The average annual streamflow rate at the outlet of Farley Lake is estimated to be approximately 0.06 cubic metres per second (m^3/s).

Baseflow to surface water features is provided primarily by groundwater discharge. However, a portion of the baseflow can also be attributed to the delayed drainage of precipitation storage in lakes and wetlands. This delayed release surface water storage can be difficult to distinguish from groundwater contributions to baseflow. Therefore, the baseflow targets determined from surface water hydrographs include both of these components.

The model simulated average annual (i.e., steady-state) groundwater discharge contributing to the total Farley Lake discharge is 0.012 m^3/s, or approximately 20% of the average annual streamflow. This was considered to be a reasonable estimate of baseflow for this watershed, and therefore, the calibration to baseflow is considered acceptable for this model.

4.4.4 Calibrated Model Parameters

The values of the hydrogeologic parameters that were determined from the calibration process are presented in Table 4-3. The hydraulic conductivity and storage coefficient values for the various hydrostratigraphic units generated by the model are within the ranges expected for the materials based on measured and literature values, as these were set as part of the calibration process.

Table 4-3 Calibrated Model Parameters

Parameter	Hydraulic Conductivity (m/s)	Specific Yield (-)	Specific Storage (1/m)	Average Annual Recharge (mm/yr)
Historical mine rock • Calibrated Value • Expected Range	• 1×10^{-3} • 1×10^{-3} to 1×10^{-2}	• 0.16 • 0.01 to 0.3	• 1.1×10^{-4} • 1×10^{-6} to 1×10^{-3}	• 16 • 4 to 146
Organics • Calibrated Value • Expected Range	• 1×10^{-6} • 1×10^{-8} to 1×10^{-5}	• 0.19 • 0.01 to 0.3	• 1.0×10^{-4} • 1×10^{-6} to 1×10^{-3}	• 16 • 4 to 146
Glaciolacustrine offshore • Calibrated Value • Expected Range	• 6.5×10^{-7} • 6×10^{-7} to 1×10^{-6}	• 0.30 • 0.01 to 0.3	• 1.0×10^{-4} • 1×10^{-6} to 1×10^{-3}	• 33 • 4 to 146
Glaciolacustrine Nearshore • Calibrated Value • Expected Range	• 1.2×10^{-5} • 3×10^{-7} to 1×10^{-4}	• 0.016 • 0.01 to 0.3	• 2.0×10^{-4} • 1×10^{-6} to 1×10^{-3}	• 33 • 4 to 146

Parameter	Hydraulic Conductivity (m/s)	Specific Yield (-)	Specific Storage (1/m)	Average Annual Recharge (mm/yr)
Sand Diamicton • Calibrated Value • Expected Range	• 2.3×10^{-7} 2×10^{-7} to 3×10^{-5}	• 0.20 0.01 to 0.3	• 1.0×10^{-4} 1×10^{-6} to 1×10^{-3}	• 16 4 to 146
Shallow Bedrock • Calibrated Value • Expected Range	• 1.2×10^{-6} • 2×10^{-7} to 2×10^{-4}	• 0.06 • 0.01 to 0.3	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	• 5 • 4 to 146
Faulted Shallow Bedrock • Calibrated Value • Expected Range	• 1.2×10^{-5} • 1×10^{-5} to 2×10^{-4}	• 0.06 • 0.01 to 0.3	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	• 5 • 4 to 146
Upper Bedrock • Calibrated Value • Expected Range	• 7×10^{-7} • 1×10^{-7} to 6×10^{-7}	n/a	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	n/a
Intermediate Bedrock • Calibrated Value • Expected Range	• 1×10^{-7} • 4×10^{-8} to 6×10^{-7}	n/a	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	n/a
Deep bedrock • Calibrated Value • Expected Range	• 5×10^{-8} • 4×10^{-8} to 6×10^{-7}	n/a	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	n/a

The transient recharge rates determined at the end of the calibration are presented on Table 4-4.

Table 4-4 Calibrated monthly recharge rates (mm/month)

Month	Recharge Zone 1	Recharge Zone 2	Recharge Zone 3
January	0.1	0.1	0.02
February	0.1	0.1	0.02
March	0.1	0.2	0.03
April	1.8	3.7	0.56
May	1.6	3.2	0.49
June	2.9	6.0	0.91
July	2.6	5.4	0.81
August	1.3	2.7	0.41
September	3.0	6.3	0.95
October	1.9	4.0	0.61
November	0.4	0.9	0.13
December	0.2	0.5	0.07

Notes:

- Recharge Zone 1 includes Historical Mine Rock, Organics, and Sand Diamicton hydrostratigraphic units
- Recharge Zone 2 includes Glaciolacustrine offshore and Glaciolacustrine nearshore hydrostratigraphic units
- Recharge Zone 3 includes Shallow Bedrock and Faulted Shallow Bedrock hydrostratigraphic units

5.0 MODEL APPLICATIONS

The calibrated groundwater flow model was used to quantify baseline groundwater levels and flow and groundwater discharge to the receiving environment under baseline conditions. The baseline model results were then used to compare to model predictions during construction, operation, and closure phases of the Project. Section 5.1 presents the results from the baseline simulations using the calibrated model. Model modifications were then completed to allow simulation of the following phases:

- Construction (Mine Years -2 to 0) – dewatering of the existing East and Wendy open pits and initial dewatering of the starter pit.
- Operation (Mine Years 0 to 5) – dewatering of open pit and groundwater discharge and seepage collection associated with the historical and new MRSAs.
- Active reclamation/closure (after Mine Year 6) – filling of the open pit and groundwater discharge associated with the MRSAs.

Model results for the construction, operation, and closure phase of the Project are discussed in Sections 5.2 to 5.4, respectively.

5.1 BASELINE CONDITIONS

The calibrated groundwater flow model discussed in Section 4.0 was used to estimate the water table elevation (i.e., the top of the saturated water column) and groundwater flow under baseline conditions.

Map 12 shows the average annual water table elevation contours under baseline conditions from the calibrated groundwater flow model. The model provides a good representation of groundwater flow conditions in the area of the open pit and mimics the ground surface contours (Map 4), with groundwater flowing regionally to the east in the central and southern portions of the model domain and to the northeast in the northern portion of the domain. Groundwater flow converges locally on Gordon and Farley lakes in the central portion of the model domain.

An estimate of groundwater discharge to the primary lakes and watercourses located within the model domain was determined from the model and is presented in Table 5-1. The locations of surface water features are presented in Map 10. The groundwater discharge rates were used to quantify changes to groundwater discharge during the construction, operation, and closure phases, as presented in Sections 5.2 to 5.4.

In Table 5-1, a positive number for the net groundwater to receiver indicates groundwater discharge to the surface water feature and a negative value indicates that the surface water feature is recharging the groundwater flow system. Baseflow values presented in the table represent the groundwater contributions to the features, and do not include contributions from surface water storage.

Table 5-1 Estimated Groundwater Discharge (m^3/s) to Watercourses and Lakes under Baseline Conditions

Watercourse	Groundwater to Surface Water	Surface Water to Groundwater	Net Groundwater to Surface Water[1]
Lakes			
Susan Lake	0.00041	0.00005	0.00036
Pump Lake	<0.00001	0.00028	-0.00028
Marnie Lake	0.00031	0.00058	-0.00027
Gordon Lake	0.00074	0.00016	0.00058
Farley Lake	0.00450	0.00209	0.00241
Marie Lake	0.00313	0.00232	0.00081
Unnamed South Lake (FAR4-A2)	<0.00001	0.00004	-0.00004
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00044	0.00009	0.00035
Tributary of Simpson Lake (FAR3-SIM2)	0.00057	0.00034	0.00023
Tributary of Swede Lake (FAR3-A1)	0.00089	0.00006	0.00083
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	<0.00001	0.00024	-0.00023
Tributary of Farley Lake (FAR5-A1)	0.00003	0.00014	-0.00012
Southern Tributary of Gordon Lake (FAR7-A1)	0.00006	0.00045	-0.00039
Diversion Channel (FAR6)	0.00001	0.00030	-0.00029
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	0.00004	0.00012	-0.00008
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	0.00013	0.00009	0.00004
Northern Tributary of Gordon Lake (FAR7-B1)	0.00010	0.00063	0.00058

NOTES:

1. - Positive value represents flow from groundwater to surface water
   - Negative value represents flow from surface water to groundwater

5.1.1 Historical Mine Rock Storage Areas

The historical MRSAs (north and south) are located at the Gordon site as shown on Map 2. Recharge through the MRSAs has the potential to affect groundwater quality and as a result the model was used to determine the discharge location and flux of water recharging the groundwater flow system from beneath the MRSAs. The historical MRSAs were incorporated into the model to understand the fate of recharge associated with these features. To provide a conservative estimate of the groundwater discharge originating from the historical MRSA, groundwater flow simulations were conducted without the contact water collection system.

The calibrated groundwater flow model was used to better understand the fate of groundwater that originates from the historical MRSAs and to estimate discharge rates to the receiving environment. A forward particle tracking approach was used, where a particle was released from each model node within the historical MRSAs. The travel paths of the particles were simulated through the model domain until they arrived at a receptor, such as a lake or watercourse. For this analysis, it was assumed that no subsurface seepage collection systems were in operation to provide a prediction of the maximum possible groundwater loading to the environment. This approach provides a conservative assessment of potential effects to the receiving environment.

The groundwater flux associated with each particle track was then determined and used to estimate the total discharge rate (Q) for the historical MRSAs to the environment. This is illustrated on the conceptual cross-section shown in Figure 5-1 below. A particle trace is shown for a particle that originates in a historical MRSA and terminates at a lake. The groundwater discharge to the lake that is contributed by the cell in the historical MRSA is conservatively assumed to be equal to the total average annual recharge rate into that element (e.g., Q_{in} = Q_{out}) during the various phases of mine development. It was assumed that the groundwater recharge that enters a historical MRSA will be carried through to the receptors. As a result, the groundwater flow model may over-estimate groundwater discharge rates, as local seepage to intermittent surface water features or ditches that may be present in the area of a historical MRSA are not accounted for in the model.

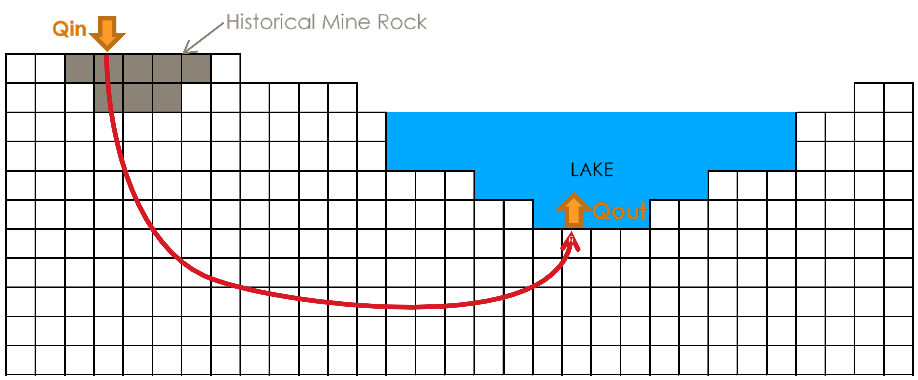

Figure 5-1 Conceptual Model Cross-Section Illustrating Particle Traces

The historical north MRSA and south MRSA received an average recharge rate of 16 mm/yr under baseline conditions. The particle tracks from the historical MRSAs under baseline conditions are presented on Map 13, and the estimated discharge rates and travel time statistics to the receiving environment are presented on Table 5-2. As shown on Map 13 and Table 5-2, the particles originating from the historical north MRSA discharge to Gordon Lake at a rate of 6.4×10^{-6} m/s or to Wendy Pit at a rate of 6.6×10^{-6} m/s. However, these flow paths are very long as they flow into the bedrock unit, and the estimated travel time from the water table to the receptors are estimated to exceed 80 years. The particles originating from the historical south MRSA discharge to Farley Lake at 1.3×10^{-4} m^3/s, East Pit at 8.6×10^{-6} m^3/s, and Wendy Pit at 2.2×10^{-6} m^3/s. The minimum travel times to Farley Lake and Wendy Pit are relatively short based on the proximity of the MRSA to these features; however, the average travel time is much longer as the majority of seepage flows through the bedrock.

Table 5-2 Predicted Groundwater Discharge Rates (m^3/s) from Historical Mine Rock Storage Area to Receiving Environment at Baseline

Mine Rock Storage Area	Receptor	Discharge (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical North MRSA	Gordon Lake	6.4×10^{-6}	83	156	286
	Wendy Pit	6.6×10^{-6}	176	303	506
Historical South MRSA	Farley Lake	1.3×10^{-4}	0.1	246	762
	East Pit	8.6×10^{-6}	62	259	823
	Wendy Pit	2.2×10^{-6}	1.5	424	969

5.2 CONSTRUCTION

The primary activities that are anticipated to potentially influence groundwater levels and flow during construction include the initial dewatering of the existing East and Wendy open pits, mitigation of pit inflows through the use of interceptor wells, and the alteration of the historical south MRSA. While these activities will continue into the initial operating years, they have been simulated separately in the construction phase to document the potential changes to groundwater levels and flow in the early phases of Project development.

5.2.1 Model Setup

Starting with the calibrated groundwater flow model, the following modifications were completed to represent the dewatering of Wendy and East pits, the use of groundwater interception wells to mitigate pit inflow, and the fate of groundwater originating from the alteration of the historical south MRSA. The modifications are discussed below for each Project component.

5.2.1.1 Dewatering East and Wendy Pits

The construction and operation of the open pit has the potential to change the baseline groundwater flow conditions, particularly through the lowering of the water table in the vicinity of the open pit. The lowering of the water table may also affect groundwater discharge to surface water features near the open pit and the discharge associated with the historical MRSAs.

To evaluate the effects of groundwater inflows to the East and Wendy pits during the construction phase, the calibrated groundwater flow model was modified to represent the extent and depth of the existing pits as seepage faces instead of head-dependent flux boundaries during the construction period. The conductance of the seepage face nodes was specified based on the hydraulic conductivity in the elements surrounding the nodes.

The hydraulic conductivity of the seepage face nodes was adjusted on a monthly basis to reflect the reduced hydraulic conductivity based on freezing and thawing of the seepage face. The hydraulic conductivity was determined using the heat and transport functionality of FEFLOW with the Freeze Thaw Model (FTM) plugin. Simulations of the freezing and thawing were used to determine the changes in hydraulic conductivity predicted based on the average monthly air temperatures. Due to the additional computational burden of running the model in heat and transport mode, the simulation of effects of freezing on dewatering were conducted with only the flow components in FEFLOW, using the variable hydraulic conductivity at the pit face due to freezing as inputs that was determined using the FTM plugin.

5.2.1.2 Groundwater Interceptor Wells

A high permeability zone in the shallow bedrock associated with the East and Wendy faults was identified during the model calibration (Map 9). Initial model runs identified that dewatering of the existing pits has a strong hydraulic connection between the pits and Gordon and Farley lakes due to this high permeability zone in shallow bedrock. To control the inflows to the open pit, 13 interceptor wells were simulated in the groundwater flow model between the pits and the lakes within the higher permeability zone, as shown on Map 9. Seven interceptor wells are located between Farley Lake and the open pit and six interceptor wells are located between Gordon Lake and the open pit. Each interceptor well was assumed to extend from the top of rock to the base of the shallow bedrock layer (i.e., the top 50 m of bedrock). The number of pumping wells, and the pumping rate from each well was optimized to intercept groundwater originating from the lakes before it entered the open pit. The pumped water from the interceptor wells was assumed to be discharged to the nearest lake (Gordon or Farley). The optimal pumping rates for each well was estimated to be 0.014 m^3/s for a total combined pumping rate of 0.182 m^3/s year-round, which is a conservative assumption as required pumping from the interceptor wells in the winter may decrease due to the open pit wall freezing.

The operation of the interceptor wells has the potential to change the baseline groundwater flow conditions, particularly through the lowering of the water table in the vicinity of the wells. The lowering of the water table may also affect groundwater discharge to surface water features located near the open pit.

To evaluate the effects of the operation of the interceptor wells during the construction phase, the calibrated groundwater flow model was modified to represent the interceptor wells pumping at 0.014 m^3/s each for the top 50 m of bedrock using a specified flux boundary condition.

5.2.1.3 Historical Mine Rock Storage Areas

The calibrated groundwater flow model was used to better understand the fate of groundwater that originates from the historical MRSAs and to estimate discharge rates to the receiving environment. A forward particle tracking approach was used, where a particle was released from each model node within the historical MRSAs, as presented in Section 5.1.1. However, the footprint of the historical MRSAs are adjusted based on the removal of mine rock from these areas during construction, to accommodate the expansion of the open pit during operation.

5.2.2 Results

5.2.2.1 Open Pit Dewatering

The predicted total groundwater inflow rates to the existing East and Wendy pits are presented on Figure 5-2 for mine years -2 to -1. The groundwater inflow rates are predicted to be initially high (0.145 m^3/s for the first month), with decreasing flows during the winter months, followed by peak flows associated with the spring freshet. The average annual groundwater inflow rate to the pits is predicted to be 0.023 m^3/s at the end of the construction period.

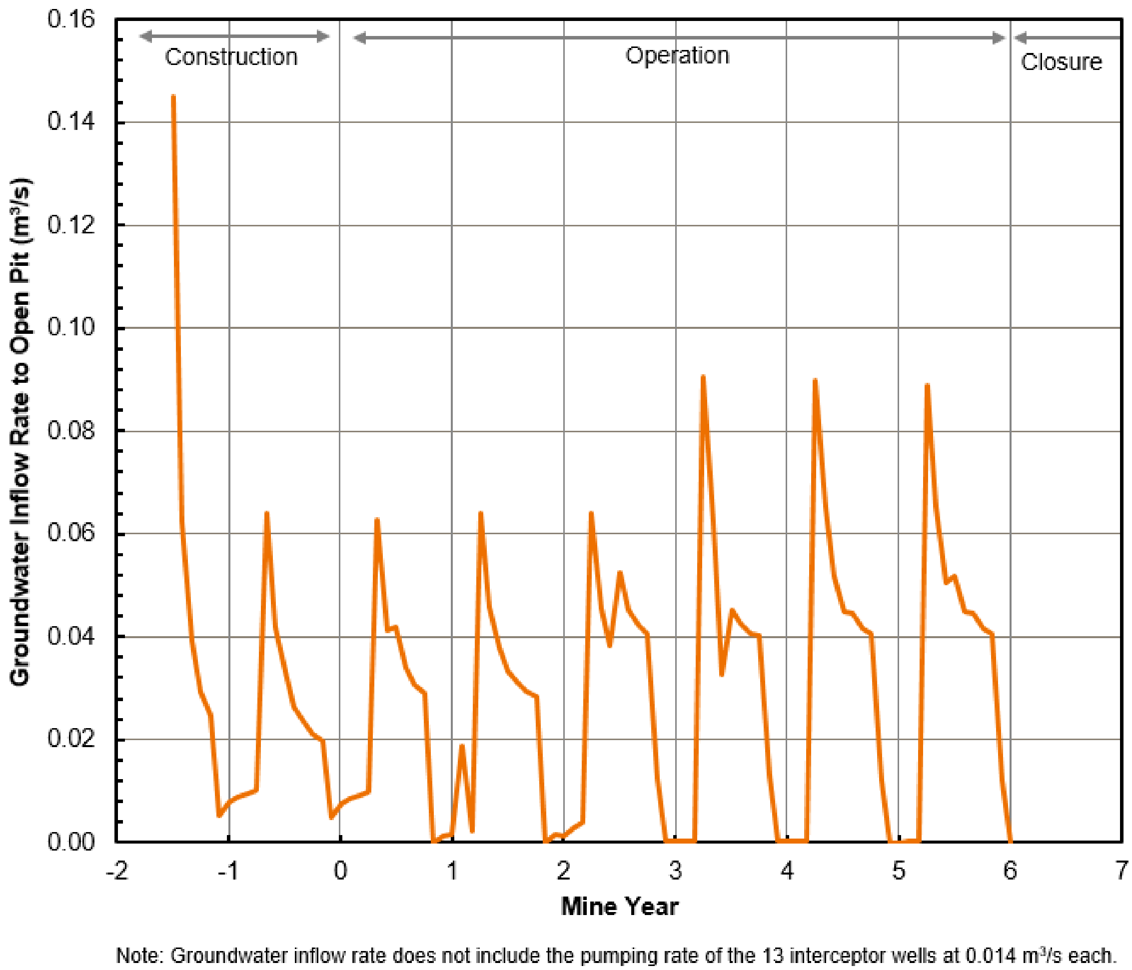

Figure 5-2 Calculated Groundwater Inflows to Historical East and Wendy Pits (Mine Years -2 to -1) and Open Pit (Mine Years -1 to 6) Over Life of Mine - Construction and Operation

The predicted groundwater elevation and drawdown contours at the end of construction period are presented on Maps 14 and 15, respectively. In the area of the East and Wendy pits, groundwater levels are lowered by approximately 1.0 m or less within 800 m of the pits, including the drawdown effect from the interceptor wells. The drawdown extends predominantly north and south of the East and Wendy pits due to the constraints of Gordon and Farley lakes.

Table 5-3 presents the comparison of baseline groundwater discharge rates with effects of the dewatering at the end of the construction period. As shown in Table 5-3, the groundwater flow system responds to the dewatering of the existing pits at the end of the construction period. Gordon, Farley, and Marie Lakes are predicted to shift from gaining groundwater to losing groundwater. The largest change in groundwater discharge is predicted at Farley Lake, which is predicted to contribute 0.010 m^3/s more flow than during baseline conditions. The water pumped from the interceptor wells will be returned to Gordon and Farley lakes during construction to offset a reduction in groundwater discharge. Groundwater discharge to Marie Lake is reduced by 227 m^3/d at the end of construction compared to baseline conditions. The diversion channel is a groundwater recharge feature under baseline conditions with recharge from the channel to groundwater increasing by 0.005 m^3/s at the end of construction compared to baseline conditions.

The changes to the groundwater discharge rates for remaining lakes and watercourses are relatively small (generally less than 0.001 m^3/s) compared to the overall anticipated flow rates in the surface water features.

Table 5-3 Estimated Groundwater Discharge to Watercourses and Lakes at End of Construction (m^3/s)

Watercourse	Baseline[1]	End of Construction[1]	Change from Baseline[1]
Lakes			
Susan Lake	0.00037	0.0006	0.00023
Pump Lake	-0.00028	-0.00019	0.00009
Marnie Lake	-0.00027	0.00006	0.00033
Gordon Lake	0.00058	-0.00536	-0.00594
Farley Lake	0.00241	-0.00736	-0.00977
Marie Lake	0.00081	-0.00182	-0.00263
Unnamed South Lake (FAR-A2)	-0.00004	-0.00001	0.00003
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00035	0.00052	0.00017
Tributary of Simpson Lake (FAR3-SIM2)	0.00023	0.00048	0.00025
Tributary of Swede Lake (FAR3-A1)	0.00083	0.00105	0.00022
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	-0.00023	-0.00007	0.00016
Tributary of Farley Lake (FAR5-A1)	-0.00012	-0.00016	-0.00004
Southern Tributary of Gordon Lake (FAR7-A1)	-0.0004	-0.0003	0.0001
Diversion Channel (FAR6)	-0.00029	-0.00546	-0.00517
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	-0.00008	-0.00004	0.00004

Watercourse	Baseline[1]	End of Construction[1]	Change from Baseline[1]
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	0.00004	-0.00001	-0.00005
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00052	-0.00068	-0.00016

NOTES:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

5.2.2.2 Mine Rock Storage Areas

The fate of groundwater that recharges beneath the historical MRSAs was determined by conducting particle tracking. The particle traces at the end of construction are presented on Map 16 assuming no contact water collection system operating. The inclusion of a contact water collection system would decrease the groundwater discharge from these areas. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from each historical MRSA and are presented in Table 5-4.

Table 5-4 Predicted Groundwater Discharge Rates (m^3/s) from Historical Mine Rock Storage Areas to Receiving Environment during Construction

Mine Rock Storage Area	Receptor	Discharge (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical North MRSA	Interceptor Wells	1.1×10^{-5}	0.06	0.81	1.43
Historical South MRSA	East Pit	1.8×10^{-5}	0.01	1.09	>2.0
	Wendy Pit	1.2×10^{-5}	0.02	0.73	>2.0

Groundwater recharge from beneath the historical north MRSA is captured by the interceptor wells with a mean advective travel time of less than 1 year. Groundwater recharge from beneath the historical south MRSA discharges to the East Pit or Wendy Pit, with a mean advective travel time of 1 year, or less.

5.3 OPERATION

The groundwater model was subsequently modified from the construction phase to simulate the effects of the Project during operation on groundwater levels and flow and the fate of groundwater originating from the historical and new MRSAs during operation. As part of these simulations, the model was used to predict groundwater inflows to the open pit and to evaluate the flow paths and groundwater discharge rates to receptors for recharge that originates from the MRSA.

5.3.1 Model Setup

Starting with the calibrated groundwater flow model and modifications completed for construction, the following additional modifications were completed:

- development and dewatering of the open pit
- variations in recharge rates related to the development of the MRSA
- reduction of footprint of the historical MRSAs as open pit develops

The modifications are discussed below for each Project component.

5.3.1.1 Open Pit Dewatering

To evaluate the effects of groundwater inflows to the open pit the calibrated groundwater flow model was modified to include the extents and depths of the open pit for two specified stages of pit development during operation:

- Mine Year 2: representing the intermediate development stage of the open pit.
- Mine Year 5: representing the ultimate extent of the open pit development at the completion of mining at the Gordon site.

Model nodes that were intersected by the walls or floor of the open pit were identified and assigned as a seepage face boundary condition in the model. Model nodes that were located above the seepage face nodes within the footprint of the open pit were set as inactive.

The hydraulic conductivity of the seepage face nodes was adjusted on a monthly basis to reflect the reduced hydraulic conductivity based on freezing and thawing of the seepage face. The hydraulic conductivity was determined using the heat transport functionality of FEFLOW with the FTM plugin. Simulations of the freezing and thawing were used to determine the changes in hydraulic conductivity predicted based on the average monthly air temperatures. Due to the additional computational burden of running the model in heat and transport mode, the simulation of effects of freezing on dewatering were conducted with only the flow components in FEFLOW, using the variable hydraulic conductivity at the pit face due to freezing as inputs that was determined using the FTM plugin.

Each of the three open pit development stages (i.e., Mine Year -2 (construction), Mine Year 2, and Mine Year 5) were simulated in the model as separate transient model runs, with the results of the previous runs used as the starting condition of the next run. Year -2 model run, presented in Section 5.2.2, represents the dewatering of the existing East and Wendy pits. An intermediate pit stage at half the life of the mine (Mine Year 2) was used as the next condition and the ultimate pit stage at the end of mine life (Mine Year 5) used as the final condition.

5.3.1.2 Groundwater Interceptor Wells

The groundwater interceptor wells installed during construction, as presented in Section 5.2.1.2, remain in place during operation to control inflows to the open pit due to a high permeability zone in the shallow bedrock associated with the East and Wendy faults (Map 9). The pumped water from the interceptor wells was assumed to be discharged to the nearest lake (Gordon or Farley). The effects of the operation of the interceptor wells during the operation phase are evaluated using the calibrated groundwater flow model modified to represent the interceptor wells pumping at 0.014 m^3/s each for the top 50 m of bedrock using a specified flux boundary condition.

5.3.1.3 Mine Rock Storage Areas

In addition to the two historical MRSAs, the Project includes a new MRSA for the collection of surplus mine rock (Map 3). Recharge through the MRSA has the potential to affect groundwater quality and as a result the model was used to determine the discharge location and flux of water recharging the groundwater flow system from beneath the MRSA. To provide a conservative estimate of the groundwater discharge originating from the MRSA, groundwater flow simulations were conducted without the contact water collection systems.

The structure of the MRSA was not added explicitly to the groundwater flow model. As the MRSA is placed on top of the existing ground surface, the MRSA was represented in the model by adjusting the groundwater recharge within the footprint of the MRSA. The groundwater recharge within the footprint of the MRSA was estimated using the site-wide water balance, which is presented in the Water Balance and Water Quality Model (Stantec 2020d).

The infiltration rate into the MRSA considers losses due to evaporation and surface runoff and was predicted to be approximately 25% of the total precipitation. As the MRSA is developed, it will take time before the MRSA reaches saturation and the precipitation infiltrating into the pile will equal the volume of water leaving the base of the pile (e.g., steady-state conditions). Infiltration that reaches the base of these piles is expected to either flow laterally along the ground surface and report as seepage at the toe of the pile (toe seepage) or recharge the underlying groundwater flow system based on the permeability of the underlying soils.

To determine the proportion of infiltration that recharges the groundwater flow system beneath the new MRSA, a SEEP/W model was used in conjunction with the groundwater flow model. The SEEP/W model was used to determine the amount of seepage that is collected in toe seepage drains (i.e., lateral seepage from surface runoff or from the waste rock/native overburden interface). The lateral drainage from within the waste rock pile was not allowed to exceed the calibrated recharge rates in the groundwater flow model. The average recharge rate to the groundwater flow system under the new MRSA was 120 mm/yr.

The groundwater flow model was used to determine the discharge location and flux of water recharging the groundwater flow system from beneath the new MRSA, using the method described for the historical MRSAs in Section 5.1.1.

5.3.2 Results

5.3.2.1 Open Pit Dewatering

The predicted pumping rates to maintain a dewatered seepage face for the three model runs were used to interpret groundwater pumping rates over the life-of-mine (LOM), which are presented in Figure 5-2. These pumping rates only consider inflows to the open pit due to groundwater and do not consider surface water runoff or precipitation inflows. As dewatering progresses, the average annual groundwater inflow rate increases from 0.023 m^3/s at the end of the construction period to 0.037 m^3/s at end of operation.

The simulated water table at the end of mine life is presented in Map 17. Changes in the water table elevation due to dewatering of the interceptor wells and the open pit are evident primarily in the area of the open pit.

The drawdown or change in water table elevation due to dewatering of the open pit at end of LOM in comparison to baseline conditions, is shown on Map 18. Dewatering of the open pit will lower the water table by up to 1.0 m that extends over an area of approximately 1,200 m from the open pit, increasing to more than 10 m within 600 m of the open pit. The induced infiltration of surface water to the shallow overburden and bedrock limits the extent of the drawdown.

Table 5-5 presents the comparison of groundwater discharge rates with effects of the dewatering at the end of the operation period (i.e., Mine Year 6). As shown in Table 5-5, Gordon, Farley, and Marie Lakes are predicted to shift from gaining groundwater to losing groundwater, as was observed during construction. The water pumped from the interceptor wells will be returned to Gordon and Farley lakes during operations to offset a reduction in groundwater discharge. For Marie Lake, the changes to the groundwater flow is relatively small compared to the overall anticipated flow rate and are not anticipated to affect water levels in the lakes.

The changes to groundwater discharge rates for remaining lakes and watercourses are relatively small (generally less than 0.001 m^3/s) compared to the overall anticipated flow rates in the surface water features.

Table 5-5 Estimated Groundwater Discharge to Watercourses and Lakes at End of Operation (m^3/s)

Watercourse	Baseline[1]	End of Operation[1]	Change from Baseline[1]
Lakes			
Susan Lake	0.00037	0.00051	0.00014
Pump Lake	-0.00028	-0.00029	-0.00001
Marnie Lake	-0.00027	-0.00019	0.00008
Gordon Lake	0.00058	-0.01049	-0.01107
Farley Lake	0.00241	-0.01445	-0.01686
Marie Lake	0.00081	-0.00204	-0.00285
Unnamed South Lake (FAR4-A2)	-0.00004	-0.00008	-0.00004
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00035	0.00048	0.00013
Tributary of Simpson Lake (FAR3-SIM2)	0.00023	0.00037	0.00014
Tributary of Swede Lake (FAR3-A1)	0.00083	0.00094	0.00011

Watercourse	Baseline[1]	End of Operation[1]	Change from Baseline[1]
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	-0.00023	-0.00022	0.00001
Tributary of Farley Lake (FAR5-A1)	-0.00012	-0.00039	-0.00027
Southern Tributary of Gordon Lake (FAR7-A1)	-0.0004	-0.00075	-0.00035
Diversion Channel (FAR6)	-0.00029	-0.00465	-0.00436
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	-0.00008	-0.00009	-0.00001
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	0.00004	0.00001	-0.00003
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00052	-0.00116	-0.00064

NOTES:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

5.3.2.2 Sensitivity of Open Pit Dewatering to Bedrock Hydraulic Conductivity

The calibration of the groundwater model was based on the fit of water levels by adjusting the assumed uniform hydraulic conductivity of hydrostratigraphic units. It is noted from Table 4-3 that the hydraulic conductivity range for the shallow bedrock has the highest observed range of the hydrostratigraphic units, and that the hydraulic conductivity of the shallow bedrock is highest of the bedrock units (Figure 3-1). As the groundwater flow at the site is expected to occur dominantly through the shallow bedrock, a sensitivity analysis was conducted to assess the effects of adjusting the hydraulic conductivity within the shallow bedrock on the expected inflows to the open pit. This included both the shallow bedrock and faulted shallow bedrock zones, shown on Map 9.

The sensitivity analysis consisted of two scenarios where the hydraulic conductivity of the shallow bedrock layers was adjusted. The details of the analysis are presented in Table 5-6. The results are compared against the average annual end of mine (EOM) inflow rates to the open pit as presented above as a base case.

Table 5-6 Sensitivity Analysis of Groundwater Inflows to Bedrock Hydraulic Conductivity – End of Operation

Scenario	Hydraulic Conductivity (m/s)		Total Pit Inflow (m^3/s)	Total Well Extraction (m^3/s)	Total Dewatering Rate (m^3/s)	Change from Baseline (%)
	Shallow Bedrock	Faulted Shallow Bedrock				
Base Case	1.2×10^{-6}	1.2×10^{-5}	0.021	0.201	0.222	-
1	1.2×10^{-5}	1.2×10^{-5}	0.057	0.224	0.281	27%
2	1.2×10^{-7}	1.2×10^{-5}	0.020	0.197	0.217	-2%

3	1.2×10^{-6}	1.2×10^{-4}	0.262	0.213	0.475	114%
4	1.2×10^{-6}	1.2×10^{-6}	0.026	0.091	0.117	-47%

As shown on Table 5-6, the total inflow to the open pit is sensitive to the value of hydraulic conductivity assigned to the faulted shallow bedrock, particularly as the hydraulic conductivity increases. Varying the hydraulic conductivity of the shallow bedrock by two orders of magnitude resulted in less than a 30% change in the total estimated dewatering required for the open pit and interceptor wells. However, varying the faulted bedrock hydraulic conductivity by the same range resulted in much larger changes to the total dewatering rate, from 47 to 114% compared to baseline. It is noted that increasing the hydraulic conductivity of the shallow bedrock or faulted shallow bedrock by an order of magnitude would also have a detrimental effect on the calibration of the model. Therefore, the hydraulic conductivity values determined during the calibration of the model are considered representative and are carried forward in the analyses.

5.3.2.3 Mine Rock Storage Areas

The fate of groundwater that recharges beneath the MRSAs (historical and new) was determined by conducting particle tracking. The particle traces at the EOM are presented on Map 19 assuming no contact water collection system operating. This assumption provides a conservative assessment of potential groundwater discharge to the receiving environment. The inclusion of the contact water collection system would decrease the groundwater discharge from these areas. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from each MRSA and are presented in Table 5-7.

Table 5-7 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Areas to Receiving Environment at End of Operation

Mine Rock Storage Area	Receptor	Discharge (m^3/s)	Travel Time (years)			Discharge Arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
Historical North MRSA	Interceptor Wells	1.1×10^{-5}	12.3	18.9	30.1	1.1×10^{-5}
Historical South MRSA	Open Pit	9.1×10^{-5}	<0.1	3.4	17.2	9.1×10^{-5}
New MRSA	Open Pit	6.1×10^{-4}	29.7	321	2,022	$4.0\text{x}10^{-4}$
	Susan Lake	1.9×10^{-5}	545	954	2,615	Negligible

Groundwater recharge from beneath the historical north MRSA discharges to the interceptor wells with a mean advective travel time of less than 19 years. Groundwater recharge from beneath the historical south MRSA discharges to the open pit with a mean advective travel time of less than 4 years. The total recharge from both of these areas are less than predicted during construction, as the open pit encroaches on these areas, decreasing the size of the historical MRSAs. The majority (i.e., 97%) of the recharge from the new MRSA, which is located farther from the open pit than the historical MRSAs, discharges to open pit with a mean advective travel time of approximately 300 years. The balance of recharge from the new MRSA discharges to the Susan Lake with a mean advective travel time of approximately 900 years.

Given the long flow paths for seepage from the new MRSA, the proportion of seepage arriving at a receiver within 300 years is provided for reference in Table 5-7. Three hundred years travel time was used as a threshold for input to the water balance model (Stantec 2020d), which had a 300-year run time.

5.4 CLOSURE

The groundwater model was subsequently modified from the operation phase to simulate the effects of the Project on groundwater levels and flow and the fate of groundwater originating from the historical and new MRSAs during closure. As part of these simulations the model was used to predict groundwater inflows to the open pit as the pit fills and to evaluate the flow paths and groundwater discharge rates to receptors for recharge that originates from the MRSAs.

5.4.1 Model Setup

Starting with the calibrated groundwater flow model and modifications completed for the end of operation, the following additional modifications were completed:

- Filling of the open pit
- Decreased pumping from groundwater interceptor wells

The modifications are discussed below for each Project component.

5.4.1.1 Open Pit Filling

The filling of the open pit during closure was simulated by removing the boundary conditions representing the open pit during operation and predicting the inflow rate and water level position over time in the open pit.

5.4.1.2 Groundwater Interceptor Wells

The groundwater interceptor wells installed in the high permeability zone in the shallow bedrock associated with the East and Wendy faults (Map 9) were assumed to continue to operate during the first stages of closure, as discontinuing the pumping was predicted to dewater Gordon Lake. Pumping of the interceptor wells decreased with time as the pit level stage was increased, so that the pumping did not interfere with the water level in the open pit. The pumped water from the interceptor wells was assumed to be discharged to the nearest lake (Gordon or Farley).

5.4.2 Results

5.4.2.1 Open Pit Filling

The rate of groundwater inflow for the open pit to fill after the end of mining activities is presented in Figure 5-3. The groundwater inflow rate increases from 0.037 m^3/s at a pit lake elevation of 126 m AMSL, increasing to a peak rate of 0.076 m^3/s after the interceptor wells begin to decrease their pumping rates at a pit lake elevation of 256 m ASML, and decreasing to 0.0001 m^3/s at a final pit lake level of 315 m AMSL.

The groundwater inflow rates to the open pit presented on Figure 5-3 were incorporated into the water balance (Stantec 2020d) to evaluate the overall time to fill the open pit during closure, considering all sources of water inputs.

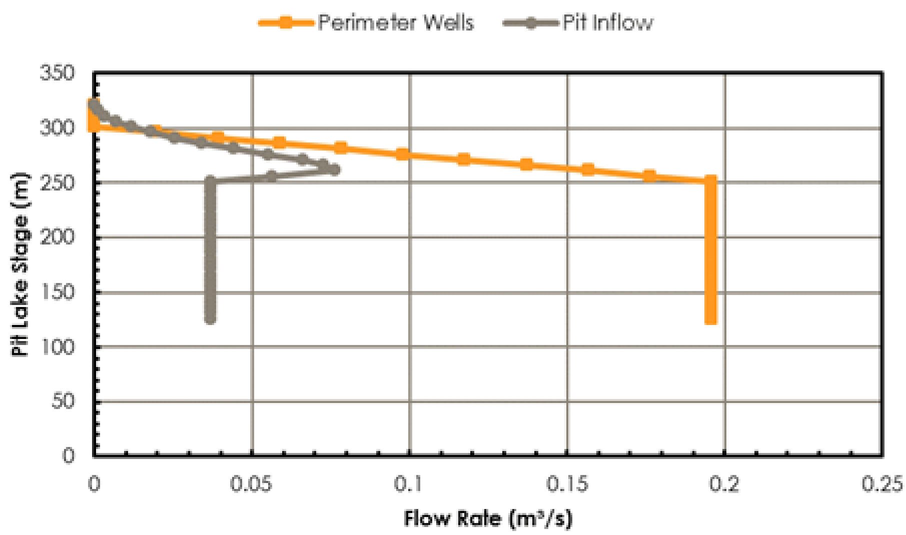

Figure 5-3 Pit Filling Rates During Closure

Table 5-8 presents the comparison of baseline groundwater discharge rates with effects of the pit lake on the surface water flows at closure (i.e., after the pit lake is full). As shown in Table 5-8, the groundwater flows to the receptors are predicted to return to near baseline rates (within 0.001 m^3/s of baseline conditions) once the pit is full. The largest change in baseline to closure groundwater discharge rates is predicted at Marie Lake, which is predicted to contribute 0.0007 m^3/s more flow in closure than during baseline conditions.

Table 5-8 Estimated Groundwater Discharge (m^3/s) to Watercourses and Lakes under Closure Conditions

Watercourse	Baseline[1]	Closure[1]	Change from Baseline[1]
Lakes			
Susan Lake	0.00037	0.00037	negligible
Pump Lake	-0.00028	-0.00028	negligible
Marnie Lake	-0.00027	-0.00027	negligible
Gordon Lake	0.00058	0.00043	-0.00015
Farley Lake	0.00241	0.00276	0.00035
Marie Lake	0.00081	0.0001	-0.00071
Unnamed South Lake	-0.00004	-0.00004	negligible

Watercourse	Baseline[1]	Closure[1]	Change from Baseline[1]
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00035	0.00035	negligible
Tributary of Simpson Lake (FAR3-SIM2)	0.00023	0.00023	negligible
Tributary of Swede Lake (FAR3-A1)	0.00083	0.00083	negligible
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	-0.00023	-0.00023	negligible
Tributary of Farley Lake (FAR5-A1)	-0.00012	-0.00012	negligible
Southern Tributary of Gordon Lake (FAR7-A1)	-0.0004	-0.00042	-0.00002
Diversion Channel (FAR6)	-0.00029	-0.00019	0.0001
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	-0.00008	-0.00008	negligible
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	0.00004	0.00004	negligible
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00052	-0.00053	-0.00001

NOTES:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

The water elevation contours and drawdowns at the end of the closure period (i.e., when the pit is full), are presented on Maps 20 and 21, respectively. As shown, at the end of closure, the water table is predicted to return to near baseline conditions, although a small area between the open pit and Farley Lake are predicted to have groundwater levels about 0.5 m lower than baseline.

5.4.2.2 Mine Rock Storage Areas

The fate of groundwater that recharges beneath the MRSAs (historical and new) was determined by conducting particle tracking. The particle traces at closure are presented on Map 22 assuming no contact water collection system operating. The inclusion of the contact water collection system would decrease the groundwater discharge from these areas. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from each MRSA and are presented in Table 5-9.

Table 5-9 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Areas to Receiving Environment at Closure (Pit Full)

Mine Rock Storage Area	Receptor	Discharge (m^3/s)	Travel Time (years)			Arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
Historical North MRSA	Gordon Lake	1.2×10^{-5}	133	252	541	8×10^{-6}

Table 5-9 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Areas to Receiving Environment at Closure (Pit Full)

Mine Rock Storage Area	Receptor	Discharge (m^3/s)	Travel Time (years)			Arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
Historical South MRSA	Pit Lake	4.1×10^{-5}	<1	1,578	16,931	3.5×10^{-5}
	Gordon Lake	2.3×10^{-7}	214	214	214	2.3×10^{-7}
	Farley Lake	3.7×10^{-5}	1.2	829	9,242	2.4×10^{-5}
New MRSA	Pit Lake	2.6×10^{-4}	1,153	6,010	24,941	Negligible
	Gordon Lake	4.6×10^{-5}	821	1,048	1,438	Negligible
	Farley Lake	1.3×10^{-4}	374	2,894	10,517	Negligible
	Susan Lake	2.1×10^{-4}	193	827	4,110	8.7×10^{-6}

Groundwater recharge from beneath the historical north MRSA discharges to Gordon Lake with a mean advective travel time of about 250 years. Groundwater recharge from beneath the historical south MRSA discharges fairly equally to the pit lake, with a mean advective travel time of about 1,500 years, or Farley Lake, with a mean advective travel time of about 830 years. Forty percent of the recharge from the new MRSA discharges to the pit lake with a mean advective travel time of approximately 6,000 years. The balance of recharge from the new MRSA discharges to Susan Lake (33%), Farley Lake (20%), or Gordon Lake (7%), with mean advective travel times in excess of 800 years.

Given the long flow paths for seepage from the historical and new MRSA, the proportion of seepage arriving at a receiver within 300 years is provided for reference in Table 5-9. Three hundred years travel time was used as a threshold for input to the water balance model (Stantec 2020d), which had a 300-year run time.

5.4.2.3 Sensitivity of Groundwater Discharge to Recharge

A sensitivity analysis was conducted to assess the potential effect of an increase or decrease in the future recharge rate on groundwater discharge to the receiving environment. The sensitivity analysis consisted of two scenarios where the recharge was adjusted as a 25% increase and a 25% decrease from the calibrated, baseline recharge value for each recharge zone. Table 5-9 presents the recharge values used in the sensitivity scenarios compared to the baseline recharge value.

Table 5-10 Sensitivity Analysis Recharge Scenarios

Scenario	Recharge Zone 1 (mm)	Recharge Zone 2 (mm)	Recharge Zone 3 (mm)
Baseline (calibration)	16	33	5
25% decrease	12	24.8	3.8
25% increase	20	41.3	6.3

Notes:
Recharge Zone 1 includes historical MRSA, organics, and sand diamicton hydrostratigraphic units
Recharge Zone 2 includes glaciolacustrine offshore and glaciolacustrine nearshore hydrostratigraphic units
Recharge Zone 3 includes shallow bedrock and faulted shallow bedrock hydrostratigraphic units.

The predicted groundwater discharge to the receiving environment for closure are presented in Table 5-10 for the baseline recharge rate, the 25% increase, and 25% decrease in recharge rate. The relative percent difference in groundwater discharge to watercourses and lakes is less than 8%, and generally less than 3%, when comparing the 25% change in recharge with the calibrated model recharge for the closure scenario. The results indicate the groundwater discharge to watercourses and lakes is relatively insensitive to variations in recharge.

Table 5-11 Sensitivity Analysis of Groundwater Discharge to Recharge – Closure (Pit Full)

Watercourse	Estimated Groundwater Discharge (m^3/s) to Watercourses and Lakes			
	Baseline[1]	Closure[1]	Closure 25% Decrease in Recharge[1]	Closure 25% Increase in Recharge[1]
Lakes				
Susan Lake	0.00037	0.00037	0.000362	0.00038
Pump Lake	-0.00028	-0.00028	-0.000282	-0.000277
Marnie Lake	-0.00027	-0.00027	-0.000278	-0.000259
Gordon Lake	0.00058	0.00043	0.000426	0.000435
Farley Lake	0.00241	0.00276	0.00275	0.002772
Marie Lake	0.00081	0.0001	0.00010	0.000099
Watercourses				
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00035	0.00035	0.000345	0.000357
Tributary of Simpson Lake (FAR3-SIM2)	0.00023	0.00023	0.000223	0.000238
Tributary of Swede Lake (FAR3-A1)	0.00083	0.00083	0.000823	0.000838
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	-0.00023	-0.00023	-0.000231	-0.000225
Southern Tributary of Gordon Lake (FAR7-A1)	-0.0004	-0.00042	-0.00043	-0.000407
Diversion Channel (FAR6)	-0.00029	-0.00019	-0.000191	-0.000188
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	-0.00008	-0.00008	-0.000081	-0.00008
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	0.00004	0.00004	0.000037	0.000043
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00052	-0.00053	-0.000539	-0.000504

Notes:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

5.5 PREDICTION CONFIDENCE

The approach used in model simulations completed for this Project was to incorporate conservative assumptions for predicting effects that may result from the Project. This report presents the assumptions made in developing these conservative predictions and discusses the high-level confidence of these predictions.

Groundwater recharge rates at the new MRSA and the historical MRSAs to the receiving environment are conservatively "over predicted" in two ways. First, the results from modelling conducted without the presence of the seepage collection system are used to predict groundwater flows to the receiving environment and to inform the environmental effects assessment. Second, all of the recharge applied within the MRSAs over the life of the mine is assumed to be carried through to the final receptors. In reality, a portion of seepage from the MRSAs may be intercepted by the seepage collection ditches and/or reduced due to design of the MRSA (e.g., additional design to enhance runoff).

The groundwater flow modelling was conducted using a model calibrated to water levels and baseflow targets to establish baseline conditions. Predictions made using the model are based on several conservative assumptions to reduce the influence of uncertainty in the predictions. Therefore, the confidence in the predictions made using the model is considered high.

6.0 CONCLUSIONS

Hydrogeology modelling was conducted to identify changes to groundwater levels and flow pathways to inform the assessment of potential effects of the LLGP on groundwater and surface water resources at the Gordon site. The modelling was conducted using FEFLOW and was calibrated to baseline conditions within acceptable industry standards.

The construction and operation of the open pit will require the open pit to be dewatered. This will also include dewatering from a series of interceptor wells installed between the pit and Gordon and Farley lakes that will be used to mitigate pit inflows. The dewatering of the open pit and pumping from the interceptor wells will result in the drawdown of the water table by up to 1 m over an area extending approximately 1,200 m around the open pit. As dewatering progresses, the average annual groundwater inflow rate increases 0.023 m^3/s to the historical pits at the end of construction to 0.037 m^3/s to the open pit at the end of operation.

The dewatering of the open pit and interceptor wells will also result in changes to groundwater discharge conditions in lakes and watercourses located near the open pit. Changes in groundwater discharge to most surface water features will remain similar to baseline conditions throughout operations, with Gordon and Farley lakes shifting from gaining to losing as a result of dewatering operations. However, these effects will be mitigated by using the groundwater interceptor wells to return water to the lakes.

Groundwater discharge to surface water features associated with the MRSAs represents a minor component of the overall surface water flow systems. The modelling results will be considered in the assessment of potential effects on the receiving environment.

7.0 REFERENCES

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8.0 STANTEC QUALITY MANAGEMENT PROGRAM

This Technical Modelling Report entitled **Lynn Lake Gold Project, Hydrogeology Assessment – Gordon Site**, prepared for Alamos Gold Inc. and dated April 8, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individual:

Jonathan Keizer, M.Sc.E., P.Eng. (NB)
Senior Hydrogeologist

Signature

This report was reviewed by the following individuals:

Michelle Fraser, M.Sc., P.Geo.
Senior Hydrogeologist

Signature

Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC, PMP
Principal – Environmental Services

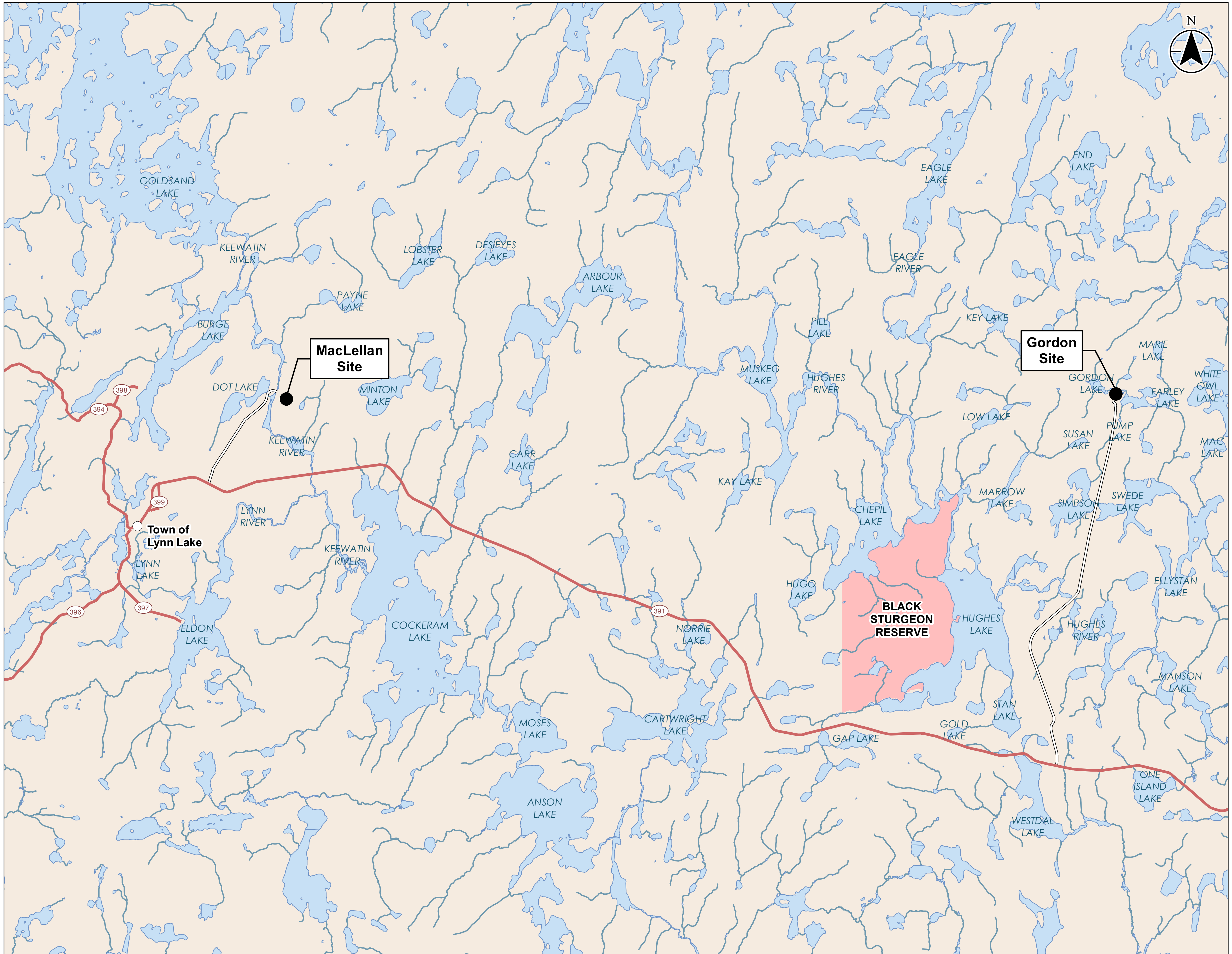
Signature

This report was independently reviewed by David Luzi, Ph.D., P.Geo.

9.0 LIMITATIONS

This Technical Modelling report entitled Lynn Lake Gold Project Hydrogeology Assessment: Gordon Site was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Alamos Gold Inc. (the "Client") to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A MAPS



Stantec

Landbase

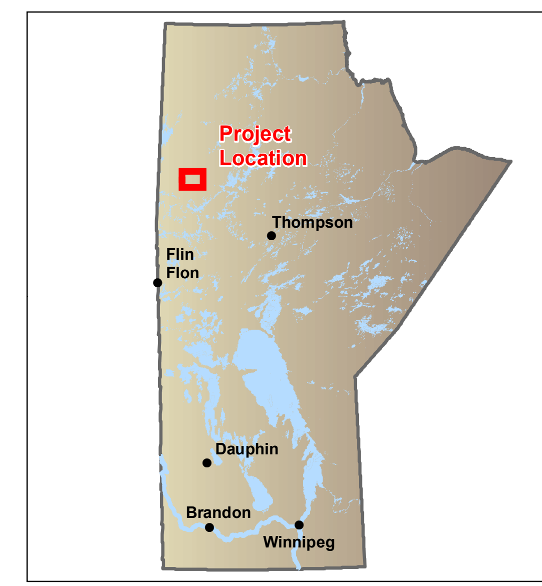
- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

0 4 8 Kilometres

1:150,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location
MacLellan and Gordon Site
Lynn Lake, Manitoba

111473003

Prepared by AC on 2018-03-16
Technical Review by MF on 2018-03-19

Client/Project

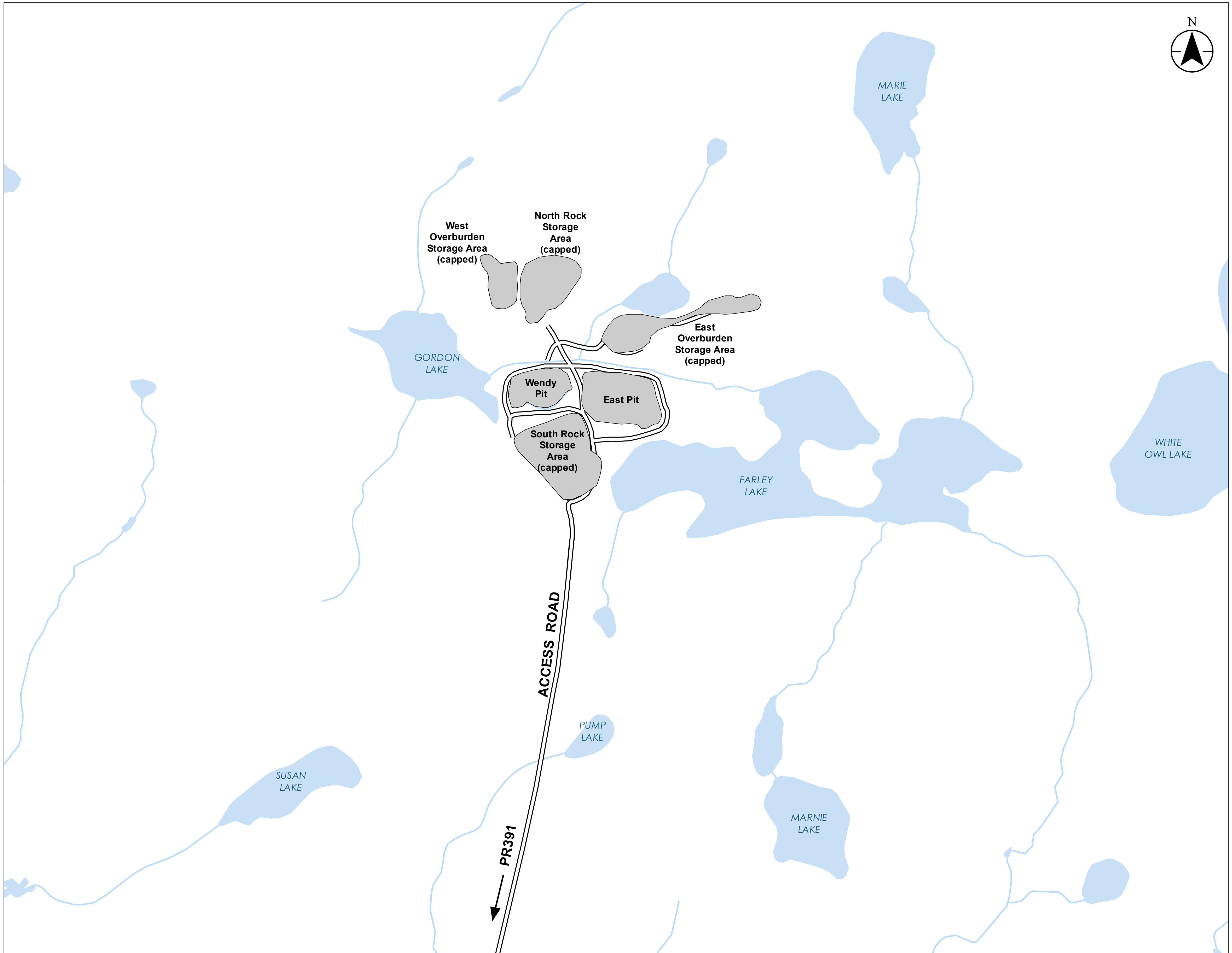
LYNN LAKE GOLD PROJECT

Map No.

1

Title

Location of the Proposed MacLellan and Gordon Mine Sites in Northwestern Manitoba



Stantec

Historical Mine Infrastructure

Existing Infrastructure Associated with Historical Mine

Landbase

Existing Access Road

Watercourse

Waterbody

0 0.5 1 Kilometre

1:20,000 (At original document size of 11x17)

Notes

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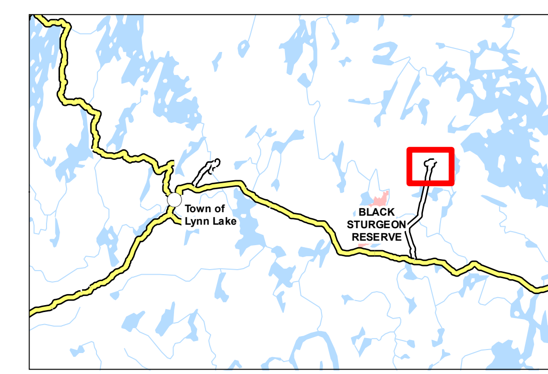
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location
Gordon Site
Lynn Lake, Manitoba

111473000

Prepared by AC on 2020-04-02
Technical Review by MF on 2020-04-02

Client/Project

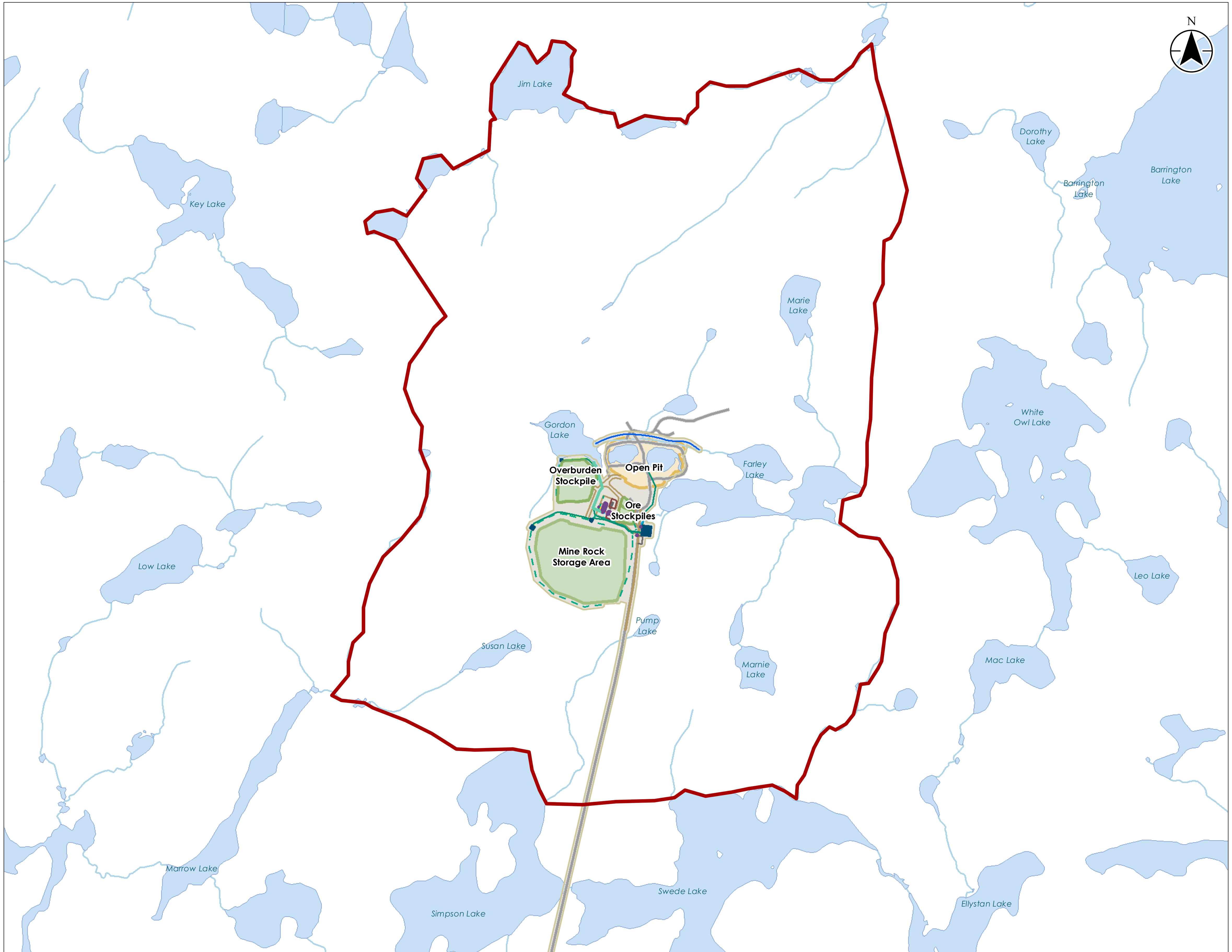
LYNN LAKE GOLD PROJECT
ENVIRONMENTAL BASELINE STUDIES

Map No.

2

Title

Historical Project Infrastructure - Gordon



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Channel
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Study Area

- Local Study Area

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

Gordon Site
Lynn Lake, Manitoba

Prepared by AC on 2020-04-02
Technical Review by MF on 2020-04-02

Client/Project

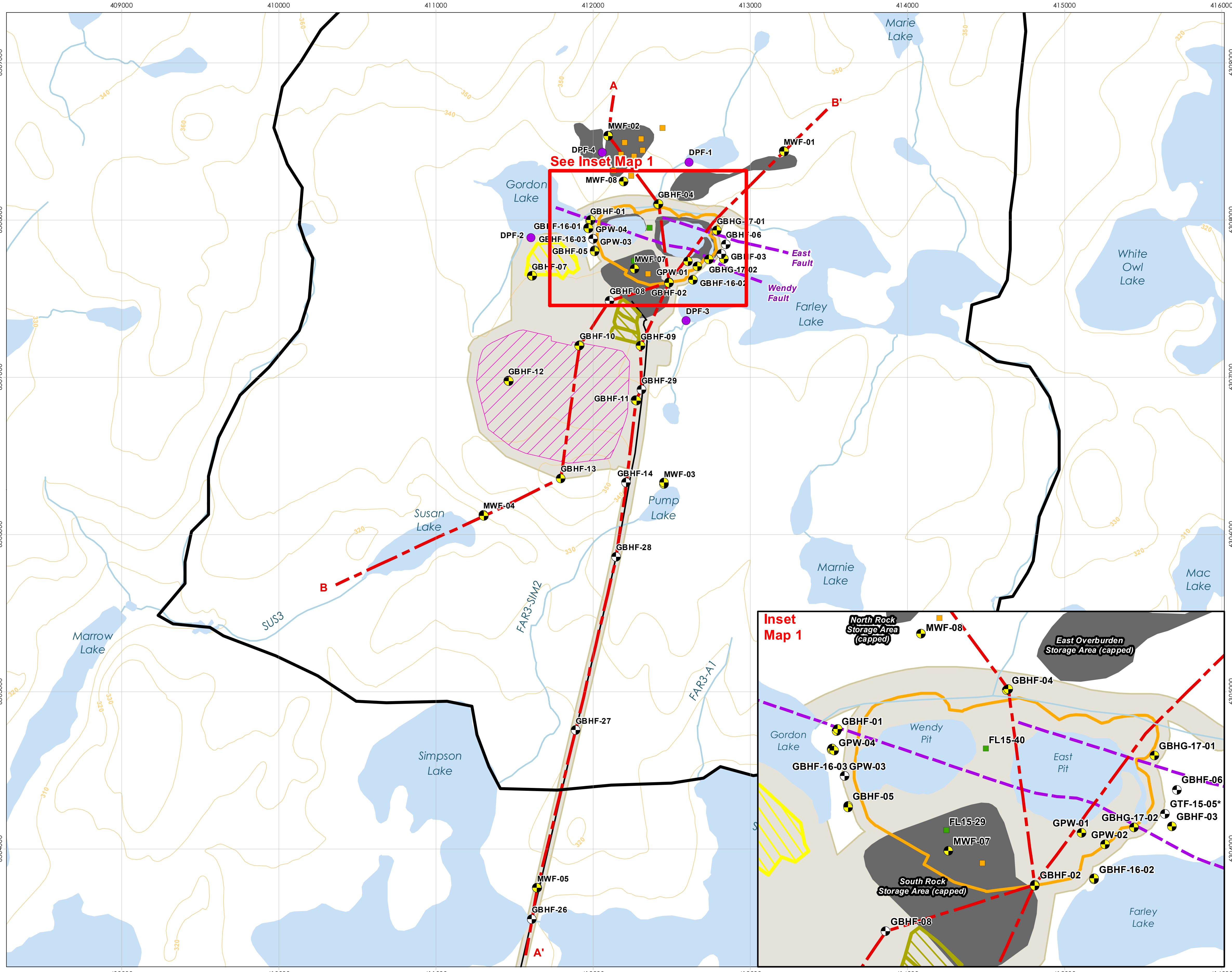
LYNN LAKE GOLD PROJECT
ENVIRONMENTAL BASELINE STUDIES

Map No.

3

Title

Site Plan - Gordon



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Survey Locations

- Borehole
- Drive-Point Piezometers
- Monitoring Well
- Exploration Borehole
- Test Pit
- Cross Section Locations

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Fault Zone
- Elevation Contours (m)
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

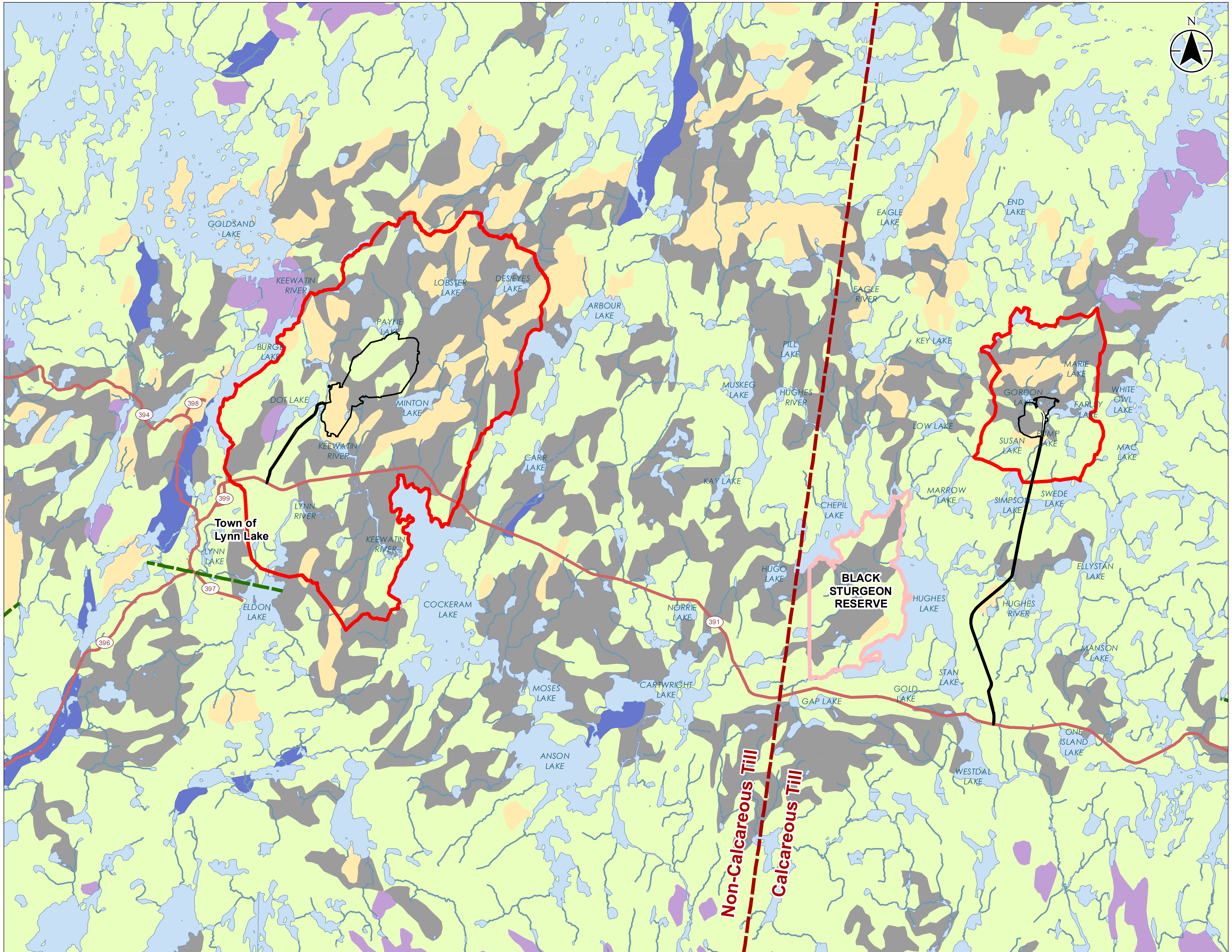
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
4

Title
Topography of Study Area - Gordon



Stantec

Project Infrastructure

Project Development Area

Study Area

Local Study Area

Surficial Geology

Organic Deposits

Marginal Glaciolacustrine Sediments

Offshore Glaciolacustrine Sediments

Proximal Glaciofluvial Sediments

Sand Diamicton

Precambrian Terrane

Landbase

Approximate Western Extent of Calcarious Till

Approximate Locations of Eskers

Existing Access Road

Highway

Watercourse

Waterbody

First Nation Reserve

0 5 10 Kilometres

1:175,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473008

MacLellan and Gordon Site
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project

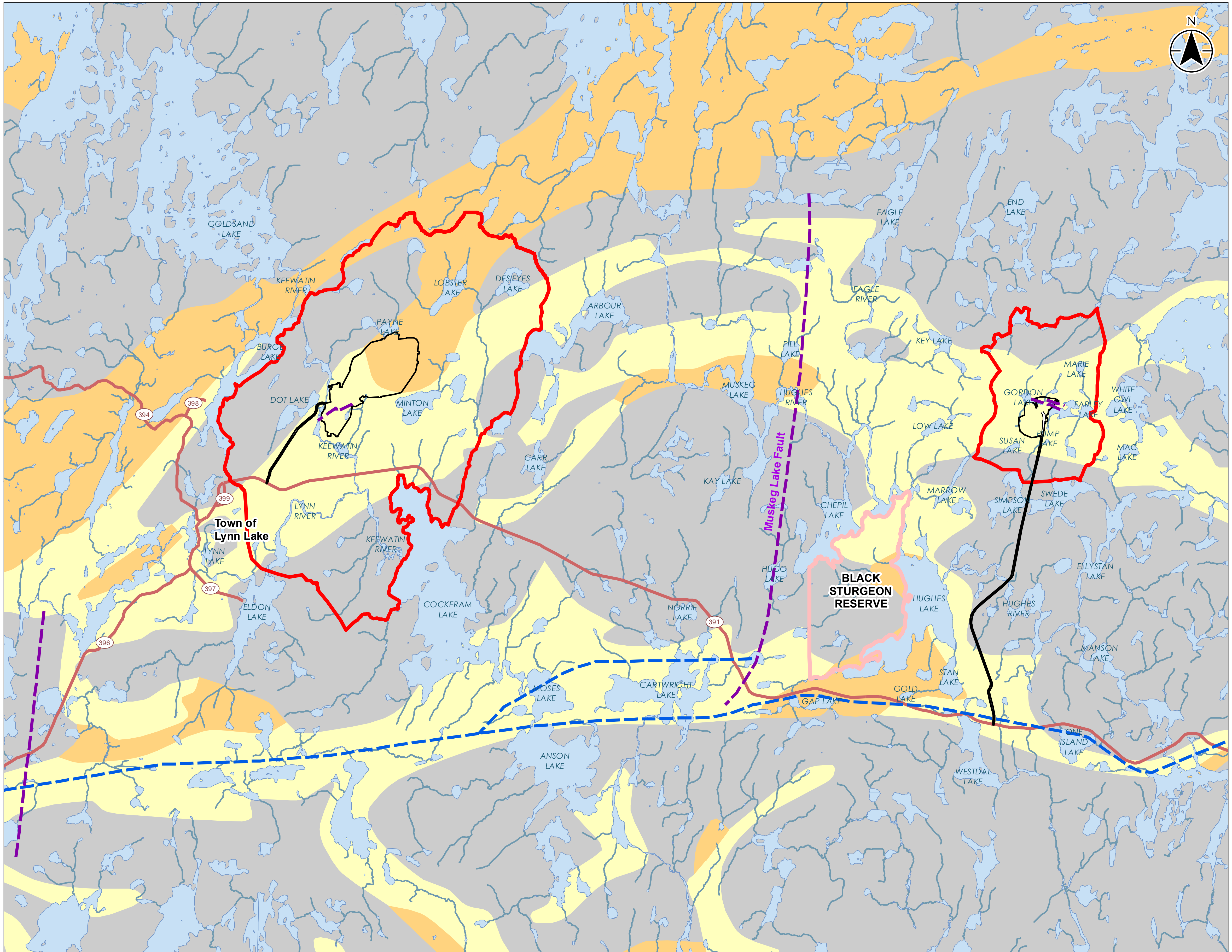
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.

5

Title

Surficial Geology



Stantec

Project Infrastructure

Project Development Area

Study Area

Local Study Area

Bedrock Geology

Intrusive Rocks

Metamorphic and Metasedimentary Rocks

Metavolcanic Rocks (includes Amisk and Wasekwan Groups and Great Island volcanic rocks)

Landbase

Approximate Location of Fault

Approximate Location of Johnson Shear Zone

Existing Access Road

Highway

Watercourse

Waterbody

First Nation Reserve

0 5 10 Kilometres

1:175,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
MacLellan and Gordon Site
Lynn Lake, Manitoba

111473008

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

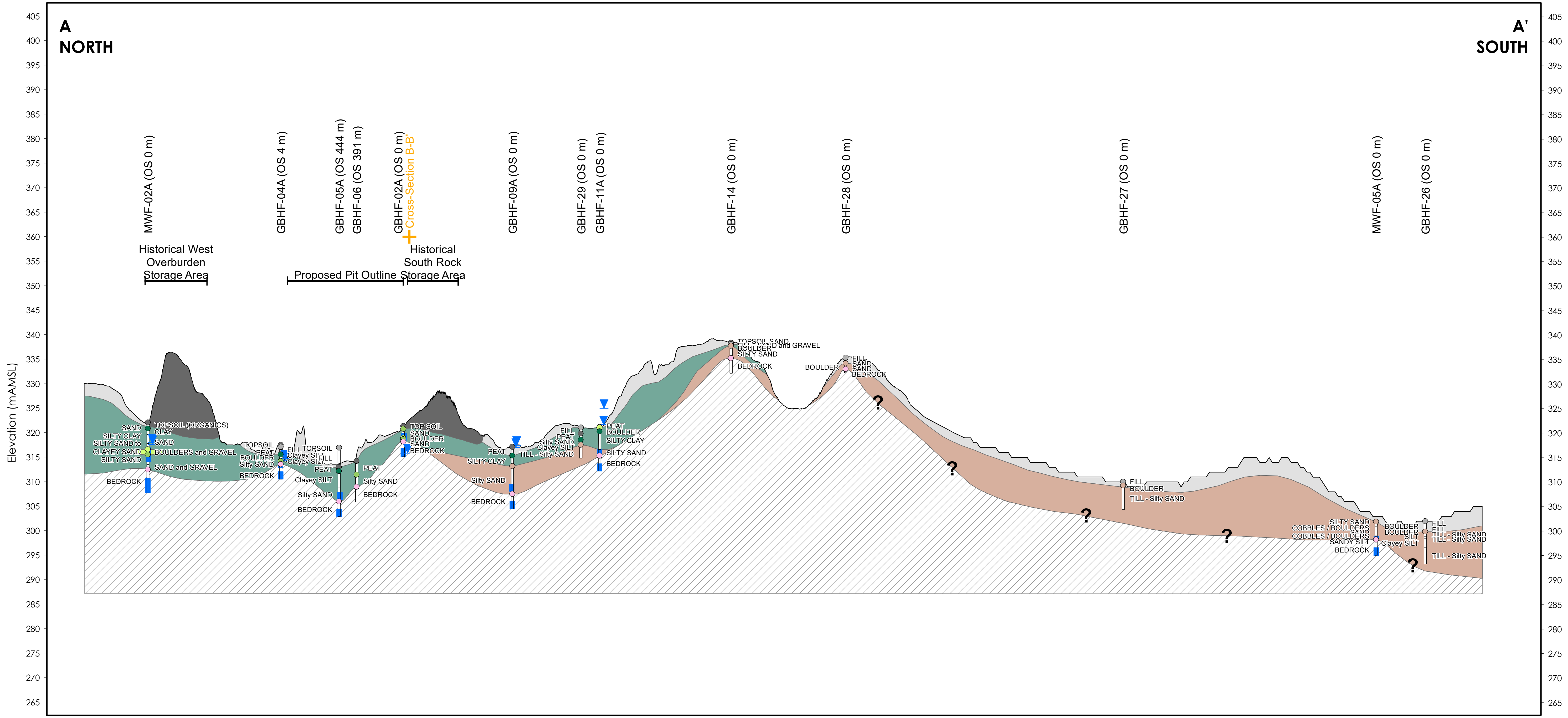
Client/Project

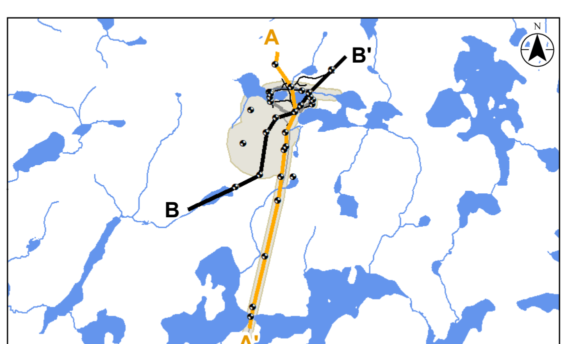
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
6

Title

Bedrock Geology





Notes

1. Manual water level measurements from September 25 to 29, 2015.

MW1-15 (OS m) — Well ID (Offset)

Stratigraphy

Water Level (June 25 to July 4, 2018)

Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock

- Ground Surface
- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

20x Vertical Exaggeration

0 — 0.5 — 1 km

1:17,500 (At original document size of 11x17)

Stantec

Alamos Gold Inc.

Project Location
Lynn Lake,
Manitoba

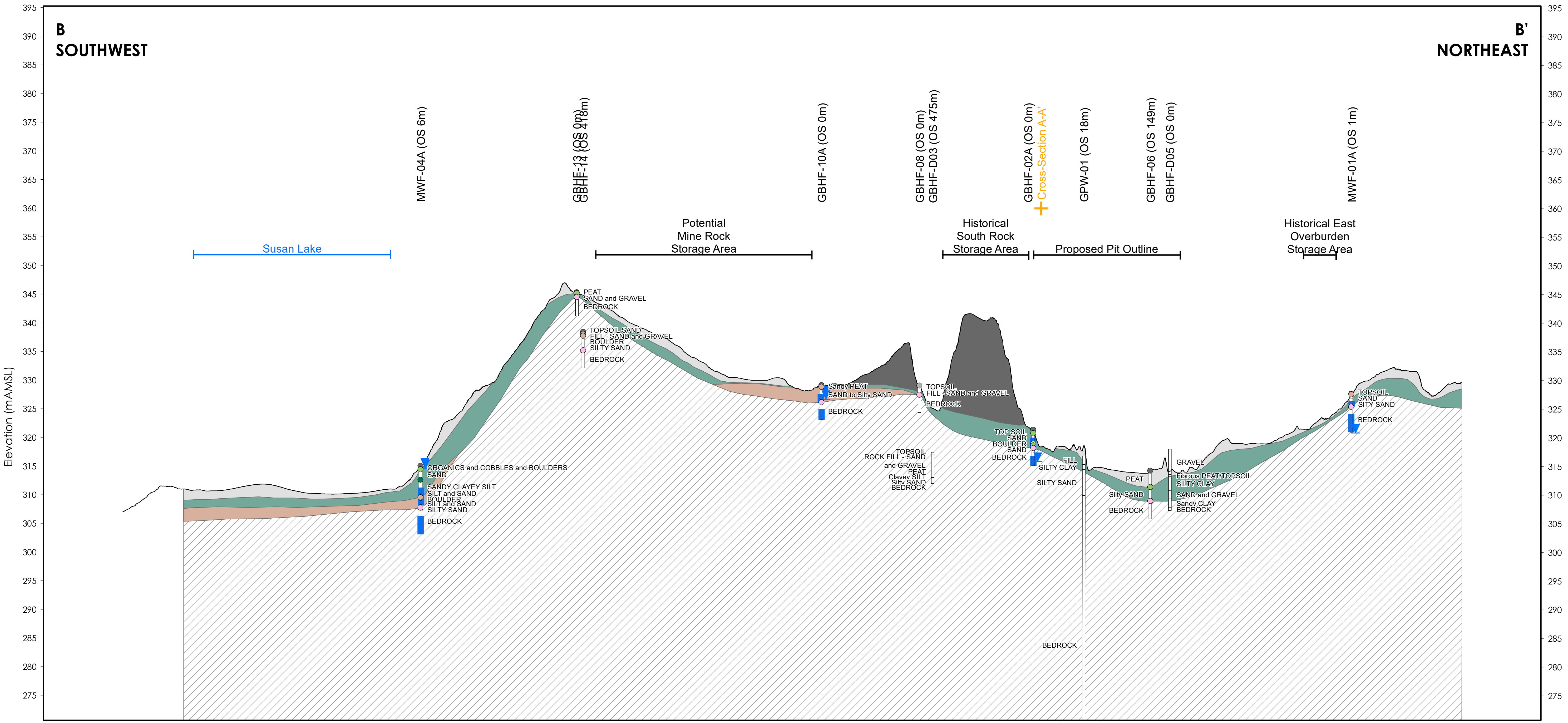
111473008
Prepared by PRM on 2019-11-18
Technical Review by JM on 2019-11-18

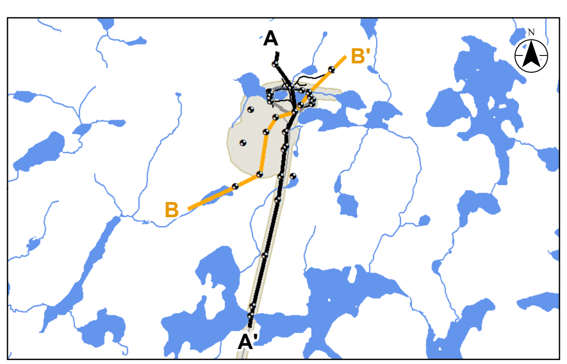
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT

Map No.
7

Title
Gordon Site
Cross-Section A-A'

Revised: 2019-11-18 By: pmoser





Notes
1. Manual water level measurements from September 25 to 29, 2015.

MW1-15 (OS m) Well ID (Offset)
Sand Stratigraphy
Water Level
(June 25 to July 4, 2018)
Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock

- Ground Surface
- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

20x Vertical Exaggeration
0 250 500 metres
1:15,000 (At original document size of 11x17)

Stantec
ALAMOS GOLD INC.

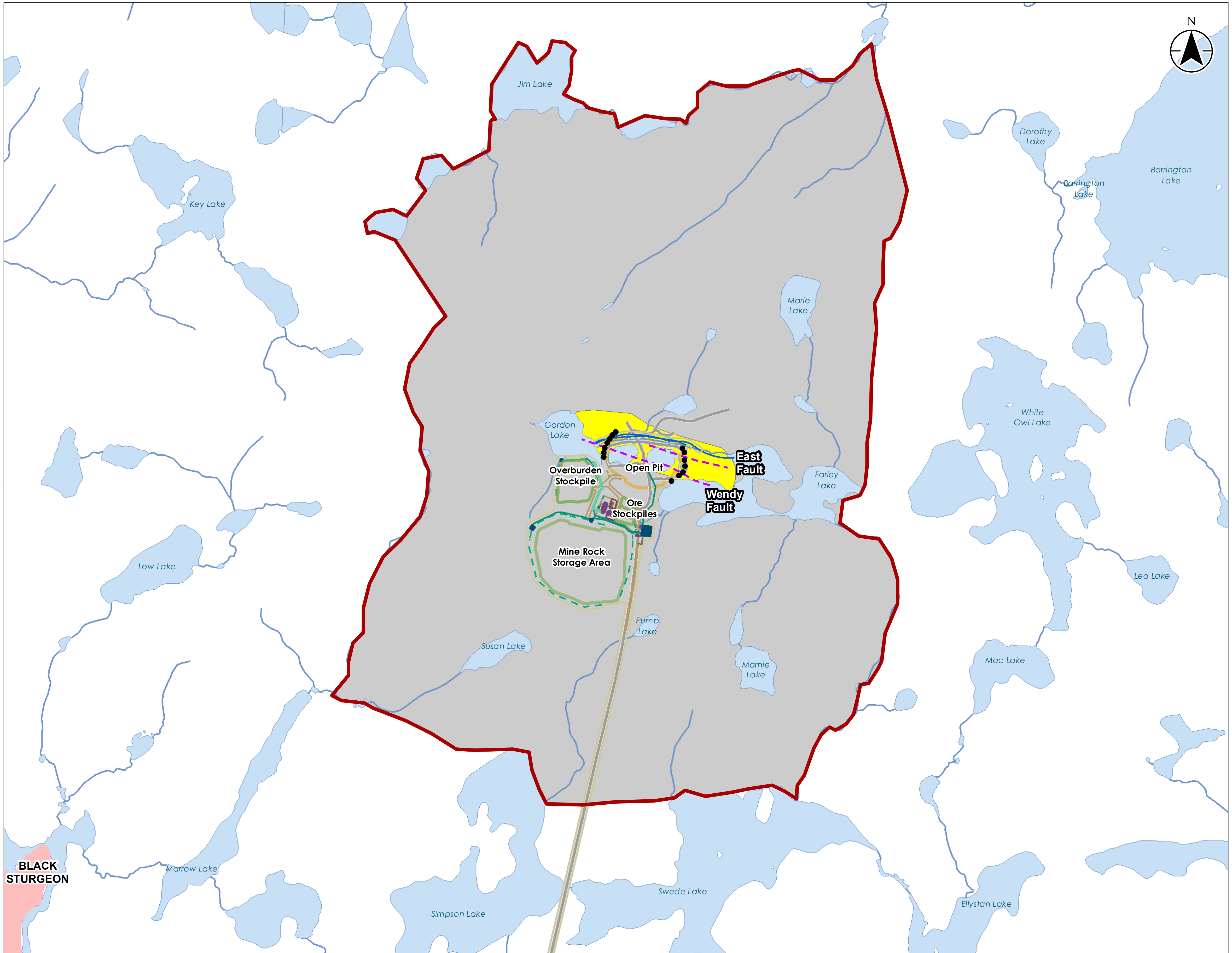
Project Location
Lynn Lake,
Manitoba

111473008
Prepared by PRM on 2019-11-18
Technical Review by JM on 2019-11-18

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT

Map No.
8

Title
Gordon Site
Cross-Section B-B'



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Channel
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Study Area

- Study Area

Groundwater Wells and Collection Pond

- Groundwater Interceptor Wells

Bedrock Geology

- Approximate Location of Fault
- Faulted Shallow Bedrock
- Shallow Bedrock

Landbase

- Existing Access Road
- Waterbody
- Watercourse

0 0.5 1 Kilometres

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473008

Gordon Site

Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-13

Technical Review by MFraser on 2020-05-13

Client/Project

ALAMOS GOLD INC.

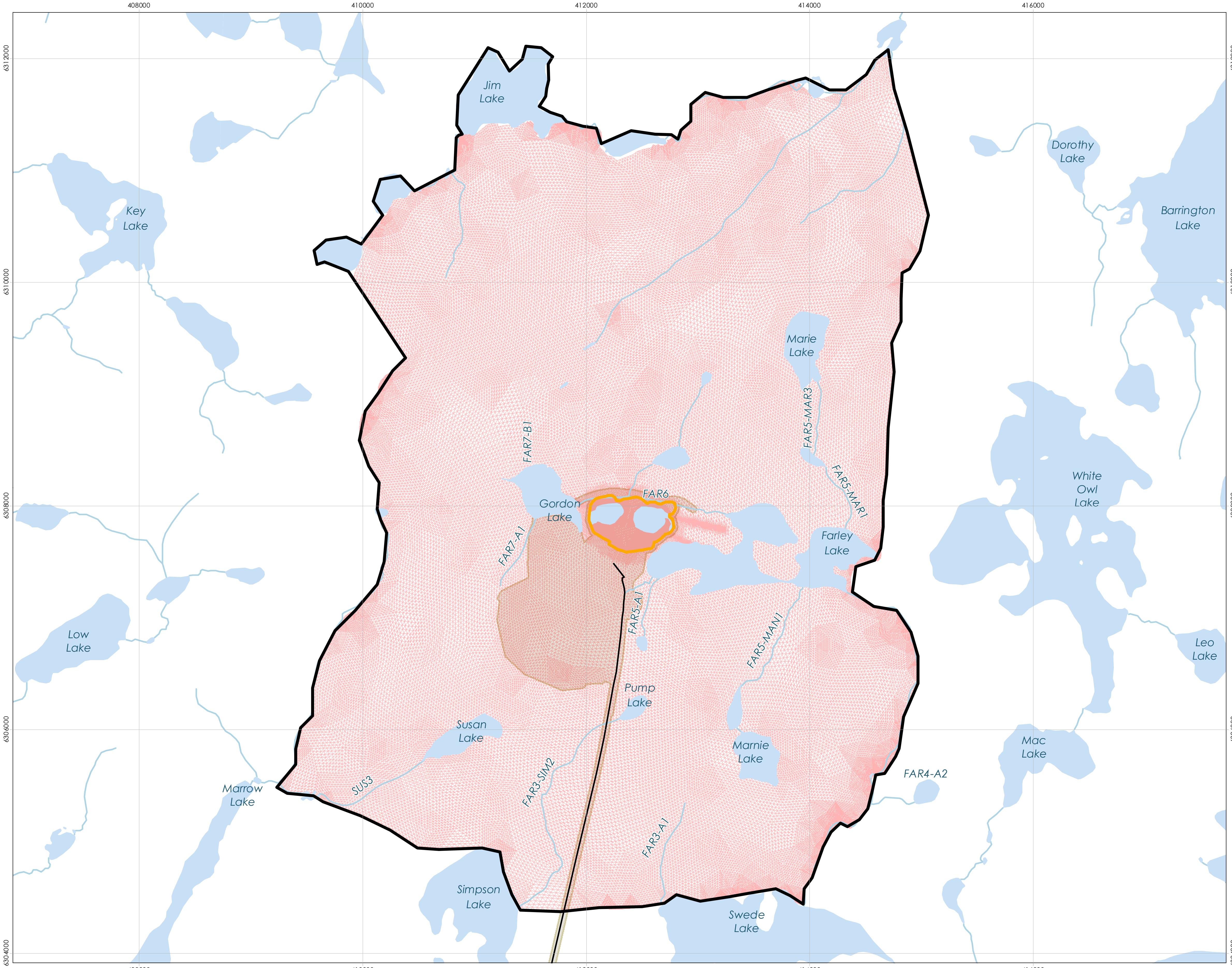
Lynn Lake Gold Project

Map No.

9

Title

Shallow Bedrock Zones - Gordon



Stantec

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)
- Model Mesh

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 0.5 1 Kilometre

(At original document size of 11x17)
1:35,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

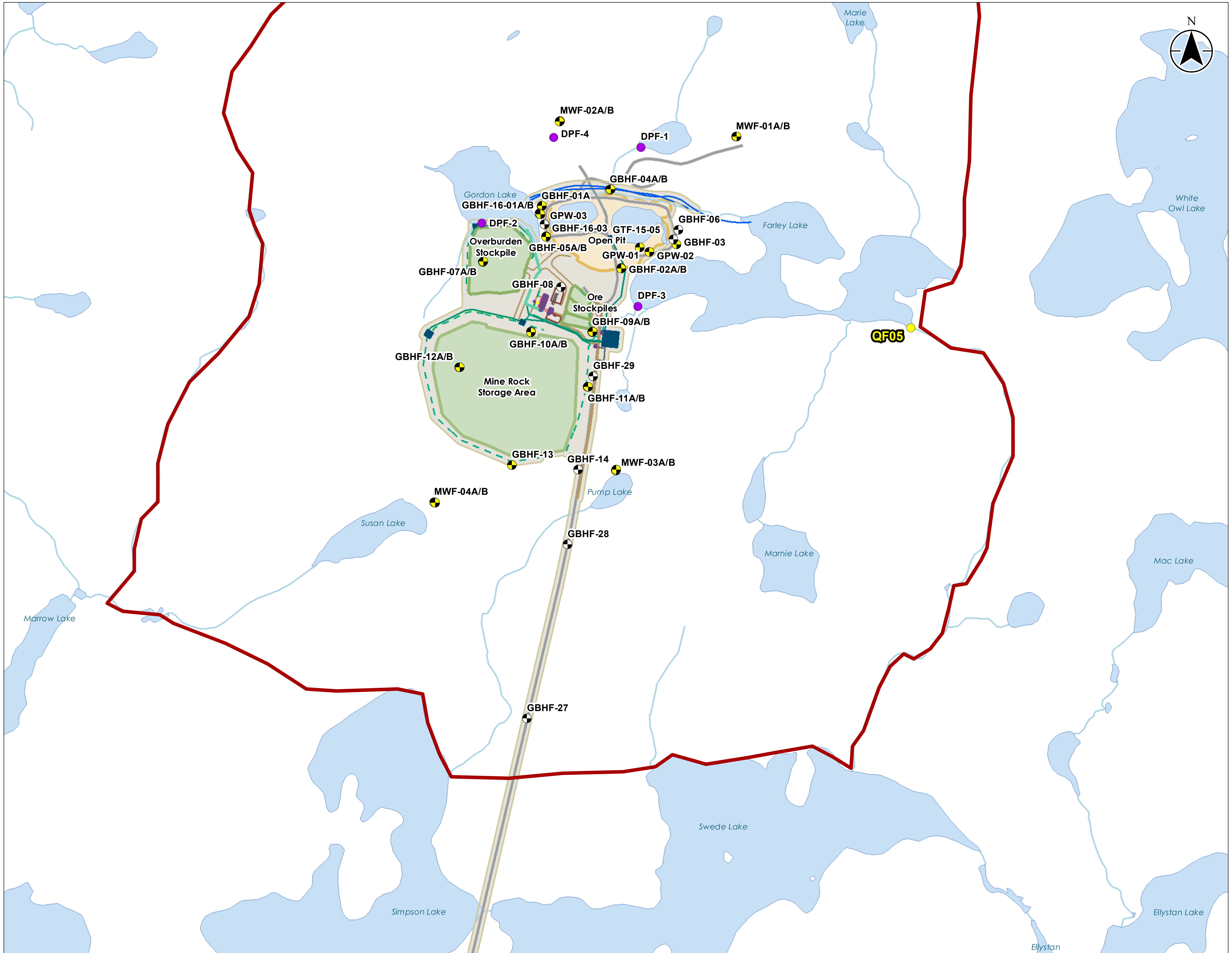
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
10

Title
Model Domain and Boundary Conditions - Gordon



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Channel
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Study Area

- Borehole
- Drive-Point Piezometers
- Monitoring Well
- Hydrology Monitoring Station
- Study Area/Model Boundary

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 500 1,000 Metres

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

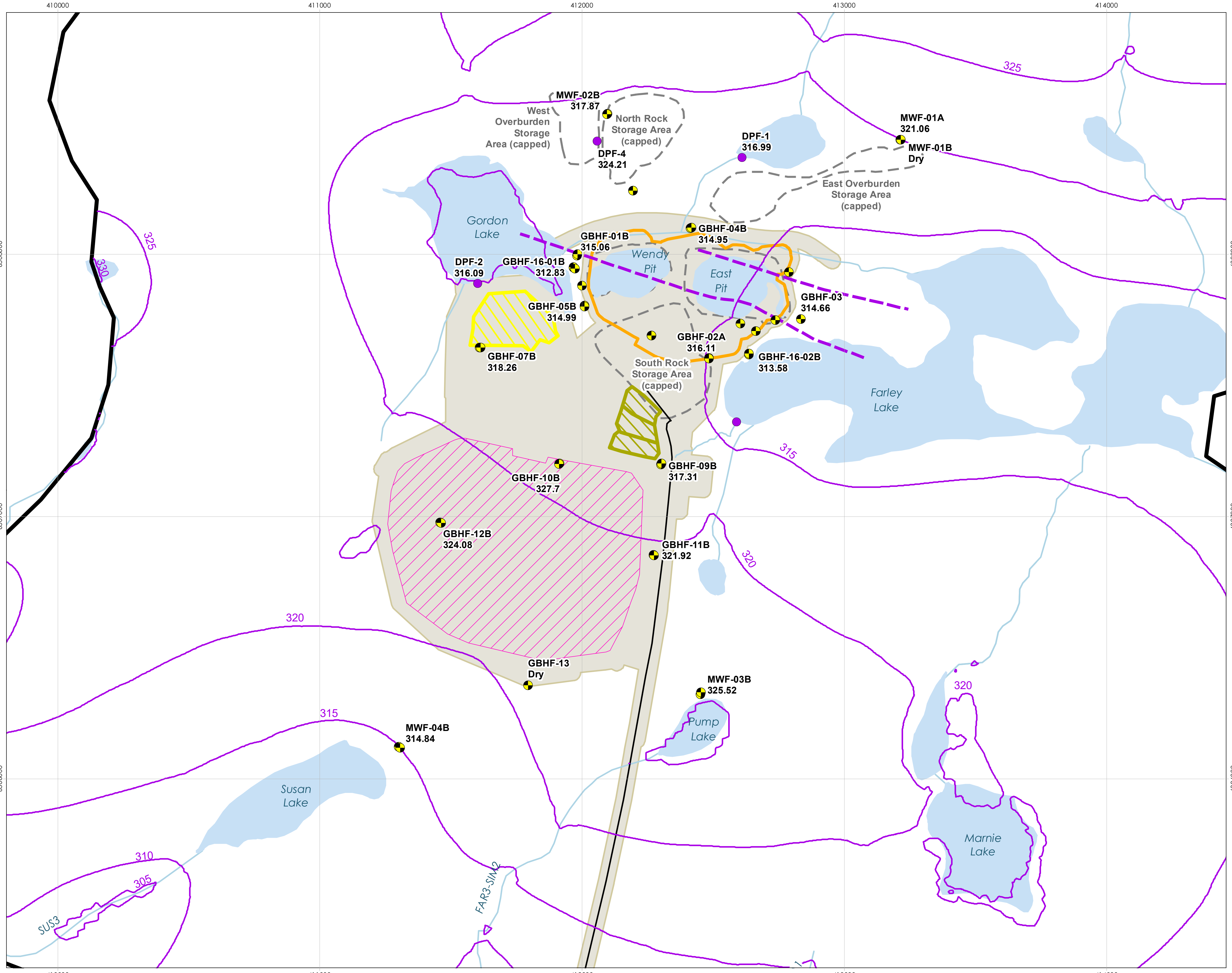
Project Location 111473008
Gordon Site
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-13
Technical Review by MFraser on 2020-05-13

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
11

Title
Location of Water Level and Baseflow Calibration Targets - Gordon



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Monitoring Well with Groundwater Elevation (mAMSL) June 25 to July 4, 2018
- Drive-Point Piezometers with Groundwater Elevation (mAMSL) June 25 to July 4, 2018
- Simulated Baseline Water Table Elevations (5 m interval)

Landbase

- Existing Access
- Fault Zone
- Watercourse
- Waterbody

N

0 150 300 Metres

(At original document size of 11x17) 1:15,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

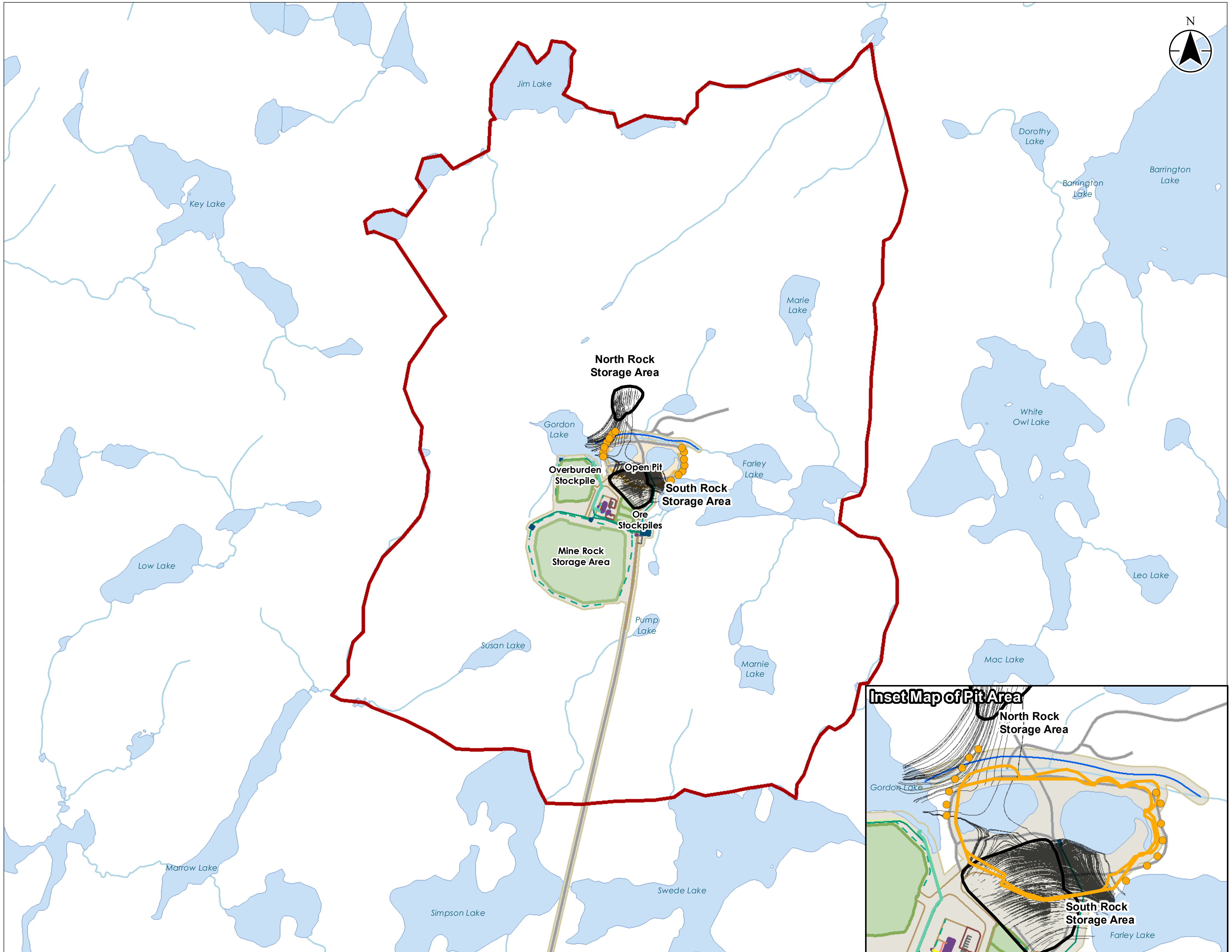
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-08
Technical Review by MFraser on 2020-04-08

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
12

Title
Baseline Water Table Elevation Contours - Gordon



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Channel
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Study Area

- Groundwater Interceptor Wells
- Particle Traces
- Study Area/Model Boundary

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres
1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473008
Gordon Site
Lynn Lake, Manitoba

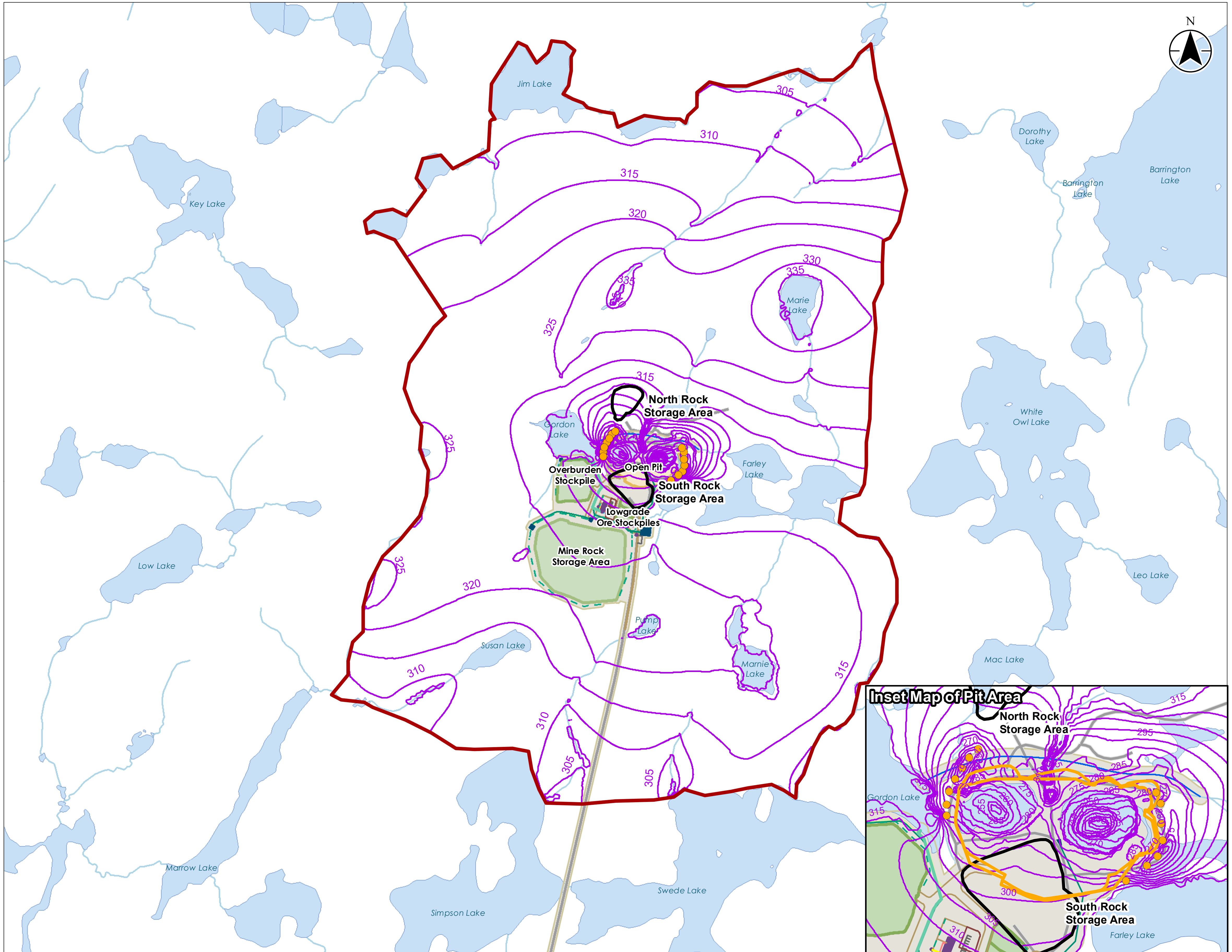
Prepared by ACampigotto on 2020-05-13
Technical Review by MFraser on 2020-05-13

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
13

Title
Baseline Particle Tracks - Gordon

\\Ca0045-pbagf01\gis\GIS_Project_Folder\111440293_AuRico\Figures\Hydro-geology\Gordon TMR 2020\Map13_BaselineParticles_Gordon_20200407.mxd Revised: 2020-05-13 By: ACampigotto



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Channel
- Fresh Water Pipe
- Sewer
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- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Study Area

- Groundwater Interceptor Wells
- Water Table Elevation Contours
- Study Area/Model Boundary

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

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1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473008

Gordon Site

Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-13

Technical Review by MFraser on 2020-05-13

Client/Project

ALAMOS GOLD INC.

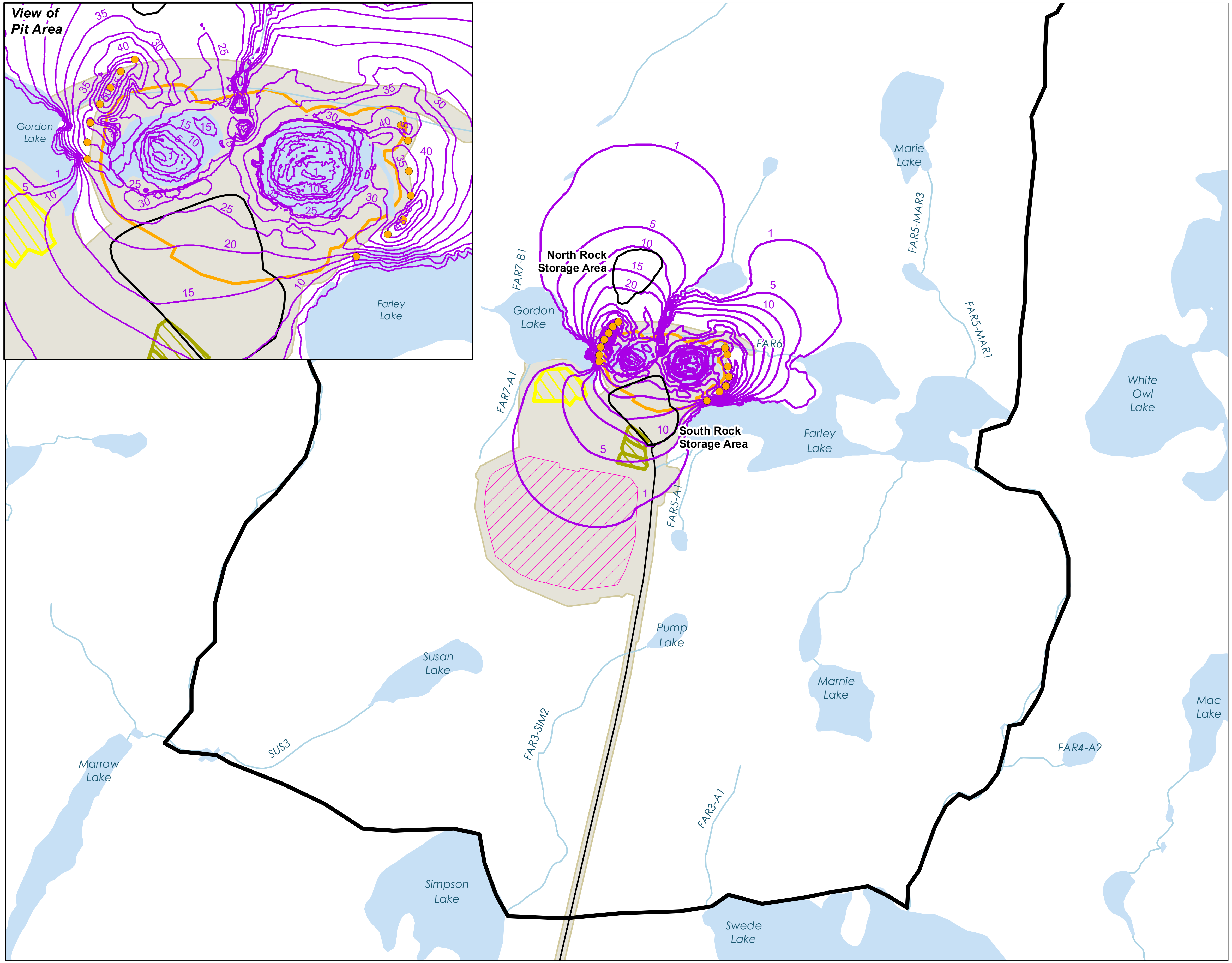
Lynn Lake Gold Project

Map No.

14

Title

Water Table Elevation Contours at End of Construction - Gordon



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase

- Existing Access Road
- Watercourse
- Waterbody

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

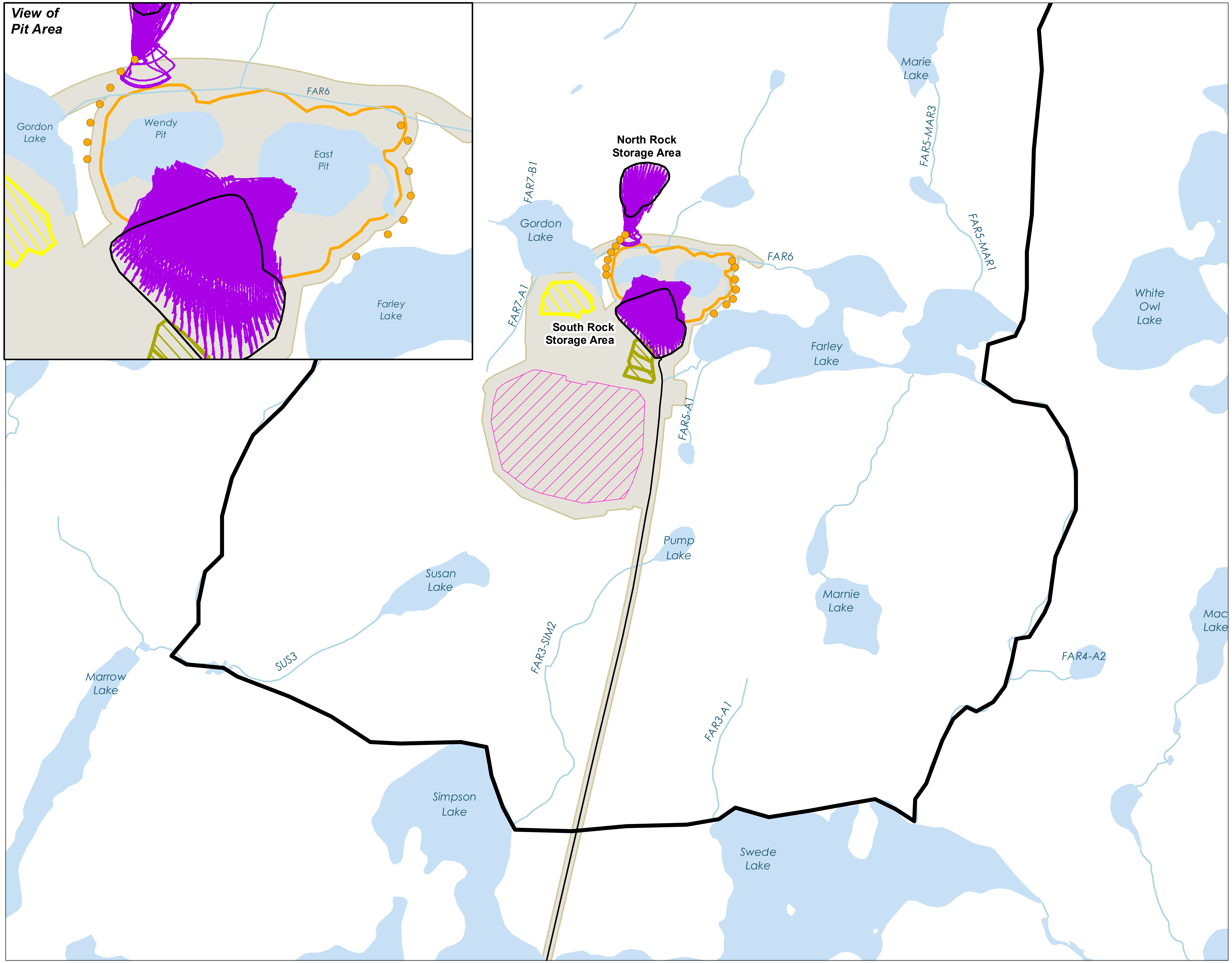
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
15

Title
Simulated Water Table Drawdown at End of Construction - Gordon Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:25,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

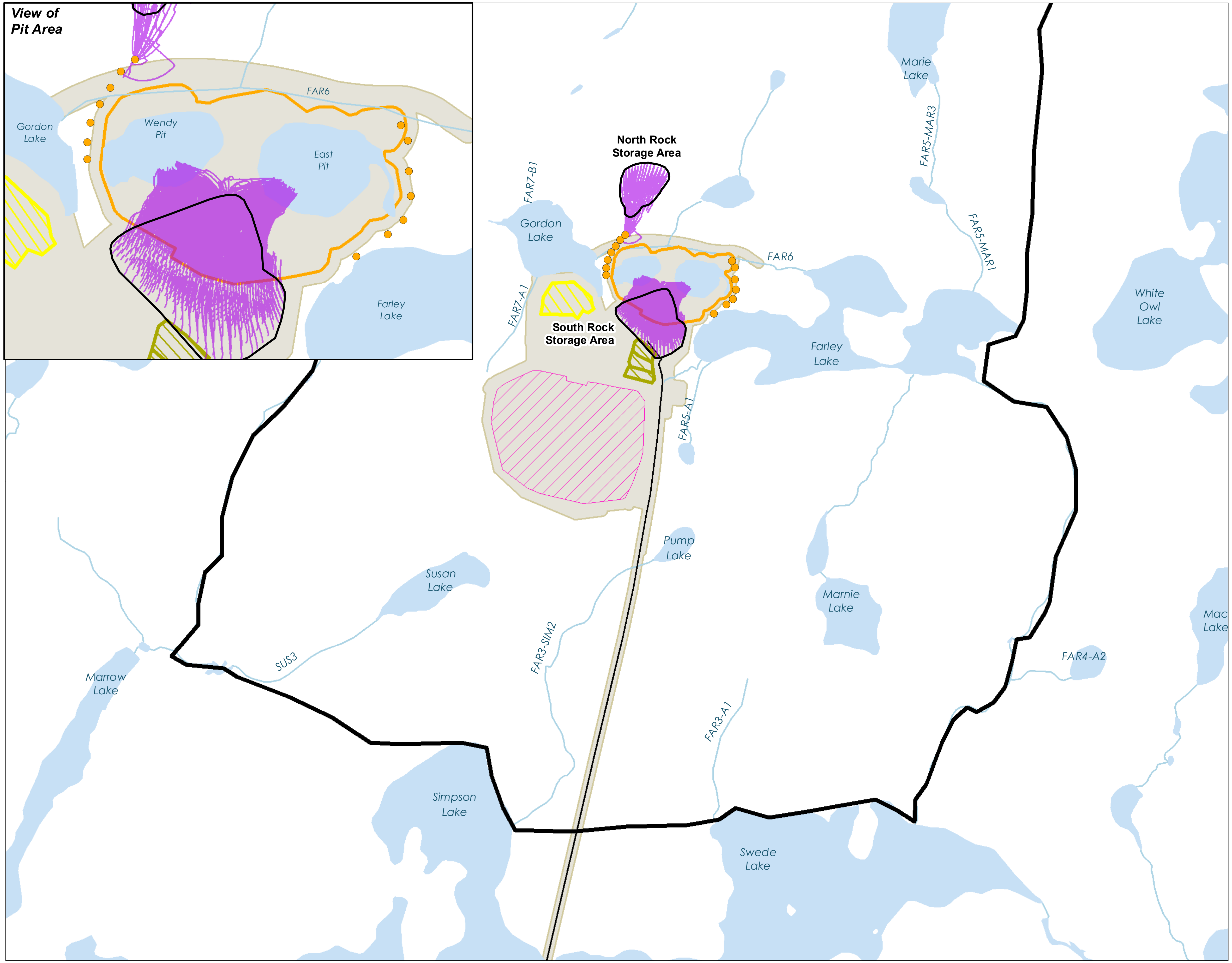
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
16

Title
Particle Traces from Historical MRSAs to Historical Pits and Receiving Environment - End of Construction, Gordon Site



Stantec

Project Infrastructure
- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area

Study Area
- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

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(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

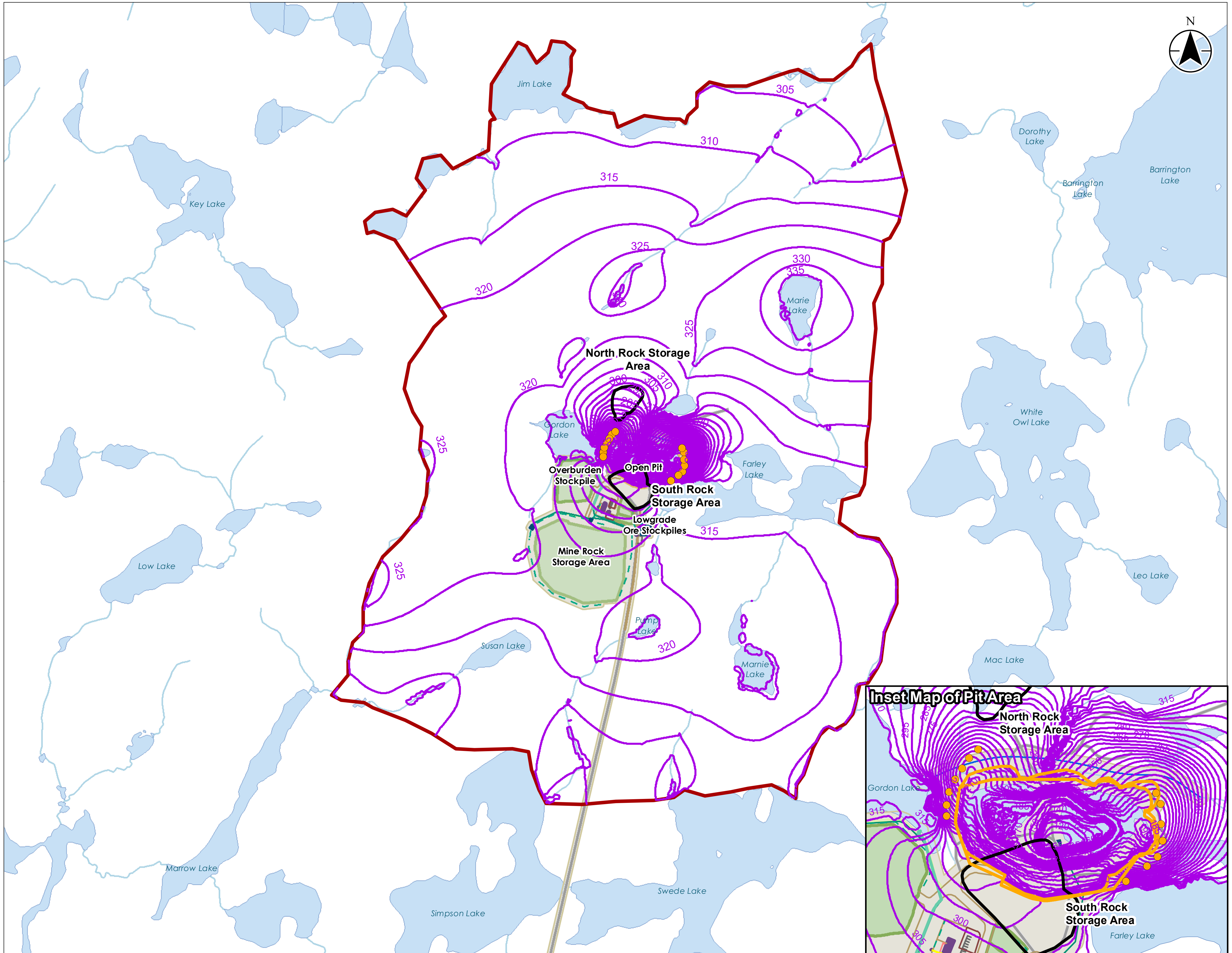
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-22
Technical Review by MFraser on 2020-05-22

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
16

Title
Particle Traces from Historical MRSAs to Historical Pits and Receiving Environment - End of Construction, Gordon Site



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
- Parking
- Diversion Channel
- Fresh Water Pipe
- Sewer
- Potable Water
- Drainage Ditch - Clean water
- Drainage Ditch - Potentially Contaminated
- Drainage Pipe
- Fire Water

Study Area

- Groundwater Interceptor Wells
- Water Table Elevation Contours
- Study Area/Model Boundary

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

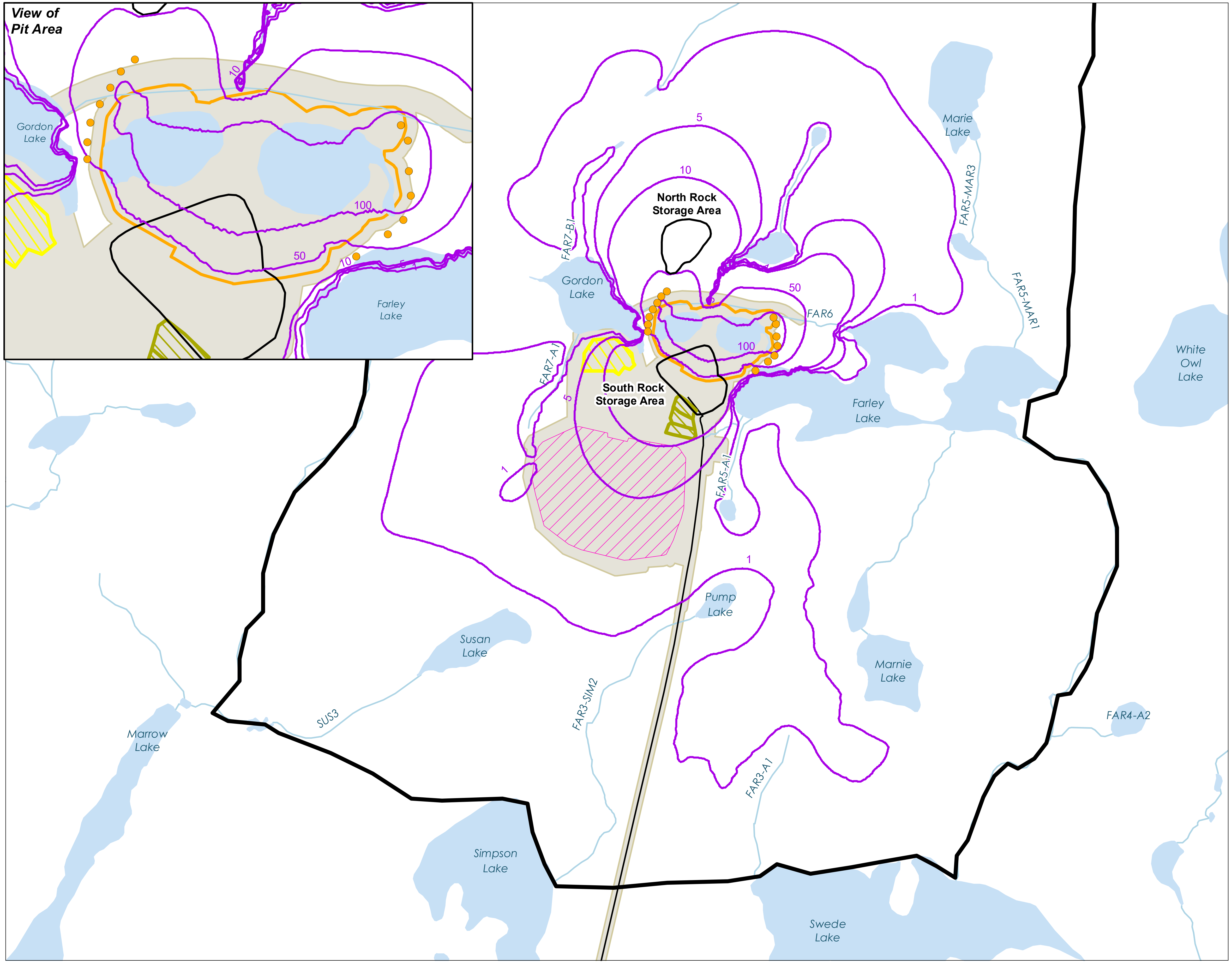
Project Location 111473008
Gordon Site
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-13
Technical Review by MFraser on 2020-05-13

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
17

Title
Water Table Elevation Contours at End of Operation – Gordon



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

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(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

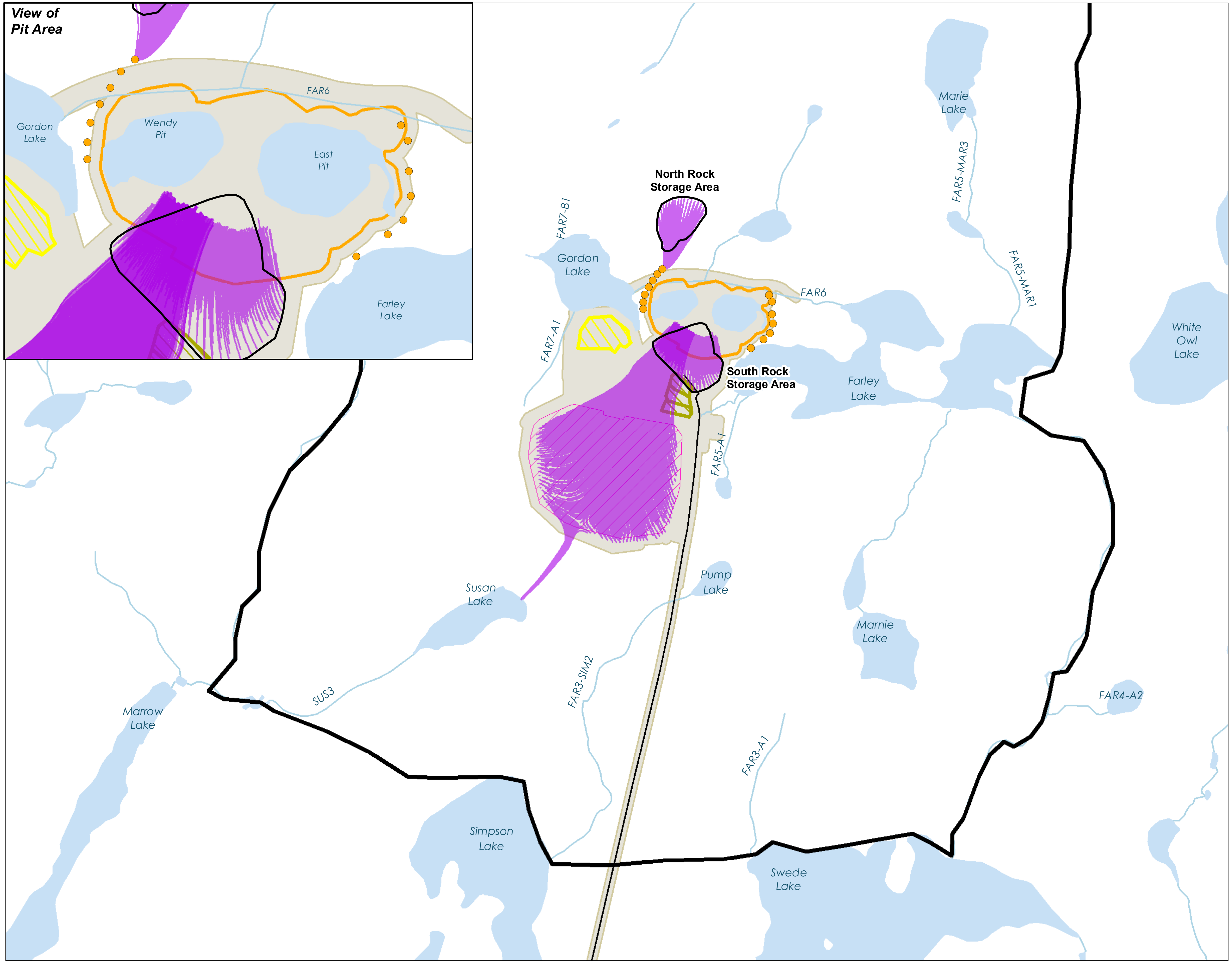
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
18

Title
Simulated Water Table Drawdown at End of Operation - Gordon Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:25,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

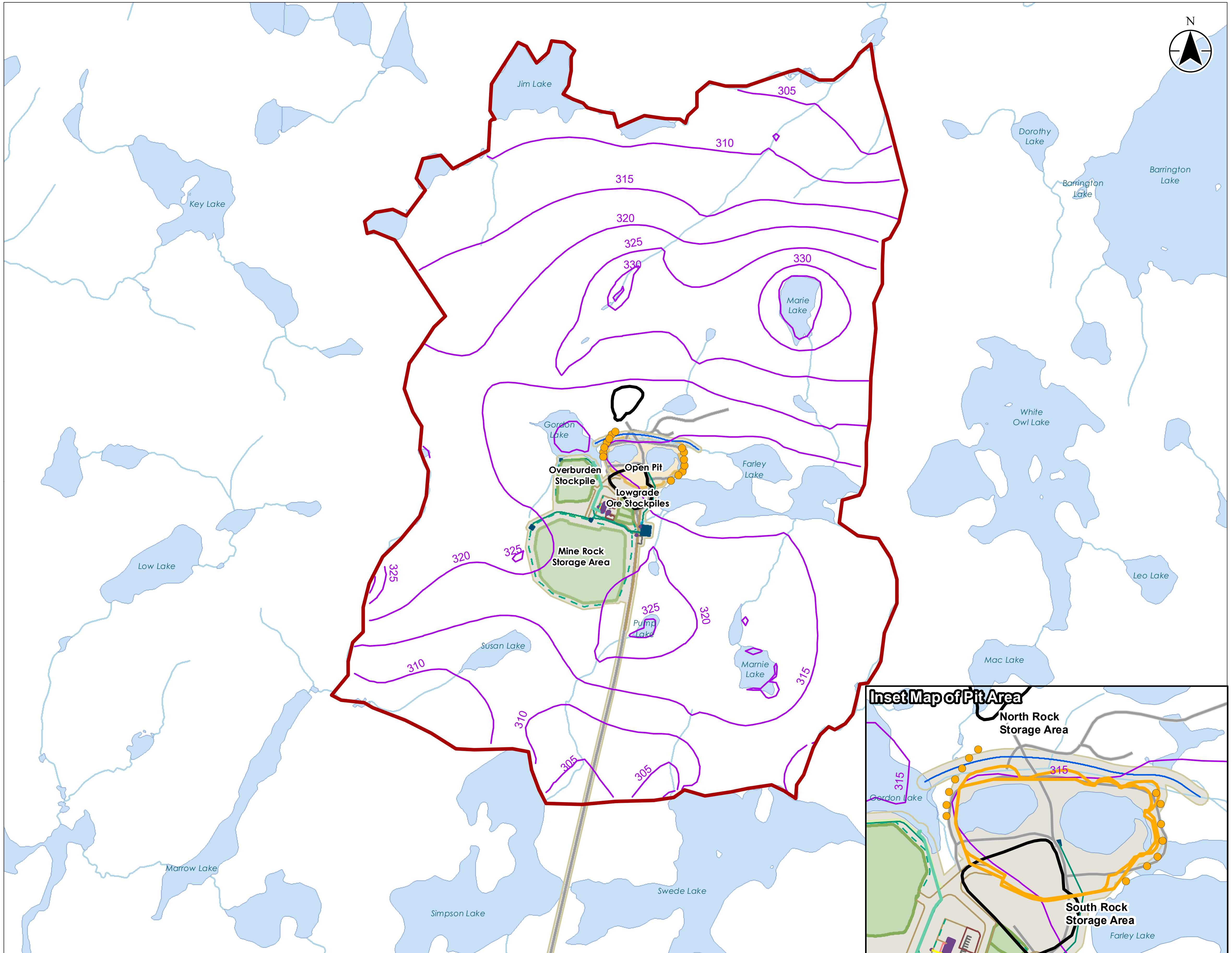
Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-05-22
Technical Review by MFraser on 2020-05-22

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
19

Title
Particle Traces from MRSAs to Open Pit and Receiving Environment under Dewatering Conditions (Year 6) - Gordon Site



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Buildings
- Pond

Site Access

- Proposed Site Access Road
- Drainage Road

Other Infrastructure

- Construction Temporary Facility
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- Drainage Ditch - Clean water
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- Drainage Pipe
- Fire Water

Study Area

- Groundwater Interceptor Wells
- Water Table Elevation Contours
- Study Area/Model Boundary

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473008

Gordon Site
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-13
Technical Review by MFraser on 2020-05-13

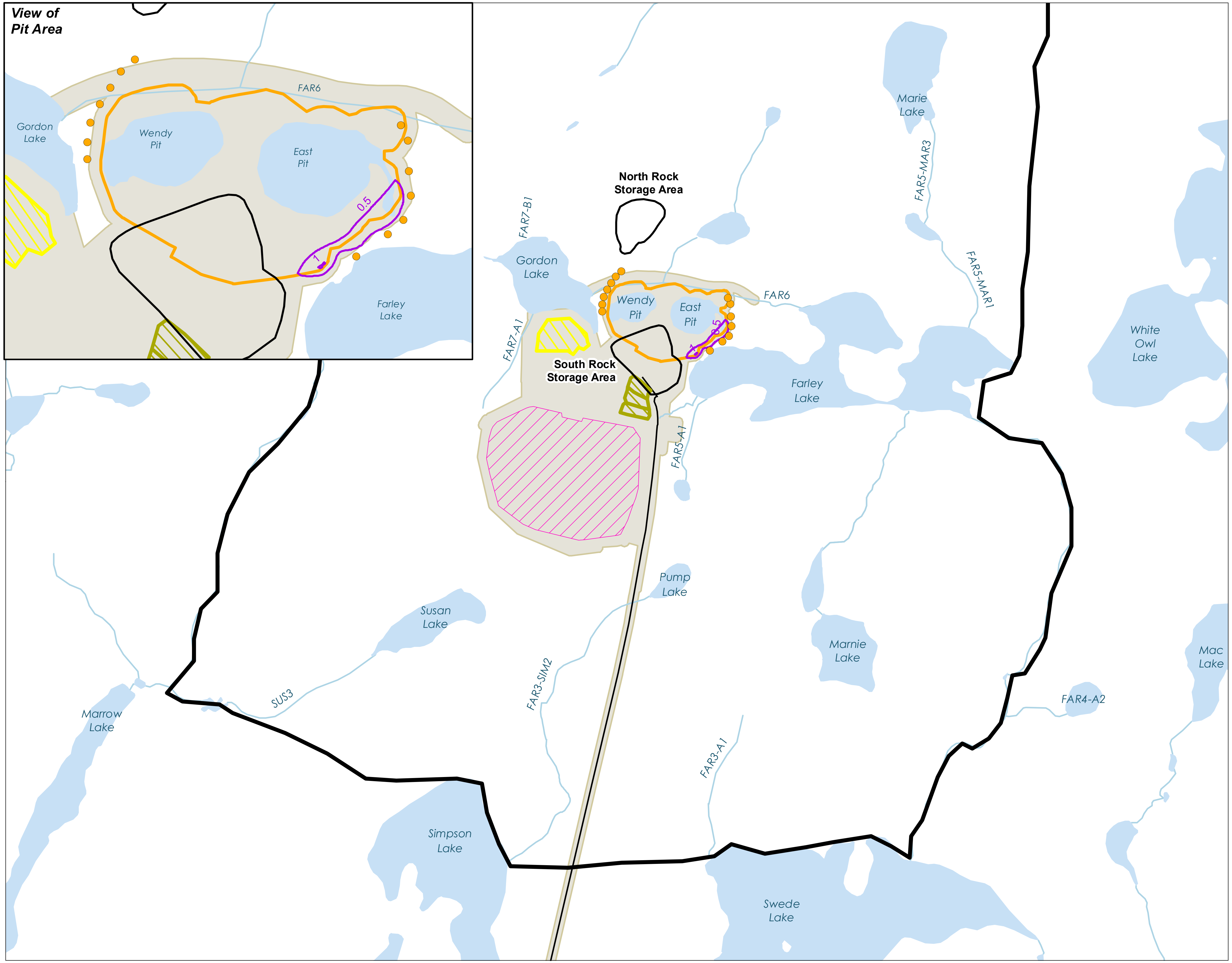
Client/Project

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
20

Title

Water Table Elevation Contours at Closure - Gordon



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:25,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

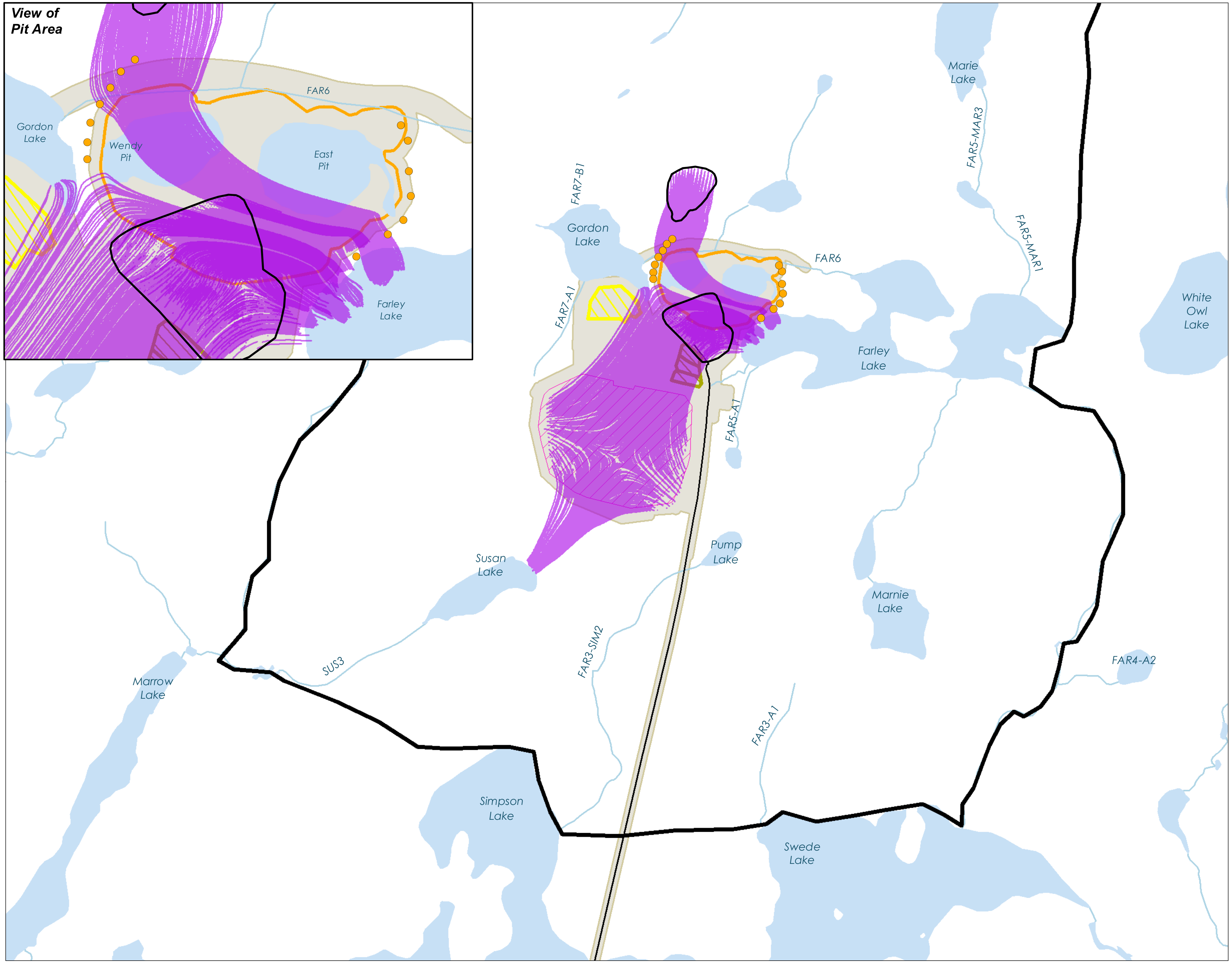
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
21

Title
Simulated Water Table Drawdown at Closure - Gordon Site



Stantec

Project Infrastructure

- Proposed Open Pit
- Potential Ore Stockpile
- Potential Mine Rock Storage Area
- Potential Overburden Stockpile
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:25,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-22
Technical Review by MFraser on 2020-05-22

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
22

Title
Particle Traces from MRSAs at End of Closure (Pit Lake) - Gordon Site

Lynn Lake Gold Project Hydrogeology Assessment – MacLellan Site

Technical Modelling Report

April 8, 2020

Prepared for:

Alamos Gold Inc.
Brookfield Place, 181 Bay Street
Suite 3910
Toronto, ON M5J 2T3

Prepared by:

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB R3B 2B9

111473010

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Abbreviations

Alamos	Alamos Gold Inc.
AMSL	above mean sea level
BGS	below ground surface
cm	centimetre
Diamicton	glacial diamicton
EA	Environmental Assessment
EIS	Environmental Impact Statement
EOM	end of mining
EPM	equivalent porous media
FTM	freeze-thaw model plugin for FEFLOW
km	kilometres
LLGP/the Project	Lynn Lake Gold Project
LOM	life of mine
m	metre
mm	millimetre
mm/yr	millimetres per year
m/s	metres per second
m^3/s	cubic metres per second
MRSA	mine rock storage area
NSZ	North Shear Zone
PEST	parameter estimation code
RMS	root mean squared

Q	discharge
TDR	Technical Data Report
TMF	tailings management facility
TMR	Technical Modelling Report

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: the 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open pit gold mines at both these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle) (Map 1, Appendix A). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This Hydrogeology Technical Modeling Report (TMR) for the MacLellan site has been prepared to assess the potential effects of the construction, operation, and closure phases of the Project on groundwater resources and the consequent indirect effects on surface water resources at the MacLellan site. The TMR considers the MacLellan site components of the Project, baseline data collected for the Project since 2015, and comments received from agencies, Indigenous communities, and other stakeholders.

To evaluate the effects of the Project, a groundwater flow model has been developed for the MacLellan site to provide estimates of:

- Changes in groundwater levels (drawdown), including changes to water table position and groundwater flow, due to dewatering of the MacLellan open pit.
- The time to fill the MacLellan open pit from groundwater inflow for use as an input to the water balance modelling conducted for the Project.
- Groundwater flow and discharge to wetlands, creeks and lakes under baseline, operation, and closure.
- Groundwater recharge and flow pathways from historical mine rock piles, overburden storage area, TMF, and MRSA developed for the Project under operation and closure.

This TMR, and a companion TMR conducted for the Gordon site (Stantec 2020b), form part of the supporting documentation for the Environmental Impact Statement (EIS)/Environmental Assessment (EA) completed for the Project.

2.0 BACKGROUND

This section provides an overview of the existing conditions that were used as background for the MacLellan site hydrogeology model development. More detailed information is presented in the following reports:

- Hydrogeology Baseline Technical Data Report (Stantec 2017c)
- Hydrology Baseline Technical Data Report (Stantec 2017b)
- Hydrogeology Technical Data Report: Validation Report (Stantec 2020a)
- Hydrology Baseline Technical Data Report: Validation Report (Stantec 2020c)

2.1 HISTORICAL MINING OPERATIONS

Historical mining operations at the MacLellan site consisted of the development of an underground mine to a depth of 448 m with five operating levels (Map 2) and a MRSA. The following is a summary of the historical mining operations described by Tetra Tech (2013).

The underground mine was active between 1986 and 1989 and produced 144,000 oz of gold and 432,000 oz of silver from a production rate of about 900 to 1,200 tpd. The shaft was first sunk in 1969 and extended to a depth of 149 m, which was then deepened to 259 m between 1980 and 1985. In 1986, the shaft was deepened to 448 m and production commenced. Ramp access from surface extends to 420 m.

The mine operated under a license that allowed for the discharge of mine water and sewage-plant effluent into polishing ponds and a marshy area adjacent to the Keewatin River. Mining continued through to 1989 when production ceased due to high operating costs and falling gold prices. From 1989 to 2000, additional drilling, trenching over crown pillar, geological mapping, and channel sampling was completed. In 2000, the mine was allowed to flood. The site has been in a state of 'care and maintenance' since 1989 with very little reclamation. Existing historical mine infrastructure includes the head frame, hoist house, maintenance building, and core shack and an historical MRSA. The historical MRSA shown on Map 2 contains surplus mine rock from historical mining operations at the MacLellan site.

2.2 CLIMATE

The climate and meteorology of the MacLellan site are detailed in the Climate and Meteorology Baseline Technical Data Report (Stantec 2017a). The Lynn Lake area has a climate typical of Northern Manitoba. The nearest permanent weather monitoring stations are Environment and Climate Change Canada stations 5061645 and 5061649, located at the Lynn Lake Airport. Climate normals (1981-2010) average temperature, precipitation, total rainfall, and total snowfall statistics for the Lynn Lake Airport are summarized in Table 2-1.

Table 2-1 Climate Normals (1981 to 2010) Statistics at Lynn Lake Airport

Month	Monthly Average Temperature (°C)	Average Total Precipitation (mm)	Average Total Rainfall (mm)	Average Total Snowfall (cm)
January	-24	20	0.2	28
February	-20	16	0.1	24
March	-13	20	1.4	25
April	-3.1	24	4.5	24
May	5.6	37	27	10
June	13	62	61	1.3
July	16	85	85	0.1
August	15	69	69	0.1
September	7.7	61	57	3.5
October	-0.6	38	12	31

Month	Monthly Average Temperature (°C)	Average Total Precipitation (mm)	Average Total Rainfall (mm)	Average Total Snowfall (cm)
November	-13	27	0.8	36
December	-21	19	0.1	26
Annual	-3.2	478	318	208

The average monthly temperature is normally above freezing from May to September. The annual total precipitation for the region is 478 mm using the 1981 to 2000 climate normals, with 34% occurring as snow and 66% as rain. July typically receives the most monthly precipitation and February the least.

2.3 PHYSIOGRAPHY, TOPOGRAPHY, AND DRAINAGE

The MacLellan site is surrounded by vegetated land, forest cover, scattered lakes, watercourses, and wetlands and is located within areas of discontinuous permafrost cover.

Regional topography around the MacLellan site slopes from a high of 375 m above mean sea level (AMSL) in the west and northwest to a low of 325 m AMSL in the southeast (Map 4). The ground surface is characterized as hummocky with steeply sloping rocky ridges that may extend 30 m to 60 m above lakes and peat-filled depressions. Surface water features and peat deposits generally occupy the topographic lows.

2.4 REGIONAL GEOLOGIC CONTEXT

A summary of the regional geology is provided below. Additional information on the regional and local geology is provided in the Hydrogeology Baseline Technical Data Report (Stantec 2017c) and subsequent validation report (Stantec 2020a).

2.4.1 Overburden Geology

The regional surficial geology has been mapped by the Geological Survey of Canada as shown on Map 5 (Kaszycki et al. 2008). During the Late Wisconsinan period, the advance of the Keewatin ice centre (part of the Laurentide Ice Sheet) deposited glacial diamicton (diamicton) derived from the crystalline bedrock of the Canadian Shield. Meltwaters, resulting from the retreat of glacial ice, eroded and cut through the various glacial deposits and resulted in deposition of glaciofluvial sediments that are typically stratified and sorted to varying degrees. As the ice retreated, glacial Lake Agassiz was formed and resulted in the deposition of glaciolacustrine laminated silt and clay.

2.4.2 Bedrock Geology

The bedrock geology of the area has been described in detail by the Manitoba Geological Survey. The Gordon and MacLellan sites are located within part of the Lynn Lake greenstone belt, which is located in the Churchill Structural Province of the Canadian Shield. Map 6 presents the regional bedrock geology. The Lynn Lake greenstone belt is comprised of metamorphosed volcanic rocks of the Wasekwan Group, metamorphosed sedimentary rocks of the Sickle Group, and plutonic intrusions. The Lynn Lake greenstone belt trends west to east and extends 130 km from the La Ronge greenstone belt in Saskatchewan (MEM 1986). Structural processes altered the Lynn Lake greenstone belt into two belts (north belt and south belt), that are separated by felsic intrusions (Beaumont-Smith and Böhm 2003). The north and south belts differ by stratigraphic sequences, chemistry, and structure (MEM 1986).

The Gordon and MacLellan sites are located within the north belt, which is characterized as a north-dipping homocline comprised of rhyolite, overlain by andesite and sedimentary rocks, and an upper unit of basaltic rocks (MEM 1986). The north belt includes the unique stratigraphic sequence known as the Agassiz Metallotect (also termed “Rainbow Trend”) (Map 6), which consists of picritic flows, iron formation, and felsic volcanic rocks. The metallotect hosts the gold deposits of the Gordon and MacLellan sites. South of the properties lies the south belt, which consists of volcanic and sedimentary rocks and the east-west trending structural feature identified as the Johnson Shear Zone (Map 6). In some areas, these weathered shear zones may have been preferentially eroded because of the orientation of the shear zone relative to the direction of ice movement and the competence of the weathered bedrock in the shear zone relative to the surrounding bedrock units (Machibroda Engineering 1988).

The MacLellan site has three mineralized deposits, the Rainbow-Dot Deposit, the MacLellan Deposit, and the Nisku Deposit. The three deposits are located south of a major east-west trending North Shear Zone (NSZ) fault, which strikes southeast (065°) and dips 75° to 85 to the north (Map 4).

3.0 CONCEPTUAL MODEL

3.1 MODELLING APPROACH

The development of a conceptual model is the fundamental first step in the preparation of a numerical groundwater model. The conceptual model combines the available hydrologic and hydrogeologic data from a site and allows for the interpretation of the hydrostratigraphy and boundary conditions so they can be entered into a numerical groundwater flow model. The general approach used to develop the conceptual and numerical model was to add complexity as warranted by the available data to achieve the objectives of the numerical modelling (see Section 1.1).

The development of the conceptual model was facilitated by the use of the geologic modelling software, Leapfrog Hydro® Version 2.5.2. The software was used to create three-dimensional (3D) volumes for each of the defined hydrostratigraphic units in the conceptual model. Inputs for volume generation included wireframes for the ground surface topography, structural features, historical underground workings, as well as contact points for the various lithologies defined from borehole and outcrop data. The conceptual model built using Leapfrog Hydro® software can be transferred directly to popular hydrogeology modelling software, including MODFLOW and FEFLOW.

3.2 CONCEPTUAL MODEL BOUNDARIES

The conceptual model boundaries were defined to coincide with or extend beyond the proposed limits for the groundwater flow model. Natural hydrologic and hydrogeologic boundaries such as watershed boundaries and surface water bodies were used to define the lateral extent of the conceptual model. The boundaries of the conceptual model correspond with the study area illustrated on Map 3. The model boundaries coincide with watershed boundaries as defined in the Hydrology Baseline Technical Data Report (Stantec 2017b). The boundaries of the conceptual model were constrained vertically by ground surface topography and extended 50 m below the base of the proposed open pit.

The conceptual model and groundwater flow model were developed based on the geologic and hydrogeologic data presented in the Hydrogeology Baseline Technical Data Report (Stantec 2017c). The data collected following this date and included in the groundwater data validation report (Stantec 2020a) were reviewed to confirm the model. The model was determined to not require edits based on the additional data collected.

3.3 HYDROSTRATIGRAPHY

The following hydrostratigraphic units are interpreted within the study area and are incorporated into the conceptual model. Details for each hydrostratigraphic unit are summarized in Sections 3.3.1 to 3.3.5:

- Historical Mine Rock
- Organics
- Glaciolacustrine
- Sand Diamicton
- Bedrock

Cross-sections depicting the geological interpretation of the hydrostratigraphic units across the study area are shown on Maps 7 to 9. The cross-section locations are presented on Map 4. Additional description of the hydrostratigraphic units is presented below, including references to monitoring well locations, where appropriate.

3.3.1 Historical Mine Rock Storage Area

A historical MRSA, identified on Map 2, contains surplus mine rock from historical mining operations at the MacLellan site. This historical MRSA was not capped or covered following the closure of historical mining activities. Hydraulic testing of the historical mine rock was not completed due to their expected high hydraulic conductivity values and limited extent below the water table. Typical testing methods are difficult to perform under these conditions. Based on the grain size and material descriptions, hydraulic conductivity values for historical mine rock were assumed to vary between 1×10^{-3} and 1×10^{-2} metres per second (m/s) during model calibration. This range is consistent with the reported hydraulic conductivity for gravel (Freeze and Cherry 1979).

3.3.2 Organics

Organic deposits in the form of fibric peat and topsoil were observed at ground surface throughout the study area. Fibric peat is the least decomposed type of peat and generally consists of greater than 30% organic material or greater than 17% organic carbon. Topsoil was observed in upland portions of the landscape and was characterized as mineral soil with minor enrichment of organic material. Typical thicknesses were less than 1 m, but accumulations of up to 3.6 m were observed in low-lying areas such as at monitoring well GBHM-22. Organic deposits were found underlying surficial fill in boreholes completed along the access road.

Hydraulic testing of the organic deposits was not completed due to their shallow nature and thickness. Hydraulic conductivity values from literature cover a wide range and are dependent on the texture of the sediments composing the organic deposit. Based on the geology and material descriptions, hydraulic conductivity values for organic deposits were assumed to vary between 1×10^{-8} and 1×10^{-5} m/s during model calibration (Fetter 2000).

3.3.3 Glaciolacustrine

Glaciolacustrine deposits were observed across the study area at either ground surface or underlying organic deposits. The glaciolacustrine deposits were discontinuous (Maps 8 and 9). The glaciolacustrine deposits consisted of nearshore coarse-grained deposits and offshore fine-grained deposits. Nearshore and offshore deposits were generally observed to grade laterally between the two units; however, in some areas the units were interlayered (Maps 8 and 9). Therefore, these units were conceptualized to be one hydrostratigraphic unit.

Hydraulic conductivity estimates from slug tests conducted in the glaciolacustrine nearshore deposits ranged from 1×10^{-7} to 6×10^{-5} m/s.

3.3.4 Sand Diamicton

Discontinuous deposits of sand diamicton were observed throughout the MacLellan site, consistent with the interpretation that the unit has been eroded by meltwaters associated with the retreat of glacial ice. When present, sand diamicton overlaid bedrock and was overlain by glaciolacustrine or organic deposits. Sand diamicton was observed in areas primarily to the northeast of the proposed open pit. The thickness of the sand diamicton generally ranged from less than 1 m to greater than 28 m (at monitoring well GBHM-14, Map 4). The sand diamicton was generally observed to occupy bedrock lows such as at monitoring wells GBHM-01, GBHM-07, and GBHM-14 (Map 4), where the thickness of the unit was observed to be greatest. Generally, the sand diamicton overlaid bedrock except in the northeast, where it overlaid glaciofluvial deposits.

Hydraulic conductivity estimates from slug tests conducted in the sand diamicton deposits ranged from 4×10^{-7} to 6×10^{-5} m/s.

3.3.5 Bedrock

Bedrock was defined as a continuous unit throughout the study area. The top of bedrock surface described in Stantec (2017c; 2020a) was interpreted from the boreholes and test pits installed at the MacLellan site, including boreholes drilled for exploration and condemnation purposes. The bedrock topography was interpreted to follow a similar trend to ground surface topography. Bedrock was observed near surface in areas associated with topographic highs and at depths up to 10 m below ground surface (BGS) associated with topographic lows, except in areas where bedrock depressions or valleys were observed. A bedrock depression or valley was observed at GBHM-01 (Map 4) located on the eastern edge of the proposed open pit and GBHM-05 located between the proposed open pit and Keewatin River in the area of the NSZ fault. Bedrock was encountered at 17.5 m BGS (317.5 m AMSL) at monitoring well GBHM-01 and at 15.8 m BGS (317.5 m AMSL) at monitoring well MWM-05.

A deep bedrock valley located along the northern edge of Minton Lake was identified from borehole logs for GBHM-14 and MWM-03 (Map 4). The orientation and extent of this bedrock valley is unknown but appears to be filled with sand diamicton that has been eroded and replaced by extensive glaciofluvial deposits. It is likely the valley was formed by erosion of the bedrock by glacial scouring as evidence by the thick sand diamicton, which was then eroded by a high-energy meltwater channel that deposited glaciofluvial sediment. The bedrock valley located in the area of Minton Lake is not interpreted to be connected with the bedrock valley associated with the NSZ fault in the area of the proposed open pit.

The hydraulic conductivity of the bedrock decreases with depth, with the upper portions being the most transmissive due to increased weathering and/or fracturing. The bedrock was subdivided into four hydrostratigraphic units based on transmissivity data collected from hydraulic testing conducted in the study area (Stantec 2017c). These units include the Shallow Bedrock, Upper Bedrock, Intermediate Bedrock, and Deep Bedrock Units. A comparison of the measured hydraulic conductivity in the bedrock for each of the hydrostratigraphic units is presented on Figure 3-1. The hydraulic conductivity was observed to be variable across each hydrostratigraphic unit, as described below.

3.3.5.1 Shallow Bedrock

The Shallow Bedrock unit consists of a zone of weathered and fractured bedrock that exists below the overburden deposits, or at ground surface where bedrock is exposed. The shallow bedrock is estimated to be approximately 10 m thick, with hydraulic conductivity estimates ranging from 5×10^{-8} to 5×10^{-4} m/s (Figure 3-1).

A mapped fault (NSZ Fault, Map 4) occurs in the area of the open pit. Hydraulic conductivity estimates are not available for the fault but are assumed to have the same properties as the host rock.

3.3.5.2 Upper Bedrock

The Upper Bedrock unit underlies the Shallow Bedrock and is estimated to be 40 m thick. The hydraulic conductivity for the Upper Bedrock is estimated to range from 1×10^{-8} to 2×10^{-7} m/s (Figure 3-1).

3.3.5.3 Intermediate Bedrock

The Intermediate Bedrock unit underlies the Upper Bedrock and is estimated to be 150 m thick. The hydraulic conductivity for the Intermediate Bedrock is estimated to range from 3×10^{-9} to 1×10^{-7} m/s (Figure 3-1).

3.3.5.4 Deep Bedrock

The Deep Bedrock unit is the deepest bedrock unit and is considered to be relatively impermeable, although discrete fractures may occur that increase the hydraulic conductivity locally. The hydraulic conductivity of this unit is estimated to range from 9×10^{-9} m/s (based on the hydraulic conductivity of bedrock with limited to no interconnected fractures) to 6×10^{-8} m/s (where fractures are present) (Figure 3-1).

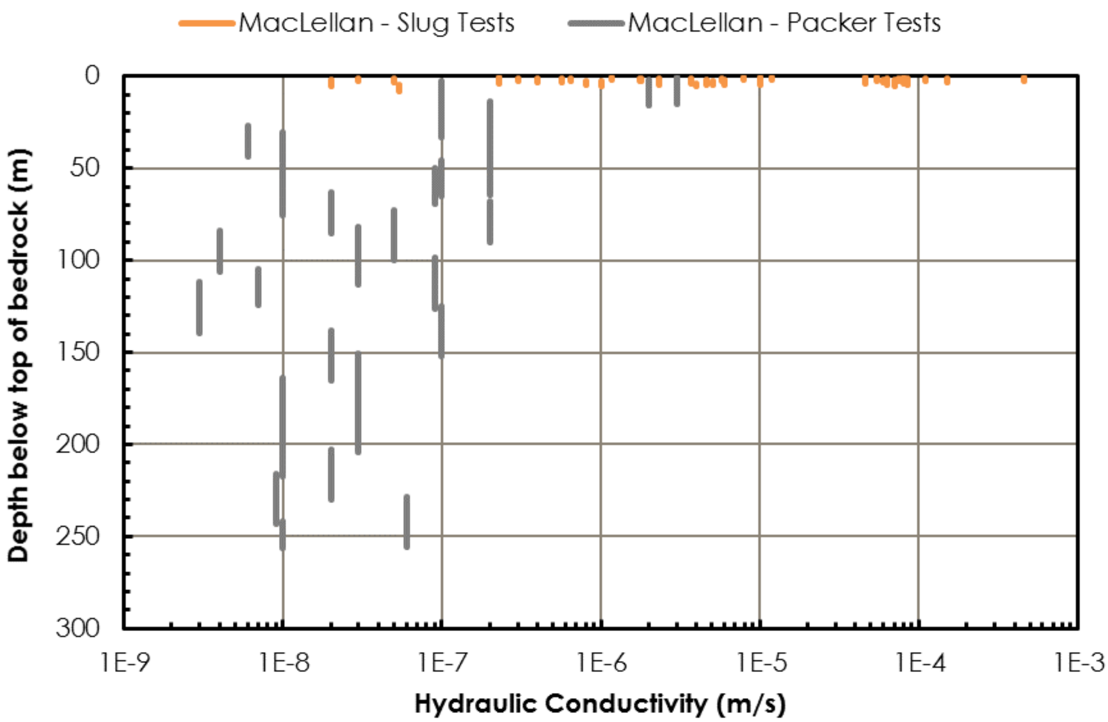

Figure 3-1 Hydraulic Conductivity Distribution in Bedrock with Depth

4.0 MODEL CONSTRUCTION AND CALIBRATION

This section describes the construction of the hydrogeology model using the hydrostratigraphic units of the conceptual model described in Section 3.0. The calibration of the model using available information on water levels and stream flow measurements collected as part of the baseline monitoring programs is also described.

The FEFLOW (version 7) groundwater modelling platform was chosen for this evaluation. It is a common platform for simulating and predicting groundwater flow in mining environments. In addition, it was selected as it is able to simulate heat transport and freeze-thaw processes (through a plug-in module) that affect the near-surface hydraulic conductivity. These processes were considered based on the discontinuous permafrost observed at the site.

An equivalent porous media (EPM) approach was selected to simulate the flow within the overburden and underlying bedrock. The EPM approach assumes that groundwater flow through fractured bedrock can be approximated by a porous medium with equivalent hydrogeologic properties of the bulk of the rock. The shallow weathered bedrock in the study area has the highest hydraulic conductivity reflecting the increased fracturing that is typical of shallow weathered bedrock in the Canadian Shield. The water level data collected within the shallow bedrock monitoring wells indicates a similar hydraulic response to the overburden system indicating a high degree of connectivity. Cook (2003) demonstrates regional connectivity occurs within the shallow bedrock zone and decreases with depth due to a decrease in fracture frequency and permeability. Groundwater flow in the bedrock is therefore expected to occur dominantly through this shallow bedrock unit.

As shown in Section 3.3.5, the permeability of the bedrock decreases with increasing depth, due to more discrete fracturing of the bedrock. At the regional scale, the EPM approach remains appropriate for predicting the effective groundwater discharge rates from the deeper bedrock into the open pit but reduces the reliability of predicted travel times through discrete fractures (Wels et al. 2012). Travel times through the discrete fractures using the EPM approach could be under-predicted (due to lower effective fracture porosities in the bedrock), or over-predicted, if there is poor connectivity of fractures at depth. This is appropriate based on the regional scale of the modelling and considering that flow was predicted to occur primarily through the shallow weathered bedrock, which is highly fractured, and therefore behaves like a porous medium.

4.1 MODEL DOMAIN

The extent of the model domain was chosen to correspond to the natural hydrogeologic boundaries and was to extend beyond the area where potential effects from the model predictions may impact on model boundaries. The model domain is presented on Map 10.

The model mesh is simulated to grade from coarser around the limits of the domain, to finer in the vicinity of the surface water features and the area of the proposed open pit. The mesh is composed of a total of 54,878 elements in each model layer with a total of 44 model layers.

The hydrostratigraphic units described in Section 3.0 were transferred to the FEFLOW model via the groundwater flow model output utility in Leapfrog Hydro®, with each hydrostratigraphic unit corresponding to a model layer presented in Table 4-1. Where hydrostratigraphic units were observed to be discontinuous across the study area and “pinch out”, the model layer was assigned a minimum thickness of 0.1 m and the hydraulic properties of the underlying hydrostratigraphic unit were assigned. The properties of the model layers are discussed further in Section 4.4.4.

Table 4-1 Relationship of Hydrostratigraphic Units and Model Layers

Hydrostratigraphic Unit	Model Layers	Thickness (m)
Overburden	1-5	Varies with hydrostratigraphic units
Shallow Bedrock	6-7	10
Upper Bedrock	8-14	40
Intermediate Bedrock	15-37	150
Deep Bedrock	38-44	Varies to bottom of model domain (elevation -15 m AMSL)

4.2 DISTRIBUTION OF HYDROGEOLOGIC PARAMETERS

The hydraulic conductivity, porosity, and recharge rate were assigned in the model based on the hydrostratigraphic units as defined in the conceptual model (Section 3.0). The geometric mean hydraulic conductivity values determined from the field-testing programs or characterized from grain size were used in the initial model set-up. The hydrostratigraphic units were assumed to be uniform and isotropic.

4.3 BOUNDARY CONDITIONS

4.3.1 Model Boundary

The model limits were assigned based on local watershed boundaries but were extended into neighbouring watersheds based on anticipated effects from the presence of the open pit. The model was extended to natural hydrologic/hydrogeologic boundaries, including watershed boundaries (assumed to be coincident with groundwater flow divides) or surface water features (also assumed to be coincident with groundwater flow divides). The model domain limits are presented on Map 10.

4.3.2 Recharge

The type of soil and vegetation present at surface is an important factor in determining whether precipitation will become runoff or groundwater recharge. A uniform recharge rate was applied across the domain, as the dominant surficial unit encountered at the MacLellan site was the glaciolacustrine unit. This is a contrast to the Gordon site where the surficial geology was more variable, and additional variability in the groundwater recharge was assigned. As shown in Section 4.4, the model was suitability calibrated to site conditions based on this single recharge value.

4.3.3 Lakes and Watercourses

As shown on Map 10 several lakes and watercourses are located within the model domain. Lakes and watercourses were assigned as boundary conditions in the model using a head-dependent flux boundary. This type of boundary condition determines the flow rate between the boundary condition and the aquifer based on the head assigned to the boundary condition. The vertical extent of the lakes was determined using available bathymetric data collected at the lakes (Stantec 2017b).

The interaction between the surface water in the lakes and watercourses and the groundwater in the underlying aquifers is defined by a “conductance” term. This term represents the presence of a layer of sediment on the lakebed or streambed that can affect the rate of water transferred between the lake or watercourse and the underlying model layer. A review of sediment analyses from lakes and watercourses showed that the sediments are generally fine-grained (Stantec 2017b) and the conductance term was assigned to the model based on an assumed hydraulic conductivity of 1×10^{-7} m/s.

4.4 CALIBRATION

4.4.1 Calibration Methodology

Model calibration was conducted using an iterative approach under steady-state conditions, followed by additional iterations to evaluate transient conditions. This involved a process where a flow simulation was carried out, the resulting groundwater levels, vertical hydraulic gradients, and baseflow rates to watercourses were compared to measured values, and the model input parameters were re-adjusted to achieve better agreement with observed (field measured) conditions and the overall interpreted groundwater flow directions. The process of model calibration involves the adjustment of model parameter values to match field-measured values within a pre-established range of error. A hybrid calibration approach was used that combined automated parameter estimation, facilitated using the Parameter Estimation code (PEST) (Doherty 2009), together with professional judgement and interpretation of the calibration results.

The calibration was completed using the following steps:

1. Prepare model files and input parameters
2. Run PEST to estimate parameter values that provide the best average fit to the observations
3. Review the model results
4. Adjust insensitive parameters from the PEST calibration (if any can be identified)
5. Repeat steps 2 through 4 until the model is determined to be adequately calibrated within acceptable ranges of error

Several parameters were adjusted during the calibration of the model, including:

- Hydraulic conductivity
- Specific yield
- Specific storage

These parameters were adjusted automatically using PEST over the ranges determined from field observations or literature values. A total of 22 parameters were adjusted during the calibration process. Key areas where manual adjustments in the automated calibration process were required included:

- Average annual recharge rate (steady-state)
- Monthly recharge rates (transient)
- Hydraulic conductivity of deep bedrock

4.4.2 Calibration to Water Levels

Model calibration was assessed by comparing model simulated water levels to observations collected from two water level datasets:

- Average annual water levels calculated from transient water levels
- Continuous water level data collected from onsite monitoring wells using pressure transducers and data recorders

The average annual water level targets at each location were calculated as the mean water level observed during the period of record available for each location and were used for the first calibration to steady-state conditions. Continuous water level observations from monitoring wells instrumented with pressure transducers were then used to attempt to fit transient water level targets based on transient recharge rates. The calculated average annual water level targets are presented in Table 4-2. The locations of the water level targets are shown on Map 11.

A plot of the simulated (modelled) versus observed (measured) average annual groundwater levels is shown in Figure 4-1. A line of perfect fit (e.g., a line having a slope of 1.0) is shown for comparison. Simulated groundwater levels that match the observed groundwater levels exactly will fall on this line. As shown on Figure 4-1 and in Table 4-2, there is generally good agreement with the water level targets; however, although there is a slight overprediction bias to the residuals. The largest residuals are observed at GBHM-06A, MWM-09A, MWM-09B and MWM-04.

Table 4-2 Water Level Calibration Residuals and Statistics

Location	Average Annual Target Water Level (m AMSL)	Simulated Average Annual Water Level (m AMSL)	Residual (m)	Target Type
MWM-01A	343.89	343.68	-0.21	Steady-state
MWM-02A	349.91	350.10	0.19	Steady-state
MWM-02B	349.48	350.03	0.55	Steady-state
MWM-04	349.92	342.75	-7.17	Steady-state
MWM-05A	332.16	332.72	0.56	Steady-state
MWM-05B	332.11	332.68	0.57	Steady-state
MWM-06A	331.27	331.64	0.37	Steady-state
MWM-06B	331.51	331.67	0.16	Steady-state
MWM-09A	344.61	337.57	-7.04	Steady-state
MWM-09B	345.01	337.57	-7.44	Steady-state
MWM-10A	327.47	326.87	-0.60	Steady-state
MWM-10B	327.77	326.77	-1.00	Steady-state
GBHM-01B	333.93	334.74	0.81	Steady-state
GBHM-03A	336.46	336.60	0.14	Steady-state

Table 4-2 Water Level Calibration Residuals and Statistics

Location	Average Annual Target Water Level (m AMSL)	Simulated Average Annual Water Level (m AMSL)	Residual (m)	Target Type
GBHM-05A	330.71	331.98	1.27	Steady-state
GBHM-05B	330.7	332.00	1.30	Steady-state
GBHM-06A	344.28	335.93	-8.35	Steady-state
GBHM-08	351.34	349.18	-2.16	Steady-state
GBHM-09A	346.22	343.83	-2.39	Steady-state
GBHM-10A	338.61	339.57	0.96	Steady-state
GBHM-10B	338.20	339.68	1.48	Steady-state
GBHM-12	335.64	340.14	4.50	Steady-state
GBHM-13A	343.21	343.61	0.40	Steady-state
GBHM-13B	343.21	343.50	0.29	Steady-state
Residual Statistics				
Sum of Squared Error (m²)			266	
Mean Error (m)			-0.62	
Absolute Mean Error (m)			1.35	
Root Mean Squared Error (m)			2.68	
Normalized Mean Squared Error (%)			8.0	

The statistical measures of the calibration to the water level data are reported in Table 4-2. These measures include the standard error of the estimate and the root mean squared (RMS) error. In evaluating the fit between the observed and the simulated water levels, the RMS error is usually regarded as the best measure (Anderson and Woessner 1991). The RMS error is essentially a standard deviation calculated as the average of the squared differences between the measured and the simulated water levels. If the ratio of the RMS error to the total water level differential over the model area is small (e.g., less than 10%; Spitz and Moreno 1996), then the errors are only a small part of the overall hydraulic response of the model. In this simulation, the ratio of the RMS error to the total water level differential (8.0%) is less than the recommended 10% threshold.

The fit of the model predicted transient water level trends to the water level hydrographs are provided in Figure 4-2. As shown, the model was unable to reproduce the seasonal recharge responses (i.e., an increase in water level in the spring recharge period following declines over the winter) in spite of efforts to vary the recharge on a monthly basis and adjusting the storage parameters (specific yield and specific storage) over the expected ranges during calibration. It is anticipated that the lack of these responses is due to the boundary conditions at the lakes and streams which were maintained at a constant stage throughout the year.

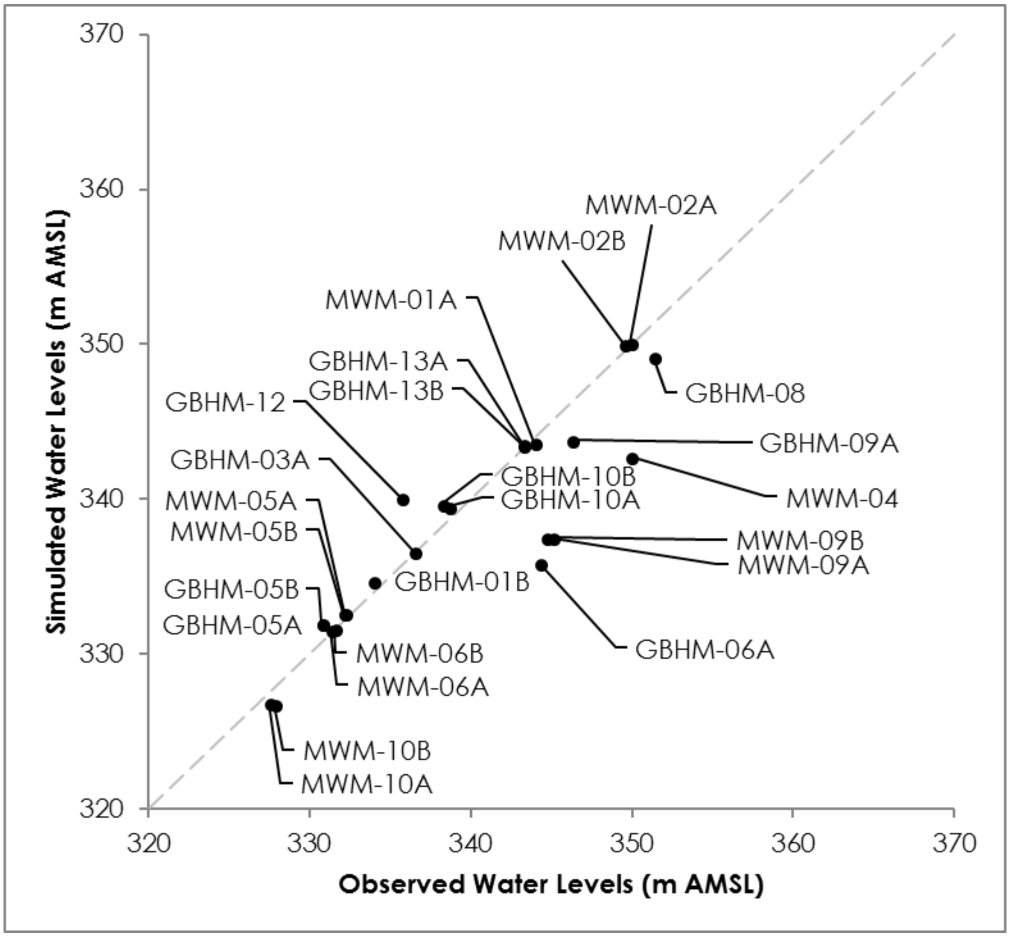

Figure 4-1 Scatterplot of Observed and Simulated Average Annual Water Levels at Calibration

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Figure No.

4-2A

Title

Transient Groundwater Level Hydrographs MacLellan

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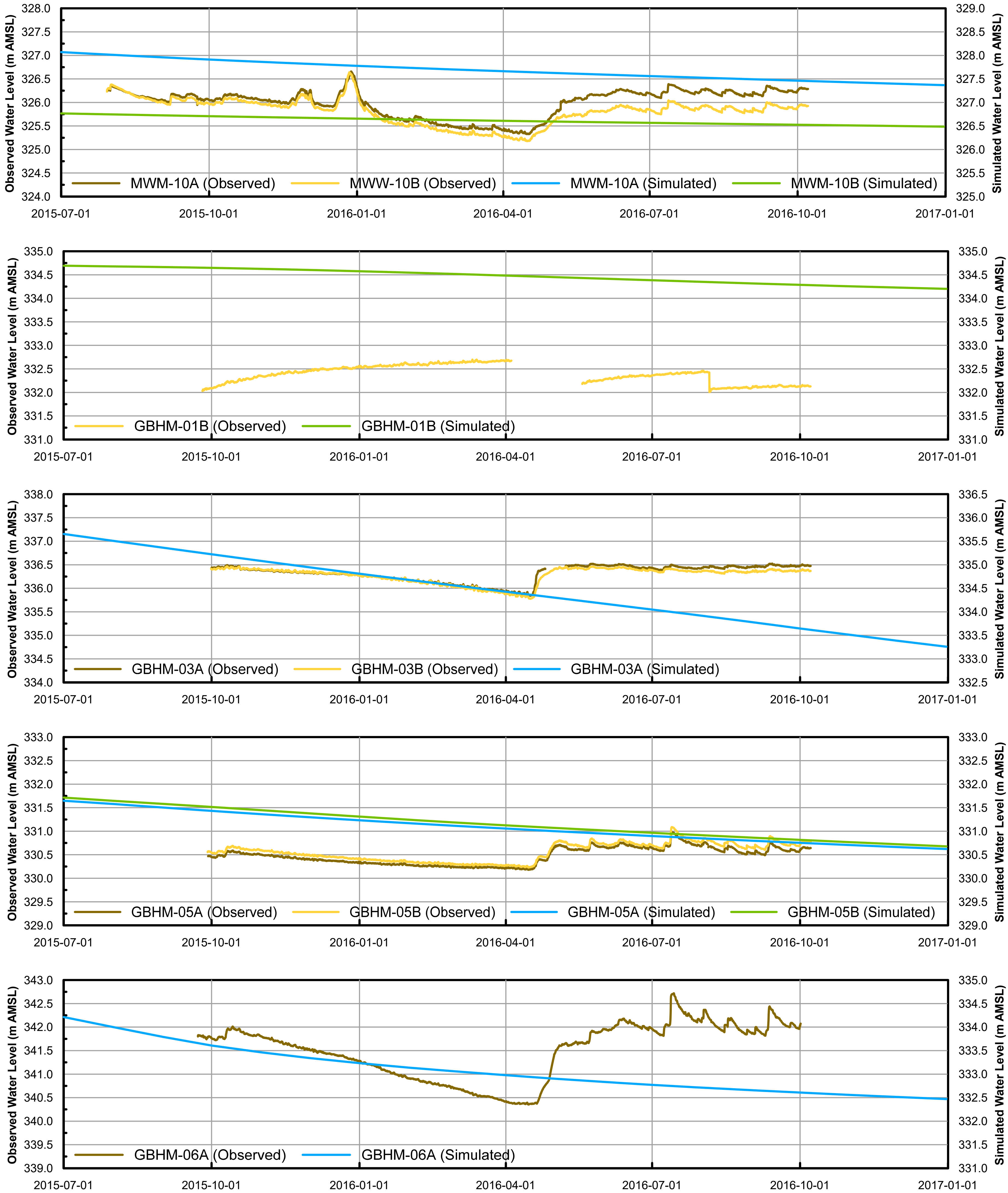

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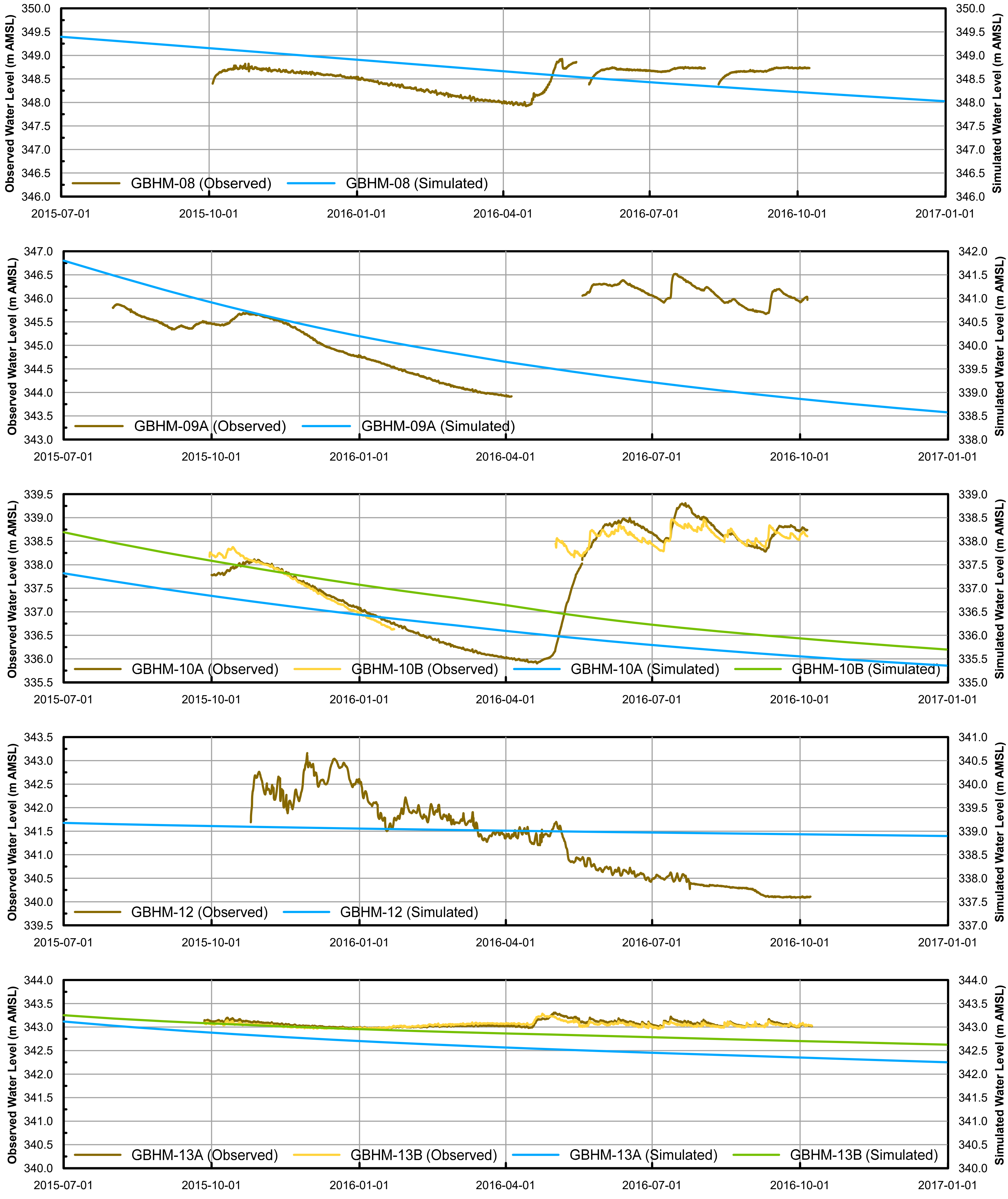
Client/Project
Lynn Lake Gold Project (LLGP)
Hydrogeology Technical Modelling Report - MacLellan

Figure No.
4-2B

Title
Transient Groundwater Level Hydrographs MacLellan



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Lynn Lake Gold Project (LLGP)
Hydrogeology Technical Modelling Report - MacLellan

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Transient Groundwater Level Hydrographs MacLellan

4.4.3 Calibration to Baseflow

The steady-state model calibration also included baseflow targets for a reach of the Keewatin River located between surface water monitoring locations AQM4 and AQM8 (Map 10). Streamflow data were developed from continuous water level data and flow measurements completed between 2015 and 2016 (Stantec 2017b). From the rating curves, the average annual streamflow rate for this reach of the Keewatin River is estimated to be approximately 0.20 cubic metres per second (m^3/s).

Baseflow to surface water features is provided primarily by groundwater discharge; however, where surface water features, such as lakes and wetlands, exist there is the potential to temporarily store precipitation and release water to a watercourse. This release of water from surface water storage can be difficult to distinguish from groundwater contributions to baseflow. Therefore, the baseflow targets are assumed to have contributions from groundwater discharge and delayed storage released from surface water features.

The steady-state model simulated groundwater discharge contributing to the Keewatin River reach discharge is 0.039 m^3/s, or approximately 20% of the average annual streamflow. This was considered to be a reasonable estimate of baseflow for this watershed, and therefore the calibration to baseflow is considered acceptable for this model.

4.4.4 Calibrated Model Parameters

The values of the hydrogeologic parameters that were determined from the calibration process are presented in Table 4-3. The hydraulic conductivity and storage coefficient values for the various hydrostratigraphic units generated by the model are within the ranges expected for the materials based on measured and literature values, as these were set as part of the calibration process.

The transient recharge rates determined at the end of the calibration are presented on Table 4-4.

Table 4-3 Calibrated Model Parameters

Parameter	Hydraulic Conductivity (m/s)	Specific Yield (-)	Specific Storage (1/m)	Average Annual Recharge (mm/yr)
Historical Mine Rock • Calibrated Value • Expected Range	• 1×10^{-3} • 1×10^{-3} to 1×10^{-2}	• 0.16 • 0.01 to 0.3	• 1.1×10^{-4} • 1×10^{-6} to 1×10^{-3}	• 120 • 4 to 146
Organics • Calibrated Value • Expected Range	• 1.2×10^{-5} • 1×10^{-8} to 1×10^{-5}	• 0.19 • 0.01 to 0.3	• 1.0×10^{-4} • 1×10^{-6} to 1×10^{-3}	
Diamicton • Calibrated Value • Expected Range	• 4.2×10^{-6} • 4×10^{-7} to 6×10^{-5}	• 0.20 • 0.01 to 0.3	• 1.0×10^{-4} • 1×10^{-6} to 1×10^{-3}	
Glaciolacustrine • Calibrated Value • Expected Range	• 8.3×10^{-6} • 1×10^{-7} to 6×10^{-5}	• 0.16 • 0.01 to 0.3	• 2.0×10^{-4} • 1×10^{-6} to 1×10^{-3}	
Shallow Bedrock • Calibrated Value • Expected Range	• 8.1×10^{-6} • 5×10^{-8} to 5×10^{-4}	• 0.06 • 0.01 to 0.3	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	
Upper Bedrock • Calibrated Value • Expected Range	• 2.0×10^{-7} • 1×10^{-8} to 2×10^{-7}	n/a	• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	
Intermediate Bedrock • Calibrated Value • Expected Range	• 3.4×10^{-8} • 3×10^{-9} to 1×10^{-7}		• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	
Deep bedrock • Calibrated Value • Expected Range	• 1.3×10^{-8} • 9×10^{-9} to 6×10^{-8}		• 1.0×10^{-4} • 4×10^{-5} to 2×10^{-3}	

Table 4-4 Calibrated monthly recharge rates (mm/month)

Month	Recharge (mm/month)
January	0.4
February	0.4
March	0.7
April	13.5
May	11.7
June	21.8
July	19.5
August	9.8
September	22.8
October	14.6
November	3.1
December	1.7

5.0 MODEL APPLICATIONS

The calibrated groundwater flow model was used to quantify baseline groundwater levels and flow and groundwater discharge to the receiving environment under baseline conditions. The baseline model results were then used to compare to model predictions during construction, operation and closure phases of the Project. Section 5.1 presents the results from the baseline simulations using the calibrated model. Model modifications were then completed to allow simulation of the following phases:

- Construction (Mine Years -2 and 0) – initial dewatering of the underground workings and starter pit and groundwater discharge associated with the TMF
- Operation (Mine Years 1 to 3) – dewatering of open pit and groundwater discharge and seepage collection associated with the new MRSA and TMF
- Active reclamation/closure (after Mine Year 13)– filling of the open pit and groundwater discharge associated with the MRSA and TMF

Model results for the construction, operation, and closure phase of the Project are discussed in Sections 5.2 to 5.4, respectively.

5.1 BASELINE CONDITIONS

The calibrated groundwater flow model discussed in Section 4.0 was used to estimate the water table elevation (i.e., the top of the saturated water column) and groundwater flow under baseline conditions.

Map 12 shows the average annual water table elevation under baseline conditions from the calibrated groundwater flow model. The model provides a good representation of groundwater flow conditions in the area of the open pit and mimics the ground surface contours (Map 4), with groundwater flowing regionally to the south/southeast toward Cockeram Lake.

An estimate of groundwater discharge to the primary lakes and rivers/creeks located within the model domain was predicted using the model and is presented in Table 5-1. The location of the surface water features are presented in Map 10. The groundwater discharge rates were used to quantify changes to groundwater discharge during the construction, operation and closure phases, as presented in Sections 5.2 to 5.4.

In Table 5-1, a positive number indicates groundwater discharge to the surface water feature and a negative value indicates that the surface water feature is recharging the groundwater flow system. Baseflow values presented in the table represent the groundwater contributions to the features, and do not include contributions from surface water storage.

Table 5-1 Estimated Groundwater Discharge (m^3/s) to Watercourses and Lakes under Baseline Conditions

Watercourse	Groundwater to Surface Water	Surface Water to Groundwater	Net Groundwater to Surface Water[1]
Lakes			
Dot Lake	0.0470	0.0410	0.0060
Minton Lake	0.0390	0.0360	0.0030
Payne Lake	0.0034	0.0027	0.0007
Lake 2	0.0023	0.0012	0.0011
Lake 3	0.0035	0.0026	0.0009
Watercourses			
Keewatin River	0.0180	0.0090	0.0090
Lynn River	0.0055	0.0012	0.0043
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	0.0001	0.0010	-0.0009
Tributary of Keewatin River (Kee3-B1)	0.0007	0.0007	0.0000
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	0.0006	0.0016	-0.0010
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	0.0001	0.0009	-0.0008

NOTES:

1 Positive value represents flow from groundwater to surface water
Negative value represents flow from surface water to groundwater

5.1.1 Historical Mine Rock Storage Area

A historical MRSA is located within the study area as shown on Map 3. Recharge through the historical MRSA has the potential to affect groundwater quality and as a result the model was used to determine the discharge location and flux of water recharging the groundwater flow system from beneath the MRSAs. The historical MRSA was incorporated into the model to understand the fate of recharge associated with this feature. To provide a conservative estimate of the groundwater discharge originating from the historical MRSA, groundwater flow simulations were conducted without the contact water collection system.

The calibrated groundwater flow model was used to better understand the fate of groundwater that originates from the historical MRSA and to estimate discharge rates to the receiving environment. A forward particle tracking approach was used, where a particle was released from each model node within the historical MRSA. The travel paths of the particles were simulated through the model domain until they arrived at a receptor, such as a lake or stream/creek. For this analysis, it was assumed that no subsurface seepage collection systems were in operation to provide a prediction of the maximum possible groundwater loading to the environment. This approach provides a conservative assessment of potential effects to the receiving environment.

The groundwater flux associated with each particle track was then determined and used to estimate the total discharge (Q) for the historical MRSA to the environment. This is illustrated on the conceptual cross-section shown in Figure 5-1 below. A particle trace is shown for a particle that originates in the historical MRSA and terminates at a lake. The groundwater discharge to the lake that is contributed by the cell in the historical MRSA is conservatively assumed to be equal to the total average annual recharge rate into that element (e.g., Qin = Qout) during the various phases of mine development. It was assumed that the groundwater recharge that enters the historical MRSA will be carried through to the receptors. As a result, the groundwater flow model may over-estimate groundwater discharge rates, as local seepage to intermittent surface water features or ditches that may be present in the area of the historical MRSA are not accounted for in the model.

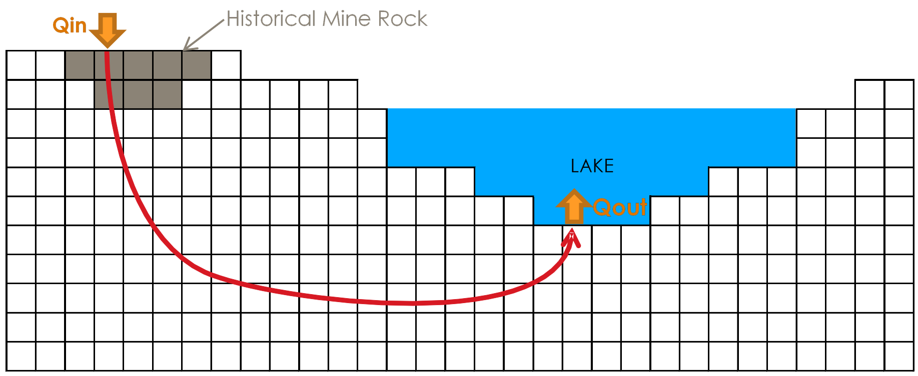

Figure 5-1 Conceptual Model Cross-Section Illustrating Particle Traces

The historical MRSA received an average recharge rate of 120 mm/yr under baseline conditions. The particle tracks from the historical MRSA under baseline conditions are presented on Map 13, and the estimated discharge rates and travel time statistics to the receiving environment are presented on Table 5-2. As shown on Map 13 and Table 5-2, all of the particles originating from the historical MRSA discharge to the Keewatin River, at a rate of 1.1×10^{-5} m^3/s. However, these flow paths are very long as they flow into the bedrock unit, and the estimated travel time from the water table to the Keewatin River are estimated to exceed 2,000,000 years. This is based on the relatively deep flow path these particles take through the bedrock before arriving at the Keewatin River.

Table 5-2 Predicted Groundwater Discharge Rates (m^3/s) from Historical Mine Rock Storage Area to Receiving Environment at Baseline

Mine Rock Storage Area	Receptor	Discharge (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical Mine Rock	Keewatin River	1.1×10^{-5}	2,085,000	2,477,000	3,452,000

5.2 CONSTRUCTION

Construction activities at the MacLellan site are anticipated to begin Mine Year -2 with the construction of the initial phases of the TMF and new MRSA, and the construction of the starter pit. These activities are anticipated to potentially influence groundwater levels and flow through the initial dewatering of the starter pit and underground workings, and the change in recharge at the base of the new MRSA and TMF. The historical MRSA will be removed during the construction of the starter pit. While these activities will continue into the initial operating years, they have been simulated separately in the construction phase to document the potential changes to groundwater levels and flow in the early phases of Project development.

5.2.1 Model Setup

Starting with the calibrated groundwater flow model, the following modifications were completed to represent the dewatering of the starter pit and the fate of groundwater originating from the MRSA and TMF. The modifications are discussed below for each Project component.

5.2.1.1 Dewatering Starter Pit

The construction and operation of the open pit has the potential to change the baseline groundwater flow conditions, particularly through the lowering of the water table in the vicinity of the open pit. This will be accomplished through the collection of sump water at the base of the starter pit, and through the dewatering of the underground workings. The dewatering of the underground workings was expected to be staged based on the development of the open pit and will be progressively lowered with the base of the open pit. The lowering of the water table associated with the dewatering of the open pit and underground workings may also affect groundwater discharge to surface water features near the open pit and the discharge associated with the MRSA or TMF.

To evaluate the effects of groundwater inflows to the starter pit/underground workings during the construction phase, the calibrated groundwater flow model was modified to represent the extent and depth of the pit as seepage faces. The conductance of the seepage face nodes was specified based on the hydraulic conductivity in the elements surrounding the nodes.

The hydraulic conductivity of the seepage face nodes was adjusted on a monthly basis to reflect the reduced hydraulic conductivity based on freezing and thawing of the seepage face. The hydraulic conductivity was determined using the heat and transport functionality of FEFLOW with the Freeze-Thaw Model (FTM) plugin. Simulations of the freezing and thawing were used to determine the changes in hydraulic conductivity predicted based on the average monthly air temperatures. Due to the additional computational burden of running the model in heat and transport mode, the simulation of effects of freezing on dewatering were conducted with only the flow components in FEFLOW. These effects were incorporated into the groundwater flow model by specifying the variable hydraulic conductivity at the pit face due to freezing as determined using the FTM plugin.

5.2.1.2 Mine Rock Storage Area

The Project includes a new MRSA for the collection of surplus mine rock at the MacLellan site (Map 3). Recharge through the MRSA has the potential to affect groundwater quality and as a result the model was used to determine the discharge location and flux of water recharging the groundwater flow system from beneath the MRSA. Because of the short duration of construction compared to the travel time of groundwater discharge originating from the MRSA, groundwater flow simulations were conducted without the contact water collection systems for the construction phase.

The structure of the MRSA was added to the groundwater flow model as a layer of high permeability material on top of the existing ground surface. The groundwater recharge within the footprint of the MRSA was estimated with a water balance approach as presented in Water Balance and Water Quality Model Technical Modelling Report: MacLellan Site (Stantec 2020d).

The infiltration rate into the MRSA considers losses due to evaporation, surface runoff, and micropore and macropore flow within the MRSA. The infiltration rate during construction is predicted to be approximately 25% of the total precipitation. As the MRSA is developed, it will take time before the MRSA reaches saturation and the precipitation infiltrating into the pile will equal the volume of water leaving the base of the pile (e.g., steady-state conditions). Infiltration that reaches the base of these piles is expected to either flow laterally along the ground surface and report as seepage at the toe of the pile (toe seepage) or recharge the underlying groundwater flow system based on the permeability of the underlying soils.

To determine the proportion of infiltration that recharges the groundwater flow system beneath the MRSA, a SEEP/W model was used in conjunction with the groundwater flow model. The SEEP/W model was used to determine the amount of seepage that is collected in toe seepage drains (i.e., lateral seepage from surface runoff or from the waste rock/native overburden interface). The lateral drainage from within the waste rock pile was not allowed to exceed the calibrated recharge rates in the groundwater flow model. The average recharge rate to the groundwater flow system under the MRSA was 120 mm/yr.

The groundwater flow model was used to predict the discharge location, flux of water recharging the groundwater flow system from beneath the MRSA, and associated groundwater flow paths, using the method described for the historical MRSA in Section 5.1.1.

5.2.1.3 Tailings Management Facility

The TMF is located within the north eastern portion of the study area as shown on Map 3. Recharge through the TMF has the potential to affect groundwater quality and as a result the model was used to determine the discharge location and flux of water recharging the groundwater flow system from beneath the TMF.

The materials for the TMF were simulated using material placed in a single layer in the groundwater flow model, placed on top of the existing ground surface. The dams of the TMF were constructed of coarse rock of high permeability, with a layer of HDPE placed on the upstream side of the dam, between the tailings and the rock fill of the dam. During construction, the tailings were assumed to have an initial hydraulic conductivity of 1×10^{-6} m/s based on the consolidation testing performed on the tailings (Golder 2016). The HDPE liner on the upstream side of the rock fill is assumed to have a hydraulic conductivity of 1×10^{-9} m/s, and the rock fill of the dam a hydraulic conductivity of 1×10^{-3} m/s.

Recharge through the first phase of the TMF during construction was assumed to be controlled by the presence of a pond in the TMF at elevation 359.4 m AMSL. This pond elevation was assigned as a constant head boundary over the entire footprint of the TMF and is assumed to be controlled by the deposition of water from the tailings slurry and the reclaim of water back to the mill. Because of the short duration of construction compared to the travel time of groundwater discharge originating from the TMF, groundwater flow simulations were conducted without the contact water collection systems for the construction phase

5.2.2 Results

5.2.2.1 Starter Pit Dewatering

The predicted total groundwater inflow rates to the starter pit during construction are presented on Figure 5-2. The groundwater inflow rates are predicted to be initially high (0.0123 m^3/s for the first month), with decreasing flows during the winter months, followed by peak flows associated with the spring freshet. The average annual groundwater inflow rate to the pits is predicted to be 0.0063 m^3/s at the end of the construction period.

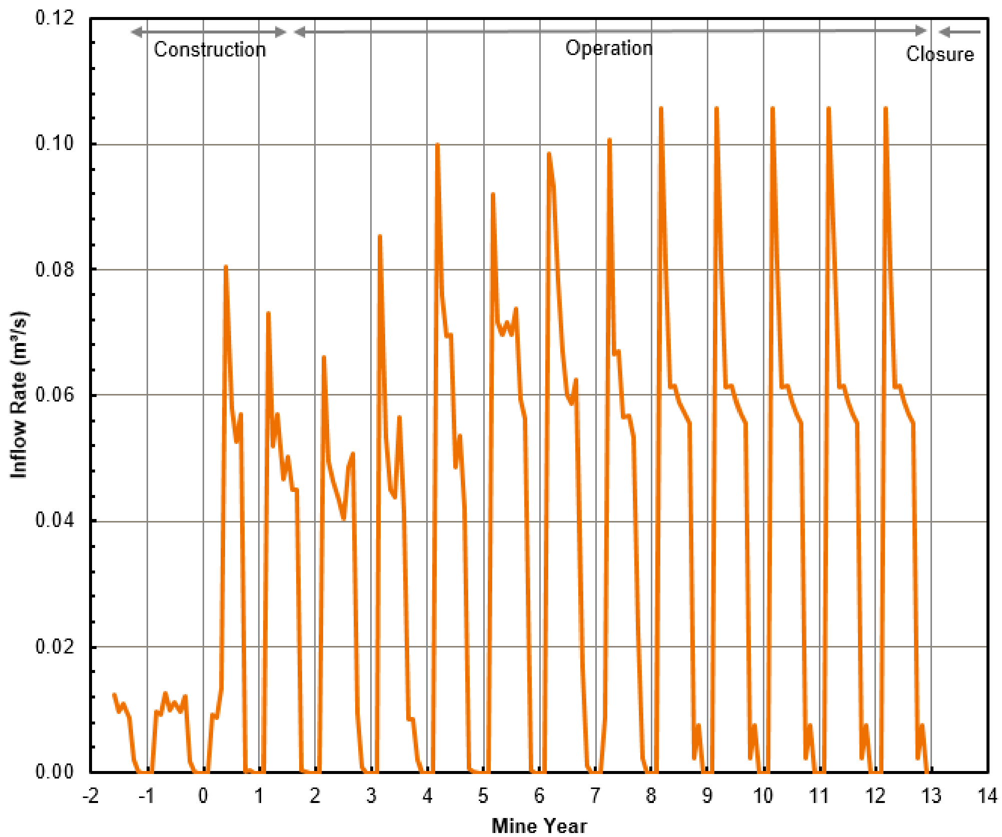

Figure 5-2 Calculated groundwater inflows to Open Pit over Life of Mine - Construction and operation

The predicted groundwater elevation contours and drawdown contours at the end of construction period are presented on Map 14 and Map 15, respectively. In the area of the starter pit, groundwater levels are lowered by approximately 1.0 m or less within 200 m of the pit. The drawdown extends predominantly south of the pit due to the constraints of Keewatin River. The construction of the TMF is predicted to increase the water level more than 1 m above baseline water levels for about 750 to 1,000 m downgradient of the TMF, as shown on Map 15.

Table 5-3 presents the comparison of baseline groundwater discharge rates with effects of the TMF and starter pit dewatering at the end of the construction period. As shown in Table 5-3, there is a negligible change in the groundwater discharge to surface water receivers (i.e. less than 0.003 m^3/s) at the end of construction except for the Lynn River and Keewatin River. The Lynn River, in the vicinity of the open pit, is predicted to shift from gaining groundwater to losing groundwater. The Lynn River is a boundary condition on the limits of the groundwater flow model, and the change in groundwater discharge to the Lynn River is likely a model artifact since the changes in groundwater table (Map 15) due to open pit dewatering does not extend to the Lynn River and the predicted change during construction does not extend to operations. The largest change in groundwater discharge is predicted at the Keewatin River, which is predicted to contribute 0.015 m^3/s of flow during construction compared to the 0.009 m^3/s predicted during baseline conditions. This increase in groundwater discharge to the Keewatin River is due to the increased hydraulic gradient to the river due to mounding associated with the TMF and limited dewatering of the starter pit.

Table 5-3 Estimated Groundwater Discharge (m^3/s) to Watercourses and Lakes at End of Construction

Watercourse	Baseline[1]	End of Construction[1]	Change from Baseline[1]
Lakes			
Dot Lake	0.0060	0.0060	0.0000
Minton Lake	0.0030	0.0040	0.0010
Payne Lake	0.0007	0.0014	0.0007
Lake 2	0.0011	0.0011	0.0000
Lake 3	0.0009	0.0009	0.0000
Watercourses			
Keewatin River	0.0090	0.0150	0.0060
Lynn River	0.0043	-0.0007	-0.0050
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	-0.0009	-0.0009	0.0000
Tributary of Keewatin River (Kee3-B1)	<0.0001	<0.0001	0.0000
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	-0.0010	-0.0010	0.0000
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	-0.0008	-0.0007	0.0001

NOTES:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

5.2.2.2 Mine Rock Storage Area and Tailings Management Facility

The fate of groundwater that recharges beneath the TMF was determined by conducting particle tracking. The particle traces at the end of construction are presented on Map 16 and are summarized on Table 5-4 by their predicted ultimate receptor, assuming no contact water collection system operating. This assumption provides a conservative assessment of potential groundwater discharge to the receiving environment during the relatively short construction period. The inclusion of the contact water collection system would decrease the groundwater discharge from these areas.

Table 5-4 Predicted Groundwater Discharge Rates (m^3/s) from Tailings Management Facility to Receiving Environment during Construction

Project Infrastructure	Receptor	Discharge (arriving within 2 years) (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
TMF	Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	0.000003	1	5	15
	Dot Lake	n/a[1]	18	25	32
	Keewatin River	n/a[1]	2	7	32
	Tributary of Keewatin River (Kee3-B1)	n/a[1]	4	18	124
	Minton Lake	n/a[1]	2	16	108
	Cockeram Lake	n/a[1]	42	65	91

Notes:

1: not applicable, travel time from source to receptor is greater than the time period for construction, therefore no discharge from source to receptor is anticipated during construction.

As shown on Table 5-4, none of the particles that originate in the TMF are predicted to arrive at receptors except Payne Lake Tributary (Kee3-Pay1) during the two-year construction period, with the majority of the particles from the TMF predicted to arrive after the construction period. The MRSA will not become saturated during the construction period and therefore, no seepage out the base of the MRSA is predicted during construction. As the particle traces are used to quantify the inflow rates to the open pit and discharge to surface water features from the MRSA and the TMF, but no particles except to Payne Lake arrived within the construction period, the predicted groundwater flow to the receptors originating from these areas during the construction period are estimated to be zero.

5.3 OPERATION

The groundwater model was subsequently modified from the construction phase to simulate the effects of the Project during operation on groundwater levels and flow and the fate of groundwater originating from the MRSA and TMF during operation. As part of these simulations the model was used to predict groundwater inflows to the open pit and to evaluate the flow paths and groundwater discharge rates to receptors for recharge that originates from the MRSA and TMF.

5.3.1 Model Setup

Starting with the calibrated groundwater flow model and modifications completed for construction, the following additional modifications were completed:

- development and dewatering of the open pit

- variations in recharge rates related to the development of the MRSA and TMF
- the installation of dewatering ditches around the perimeter of the MRSA and TMF to mitigate the migration of solutes from these areas

The modifications are discussed below for each Project component.

5.3.1.1 Open Pit Dewatering

To evaluate the effects of groundwater inflows to the open pit the calibrated groundwater flow model was modified to include the extents and depths of the open pit for two specified stages of development of the open pit as discussed below:

- Mine Year 5: representing the intermediate development stage of the open pit.
- Mine Year 13: representing the ultimate extent of the open pit development at the completion of mining at the MacLellan site.

Model nodes that were intersected by the walls or floor of the open pit were identified and assigned as a seepage face boundary condition in the model. Model nodes that were located above the seepage face nodes within the footprint of the open pit were set as inactive.

The hydraulic conductivity of the seepage face nodes was adjusted on a monthly basis to reflect the reduced hydraulic conductivity based on freezing and thawing of the seepage face. The hydraulic conductivity was determined using the heat and transport functionality of FEFLOW with the FTM plugin. Simulations of the freezing and thawing were used to determine the changes in hydraulic conductivity predicted based on the average monthly air temperatures. Due to the additional computational burden of running the model in heat and transport mode, the simulation of effects of freezing on dewatering were conducted with only the flow components in FEFLOW, using the variable hydraulic conductivity at the pit face due to freezing as inputs that was determined using the FTM plugin.

Each of the open pit development stages (i.e., Mine Year -2 (construction), Mine Year 5, and Mine Year 13) were simulated in the model as separate transient model runs, with the results of the previous runs used as the starting condition of the next run. Year -2 model run presented in Section 5.2 represents the dewatering of the starter pit. An intermediate pit stage of the mine development (Mine Year 5) was used as the next condition, and the ultimate pit stage at the end of mine life (Mine Year 13) used as the final condition.

5.3.1.2 Mine Rock Storage Area and Tailings Management Facility

The Project includes a new MRSA and TMF during operation, which were represented in a similar manner to that described in Sections 5.2.1.2 and 5.2.1.3, with the MRSA and TMF constructed to their full extent at the end of the simulated stages of mine development.

Alterations to how the TMF was represented in the model at end of mine life included the reduction of the bulk hydraulic conductivity from 1×10^{-6} m/s to 1×10^{-7} m/s, to reflect the consolidation of tailings at the base of the pile. In addition, the constant head boundary representing the tailings pond was removed, and the total recharge into the TMF was adjusted to maintain a tailings ponds at the top of the tailings surface at the end of operations.

5.3.1.3 Seepage Collection System

A seepage collection system is proposed to be installed around the perimeter of the TMF and MRSA, as shown on Map 3. The seepage collection system was simulated in the model using a seepage face boundary condition, based on a series of 2 m deep ditches. This depth was selected as it was determined to be the most effective at intercepting a portion of the groundwater seepage from the TMF and MRSA, as the water table is below this depth in several locations in this upland area.

5.3.2 Results

5.3.2.1 Open Pit Dewatering

The predicted pumping rates to maintain a dewatered seepage face for the three model runs were used to interpret groundwater pumping rates over the life of mine (LOM) and are presented in Figure 5-2. These pumping rates only consider inflows to the open pit due to groundwater and do not consider surface water runoff or precipitation inflows that may enter the open pit. As dewatering progresses the average annual groundwater inflow rate increases from 0.006 m^3/s at the end of the construction period to 0.041 m^3/s at end of operation.

The simulated water table at the end of mine life is presented in Map 17 and Map 18, with and without the effect of the seepage collection ditches, respectively. Changes in the water table elevation due to dewatering of the open pit are evident primarily in the area south of the open pit. The drawdown or change in water table elevation due to dewatering of the open pit, at end of LOM in comparison to baseline conditions is shown on Map 19 and Map 20, with and without the effect of the seepage collection ditches, respectively. Dewatering of the open pit will lower the water table by up to 1.0 m that extends over an area of approximately 800 m south of the open pit, increasing to more than 10 m within 600 m of the open pit. The induced infiltration of surface water to the shallow overburden and bedrock limits the extent of the drawdowns. East Pond is anticipated to be dewatered during operations due to the lowering of the water table by up to 5 m and the loss of catchment due to open pit development. Map 19 and Map 20 also presents the predicted zone of influence of the TMF on groundwater levels compared to baseline conditions. As identified by the -0.5 m drawdown contour, mounding of the water table within the area of the TMF is predicted to extend up to 1,000 m from the limits of the TMF. Drawdown due to the operation of the seepage collection ditches around the perimeter of the TMF and MRSA are predicted to lower the water table up to 1 m in the immediate vicinity of the collection ditches, particularly along the eastern and southern portions of the MRSA and will limit the extent of mounding of the water table from development of the TMF.

Table 5-5 presents the comparison of groundwater discharge rates with effects of the dewatering at the end of the operation period (i.e., end of mining). Watercourse Kee3-Pay1 in the vicinity of the open pit is predicted to shift from losing groundwater in baseline to gaining groundwater in operations due to mounding of the water table in the vicinity of the TMF and an increased hydraulic gradient to Kee3-Pay1. The rate of groundwater discharge to Payne Lake, Minton Lake, Lake 2, and Lake 3 increases from baseline conditions to the end of operation due to further development of the TMF and 50% saturation of the MRSA which results in further mounding of water table in the vicinity of the TMF compared to construction. The mounding of the water table increases the horizontal hydraulic gradient toward these lakes. The rate of groundwater recharge from watercourse Kee3-B2-A1 increases at the end of operation compared to baseline conditions due to dewatering of the open pit. For the remaining watercourses and lakes, the changes to the groundwater discharge rates are relatively small (less than 0.003 m^3/s) compared to the baseline conditions and the overall anticipated flow rates in the surface water features.

Table 5-5 Estimated Groundwater Discharge to Watercourses and Lakes at End of Operations (m^3/s) without Seepage Collection Ditches

Watercourse	Baseline[1]	End of Operation[1]	Change from Baseline
Lakes			
Dot Lake	0.0060	0.0070	0.0010
Minton Lake	0.0030	0.0060	0.0030
Payne Lake	0.0007	0.0035	0.0028
Lake 2	0.0011	0.0019	0.0008
Lake 3	0.0009	0.0023	0.0014
Watercourses			
Keewatin River	0.0090	0.0083	-0.0007
Lynn River	0.0043	0.0057	0.0014
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	-0.0009	-0.0003	0.0006
Tributary of Keewatin River (Kee3-B1)	<0.0001	0.0018	0.0018
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	-0.0010	-0.0041	-0.0032
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	-0.0008	0.0027	0.0035

NOTES:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

The operation of seepage collection ditches around the perimeter of the TMF and MRSA were also simulated in the model. The effects of these features on the groundwater discharge is presented on Table 5-6. The operation of collection ditches is predicted to collect 0.0098 m^3/s of groundwater and will have relatively minor changes to lake baseflows compared to operation without ditches.

Table 5-6 Estimated Groundwater Discharge to Watercourses and Lakes at End of Operations (m^3/s) with 2-metre Deep Seepage Collection Ditches

Watercourse	Baseline[1]	End of Operation[1]	Change from Baseline
Lakes			
Dot Lake	0.0060	0.0060	0.0000
Minton Lake	0.0030	0.0060	0.0030
Payne Lake	0.0007	0.0038	0.0031
Lake 2	0.0011	0.0022	0.0011
Lake 3	0.0009	0.0026	0.0017
Watercourses			
Keewatin River	0.0090	0.0080	-0.0010
Lynn River	0.0043	0.0060	0.0017
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	-0.0009	-0.0006	0.0003
Tributary of Keewatin River (Kee3-B1)	<0.0001	0.0011	0.0011
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	-0.0010	-0.0041	-0.0032
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	-0.0008	0.0022	0.0030
Seepage Collection Ditches	0	0.0098	0.0098

NOTES:
1. Positive value represents discharge of groundwater to the receiver
   Negative value represents surface water infiltration or recharge from receiver to the groundwater flow system

5.3.2.2 Sensitivity of Open Pit Dewatering to Bedrock Hydraulic Conductivity

The calibration of the groundwater model was based on the fit of water levels by adjusting the assumed uniform hydraulic conductivity of hydrostratigraphic units. It is noted from Table 4-3 that the hydraulic conductivity range for the shallow bedrock has the highest observed range of the hydrostratigraphic units, and that the hydraulic conductivity of the shallow bedrock is highest of the bedrock units (Figure 3-1). As the groundwater flow within the study area is expected to occur dominantly through the shallow bedrock, a sensitivity analysis was conducted to assess the effects of adjusting the hydraulic conductivity within the shallow bedrock on the expected inflows to the open pit.

The sensitivity analysis consisted of two scenarios where the hydraulic conductivity of the shallow bedrock layers was adjusted. The details of the analysis are presented in Table 5-7. The results are compared against the average annual end of mine (EOM) inflow rates to the open pit as presented above, Section 5.3.2.1, as a base case.

Table 5-7 Sensitivity Analysis of Groundwater Inflows to Bedrock Hydraulic Conductivity – Mine Year 13

Scenario	Hydraulic Conductivity of Shallow Bedrock (m/s)	Total Pit Inflow (m^3/s)	Change from Baseline	Contribution from Keewatin River (m^3/s)
Base Case	8.1×10^{-6}	0.041	0	0.0071
1	8.1×10^{-7}	0.029	29%	0.0043
2	8.1×10^{-5}	0.125	206%	0.023

As shown on Table 5-7, the total inflow to the open pit is very sensitive to the value of hydraulic conductivity assigned to the shallow bedrock, particularly as the hydraulic conductivity increases. The inflow rates vary by less than 30% with an order of magnitude decrease in hydraulic conductivity but increases by about 200% with an order of magnitude increase in hydraulic conductivity. It is noted that increasing the hydraulic conductivity of the shallow bedrock an order of magnitude would also have a detrimental effect on the calibration of the model. Therefore, the hydraulic conductivity values determined during the calibration of the model are considered representative and are carried forward in the analyses.

5.3.2.3 Mine Rock Storage Area and Tailings Management Facility

The fate of groundwater that recharges beneath the MRSA and TMF was determined through particle tracking. The particle traces at the EOM are presented on Map 21 assuming no contact water collection system operating. This assumption provides a conservative assessment of potential groundwater discharge to the receiving environment. The inclusion of the contact water collection system would decrease the groundwater discharge from these areas. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from the MRSA and TMF and are presented in Table 5-8.

Table 5-8 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Area and Tailings Management Facility to Receiving Environment at End of Operation without Seepage Collection Ditches

Project Infrastructure	Receptor	Discharge (m^3/s)	Travel Time (years)			Discharge Arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
MRSA	Keewatin River	0.000065	94	310	3,189	0.000052
	Tributary of Keewatin River (Kee3-B1)	0.001300	3	81	1,853	0.001189
	Open Pit	0.001300	18	603	46,397	0.000969
	Minton Lake	0.004500	20	754	8,376	0.003063
	Cockeram Lake	0.000008	131,865	132,155	132,445	0.000000
TMF	Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	0.000120	140	210	326	0.000121
	Keewatin River	0.000225	103	1,302	32,869	0.000131
	Tributary of Keewatin River (Kee3-B1)	0.003000	1	327	5,268	0.001013
	Open Pit	0.000300	178	11,364	48,415	0.000000
	Minton Lake	0.001100	3	4,447	29,497	0.000039
	Cockeram Lake	0.000082	108,755	196,541	368,155	0.000000
	Subsurface Seepage to Fen	0.000073	1	129	1,226	0.000067

As shown on Table 5-8, the groundwater recharge from beneath the TMF without ditches discharges primarily to a tributary to Keewatin River Tributary (61%) or Minton Lake (22%) with smaller contributions to Payne Lake Tributary (2%), Keewatin River (5%), the open pit (6%), or Cockeram Lake (2%). The mean advective travel times vary from 210 years to the Payne Lake Tributary, to more than 196,000 years to Cockeram Lake. Groundwater recharge from beneath the MRSA discharges without ditches primarily to Minton Lake (62%), Keewatin River Tributary (18%), or the open pit (18%) with the remainder discharging to the Keewatin River (1%) or Cockeram Lake (<1%). The mean advective travel times vary from 81 years to Keewatin River Tributary to in excess of 132,000 years to Cockeram Lake.

Similarly, the fate of groundwater that recharges beneath the MRSA and TMF with a 2-m perimeter seepage collection ditch was also determined by conducting particle tracking. The particle traces at the end of operation with the 2-m perimeter ditch are presented on Map 22. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from each MRSA and are presented in Table 5-9.

Table 5-9 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Area and Tailings Management Facility to Receiving Environment at End of Operation with 2-metre Deep Seepage Collection Ditches

Project Infrastructure	Receptor	Discharge (m^3/s)	Travel Time (years)			Discharge arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
MRSA	Keewatin River	0.000031	87	117	337	0.000030
	Tributary of Keewatin River (Kee3-B1)	0.001500	1	20	364	0.001412
	Open Pit	0.000500	14	168	14,333	0.000513
	Minton Lake	0.001500	3	70	264	0.001499
	Seepage Collection Ditches	0.003600	0	43	595	0.003431
TMF	Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	0.000004	134	1,533	4,456	0.000001
	Keewatin River	0.000116	90	229	3,200	0.000112
	Tributary of Keewatin River (Kee3-B1)	0.002500	2	248	4,501	0.002010
	Open Pit	0.000300	807	5,071	30,801	0.000000
	Minton Lake	0.001500	5	437	12,077	0.000486
	Cockeram Lake	0.000128	32,796	130,146	550,064	0.000000
	Seepage Collection Ditches	0.000352	1	196	807	0.000217

As shown on Table 5-9, the seepage collection ditches are predicted to capture 7% and 50% of the overall seepage from the TMF and MRSA. The groundwater recharge from beneath the TMF with ditches discharges primarily to a tributary to Keewatin River tributary (51%) or Minton Lake (31%) with smaller contributions to Payne Lake Tributary (<1%), Keewatin River (2%), the open pit (6%), or Cockeram Lake (2%). The mean advective travel times vary from 229 years to the Keewatin River, to more than 130,000 years to Cockeram Lake. Groundwater recharge from beneath the MRSA with ditches discharges primarily to Minton Lake (21%) or Keewatin River Tributary (21%), with the remainder discharging to the open pit (7%), or Keewatin River (<1%). The mean advective travel times vary from 20 years to Keewatin River Tributary to in excess of 168 to the open pit.

Given the long flow paths for seepage from the MRSA and TMF, the proportion of seepage arriving at a receiver within 300 years is provided for reference in Table 5-8 and Table 5-9. Three hundred years travel time was used as a threshold for input to the water balance model (Stantec 2020d), which had a 300-year run time.

5.4 CLOSURE

The groundwater model was subsequently modified from the operation phase to simulate the effects of the Project during closure on groundwater levels and flow and the fate of groundwater originating from the MRSA and TMF. As part of these simulations the model was used to predict groundwater inflows to the open pit as it was filling, and to evaluate the flow paths and groundwater discharge rates to receptors for recharge that originates from the MRSA and TMF.

5.4.1 Model Setup

Starting with the calibrated groundwater flow model and modifications completed for operation, the pit boundary was modified to allow for the pit to fill over time due to groundwater. The modifications to the operation model are discussed below for each Project component.

5.4.1.1 Open Pit Filling

The groundwater inflows to the open pit as it is filled during closure was simulated in the groundwater flow model by modifying the seepage face boundary conditions at the ultimate extent of the open pit development at the completion of mining at the MacLellan site. The pit inflow rate was estimated by removing the seepage face boundary conditions and monitoring the predicted water level in the pit lake and the inflow rate to the pit lake.

5.4.1.2 Mine Rock Storage Area and Tailings Management Facility

The new MRSA and TMF as represented during operation with the MRSA and TMF constructed to their full extent at the stages of mine development were maintained throughout closure. Although progressive rehabilitation of the MRSA is proposed by application of a cover, the cover is not anticipated to reduce the groundwater recharge rate out the base of the MRSA. Simulations of the continued operation of the perimeter seepage collection ditches were conducted, as well as the removal of the seepage collection ditches post-closure (i.e., once the water quality is suitable for direct discharge to the receiving environment).

5.4.2 Results

5.4.2.1 Open Pit Filling

The rate of groundwater inflow and time for the open pit to fill after the end of mining activities is presented in Figure 5-10. The groundwater inflow rate decreases from 0.037 m^3/s at a pit lake elevation of 0 m AMSL to 0.005 m^3/s at a final pit lake level of 330 m AMSL. The groundwater inflow rates to the open pit presented on Figure 5-10 were incorporated into the water balance (Stantec 2020d) to evaluate the overall time to fill the open pit during closure considering both groundwater and surface water sources.

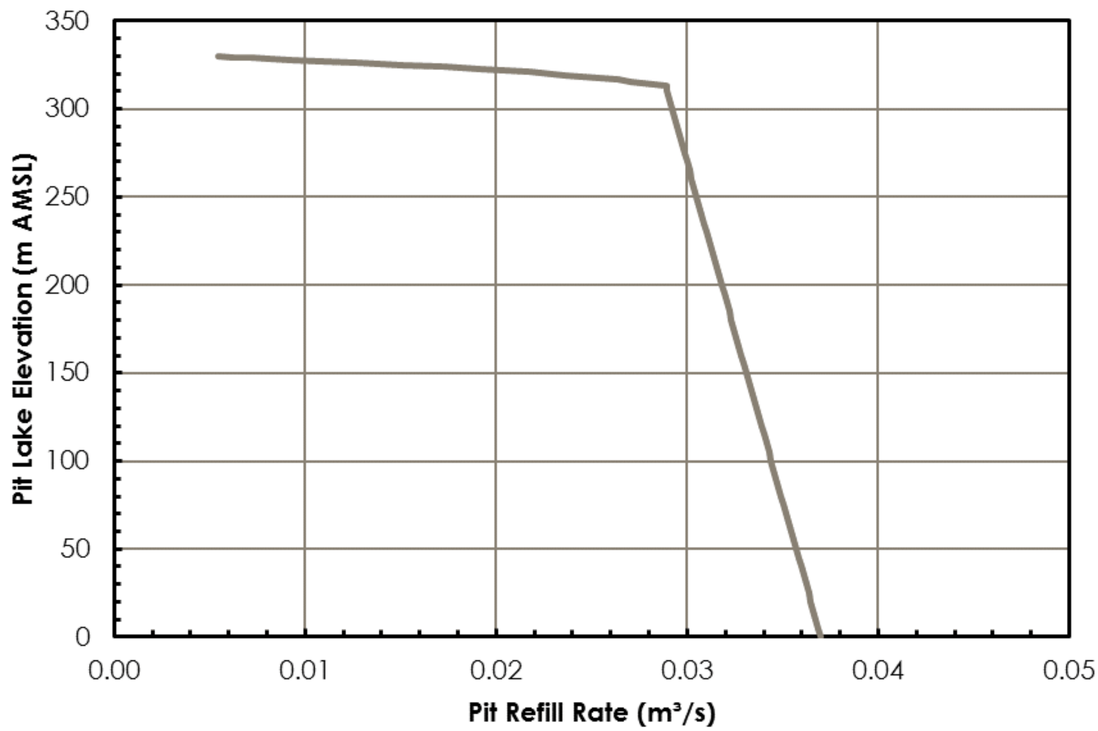

Figure 5-3 Pit Filling Rates During Closure

The water table elevations at the end of closure are presented on Map 23 and Map 24, not including and including the effect of the seepage collection ditches, and the change of the water table position compared to baseline conditions are presented on Map 25 and Map 26, respectively. As shown, at the end of closure with the seepage collection ditches, the water table is predicted to return to near baseline conditions within the vicinity of the open pit. The mounding of the water table is limited by the seepage collection ditches around the perimeter of the TMF and MRSA (Map 26). Mounding of the water table is confined to the footprint of the TMF and MRSA as well as the fen located east of the MRSA. Drawdown due to the presence of the seepage collection ditches around the perimeter of the TMF and MRSA is predicted in the direct vicinity of the collection ditches, specifically located along the eastern and southern portions of the MRSA. Map 25 presents the simulated drawdown in comparison to baseline conditions with the decommissioning of the seepage collection ditches around the MRSA and TMF for comparison. Without the seepage collection ditches, the mounding of the water table extends up to 2,400 m from the limits of the TMF. As the groundwater level returns to near baseline conditions, it is anticipated that at least a portion of East Pond may refill.

Table 5-10 presents the comparison of baseline groundwater discharge rates with effects of the pit lake on the surface water flows at closure (i.e., after the pit lake is full) without seepage collection ditches around the TMF and MRSA. The groundwater flows to the receptors are predicted to return to near baseline levels once the pit is full. The predicted changes to the groundwater flow rates are relatively small (generally less than 0.003 m^3/s) compared to the overall anticipated flow rates in the surface water features and are not anticipated to affect water levels in the streams or lakes. The largest change in baseline to closure groundwater discharge rates is predicted at the tributary to Keewatin River (Kee3-B2-A1), which is predicted to lose 0.0032 m^3/s more flow in closure than during baseline conditions, which is consistent with the effects observed during operations.

Table 5-10 Estimated Groundwater Discharge to Watercourses and Lakes at End of Closure (m^3/s) without Seepage Collection Ditches

Watercourse	Baseline[1]	Post-Closure[1]	Change from Baseline
Lakes			
Dot Lake	0.0060	0.0060	<<0.0001
Minton Lake	0.0030	0.0060	0.0030
Payne Lake	0.0007	0.0038	0.0031
Lake 2	0.0011	0.0022	0.0011
Lake 3	0.0009	0.0026	0.0017
Watercourses			
Keewatin River	0.0090	0.0080	-0.0010
Lynn River	0.0043	0.0060	0.0017
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	-0.0009	-0.0006	0.0003
Tributary of Keewatin River (Kee3-B1)	<0.0001	0.0011	0.0011
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	-0.0010	-0.0041	-0.0032
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	-0.0008	0.0022	0.0030

NOTES:
1 Positive value represents flow from groundwater to surface water
Negative value represents flow from surface water to groundwater

The operation of seepage collection ditches around the perimeter of the TMF and MRSA were also simulated in the model. The effects of these features on the groundwater discharge is presented on Table 5-11. The operation of collection ditches is predicted to collect 0.0104 m^3/s of groundwater and will have relatively minor changes to lake baseflows compared to operation without ditches.

Table 5-11 Estimated Groundwater Discharge to Watercourses and Lakes at End of Closure (m^3/s) with 2-m Deep Seepage Collection Ditches

Watercourse	Baseline[1]	Post-Closure[1]	Change from Baseline
Lakes			
Dot Lake	0.0060	0.0060	<<0.0001
Minton Lake	0.0030	0.0030	<<0.0001
Payne Lake	0.0007	0.0028	0.0021
Lake 2	0.0011	0.0016	0.0005
Lake 3	0.0009	0.0023	0.0014
Watercourses			
Keewatin River	0.0090	0.0089	-0.0001
Lynn River	0.0043	0.0057	0.0014
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	-0.0009	-0.0003	0.0006
Tributary of Keewatin River (Kee3-B1)	<0.0001	0.0017	0.0017
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	-0.0010	-0.0041	-0.0032
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	-0.0008	0.0025	0.0033
Seepage Collection Ditches	0	0.0104	0.0104

NOTES:
1. Positive value represents flow from groundwater to surface water
   Negative value represents flow from surface water to groundwater

5.4.2.2 Mine Rock Storage Area and Tailings Management Facility

The fate of groundwater that recharges beneath the MRSA and TMF was determined by conducting particle tracking. The particle traces at closure are presented on Map 27 assuming no contact water collection system operating. This assumption provides a conservative assessment of potential groundwater discharge to the receiving environment. The inclusion of the contact water collection system would decrease the groundwater discharge from the MRSA and TMF. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from the MRSA and TMF and are presented in Table 5-12.

Table 5-12 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Area and Tailings Management Facility to Receiving Environment at Closure (Pit Full, without Seepage Collection Ditches)

Project Infrastructure	Receptor	Discharge (m^3/s)	Travel Time (years)			Discharge Arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
MRSA	Keewatin River	0.000100	103	1,428	39,811	0.000045
	Tributary of Keewatin River (Kee3-B1)	0.001900	1	241	5,943	0.001812
	Open Pit	0.001200	2,363	11,875	61,476	0.000837
	Minton Lake	0.004400	4	4,860	31,355	0.002995
	Cockeram Lake	0.000034	140,017	249,217	648,383	0.000000
TMF	Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	0.000120	141	213	345	0.000117
	Keewatin River	0.000200	103	1,428	39,811	0.000130
	Tributary of Keewatin River (Kee3-B1)	0.003100	1	241	5,943	0.002117
	Open Pit	0.000200	2,363	11,875	61,476	0.000000
	Minton Lake	0.001100	4	4,860	31,355	0.000033
	Cockeram Lake	0.000034	140,017	249,217	648,383	0.000000
	Subsurface Seepage to Fen	0.000146	1	151	1,302	0.000109

As shown on Table 5-12, the groundwater recharge from beneath the TMF discharges primarily to a tributary of the Keewatin River (63%) or to Minton Lake (22%) with smaller contributions to Payne Lake Tributary (2%), Keewatin River (4%), the open pit (4%), and Cockeram Lake (<1%). The mean advective travel times vary from 213 years to the Payne Lake Tributary, to more than 249,000 years to Cockeram Lake. Groundwater recharge from beneath the MRSA discharges primarily to Minton Lake (58%) or Keewatin River Tributary (25%), with the remainder discharging to the open pit (16%), Keewatin River (1%) or Cockeram Lake (<1%). The mean advective travel times vary from 67 years to Keewatin River Tributary to in excess of 230,000 years to Cockeram Lake.

Similarly, the fate of groundwater that recharges beneath the MRSA and TMF with a 2-m perimeter ditch was also determined by conducting particle tracking. The particle traces at closure with collection ditches are presented on Map 28. The particle traces were used to quantify the inflow rates and travel times to the open pit and discharge to surface water features from the MRSA and TMF including the effect of the collection ditches and are presented in Table 5-13.

Table 5-13 Predicted Groundwater Discharge Rates (m^3/s) from Mine Rock Storage Area and Tailings Management Facility to Receiving Environment at Closure (Pit Full, with 2 m Deep Seepage Collection Ditches)

Project Infrastructure	Receptor	Discharge (m^3/s)	Travel Time (years)			Discharge Arriving within 300 years (m^3/s)
			Minimum	Mean	Maximum	
MRSA	Keewatin River	0.000031	87	106	242	0.000031
	Tributary of Keewatin River (Kee3-B1)	0.001521	2	15	368	0.001480
	Open Pit	0.000457	43	271	14,068	0.000441
	Minton Lake	0.001166	4	77	251	0.001166
	Seepage Collection Ditches	0.004400	0	94	613	0.003930
TMF	Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	0.000003	163	937	2,428	0.000002
	Keewatin River	0.000100	89	217	2,155	0.000117
	Tributary of Keewatin River (Kee3-B1)	0.002400	2	244	4,834	0.002187
	Open Pit	0.000200	941	6,520	56,425	0.000000
	Minton Lake	0.000600	5	872	63,590	0.000474
	Cockeram Lake	0.000100	29,130	87,622	231,790	0.000000
	Seepage Collection Ditches	0.001497	1	248	835	0.000498

As shown on Table 5-13, the seepage collection ditches are predicted to capture 30% and 58% of the overall seepage from the TMF and MRSA. The groundwater recharge from beneath the TMF with ditches discharges primarily to a tributary to Keewatin River (49%) or Minton Lake (12%) with smaller contributions to Payne Lake Tributary (<1%), Keewatin River (2%), the open pit (4%), or Cockeram Lake (2%). The mean advective travel times vary from 240 years to the Keewatin River Tributary, to more than 249,000 years to Cockeram Lake. Groundwater recharge from beneath the MRSA with ditches discharges primarily to Minton Lake (15%) or Keewatin River Tributary (20%), with the remainder discharging to the open pit (6%), or Keewatin River (<1%). The mean advective travel times vary from 67 years to Keewatin River Tributary to in excess of 230,000 years to Cockeram Lake.

Given the long flow paths for seepage from the MRSA and TMF, the proportion of seepage arriving at a receiver within 300 years is provided for reference in Table 5-12 and Table 5-13. Three hundred years travel time was used as a threshold for input to the water balance model (Stantec 2020d), which had a 300-year run time.

5.4.2.3 Sensitivity of Groundwater Discharge to Recharge

A sensitivity analysis was conducted to assess the potential effect of an increase or decrease in the future recharge rate on groundwater discharge to the receiving environment. The sensitivity analysis consisted of two scenarios where the recharge was adjusted as a 25% increase and a 25% decrease from the calibrated, baseline recharge value for each recharge zone. Table 5-14 presents the recharge values used in the sensitivity scenarios compared to the baseline recharge value.

Table 5-14 Sensitivity Analysis Recharge Scenarios

Scenario	Recharge
Baseline (calibration)	120
25% decrease	90
25% increase	150

The predicted groundwater discharge to the receiving environment for closure are presented in Table 5-15 for the baseline recharge rate, the 25% increase, and 25% decrease in recharge rate without the effect of the seepage collection ditches. The relative percent difference in groundwater discharge to watercourses and lakes is less than 20%, and generally less than 10%, when comparing the 25% change in recharge with the calibrated model recharge for the closure scenario, except for Payne Lake, Keewatin River, and the Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1). The sensitivity analysis suggests groundwater discharge to Payne Lake, Keewatin River, and Kee3-B2-A1 is sensitive to a 25% decrease in modelled recharge compared to the calibrated model recharge value. For the 25% increase in recharge sensitivity scenario, the relative percent difference in groundwater discharge to watercourses and lakes was less than 20% except for Kee3-B2-A1. The results of the sensitivity analysis indicate the groundwater discharge to watercourses and lakes is relatively insensitive to a 25% increase in modelled recharge and sensitive to a 25% decrease in modelled discharge for Payne Lake, Keewatin River, and Kee3-B2-A1.

Table 5-15 Sensitivity Analysis of Groundwater Discharge to Recharge – Closure (Pit Full, without Seepage Collection Ditches)

Watercourse	Estimated Groundwater Discharge (m^3/s) to Watercourses and Lakes			
	Baseline[1]	Closure[1]	Closure 25% Decrease in Recharge[1]	Closure 25% Increase in Recharge[1]
Lakes				
Dot Lake	0.0060	0.0060	0.0059	0.0064
Minton Lake	0.0030	0.0060	0.0053	0.0066
Payne Lake	0.0007	0.0038	0.0029	0.0045
Lake 2	0.0011	0.0022	0.0020	0.0024
Lake 3	0.0009	0.0026	0.0025	0.0027

Watercourses				
Keewatin River	0.0090	0.0080	0.0044	0.0089
Lynn River	0.0043	0.0060	0.0055	0.0065
Tributary of Keewatin River connecting with East Pond (Kee3-A1)	-0.0009	-0.0006	-0.0007	-0.0005
Tributary of Keewatin River (Kee3-B1)	0.0000	0.0011	0.0009	0.0012
Watercourse from East Pond to Tributary of Keewatin River (Kee3-B2-A1)	-0.0010	-0.0041	0.0014	-0.0015
Watercourse connecting Payne Lake and Keewatin River (Kee3-Pay1)	-0.0008	0.0022	0.0018	0.0024
Notes: 1. Positive value represents flow from groundwater to surface water Negative value represents flow from surface water to groundwater				

5.5 PREDICTION CONFIDENCE

The approach used in model simulations completed for this Project was to incorporate conservative assumptions for predicting effects that may result from the Project. This report presents the assumptions made in developing these conservative predictions and discusses the high level of confidence in these predictions.

The modelling was conducted using an EPM approach. As discussed in Section 4.0, this is appropriate based on the regional scale of the modelling and considering that flow was predicted to occur primarily through the shallow weathered bedrock, which is highly fractured, and therefore behaves like a porous medium.

Groundwater recharge rates at the MRSA, TMF and historical MRSA to the receiving environment are conservatively “over predicted” in two ways. First, the results from modelling conducted without the presence of the seepage collection system are used to predict groundwater flows to the receiving environment and to inform the environmental effects assessment. Second, all of the recharge applied within the MRSA, TMF and historical MRSA are assumed to be carried through to the final receptors.

The groundwater flow modelling was conducted using a model calibrated to water levels and baseflow targets to establish baseline conditions. Predictions made using the model are based on several conservative assumptions to reduce the influence of uncertainty in the predictions. Therefore, the confidence in the predictions made using the model is considered high.

6.0 CONCLUSIONS

Hydrogeology modelling was conducted to identify changes to groundwater levels and flow pathways to inform the assessment of potential effects of the LLGP on groundwater and surface water resources at the MacLellan site. The modelling was conducted using FEFLOW and was calibrated to baseline conditions within acceptable industry standards.

The construction and operation of the open pit will require the open pit to be dewatered. The dewatering of the open pit will result in the drawdown of the water table by up to 1.0 m over an area extending approximately 800 m south of the open pit. As dewatering progresses, the average annual groundwater inflow rate increases from 0.006 m^3/s with the starter pit at the end of construction to 0.041 m^3/s with the open pit at the end of operation.

The dewatering of the open pit and mounding of the water table in the vicinity of the TMF will also result in changes to groundwater discharge conditions in watercourses and lakes located near the open pit and TMF. Groundwater discharge to most surface water features will increase as a result of mounding of the water table in the vicinity of the TMF which increases the hydraulic gradient toward these features. A small number of surface water features, such as Kee3-B2-A1, will lose flow to groundwater recharge as a result of the dewatering operations.

Groundwater discharge to surface water features associated with Project facilities represents a minor component of the overall surface water flow systems. The installation of a seepage collection system around the TMF and new MRSA is predicted to capture up to 30% and 58% of seepage from these features, respectively. The modelling results will be considered in the assessment of potential effects on the receiving environment.

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8.0 STANTEC QUALITY MANAGEMENT PROGRAM

This Technical Modelling Report entitled **Lynn Lake Gold Project Hydrogeology Assessment – MacLellan Site**, prepared for Alamos Gold Inc. and dated April 8, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individual:

Jonathan Keizer, M.Sc.E., P.Eng. (NB)
Senior Hydrogeologist

Signature

This report was reviewed by the following individual:

Michelle Fraser, M.Sc., P.Geo.
Hydrogeologist, Discipline Lead

Signature

Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC, PMP
Principal, Environmental Services

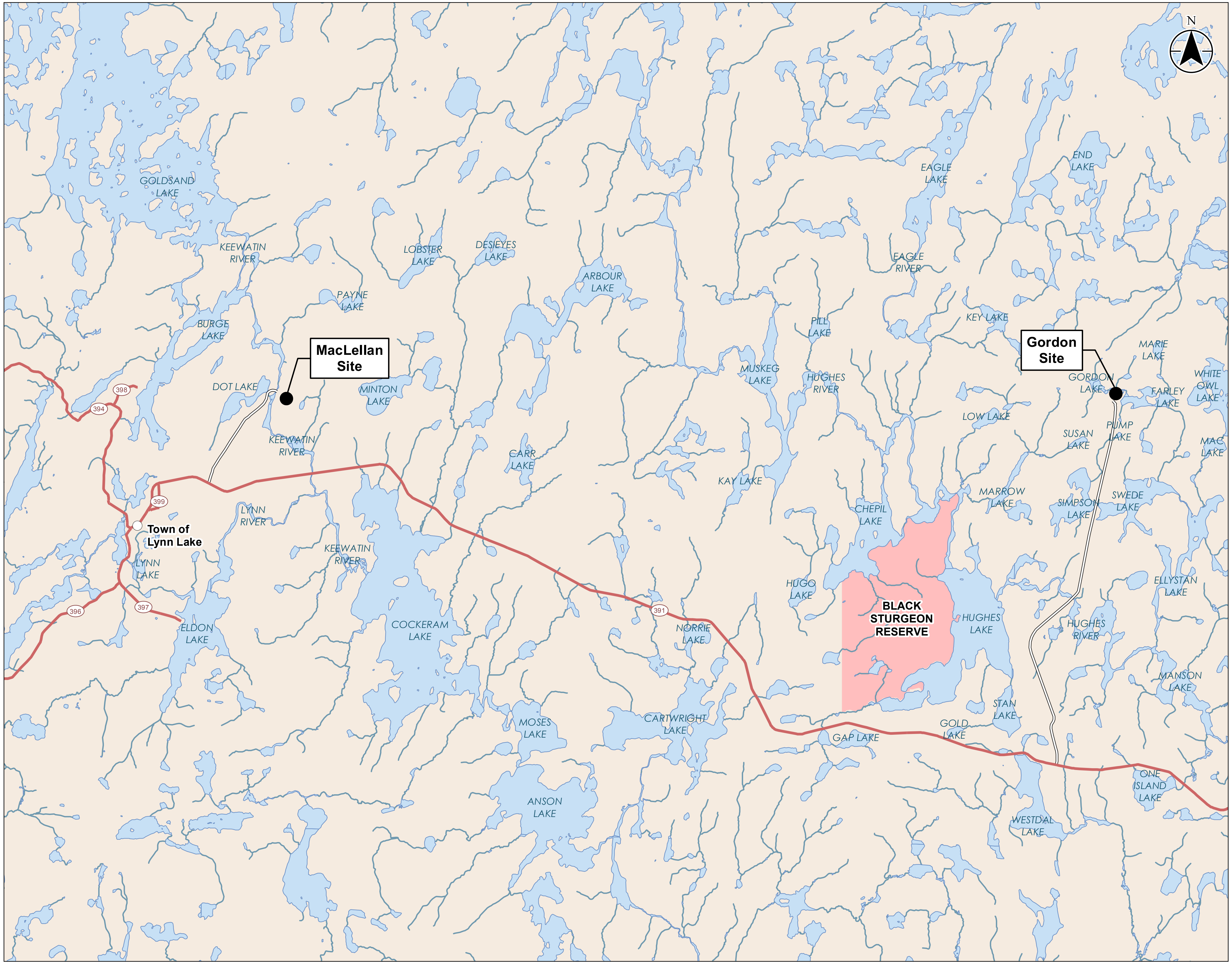
Signature

This report was independently reviewed by Jennifer McPhail, M.Eng. P.Eng., Associate

9.0 LIMITATIONS

This Technical Modelling Report entitled Lynn Lake Gold Project Hydrogeological Assessment – MacLellan Site was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Alamos Gold Inc. (the "Client") to support the approvals and permitting process for the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A MAPS



Stantec

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

0 4 8 Kilometres

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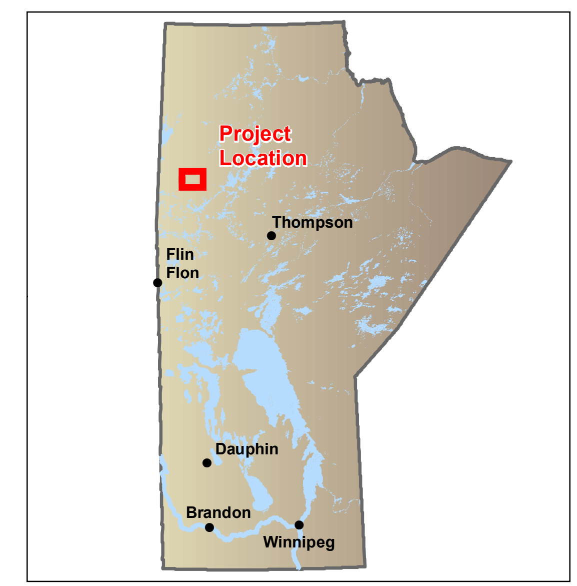
Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location 111473003

MacLellan and Gordon Site
Lynn Lake, Manitoba

Prepared by AC on 2018-03-16
Technical Review by MF on 2018-03-19

Client/Project

LYNN LAKE GOLD PROJECT

Map No.

1

Title

Location of the Proposed MacLellan and Gordon Mine Sites in Northwestern Manitoba

Stantec

Historical Mine Infrastructure

Existing Infrastructure Associated with Historical Mine

Landbase

Existing Access Road

Watercourse

Waterbody

0 100 200 Metres

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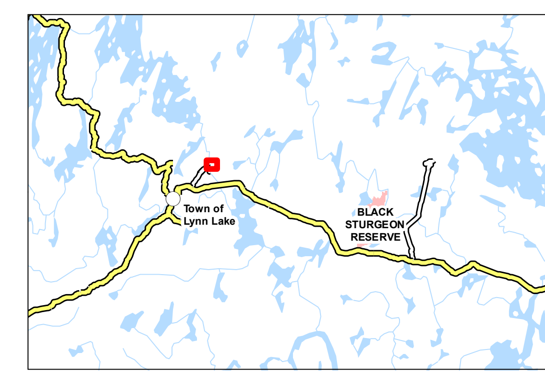
Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location
MacLellan Site
Lynn Lake, Manitoba

111473003

Prepared by AC on 2019-12-10
Technical Review by JK on 2019-12-10

Client/Project

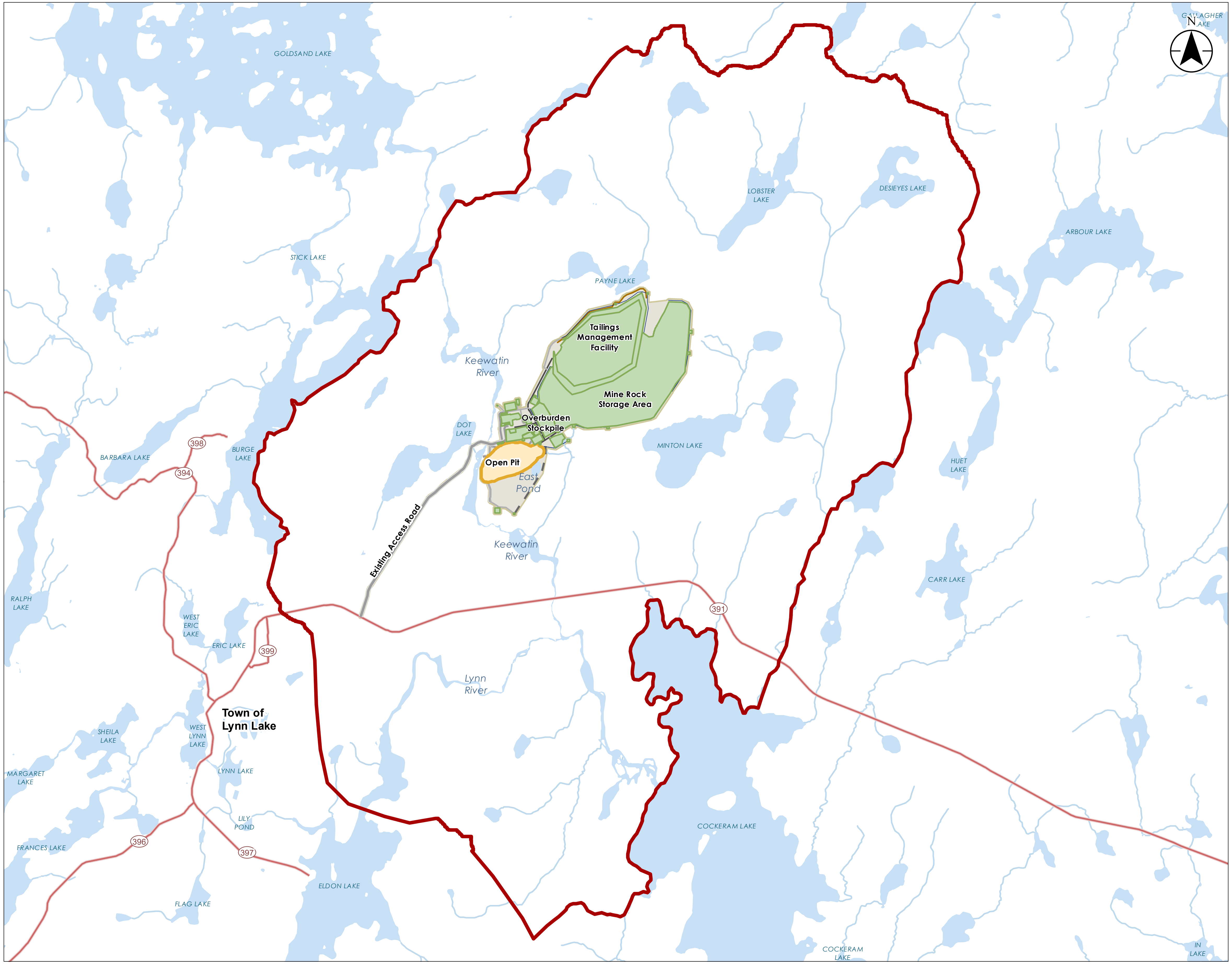
LYNN LAKE GOLD PROJECT

Map No.

2

Title

Historical Project Infrastructure - MacLellan



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 1 2 Kilometres

1:80,000 (At original document size of 11x17)

Notes

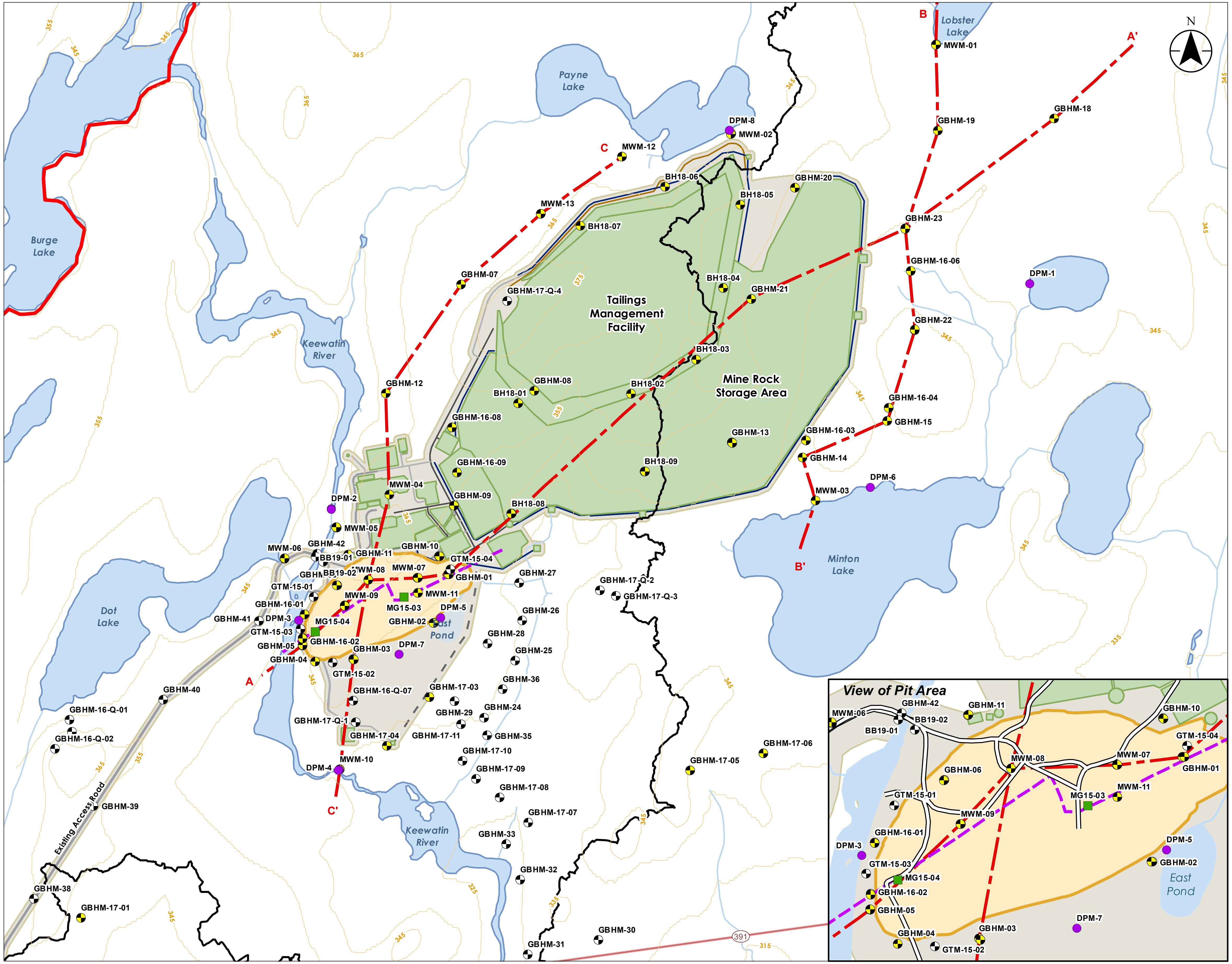
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000
MacLellan Site
Lynn Lake, Manitoba
Prepared by AC on 2019-12-10
Technical Review by JK on 2019-12-10

Client/Project
LYNN LAKE GOLD PROJECT

Map No.
3

Title
Site Plan - MacLellan



Stantec

Project Infrastructure

- Infilled Waterbody
- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Study Area
- Subwatersheds

Survey Locations

- Borehole
- Drive-Point Piezometers
- Monitoring Well
- Exploration Borehole
- Cross Section Locations

Landbase

- Highway
- Existing Access Road
- Approximate Location of NSZ
- Elevation Contours (m)
- Waterbody

0 0.5 1 Kilometres

1:30,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location: MacLellan Site, Lynn Lake, Manitoba — 111473000

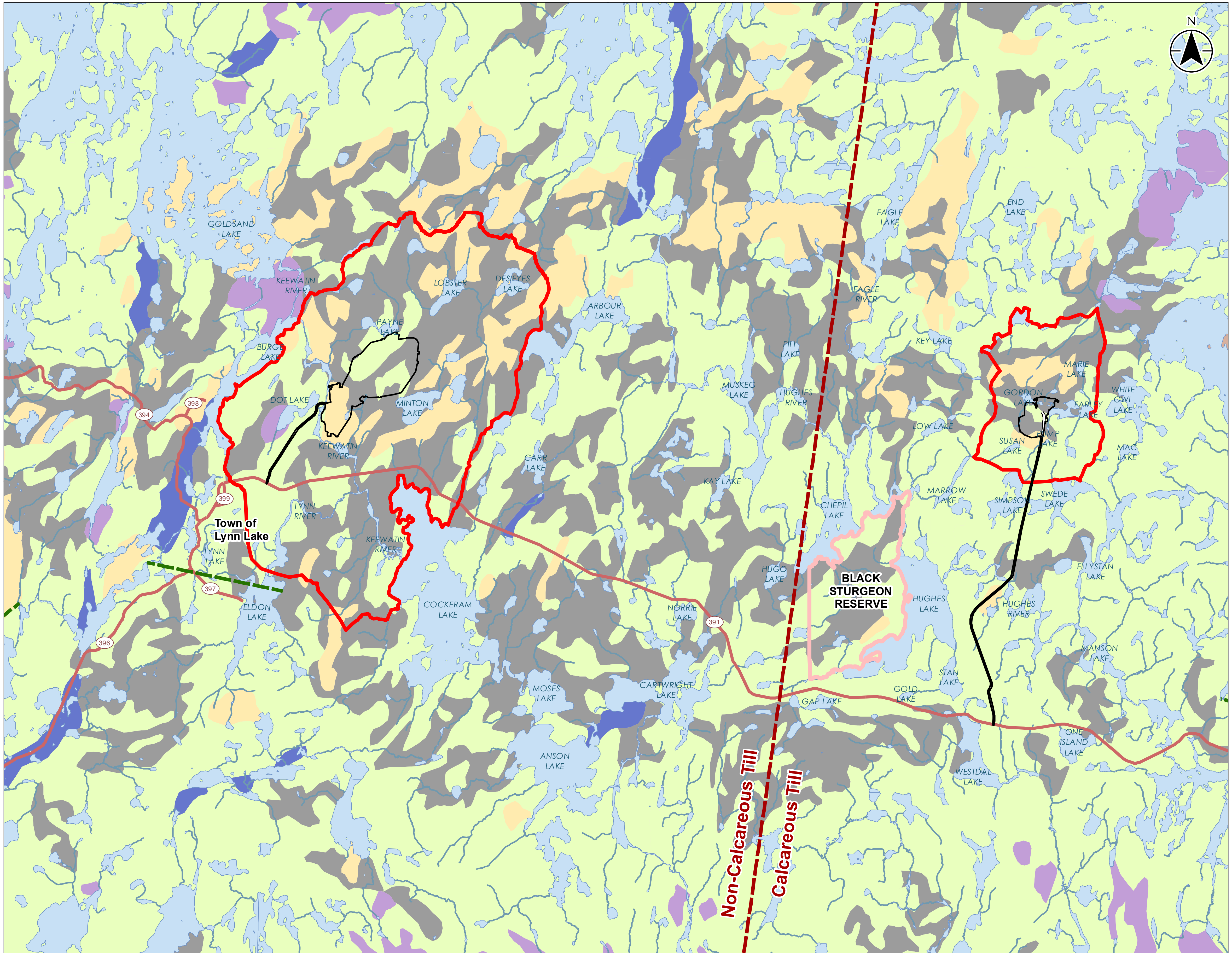
Prepared by AC on 2019-12-10
Technical Review by JK on 2019-12-10

Client/Project: LYNN LAKE GOLD PROJECT

Map No. 4

Title

Topography of Study Area - MacLellan



Stantec

Project Infrastructure

Project Development Area

Study Area

Local Study Area

Surficial Geology

Organic Deposits
Marginal Glaciolacustrine Sediments
Offshore Glaciolacustrine Sediments
Proximal Glaciofluvial Sediments
Sand Diamicton
Precambrian Terrane

Landbase

Approximate Western Extent of Calcarious Till
Approximate Locations of Eskers
Existing Access Road
Highway
Watercourse
Waterbody
First Nation Reserve

0 5 10 Kilometres

1:175,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473008
MacLellan and Gordon Site
Lynn Lake, Manitoba

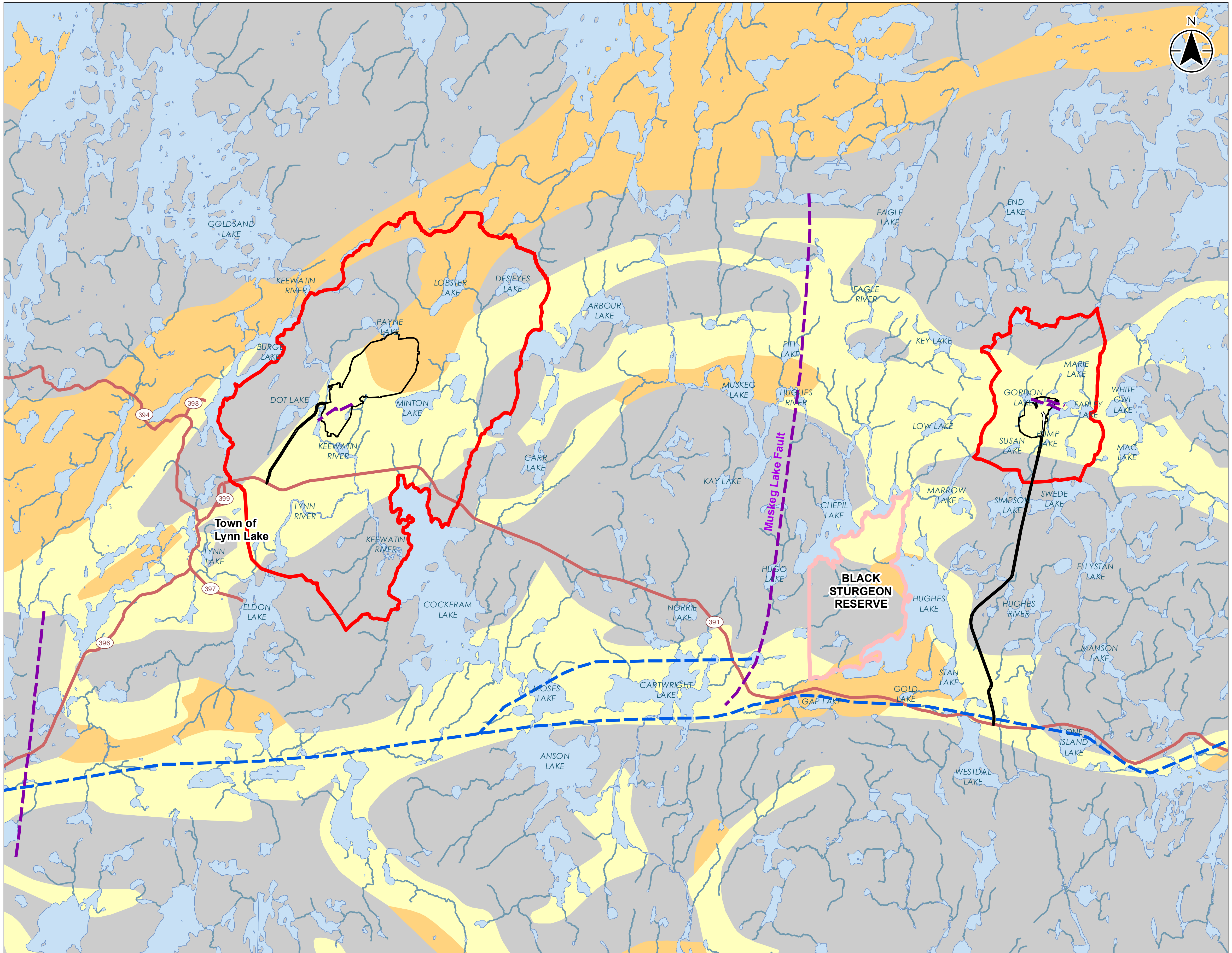
Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

Client/Project

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
5

Title
Surficial Geology



Stantec

Project Infrastructure

Project Development Area

Study Area

Local Study Area

Bedrock Geology

Intrusive Rocks

Metamorphic and Metasedimentary Rocks

Metavolcanic Rocks (includes Amisk and Wasekwan Groups and Great Island volcanic rocks)

Landbase

Approximate Location of Fault

Approximate Location of Johnson Shear Zone

Existing Access Road

Highway

Watercourse

Waterbody

First Nation Reserve

0 5 10 Kilometres

1:175,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location: MacLellan and Gordon Site, Lynn Lake, Manitoba

111473008

Prepared by ACampigotto on 2020-04-07
Technical Review by MFraser on 2020-04-07

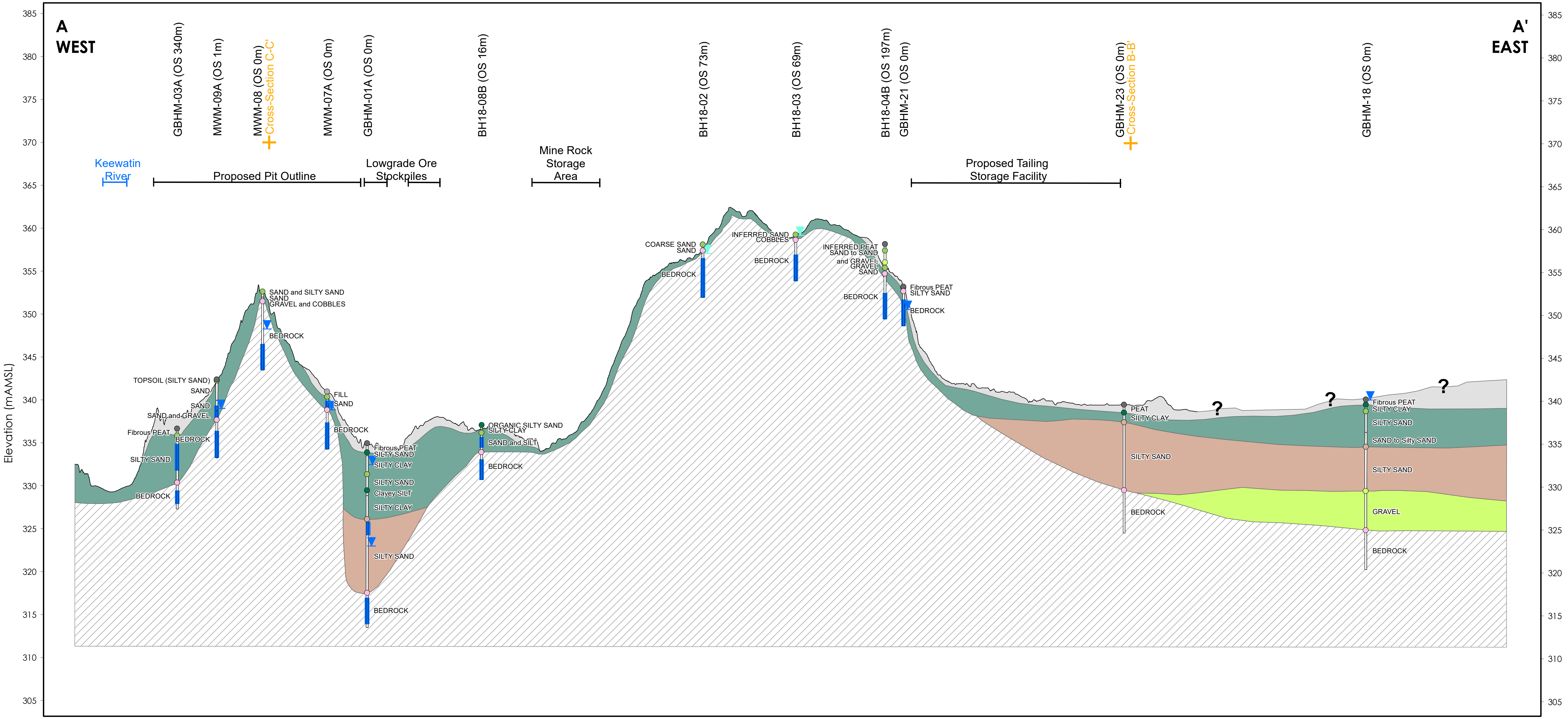
Client/Project

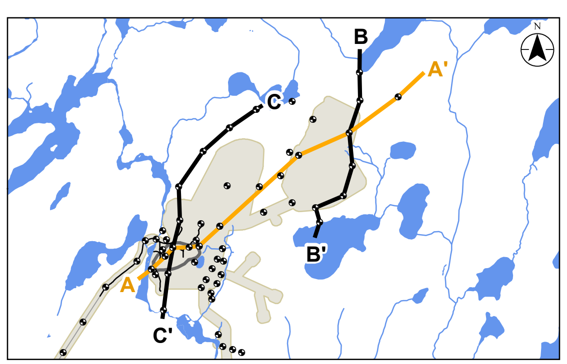
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
6

Title

Bedrock Geology





Notes

1. Manual water level measurements from September 25 to 29, 2015.

MW1-15 (OS m)

Sand

Well ID (Offset)

Stratigraphy

Water Level
(June 22-26, 2018)
(July 4-5, 2019)

Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock

- Ground Surface
- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

50x Vertical Exaggeration

0 500 1,000 metres

1:25,000 (At original document size of 11x17)

Stantec

Alamos Gold Inc.

Project Location
Lynn Lake,
Manitoba

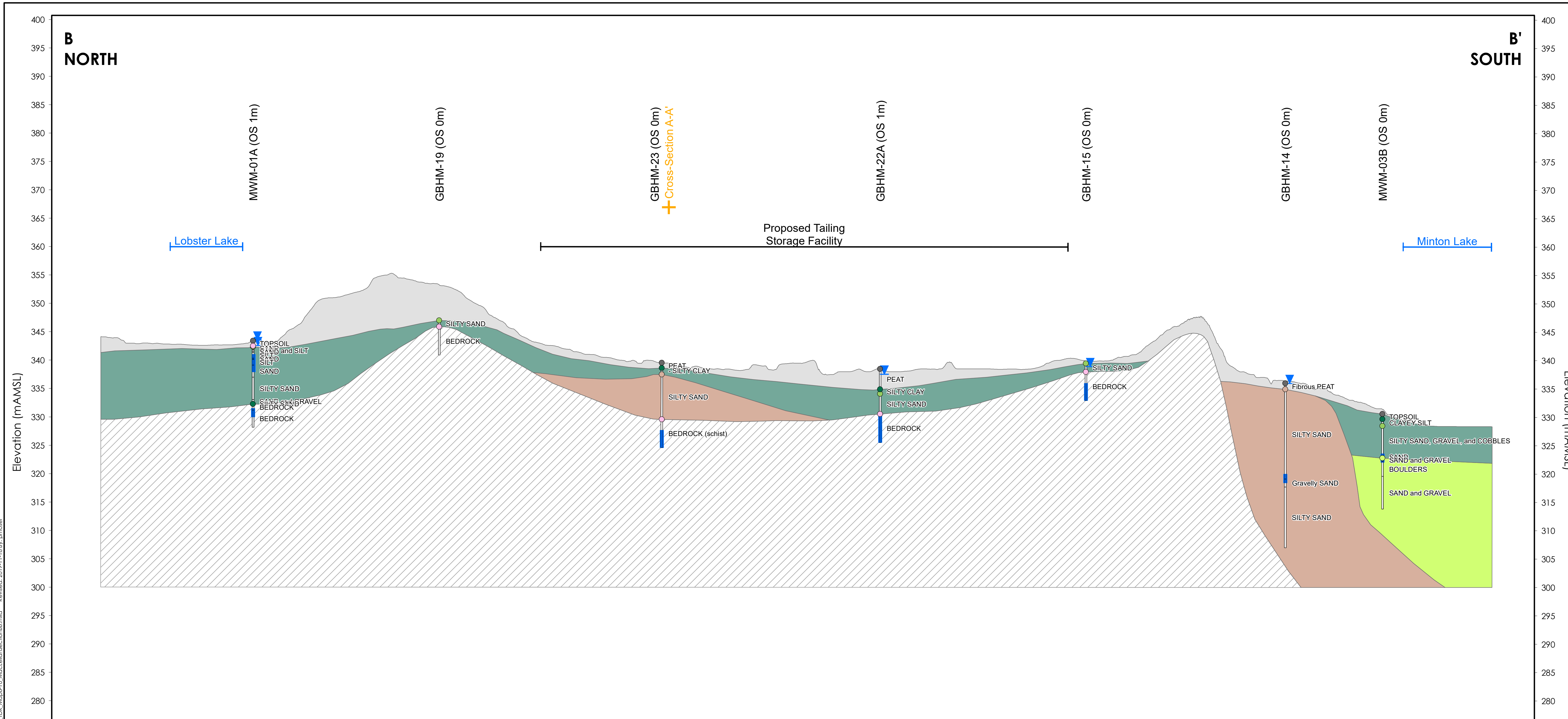
111473008
Prepared by PRM on 2019-11-18
Technical Review by JM on 2019-11-18

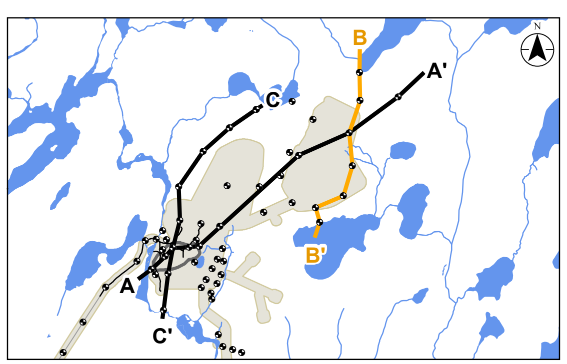
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT

Map No.
7

Title
MacLellan Site
Cross-Section A-A'

\\cd1004-f01\work_group\01609\active\111440293_Alamos\MXD\Hydrogeology\TDR\111473008_HG_TDR_Map8-9_MaclellanSectionAA.mxd Revised: 2019-11-18 By: pmoser





Notes

1. Manual water level measurements from September 25 to 29, 2015.

MW1-15 (OS m) Well ID (Offset)

Stratigraphy

Water Level (June 22-26, 2018)

Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock

- Ground Surface
- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

20x Vertical Exaggeration

0 250 500 metres

1:15,000 (At original document size of 11x17)

Stantec

Alamos Gold Inc.

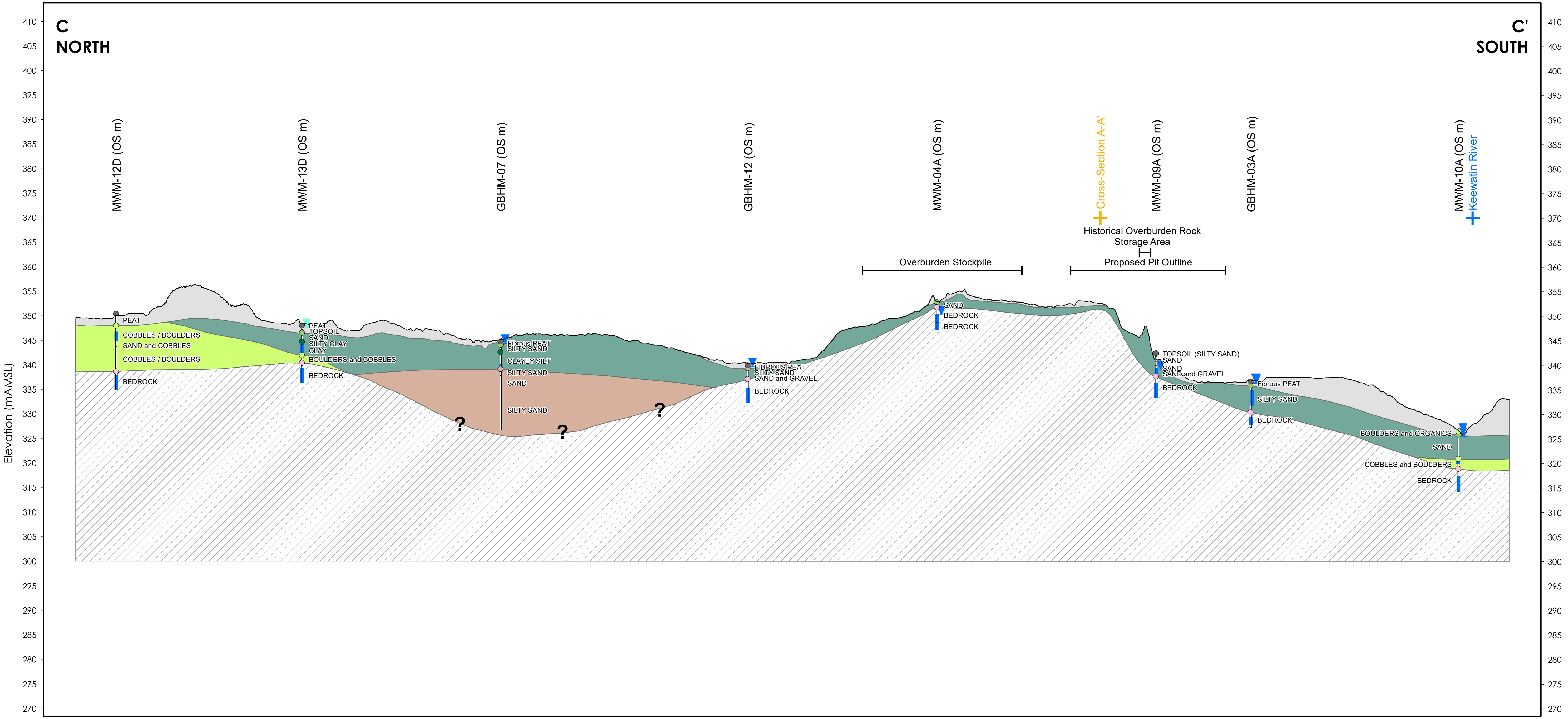
Project Location
Lynn Lake,
Manitoba

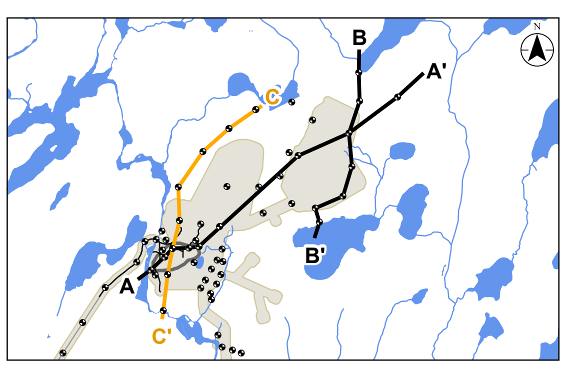
111473008
Prepared by PRM on 2019-11-18
Technical Review by JM on 2019-11-18

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT

Map No.
8

Title
MacLellan Site
Cross-Section B-B'





MW1-15 (OS m)	Well ID (Offset)
Sand	Stratigraphy
	Water Level (June 22-26, 2018) (July 4-5, 2019)
	Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock

- Ground Surface
- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

20x Vertical Exaggeration

0 250 500 metres

1:17,500 (At original document size of 11x17)

Stantec

Alamos Gold Inc.

Project Location
Lynn Lake,
Manitoba

111473000
Prepared by PRM on 2019-11-18
Technical Review by MF on 2020-03-13

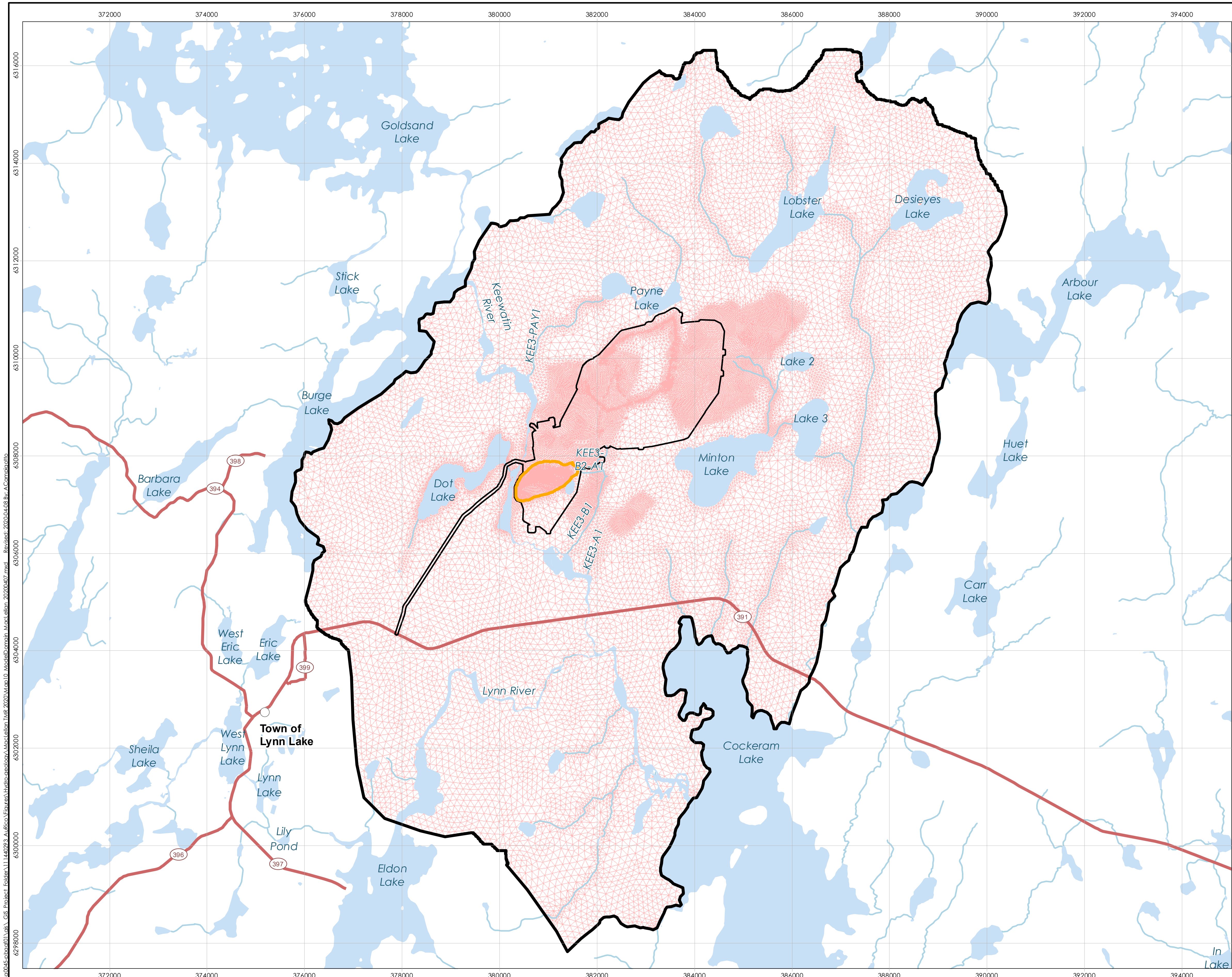
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT

Map No.
9

Title
MacLellan Site
Cross-Section C-C'

Notes
1. Manual water level measurements from September 25 to 29, 2015.

\\cd1004-f01\work_group\01609\active\111440293_Alamos\MXD\Hydrogeology\TDR\111473008_HG_TDR_Map8-11_MacLellanSectionCC.mxd Revised: 2020-03-13 By: pmoser



Stantec

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)
- Model Mesh

Landbase
- Highway
- Watercourse
- Waterbody

N

0 1 2 Kilometres
(At original document size of 11x17)
1:80,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

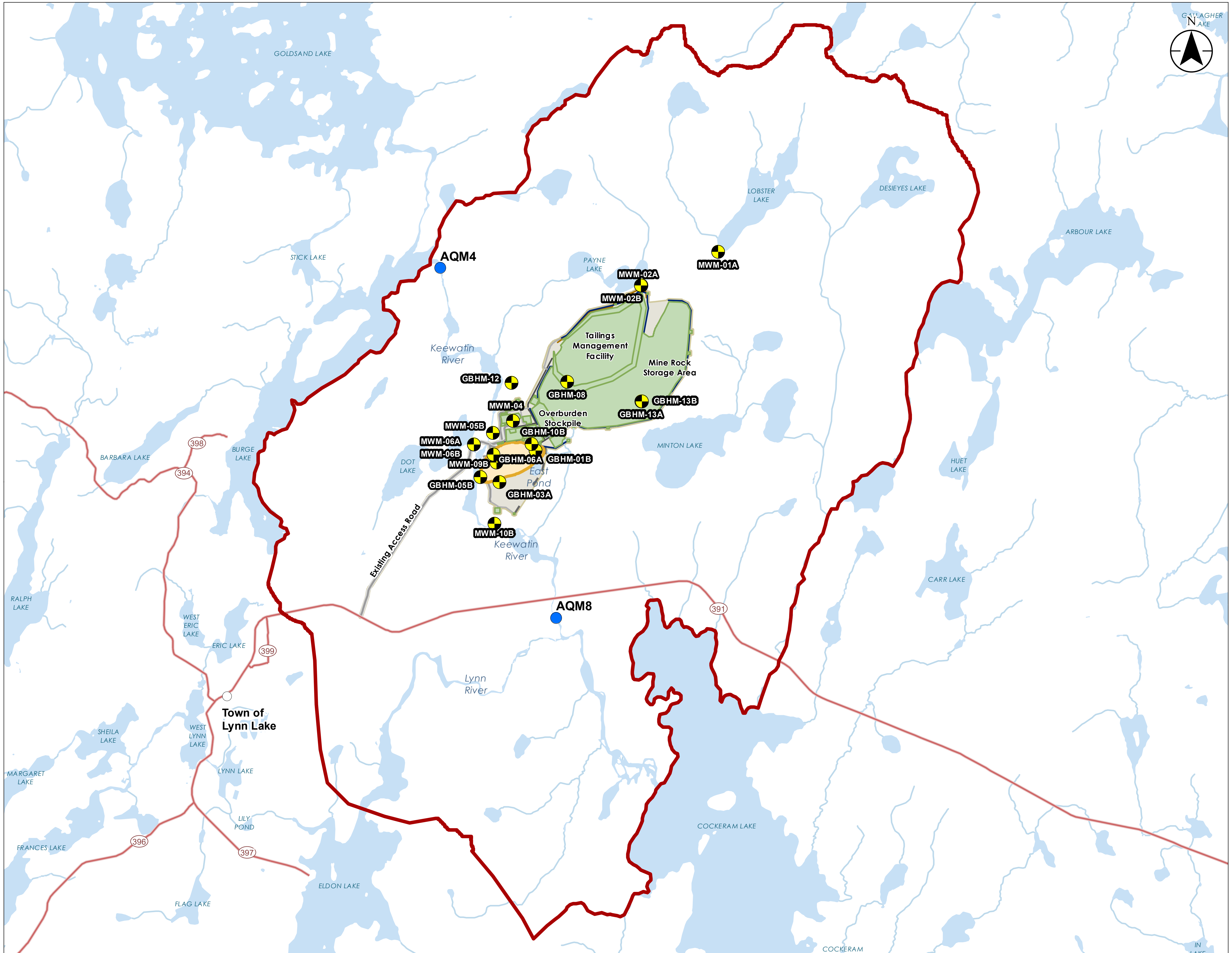
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-08
Technical Review by MFraser on 2020-04-08

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
10

Title
Model Domain and Boundary Conditions - MacLellan



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Groundwater Level Target
- Surface Water Calibration Target
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 1 2 Kilometres

1:80,000 (At original document size of 11x17)

Notes

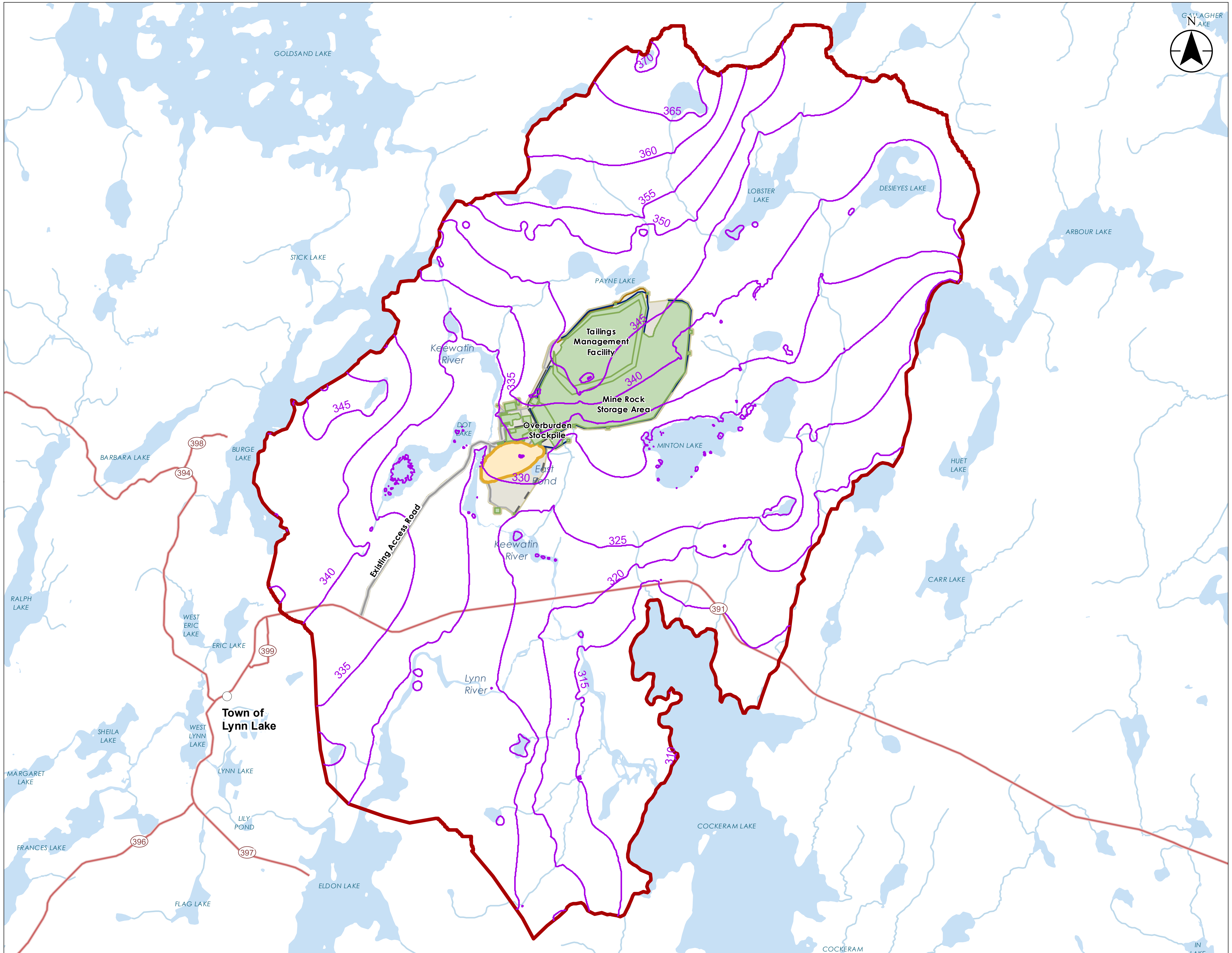
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000
MacLellan Site
Lynn Lake, Manitoba
Prepared by AC on 2019-12-10
Technical Review by JK on 2019-12-10

Client/Project
LYNN LAKE GOLD PROJECT

Map No.
11

Title
Location of Water Level and Baseflow Calibration Targets - MacLellan



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Elevation Contours
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 1 2 Kilometres

1:80,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site
Lynn Lake, Manitoba

Prepared by AC on 2019-12-10
Technical Review by JK on 2019-12-10

Client/Project

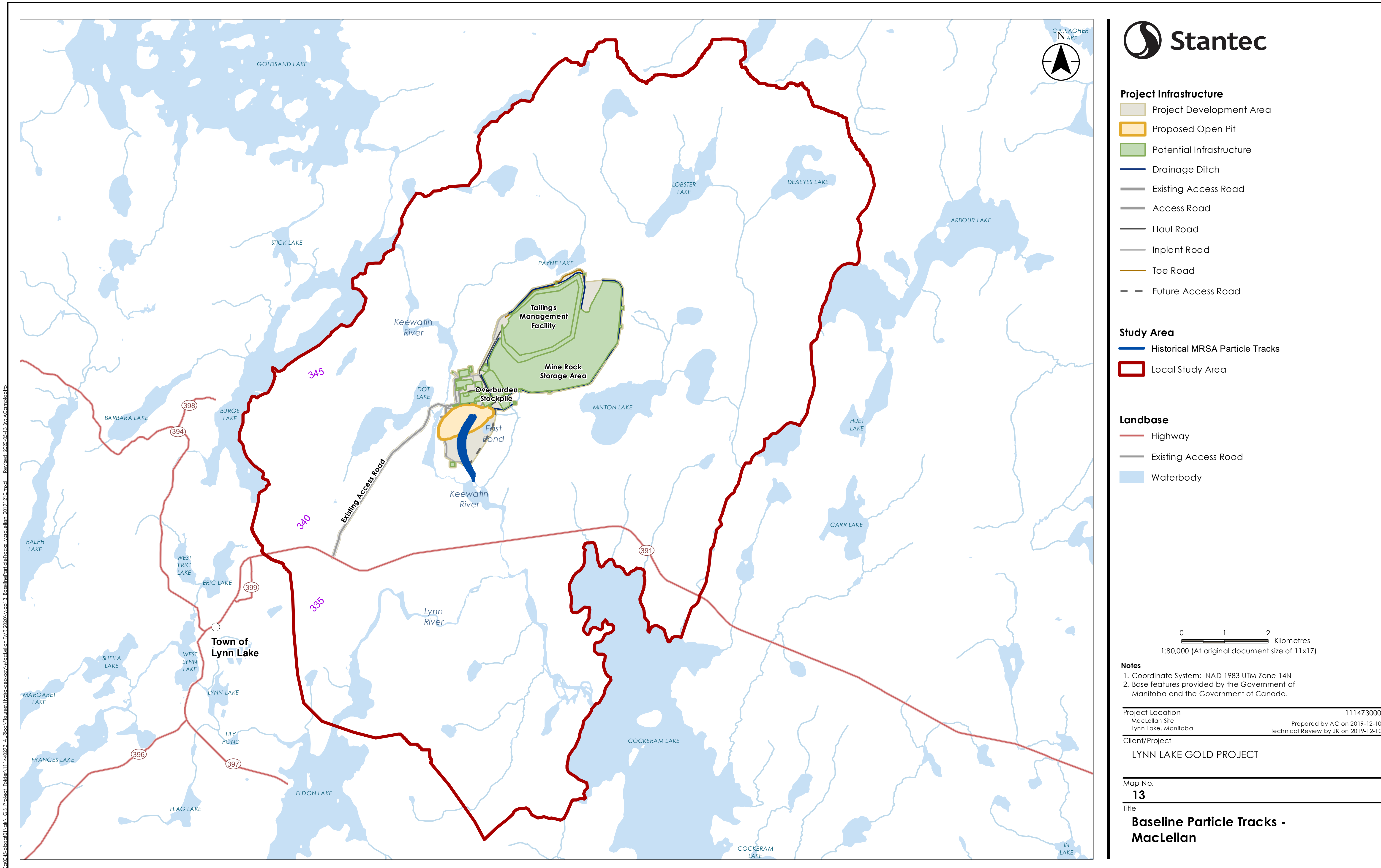
LYNN LAKE GOLD PROJECT

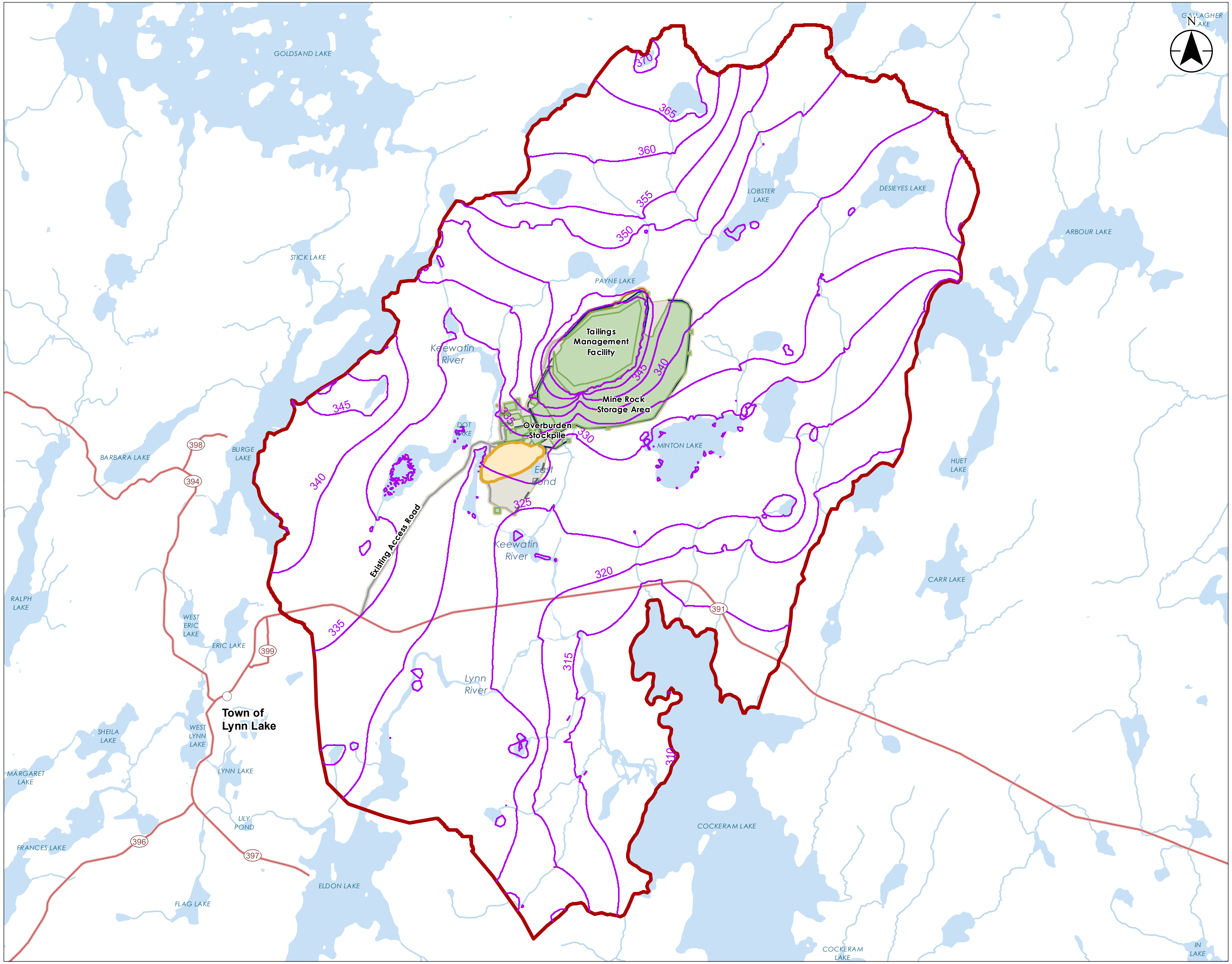
Map No.

12

Title

Baseline Water Table Elevation Contours - MacLellan


Stantec
Project Infrastructure
Project Development Area
Proposed Open Pit
Potential Infrastructure
Drainage Ditch
Existing Access Road
Access Road
Haul Road
Inplant Road
Toe Road
Future Access Road
Study Area
Historical MRSA Particle Tracks
Local Study Area
Landbase
Highway
Existing Access Road
Waterbody
0 1 2 Kilometres
1:80,000 (At original document size of 11x17)
Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.
Project Location
MacLellan Site
Lynn Lake, Manitoba
111473000
Prepared by AC on 2019-12-10
Technical Review by JK on 2019-12-10
Client/Project
LYNN LAKE GOLD PROJECT
Map No.
13
Title
Baseline Particle Tracks - MacLellan
Tailings Management Facility
Mine Rock Storage Area
Overburden Stockpile
East Pond
Keewatin River
Existing Access Road
Lynn River
Town of Lynn Lake
GOLDSAND LAKE
STICK LAKE
PAYNE LAKE
LOBSTER LAKE
DESIEYES LAKE
ARBOUR LAKE
MINTON LAKE
DOT LAKE
BURGE LAKE
BARBARA LAKE
HUET LAKE
CARR LAKE
RALPH LAKE
WEST ERIC LAKE
ERIC LAKE
SHEILA LAKE
WEST LYNN LAKE
LYNN LAKE
MARGARET LAKE
LILY POND
FRANCES LAKE
ELDON LAKE
FLAG LAKE
COCKERAM LAKE
345
340
335
398
394
399
391
396
397



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Elevation Contours
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 1 2 Kilometres

1:80,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location: MacLellan Site, Lynn Lake, Manitoba — 111473000

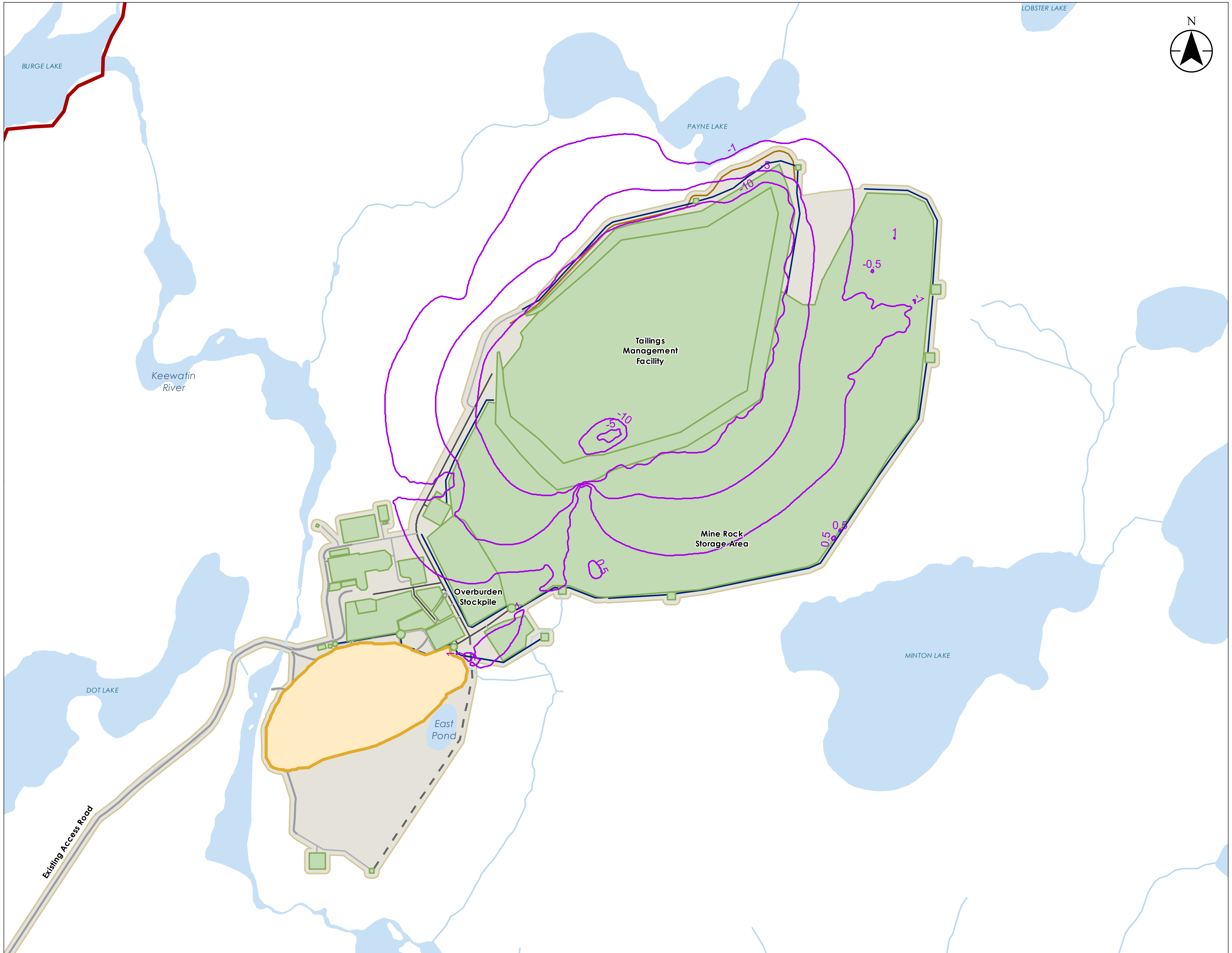
Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project: LYNN LAKE GOLD PROJECT

Map No. 14

Title

Water Table Elevation Contours at End of Construction - MacLellan (no contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Drawdown Contours
- Study Area

Landbase

- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site
Lynn Lake, Manitoba

Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project

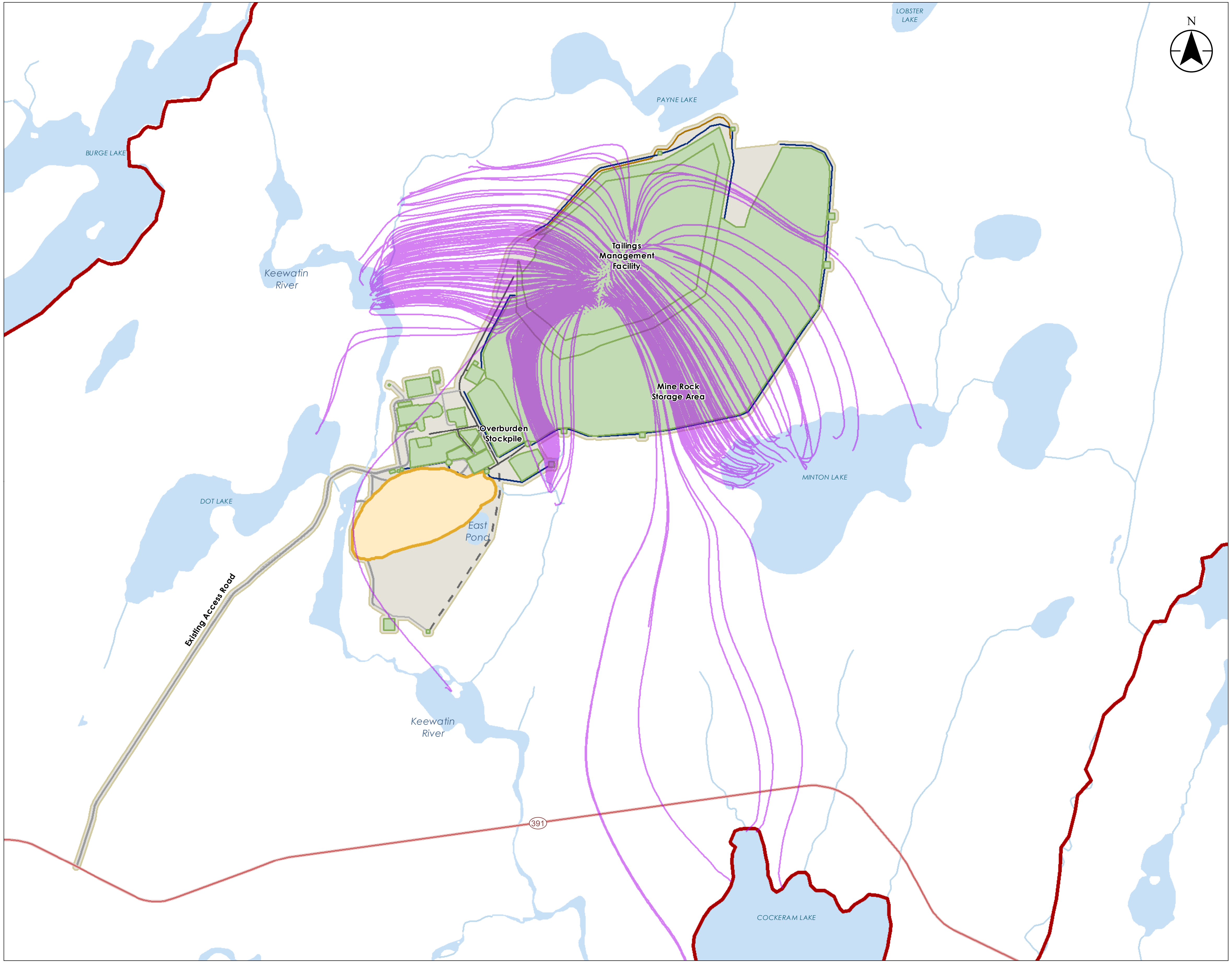
LYNN LAKE GOLD PROJECT

Map No.

15

Title

Simulated Water Table Drawdown at End of Construction - MacLellan (no contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Particle Tracks
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 0.5 1 Kilometres
1:35,000 (At original document size of 11x17)

Notes

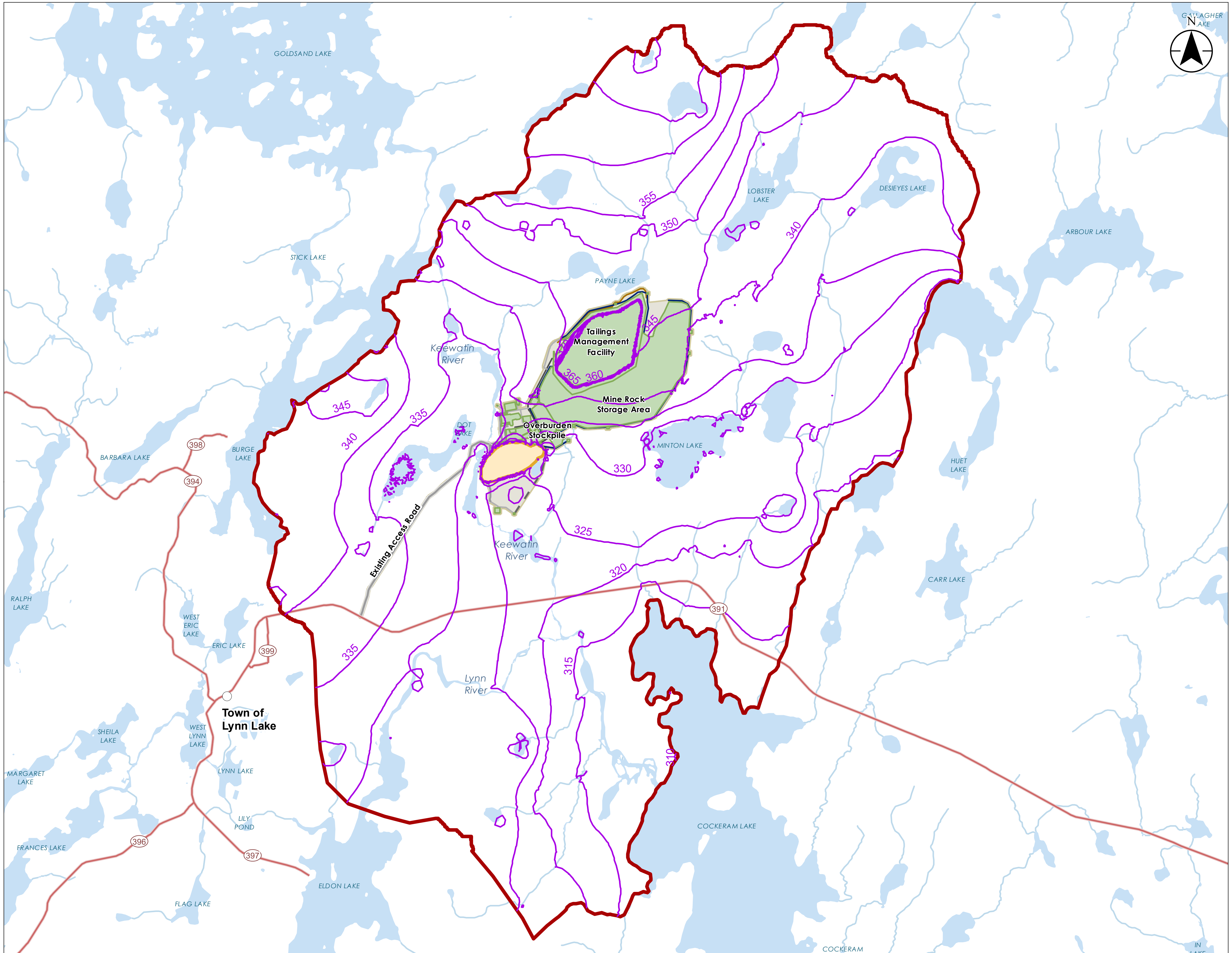
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000
MacLellan Site
Lynn Lake, Manitoba
Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project
LYNN LAKE GOLD PROJECT

Map No.
16

Title
Particle Traces from the TMF to the Receiving Environment - End of Construction - MacLellan (no contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Propose Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Elevation Contours
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 1 2 Kilometres

1:80,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site
Lynn Lake, Manitoba

Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project

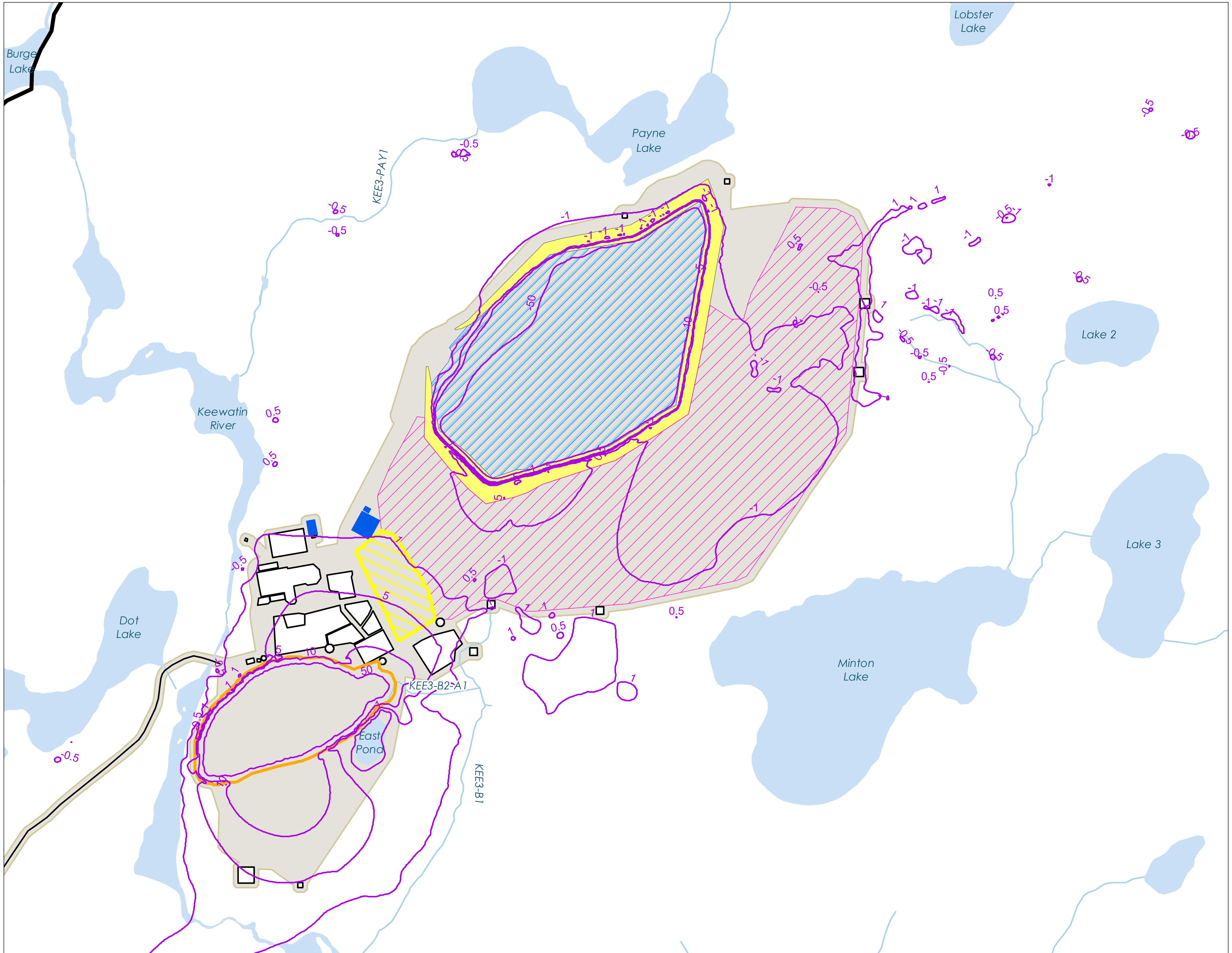
LYNN LAKE GOLD PROJECT

Map No.

17

Title

Water Table Elevation Contours at End of Operation - MacLellan (no contact water collection ditches)



Stantec

Project Infrastructure

- Proposed Open Pit
- Proposed Mine Rock Stockpile
- Proposed Overburden Stockpile
- Proposed Tailings Management Facility
- Proposed Tailings Management Facility Pond
- Other Proposed Ponds
- Other Proposed Areas
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Survey Locations

- Water Table Drawdown Contours

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:25,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

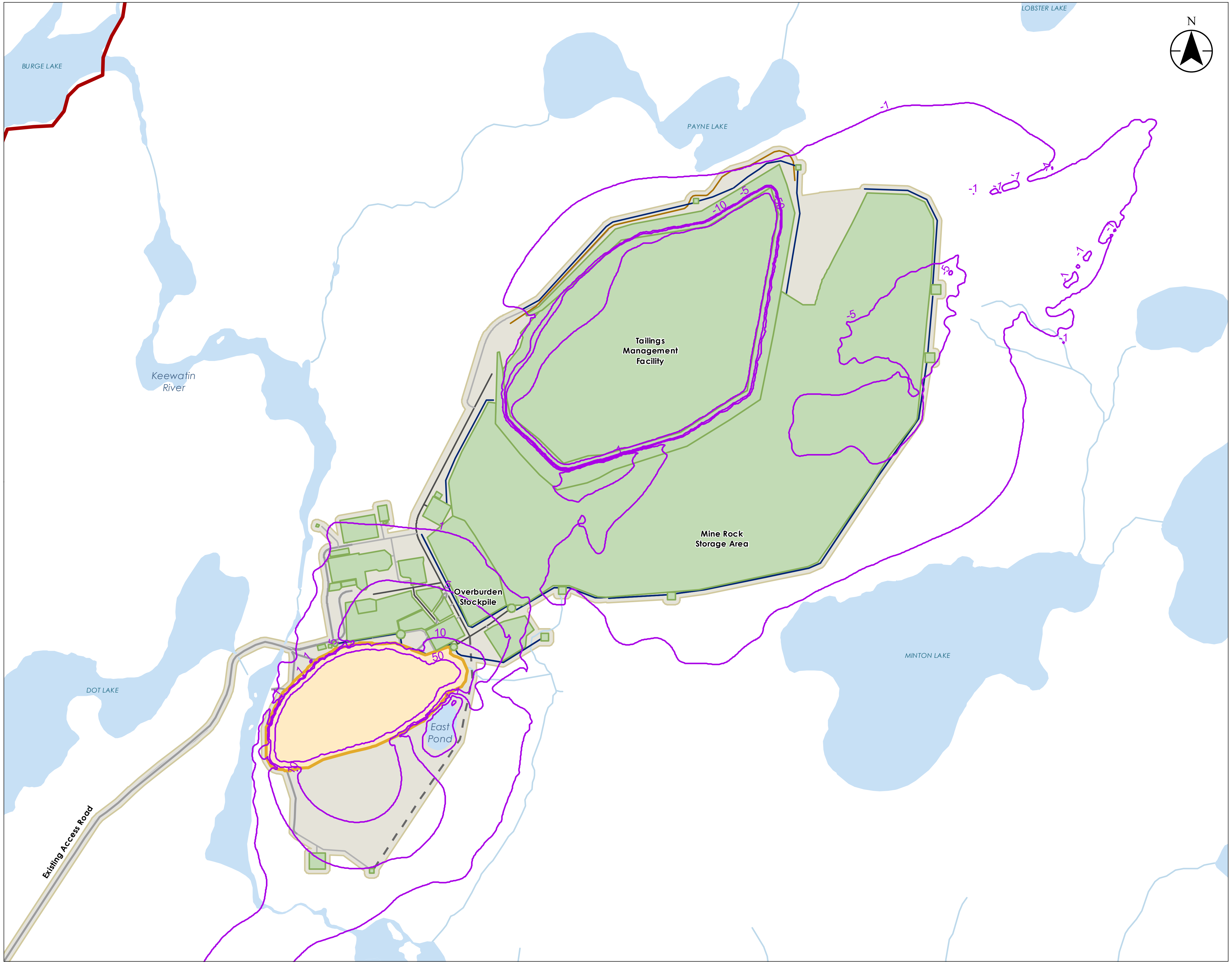
Prepared by ACampigotto on 2020-05-08
Technical Review by MFraser on 2020-05-08
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
18

Title

Simulated Water Table Drawdown at End of Operation - MacLellan Site (including contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Drawdown Contours
- Study Area

Landbase

- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site
Lynn Lake, Manitoba

Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project

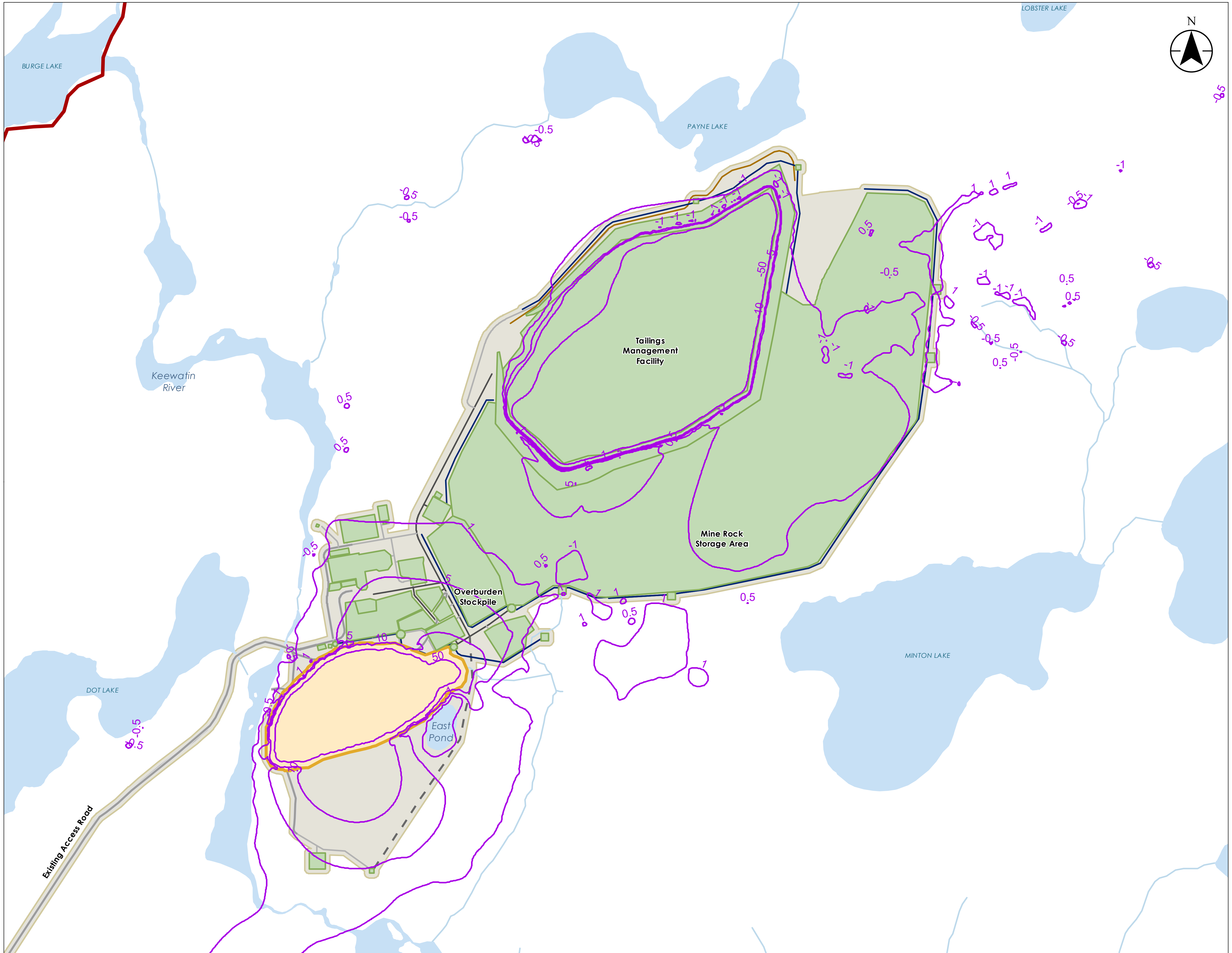
LYNN LAKE GOLD PROJECT

Map No.

19

Title

Simulated Water Table Drawdown at End of Operation - MacLellan (not including contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Drawdown Contours
- Study Area

Landbase

- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site
Lynn Lake, Manitoba

Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project

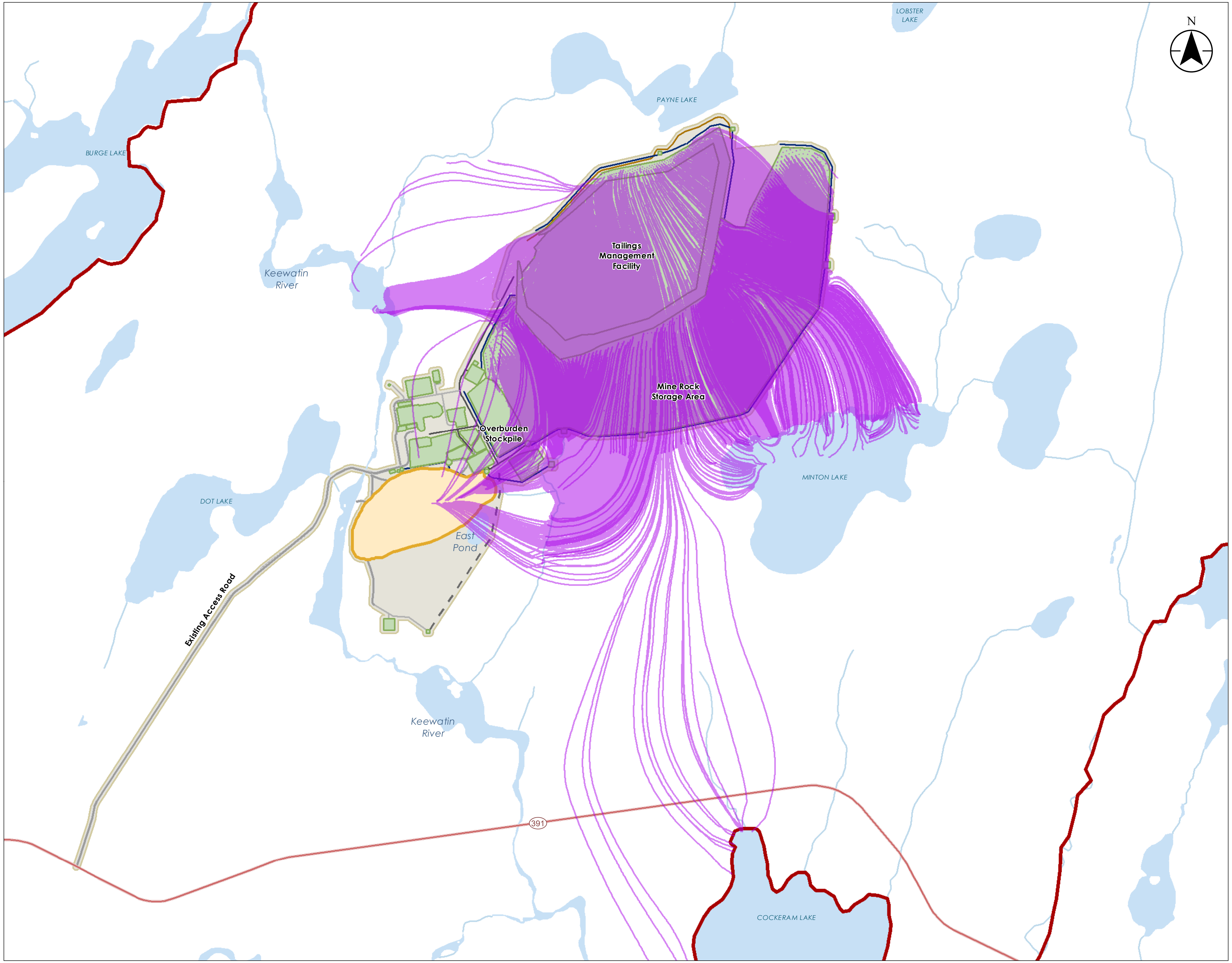
LYNN LAKE GOLD PROJECT

Map No.

20

Title

Simulated Water Table Drawdown at End of Operation - MacLellan (including contact water collection ditches)



Stantec

Project Infrastructure
- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area
- Particle Tracks
- Study Area

Landbase
- Highway
- Existing Access Road
- Waterbody

0 0.5 1 Kilometres
1:35,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

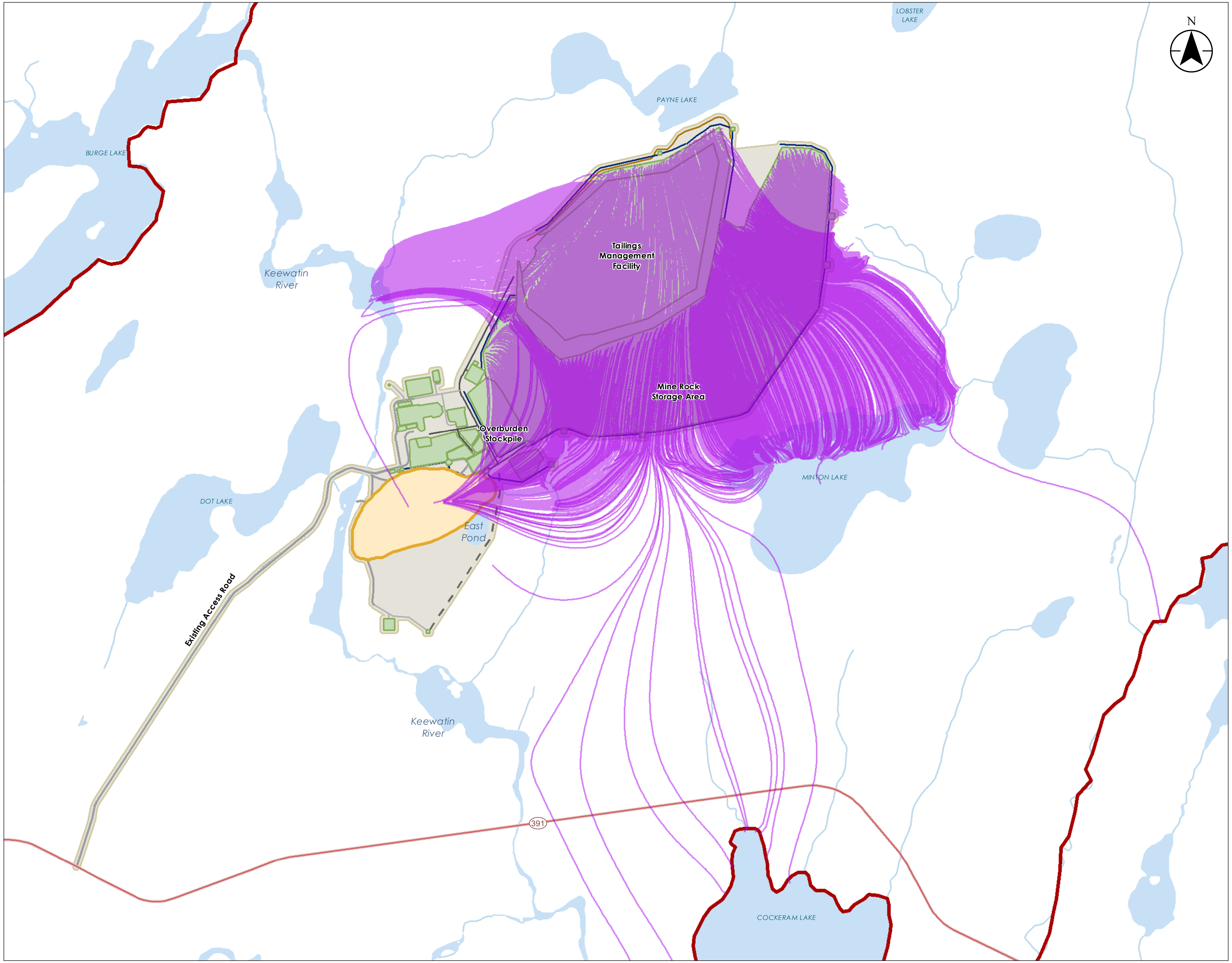
Project Location 111473000
MacLellan Site
Lynn Lake, Manitoba
Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project
LYNN LAKE GOLD PROJECT

Map No.
21

Title
Particle Traces from MRSA and TMF to Open Pit and Receiving Environment under Dewatering Conditions (Year 13) (no contact water collection ditches) - MacLellan Site

\\Ca0045-pbaaf01\gis_GIS_Project_Folder\111440293_AuRico\Figures\Hydro-geology\MacLellan_TMR_2020\Map21_ParticleTracksEndOfOperationWithSeepage_MacLellan_20191213.mxd Revised: 2020-05-13 By: ACampigotto



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Particle Tracks
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:35,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site

Lynn Lake, Manitoba

Prepared by AC on 2019-12-13

Technical Review by JK on 2019-12-13

Client/Project

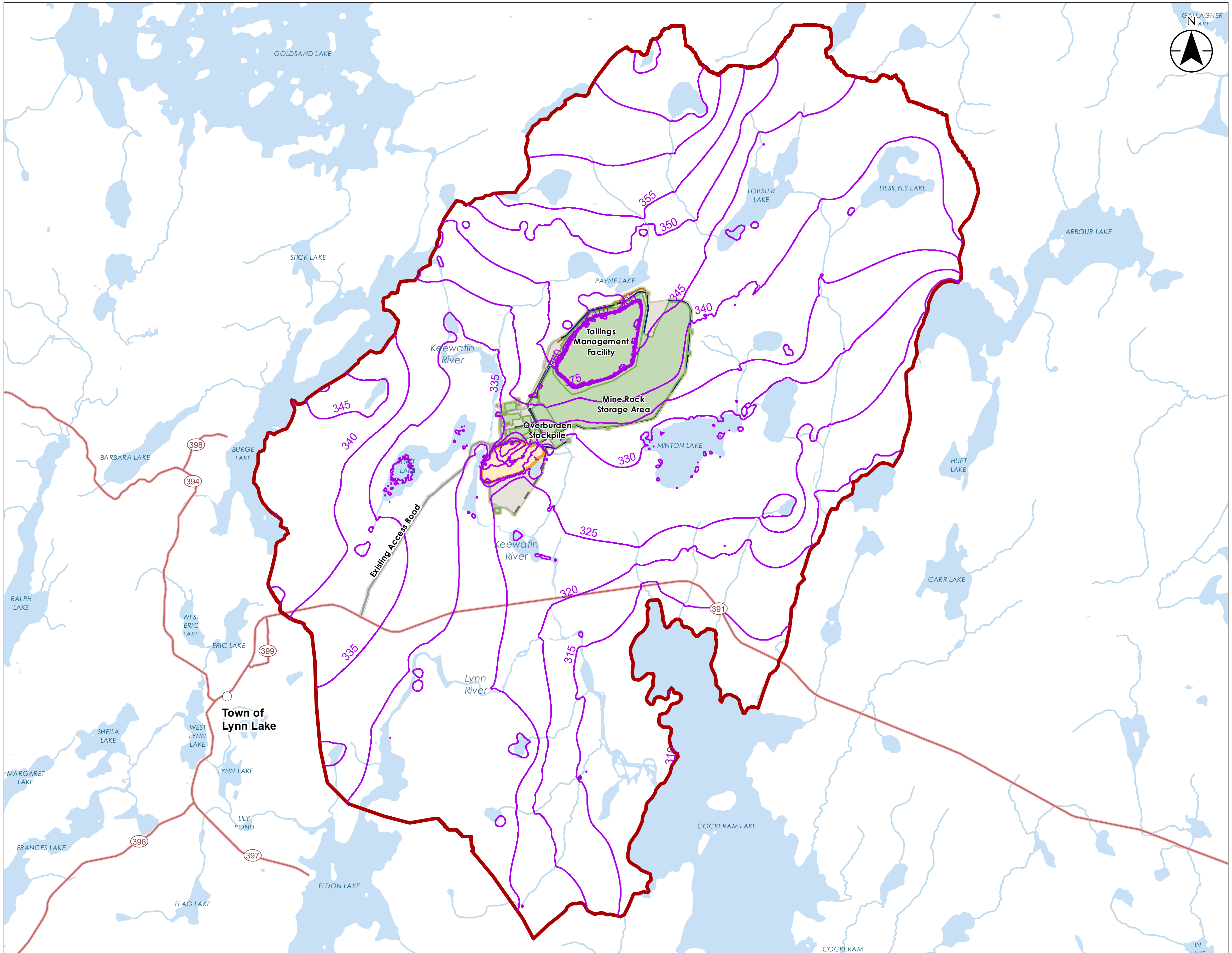
LYNN LAKE GOLD PROJECT

Map No.

22

Title

Particle Traces from MRSA and TMF to Open Pit and Receiving Environment under Dewatering Conditions (Year 13) (including contact water collection ditches) - MacLellan Site



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Elevation Contours
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 1 2 Kilometres

1:80,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000

MacLellan Site

Lynn Lake, Manitoba

Prepared by AC on 2019-12-13

Technical Review by JK on 2019-12-13

Client/Project

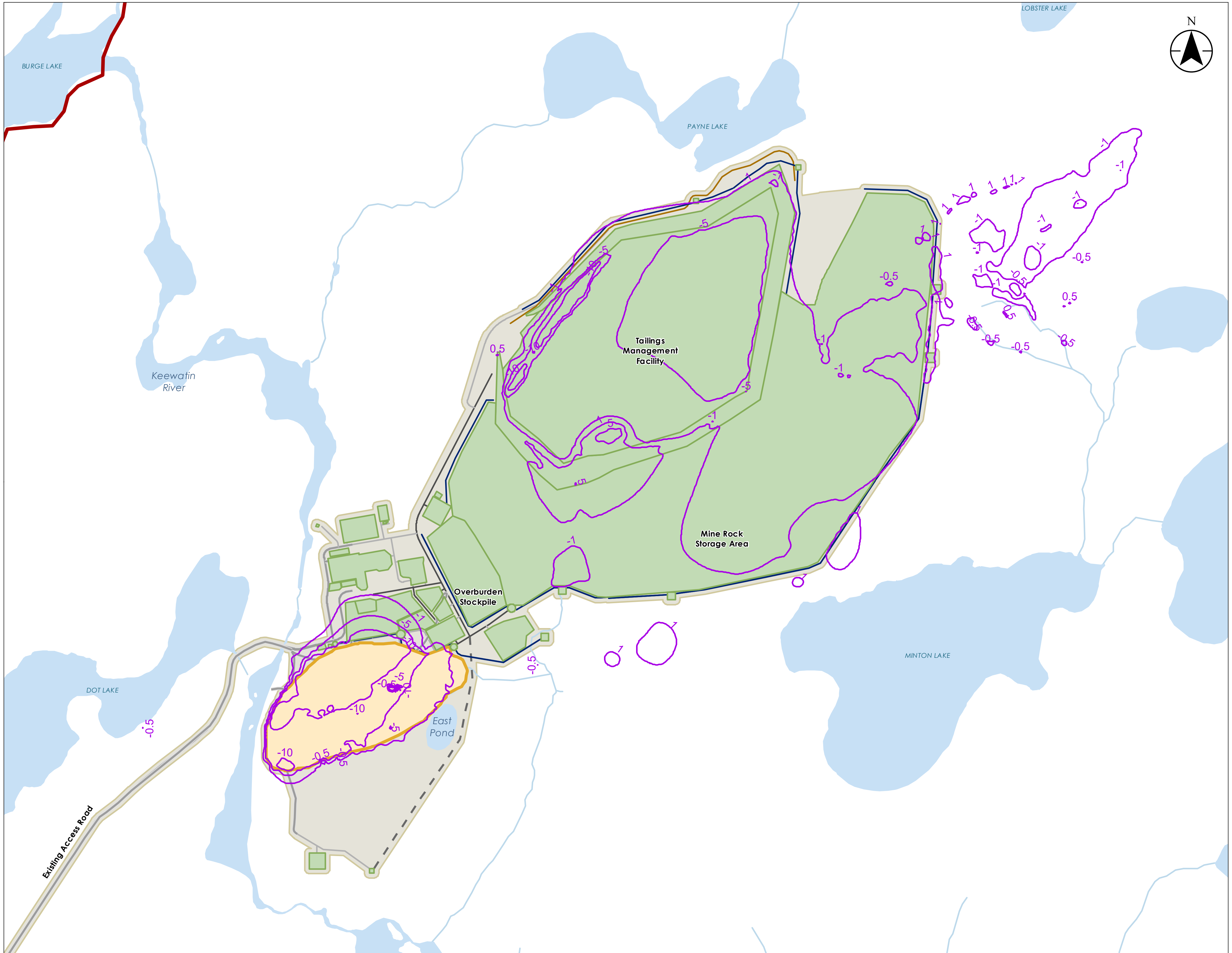
LYNN LAKE GOLD PROJECT

Map No.

23

Title

Water Table Elevation Contours at End of Closure - MacLellan (no contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Water Table Drawdown Contours
- Study Area

Landbase

- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000
MacLellan Site
Lynn Lake, Manitoba
Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project

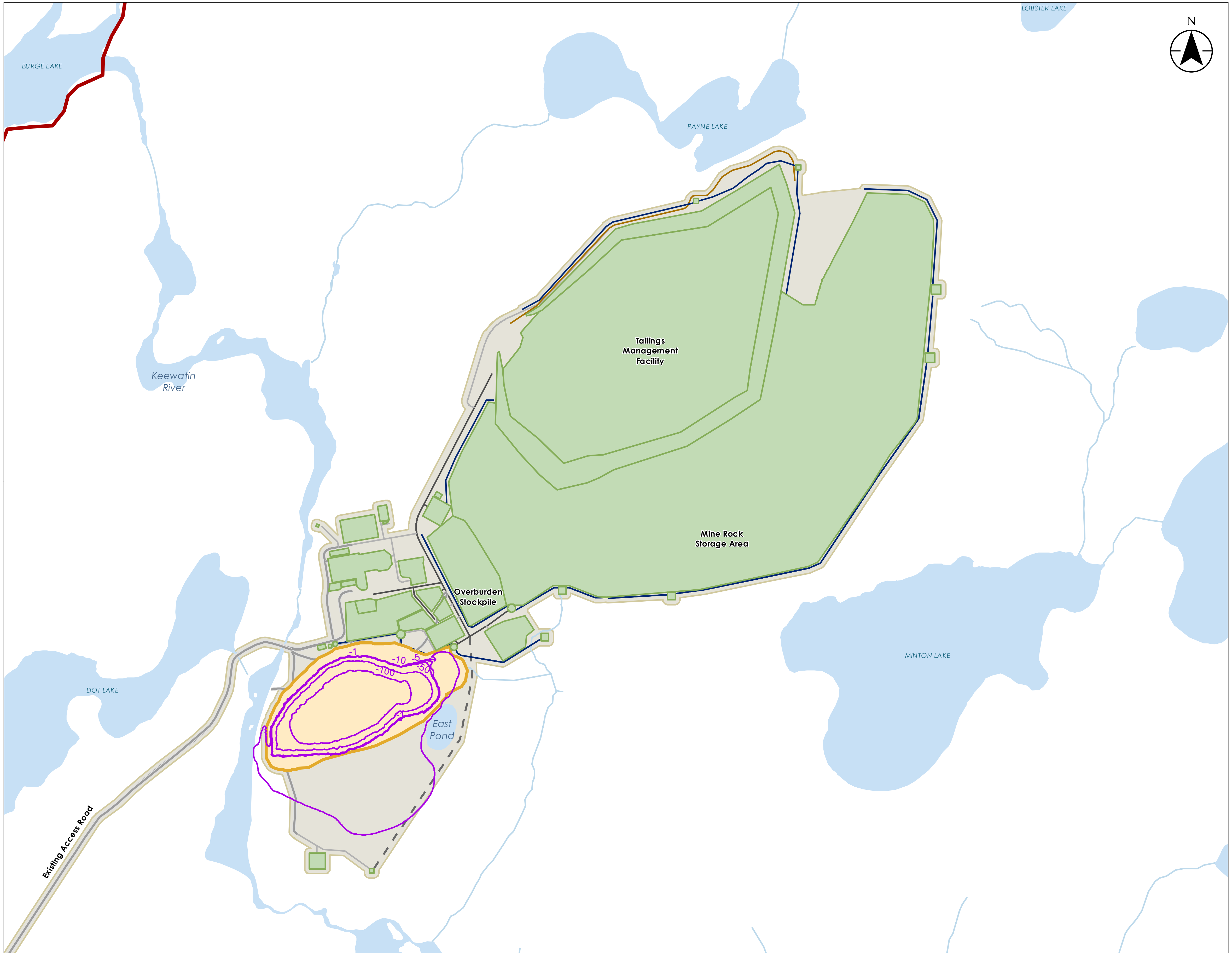
LYNN LAKE GOLD PROJECT

Map No.

24

Title

Water Table Elevation Contours at End of Closure - MacLellan (including water collection ditches)



Stantec

Project Infrastructure
- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area
- Water Table Drawdown Contours
- Study Area

Landbase
- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:25,000 (At original document size of 11x17)

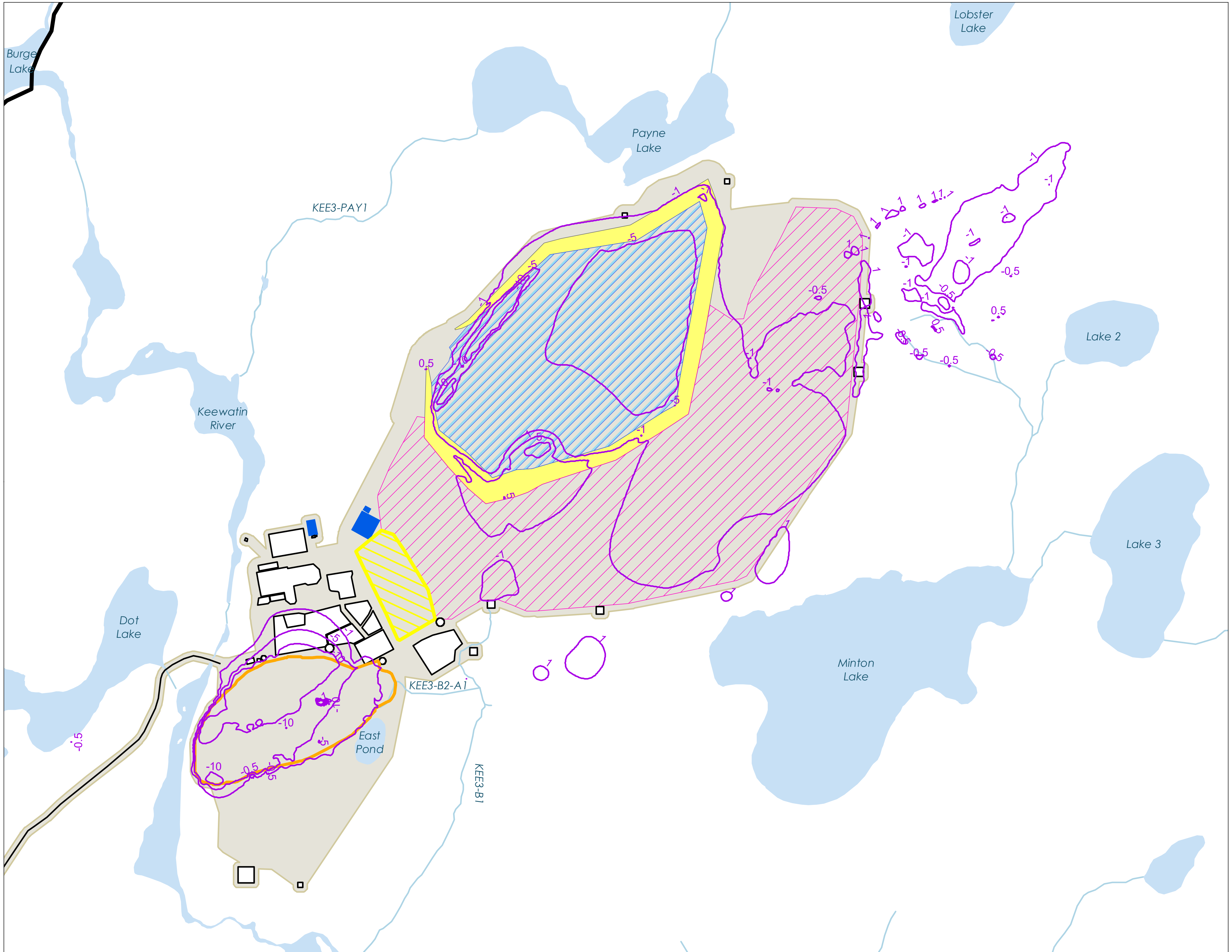
Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111473000
MacLellan Site
Lynn Lake, Manitoba
Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project
LYNN LAKE GOLD PROJECT

Map No.
25

Title
Simulated Water Table Drawdown at End of Closure - MacLellan (no contact water collection ditches)



Stantec

Project Infrastructure

- Proposed Open Pit
- Proposed Mine Rock Stockpile
- Proposed Overburden Stockpile
- Proposed Tailings Management Facility
- Proposed Tailings Management Facility Pond
- Other Proposed Ponds
- Other Proposed Areas
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Survey Locations

- Water Table Drawdown Contours

Landbase

- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres

(At original document size of 11x17)
1:25,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

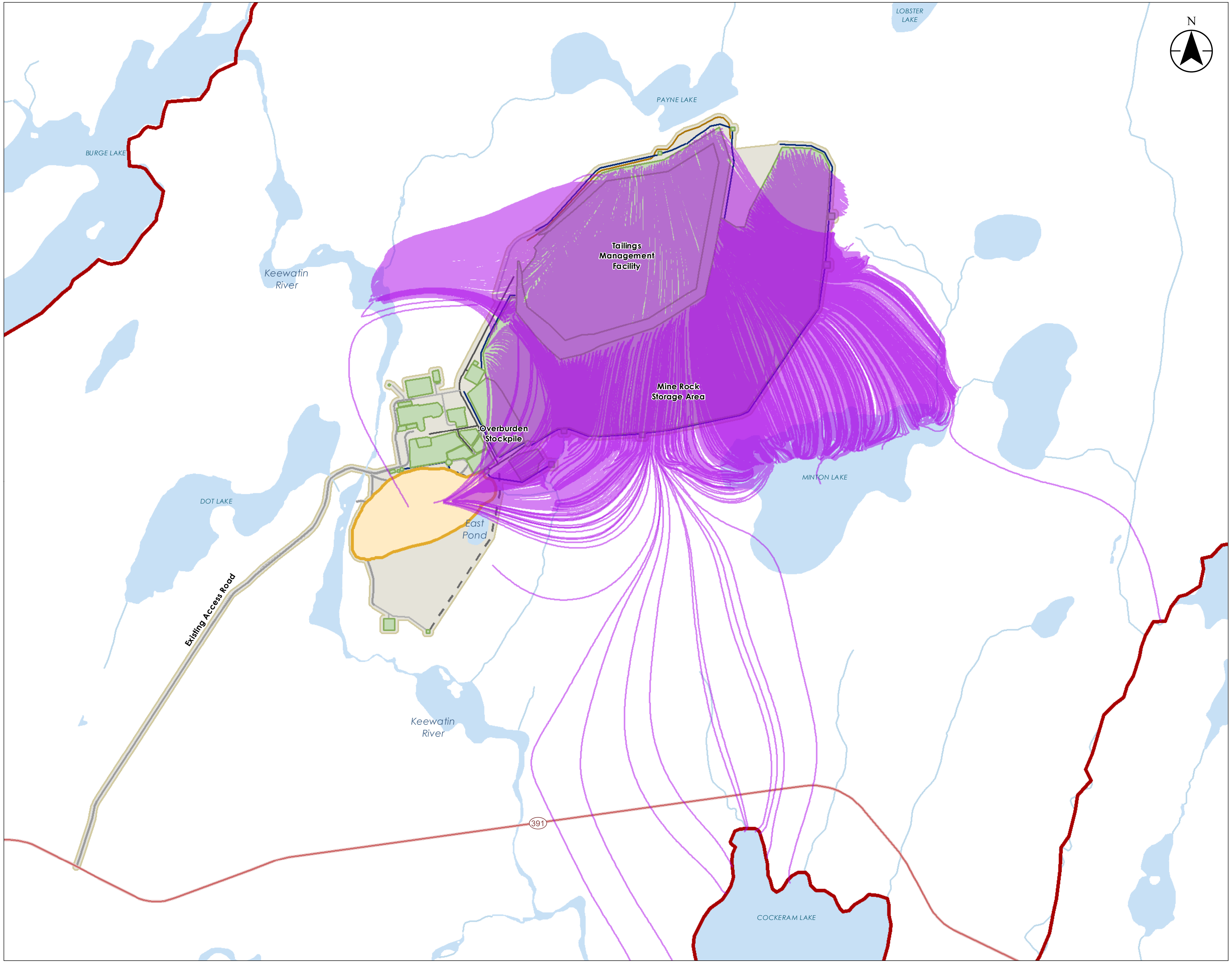
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-13
Technical Review by MFraser on 2020-05-13
Senior GIS Review by XXxxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
26

Title
Simulated Water Table Drawdown at End of Closure - MacLellan Site (including contact water collection ditches)



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Drainage Ditch
- Existing Access Road
- Access Road
- Haul Road
- Inplant Road
- Toe Road
- Future Access Road

Study Area

- Particle Tracks
- Study Area

Landbase

- Highway
- Existing Access Road
- Waterbody

0 0.5 1 Kilometres

1:35,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
MacLellan Site
Lynn Lake, Manitoba

111473000
Prepared by AC on 2019-12-13
Technical Review by JK on 2019-12-13

Client/Project

LYNN LAKE GOLD PROJECT

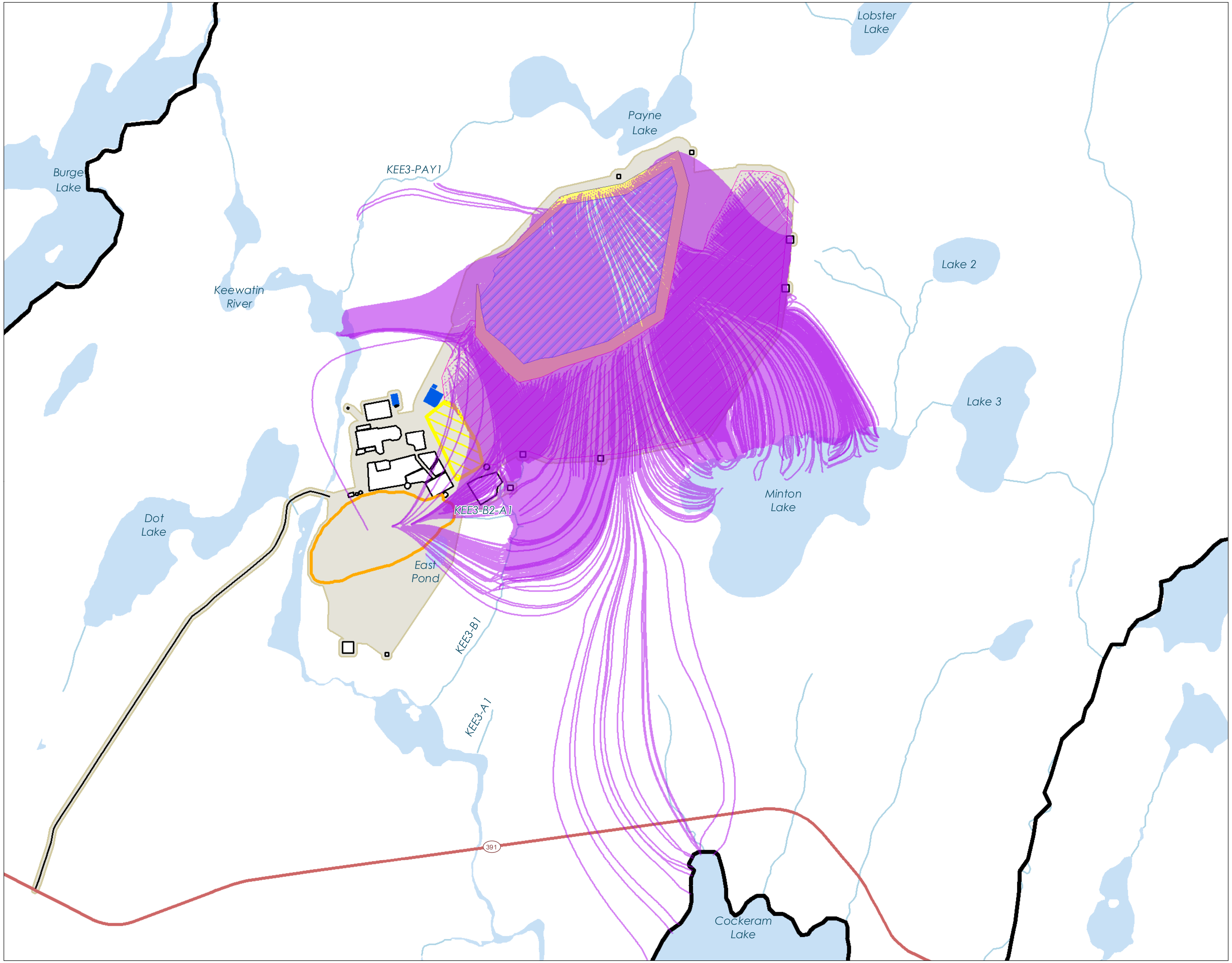
Map No.

27

Title

Particle Traces from MRSA and TMF at End of Closure (Pit Lake) - MacLellan (not including contact water collection ditches)

\\Ca0045-pbagf01\gis_GIS_Project_Folder\111440293_AuRico\Figures\Hydro-geology\MacLellan TMR 2020\Map27_particleTracksEndOfClosureWithoutSeepage_MacLellan_20200408.mxd Revised: 2020-05-13 By: ACampigotto



Stantec

Project Infrastructure

- Proposed Open Pit
- Proposed Mine Rock Stockpile
- Proposed Overburden Stockpile
- Proposed Tailings Management Facility
- Proposed Tailings Management Facility Pond
- Other Proposed Ponds
- Other Proposed Areas
- Project Development Area

Study Area

- Groundwater Local Assessment Area (LAA) and Regional Assessment Area (RAA)

Survey Locations

- Water Table Drawdown Contours

Landbase

- Existing Access Road
- Highway
- Watercourse
- Waterbody

N

0 400 800 Metres

(At original document size of 11x17)
1:35,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-05-13
Technical Review by MFraser on 2020-05-13
Senior GIS Review by XXxxxxx on XXXX-xx-xx

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
28

Title
Particle Traces from MRSA and TMF at End of Closure (Pit Lake) - MacLellan Site (including contact water collection ditches)

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Lynn Lake Gold Project Human Health and Ecological Risk Assessment

Technical Modelling Report

April 30, 2020

Prepared for:

Alamos Gold Inc.
Brookfield Place, 181 Bay Street
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Toronto, ON M5J 2T3

Prepared by:

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB R3B 2B9

111473008

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Abbreviations

ADD	average daily dose
AF	averaging factor
Alamos	Alamos Gold Inc.
AuRico	AuRico Gold Inc.
AMSL	above mean sea level
($B[a]P_{TPE}$)	benzo(a)pyrene total potency equivalents
BGS	below ground surface
BW	body weight
CAAQS	Candian Ambient Air Quality Standards
CAC	criteria air contaminant
CCME	Canadian Council of Ministers of the Environment
COPC	chemical of potential concern
Carlisle	Carlisle Goldfields Ltd.
CWF	Canadian Wildlife Federation
CWS	Canadian Wildlife Service
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSM	conceptual site model
DOC	dissolved organic carbon
DPM	diesel particulate matter
EA	Environmental Assessment
ECO SSL	Ecological Soil Screening Levels
EIS	Environmental Impact Statement
EOM	end of mining

EPC	exposure point concentration
EPM	equivalent porous media
ERA	ecological risk assessment
ESEA	Endangered Species and Ecosystems Act
FCSAP	Federal Contaminated Sites Action Plan
FNFNES	First Nations Food, Nutrition & Environment Study
FTM	freeze-thaw model plugin for FeFlow
GOF	goodness of fit
HCN	hydrogen cyanide
HHERA	human health and ecological risk assessment
HHRA	human health risk assessment
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
km	kilometres
LAA	Local Assessment Area
LD	lethal dose
LLGP	Lynn Lake Gold Project
LOAEL	lowest observed adverse effects level
LOM	life of mine
m	metre
mm	millimetre
mm/yr	millimetres per year
m/s	metres per second
m^3/s	cubic metres per second
MB CDC	Manitoba Conservation Data Centre

MCFN	Marcel Colomb First Nation
MOECC	Ontario Ministry of the Environment and Climate Change
MECP	Ontario of the Ministry of Environment, Conservation and Parks
MHA	Manitoba Herps Atlas
MRSA	mine rock storage area
Mt	million tonnes
MWSQG	Manitoba Water Quality Standards, Objectives and Guidelines
NOAEL	no observed adverse effects level
NO_2	nitrogen dioxide
ORNL	Oak Ridge National Laboratory
oz	ounces
PAG	potentially acid generating
PAH	polyclic aromatic hydrocarbon
PEF	potency equivalency factor
PEL	probable effect level
PEST	parameter estimation code
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 um diameter
the Project	the Lynn Lake Gold Project
RAA	Regional Assessment Area
RIAQG	Residential Indoor Air Quality Guideline
RMS	root mean squared
ROC	receptor of concern
RIVM	National Institute for Public Health and the Environment, The Netherlands
RQ	risk quotient

SARA	Species at Risk Act
SAR	Species at Risk
SF	slope factor
SOCC	Species of Conservation Concern
SO_2	sulfur dioxide
SQG	soil quality guideline
SR	screening ratio
SRC	serious risk concentration
TC	tolerable concentration
TDI	tolerable daily intake
TDR	technical data report
TMR	technical modelling report
TMF	tailings management facility
TRV	toxicological refence value
UCLM	upper confidence limit of the mean
UR	unit risk
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
VC	Valued Component
VOC	volatile organic compound

1.0 INTRODUCTION

The Lynn Lake Gold Project (LLGP; or "the Project") consists of two primary deposit sites, which are both located near Lynn Lake, Manitoba: the 'Gordon' site and the 'MacLellan' site. Alamos Gold Inc. (Alamos) intends to construct (redevelop), operate and eventually close/reclaim open pit gold mines at both these historical mine sites. The Gordon site is located approximately 55 kilometres (km) east of Lynn Lake, Manitoba (by vehicle), and the MacLellan site is located approximately 8 km northeast of Lynn Lake (by vehicle) (Map 1, Appendix A). Lynn Lake is located approximately 820 km northwest of Winnipeg.

This human health and ecological risk assessment (HHERA) was completed to support the assessment of human health and ecological effects as part of the environmental assessment for the Project.

The construction, operation, and closure of the Project have the potential to alter baseline conditions with respect to the concentrations of chemicals in the air, soil, water, and biota near the Project. These changes to the environment have the potential to adversely affect the health of human receptors and ecological receptors (terrestrial and aquatic wildlife, and communities of fish, vegetation, and invertebrates). The HHERA characterizes the change in exposure to project-related chemicals that human and ecological receptors may experience between baseline (existing) and future conditions, to quantify the potential change to human health and ecological risk that may be attributed to the Project.

The methods and guidance prescribed by Health Canada (Health Canada 2019a, 2012, 2010a) were used to assess the human health risks, while those provided by the Canadian Council of Ministers of the Environment (CCME) and the Federal Contaminated Sites Action Plan (FCSAP), were used to assess the ecological health risk. This approach is intended to protect the health of people and ecological receptors, which rely on the viability of the local environment and ecological resources within the local assessment area (LAA) /regional assessment area (RAA) of the Project (which are the same area for the Project).

The information presented in this HHERA applies baseline environmental quality data to establish baseline conditions for human and ecological health. Modelled future conditions are applied to characterize scenarios associated with the Project. The environmental data representing baseline and future scenarios are presented in the Valued Component (VC) sections and associated baseline reports, technical data reports, and modelling reports for atmospheric environment, groundwater, surface water, fish and fish habitat, vegetation and wetlands, and wildlife and wildlife habitat.

The conclusions in this HHERA report regarding human health risk are presented in the human health VC, while the conclusions regarding ecological risk to terrestrial receptors are presented in the wildlife and wildlife habitat VC.

The HHERA is supported by seven appendices: Appendix A – Maps; Appendix B – Baseline Data; Appendix C – ProUCL Outputs; Appendix D – Ubiquotous Elements; Appendix E – Example Calculations, Dermal RAF, Uptake Factors; Appendix F – HHRA Outputs; and Appendix G – ERA Outputs.

1.1 PROJECT DESCRIPTION

The Project components include the development of new mine infrastructure at the MacLellan site, including an open pit, a central ore milling and processing plant, associated infrastructure, ore and overburden stockpiles, mine rock storage areas (MRSAs), and a tailings management facility (TMF). At the Gordon site, new infrastructure will be limited to the open pit, ore and overburden stockpiles, a MRSA, and minor supporting infrastructure for equipment storage and maintenance. There will be no tailings storage or milling at the Gordon site.

The Project has three phases: construction, operations, and decommissioning/closure. The construction phase includes site preparation, physical construction, equipment installation, pre-production, and commissioning. Construction is expected to take approximately two years to complete (Years -2 and -1). The operations phase includes ore and mine rock extraction, ore processing, and waste management. The operations phase (starting in Year 1) and is expected to take approximately 6 years at the Gordon site (5 years of active ore and mine rock extraction and an extra year of materials transfer to the MacLellan site for ore processing) and 13 years to complete at the MacLellan site. Active reclamation/closure is expected to take approximately 5-6 years to complete at each site. It will be followed by approximately 10 years of post-closure monitoring and years of pit filling (approximately 11 years at the Gordon site and approximately 21 years at the MacLellan site).

2.0 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT METHODS

The HHERA evaluates the health risk to human and ecological receptors from their exposure to chemicals in environmental media (e.g., air, soil, water, and biota). The HHERA consists of two components: a human health risk assessment (HHRA) and an ecological risk assessment (ERA). The HHRA characterizes the short-term (acute) and long-term (chronic) health risk to people, while the ERA characterizes the potential chronic risk to a species population (e.g., meadow voles), a community of multiple species (e.g., soil invertebrate community), or an individual within a species (applicable to rare and endangered species).

In the context of an environmental assessment for major infrastructure projects, the HHERA evaluates the potential change in health risk to people and ecological receptors that may occur between baseline environmental conditions and future conditions, during the various phases of the Project. Baseline environmental conditions may be based on historical monitoring data, measured data collected during baseline studies, or modelled data. Future conditions are based on modelled data that reflects predicted environmental conditions during Project construction phase, operations phase, decommissioning, reclamation, closure and post-closure.

The HHERA considers three scenarios or cases in evaluating the potential changes in human and ecological health risks. These include:

1) Baseline Case: evaluates the existing exposures and health risks based on the measured chemical concentrations in environmental media (air, soil, water, sediment, plants, benthic invertebrates and

fish). Chemical concentrations for wild meat (e.g. moose) and, soil invertebrates are estimated based upon measured concentrations of chemicals in other media.

2) Future Case: evaluates the future health risks based on the predicted chemical concentrations in environmental media, as determined through detailed modelling from other valued component chapters (e.g. air quality, water quality). These modelling results are used to predict the future chemical concentrations in exposure media that human and ecological receptors are exposed to (i.e. air, water, soil, sediment, vegetation, wild meat, fish, soil invertebrates and benthic invertebrates)

3) Project Alone Case: evaluates health risks associated with exposure to predicted chemical concentrations in environmental media that are attributable only to project activities (i.e. these do not consider the contribution that Baseline Case concentrations make to overall exposure). Project Alone Case concentrations are used in the HHRA to evalute the potential incremental increase in lifetime cancer risk that would be associated with the release of carcinogenic chemicals from the Project.

The change in health risk from Baseline Case to Future Case during the various phases of the Project is the basis for determining whether the Project may result in an unacceptable risk to human or ecological health.

The following sections describe the underlying concepts and approach to conducting an HHERA that is prescribed by Health Canada, the CCME, and the FCSAP.

2.1 COMPONENTS OF HEALTH RISK

All chemicals have the potential to cause adverse health effects to biological organisms. The presence of health risk depends on three factors:

1. The presence of a human or ecological receptor (i.e., receptor)

2. The presence of a COPC with inherent toxicity

3. The exposure pathway and the degree of human or ecological receptor exposure to a chemical.

As illustrated in Figure 2-1, if all three factors of health risk interact (i.e., a receptor is exposed to a chemical hazard), a risk may exist. The degree of adverse health risk depends on other factors such as the exposure dose or concentration, exposure duration, and the inherent toxicity of the chemical to the human or ecological receptor.

If one or more factors(s) is absent, there would be no potential health risk. Also, if a receptor is exposed to a chemical, but the chemical is inherently non-toxic, then there is no potential risk.

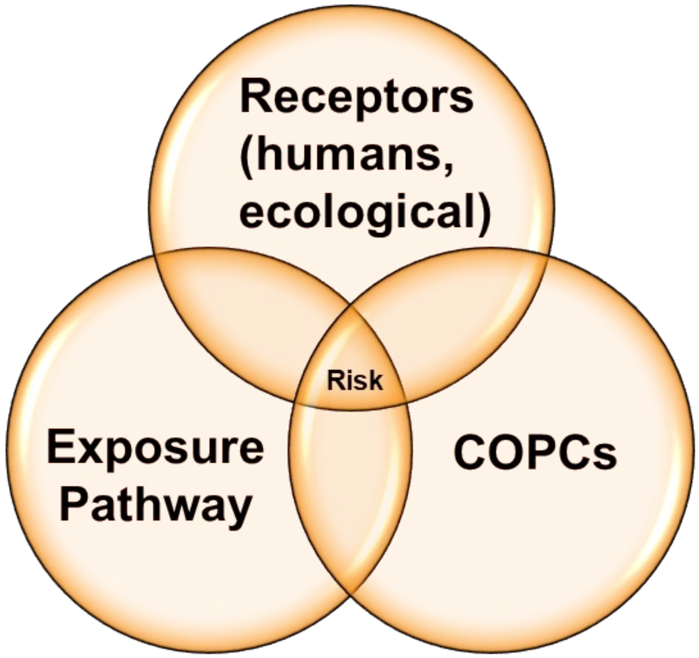

Figure 2-1 Considerations for a Quantitative HHERA (after Health Canada 2019a)

2.2 RISK ASSESSMENT APPROACH AND FRAMEWORK

This HHERA was conducted according to accepted risk assessment methodologies and follows guidance published and endorsed by regulatory agencies such as Health Canada, the CCME, and the FCSAP. This approach is consistent with previous projects that have been reviewed by the Impact Assessment Agency of Canada. The HHRA applies the following guidance for assessing human health for an environmental assessment:

- Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment (Health Canada 2019a).
- Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment: Air Quality (Health Canada 2017a).
- Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment: Country Foods (Health Canada 2017b).
- Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment: Drinking and Recreational Water Quality (Health Canada 2016a).

The HHRA guidance applicable to federal contaminated sites in Canada was also considered as needed, including:

- Federal Contaminated Sites Risk Assessment in Canada, Part I: Guidance on Human Health Risk Preliminary Quantitative Risk Assessment (PQRA), Version 2.0 (Health Canada 2012).
- Federal Contaminated Sites Risk Assessment in Canada, Part V: Guidance on Complex Human Health Detailed Quantitative Risk Assessment For Chemicals (DQRACHEM) (Health Canada 2010a).
- Federal Contaminated Site Risk Assessment in Canada: Supplemental Guidance on Human Health Risk Assessment for Country Foods (HHRAFoods) (Health Canada, 2010c).
- Federal Contaminated Sites Risk Assessment in Canada, Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors Version 2.0 (Health Canada 2010b).

The HHERA applies the following guidance for assessing ecological risk:

- A Framework for Ecological Risk Assessment—Canadian Council of Ministers of the Environment (CCME 1996).
- Ecological Risk Assessment Guidance Document – Canadian Council of Ministers of the Environment (CCME 2020).

Federal Contaminated Sites Action Plan (FCSAP) Guidance documents considered included:

- FCSAP Ecological Risk Assessment Guidance (FCSAP 2012).
- FCSAP Module 3: Standardization of Wildlife Receptor Characteristics (FCSAP 2012).
- FCSAP Module 6: Ecological Risk Assessment for Amphibians on Federal Contaminated Sites (FCSAP 2019).

The basic risk assessment framework includes the following fundamental stages: site characterization, problem formulation, toxicological assessment, exposure assessment, risk characterization, and uncertainty assessment. Each component is discussed below:

- The **Site Characterization** stage includes a review of existing biophysical, chemical, and land use information completed in support of this EA and identifies the information that is relevant to the HHERA. The identification of chemicals of potential concern (COPC) is presented in this stage followed by the modelled predictions of chemical concentrations in biotic and abiotic environments.
- The **Problem Formulation** stage is an information gathering and interpretation stage that is used to focus the HHERA on the primary areas of concern for the Project. Problem formulation defines the nature and scope of the risk assessment, permits practical boundaries to be placed on the overall scope, and confirms that the HHERA is directed at the key areas and issues of concern related to

the Project emissions. The data gathered provide information regarding the physical layout and characteristics of the assessment area (e.g., the LAA), possible exposure pathways, potential human and ecological receptors, and other specific areas or issues of concern.

- The **Toxicity Assessment** stage involves the selection of toxicity reference values (TRVs) and the identification of regulatory benchmarks for each COPC as appropriate. Toxicity is the potential for a chemical to produce damage, permanent or temporary, to the structure or functioning of the receptor's body. With the exception of community receptors, the toxicity of a chemical depends on the amount of chemical taken into the body (referred to as the "dose") and the duration of exposure (i.e., the length of time the receptor is exposed to the chemical). For community receptors (e.g. plants, benthinc invertebrates, fish) the toxicity depends on the concentration of COPC in the media where the receptors live. For example, for benthic invertebrates, the toxicity depends on the concentration of the COPC in sediment. For each COPC, there is a specific dose and duration of exposure necessary to produce a toxic effect in a given receptor. TRVs are published by provincial, federal or international (e.g., United States Environmental Protection Agency [US EPA]) agencies.

- The **Exposure Assessment** stage builds on the receptor and exposure pathway identification completed in the problem formulation stage. For each COPC, exposures are estimated for each receptor for each of the exposure pathways that are relevant for that receptor. The rate of exposure to chemicals may be expressed as a dose, which is the amount of chemical taken in per body weight per unit time (e.g., microgram (µg) of chemical per kilogram (kg) body weight per day), or as a concentration in the exposure pathway (e.g., when considering health risks to people from the inhalation of COPC, the rate of exposure would be the chemical concentration in air) or environmental media. Exposures are estimated for Baseline Case and Future Case. For carcinogenic COPC, exposures are also estimated for the Project Alone Case.

- The **Risk Characterization** stage involves assessing qualitatively and quantitatively the potential risk to receptors from exposure to COPC. The risk characterization compares the results of the exposure assessment with the TRV established in the toxicity assessment to quantify the level of health risk associated with the predicted exposures. Within an EA framework, the health risks associated with the Future Case are compared to the health risks associated with Baseline Case to provide the context for how the Project may affect health.

- The **Uncertainty Assessment** is used to identify the uncertainties associated with the data used in the assessment and predicts how these uncertainties may influence the final risk estimates and conclusions. Uncertainties may exist in numerous areas including the collection and analysis of samples, estimates of exposure, derivation of TRV and the assumptions used when professional judgment is applied. Understanding how the uncertainties can influence the exposure and risk estimated for Baseline Case and Future Case conditions provides an indication of the confidence that can be placed on the risk assessment conclusions.

Overall, in risk assessment the industry standard is to overstate, rather than understate, potential health risks. Regulatory guidance supports use of a conservative approach (one that overestimates exposures and toxicological responses) when assessing potential health risks for both human and ecological receptors. This conservative approach has been maintained in the assessment of potential human health and ecological risks for the Project.

3.0 SITE CHARACTERIZATION

Site characterization provides the context for how the Project could affect the environment in a manner that could influence human or ecological health risk. This includes the spatial and temporal boundaries the study areas for the HHERA, a summary of the environmental setting, and the receptor locations used to evaluate human health and ecological health risks.

3.1 SPATIAL AND TEMPORAL BOUNDARIES

3.1.1 Spatial Boundaries

There are three distinct spatial boundaries applied in the HHERA. The Project Development Area (PDA), Local Assessment Area (LAA), and Regional Assessment Area (RAA) as shown in Map 1, Appendix A.

The PDA encompasses the Project footprint and a 30-meter buffer around its perimeter. The Project footprint includes the areas where project activities would take place, the anticipated area of direct physical disturbance associated with construction and operation activities. The PDA includes the access roads, the open pits, mine rock storage areas, overburden stockpiles, and ore stockpiles at the Gordon and MacLellan sites; and the tailings management facility and ore milling and processing plant at the MacLellan site. The PDA does not include Provincial Road 391 that connects the Gordon and MacLellan sites.

The LAA is defined as a 50 km by 28 km area centered on the Project and includes both the Gordon and MacLellan sites as shown in Map 1, Appendix A. The LAA encompasses the area in which Project-related environmental effects (direct or indirect) can be predicted or measured with a level of confidence that allows for assessment; and in which there is a reasonable expectation that those potential environmental effects in the LAA could be of potential concern to human health. The RAA represents the area where environmental effects from past, present, or reasonably foreseeable future projects may have cumulative effects to human health. Consistent with the Atmospheric VC, the LAA for the Project is the same area as the RAA, therefore refence to the LAA in this report includes both the LAA and the RAA.

The LAA for the HHERA considered, and is the combined spatial boundaries of, the Atmospheric Environment VC and the Surface Water VC, because the future environmental conditions used to predict effects to human and ecological health are based on modelled future conditions from these other VCs. The LAA is further divided into the Gordon region and MacLellan region to characterize the potential effect to human and ecological health separately. The boundaries of each region are identified on Map 1, Appendix A.

3.1.2 Temporal Boundaries

The temporal boundaries for the Project consist of the following phases.

- Construction (i.e., site preparation, physical construction/equipment installation, pre-production, and commissioning) is is anticipated to take approximately 2 years to complete. Some limited pre-production may occur during this period. Project construction activities will be carried out concurrently at both mine sites.
- Operation (i.e., ore and mine rock extraction, processing, and waste management) and is expected to take approximately 13 years to complete.
  - Mining operations are expected to commence at both sites in Year 1. Mining at the Gordon site will be undertaken for six years while mining at the MacLellan site will be undertaken for the entire life of the Project (i.e., 13 years).
  - The ore stockpiled during mine operations (both sites) will provide feedstock to the ore milling and processing plant during the operations phase.
- Decommissioning/closure is scheduled to begin in Year 6 at the Gordon site and in Year 14 at the MacLellan site, and is expected to take approximately 5-6 years to complete at each site. It will be followed by approximately 10 years of post-closure monitoring and between 11 and 21 years of pit filling (for the Gordon and MacLellan sites, respectively).

3.2 ENVIRONMENTAL SETTING

The Project is located in northern Manitoba, near the Town of Lynn Lake. The landscape is dominated by vegetation communities typical of the boreal forest. Within and immediately surrounding the Project are forested areas, wetlands and lakes. Existing land uses around the Project include residential, traditional and recreational uses. Residential uses are concentrated in the communities of Lynn Lake and the Black Sturgeon Reserve. The lands surrounding these communities are used for traditional land uses and recreational activities.

The Project is in the Boreal Shield Ecozone, Churchill River Upland Ecoregion, and Reindeer Lake Ecodistrict (Smith et al. 1998), which is characterized by black spruce-dominated forests on mineral soils and in poorly drained peatlands. Tamarack (*Larix laricina*) is typical on wetter peatland sites, while drier sites are forested white birch (*Betula papyrifera*), jack pine, and occasionally white spruce (*Picea glauca*). Jack pine (*Pinus banksiana)* stands occur on upland sites, while white birch is found throughout the Ecodistrict. Field surveys documented 200 plant species within the LAA/RAA.

The Project is in the High Boreal wetland region, which is characterized by permafrost and non-permafrost wooded bogs and patterned fens (Halsey et al. 1997). An estimated 37% of the High Boreal wetland region is covered in wetlands, comprised of (in order of dominance): permafrost wooded bogs, wooded fens with internal lawns, patterned open fens, non-patterned open fens, and wooded fens with internal lawns, along with small percentages of swamps and marshes. Eleven wetland types have been recorded within the LAA/RAA.

Based on information from provincial and federal databases, satellite imagery, peer-reviewed literature, telephone interviews with local land users, and motion-triggered cameras, the LAA/RAA is known to support a wide range of mammals including muskrat (*Ondatra zibethicus*), moose (*Alces alces*), Northern river otter (*Lontra canadensis*), American mink (*Mustela vision*), meadow vole (*Microtus pennsylvanicus*), snowshoe hare (*Lepus americanus*), ermine (*Mustela erminea*), red fox (*Vulpes vulpes*), black bear (*Ursus americanus*), and deer mouse (*Peromyscus maniculatus*) (FCSAP 2012). Moose and black bear are some of the important game species harvested by First Nations and local resource users.

Based on the Manitoba Breeding Bird Atlas (MB BBA 2019), 198 bird species have the potential to breed in the general region of the LAA/RAA. Among them, 62 are waterbirds, 4 are upland game birds, 18 are raptors, and 114 are passerines (i.e., songbirds) or near-passerines (e.g., woodpeckers). The full list of the 198 observed and potentially present bird species is in the Bird Baseline Technical Data Report for the Project. Among these species, a number are proposed by CCME and FCSAP as possible receptors to use in ERA mallard (*Anas platyrhynchos*), spotted sandpiper (*Actitus macularia*), lesser scaup (*Aythya affinis*), common merganser (*Mergus merganser*), bald eagle (*Haliaeetus leucocephalus*), great blue heron (*Ardea herodias*), Common loon (*Gavia immer*), ruffed grouse (*Bonasa umbellus*), spruce grouse (*Dendragapus canadensis*), barn swallow (*Hirundo rustica*), red-tailed hawk (*Butro jamaicensis*), and American robin (*Turdus migratorius*) (FCSAP 2012, CCME 2020).

The LAA/RAA lies within four subwatersheds of the broader Granville Lake Watershed: Hughes River, Lower Keewatin River, Lower Lynn River, and Cockeram Lake. The Hughes River Subwatershed contains large lakes such as Ellystan Lake, White Owl Lake, Swede Lake, Simpson Lake, Farley Lake, and Gordon Lake. Most lakes in the LAA/RAA are shallow (<3 m) with soft substrates (e.g., sand or muck). Hard substrates (e.g., boulders or cobbles) are less common but present in some locations. Aquatic vegetation and cover in the littoral zone is abundant in most of the lakes in the LAA/RAA. Stream habitats are generally low gradient, interspersed with short cascades that do not generally create barriers to migration. Beavers are active in the LAA/RAA and their dams present seasonal or temporary barriers to fish passage on several tributaries to the rivers and lakes.

Seventeen fish species are known to be present in the lakes and streams near the Gordon and MacLellan sites based on field surveys from 2015 to 2018. Small-bodied fish species are most diverse in streams and large lakes. Brook stickleback (*Culaea inconstans*) were the most widespread small bodied species and the only one present in small, shallow lakes. Other small-bodied species were ninespine stickleback (*Pungitius pungitius*), log perch (*Percina caprodes*), trout perch (*Percopsis omiscomaycus*), emerald shiner (*Notropis atherinoides*), spottail shiner (*Notropis hudsonius*), longnose dace (*Rhinichthys cataractae*), lake chub (*Couesius plumbeus*), and slimy sculpin (*Cottus cognatus*). Large-bodied fish species were northern pike (*Esox lucius*), walleye (*Sander vitreus*), yellow perch (Perca flavescens), lake whitefish (*Coregonus clupeaformis*), burbot (*Lota lota*), cisco (*Coregonus artedi*), white sucker (*Catostomus commersoni*), and longnose sucker (*Catostomus catostomus*). Larger lakes, such as Cockeram Lake, typically support a greater diversity of fish and fish habitat than smaller lakes in the LAA/RAA. Northern pike are the most widespread large-bodied species in the LAA/RAA, while brook stickleback are the most widespread small-bodied species.

The Gordon site was a former open pit gold mine between 1996 and 1999. The Gordon site went through reclamation after closure, and the site currently consists of a 15 km gravel access road, a bridge across the Hughes River, two capped mine rock storage areas, two capped overburden storage areas, and two water-filled open pits. The buildings and infrastructure from historical operations have been removed. The Gordon site is in the headwaters of a tributary to the Hughes River watershed, and no large rivers flow through the area. Farley Creek, the outlet of Farley Lake, is the largest stream potentially affected by the Project. Short cascades and a proliferation of beaver dams present barriers to fish passage during most flow conditions in several of the streams near the Gordon site.

The MacLellan site was a former underground gold and silver mine that operated between 1986 and 1989. Since closure, the site has been in a care and maintenance phase, with very little reclamation completed. The site currently consists of a 4.6-km gravel access road, power transmission line (abandoned pole line), and infrastructure from the former underground mine, such as head frame, hoist house and shaft, access ramp, maintenance and other storage buildings, core shack and core racks, vent raise, and mine water settling ponds. The Keewatin, Cockeram, and Lynn rivers and their tributaries connect the lakes near the MacLellan site. The Keewatin River is the largest river in the LAA/RAA, connecting Goldsand and Burge lakes upstream of the MacLellan site to Cockeram Lake downstream of the mine site. The Lynn River is a tributary to the Keewatin River upstream of Cockeram Lake.

3.3 RECEPTOR LOCATIONS

Air dispersion modelling was used to estimate COPC concentrations in air at 160 receptor locations across the LAA/RAA (45 locations in Gordon region, 114 locations in the MacLellan region, and single central location within the boundaries of the work camp located within the MacLellan PDA; see Map 2, Appendix A). Receptor locations were selected to represent places where receptors are likely to be present and could be exposed to emissions from the Project. The selection of receptor locations was based on considerations of land use and on input from local communities. Locations included residential developments, commercial and institutional buildings, hunting and/or fishing camps, and potential indigenous use locations. Information related to locations used for traditional purposes was used to select receptor locations where Indigenous persons may be present. This includes locations used for hunting, trapping, fishing, plant gathering, camping/shelter as well as cultural and spiritual areas. The receptor locations are identified on Map 1 (Appendix A). The locations of potential indigenous receptors were informed by Alamo's engagement with Indigenous communities and publicly available sources traditional land use information. Due to the length of time required to conduct air quality modeling Indigenous receptors were selected early in the assessment process and represent potential receptor locations rather than individual use sites.

Dust deposition was modelled at the 160 receptor locations to estimate potential metal accumulation in surface soil over the operational life of the Project. This information was used to evaluate changes in metal concentrations in soil that could result in changes in exposures to metals in soil and plants for human and ecological receptors. The ground surface in the work camp will be covered with buildings, pavement or aggregate material. Aggregate is not considered to be soil, and human contact with aggregate material does not result in the same types of exposures that result from human contact with soil. For example: aggregate material consists of stones that are larger in size than soil particles and therefore, aggregate material will not adhere to exposed skin surfaces. In addition, dust deposited on the aggregate material would not be expected to accumulate on the surface. Rather, it would be washed from the surface into the interstitial spaces between the aggregate material by rain and snow. Thus, dust deposition would not contribute to direct contact exposures such as incidental soil ingestion or dermal uptake of contaminants from soil adhered to skin of workers housed at the camp, and deposition of metal has not been evaluated at the work camp receptor location.

For the ERA, potential risks to ecological receptors were assessed for the Gordon region and the MacLellan region separately (Map 1, Appendix A). Unlike the HHRA, these two regions were not further subdivided to assess risk at specific locations. Rather than being location specific, the ERA used an hybrid approach representative of potential upper limit exposures for each media at each region (as further discussed in Section 6.1.7)

3.4 CHEMICALS OF POTENTIAL CONCERN

Chemicals of potential concern are identified as those Project-related chemicals that may be released to the receiving environment, that have the potential to elicit adverse human or ecological health effects. Project activities are predicted to result in emission of the following groups of chemicals:

- Criteria Air Contaminants (CACs) - NO_2, SO_2, and $PM_{2.5}$.
- Hydrogen cyanide (HCN) and diesel particulate matter (DPM).
- Volatile organic compounds (VOCs) including acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, propionaldehyde, toluene, 2,2,4-trimethylpentane and xylenes.
- Non-carcinogenic and and carcinogenic polycyclic aromatic hydrocarbons (PAHs) bound to particulate from diesel based combustion sources (e.g., trucks). Non-carcinogenic PAHs include acenaphthene, acenaphthylene, anthracene, fluoranthene, flourene, naphthalene, phenanthrene and pyrene. Carcinogenic PAHs include acenaphthene, acenaphthylene, benz(a)anthracene, benzo(a)pyrene B[a]P, benzo(b+j+k) fluoranthene, benzo(ghi)perylene, chrysene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene. Potential carcinogenic health risks were calculated based on exposure to benzo(a)pyrene total potency equivalents (B[a]PTPE).
- Airborne particulate-bound metals from fugitive dust from ore, waste rock, and tailings. Particulate-bound metals can also deposit on soil.
- Metals from treated effluent or seepage.
- Metals that could potentially be emitted by the Project, and are therefore considered COPC include: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, uranium, vanadium, zinc.

Potential Project emissions (i.e., CACs, VOCs, PAHs and metals) were carried forward collectively without additional screening.

The list of chemicals emitted by the Project was based on the following:

- Review of the Project design.
- Review of mineralogical and trace constituent analysis of the ore, waste rock and overburden.
- Review of air contaminants included in the National Pollutant Release Inventory for gold mines.
- Review of air contaminants with Canadian Ambient Air Quality Standards (CAAQS) that may be emitted by the Project.
- Review of air contaminants emitted from vehicle tailpipe exhaust.

Routine laboratory parameters such as alkalinity, hardness and hydroxide and select inorganics (such as aluminum, bismuth, calcium, iron, lithium, magnesium, potassium and titanium), though measured, were not considered as COPC because they are generally regarded as being innocuous or non-toxic or there is insufficient toxicological information on these compounds to assess potential toxicity. These parameters were not included in the screening. Further rationale for excluding these elements is provided in Appendix D (Ubiquitous Elements).

4.0 BASELINE AND FUTURE EXPOSURE POINT CONCENTRATIONS

Potential health risks related to exposure to a COPC in a given media (e.g., soil) depends on the concentration of the COPC in that media. Baseline Case concentrations were estimated using measured and/or modelled data depending on the media. Future Case concentrations were estimated using Baseline Case concentrations and the changes predicted to occur as a result of Project activities.

To evaluate the potential health risks associated with COPC from the Project, the concentrations of COPC in each of the environmental media to which human and ecological receptors may be exposed, was determined for each of the assessed scenarios (i.e., Baseline Case, Project Alone Case (carcinogenic exposures only), and Future Case). These concentrations are called exposure point concentrations (EPCs) and are used to calculate exposures for human and ecological receptors.

Where measured baseline data were available/applicable, the EPCs were typically based on the 95 percent (%) upper confidence limit of the mean (UCLM). The 95% UCLMs represent reasonably expected and spatially distributed COPC exposure concentrations for human and ecological receptors. The 95% UCLMs were calculated using US EPA ProUCL software (US EPA 2015), version 5.1. The ProUCL outputs are provided in Appendix C (ProUCL Data Outputs); these outputs also contain summary statistics. Where there were insufficient data to determine a 95% UCLM (i.e., less than ten samples (US EPA 2015), COPC concentrations were represented by the maximum measured concentration. Additional details related to the selection of EPCs including the treatment of non-detects are provided in Appendix C.

Baseline Case EPCs were estimated using measured and/or modelled data depending on the media. Baseline Case concentrations in air, soil, terrestrial vegetation, small mammals, sediment and fish were based on samples collected from the Gordon and MacLellan regions. Baseline EPCs for surface water were based on the maximum 12-month running average of the modelled concentrations for the Expected modelling scenario (Stantec 2020b and 2020c). Where measured baseline data were available for biological tissues (e.g., for terrestrial vegetation, fish, etc.), these values were used in place of modelled values for the Baseline Case. Where measured baseline data were not available for biological tissues (i.e., soil invertebrates, aquatic plants, benthic invertebrates and wild meat), Baseline Case concentrations were estimated using standard modelling approaches including the use of uptake factors. The equation used to calculate metal COPC concentrations in a biological tissue from either a soil or water concentration (herein referred to as the generalized equation) is as follows:

$$EPC_j = EPC_i \times UP_{ij} \qquad \text{Equation 4-1}$$

Where:

EPC_j = Exposure point concentration in target biotic tissue *j* (e.g., plants or fish, mg/kg wet weight)

EPC_i = Exposure point concentration in measured media *i* (e.g., soil and/or surface water, in mg/kg dry weight or in mg/L)

UP_{ij} = Uptake Factor from environmental medium *i* to target biota tissue *j* (environmental medium and biotic tissue dependent). Depending on the metal COPC and the media, uptake factors were either based on linear relationships, resulting in a single value, or non-linear relationships, where the value of the uptake factor depends on the exposure point concentration.

For Project Alone and/or Future Case, the EPCs used in the HHERA were based on the results of the predictive air dispersion and deposition modelling (Stantec 2020a) and the predictive water quality modelling (Stantec 2020b; 2020c).

Future concentrations of metal COPC in terrestrial vegetation and soil invertebrates were estimated based upon Future Case concentrations of metal COPC in soil as predicted by the air dispersion and deposition modelling.

Future concentrations of metal COPC in aquatic plants, benthic invertebrates, fish and sediment were estimated using the predictive concentrations from surface water modelling. The metal COPC concentrations in surface water were based on treated effluent released from the Project as well as groundwater seepage from tailings, deposition and baseline surface water concentrations.

Future Case concentrations in wild meat were estimated using Future Case concentrations in soil, surface water, and food (e.g., vegetation, invertebrates).

Predicted changes in COPC concentrations in soil and water, as a result of the Project, were used to predict changes in both modelled and measured data. In order to properly compare modelled Future Case concentrations in tissue, to measured Baseline Case concentrations, it was necessary to reconcile the measured and model-estimated values using a proportional increase approach. This was accomplished using the following process. First, modelled Baseline Case concentrations were calculated using Baseline Case concentrations in soil and/or water and literature-based uptake factors. Modelled Future Case concentrations were then calculated using predicted Future Case concentrations in soil and or water and the same uptake factors. The ratio of the modelled Future Case concentrations and the modelled Baseline Case concentrations were then multiplied by the measured Baseline Case concentrations to predict the Future Case concentration in vegetation, small mammals, sediment and fish tissue.

In summary, this proportioning approach for estimating Future Concentrations of metal COPC was used for the following media:

- Terrestrial vegetation (including coniferous and deciduous vegetation, berries and Labrador tea) – estimated based on predicted change in soil concentrations.
- Small mammals – estimated based on predicted change in soil concentrations.
- Fish Tissue – estimated based on predicted change in surface water concentrations.
- Sediment – estimated based on predicted change in surface water concentrations.

4.1 AIR

Baseline Case concentrations for select CAC and COPC were based on the following:

- Baseline Case concentrations for $PM_{2.5}$ and dustfall were based on samples collected as part of the LLGP baseline ambient air quality monitoring program between June 18, 2016 and October 9, 2016. Ambient air quality monitoring locations are provided in Map 2, Appendix A.
- Baseline Case concentrations SO_2 and NO_2 were based on actual 2018 ambient air quality monitoring results from the NAPS station in Fort Smith, NWT (the 90th percentile of hourly measurements). Fort Smith is also a remote location like Lynn Lake and located approximately 700 km to the northwest of the LAA.
- No Baseline Case concentrations were available for DPM, HCN, metals, VOCs or PAHs. Given the remoteness of the LAA, low population density, and limited industrial activity, baseline concentrations of these chemicals are assumed to be negligible.
- Baseline Case concentrations were assumed to be consistent throughout the LAA, therefore the same Baseline Case concentrations were adopted for both the Gordon region and the MacLellan region.

Future Case concentrations were based on the results of air dispersion modelling during the operation period. Airborne concentrations were modelled for operation only, as emissions during construction and decommissioning, reclamation, closure, and post-closure are substantively lower than those of operation (Stantec 2020a).

The modelling was conducted for 45 receptor locations in the Gordon region and 115 receptor locations in the MacLellan region (1 receptor location in the work camp and 114 receptor locations within the MacLellan region outside the MacLellan PDA). Receptor locations are provided on Map 1, Appendix A. Future Case concentrations were calculated for 1-hr, 24-hr and annual average time periods, where applicable. In some cases, EPCs were based on a specific statistic to meet requirements for comparison to a particular guideline. These statistics are provided in Table 4-1 to Table 4-15**.**

4.1.1 CAC

Baseline and Future Case concentrations of CACs at the Gordon region, MacLellan region and at the work camp are provided in Table 4-1 to Table 4-3. CACs include SO_2, NO_2 and $PM_{2.5}$.

Table 4-1 1-hour Concentrations of SO_2 and NO_2

COPC	Baseline Case (µg/m³)	Future Case		
		Gordon Region	MacLellan Region	Work Camp
		Maximum 1-hour (µg/m³)	Maximum 1-hour (µg/m³)	Maximum 1-hour (µg/m³)
SO_2 [a]	6.00E+00	4.47E+01	3.62E+01	9.62E+01
NO_2 [b]	7.50E+00	9.55E+01	9.15E+01	1.31E+02

NOTES:
a Based on the Maximum 99th Percentile Daily Maximum 1-hour concentration
b Based on the Maximum 98th Percentile Daily Maximum 1-hour concentration

Table 4-2 24-hour Concentrations of SO_2 and $PM_{2.5}$

COPC	Baseline Case (µg/m³)	Future Case		
		Gordon Region	MacLellan Region	Work Camp
		Maximum 24-hour (µg/m³)	Maximum 24-hour (µg/m³)	Maximum 24-hour (µg/m³)
SO_2 [a]	6.00E+00	1.35E+01	1.57E+01	2.24E+01
$PM_{2.5}$ [b]	2.90E+00	8.45E+00	8.40E+00	2.76E+01

NOTES:
a Based on the Maximum 24-hour Concentrations
b Based on the Maximum 3-year Average of the 98th Percentile of 24-hour Average Concentrations

Table 4-3 Annual Concentrations of NO_2 and $PM_{2.5}$

COPC	Baseline Case (µg/m³)	Future Case		
		Gordon Region	MacLellan Region	Work Camp
		Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)
NO_2 [a]	1.90E+00	3.61E+00	3.96E+00	9.06E+00
$PM_{2.5}$ [b]	2.30E+00	3.54+00	3.74E+00	7.18E+00

NOTES:
[a] Based on the Maximum 5-year Average Concentrations
[b] Based on the Maximum 3-year Average Concentrations

4.1.2 DPM

Baseline and Future Case concentrations of DPM are provided in Table 4-4 and Table 4-5. The Future Case concentrations of DPM are comprised of Project Alone Case concentrations only, as Baseline Case concentrations were not available for Gordon region and MacLellan region and given the remoteness of the LAA, low population density and limited industrial activity, baseline concentration of DPM is assumed to be negligible.

Table 4-4 2-hour Concentration of DPM during Project Operations

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum 2-hour (µg/m³)	Maximum 2-hour (µg/m³)	Maximum 2-hour (µg/m³)
DPM	--	2.90E+00	2.78E+00	1.15E+01

NOTE:
-- Concentrations not measured

Table 4-5 Annual Concentration of DPM during Project Operations

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)
DPM	--	2.13E-02	2.59E-02	1.24E-01

NOTE:
-- Concentrations not measured

4.1.3 HCN

Baseline and Future Case concentrations of HCN are provided in Table 4-6 to Table 4-7. The Future Case concentrations of HCN are comprised of Project Alone concentrations only. Baseline Case concentrations were assumed to be negligible.

Table 4-6 1-hour Concentrations of HCN

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum 1-hour (µg/m³)	Maximum 1-hour (µg/m³)	Maximum 1-hour (µg/m³)
HCN	--	4.81E-01	7.15E+00	3.09E+01

NOTE:
-- Concentrations not measured

Table 4-7 Annual Concentrations of HCN

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum Annual (µg/m³)	Maximum Annual (µg/m³)	Maximum Annual (µg/m³)
HCN	--	8.44E-03	2.24E-01	1.28E+00

NOTE:
-- Concentrations not measured

4.1.4 VOCs

Baseline and Future Case concentrations of non-carcinogenic and carcinogenic VOCs are provided in Table 4-8 to Table 4-11. The Future Case concentrations of VOCs are comprised of Project Alone concentrations only, as Baseline Case concentrations were assumed to be negligible.

Table 4-8 1-hour Concentrations – Non-Carcinogenic VOCs

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum 1-hour (µg/m³)	Maximum 1-hour (µg/m³)	Maximum 1-hour (µg/m³)
Acetaldehyde	--	1.04E+00	8.79E-01	3.52E+00
Benzene	--	4.06E-01	3.44E-01	1.37E+00
1,3-Butadiene	--	2.02E-02	1.71E-02	6.85E-02
Ethylbenzene	--	6.99E-02	5.93E-02	2.37E-01
Formaldehyde	--	2.95E+00	2.51E+00	1.00E+01
Propionaldehyde	--	2.35E-01	1.99E-01	7.97E-01
Toluene	--	3.32E-01	2.82E-01	1.13E+00
2,2,4-Trimethylpentane	--	9.22E-02	7.83E-02	3.13E-01
Xylenes	--	2.29E-01	1.94E-01	7.78E-01

NOTE:
-- Concentrations not measured

Table 4-9 24-hour Concentrations – Non-Carcinogenic VOCs

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum 24-hour (µg/m³)	Maximum 24-hour (µg/m³)	Maximum 24-hour (µg/m³)
Acetaldehyde	--	1.95E-01	1.95E-01	8.18E-01
Acrolein	--	2.87E-02	4.45E-02	1.86E-01
Benzene	--	4.93E-02	7.65E-02	3.20E-01
1,3-Butadiene	--	2.45E-03	3.80E-03	1.59E-02
Formaldehyde	--	3.59E-01	5.57E-01	2.34E+00
Toluene	--	4.04E-02	6.27E-02	2.62E-01
Xylenes	--	2.78E-02	4.32E-02	1.81E-01

NOTE:
-- Concentrations not measured

Table 4-10 Annual Concentrations – Non-Carcinogenic VOCs

COPC	Baseline Case (µg/m³)	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)
Acetaldehyde	--	7.66E-03	7.66E-03	4.82E-02
Acrolein	--	1.73E-03	1.75E-03	1.10E-02
Benzene	--	2.98E-03	3.00E-03	1.89E-02
1,3-Butadiene	--	1.48E-04	1.49E-04	9.39E-04
Ethylbenzene	--	5.13E-04	5.17E-04	3.25E-03
Formaldehyde	--	2.17E-02	2.18E-02	1.38E-01
Propionaldehyde	--	1.73E-03	1.74E-03	1.09E-02
Toluene	--	2.44E-01	2.46E-03	1.55E-02
2,2,4-Trimethylpentane	--	6.77E-04	6.82E-04	4.29E-03
Xylenes	--	1.68E-02	1.69E-03	1.07E-02

NOTE:
-- Concentrations not measured

Table 4-11 Annual Concentrations – Carcinogenic VOCs

COPC	Project Alone Case		
	Gordon Region	MacLellan Region	Work Camp
	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)
Acetaldehyde	7.66E-03	7.66E-03	4.82E-02
Benzene	2.98E-03	3.00E-03	1.89E-02
1,3-Butadiene	1.48E-04	1.49E-04	9.39E-04
Formaldehyde	2.17E-02	2.18E-02	1.38E-01
2,2,4-Trimethylpentane	6.77E-04	6.82E-04	4.29E-03

4.1.5 PAHs

Baseline and Future Case concentrations of non-carcinogenic and carcinogenic PAHs are provided in Table 4-12 and Table 4-13, respectively. The Future Case concentrations of PAHs are comprised of Project Alone concentrations only, as Baseline Case concentrations were assumed to be negligible.

Table 4-12 Non-carcinogenic Exposure Point Concentrations – PAHs

COPC	Baseline Case	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum Annual Average (µg/m^3)	Maximum Annual Average (µg/m^3)	Maximum Annual Average (µg/m^3)
Acenaphthene	--	5.01E-05	5.04E-05	3.18E-04
Acenaphthylene	--	6.53E-05	6.57E-05	4.14E-04
Anthracene	--	7.10E-06	7.35E-05	4.45E-05
Fluoranthene	--	8.26E-06	8.52E-06	5.19E-05
Fluorene	--	6.77E-05	6.88E-05	4.27E-04
Naphthalene	--	5.19E-04	5.23E-04	3.29E-03
Phenanthrene	--	1.17E-04	1.19E-04	7.35E-04
Pyrene	--	9.30E-06	9.69E-06	5.82E-05

NOTE:
-- Concentrations not measured

Table 4-13 Carcinogenic Exposure Point Concentrations– PAHs

COPC	Project Alone Case								
	Gordon Region			MacLellan Region			Work Camp		
	Maximum Annual Average (µg/m³)	PEF[a]	$B[a]P_{TPE}$	Maximum Annual Average (µg/m³)	PEF[a]	$B[a]P_{TPE}$	Maximum Annual Average (µg/m³)	PEF[a]	$B[a]P_{TPE}$
Acenaphthene	5.01E-05	0.001	5.01E-08	5.04E-05	0.001	5.04E-08	3.18E-04	0.001	3.18E-07
Acenaphthylene	6.53E-05	0.01	6.53E-07	6.57E-05	0.01	6.57E-07	4.14E-04	0.01	4.14E-06
Benz[a]anthracene	5.26E-07	0.1	5.26E-08	5.61E-07	0.1	5.61E-08	3.27E-06	0.1	3.27E-07
Benzo[a]pyrene	9.57E-08	1	9.57E-08	1.20E-07	1	1.20E-07	5.55E-07	1	5.55E-07
Benzo[b]fluoranthene	1.42E-07	0.1	1.42E-08	1.79E-07	0.1	1.79E-08	8.25E-07	0.1	8.25E-08
Benzo[g,h,i]perylene	3.51E-07	0.01	3.51E-09	3.79E-07	0.01	3.79E-09	2.17E-06	0.01	2.17E-08
Benzo[k]fluoranthene	1.09E-07	0.1	1.09E-08	1.38E-07	0.1	1.38E-08	6.34E-07	0.1	6.34E-08
Chrysene	6.12E-07	0.01	6.12E-09	6.70E-07	0.01	6.70E-09	3.76E-06	0.01	3.76E-08
Dibenzo[a,h]anthracene	2.63E-08	1.01	2.66E-08	3.31E-08	1.0	3.31E-08	1.52E-07	1.0	1.52E-07
Indeno[1,2,3-cd]pyrene	9.15E-08	0.1	9.15E-09	1.15E-07	0.1	1.15E-08	5.30E-07	0.1	5.30E-08
$B[a]P_{TPE}$			9.22E-07			9.70E-07			5.75E-06

NOTE:

[a] Potency equivalent factors (PEF) obtained from Health Canada (2012). With the exception of Potency Equivalent Factors (PEF) for acenaphthene and acenapthylene, PEF were obtained from Health Canada (2012). The PEF for acenaphthene and acenaphthylene were obtained from MOE (2011).

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4.1.6 Metals

Baseline and Future Case concentrations of non-carcinogenic and carcinogenic metals are provided in Table 4-14 and Table 4-15, respectively. The Future Case concentrations of metals are comprised of Project Alone concentrations only, as Baseline Case concentrations were not available. Future case concentrations of antimony, barium and strontium were not modelled because these metals are not expected to be emitted to the air by the Project.

Table 4-14 Non-Carcinogenic Exposure Point Concetrations for Residential Receptors and Indigenous Receptors – Metals

Metals	Baseline Case	Future Case (Project Alone Case)		
		Gordon Region	MacLellan Region	Work Camp
		Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)
Antimony	--	--	--	--
Arsenic	--	5.59E-05	4.30E-04	5.30E-03
Barium	--	--	--	--
Beryllium	--	3.96E-07	3.17E-07	3.04E-06
Cadmium	--	3.69E-07	5.13E-06	5.60E-05
Chromium Total	--	4.97E-05	2.72E-04	1.37E-03
Cobalt	--	1.30E-05	4.54E-05	2.30E-04
Copper	--	4.33E-05	1.80E-04	8.84E-04
Lead	--	1.13E-05	1.49E-04	1.97E-03
Manganese	--	1.61E-07	2.02E-07	9.31E-07
Mercury	--	7.36E-09	4.97E-08	8.32E-07
Molybdenum	--	9.91E-07	1.16E-06	9.75E-06
Nickel	--	3.46E-05	3.23E-04	1.75E-03
Selenium	--	4.29E-07	2.56E-06	3.68E-05
Silver	--	1.99E-07	2.50E-06	3.48E-05
Strontium	--	--	--	--
Thallium	--	1.90E-07	2.36E-06	4.05E-05
Uranium	--	8.95E-07	2.50E-06	4.10E-05
Vanadium	--	5.65E-05	1.09E-04	5.89E-04
Zinc	--	6.78E-05	9.73E-04	7.82E-03

NOTES:
-- Concentrations not measured

Table 4-15 Carcinogenic Exposue Point Concentration– Metals

Metals	Project Alone Case		
	Gordon Region	MacLellan Region	Work Camp
	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)	Maximum Annual Average (µg/m³)
Arsenic	5.59E-05	4.30E-04	5.30E-03
Beryllium	3.96E-07	3.17E-07	3.04E-06
Cadmium	3.69E-07	5.13E-06	5.60E-05
Chromium VI	1.84E-09	2.32E-09	1.07E-08
Nickel	3.46E-05	3.23E-04	1.75E-03

4.2 SOIL

Baseline Case concentrations in soil were based on samples collected from within the LAA. Samples were identified as either coming from the Gordon region or the MacLellan region. Sample locations are provided in Map 3, Appendix A.

Deposition was modelled for the operation phase when release of rock and ore dust is expected to occur. Although it is anticipated that dust would be released from the Project during the construction phase, this dust will be composed of overburden and the metal concentrations in this material would not be expected to differ from metal concentrations in existing surface soils. Thus, dust deposition during the construction phase would not be expected to alter metal concentrations in surface soil. Therefore, the construction phase was not included in the prediction of the change in metal concentrations in surface soil over the operational life of the Project.

The specific dust deposition rates predicted at each of the selected deposition receptor locations were used to estimate the Future Case concentrations of metal COPC in soil. Future Case concentrations in soil were assumed to be based on 5 years of active ore extraction operation for the Gordon site and 13 years of active ore extraction operation for the MacLellan site. The incremental increase in metal concentration in soil resulting from rock and ore dust deposition assumed that metal accumulation in the soil would occur over the life of mine and that there would be no loss of metal from the soil (e.g., from runoff). The exposure point concentration in soil was calculated based on the 95% UCLM deposition rate for a region, assuming the deposited metals mix with the top 2 cm of soil, which is the mixing depth for untilled soil recommended by the US EPA (2005).

4.2.1 Gordon Region

Baseline metal concentrations in soil for the Gordon region were based on 28 samples and three field duplicates collected in 2015 and 2016. The 95% UCLM concentration was adopted as the Baseline Case concentration for each metal throughout the Gordon region. Deposition was modelled for the 45 receptor locations. The 95% UCLM deposition rate was used to estimate future concentrations in soil for the Gordon region. Baseline Case and Future Case EPCs for metal COPC for the Gordon region are provided in Table 4-16.

4.2.2 MacLellan Region

Baseline metal concentrations in soil for the MacLellan region were based on 25 samples and three field duplicates collected in 2015 and 2016. The 95% UCLM concentration was adopted as the Baseline Case concentration for each metal throughout the MacLellan region. Deposition was modelled for the 115 receptor locations. The 95% UCLM deposition rate (outside the permanent work camp) was used to estimate future concentrations in soil in the MacLellan region. Baseline Case and Future Case EPCs for metal COPC in soil are provided in Table 4-16.

Table 4-16 Exposure Point Concentrations in Soil – Metals

COPC	Gordon Region		MacLellan Region	
	Baseline Case (mg/kg)	Future Case (mg/kg)	Baseline Case (mg/kg)	Future Case (mg/kg)
Antimony	1.21E-01	1.21E-01	1.50E-01	1.50E-01
Arsenic	1.09E+00	1.15E+00	1.58E+00	2.05E+00
Barium	4.85E+01	4.85E+01	3.72E+01	3.72E+01
Beryllium	2.99E-01	2.99E-01	1.28E-01	1.28E-01
Cadmium	3.59E-01	3.60E-01	3.51E-01	3.56E-01
Chromium	7.71E+00	7.75E+00	4.88E+00	5.14E+00
Cobalt	3.11E+00	3.12E+00	2.08E+00	2.12E+00
Copper	3.81E+01	3.81E+01	7.85E+01	7.87E+01
Lead	8.16E+00	8.17E+00	7.98E+00	8.14E+00
Manganese	7.97E+01	7.97E+01	5.13E+01	5.13E+01
Mercury	1.10E-01	1.10E-01	2.03E-01	2.03E-01
Molybdenum	8.20E+00	8.20E+00	7.29E-01	7.30E-01
Nickel	5.21E+00	5.25E+00	3.45E+01	3.48E+01
Selenium	2.50E-01	2.50E-01	9.50E-01	9.53E-01
Silver	1.58E-01	1.58E-01	2.25E-01	2.28E-01
Strontium	2.06E+01	2.06E+01	1.49E+01	1.49E+01
Thallium	1.82E-01	1.82E-01	1.30E-01	1.33E-01
Uranium	4.51E-01	4.52E-01	4.00E-01	4.03E-01
Vanadium	1.22E+01	1.22E+01	5.57E+00	5.67E+00
Zinc	4.67E+01	4.68E+01	8.30E+01	8.40E+01

4.3 TERRESTRIAL PLANTS

Terrestrial vegetation consisted of traditional plants, coniferous and deciduous vegetation and garden produce were collected from the LAA. Sample locations are provided in Map 3, Appendix A. The results of the traditional plants and the garden produce were used to predict risks for humans, while the results of the traditional plants, and coniferous and deciduous vegetation (collectively referred to as wild vegetation) were used to estimate concentrations in tissues of target hunting species and health risks for ecological receptors.

4.3.1 Traditional Plants

Traditional plants including berries and Labrador tea were collected from each region. Details related to the Baseline Case and Future Case concentrations in traditional plants for each region are discussed in Section 4.3.1.1 and Section 4.3.1.2, respectively, and concentrations are provided in Table 4-17.

4.3.1.1 Gordon Region

Baseline Case metal concentrations in traditional plants (i.e., berries and tea) were based on 61 samples and seven field duplicates collected throughout the Gordon region in 2015 and 2016:

- Berries: blueberries (*Vaccinium corymbosum*), bog cranberries (*Vaccimum oxycoccos*), cloud berries (*Rubus chamaemorus*) (n=38).
- Labrador tea (n= 30).

The 95% UCLM concentrations of berries or tea was adopted as the Baseline Case concentration for each metal throughout the Gordon region. Future Case concentrations of metal COPC in vegetation were estimated using Equation 4-1 (relating metal concentrations in vegetation to soil concentrations) and published uptake factors from soil-to-vegetation (Bechtel and Jacobs 1998; Sheppard and Evenden 1988; US EPA 2007). Baseline Case and Future Case EPCs for metal COPC in traditional plants are provided in Table 4-17.

4.3.1.2 MacLellan Region

Baseline Case metal concentrations in traditional plants (i.e., berries and tea) were based on 53 samples and five field duplicates collected throughout the MacLellan region:

- Berries: blueberries, bog cranberries, cloud berries (n=31).
- Labrador tea (n=27).

The 95% UCLM concentration was adopted as the Baseline Case concentration for each metal throughout the MacLellan region. Future Case concentrations of metal COPC in vegetation were estimated using Equation 4-1 (relating elemental concentrations in vegetation to soil concentrations) and published uptake factors from soil-to-vegetation (Bechtel and Jacobs 1998; Sheppard and Evenden 1988; US EPA 2007). Baseline Case and Future Case EPCs for metal COPC in traditional plants are provided in Table 4-17.

Table 4-17 Exposure Point Concentrations in Traditional Plants – Metals

COPC	Gordon Region				MacLellan Region			
	Berries		Other (Labrador Tea)		Berries		Other (Labrador Tea)	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	9.60E-03	9.60E-03	3.36E-02	3.36E-02	5.90E-03	5.90E-03	3.34E-02	3.34E-02
Arsenic	9.60E-03	1.01E-02	1.38E-02	1.46E-02	5.90E-03	7.65E-03	1.50E-02	1.95E-02
Barium	2.91E+00	2.91E+00	3.79E+01	3.79E+01	2.30E+00	2.30E+00	3.56E+01	3.56E+01
Beryllium	9.60E-03	9.60E-03	1.38E-02	1.38E-02	5.90E-03	5.90E-03	1.50E-02	1.51E-02
Cadmium	3.07E-02	3.07E-02	1.56E-01	1.56E-01	4.03E-02	4.03E-02	2.88E-02	2.91E-02
Chromium	9.60E-02	9.65E-02	1.38E-01	1.39E-01	5.90E-02	6.21E-02	1.50E-01	1.58E-01
Cobalt	3.78E-02	3.79E-02	4.01E-02	4.02E-02	1.82E-02	1.86E-02	5.30E-02	5.41E-02
Copper	7.62E-01	7.63E-01	1.71E+00	1.71E+00	7.74E-01	7.76E-01	1.72E+00	1.72E+00
Lead	3.84E-02	3.85E-02	5.52E-02	5.53E-02	2.36E-02	2.41E-02	6.01E-02	6.08E-02
Manganese	4.53E+01	4.53E+01	3.22E+02	3.22E+02	4.28E+01	4.28E+01	3.69E+02	3.69E+02
Mercury	9.60E-03	9.60E-03	1.38E-02	1.38E-02	5.90E-03	5.90E-03	1.50E-02	1.50E-02
Molybdenum	6.85E-02	6.85E-02	8.61E-02	8.61E-02	2.51E-02	2.51E-02	3.02E-02	3.02E-02
Nickel	1.71E-01	1.72E-01	3.89E-01	3.91E-01	5.74E-01	5.79E-01	2.37E+00	2.38E+00
Selenium	9.60E-02	9.61E-02	1.38E-01	1.38E-01	5.90E-02	5.92E-02	1.50E-01	1.51E-01
Silver	1.92E-02	1.92E-02	2.76E-02	2.77E-02	1.18E-02	1.28E-02	3.01E-02	3.26E-02
Strontium	1.04E+00	1.04E+00	5.82E+00	5.82E+00	3.70E-01	3.70E-01	7.61E+00	7.61E+00
Thallium	5.76E-03	5.77E-03	3.71E-02	3.71E-02	3.54E-03	3.61E-03	5.19E-02	5.29E-02
Uranium	1.92E-03	1.92E-03	2.76E-03	2.76E-03	1.18E-03	1.19E-03	3.01E-03	3.01E-03
Vanadium	9.60E-02	9.63E-02	1.38E-01	1.38E-01	5.90E-02	6.01E-02	1.50E-01	1.53E-01
Zinc	3.35E+00	3.36E+00	1.00E+01	1.00E+01	3.47E+00	3.51E+00	9.73E+00	9.80E+00

4.3.2 Terrestrial Wild Plants

Terrestrial wild plants including coniferous vegetation (spruce), deciduous vegetation (e.g., aspen, willow, alder, birch), Labrador tea and berries was collected from each region Concentrations in terrestrial wild plants were used in the HHRA to predict concentrations in wild meat, and in the ERA to predict potential health risks for ecological receptors.

4.3.2.1 Gordon Region

Baseline Case metal concentrations in terrestrial plants were based on a combined total of 112 samples (28 coniferous, 23 deciduous, 27 Labrador tea and 34 berry samples) and 13 field duplicates (three coniferous, three deciduous, three Labrador tea and four berry samples) collected throughout the Gordon region in 2015 and 2016. The average of the 95% UCLM concentrations for coniferous vegetation, deciduous plants, Labrador tea and berries was adopted as the Baseline Case concentrations throughout the Gordon region. Future Case concentrations of metal COPC in vegetation were estimated using Equation 4-1 relating elemental concentrations in vegetation to soil concentrations and published uptake factors from soil-to-vegetation (Bechtel and Jacobs 1998; Sheppard and Evenden 1988; US EPA 2007). Baseline Case and Future Case EPCs for metal COPC in soil are provided in Table 4-18.

4.3.2.2 MacLellan Region

Baseline Case metal concentrations in terrestrial plants were based on a combined total of 93 samples (23 coniferous, 17 deciduous, 25 Labrador tea and 28 berry samples) and nine field duplicates (two coniferous, two deciduous, two Labrador tea, and three berry samples) collected throughout the MacLellan region in 2015 and 2016. The average of the 95% UCLM concentrations for coniferous vegetation,deciduous vegetation, Labrador tea and berries was adopted as the Baseline Case concentrations throughout the MacLellan region. Future Case concentrations of metal COPC in vegetation were estimated using Equation 4-1 relating elemental concentrations in vegetation to soil concentrations and published uptake factors from soil-to-vegetation (Bechtel and Jacobs 1998; Sheppard and Evenden 1988; US EPA 2007). Baseline Case and Future Case EPCs for metal COPC in soil are provided in Table 4-18.

Table 4-18 Exposure Point Concentrations in Terrestrial Wild Plants – Metals

COPC	Gordon Region		MacLellan Region	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	2.49E-02	2.49E-02	2.49E-02	2.49E-02
Arsenic	1.36E-02	1.43E-02	1.22E-02	1.58E-02
Barium	1.96E+01	1.96E+01	1.89E+01	1.89E+01
Beryllium	1.73E-02	1.73E-02	1.99E-02	2.00E-02
Cadmium	1.05E-01	1.05E-01	6.60E-02	6.66E-02
Chromium	1.36E-01	1.36E-01	1.22E-01	1.28E-01
Cobalt	1.12E-01	1.13E-01	1.04E-01	1.06E-01
Copper	1.47E+00	1.47E+00	1.37E+00	1.37E+00
Lead	1.44E-01	1.45E-01	5.69E-02	5.75E-02
Manganese	2.58E+02	2.58E+02	2.48E+02	2.48E+02
Mercury	1.36E-02	1.36E-02	9.93E-03	9.93E-03
Molybdenum	4.07E-01	4.07E-01	3.72E-02	3.73E-02
Nickel	4.24E-01	4.27E-01	2.42E+00	2.43E+00

Table 4-18 Exposure Point Concentrations in Terrestrial Wild Plants – Metals

COPC	Gordon Region		MacLellan Region	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Selenium	1.36E-01	1.36E-01	1.22E-01	1.22E-01
Silver	2.72E-02	2.72E-02	2.43E-02	2.46E-02
Strontium	5.11E+00	5.11E+00	1.18E+01	1.18E+01
Thallium	2.11E-02	2.11E-02	2.61E-02	2.66E-02
Uranium	2.72E-03	2.72E-03	2.43E-03	2.44E-03
Vanadium	1.36E-01	1.36E-01	1.22E-01	1.24E-01
Zinc	1.61E+01	1.61E+01	2.08E+01	2.10E+01

4.3.3 Garden Produce

Garden produce was collected from the MacLellan region, but not the Gordon region. No backyard gardens were identified in the Gordon region.

4.3.3.1 Gordon Region

The concentrations from the MacLellan region will be used to evaluate risk for receptors in the Gordon region. Baseline Case and Future Case EPCs for metal COPC in soil are provided in Table 4-19.

4.3.3.2 MacLellan Region

Baseline Case metal concentrations in backyard garden produce were based on nine samples of backyard garden produce (carrots (3), potatoes (5) and beets (1)) collected from the Town of Lynn Lake (within the MacLellan region) in 2016. The maximum concentration was adopted as the Baseline Case concentration for each metal in backyard garden produce throughout the MacLellan region. Future Case concentrations of metal COPC in vegetation were estimated Equation 4-1 relating elemental concentrations in vegetation to soil concentrations and published uptake factors from soil-to-vegetation (Bechtel Jacobs 1998; Sheppard and Evenden 1988; US EPA 2007).Baseline Case and Future Case EPCs for metal COPC in soil are provided in Table 4-19.

Table 4-19 Exposure Point Concentrations in Garden Produce – Metals

COPC	Gordon Region		MacLellan Region	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	8.35E-03	8.35E-03	8.35E-03	8.35E-03
Arsenic	8.35E-03	8.83E-03	8.35E-03	1.08E-02
Barium	3.49E+00	3.49E+00	3.49E+00	3.49E+00
Beryllium	8.35E-03	8.36E-03	8.35E-03	8.37E-03
Cadmium	1.43E-02	1.43E-02	1.43E-02	1.45E-02
Chromium	8.35E-02	8.39E-02	8.35E-02	8.79E-02
Cobalt	1.67E-02	1.67E-02	1.67E-02	1.70E-02
Copper	1.67E+00	1.67E+00	1.67E+00	1.67E+00
Lead	3.34E-02	3.34E-02	3.34E-02	3.38E-02
Manganese	1.86E+00	1.86E+00	1.86E+00	1.86E+00
Mercury	8.35E-03	8.35E-03	8.35E-03	8.35E-03
Molybdenum	2.43E-01	2.43E-01	2.43E-01	2.44E-01
Nickel	3.69E-01	3.71E-01	3.69E-01	3.72E-01
Selenium	8.35E-02	8.36E-02	8.35E-02	8.38E-02
Silver	1.67E-02	1.67E-02	1.67E-02	1.81E-02
Strontium	1.76E+00	1.76E+00	1.76E+00	1.76E+00
Thallium	5.01E-03	5.02E-03	5.01E-03	5.11E-03
Uranium	2.79E-03	2.79E-03	2.79E-03	2.80E-03
Vanadium	8.35E-02	8.38E-02	8.35E-02	8.51E-02
Zinc	4.58E+00	4.59E+00	4.58E+00	4.61E+00

4.4 SMALL MAMMALS

Small mammals were collected from the Gordon region and the MacLellan region. Sampling locations are provided in Map 4, Appendix A.

4.4.1 Gordon Region

Baseline Case metal concentrations in small mammals were based on the maximum concentration of individual metals from three red-backed voles and three deer mice collected in the Gordon region. Future concentrations in small mammals were estimated using the predicted concentrations of COPC in soil and the generalized equation relating elemental concentrations in biota to soil concentrations and using published uptake factors (JWL and IES2008; Sample et al. 1998b; US EPA 2007). Baseline and Future Case EPCs for metal COPC in small mammals are provided in Table 4-20.

4.4.2 MacLellan Region

Baseline Case metal concentrations in small mammals were based on the maximum concentration of individual metals from six red-backed voles collected in the MacLellan region. Future concentrations in small mammals were estimated using the predicted concentrations of COPC in soil and the generalized equation relating elemental concentrations in biota to soil concentrations and using published uptake factors (JWL and IES2008; Sample et al. 1998b; US EPA 2007). Baseline and Future Case EPCs for metal COPC in small mammals are provided in Table 4-20.

Table 4-20 Exposure Point Concentrations in Small Mammals – Metals

COPC	Gordon Region		MacLellan Region	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	1.10E-02	1.10E-02	5.00E-03	5.00E-03
Arsenic	1.89E-01	2.00E-01	4.60E-02	5.97E-02
Barium	2.40E+01	2.40E+01	4.87E+01	4.87E+01
Beryllium	5.00E-03	5.00E-03	5.00E-03	5.01E-03
Cadmium	1.00E-01	1.00E-01	3.53E-01	3.56E-01
Chromium	1.40E-01	1.41E-01	5.00E-02	5.26E-02
Cobalt	6.40E-02	6.42E-02	6.10E-02	6.22E-02
Copper	5.49E+00	5.49E+00	3.34E+00	3.34E+00
Lead	6.50E-02	6.51E-02	8.80E-02	8.88E-02
Manganese	8.75E+00	8.75E+00	8.48E+00	8.48E+00
Mercury	2.90E-02	2.90E-02	4.40E-02	4.40E-02
Molybdenum	3.00E-01	3.00E-01	1.76E-01	1.76E-01
Nickel	1.50E-01	1.50E-01	1.50E-01	1.51E-01
Selenium	4.80E-01	4.80E-01	5.20E-01	5.21E-01
Silver	1.00E-02	1.00E-02	1.00E-02	1.01E-02
Strontium	6.24E+00	6.24E+00	9.30E+00	9.30E+00
Thallium	6.11E-02	6.12E-02	3.00E-03	3.06E-03
Uranium	5.40E-03	5.41E-03	1.00E-03	1.01E-03
Vanadium	1.50E-01	1.51E-01	5.00E-02	5.09E-02
Zinc	3.04E+01	3.04E+01	3.06E+01	3.06E+01

4.5 SURFACE WATER

Surface water samples were collected from both the Surface Water LAA for the Gordon site and the MacLellan site. The locations of these samples are provided in Map 5 and Map 6, Appendix A. The results from these samples were used to model Baseline Case concentrations in surface water.

4.5.1 Gordon Region

Baseline Case surface water concentrations for predicting changes in fish tissue were based on the maximum 12-month running average of the modelled baseline surface water concentrations in Swede Lake because it was assumed people in the Gordon region would obtain local fish from Swede Lake. Baseline Case surface water concentrations for predicting risks related to consumption (for both human and ecological receptors) and for predicting Baseline Case concentrations in wild meat were based on the maximum 12-month running averages of modelled Baseline Case surface water concentrations from waterbodies within the Surface Water LAA for the Gordon site (including West Farley Lake, East Farley Lake, Swede Lake, Ellystan Lake and Susan Lake). The latter approach is based on the assumption that human and ecological receptors could potentially consume surface water from multiple lakes throughout the Surface Water LAA for the Gordon site (Stantec 2020b)

Future Case surface water concentrations for predicting changes in fish tissue were based on the maximum 12-month running average surface water concentrations in Swede Lake for the Expected case. Expected case inputs include average and geometric mean concentrations for surface and groundwater, respectively (Stantec 2020b), and is representative of the typical changes in surface water concentrations that may occur as a result of the Project. Future Case concentrations for assessing ingestion and predicting concentrations in wild meat and is based on the maximum 12-month running average surface water concentrations for the Expected case for waterbodies in the Surface Water LAA for the Gordon site. Baseline Case and Future Case EPC for metal COPC in surface water from Swede Lake are provided in Table 4-21, while Baseline Case and Future Case EPC in waterbodies from the Surface Water LAA for the Gordon site are provided in Table 4-21.

4.5.2 MacLellan Region

Baseline Case surface water concentrations for predicting changes in fish tissue were based on the maximum 12-month running average of the modelled baseline surface water concentrations in Cockeram Lake because it was assumed that people in the MacLellan region would obtain local fish from Cockeram Lake. Baseline Case surface water concentrations for predicting risks related to consumption (for both human and ecological receptors) and for predicting Baseline Case concentrations in wild meat were based on the maximum 12-month running averages of modelled Baseline Case surface water concentrations from waterbodies within the Surface Water LAA for the MacLellan site (including Keewatin River, Minton Lake, Cockeram River, Cockeram Lake and a catchment adjacent to and north of the PDA; Stantec 2020c).

Future Case surface water concentrations for predicting changes in fish tissue were based on the maximum 12-month running average surface water concentrations in Cockeram Lake for the Expected case (Stantec 2020c). Future Case concentrations for assessing ingestion and predicting concentrations in wild meat and is based on the maximum 12-month running average surface water concentrations for the Expected case for waterbodies in the Surface Water LAA for the MacLellan site. Baseline Case and Future Case EPC for metal COPC in surface water from Cockeram Lake are provided in Table 4-21, while Baseline Case and Future Case EPC in waterbodies from the Surface Water LAA for the MacLellan site are provided in Table 4-21.

Table 4-21 Exposure Point Concentrations in Surface Water – Metals-Swede Lake and Cockeram Lake

COPC	Swede Lake (Gordon Region)		Cockeram Lake (MacLellan Region)	
	Baseline Case (mg/L)	Future Case (mg/L)	Baseline Case (mg/L)	Future Case (mg/L)
Antimony	1.1E-04	2.2E-04	8.1E-05	1.0E-04
Arsenic	2.9E-04	7.1E-04	2.1E-04	2.9E-04
Barium	1.0E-02	1.7E-02	7.4E-03	7.7E-03
Beryllium	8.7E-05	9.3E-05	8.2E-05	8.2E-05
Cadmium	4.7E-06	4.9E-06	6.9E-06	7.6E-06
Chromium	1.6E-04	1.7E-04	1.7E-04	1.8E-04
Cobalt	8.5E-05	8.8E-05	2.6E-04	3.0E-04
Copper	5.7E-04	5.8E-04	2.4E-03	2.4E-03
Lead	6.1E-05	6.1E-05	4.5E-05	4.9E-05
Manganese	2.4E-02	3.3E-02	2.4E-02	2.5E-02
Mercury	9.9E-07	9.9E-07	1.1E-06	1.2E-06
Molybdenum	8.5E-04	1.2E-03	9.0E-05	1.3E-04
Nickel	2.5E-04	2.7E-04	2.8E-02	2.8E-02
Selenium	4.4E-05	7.2E-05	4.7E-05	5.0E-05
Silver	6.1E-06	6.2E-06	5.0E-06	5.1E-06
Strontium	3.7E-02	7.3E-02	1.6E-02	1.8E-02
Thallium	3.7E-05	3.9E-05	2.9E-05	3.0E-05
Uranium	3.7E-05	1.9E-04	4.2E-05	5.2E-05
Vanadium	2.3E-04	2.4E-04	1.4E-04	1.5E-04
Zinc	3.4E-03	3.5E-03	6.8E-03	6.9E-03

Table 4-22 Exposure Point Concentrations in Surface Water – Metals

COPC	Surface Water LAA for the Gordon site		Surface Water LAA for the MacLellan site	
	Baseline Case (mg/L)	Future Case (mg/L)	Baseline Case (mg/L)	Future Case (mg/L)
Antimony	1.06E-04	3.63E-04	8.60E-05	1.61E-04
Arsenic	2.93E-04	5.84E-04	2.66E-04	6.02E-04
Barium	2.06E-02	3.41E-02	8.64E-03	9.79E-03
Beryllium	4.72E-05	5.38E-05	8.64E-05	8.89E-05
Cadmium	2.46E-06	2.84E-06	5.54E-06	1.16E-05
Chromium	8.65E-05	9.31E-05	1.77E-04	2.03E-04
Cobalt	4.80E-05	5.22E-05	1.92E-04	3.26E-04
Copper	2.15E-04	2.53E-04	1.12E-03	1.21E-03
Lead	3.64E-05	3.89E-05	6.37E-05	7.54E-05
Manganese	5.84E-02	6.69E-02	4.60E-02	5.10E-02
Mercury	7.30E-07	7.59E-07	1.42E-06	1.48E-06
Molybdenum	3.20E-04	7.22E-04	1.02E-04	2.12E-04
Nickel	1.83E-04	2.11E-04	8.97E-03	9.62E-03
Selenium	2.94E-05	4.55E-05	4.87E-05	5.87E-05
Silver	3.57E-06	3.93E-06	5.03E-06	5.50E-06
Strontium	9.49E-02	1.75E-01	1.60E-02	2.38E-02
Thallium	1.99E-05	2.31E-05	3.51E-05	3.58E-05
Uranium	5.22E-05	2.76E-04	4.92E-05	9.48E-05
Vanadium	1.12E-04	1.31E-04	1.93E-04	2.06E-04
Zinc	7.89E-04	8.56E-04	3.60E-03	3.86E-03

4.6 FISH

Both large bodied and small bodied fish were collected from the Surface Water LAA for the Gordon site and the Surface Water LAA for the MacLellan site. The large bodied fish data were used in the HHRA, while both the large and small bodied fish data were used in ERA. Fish sampling locations are provided in Map 7, Appendix A.

4.6.1 Fish for Human Consumption

Large-bodied fish including northern pike, lake whitefish and walleye were collected for the HHRA as these species are considered representative of fish consumed by local residents and Indigenous people. Metal concentrations in these fish are assumed to be representative of the concentrations in other target fish species. Fish tissues considered for human consumption included liver, carcass and muscle as it was assumed that humans could consume the entire fish.

4.6.1.1 Gordon Region

Based on communication with local residents and Indigenous people, it was assumed that receptors did not harvest fish from Farley Lake (immediately downstream of the Project). Swede Lake is located immediately downstream of Farley Lake and formerly supported a commercial fishery, therefore it is possible that people may obtain a portion of their local fish from Swede Lake. Baseline Case metal concentrations in fish were based on 33 samples each of liver, carcass and muscle samples from large-bodied fish collected from Swede Lake in 2015 and 2016. Fish species included walleye (n=3), Lake whitefish (n=15) and Northern Pike (n=15). The average of the 95% UCLM concentrations of liver, carcass and muscle concentrations was adopted as the Baseline Case concentration for each metal in fish from Swede Lake. The Future Case concentrations for fish were estimated using the predictive concentrations from surface water modelling (for Swede lake). Uptake factors for surface water to fish for predicting Future Case concentrations were obtained from the Canadian Standards Association (CSA 1987), Davis et al. (1993), Lijzen et al. (2001), McGeer et al. (2003), Nussey et al. (1999), and the US EPA (2003c). Baseline Case and Future Case EPCs for metal COPC in large-bodied fish are provided in Table 4-23.

4.6.1.2 MacLellan Region

It was assumed that people in the MacLellan region obtain a portion of their local fish from Cockeram Lake. Baseline Case metal concentrations in fish were based on 29 samples each of liver, carcass and muscle tissue collected from Cockeram Lake in 2015 and 2016. Fish species included walleye n=1), Lake whitefish (n=13) and Northern Pike (n=15). The average of the 95% UCLM concentrations of liver, carcass and muscle concentrations was adopted as the Baseline Case concentration for each metal in fish tissue from Cockeram Lake. The Future Case concentrations for fish were estimated using the predictive concentrations from surface water modelling (for Cockeram Lake). Uptake factors for surface water to fish for predicting Future Case concentrations were obtained from the Canadian Standards Association (CSA 1987), Davis et al. (1993), Lijzen et al. (2001), McGeer et al. (2003), Nussey et al. (1999), and the US EPA (2003c). Baseline Case and Future Case EPCs for metal COPC in large-bodied fish are provided in Table 4-23.

Table 4-23 Exposure Point Concentrations in Large Bodied Fish for Human Consumption – Metals

COPC	Surface Water LAA for the Gordon Site		Surface Water LAA for the MacLellanSite	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	2.30E-02	4.76E-02	2.20E-02	2.79E-02
Arsenic	5.69E-02	1.40E-01	1.83E-02	2.58E-02
Barium	5.63E-01	9.22E-01	5.38E-01	5.60E-01
Beryllium	5.00E-03	5.32E-03	5.00E-03	5.04E-03
Cadmium	2.88E-02	3.00E-02	7.16E-02	7.83E-02
Chromium	1.70E-01	1.74E-01	8.00E-02	8.62E-02
Cobalt	5.13E-02	5.30E-02	8.74E-02	9.86E-02
Copper	5.55E+00	5.60E+00	7.33E+00	7.36E+00
Lead	5.80E-02	5.80E-02	2.00E-02	2.18E-02
Manganese	2.43E+00	3.30E+00	3.26E+00	3.50E+00
Mercury	3.98E-01	3.98E-01	3.61E-01	3.72E-01
Molybdenum	7.53E-02	1.05E-01	5.87E-02	8.53E-02
Nickel	7.33E-02	7.87E-02	2.96E-01	2.97E-01
Selenium	4.67E-01	7.62E-01	6.77E-01	7.15E-01
Silver	6.57E-02	6.71E-02	3.04E-02	3.13E-02
Strontium	2.31E+00	4.59E+00	3.53E+00	3.92E+00
Thallium	9.30E-03	9.89E-03	1.08E-02	1.09E-02
Uranium	3.20E-03	1.70E-02	1.57E-03	1.95E-03
Vanadium	1.34E-01	1.45E-01	1.06E-01	1.11E-01
Zinc	1.46E+02	1.46E+02	2.80E+01	2.80E+01

4.6.2 Fish for Ecological Receptors

Small-bodied fish such as spottail shiner and brook stickleback, and large-bodied fish such as northern pike, walleye, lake whitefish and yellow perch were collected for the ERA.

4.6.2.1 Gordon Region

For the ERA, Baseline Case metal concentrations in fish were based on 28 whole body samples from small-bodied fish and 63 muscle samples, 63 liver samples, and 63 carcass samples from large-bodied fish collected throughout the Surface Water LAA for the Gordon region in 2015 and 2016. Fish species include brook stickleback (n= 18), spottail shiner (n=8), yellow perch, (n=2) northern pike (n=45), walleye (n=3), and lake whitefish (n=15). The maximum of the 95% UCLM concentration for whole body, muscle, liver or carcass was considered as the representative baseline EPC for fish. The Future Case concentrations for fish were estimated using the predictive concentrations from surface water modelling. Uptake factors for surface water to fish for predicting Future Case concentrations were obtained from the Canadian Standards Association (CSA 1987), Davis et al. (1993), Lijzen et al. (2001), McGeer et al. (2003), Nussey et al. (1999), and the US EPA (2003c). Baseline and Future Case EPCs for metal COPC in fish consumed by ecological receptors are provided in Table 4-24.

4.6.2.2 MacLellan Region

For the ERA, Baseline Case metal concentrations in fish tissue were based on 39 whole body samples from small-bodied fish and 49 muscle samples, 49 liver samples and 49 carcass samples from large-bodied fish collected throughout the Surface Water LAA for the MacLellan region in 2015 and 2016. Fish species include brook stickleback (n= 30), spottail shiner (n=9), yellow perch, (n=2) northern pike (n=35), walleye (n=1), and lake whitefish (n=13).

The maximum of the 95% UCLM concentration for each metal COPC in the dataset was whole body, muscle, liver or carcass was considered as the representative baseline EPC for fish. The Future Case concentrations for fish were estimated using the predictive concentrations from surface water modelling. Uptake factors for surface water to fish for predicting Future Case concentrations were obtained from the Canadian Standards Association (CSA 1987), Davis et al. (1993), Lijzen et al. (2001), McGeer et al. (2003), Nussey et al. (1999), and the US EPA (2003a). Baseline and Future Case EPCs for metal COPC in fish are provided in Table 4-24.

Table 4-24 Exposure Point Concentrations in Fish for Ecological Receptors – Metals

COPC	Surface Water LAA for the Gordon Site		Surface Water LAA for the MacLellanSite	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	3.00E-02	1.03E-01	2.60E-02	4.88E-02
Arsenic	1.12E-01	2.23E-01	5.01E-02	1.13E-01
Barium	1.76E+00	2.91E+00	2.76E+00	3.12E+00
Beryllium	5.00E-03	5.70E-03	5.00E-03	5.14E-03
Cadmium	7.83E-02	9.04E-02	1.35E-01	2.48E-01
Chromium	2.70E-01	2.91E-01	1.40E-01	1.60E-01
Cobalt	1.34E-01	1.46E-01	1.18E-01	2.00E-01
Copper	1.62E+01	1.73E+01	2.02E+01	2.09E+01
Lead	1.34E-01	1.43E-01	1.85E-01	2.19E-01
Manganese	4.93E+00	5.64E+00	7.57E+00	8.39E+00
Mercury	5.03E-01	5.23E-01	4.26E-01	4.44E-01
Molybdenum	1.77E-01	3.99E-01	1.60E-01	3.34E-01
Nickel	4.20E-01	4.84E-01	4.01E-01	4.18E-01
Selenium	1.06E+00	1.64E+00	1.35E+00	1.62E+00
Silver	1.77E-01	1.95E-01	5.76E-02	6.29E-02
Strontium	7.92E+00	1.46E+01	1.10E+01	1.63E+01

Table 4-24 Exposure Point Concentrations in Fish for Ecological Receptors – Metals

COPC	Surface Water LAA for the Gordon Site		Surface Water LAA for the MacLellanSite	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Thallium	2.19E-02	2.54E-02	1.62E-02	1.65E-02
Uranium	4.80E-03	2.54E-02	2.70E-03	5.20E-03
Vanadium	3.03E-01	3.52E-01	2.04E-01	2.18E-01
Zinc	3.86E+02	3.88E+02	4.38E+01	4.40E+01

4.7 SEDIMENT

Sediment samples were collected from the Surface Water LAA for the Gordon site and for the MacLellan site. Sample locations are provided in Map 8, Appendix A.

4.7.1 Gordon Region

Baseline Case metal concentrations in sediment were based on the 48 samples and nine field duplicates collected from various waterbodies throughout the Surface Water LAA for the Gordon site in 2015 and 2016. The 95% UCLM concentration was adopted as the Baseline Case concentration for each metal throughout the Gordon region. Future Case concentrations of metal COPC in sediment were estimated based upon the predicted Future Case concentration in surface water from the various waterbodies with the Surface Water LAA for the Gordon Site and Equation 4-1 for estimating sediment concentrations from surface water concentrations. Where available, uptake factors for water-to-sediment were based on concentration ratios (CR) from Sheppard et al. (2010) which were adjusted to consider site-specific sediment characteristics (e.g., organic carbon and grain-size) and provide the quantity of the available and mineralized metal content in the sediment. For metals not covered by Sheppard et al. (2010), sediment-to-water partition coefficients were obtained from other sources as follows: mercury from CSA (2011 update).

Baseline Case and Future Case EPCs for metal COPC in sediment are provided in Table 4-25.

4.7.2 MacLellan Region

Baseline metal concentrations in sediment were based on the 51 samples and nine field duplicates collected from various waterbodies throughout the Surface Water LAA for the MacLellan site in 2015 and 2016. The 95% UCLM concentration was adopted as the Baseline Case concentration for each metal throughout the MacLellan region. Future Case concentrations of metal COPC in sediment were estimated based upon the predicted Future Case concentration in surface water from the various waterbodies with the Surface Water LAA for the MacLellan site and Equation 4-1 for estimating sediment concentrations from surface water concentrations. Where available, uptake factors for water-to-sediment were based on CR from Sheppard et al. (2010) which were adjusted to consider site-specific sediment characteristics (e.g., organic carbon and grain-size) and provide the quantity of the available and mineralized metal content in the sediment. For metals not covered by Sheppard et al. (2010), sediment-to-water partition coefficients were obtained from other sources as follows: mercury from CSA (2011 update).

Baseline Case and Future Case EPCs for metal COPC in sediment are provided in Table 4-25.

Table 4-25 Exposure Point Concentrations in Sediment – Metals

COPC	Surface Water LAA for the Gordon Site		Surface Water LAA for the MacLellanSite	
	Baseline Case (mg/kg)	Future Case (mg/kg)	Baseline Case (mg/kg)	Future Case (mg/kg)
Antimony	1.76E-01	1.76E-01	1.26E-01	1.82E-01
Arsenic	4.99E+00	5.30E+00	2.71E+00	2.92E+00
Barium	1.38E+02	1.38E+02	9.34E+01	9.45E+01
Beryllium	8.46E-01	8.62E-01	4.14E-01	4.20E-01
Cadmium	3.89E-01	3.89E-01	4.44E-01	4.49E-01
Chromium	4.37E+01	4.37E+01	1.00E+02	1.00E+02
Cobalt	1.03E+01	1.04E+01	3.95E+01	4.04E+01
Copper	2.03E+01	2.04E+01	1.32E+02	1.32E+02
Lead	8.73E+00	8.75E+00	7.39E+00	7.45E+00
Manganese	7.37E+02	7.71E+02	6.46E+02	6.58E+02
Mercury	8.32E-02	8.32E-02	6.50E-02	6.50E-02
Molybdenum	7.86E+00	8.04E+00	7.64E-01	7.95E-01
Nickel	3.11E+01	3.14E+01	3.33E+02	3.36E+02
Selenium	7.84E-01	7.84E-01	5.77E-01	5.77E-01
Silver	8.30E-02	8.33E-02	2.15E-01	2.15E-01
Strontium	3.11E+01	8.24E+01	3.47E+01	3.78E+01
Thallium	2.42E-01	2.66E-01	1.89E-01	1.92E-01
Uranium	3.25E+00	4.05E+00	1.65E+00	1.75E+00
Vanadium	4.51E+01	4.52E+01	2.67E+01	2.67E+01
Zinc	1.06E+02	1.06E+02	1.52E+02	1.52E+02

4.8 TERRESTRIAL INVERTEBRATES

Terrestrial invertebrates represent an important food source for small mammals and birds. Earthworms and slugs were the target of baseline sampling programs, but none were observed during collection periods from either the Gordon or MacLellan regions. However, the absence of these organisms from the collection program does not mean that they do not exist in the region. As such, concentrations of COPC in soil invertebrates for both Baseline Case and Future Case were estimated using the baseline and predicted future concentrations of COPC in soil along with Equation 4-1, which relates metal concentrations in biota to soil concentrations and published uptake factors (Sample et al. 1998a; US EPA 2007). Predicted Baseline and Future Case concentrations in terrestrial invertebrates are provided in Table 4-26.

Table 4-26 Exposure Point Concentrations in Soil Invertebrates – Metals

COPC	Gordon Region		MacLellan Region	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	1.94E-02	1.94E-02	2.40E-02	2.40E-02
Arsenic	4.10E-02	4.26E-02	5.34E-02	6.42E-02
Barium	7.06E-01	7.06E-01	5.42E-01	5.42E-01
Beryllium	2.15E-03	2.15E-03	9.22E-04	9.24E-04
Cadmium	5.87E-01	5.87E-01	5.76E-01	5.83E-01
Chromium	3.78E-01	3.80E-01	2.39E-01	2.51E-01
Cobalt	6.08E-02	6.10E-02	4.06E-02	4.15E-02
Copper	2.23E+00	2.23E+00	2.70E+00	2.70E+00
Lead	7.00E-01	7.01E-01	6.88E-01	6.99E-01
Manganese	1.12E+00	1.12E+00	7.22E-01	7.22E-01
Mercury	2.98E-02	2.98E-02	5.50E-02	5.50E-02
Molybdenum	1.25E+00	1.25E+00	1.11E-01	1.11E-01
Nickel	8.83E-01	8.89E-01	5.84E+00	5.89E+00
Selenium	3.94E-02	3.95E-02	1.50E-01	1.50E-01
Silver	5.17E-02	5.18E-02	6.87E-02	7.45E-02
Strontium	2.87E-01	2.87E-01	2.08E-01	2.08E-01
Thallium	1.37E-03	1.37E-03	9.78E-04	9.97E-04
Uranium	2.38E-03	2.38E-03	2.11E-03	2.13E-03
Vanadium	8.17E-02	8.20E-02	3.74E-02	3.81E-02
Zinc	4.83E+01	4.83E+01	5.83E+01	5.85E+01

4.9 AQUATIC PLANTS

Baseline sampling for the HHERA was conducted before information on the consumption of aquatic plants as available through the Indigenous and community engagement process. In the absence of local information, the HHERA relied on information contained in the First Nations Food, Nutrition & Environment Study (FNFNES) – Results from Manitoba 2010 (Chan et al. 2012) which did not identify aquatic plants as being consumed. As a result, baseline aquatic vegetation samples were not collected from the Surface Water LAA for the Gordon and Maclellan Sites. Therefore, concentrations of metal COPC in aquatic vegetation for all cases were estimated based upon the measured Baseline Case concentrations of metal COPC in the Surface Water LAA for the Gordon and MacLellan Site. Uptake to aquatic plants was modelled using the Baseline Case concentrations for surface water and Equation 4-1 relating chemical concentrations in vegetation to predicted surface water concentrations, partitioning coefficients, and published uptake factors from surface water-to-vegetation (Bechtel and Jacobs 1998; Sheppard and Evenden 1988; US EPA 2007). The Future Case concentrations for aquatic plants were estimated using the predictive concentrations from surface water modelling. Baseline and Future Case EPCs for metal COPC in aquatic plants are provided in **Table** 4-27.

Table 4-27 Exposure Point Concentrations in Aquatic Plants – Metals

COPC	Surface Water LAA for the Gordon Site		Surface Water LAA for the MacLellanSite	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	9.02E-04	2.48E-03	6.46E-04	9.31E-04
Arsenic	2.44E-02	2.58E-02	1.32E-02	1.43E-02
Barium	2.79E+00	3.06E+00	1.89E+00	1.92E+00
Beryllium	6.73E-02	6.82E-02	3.98E-02	4.02E-02
Cadmium	4.82E-02	4.83E-02	5.18E-02	5.21E-02
Chromium	2.33E-01	2.33E-01	5.34E-01	5.34E-01
Cobalt	1.01E-02	1.01E-02	3.85E-02	3.94E-02
Copper	8.31E-01	8.33E-01	1.74E+00	1.74E+00
Lead	1.16E-01	1.16E-01	1.06E-01	1.06E-01
Manganese	7.57E+00	7.92E+00	6.63E+00	6.76E+00
Mercury	1.24E-02	1.24E-02	1.09E-02	1.09E-02
Molybdenum	2.45E-01	2.51E-01	2.38E-02	2.48E-02
Nickel	1.84E-01	1.85E-01	1.08E+00	1.09E+00
Selenium	5.04E-02	5.05E-02	3.60E-02	3.60E-02
Silver	3.73E-04	3.75E-04	9.67E-04	9.69E-04
Strontium	1.61E+00	4.28E+00	1.80E+00	1.96E+00
Thallium	7.77E-05	8.54E-05	6.07E-05	6.17E-05
Uranium	8.52E-03	1.06E-02	1.91E-03	1.96E-03
Vanadium	2.84E-02	2.85E-02	1.68E-02	1.68E-02
Zinc	8.35E+00	8.35E+00	1.02E+01	1.02E+01

4.10 BENTHIC INVERTEBRATES

Baseline benthic invertebrates were not collected from the Surface Water LAA for the Gordon and MacLellan regions. The concentrations of metal COPC in benthic invertebrates for both Baseline and Future Case were estimated based upon the metal concentration in sediment under each case as well as the generalized equation for estimating benthic invertebrate tissue concentrations from sediment concentrations. Uptake factors for sediment to benthic invertebrates were obtained from Garn et al. (2001), Hamilton et al. (2002), Haus et al. (2007), ORNL (1998), and Welsh and Maughan (1994).The Baseline and Future Case EPCs of metal COPC in benthic invertebrates are provided in Table 4-28.

Table 4-28 Exposure Point Concentrations in Benthic Invertebrates – Metals

COPC	Surface Water LAA for the Gordon Site		Surface Water LAA for the MacLellanSite	
	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)	Baseline Case (mg/kg wet weight)	Future Case (mg/kg wet weight)
Antimony	1.27E-03	3.48E-03	9.07E-04	1.31E-03
Arsenic	1.72E+00	1.79E+00	1.08E+00	1.15E+00
Barium	1.88E+01	2.06E+01	1.28E+01	1.29E+01
Beryllium	1.12E-01	1.14E-01	5.47E-02	5.55E-02
Cadmium	5.70E-01	5.70E-01	6.24E-01	6.29E-01
Chromium	6.43E+00	6.43E+00	8.70E+00	8.70E+00
Cobalt	2.48E-02	2.49E-02	9.47E-02	9.69E-02
Copper	3.21E+01	3.22E+01	6.28E+01	6.29E+01
Lead	9.50E-01	9.52E-01	8.31E-01	8.37E-01
Manganese	1.12E+02	1.17E+02	9.79E+01	9.98E+01
Mercury	1.02E-02	1.02E-02	7.99E-03	7.99E-03
Molybdenum	4.10E+00	4.19E+00	3.98E-01	4.14E-01
Nickel	3.96E+00	3.98E+00	3.03E+01	3.07E+01
Selenium	4.91E-01	4.91E-01	3.61E-01	3.61E-01
Silver	6.47E-03	6.50E-03	1.68E-02	1.68E-02
Strontium	1.96E+00	5.20E+00	2.19E+00	2.38E+00
Thallium	4.79E-02	5.27E-02	3.74E-02	3.81E-02
Uranium	5.46E-02	6.81E-02	2.77E-02	2.94E-02
Vanadium	8.15E-01	8.17E-01	4.82E-01	4.82E-01
Zinc	1.66E+02	1.66E+02	1.79E+02	1.79E+02

4.11 WILD MEAT

Wild meat samples were not collected from the LAA. It is generally not considered ethical to sacrifice large mammals for an EA.

Baseline and Future Case metal concentrations in wild meat (moose, snowshoe hare, beaver, grouse and mallard) were modelled using generalized equations from the US EPA (2005a,b). The generalized equation used to calculate COPC concentrations in wild meat that will be consumed by humans is:

$$C_{meat} = \Big(\big(F_V \times Q_{V(meat)} \times P_V\big) + \big(F_S \times Q_{S(meat)} \times C_s\big) + \big(F_{Sed} \times Q_{Sed(meat)} \times C_{Sed}\big) + \big(F_{Food} \times Q_{Food(meat)} \times C_{Food}\big) + \big(F_W \times Q_{W(meat)} \times C_W\big)\Big) \times B_{a(meat)} \times MF$$

where:

C_{meat} = Concentration of COPC in meat tissue (mg/kg wet weight);

F_V = Fraction of vegetation from site (conservatively set at 100%; unitless), could be comprised of terrestrial vegetation (coniferous or decididuous), berries or aquatic vegetation.;

$Q_{V(meat)}$ = Quantity of vegetation (including terrestrial and/or aquatic vegetation) ingested by animal (kg dry weight/day);

P_V = Concentration of COPC in vegetation (mg/kg dry weight);

F_S = Fraction of soil from site (conservatively set at 100%; unitless);

$Q_{S(meat)}$ = Quantity of soil ingested by animal (kg dry weight/day);

C_S = Concentration of COPC in soil (mg/kg dry weight);

F_{Sed} = Fraction of sediment from site (conservatively set at 100%; unitless);

$Q_{Sed(meat)}$ = Quantity of sediment ingested by animal (kg dry weight/day);

C_{Sed} = Concentration of COPC in sediment (mg/kg dry weight);

F_{Food} = Fraction of food from site (conservatively set at 100%; unitless);

$Q_{Food(meat)}$ = Quantity of food ingested by animal (kg dry weight/day);

C_{Food} = Concentration of COPC in food (mg/kg dry weight);

F_W = Fraction of water from site (conservatively set at 100%; unitless);

$Q_{W(meat)}$ = Quantity of water ingested by animal (L/day);

C_W = Concentration of COPC in surface water (mg/L);

$B_{a(meat)}$ = COPC-specific bio-transfer factor for animal (day/kg wet weight); and

MF = Metabolic factor (set at 1.0; unitless).

The target hunting species were conservatively assumed to spend an entire lifetime within either the Gordon or MacLellan region and not range into other areas that would be subject to different (lesser) rates of deposition. As such, the fractions of soil, terrestrial vegetation, terrestrial invertebrates, surface water, aquatic plants, benthic invertebrates and sediment that the target species would consume within the Gordon and MacLellan regions have conservatively been set at 100%. It was also conservatively assumed that all metal COPC are 100% bioavailable and are not metabolized (i.e., metabolic factor of 1). The intake rates of soil, terrestrial vegetation, terrestrial invertebrates, surface water, aquatic plants, benthic invertebrates and sediment for the moose, snowshoe hare, beaver, spruce grouse and mallard were estimated using the animals' body weights and the equations provided in US EPA (2005a,b). The body weights of each species and the intake rates for each media are provided in the receptor profiles in Section 6.1.2 of the ERA.

Uptake factors from the primary literature and intake rates for predicting animal tissue concentrations are available for beef cattle. In accordance with US EPA (2005a,b) guidance, to predict the uptake of COPC into moose, snowshoe hare, beaver, spruce grouse and mallard, the beef uptake factor is adjusted based on the relative lipid content of these animals. The fat content of the moose, snowshoe hare and beaver were assumed to be 10%, and the fat content for the spruce grouse and mallard were assumed to be 14% (based on fat content of a chicken), in contrast to 19% for the beef cattle as per Shultz *et al.* (1994), Stephenson (2003), and Knott *et al.* (2005).

Concentrations of COPC in wild meat under baseline conditions were estimated using the equations and uptake factors described above, as well as the baseline concentrations for soil, terrestrial vegetation, terrestrial invertebrates, surface water, aquatic plants, benthic invertebrates and sediment. The concentrations under future conditions were estimated using the same equations and uptake factors and the predicted future concentrations in these media.

Baseline Case and Future Case EPCs for metal COPC in wild meat from the Gordon region and MacLellan regions are provided in Table 4-29 to Table 4-32.

Table 4-29 Baseline Exposure Point Concentrations in Wild Meat from the Gordon Region– Metals

COPC	Gordon Region				
	Baseline Case				
	Large Mammal (Moose) (mg/kg wet weight tissue)	Small Mammal (Snowshoe hare) (mg/kg wet weight tissue)	Aquatic Mammal (Beaver) (mg/kg wet weight tissue)	Terrestrial Bird (Spruce grouse) (mg/kg wet weight tissue)	Aquatic Bird (Mallard duck) (mg/kg wet weight tissue)
Antimony	5.76E-04	7.13E-06	4.83E-06	5.14E-06	1.16E-06
Arsenic	1.21E-03	1.31E-05	4.78E-05	7.46E-06	2.78E-04
Barium	6.96E-02	8.25E-04	5.87E-04	5.83E-04	3.56E-04
Beryllium	8.55E-04	5.51E-06	1.45E-05	3.60E-06	2.13E-05
Cadmium	3.23E-04	3.55E-06	2.88E-06	3.17E-06	7.26E-06
Chromium	3.10E-02	3.14E-04	1.15E-03	1.92E-04	3.22E-03
Cobalt	5.85E-02	7.75E-04	1.17E-03	4.90E-04	4.34E-04
Copper	4.11E-01	5.01E-03	4.73E-03	3.33E-03	2.59E-02
Lead	1.39E-03	1.82E-05	2.46E-05	1.20E-05	3.47E-05
Manganese	2.34E+00	2.83E-02	1.72E-02	2.02E-02	5.78E-03
Mercury	2.05E-03	2.09E-05	2.15E-05	1.57E-05	1.89E-05
Molybdenum	6.82E-02	7.96E-04	8.14E-04	5.82E-04	2.28E-03
Nickel	6.89E-02	7.78E-04	1.20E-03	5.69E-04	2.33E-03
Selenium	7.71E-03	8.56E-05	6.83E-05	6.15E-05	1.10E-04
Silver	1.87E-03	2.35E-05	1.44E-05	1.78E-05	5.40E-06
Strontium	3.84E-02	4.38E-04	3.64E-04	3.06E-04	1.65E-04

Table 4-29 Baseline Exposure Point Concentrations in Wild Meat from the Gordon Region– Metals

COPC	Gordon Region				
	Baseline Case				
	Large Mammal (Moose) (mg/kg wet weight tissue)	Small Mammal (Snowshoe hare) (mg/kg wet weight tissue)	Aquatic Mammal (Beaver) (mg/kg wet weight tissue)	Terrestrial Bird (Spruce grouse) (mg/kg wet weight tissue)	Aquatic Bird (Mallard duck) (mg/kg wet weight tissue)
Thallium	1.96E-02	2.50E-04	1.77E-04	1.71E-04	1.70E-04
Uranium	3.01E-05	3.82E-07	2.46E-06	1.67E-07	1.87E-06
Vanadium	1.15E-02	1.71E-04	4.91E-04	8.71E-05	3.41E-04
Zinc	3.78E-02	4.08E-04	3.55E-04	3.29E-04	1.33E-03

Table 4-30 Future Exposure Point Concentrations in Wild Meat from the Gordon Region– Metals

COPC	Gordon Region				
	Future Case				
	Large Mammal (mg/kg wet weight tissue)	Small Mammal (mg/kg wet weight tissue)	Aquatic Mammal (mg/kg wet weight tissue)	Terrestrial Bird (mg/kg wet weight tissue)	Aquatic Bird (mg/kg wet weight tissue)
Antimony	5.89E-04	7.15E-06	5.26E-06	5.15E-06	1.61E-06
Arsenic	1.28E-03	1.39E-05	5.12E-05	7.89E-06	2.91E-04
Barium	6.99E-02	8.25E-04	5.94E-04	5.83E-04	3.83E-04
Beryllium	8.62E-04	5.51E-06	1.47E-05	3.60E-06	2.16E-05
Cadmium	3.23E-04	3.55E-06	2.89E-06	3.17E-06	7.26E-06
Chromium	3.11E-02	3.15E-04	1.15E-03	1.93E-04	3.22E-03
Cobalt	5.87E-02	7.78E-04	1.18E-03	4.91E-04	4.36E-04
Copper	4.11E-01	5.01E-03	4.74E-03	3.33E-03	2.60E-02
Lead	1.39E-03	1.82E-05	2.46E-05	1.20E-05	3.47E-05
Manganese	2.34E+00	2.83E-02	1.72E-02	2.02E-02	5.97E-03
Mercury	2.05E-03	2.09E-05	2.15E-05	1.57E-05	1.89E-05
Molybdenum	6.84E-02	7.96E-04	8.24E-04	5.82E-04	2.33E-03
Nickel	6.93E-02	7.82E-04	1.21E-03	5.73E-04	2.34E-03
Selenium	7.72E-03	8.58E-05	6.84E-05	6.16E-05	1.10E-04
Silver	1.87E-03	2.36E-05	1.44E-05	1.78E-05	5.41E-06
Strontium	4.41E-02	4.39E-04	5.36E-04	3.07E-04	3.97E-04
Thallium	1.96E-02	2.50E-04	1.80E-04	1.71E-04	1.86E-04
Uranium	3.31E-05	3.85E-07	3.03E-06	1.68E-07	2.32E-06

Table 4-30 Future Exposure Point Concentrations in Wild Meat from the Gordon Region– Metals

COPC	Gordon Region				
	Future Case				
	Large Mammal (mg/kg wet weight tissue)	Small Mammal (mg/kg wet weight tissue)	Aquatic Mammal (mg/kg wet weight tissue)	Terrestrial Bird (mg/kg wet weight tissue)	Aquatic Bird (mg/kg wet weight tissue)
Vanadium	1.16E-02	1.72E-04	4.93E-04	8.74E-05	3.41E-04
Zinc	3.79E-02	4.08E-04	3.56E-04	3.29E-04	1.33E-03

Table 4-31 Baseline Exposure Point Concentrations in Wild Meat from the MacLellan Region – Metals

COPC	MacLellan Region				
	Baseline Case				
	Large Mammal (mg/kg wet weight tissue)	Small Mammal (mg/kg wet weight tissue)	Aquatic Mammal (mg/kg wet weight tissue)	Terrestrial Bird (mg/kg wet weight tissue)	Aquatic Bird (mg/kg wetweight tissue)
Antimony	5.76E-04	7.21E-06	4.68E-06	5.21E-06	1.09E-06
Arsenic	9.97E-04	1.49E-05	3.17E-05	7.75E-06	1.74E-04
Barium	6.59E-02	7.89E-04	5.26E-04	5.59E-04	2.54E-04
Beryllium	7.20E-04	5.79E-06	9.72E-06	4.00E-06	1.17E-05
Cadmium	2.22E-04	2.28E-06	2.25E-06	2.25E-06	7.74E-06
Chromium	4.33E-02	2.52E-04	2.32E-03	1.60E-04	4.87E-03
Cobalt	6.52E-02	6.77E-04	3.08E-03	4.41E-04	1.48E-03
Copper	4.88E-01	5.78E-03	1.02E-02	3.43E-03	5.19E-02
Lead	7.70E-04	1.08E-05	1.87E-05	6.80E-06	3.05E-05
Manganese	2.25E+00	2.71E-02	1.63E-02	1.94E-02	5.19E-03
Mercury	1.60E-03	1.69E-05	1.83E-05	1.36E-05	1.81E-05
Molybdenum	6.28E-03	7.24E-05	7.65E-05	5.29E-05	2.20E-04
Nickel	4.09E-01	4.51E-03	1.00E-02	3.31E-03	1.82E-02
Selenium	6.87E-03	8.09E-05	6.10E-05	5.86E-05	8.51E-05
Silver	1.71E-03	2.16E-05	1.49E-05	1.67E-05	9.16E-06
Strontium	8.36E-02	9.82E-04	6.57E-04	6.99E-04	2.10E-04
Thallium	2.39E-02	2.99E-04	1.96E-04	2.08E-04	1.39E-04
Uranium	2.31E-05	3.40E-07	1.44E-06	1.49E-07	9.83E-07
Vanadium	8.89E-03	1.19E-04	2.98E-04	6.90E-05	2.02E-04
Zinc	4.87E-02	5.32E-04	4.61E-04	4.23E-04	1.47E-03

Table 4-32 Future Exposure Point Concentrations in Wild Meat from the MacLellan Region – Metals

COPC	Maclellan Region				
	Future Case				
	Large Mammal (mg/kg wet weight tissue)	Small Mammal (mg/kg wet weight tissue)	Aquatic Mammal (mg/kg wet weight tissue)	Terrestrial Bird (mg/kg wet weight tissue)	Aquatic Bird (mg/kg wet weight tissue)
Antimony	5.79E-04	7.22E-06	4.97E-06	5.21E-06	1.25E-06
Arsenic	1.25E-03	1.93E-05	3.70E-05	9.97E-06	1.85E-04
Barium	6.60E-02	7.89E-04	5.27E-04	5.59E-04	2.56E-04
Beryllium	7.24E-04	5.81E-06	9.80E-06	4.01E-06	1.19E-05
Cadmium	2.23E-04	2.30E-06	2.27E-06	2.27E-06	7.80E-06
Chromium	4.42E-02	2.65E-04	2.33E-03	1.69E-04	4.87E-03
Cobalt	6.66E-02	6.91E-04	3.15E-03	4.51E-04	1.52E-03
Copper	4.89E-01	5.79E-03	1.02E-02	3.43E-03	5.19E-02
Lead	7.79E-04	1.10E-05	1.90E-05	6.90E-06	3.07E-05
Manganese	2.25E+00	2.71E-02	1.64E-02	1.94E-02	5.26E-03
Mercury	1.60E-03	1.69E-05	1.83E-05	1.36E-05	1.81E-05
Molybdenum	6.34E-03	7.26E-05	7.85E-05	5.30E-05	2.29E-04
Nickel	4.12E-01	4.54E-03	1.01E-02	3.33E-03	1.84E-02
Selenium	6.89E-03	8.12E-05	6.12E-05	5.88E-05	8.51E-05
Silver	1.73E-03	2.19E-05	1.51E-05	1.69E-05	9.23E-06
Strontium	8.40E-02	9.83E-04	6.68E-04	6.99E-04	2.24E-04
Thallium	2.44E-02	3.05E-04	2.00E-04	2.12E-04	1.41E-04
Uranium	2.36E-05	3.42E-07	1.45E-06	1.50E-07	1.04E-06
Vanadium	9.04E-03	1.21E-04	3.00E-04	7.03E-05	2.02E-04
Zinc	4.90E-02	5.36E-04	4.63E-04	4.25E-04	1.47E-03

4.12 SUMMARY OF APPROACHES USED TO ESTIMATE EXPOSURE POINT CONCENTRATIONS

A summary of the approaches used to estimate exposure point concentrations for each media are provided in Table 4-33.

Table 4-33 Summary of Approaches used to Estimate Exposure Point Concentrations

Media	Sample Information	Approach Used to Estimate Baseline Case Concentrations	Approach Used for Future Case Concentrations
Air	Baseline Case concentrations of SO_2 and NO_2 were based on actual 2018 ambient air quality monitoring results from the NAPS station in Fort Smith, NWT (the 90th percentile of hourly measurements). Fort Smith is also a remote location like Lynn Lake and located approximately 700 km to the northwest of the LAA. Baseline Case concentrations for $PM_{2.5}$ and dustfall were based on the average concentrations of samples collected as part of the LLGP baseline ambient air quality monitoring program between June 18, 2016 and October 9, 2016.	90th Percentile of hourly measured concentrations of NO_2 and SO_2 at Fortsmith, NWT. Average of measured concentrations of $PM_{2.5}$ and dustfall at LLGP.	Future Case EPCs of CACs (SO_2, NO_2, $PM_{2.5}$) were based on maximum predicted CAC concentrations derived using air dispersion modelling for receptor locations in the Gordon region, MacLellan region and at a single receptor location in work camp. Future Case EPCs of non-metal COPC such as DPM, HCN, VOC, PAHs and Metals in air were based on maximum predicted emissions of COPC at each receptor location during project operations. Since baseline concentrations were not measured for DPM, HCN, VOC, PAHs and metals, the predicted concentrations of COPC for Project Alone Case (project operations) were considered as Future Case concentrations when calculating non-carcinogenic risks for human receptors in Section 5.4.3.
Soil	A total of 33 samples (30 samples and 3 field duplicates) were collected in the Gordon region. A total of 26 samples (23 samples + 3 field duplicates) were collected in the MacLellan region.	95th UCLM	Predicted based on the 95% UCLM Baseline Case concentration in soil for each region and the 95% UCLM deposition rate for each region.
Terrestrial Plants	A total of 132 vegetation samples (119 samples + 13 field duplicates) were collected in the Gordon LAA. A total of 104 samples (95 samples + 9 field duplicates) were collected in the MacLellan LAA. Vegetation samples consisted of traditional plants (i.e., berries and Labrador tea), browse (includes both coniferous and deciduous vegetation) and garden produce.	95th UCLM for each type of vegetation	Predicted using uptake equations (soil to vegetation), Baseline Case vegetation concentrations and Future Case concentrations in soil.
Small Mammals	A total of six specimens were collected in Gordon region. A total of six specimens were collected in the MacLellan region.	Maximum	Predicted using uptake equations and Future Case soil concentrations.
Surface water	Baseline and Future Case concentrations were modelled. The water model was calibrated using the conentraitons from the Gordon region and the MacLellan region.	Modelled (obtained from Surface Water Assessment)	Modelled using the maximum 12-month running average surface water concentrations. Baseline Case and Future Case concentrations in Swede Lake and Cockeram Lake were used to estimate changes in fish tissue concentrations. Whle Future Case concentrations in surface water from the Surface Water LAA for the Gordon site and the MacLellan site were used to predict concentrations in wild meat and for the ERA.

Table 4-33 Summary of Approaches used to Estimate Exposure Point Concentrations

Media	Sample Information	Approach Used to Estimate Baseline Case Concentrations	Approach Used for Future Case Concentrations
Fish Tissue	A total of 28 whole body samples from small-bodied fish and 189 liver, muscle and carcass samples from large-bodied fish were collected in the Gordon region. A total of 39 whole body samples from small-bodied fish and 147 liver, muscle and carcass samples from large-bodied fish were collected in the MacLellan region.	Average of the 95th UCLM of the liver, flesh and carcass samples	Predicted using uptake equations (surface water to fish tissue) and Future Case surface water concentration.
Sediment	A total of 48 samples and 9 field duplicates were collected from waterbodies in the Gordon region. A total of 51 samples and nine field duplicates were collected from the MacLellan region.	95th UCLM	Predicted using uptake equations Future Case concentrations in surface water.
Terresrial Invertebrates	Concentrations of metal COPC in soil invertebrates for all cases were estimated using uptake equations and soil concentrations.	Modelled based on soil concentrations.	Predicted using uptake equations and Future Case soil concentrations.
Aquatic Plants	Concentrations of metal COPC in aquatic vegetation for all cases were estimated based upon the use of uptake equations (water to aquatic plant) and surface water concentrations.	Predicted based on Baseline Case surface water concentrations.	Predicted using uptake equations and Future Case surface water concentrations.
Benthic Invertebrates	Concentrations of metal COPC in benthic invertebrates for both the Baseline and Future cases were estimated using uptake equations (sediment to benthic invertebrate) and the sediment concentration.	Predicted based on sediment concentrations.	Predicted based on Future Case sediment concentrations.
Wild Meat	Samples of wild meat were not collected from the LAA. Therefore Baseline Case and Future Case concentrations in wild meat were predicted using uptake equations.	Predicted using uptake equations Baseline Case concentrations in soil, surface water, vegetation and food (i.e, soil invertebrates and benthic invertebrates).	Predicted using uptake equations and Future Case concentrations in soil, surface water, vegetation and food.

5.0 HUMAN HEALTH RISK ASSESSMENT

A human health risk assessment is a scientific study that estimates the nature and magnitude of potential adverse health risks in humans following exposure to Project-related chemical emissions. This HHRA assessed interactions between measured or predicted concentrations of COPC in environmental media (i.e., air, soil, water, air, and food items) that may occur due to Project-related emissions, and the potential for these interactions to result in adverse health risks to human receptors exposed to these media.

5.1 PROBLEM FORMULATION

Problem formulation is the first major component of a HHRA and is intended to define key issues that will be further evaluated in a risk assessment. Problem formulation includes the identification of relevant receptors of concern and their characteristics, COPC and exposure pathways that potentially connect the receptors to relevant contaminated environmental media. As the relevant COPC have been identified elsewhere (Section 3.4), the key tasks of the problem formulation step include the following:

- Receptor Identification and Characterization: Identification of the "receptors of concern" which includes the people with the greatest probability of exposure to the COPC and/or those that have the greatest potential sensitivity to the COPC.

- Exposure Pathway Identification: Identification of the means by which COPC move through the environment from a source to a point of contact with people; these exposure pathways are then used to develop the conceptual site model (CSM).

5.1.1 Human Receptors Characterization

Three representative human receptors are evaluated. The Indigenous Receptor and Residential Receptor are assumed to be present in each region, while the Off-Duty Worker Receptor is assumed to be present only at the work camp.

- **Indigenous Receptors** – Includes Indigenous people who may live in either region, but who are assumed to consume higher levels of country foods, harvested from within their region, compared to the Residential Receptors. They are assumed to spend 100% of their time in one of the two regions. This would also apply to Indigenous people who regularly come to the area to harvest food but do not live in either region.

- **Residential Receptors** – Includes non-Indigenous residents who may live in one of the two regions. Residents are assumed to spend 100% of their time in one of the two regions. Residential receptors are assumed to consume less country foods than the Indigenous Receptor.

- **Off-Duty Worker Receptors** – Includes Off-Duty Workers present in the permanent work camp at the MacLellan site. This receptor is only evaluated for inhalation exposures, as ingestion exposures are assumed to be comparable to those of the general population because this receptor will not consume country foods, backyard foods or untreated water from the LAA.

Other receptors such as visitors to the LAA are expected to have lower exposures than these receptor groups.

5.1.1.1 General Receptor Assumptions

The following assumptions apply to both the Indigenous Receptors and Residential Receptors:

- Human receptors were assumed to spend 100% of their time within their particular region and no distinction was made between time spent indoors and time spent outdoors. This means that the COPC concentrations in air predicted for each residential receptor location were assumed to be the same indoors and outdoors. This approach assumes that inhalation exposures to COPC happens on a 24-hour per day basis and is not limited to the time a person spends outdoors.

- Human receptors were assumed to be exposed to the EPCs calculated for the appropriate exposure averaging period (e.g. 1-hour, 24-hour, annual average etc.) for each COPC predicted in their region (i.e., Gordon region and MacLellan region).

- The air quality modelling provided dust depostion estimates for each of the 45 recpetor locations in the Gordon region and the 114 receptor locations in the MacLellan region. The deposition estimates for the 45 receptor locations in the Gordon region were used to calulate a 95%UCLM dust depostion estimate for the Gordon region. The deposition estimates for the 114 receptor locaitons in the MacLellan region that outside the PDA, were used to calculate the 95% UCLM dust deposition estimate for the MacLellan region. The 95% UCLM deposition rate for a region was used to estimate dust deposition across that entire region. The approach provides reasonable upper estimates of the potential increases in metal concentrations in soil and therefore, the potential increases in exposures to COPC in soil.

- Human receptors were assumed to potentially obtain drinking water from surface water in their particular region.
- Receptors in a given region were assumed to obtain 100% of wild meat, berries and traditional plants from their region.
- Receptors were assumed to obtain 10% of the fish they consume on a yearly basis from Swede Lake (for Gordon region receptors) or Cockeram Lake (for MacLellan region receptors). This is considered conservative, as information gathered through community and Indigenous engagement suggests that people obtain fish from lakes across the Gordon and MacLellan regions. Thus, assuming that 10% of the fish consumed in a year is harvested from the lakes immediately downstream from the Project will likely over estimated.
- It was assumed that receptors would consume fish muscle (i.e., fillet), fish liver, and fish carcass from their particular region.
- Receptors were assumed to consume backyard garden produce, and it was further assumed that the consumption of backyard garden produce accounted for 10% of the yearly combined intake of root vegetables and other vegetables identified by Health Canada (2012). The assumption that 10% of vegetables are obtained from backyard gardens is consistent with CCME (2006) for residential land use which determined the quantity of produce that could reasonably be produced from a typical

backyard garden in a given growing season. Based on these results, the CCME concluded that backyard produce could account for up to 10% of the total yearly intake of produce.

5.1.1.2 Specific Assumption for the Indigenous Receptors

The following specific assumption applies to Indigenous Receptors:

- The country food consumption rates for the Indigenous Receptor were based on the 95th percentile grams of traditional food per day reported in the First Nations Food, Nutrition & Environment Study (FNFNES) – Results from Manitoba 2010 (Chan et al. 2012).

Ingestion related assumptions for the Indigenous Receptor are summarized in Table 5-1.

5.1.1.3 Specific Assumption for the Residential Receptors

The following specific assumption applies to the Residential Receptors:

- The country food consumption rates for the Residential Receptor were based on the mean grams of traditional food per day reported in Chan et al. (2012).

Ingestion related assumptions for the Indigenous Receptor are summarized in Table 5-1.

5.1.1.4 Specific Assumptions for the Off-Duty Worker Receptor

The following specific assumptions applies to the Off-Duty Worker Receptor:

- Off-Duty Workers are assumed to be present in the camp for 24 hours per day on a 14-days on/14-days off rotation schedule for a total of 26 weeks per year.
- Off-Duty Workers do not consume country foods or untreated water from the LAA.

Table 5-1 Receptor Parameters used in the HHRA

Parameter	Units	Infant	Toddler	Child	Teen	Adult	Reference/Explanation
General Receptor Characteristics – applies to all receptor groups							
Age Range	-	0-6 m	7 m - 4 yrs	5 - 11 yrs	12-19 yrs	>20yrs	Health Canada, 2012
Years within an Age Group	years	0.5	4.5	7	8	60	Health Canada, 2012
Body Weight	kg	8.2	16.5	32.9	59.7	70.7	Health Canada, 2012
Soil Ingestion Rate	g/day	0.02	0.08	0.02	0.02	0.02	Health Canada, 2012
Drinking Water Consumption	L/day	0.3	0.6	0.8	1	1.5	Health Canada, 2012
Skin Surface Area – applies to all receptor groups							
Hands	cm^2	320	430	590	800	890	Health Canada, 2012
Upper & Lower Arms	cm^2	550	890	1480	2230	2500	Health Canada, 2012
Upper & Lower Legs	cm^2	910	1690	3070	4970	5720	Health Canada, 2012
Total	cm^2	1780	3010	5140	8000	9110	Health Canada, 2012
Soil Loading to Skin							
Hands	g/cm^2	1.0E-04	1.0E-04	1.0E-04	1.0E-04	1.0E-04	Health Canada, 2012
Other Surfaces	g/cm^2	1.0E-05	1.0E-05	1.0E-05	1.0E-05	1.0E-05	Health Canada, 2012
Averaged Loading	g/cm^2	2.6E-05	2.3E-05	2.0E-05	1.9E-05	1.9E-05	Calculated as weighted average loading.
Residential Receptors							
Food Ingestion Rates							
Local Wild Meat-Large Mammal	g/day	0.00E+00	5.43E+00	7.98E+00	1.12E+01	1.72E+01	The intake rate for the adult was selected from Chan et al. (2012) for average intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for wild meat for the age group provided by Health Canada (2012) and the intake rate for the adult provided by Health Canada (2012). Residential receptors were assumed to obtain 100% of their wild meat from their respective region.
Local Wild Meat-Small Mammal	g/day	0.00E+00	2.83E-01	4.17E-01	5.83E-01	9.00E-01	

Table 5-1 Receptor Parameters used in the HHRA

Parameter	Units	Infant	Toddler	Child	Teen	Adult	Reference/Explanation
Local Wild Meat-Aquatic Mammals	g/day	0.00E+00	1.42E-01	2.08E-01	2.92E-01	4.50E-01	
Local Wild Meat-Aquatic Birds	g/day	0.00E+00	1.96E+00	2.88E+00	4.04E+00	6.23E+00	
Local Wild Meat-Terrestrial Birds	g/day	0.00E+00	2.27E-01	3.33E-01	4.67E-01	7.20E-01	
Local Fish	g/day	0.00E+00	4.03E-01	7.22E-01	8.49E-01	9.34E-01	The intake rate for the adult was selected from Chan et al. (2012) for average intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for fish for the age group provided by Health Canada (2004) and the intake rate for the adult provided by Health Canada (2004). Receptors are assumed to obtain 10% of there fish intake from local sources. This is considered conservative, as information gathered through community and Indigenous engagement suggests that people obtain fish from lakes across the Gordon and MacLellan regions. Thus, assuming that 10% of the fish consumed in a year is harvested from the lakes immediately downstream from the Project will likely over estimated.
Traditional Plant Intake-Berries	g/day	3.50E+00	3.88E+00	5.84E+00	7.83E+00	7.33E+00	The intake rate for the adult was selected from Chan et al. (2012) for average intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for vegetation (sum of root vegetables and other vegetables) for the age group provided by Health Canada (2012) and the intake rate for the adult provided by Health Canada (2012). Receptors

Table 5-1 Receptor Parameters used in the HHRA

Parameter	Units	Infant	Toddler	Child	Teen	Adult	Reference/Explanation
							were assumed to obtain 100% of their intake of berries from their respective region.
Traditional Plant Intake- Other	g/day	1.19E+00	1.32E+00	1.98E+00	2.66E+00	2.49E+00	The intake rate for the adult was selected from Chan et al. (2012) for average intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for vegetation (sum of root vegetables and other vegetables) for the age group provided by Health Canada (2012) and the intake rate for the adult provided by Health Canada (2012). Receptors were assumed to obtain 100% of their intake of traditional plants from their respective region.
Backyard Produce	g/day	1.55E+01	1.72E+01	2.59E+01	3.47E+01	3.25E+01	The intake rate was based on the sum of the root vegetables and other vegeatbles for each age group provided in Health Canada (2012). Receptors were assumed to obtain 10% of their total intake of vegetables from backyard gardens.
Indigenous Receptor							
Local Wild Meat- Large Mammal	g/day	0.00E+00	1.80E+01	2.65E+01	3.71E+01	5.73E+01	The intake rate for the adult was selected from Chan et al. (2012) for high consumption intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for wild meat for the age group provided by Health Canada (2012) and the intake rate for the adult provided by Health Canada (2012). Receptors were assumed to obtain 100% of their intake of traditional plants from their respective region.
Local Wild Meat- Small Mammal	g/day	0.00E+00	1.56E+00	2.30E+00	3.21E+00	4.96E+00	
Local Wild Meat- Aquatic Mammals		0.00E+00	5.76E-01	8.47E-01	1.19E+00	1.83E+00	
Local Wild Meat- Aquatic Birds	g/day	0.00E+00	1.04E+01	1.52E+01	2.13E+01	3.29E+01	
Local Wild Meat- Terrestrial Birds	g/day	0.00E+00	6.11E-01	8.98E-01	1.26E+00	1.94E+00	

Table 5-1 Receptor Parameters used in the HHRA

Parameter	Units	Infant	Toddler	Child	Teen	Adult	Reference/Explanation
Local Fish	g/day	0.00E+00	1.57E+00	2.81E+00	3.30E+00	3.63E+00	The intake rate for the adult was selected from Chan et al. (2012) for high consumption intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for fish for the age group provided by Health Canada (2004) and the intake rate for the adult provided by Health Canada (2004). Receptors are assumed to obtain 10% of there fish intake from local sources. This is conservative based on discussions with residents who indicated they typically do not obtain fish from waterbodies in the Gordon region or the MacLellan region.
Traditional Plant Intake-Berries	g/day	1.46E+01	1.62E+01	2.44E+01	3.27E+01	3.06E+01	The intake rate for the adult was selected from Chan et al. (2012) for high consumption intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for vegetation (sum of root vegetables and other vegetables) for the age group provided by Health Canada (2012) and the intake rate for the adult provided by Health Canada (2012). Receptors were assumed to obtain 100% of their intake of berries from their respective region.
Traditional Plant Intake- Other	g/day	4.28E+00	4.75E+00	7.15E+00	9.58E+00	8.97E+00	The intake rate for the adult was selected from Chan et al. (2012) for high consumption intake. The intake rates for the remaining age groups were calculated by adjusting the intake rate for the adult from Chan et al. (2012) by the ratio of the intake rate for vegetation (sum of root vegetables and other vegetables) for the age group provided by Health Canada (2012) and the intake rate for the adult provided by Health Canada (2012). Receptors were assumed to obtain 100% of their intake of traditional plants from their respective region.
Backyard Produce	g/day	1.55E+01	1.72E+01	2.59E+01	3.47E+01	3.25E+01	The intake rate was based on the sum of the root vegetables and other vegeatbles for each age group provided in Health Canada (2012). Receptors were assumed to obtain 10% of their total intake of vegetables from backyard gardens.

NOTE:
[A] Soil ingestion rate includes incidental ingestion of both soil and indoor dust. The concentrations in soil and indoor dust were assumed to be equivalent for risk estimates.

5.1.1.5 Human Receptor Locations

Receptors were assumed to be present in either the Gordon region or the and MacLellan region (Map 1, Appendix A). The exposures for human receptors in each region are evaluated separately because changes to the environment are different between the two regions. Water-related exposures for receptors in the Gordon region are based on exposure to water or aquatic species from the Surface Water LAA for the Gordon site (boundaries provided on Map 1, Appendix A). Water-related exposures for receptors in the MacLellan region are based on exposure to water or aquatic species from the Surface Water LAA for the MacLellan site (boundaries provided on Map 1, Appendix A).

Specific receptor locations selected for air modelling and deposition were selected to represent places where people are likely to be present and could be exposed to emissions from the Project. The selection of receptor locations was based on considerations of land use and on input from local communities. Locations included residential developments, commercial and institutional buildings, hunting and/or fishing camps, and potential indigenous use locations. The locations of potential indigenous receptors were informed by Alamos' engagement with Indigenous communities and publicly available sources traditional land use information. Due to the length of time required to conduct air quality modeling Indigenous receptors were selected early in the assessment process and represent potential receptor locations rather than individual use sites.

5.1.2 Ingestion of Surface Water Pathway- Humans

On occasion, humans could ingest water directly from the lakes located in their particular region; however, based on information gathered through engagement, which indicate that people do not obtain drinking water directly from the lakes in either region, these occurrences are expected to be infrequent. The exceptions are West Lynn Lake, which is the water supply for the town of Lynn Lake. West Lynn Lake is not expected to be affected by the Project, and Hughes Lake, which is used as a source of water for the Black Sturgeon reserve, but it is located outside of the Surface Water LAA for the Gordon site and the water passes through a water treatment system prior to distribution to the community. The average of the predicted Future Case concentrations of metals in lakes in the Gordon region and the MacLellan region were compared to Canadian drinking water guidelines (Table 5-2). Preference was given to guidelines from Health Canada (2019b); in the absence of Health Canada guidelines, guidelines from other jurisdications (e.g., Ontario) were selected. Future Case concentrations of metals in the applicable lakes in the Gordon region and the MacLellan region were less than the apllicable guidelines, suggesting that even if the water were used for consumption, health risks related to metal exposures would be negligible. Health Canada guidance notes that where multiple pathways of epxosure are being evaluated, epxosure to contaminants in drinking and recreational water should be included in the multi-media assessment (Health Canada 2016a). However, the drinking water supplies for the Town of Lynn Lake and Black Sturgeon Reserve will not be affected by Project activities, meaning that the potential human health risks associated with the presence of metals in the drinking water supplies for these communities will not change between Baseline Case and Future Case conditions. In addition, the assessment of potential health risks associated with ingestion and dermal contact exposures, uses a risk acceptability benchmark of 0.2 rather than 1.0, which is consistent with

Health Canada guidance (2019a) when exposures not affected by Project activities are not included in the assessment. Therefore, the ingestion of surface water pathway by humans was not assessed further.

Table 5-2 Screening of Surface Water Against Drinking Water Guidelines

Chemical	Drinking Water Quality Guideline	Gordon Surface Water LAA- Future Case	MacLellan Surface Water LAA- Future Case
	mg/L	mg/L	mg/L
Antimony	6.0E-03[a]	3.63E-04	1.61E-04
Arsenic	1.0E-02[a]	5.84E-04	6.02E-04
Barium	1E+00[a]	3.41E-02	9.79E-03
Beryllium	4E-03[b]	5.38E-05	8.89E-05
Cadmium	5.00E-03[a]	2.84E-06	1.16E-05
Chromium	5E-02[a]	9.31E-05	2.03E-04
Cobalt	3E-03[b]	5.22E-05	3.26E-04
Copper	2E-03[a]	2.53E-04	1.21E-03
Lead	5E-03[a]	3.89E-05	7.54E-05
Manganese	1.2E-01[a]	6.69E-02	5.10E-02
Mercury	1.0E-03[a]	7.59E-07	1.48E-06
Molybdenum	7E-02[b]	7.22E-04	2.12E-04
Nickel	1E-01[b]	2.11E-04	9.62E-03
Selenium	5.0E-02	4.55E-05	5.87E-05
Silver	1.0E-02[b]	3.93E-06	5.50E-06
Strontium	7E+00[a]	1.75E-01	2.38E-02
Thallium	2E-03[b]	2.31E-05	3.58E-05
Uranium	2.0E-02[b]	2.76E-04	9.48E-05
Vanadium	6.2E-03[b]	1.31E-04	2.06E-04
Zinc	5E+00[a]	8.56E-04	3.86E-03

NOTES:
[a]Guidelines for Canadian Drinking Water Quality (Health Canada, 2019b)
[b] MECP GW-1 component value for groundwater ingestion (MOE, 2011).

5.1.3 Direct Contact with Sediment-Humans

There are no human health sediment quality guidelines; however, based on Health Canada (2017c), in the absence of guidelines, concentrations in sediment can be comapred to soil quality guidelines protective of human health. With the exception of cobalt from the MacLellan region, vanadium from the Gordon region, and manganese and nickel from the Gordon and MacLellan regions, Baseline Case and Future Case concentrations of metals in sediment are below the applicable soil quality guidelines for protection of human health (Table 5-3). Baseline Case concentrations of the identified metals in sediment exceed the applicable guidelines and the Project-related increases in sediment concentrations from the two regions are predicted to be less than 5%. Humans could come in direct contact with sediment; however, risks related to sediment contact are considered minor. In addiiton, there are no public beaches or areas of shoreline where high intensity activities occur were identified in the Gordon or MacLellan regions and locations where humans could be exposed to sediment are remote and exposure would be infrequent. Overall this supports the conclusion that risks related to direct contact with sediment are minor and were therefore not assessed further.

Table 5-3 Screening of Sediment Against Soil Quality Guidelines

Chemical	Soil Quality Guideline for Human Direct Contact-Residential	Sediment from Gordon Region – Future Case	Sediment from MacLellan Region- Future Case
	mg/kg	mg/kg	mg/kg
Antimony	7.5[a]	1.76E-01	1.82E-01
Arsenic	12[b]	5.30E+00	2.92E+00
Barium	6800[b]	1.38E+02	9.45E+01
Beryllium	75[b]	8.62E-01	4.20E-01
Cadmium	14[b]	3.89E-01	4.49E-01
Chromium	220[b]	4.37E+01	1.00E+02
Cobalt	22[a]	1.04E+01	4.04E+01
Copper	1100[b]	2.04E+01	1.32E+02
Lead	140[b]	8.75E+00	7.45E+00
Manganese	360[c]	7.71E+02	6.58E+02
Mercury	6.6[b]	8.32E-02	6.50E-02
Molybdenum	110[a]	8.04E+00	7.95E-01
Nickel	200[b]	3.14E+01	3.36E+02
Selenium	80[b]	7.84E-01	5.77E-01
Silver	77[a]	8.33E-02	2.15E-01
Strontium	9400[c]	8.24E+01	3.78E+01
Thallium	1[b]	2.66E-01	1.92E-01
Uranium	23[b]	4.05E+00	1.75E+00
Vanadium	39[a]	4.52E+01	2.67E+01
Zinc	10000[b]	1.06E+02	1.52E+02

NOTES:

[a] MOE (2011) S1 soil quality guideline for protection of humans due to direct contact with soil.

[b] CCME soil quality guidelines for protection of human health - Residential Land use.

[C] USEPA (2019) Regional Screening Level Residential Soil Table. Non-cancer SL for a child based on an HQ of 0.2.

5.1.4 Exposure Pathway Screening and Conceptual Site Model

The exposure pathway screening and development of the CSM provide the exposure pathways by which people might be exposed to COPC. In the exposure assessment, the likelihood that human receptors may come into contact with a COPC was evaluated by examining the potential pathway for the movement of a COPC from its source to the eventual point of intake (exposure) by the receptor. For the HHRA, the potential exposure media for human receptors and a pathway-specific rationale for inclusion or exclusion from the HHRA are shown in Figure 5-1. The rationale for the inclusion of each pathway in the HHRA is provided in Table 5-4. In is noted that the Off-Duty Worker receptor was only evaluated for inhalation exposures. The work camp will be covered in buildings, pavement or aggregate material. This aggregate material will not be covered in soil and will remain exposed for the lifetime of the work camp. Aggregate is not considered to be soil, and human contact with aggregate material does not result in the same types of exposures that result from human contact with soil.

Off-Duty Workers will not consume untreated surface water or consume country food from the LAA.

Beginning with the source media (e.g., air, soil, water), the key exposure pathways through which potential dietary items can accumulate COPC and human receptors can become exposed to COPC are summarized in the human health CSM (Figure 5-1).

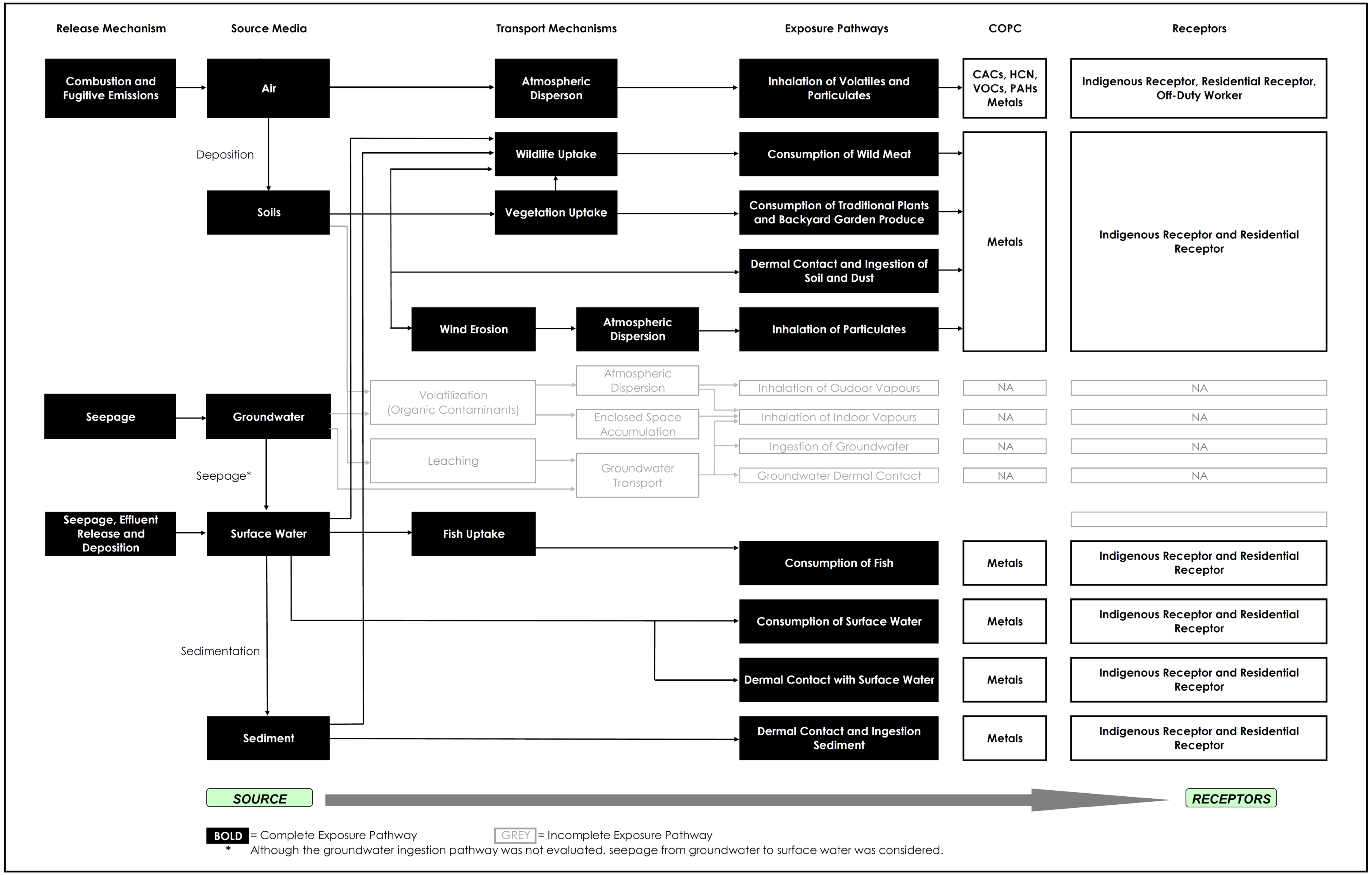
Table 5-4 Rationale for Exposure Pathway Inclusion in the HHRA

Exposure Pathway	Receptor Category	Carried Forward for HHRA	Rationale
Inhalation of COPC from air emissions (Short-term and Long-term)	Indigenous Receptor	Yes	COPC will be released to the air from Project-related activities. Each of the three receptors could inhale COPC released to the air as a result of Project-related activities. For this reason, this exposure pathway was evaluated in this assessment. Both short-term and long-term exposures were assessed.
	Residential Receptor	Yes	
	Off-Duty Workers	Yes	
Incidental ingestion and dermal contact with soil	Indigenous Receptor	Yes	Dust dispersion and deposition from Project-related activities could affect soil quality. Indigenous and Residenital receptors could come in direct contact with soil through ingestion or dermal contact. For this reason, this exposure pathway was evaluated in this assessment. The ground in the work camp will be covered by buildings or aggregate material. Deposited dust would accumulate in the interstitial spaces in the aggregate and would not contribute to incidental soil ingestion or dermal contact for Off-Duty Workers in the camp. For this reason this pathway has not been assessed for Off-Duty Workers.
	Residential Receptor	Yes	
	Off-Duty Workers	No	
Surface Water Ingestion	Indigenous Receptor	No	On occasion, receptors could ingest water directly from the lakes located in their particular region; however, based on the results of engagement, which indicate that people do not obtain drinking water directly from the lakes in either region, these occurrences are expected to be infrequent. The the predicted future concentrations of metals in the lakes in the Gordon region and the MacLellan region are less than the applicable Canadian drinking water guidelines (**Table 5-2**), suggesting that even if the water were used for consumption, health risks related to metal exposures would be negligible. Therefore, the ingestion of surface water pathway by human receptors was not assessed further.
	Residential Receptor	No	
	Off-Duty Workers	No	
Consumption of traditional vegetation	Indigenous Receptor	Yes	Deposition of dust and metals on soils, and subsequent accumulation in vegetation could occur as a result of Project activities. Indigenous receptors and residential receptors could consume traditional vegetation. For this reason, this exposure pathway was evaluated in this assessment. However, Off-Duty Workers would not consume traditional vegetation. For this reason this pathway has not been evaluated to Off-Duty Workers.
	Residential Receptor	Yes	
	Off-Duty Workers	No	
Consumption of garden produce	Indigenous Receptor	Yes	Deposition of dust and metals on soils, and subsequent accumulation in garden produce could occur as a result of Project activities. This could change concentrations in garden produce. Indigenous receptors and Residential receptors could consume garden produce, therefore this pathway was evaluated. However, Off-Duty Workers
	Residential Receptor	Yes	

Table 5-4 Rationale for Exposure Pathway Inclusion in the HHRA

Exposure Pathway	Receptor Category	Carried Forward for HHRA	Rationale
	Off-Duty Workers	No	would not consume garden produce. For this reason this pathway has not been evaluated to Off-Duty Workers.
Consumption of Wild Meat	Indigenous Receptor	Yes	Changes in soil, surface water and vegetation concentrations can result to changes in wild meat concentrations. Indigenous and Residential receptors may consume wild meat. For this reason, this exposure pathway was evaluated for Indigenous and Residential receptors. However, Off-Duty Workers would not consume wilrd meat. For this reason this pathway has not been evaluated for Off-Duty Workers.
	Residential Receptor	Yes	
	Off-Duty Workers	No	
Fish Ingestion	Indigenous Receptor	Yes	Changes in surface water quality due to Project-related activities could result in higher concentrations of COPC in fish tissues. Indigenous receptors and Residential receptors could consume local fish. For this reason, this exposure pathway was evaluated for Indigenous and Residential receptors. However, Off-Duty Workers would not consume fish. For this reason this pathway has not been evaluated to Off-Duty Workers.
	Residential Receptor	Yes	
	Off-Duty Workers	No	
Ingestion and dermal contact with groundwdater	Indigenous Receptor	No	There are no known active groundwater water wells used as a source of drinking water in the Groundwater LAA/RAA. For this reason, this exposure pathway was not evaluated.
	Residential Receptor	No	
	Off-Duty Workers	No	
Incidental ingestion and dermal contact with sediment	Indigenous Receptor	No	Humans could come in direct contact with sediment; however, risks related to sediment contact are considered minor. There are no public beaches or areas of shoreline where high intensity activities occur were identified in the Gordon or MacLellan regions and locations where humans could be exposed to sediment are remote and exposure would be infrequent. With the exception of cobalt from the MacLellan region, vanadium from the Gordon region, and manganese and nickel from the Gordon and MacLellan regions, Baseline Case and Future Case concentrations of metals in sediment are below the applicable soil quality guidelines for protection of human health (Table 5-3). Baseline Case concentrations of the identified metals in sediment exceed the applicable guidelines and the Project-related increases in sediment concentrations from the two regions are predicted to be less than 5%. For this reason, this exposure pathway was not evaluated.
	Residential Receptor	No	
	Off-Duty Workers	No	

Figure 5-1 Conceptual Site Model for the Human Health Risk Assessment



5.2 EXPOSURE ASSESSMENT

The main objective of the exposure assessment is to develop a quantitative estimate of exposure for human receptors to each COPC, based on COPC concentrations in environmental media and receptor characteristics.

Section 4.0 presented the EPCs used in the risk assessment for air, soil, vegetation, surface water, wild meat, fish tissue for the Baseline Case and the Future Case, as well as the Project Alone Case (where applicable). The HHRA used these EPCs to estimate exposure, or dose for the assessment of human health risk. The exposure dose summary tables are provided in Appendix F.

5.2.1 Methods

5.2.2 Calculation of Average Daily Dose

5.2.2.1 Inhalation Exposures

The inhalation TRVs for non-carcinogenic COPC are expressed as chemical concentrations in air (e.g. mg/m^3) rather than as doses on a per body weight basis (mg/kg-day). As a result, potential human health risks associated with inhalation exposures to COPC are characterized by comparing the predicted COPC concentration in air with the corresponding TRVs (Section 5.3.3). Inhalation TRVs are provided for specified exposure durations (e.g. 1-hour, 2-hour, 24-hour, annual average). If the exposure durations anticipated for specific receptors are shorter than the exposure durations assumed in the derivation of the TRVs, it is appropriate to convert the shorter duration exposures that may be experienced by the receptors to an exposure duration that is equivalent to the exposure durations stipulated for the TRV. Therefore, where the exposure durations for the Indigenous, Residential or Off-Duty Worker are anticipated to be shorter than the exposure duration stipulated by the TRVs, COPC concentrations have been adjusted to provide exposure-duration equivalent COPC concentrations for estimating potential inhalation health risks.

As noted in Section 5.1.1.1, Indigenous and Residential receptors are assumed to be present in a given area 24 hours per day on a continuous year-round basis, and no distinction has been made between the time a receptor may spend indoors or outdoors. Therefore, for these receptors, it is not necessary to adjust the predicted COPC concentrations in air prior to comparison with the respective TRVs. The COPC concentrations for the various exposure averaging periods (1-hour, 2-hour, 24-hour, annual average) can be compared directly to the respective TRVs to estimate the potential inhalation health risk for these receptor groups.

Workers employed on the mine-site would be expected to spend a total of 26 weeks/year in camp (based on a 14 days on/14 days off work rotation). For COPC where the exposure benchmarks or TRVs are based on short-term exposure duration (1-hour, 2-hour and 24-hour), concentrations were compared directly to the corresponding CAAQS or TRV without adjustment.

For CACs, the annual exposure benchmarks are based on air quality standards that are considered protective of health (rather than toxicological reference values). By convention, air quality standards for CACs are compared to a statistical interpretation of the chemicals concentrations in air (e.g., annual average CAAQS for $PM_{2.5}$, based on the 3-year average of the annual average of all 1-hour concentrations) and not personal (receptor) exposures. Therefore, exposures to CACs, including annual exposures were not adjusted and were directly comparted to the CAAQS. This approach will over-estimate the exposures that would likely be experienced by workers.

For all other COPC, the annual exposure benchmarks are based on TRVs and the predicted maximum COPC concentrations are adjusted to account for the time the Workers are in the LAA (i.e., 26 weeks/52 weeks per year) to provide annual average exposure estimates that are compared to the TRVs. COPC concentrations were adjusted as shown in Equation 5-1 to represent the effective annual average and lifetime averaged daily exposures that Workers could be expected to experience while in the work camp. The overall adjustment factors based on the exposure duration are provided in Table 5-5. These values have been applied to the predicted maximum COPC concentrations for the annual averaging period to calculate the COPC concentrations (annual average and lifetime daily average) used to characterize potential inhalation health risks for workers in the camp.

For the carcinogenic chemicals, the assessment of potential risk is based on a comparison of the lifetime averaged daily concentration of the chemical in air. Although inhalation exposures to the carcinogenic COPC will only occur over the operation phase of the Project (i.e., 13 years), the predicted Future Case concentrations of carcinogenic COPC in air must be converted to lifetime averaged daily concentration (LADC) so that the predicted lifetime exposures can be properly compared to the carcinogenic inhalation TRV. For inhalation exposures for Workers, LADC (inhalation exposure) in µg/m^3 is calculated as shown in Equation 5-1 using the values of D1, D2, D3 and D4 provided in Table 5-5. For Indigenous Receptors and Residential Receptors who will not be present within the PDA, but are assumed to be present in the LAA on a continuous year-round basis, the LADC is calculated as shown in Table 5-5 based on the assumption that a receptor could be at a given location 24 hours per day 7 days per week 52 weeks per year over the full 13-year operational life of the mine.

Equation 5-1

$$Dose\ \left({}^{\mu g}/_{m^3}\right) = \frac{C_A \times RAF_{Inh} \times D_1 \times D_2 \times D_3 \times D_4}{LE}$$

Where:

Dose	Adjusted chemical concentration (inhalation)	µg/m^3
C_{air}	Chemical concentration in air	µg/m^3
RAF_{Inh}	Relative Absorption Factor (inhalation) (Assumed to be 1 for all COPC)	Unitless
D_1	Hours per day exposed (24 hours)/ 24-hours	Unitless
D_2	Days per week exposed (7days) / 7 days	Unitless
D_3	Weeks per year exposed (26 weeks) / 52 weeks	Unitless
D_4	Total years exposed at the site (13 years- used for carcinogens only)	Years
LE	Life expectancy (80 years) (used for carcinogens only)	Years

Table 5-5 Adjustment Factors for Inhalation Exposures

Exposure Averaging Period	D1			D2			D3			D4	Life Expectancy	Overall Adjustment Factor	
	Hours of exposure	Hours per day	Fraction of Day exposed	Days /week of Exposure	Days/Week	Fraction of Week Exposed	Weeks per year of Exposure	Total Weeks per year	Fraction of Year Exposed	Years of exposure			
	(A)	(B)	(D_1=A/B)	(E)	(F)	(D_2=E/F)	(G)	(H)	(D_3=G/H)	(D_4)	LE	Calculation	Value
Annual Average (Worker)	24	24	1	7	7	1	26	52	0.5	-	-	$D_1 \times D_2 \times D_3$	0.5
Lifetime Averaged (Worker)	24	24	1	7	7	1	26	52	0.5	13	80	$\frac{(D_1 \times D_2 \times D_3 \times D_4)}{LE}$	0.081
Lifetime Averaged (Indigenous and Residential Receptors)	24	24	1	7	7	1	52	52	1	13	80	$\frac{(D_1 \times D_2 \times D_3 \times D_4)}{LE}$	0.16

5.2.2.2 Ingestion and Dermal Contact Exposures

Daily intakes from soil, backyard produce and country foods (e.g., vegetation, fish, wild meat) are determined for each individual COPC. Receptor assumptions for exposure to soil were based on recommendations in Health Canada (2012). Site-specific assumptions include;

- Receptors obtain 10% of the daily fish intake from their region and
- Receptors obtain 10% of their daily intake of vegetables from backyard produce.

Information gathered during Indigenous and community engagement suggests that people are unlikely harvest fish from lakes in either region due to concerns of perceived contamination of the lakes by pervious mining activities in the region. Therefore, the assumption that 10% the fish an individual consumes on a yearly basis is harvested from either the Gordon region (Swede Lake) or the MacLellan region (Cockeram Lake) it considered conservative. The assumption that 10% of vegetable intake comes from backyard produce is consistent with CCME (2006).

Site-specific consumption rates and details on the proportion of each country food consumed were not available. As a result, this HHRA relied upon the recommended consumption quantities in Health Canada (2012) as well as the information provided in Chan et al. (2012) and as presented in Table 5-1.

Daily intakes are calculated in the form of chronic daily intakes (CDIs) (to assess non-carcinogenic endpoints) and lifetime average daily doses (LADDs) (to assess carcinogenic endpoints), using the equations presented below.

Equation 5-2

$$CDI_i = Intake_{nc} \text{ x } EPC_i$$

$$LADD_i = Intake_c \text{ x } EPC_i$$

Where:

CDI_i = chronic daily intake via pathway *i*, mg/kg bw-day (Note: bw means body weight);
$LADD_i$ = lifetime average daily dose via pathway *i*, mg/kg bw-day;
$Intake_{nc}$ = intake rate for medium *i* (e.g., fish) (non-carcinogenic), kg medium/kg bw-day;
$Intake_c$ = intake rate for medium *i* (e.g., fish) (carcinogenic), kg medium/kg bw-day; and
EPC_i = Exposure concentration of chemical in medium *i* (e.g., fish), mg COPC/kg medium.

Similar to the inhalation assessment, for the multi-pathway assessment, EPCs considered representative of the predicted concentrations for a specific media (e.g., soil, vegetation, fish) in a specific region were used to assess health risks for the receptor associated with that particular region. Additional exposure assumptions include the following:

- Receptors obtain 100% of their intake of soil, wild meat and traditional plants and 10% of their fish and vegetables (as backyard produce) from their respective regions.

5.3 TOXICITY ASSESSMENT

Toxicity is the potential for a chemical to produce damage (whether permanent or temporary) to the structure or functioning of the receptor's body. The toxicity of a chemical depends on the amount taken into the body (referred to as the "dose") and the duration of exposure (the length of time the receptor is exposed to the chemical). For each chemical, there is a specific dose and duration of exposure necessary to produce a toxic environmental effect in a given receptor. This is referred to as the "dose-response relationship" of a chemical. The toxic potency of a chemical is dependent on the inherent properties of the chemical itself (its ability to cause a biochemical or physiological response at the site of action within the receptor's body) as well as the ability of the chemical to reach the site of action. This dose-response principle is central to the risk assessment methodology.

5.3.1 Toxicological Reference Values

The toxicity assessment (also known as a hazard assessment) involves the selection of toxicological reference values (TRVs), also referred to as exposure limits, for each COPC. Two general categories of chemicals are commonly recognized by agencies and applied when estimating TRVs for human health (US EPA 1989a). These categories are based on a chemical's mode of action in the body and include "threshold" chemicals (typically used to evaluate non-carcinogenic substances) and "non-threshold" chemicals (typically used for carcinogenic substances).

In the case of threshold chemicals, a threshold level must be exceeded for toxicity to occur. Generally, at low doses the body is able to remove the substances from the body without the substance causing an adverse or toxic effect. As the dose or exposure increases, the body's ability to clear the substances is reduced. When the exposure to a substance exceeds the body's ability to process and excrete the substance, it can cause adverse or toxic effects. The point at which this occurs is called the threshold. The threshold is different for each chemical. The exposure limits developed for each substance reflect the threshold for each chemical. Exposure limits for oral/dermal exposure and inhalation exposures are developed from toxicological studies of human or animal populations and are set so that no adverse effects will result for the established exposure limit. The derivation of a TRV is often based on the identification of a no observable adverse effect level (NOAEL) which is the dose or amount of the chemical that results in no obvious response in the most sensitive test species and test endpoint. The application of uncertainty or safety factors to the NOAEL provides an added level of protection, allowing for derivation of a TRV that is expected to be safe to the general public (including sensitive members of the population) following exposure for a prescribed period of time. Generic nomenclature for TRV for threshold chemicals includes tolerable concentration (TC), which refers to the acceptable concentration of an airborne chemical for which the primary route of exposure is inhalation, and tolerable daily intake (TDI), which refers to the acceptable dose of a chemical and is most commonly expressed in terms of the total intake of the chemical per unit of body weight per day (mg/kg-day).

Non-threshold chemicals (e.g., a carcinogen), work through a non-threshold mechanism. This means that any exposure to a non-threshold chemical is associated with some level of risk. At very low doses, the probability that an adverse effect will occur is extremely small. The probability of an adverse effect occurring increases as the dose increases. Agencies such as Health Canada and the US EPA assume that any level of long-term exposure to carcinogenic chemicals is associated with some “hypothetical cancer risk”. As a result, agencies have typically employed acceptable incremental lifetime cancer risk (ILCR) levels (i.e., levels over and above those that one would expect to be exposed to from background sources other than related to the Project). Generic nomenclature for TRV for non-threshold chemicals includes unit risk (UR), defined as the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a unit concentration of 1 mg/L in water, or 1 mg/m^3 in air (US EPA 1989a), and cancer Slope Factor (SF), which is generally defined as the upper-bound increased cancer risk from a lifetime exposure to a substance usually expressed in units of proportion (of a population) affected per mg/kg-day (US EPA 1989a).

5.3.2 Methods

A number of sources were consulted in the selection of TRVs for assessing inhalation and oral exposures to COPC. These sources are provided below along with the TRVs selected for the HHRA.

Order of preference was based on recommendations in Health Canada (2012):

- Health Canada
- US EPA IRIS
- WHO: International Programme on Chemical Safety (INCHEM, WHO 2019)
- RIVM
- ATSDR
- CalEPA
- TCEQ
- MECP or AEP

5.3.3 Inhalation Ambient Air Quality Criteria (CAC)

Non-carcinogenic inhalation TRV for CAC are provided in Table 5-6. Canadian Ambient Air Quality Standards (CAAQS) have been developed for nitrogen dioxide (NO_2) sulphur dioxide (SO_2) and fine particulate matter ($PM_{2.5}$). While CAAQS are not TRVs, ongoing reviews of the CAAQS help confirm they reflect the latest scientific information and are sufficiently stringent to protect human health and the environment (CCME 2014). Therefore, the CAAQS are considered appropriate for the purposes of calculating CRs.

Table 5-6 Non-Carcionogenic Inhalation Toxicological Reference Values for CAC

COPC	Averaging Period	Air Quality Standard (µg/m³)	Health Endpoint	Source
CAC				
SO_2	1-hour	1.7E+02[a]	Respiratory Health Effects	CAAQS (Year 2025) CCME (2017)
	24-hour	1.3E+02	Respiratory Health Effects	AEP (2016)
NOx (As NO_2)	1-hour	7.9E+01[b]	Respiratory Health Effects	CAAQS (Year 2025) CCME(2017)
	Annual	2.3E+01[c]	Respiratory Health Effects	CAAQS (Year 2025) CCME(2017)
$PM_{2.5}$	24-hour	2.7E+01[d]	Health Effects	CAAQS (Year 2020) CCME (2017)
	annual	8.8E+00[e]	Health Effects	CAAQS (Year 2020) CCME (2017)

NOTES:
[a] Based on the 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations.
[b] Based on the 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.
[c] The average over a single calendar year of all 1-hour average NO_2 concentrations
[d] Based on the 3 year average of the annual 98th percentile of the daily 24-hour average concentrations.
[e] Based on the 3-year average of the annual average of all 1-hour concentrations.

5.3.4 Inhalation Toxicological Reference Values

The TRV for non-carcinogenic chemicals selected for use in the HHRA are considered protective of the general population, including sensitive subpopulations and life stages including the infant, toddler, child, teen and adult.

5.3.4.1 Inhalation TRV for DPM and HCN

The inhalation TRVs for DPM and HCN are provied in Table 5-7 and Table 5-8.

Table 5-7 Non-Carcionogenic Inhalation Toxicological Reference Values for Diesel Particulate Matter (DPM)

COPC	Averaging Period	TRV (µg/m³)	Health Endpoint	Source
DPM	2-hour	1.0E+01[a]	Respiratory Responses in the General Population	Health Canada (2016c)
	Annual	5E+00[b]	Respiratory Responses in the General Population	Health Canada (2016c)

NOTES:
[a] For non-cancer short-term exposure.
[b] For non-cancer chronic exposure.

Table 5-8 Non-Carcionogenic Inhalation Toxicological Reference Values for Hydrogen Cyanide (HCN)

COPC	Averaging Period	TRV (µg/m³)	Health Endpoint	Source
Hydrogen Cyanide	1-hour	3.4E+02	Central Nervous System	OEHHA (2008)
	Annual	2.5	Thyroid enlargement and altered iodide uptake	US EPA (2010) modified by MECP (2019)

5.3.4.2 Inhalation TRV for VOC

Inhalation TRV for non-carcinogenic and carcinogenic VOCs are provided in Table 5-9 and Table 5-10.

Table 5-9 Non-Carcinogenic Inhalation Toxicological Reference Values for VOC

COPC	Averaging Period	TRV (µg/m³)	Health Endpoint	Source
VOC				
Acetaldehyde	1-hour	1.4E+03	Increased airway responsiveness in asthmatics	Health Canada (2018a)
	24-hour	2.8E+02	Olfactory epithelial degeneration in the nasal cavity	Health Canada (2018a)
	Annual	9E+00	Degeneration of olfactory epithelium	US EPA (1991a)
Acrolein	24-hour	1.1E+01	Eye, nose, and throat irritation and decreased respiratory rate	TCEQ (2015a)
	Annual	2E-02	Nasal Lesions	US EPA (2003a)
Benzene	1-hour	5.8E+02	Depressed peripheral lymphocytes and depressed mitogen-induced blastogenesis of femoral B-lymphocytes	TCEQ (2015b)
	24-hour	3.2E+02	Depressed peripheral lymphocytes and depressed mitogen-induced blastogenesis of femoral B-lymphocytes	TCEQ (2015b)
	Annual	3.0E+01	Decreased lymphocyte count	US EPA (2003b)
1,3-Butadiene	1-hour	3.7E+03	Developmental toxicity; reduction in extra gestational weight gain and in fetal body weight	TCEQ (2008)
	24-hour	9.5E+02	Developmental toxicity; reduction in extra gestational weight gain and in fetal body weight	TCEQ (2015c)
	Annual	2.0E+00	Reproductive- Ovarian atrophy	US EPA (2002)
Ethylbenzene	1-hour	8.6E+04	Ototoxicity	TCEQ (2015d)
	Annual	1.0E+03	Developmental Toxicity- Reduced litter size; increased relative liver, kidney and spleen weights of dams, skeletal variations.	Health Canada (2010b)
Formaldehyde	1-hour	1.2E+02	Eye irritation	Health Canada (2018a)
	24-hour	5.0E+01	Eye and nose irritation	TCEQ (2015e)
	Annual	1.0E+01	Histological changes in the nasal mucosa	ATSDR (1999)
Propionaldehyde	1-hour	1.8E+03	Mild irritation of mucosal surfaces	TCEQ (2015f)
	Annual	8E+00	Atrophy of olfactory epithelium	US EPA (2008)

Table 5-9 Non-Carcinogenic Inhalation Toxicological Reference Values for VOC

COPC	Averaging Period	TRV (µg/m³)	Health Endpoint	Source
Toluene	1-hour	3.7E+04	Reproductive/development; headache, dizziness, sensory irritation	OEHHA (1999a)
	24-hour	2.3E+03	Neurobehavioural test results	Health Canada (2018a)
	Annual	3.8E+03	NOAEL based on exposure of humans for 6h/d	Health Canada (2010b)
2,2,4-Trimethylpentane	1-hour	1.9E+04	Transient neurobehavioral impairments and neurological function impairments	TCEQ (2016)
	Annual	1.8E+03	Free-standing NOAEL due to lack of general systemic effects	TECQ (2016)
Xylenes	1-hour	2.2E+04	Central Nervous System Impairment, respiratory and eye irritation	OEHHA (1999b)
	24-hour	7.3E+02	Health	MOE (2012)
	Annual	1.8E+02	Maternal effects, fetal retardation, increased proportion of fetal mortality and resorbed fetuses	Health Canada (2010b)

Table 5-10 Carcinogenic Inhalation Toxicological Reference Values for VOC

COPC	TRV- Unit Risk (µg/m³)⁻¹	TRV-RSC (µg/m³)	Health Endpoint	Primary Source
Acetaldehyde	2.2E-06	4.6E+00	Nasal squamous cell carcinoma or adenocarcinoma	US EPA (1988a)
Benzene	3.3E-06	3.0E+00	Respiratory Tract Tumors	Health Canada (2010b)
1,3-Butadiene	3.0E-05	3.3E-01	Leukemia	US EPA (2002)
Formaldehyde	1.3E-05	7.69E-01	Squamous cell carcinoma	US EPA (1989b)
2,2,4-Trimethylpentane	-	1.8E+03	Free-standing NOAEL due to lack of general systemic effects	TECQ (2016)

5.3.4.3 Inhalation TRV- PAH

Inhalation TRV for non-carcinogenic and carcinogenic PAHs are provided in Table 5-11 and Table 5-12.

Table 5-11 Long-term Non-carcinogenic Toxicological Reference Values – PAH

PAH	TRV ($\mu g/m^3$)	Health	Primary Source
Acenaphthene	1.0E+01	Health Effects	TCEQ (2019)
Acenaphthylene	1.0E+01	Health Effects	TCEQ (2019)
Anthracene	5.0E-02	Health Effects	TCEQ (2019)
Fluoranthene	5.0E-02	Health Effects	TCEQ (2019)
Fluorene	1E+00	Health Effects	TCEQ (2019)
Naphthalene	3.7E+00	Health Effects	MOE (2011)
Phenanthrene	8E-01	Health Effects	TCEQ (2019)
Pyrene	5E-02	Health Effects	TCEQ (2019)

Table 5-12 Long-term Carcinogenic Toxicological Reference Values – PAH as $B[a]P_{TPE}$

Exposure Duration	Inhalation TRV $(\mu g/m^3)^{-1}$	RsC ($\mu g/m^3$)	Health	Primary Source
Lifetime	3.1E-05	3.23E-01	Respiratory tract tumors	Health Canada (2010b)

5.3.4.4 Inhalation TRV- Metals

Inhalation TRV for non-carcinogenic and carcinogenic metals are provided in Table 5-13 and Table 5-14.

Table 5-13 Long-term Non-carcinogenic Toxicological Reference Values – Metals

Metals	TRV (µg/m³)	Health Endpoint	Primary Source
Antimony	2.0E-01	Pulmonary toxicity, chronic interstitial inflammation	US EPA (1995a)
Arsenic	1.0E+00	Unspecified Health Effect	RIVM (2001)
Barium	1.0E+00	Cardiovascular effects	RIVM (2001)
Beryllium	2.0E-02	Respiratory effects	US EPA (1998a)
Cadmium	1.0E-02	Urinary	ATSDR (2012)
Chromium III	2.0E-03	Respiratory effects	OEHHA (2001)
Cobalt	5.0E-01	Lung disease	RIVM (2001)
Copper	1.0E+00	Respiratory and immunological effects in rabbits	RIVM (2001)
Lead	2.0E-01	Health effects	MECP (2016)
Manganese	5.0E-02	Nervous system effects: Impairment of neurobehavioral effects	US EPA (1993a)
Mercury	3.0E-01	Nervous system effects: Hand tremor; increases in memory disturbances; slight subjective and objective evidence of autonomic dysfunction	US EPA (1995b)
Molybdenum	1.2E+01	Body weight effects	RIVM 2001
Nickel	2.0E-02	Respiratory: increases in lung granulocytes and multi-nucleated counts	Health Canada (2010b)
Selenium	2.0E-01	Health effects	TCEQ (2019)
Silver	1.0E-02	Health effects	TCEQ (2019)
Strontium	2.0E+00	Health effects	TCEQ (2019)
Thallium	1.0E-01	Health effects	TCEQ (2019)
Titanium	5.0E+00	Health effects	TCEQ (2019)
Uranium	3.0E-01	Kidney effects	MOE (2011)
Vanadium	1.0E+00	Health effects	RIVM (2009)
Zinc	2.0E+00	Health effects	TCEQ (2019)

Table 5-14 Long-term Carcinogenic Toxicological Reference Values – Metals

Parameter	TRV- Unit Risk $(\mu g/m^3)^{-1}$	TRV-RSC $(\mu g/m^3)$	Health Endpoint	Primary Source
Arsenic	6.4E-03	1.6E-03	Lung Cancer	Health Canada (2010b)
Beryllium	2.4E-03	4.2E-03	Lung cancer	US EPA (1998a)
Cadmium	9.8E-03	1.0E+03	Lung Cancer	Health Canada (2010b)
Chromium VI	7.6E-02	1.3E-04	Lung cancer	Health Canada (2010b)
Nickel	1.3E-03	7.7E-03	Lung and nasal cancer	Health Canada (2010b)

5.3.5 Oral Toxicological Reference Values

Oral TRV for non-carcinogenic and carcinogenic metals are provided in Table 5-15 and Table 5-16.

5.3.5.1 Oral TRV – Metals

Table 5-15 Long-term Non-carcinogenic Toxicological Reference Values – Metals

Parameter	Oral TRV mg/kg-day	Health Endpoints	Specific Receptor Age Groups	Primary Source
Antimony	4.0E-04	Changes in longevity, blood glucose and cholesterol in mice	All age groups	US EPA (1987)
Arsenic	3.0E-04	Cardiovascular, Dermal: Hyperpigmentation, keratosis and possible vascular complications	All age groups	US EPA (1991b)
Barium	2.0E-01	Renal lesions in mice	All age groups	Health Canada (2010b)
Beryllium	2.0E-03	Gastrointestinal: Small intestinal lesions	All age groups	US EPA (1998a)
Cadmium	1.0E-03	Renal tubular dysfunction, manifested by low molecular weight protenuria	All age groups	Health Canada (2010b)
Chromium (Chromium III)	1.5E+00	No effects observed	All age groups	US EPA (1998b)
Cobalt	1.0E-02	Heart: Cardiomyopathy	All age groups	MOE (2011)
Copper	9.1E-02	Hepatotoxicity, gastrointestinal effects	0-6 months	Health Canada (2010b)
	9.1E-02		7 months-4 years	

Table 5-15 Long-term Non-carcinogenic Toxicological Reference Values – Metals

Parameter	Oral TRV mg/kg-day	Health Endpoints	Specific Receptor Age Groups	Primary Source
	1.1E-01		5 years-11 years	
	1.3E-01		12 years-19 years	
	1.4E-01		20+ years (70.7kg)	
Lead	3.6E-03	Decreased haemoglobin synthesis, anemia, irreversible neurological and cognitive damage	All age groups	RIVM (2001)
Manganese	1.4E-01	Parkinsonian-like neurotoxicity	0-6 months	Health Canada (2010b)
	1.4E-01		7 months- 4 years	
	1.2E-01		5 years- 11 years	
	1.4E-01		12 years-19 years	
	1.6E-01		20+ years (70.7kg)	
Mercury	3.0E-04	Nephrotoxicity	All age groups	Health Canada (2010b)
Methylmercury	1.0E-04	Developmenal neuropsychological impairment	All age groups	US EPA (2001)
Molybdenum	2.3E-02	Developmental: Reproductive effects	0-6 months	Health Canada (2010b)
	2.3E-02		7 months-4 years	
	2.3E-02		5 years-11 years	
	2.7E-02		12 years-19 years	
	2.8E-02		20+ years (70.7kg)	
Nickel	1.1E-02	Two generation reproductive toxicity in rats: post implantation perinatal lethality	All age groups	Health Canada (2010b)
Selenium	5.5E-03	Selenosis	0-6 months	Health Canada (2010b)
	6.2E-03		7 months-4 years	
	6.3E-03		5 years-11 years	
	6.2E-03		12 years-19 years	
	5.7E-03		20+ years (70.7kg)	
Silver	5.0E-03	Dermal: Argyria	All age groups	US EPA (1991c)
Strontium	6.0E-01	Musculoskeletal: Rachitic bones	All age groups	US EPA (1992)
Thallium	1.4E-05	Alopecia (hair loss)	All age groups	MOE (2011)
Uranium	6.0E-04	Nephrotoxic, hepatotoxic effects	All age groups	Health Canada (2010b)
Vanadium	9.0E-03	Dermal: Decreased hair1.36E-01 cystine	All age groups	US EPA (1988b)

Table 5-15 Long-term Non-carcinogenic Toxicological Reference Values – Metals

Parameter	Oral TRV mg/kg-day	Health Endpoints	Specific Receptor Age Groups	Primary Source
Zinc	5.0E-01	Increased growth of infant: length, weight, and head circumference	0-6 months	Health Canada (2010b)
	5.0E-01		7 months-4 years	
	5.0E-01		5 years-11 years	
	5.0E-01		12 years-19 years	
	6.0E-01		20+ years (70.7kg)	

Table 5-16 Long-term Carcinogenic Toxicological Reference Values – Metals

Parameter	Oral TRV $(mg/kg\text{-}day)^{-1}$	Health Endpoint	Reference
Arsenic	1.8E+00	Bladder, lung, liver	Health Canada (2010b)

5.4 RISK CHARACTERIZATION

The final step in the HHRA is risk characterization. The risk characterization compares the estimated exposures to the COPC for each of the receptors with the toxicity reference values to determine if site related exposures exceed the identified limits. Because of the differences in the biological mechanisms of action between non-carcinogenic and carcinogenic chemicals, the potential hazard/risks are determined differently. The characterization of the hazards associated with exposure to non-carcinogenic chemicals and the risks associated with exposure to carcinogenic chemicals (e.g., arsenic) are presented below.

5.4.1 Non-carcinogenic Chemicals

The assessment of human health risks from non-carcinogenic chemicals is conducted using CRs for the inhalation pathway and hazard quotients (HQs) for other pathways. Consistent with Health Canada (2019a), a target CR or HQ of 1.0 is considered applicable for non-carcinogenic chemicals, assuming all potential exposure media and pathways are considered, including background dietary intake. Where an HHRA evaluates only project-related exposures (excluding background estimated daily intake for sources not related to the project, including consumer products, food, air, and water), a target HQ of less than or equal to 0.2 will be deemed negligible to compensate for the exposures not taken into consideration.

The CRs were used to evaluate the health risks from short-term and long-term exposure of all life stages to CACs, non-metal COPC and metal COPC in air. The CRs for CACs were calculated by dividing the appropriate statistical interpretation of the chemical concentrations in air (not adjusted for exposure) by the CAAQS and compared to a CR of 1.0. For other COPC where TRVs for short-term exposures (1-hour, 2-

hour, 24-hour) were available, the CRs were calculated using unadjusted COPC concentrations and the potential health risks were evaluated using a CR benchmark of 1.0. The CRs for annual exposures to other COPC were adjusted based on the time spent in the LAA and were compared to the TRVs. Indigenous and Residential receptors were assumed to spend 100% of their time in the LAA and thus, for these receptors, adjustment of the annual average concentrations to account for time spent away from the LAA was not necessary. However, in estimating the LADC for the Indigenous and Residential receptors, it was necessary to calculate a LADC based on 13 years of mine operation over an 80-year lifetime. Off-Duty Workers would be in the LAA for 26 weeks per year. Therefore, the predicted annual average COPC concentrations were adjusted by a factor of 0.5 for account for the period of the year when these workers would away from the LAA. The LADC for the Off-Duty Workers were also adjusted based on 13 years of mine operation over an 80-year lifetime.

In general, the health effects and risks associated with inhalation exposures are distinct from those associated with oral and dermal exposures and thus, inhalation health risks are assessed independently from oral/dermal exposure risks. For these receptors and exposure durations, where inhalation exposures have been assumed to occur on a continuous basis and Project-related exposures represent the predominant contributor to exposure, a CR benchmark of 1.0 is appropriate for assessing potential risks.

HQs were calculated by dividing the predicted exposure (or dose) by the oral TRV for a specific COPC. People are potentially exposed to chemicals through five main media (i.e., air, water, soil, food, and consumer products). Where an HHRA evaluates only Project-related exposures and excludes background risk from other sources, a target HQ of 0.2 is considered appropriate (Health Canada, 2019a) For this HHRA, the potential non-carcinogenic health risks associated with ingestion, soil, and country food was undertaken, and the health risks associated with each source were compared to the benchmark HQ of 0.2.

As discussed above, if the Future Case risks are less than the target benchmark (CR<1.0 or HQ<0.20), human health risks related to the Project are considered to be negligible. If predicted human health risks, under Baseline Case and/or Future Case conditions are higher than the benchmark, it does not necessarily indicate that an adverse health effect will occur, but rather it triggers a more in-depth review. Review of such CR and HQ values is important since both the exposure estimates and the toxicological criteria are based on a series of conservative assumptions, including multiple predictive models and reasonable "conservative" exposure scenarios. In situations where the CR or HQ approaches or exceeds the established risk acceptability benchmarks, a detailed review of the assumptions is necessary to provide a greater degree of confidence that the assumptions are not unreasonable precautionary or conservative (Alberta Health and Wellness, 2011, Health Canada 2019a).

5.4.2 Carcinogenic Chemicals

Potential health risks associated with inhalation exposures to cancer-causing COPC were expressed as concentration ratios (CR). The CRs were derived by dividing the LADC of the carcinogenic COPC in air by the risk-specific concentration (RsC) associated with a 1 in 100,000 incremental increase in lifetime cancer risk. The RsC is derived from the inhalation unit risk (IUR) (provided in **Section 5.3.3**) as shown below. A CR less than 1.0 indicates that the cancer risks associated with the predicted exposures to the COPC would not exceed the risk acceptability benchmark of 1 in 100,000 established by regulatory agencies such as Health Canada and the CCME.

$$RsC\ \left(\frac{mg}{m^3}\right) = \frac{10^{-5}}{IUR\ \left(\frac{mg}{m^3}\right)^{-1}}$$

Where:

RsC	Risk-specific concentration	mg/m^3
10^{-5}	Target level of risk	Unitless
IUR	Inhalation unit risk	$(mg/m^3)^{-1}$

Potential health risks associated with non-inhalation exposures to cancer-causing COPC were expressed as Incremental Increase in Lifetime Cancer Risks (ILCR) and represent the increased risk of a person in a given population developing cancer over his or her lifetime as a result of the Project. ILCR consider the increase in risk over and above background risk. For cancer-causing COPC evaluated as part of the soil, or food pathway assessment, ILCR estimates resulting from a lifetime of exposure through multiple pathways were calculated by estimating a lifetime average daily dose (LADD) (over an assumed lifetime for a person of 80 years), and multiplying that LADD by the TRV (which is also referred to as the slope factor (SF)) for cancer-causing contaminants in media other than air. Consistent with Health Canada (2019a, 2012), the ILCR was compared to a benchmark of 1 person in a population of 100,000 (i.e. 0.00001, or $1E^{-05}$) predicted to develop cancer as a result of their contaminant exposure from project-related releases. The ILCR does not include consideration of background risk present under Baseline Case, thus only the Future Case ILCRs are reported and these represent the increase in potential cancer risk due to the Project only.

5.4.3 Human Health Risk via Inhalation

The potential changes in inhalation health risks were assessed for exposures to COPC that include CACs, DPM, HCN, VOCs, PAHs and metals. The risks associated with inhalation exposures to non-carcinogenic chemicals (CAC, DPM, HCN, metals and VOC) were evaluated for 1-hour, 2-hour, 24-hour and/or annual exposure times in cases where time-specific inhalation guidelines were available. The risks associated with inhalation of carcinogenic chemicals (metals, VOCs, and PAHs (as $B[a]P_{TPE}$)) were evaluated based on lifetime exposure. It is noted that inhalation risks for the Indigenous receptor and the Residential receptor in a given region are identical as each receptor is assumed to be present in the region 100% of the time.

The human health risks associated with inhalation exposures to COPC were evaluated for the Indigenous Receptor and Residential Receptor in the Gordon and MacLellan regions and for the Off-Duty Worker at the work camp. A full list of receptor locations, with easting and northing locators, is provided in Table E-2 of Appendix E of the Air Quality Technical Modelling Report (Stantec 2020a). The results of the risk characterization are summarized below.

5.4.3.1 Inhalation Risk – CAC

Gordon Region

Non-cancer risks for CACs such as SO_2, NO_2 and $PM_{2.5}$ were calculated for Baseline Case and/or Future Case for the Gordon region, as provided in Table 5-17 to Table 5-19.

With the exception of exposure to 1-hour NO_2, the CRs associated with inhalation exposures for the CACs are below the benchmark of 1.0. A frequency analysis of the inhalation exposures to 1-hour NO_2 is provided below.

The air quality assessment (Stantec 2020a) provided the measured and predicted NO_2 concentrations for the Baseline Case and Future Case of the Project in the Gordon region. The maximum 3-year average 98th percentile of the daily 1-hour maximum NO_2 concentrations was compared to the 1-hour NO_2 CAAQS for 2020 and 2025. The 1-hour NO_2 CAAQS for 2020 and 2025 reflect the findings of the human health risk assessment for NO_2 completed by Health Canada in 2016 (Health Canada 2016b), but incorporate a recognition of the roles that magnitude and frequency of exposure play in determining the potential health risks associated with inhalation exposures to NO_2. Therefore, at receptor locations where 1-hour NO_2 concentrations are predicted to exceed the 1-hour NO_2 2025 CAAQS (79 $\mu g/m^3$), the assessment of potential human health risks should incorporate consideration of the magnitude and frequency of these exceedances. Consideration is also given to the pattern of exceedances (the time of day and time of year when the exceedances are predicted to occur and whether the exceedances occur in isolation or over consecutive 1-hour periods).

The maximum 3-year average 98th percentile of the daily 1-hour maximum NO_2 concentration in the Gordon region exceeds the 2025 CAAQS of 79 $\mu g/m^3$ (maximum CR – 1.21). An exceedance of a CR is not an indication that human health effects will occur. Rather, it is an indication that additional investigation is required to further characterize potential human health risks. The additional evaluation of potential human health risks associated with inhalation exposures to NO_2 considered how often the 1-hour NO_2 concentrations were predicted to exceed the 2025 CAAQS and whether the exceedances occurred individually, or if they occurred over consecutive 1-hour periods. Individual exceedances of the 1-hour NO_2 CAAQS that are separated by periods of time when the 1-hour NO_2 concentrations are below the CAAQS allow for recovery from the respiratory effects associated with the exposure. Respiratory recovery would be delayed in situations where multiple exceedances of the 1-hour NO_2 CAAQS occur in consecutive hours. Prolonged exposures to 1-hour NO_2 concentrations above the CAAQS could result in increased respiratory effects compared to shorter-term exposures. Thus, exceedances of the 1-hour NO_2 that occur in blocks of time may represent a greater potential human health risk than exceedances that occur on an individual (single hours) or a short-term basis (blocks of several hours). The 1-hour NO_2 concentrations were modelled over a 5-year period representing a total of 43,800 1-hour periods (8,760 hours per year x 5 years).

The assessment of potential human health risks associated with inhalation exposures to NO_2 considered 1-hour and annual average NO_2 concentrations at 45 special receptor locations in the Gordon region. At each of the 45 receptor locations, predicted annual average NO_2 concentrations (including background NO_2) were below the 2025 annual average NO_2 CAAQS. At 42 of these receptor locations, 1-hour NO_2

concentrations were below the 2025 1-hour NO_2 CAAQS (79 µg/m^3). At three special receptor locations, (Map 9 Appendix A) Potential Indigenous Receptor 24, Potential Indigenous Receptor 25 and Potential Indigenous Receptor 27 (all three locations fall within Trapping 22 and Travel 25 identified in the Marcel Colomb First Nation TLRU Study (Stantec 2018), the maximum predicted 1-hour NO_2 concentration exceeded the 2025 1-hour NO_2 CAAQS.

The air quality assessment (Stantec 2020a) modelled 1-hour NO_2 concentrations over a 5-year period (43,800 1-hour NO_2 results per special receptor location). In the Gordon region, the maximum number of exceedances of the 2025 1-hour NO_2 CAAQS over the 5-year modelling period are predicted to occur at the Potential Indigenous Receptor 27, located north of the Gordon PDA (Map 9 Appendix A). At this location, the 1-hour NO_2 concentrations were predicted to exceed the 1-hour NO_2 CAAQS (79 µg/m^3) 170 times over the 5-year modelling period. This represents 0.38% of the time. Exceedances occur predominantly as single events separated by prolonged periods where the 1-hour NO_2 concentrations are below the 2025 1-hour NO_2 CAAQS. There are three instances (April 12 in year 1, May 14 in year 4 and December 14 in year 3) where the exceedances are predicted to occur over 5 consecutive hours. However, the maximum 1-hour NO_2 concentration predicted during these periods is 97 µg/m^3 (May 14 year 4), which is below the 2020 1-hour NO_2 CAAQS. In addition, the 170 exceedances over the 5-year modelling period happen during the colder months (November through May) and between the hours of 20:00 and 6:00 the following morning. Within this period, there is no fixed pattern to when individual exceedances happen. Information provided from Traditional Land and Resources Use studies and in the Manitoba Métis Traditional Knowledge, Land Use, and Occupancy Study for the Lynn Lake Gold Mine Project (SVS 2020), do not identify habitations in the vicinity of the Potential Indigenous Receptor 27, or the other two special receptor locations where exceedances of the 1-hour NO_2 2025 CAAQS, are predicted to occur. In the absence of habitation near these special receptor locations, it is less likely that people would be present in these areas at the time of day when then these exceedances are predicted to occur, than if the exceedances were to occur during daylight hours. In addition, the maximum 1-hour NO_2 concentrations for the modelled five years for each of these three special receptor locations are below the Health Canada short-term Residential Indoor Air Quality Guideline (RIAQG) for NO_2 of 170 µg/m^3 (Health Canada 2018b), and the predicted annual average NO_2 concentrations are below the 2025 annual average NO_2 CAAQS. Predicted annual average NO_2 concentrations at the remaining 44 special receptor locations within the Gordon region are also below the annual average CAAQS.

Based on the results it is reasonable to conclude that occasional exceedances of the 2025 1-hour NO_2 CAAQS represent a negligible human health risk for people who may be in the area.

Table 5-17 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of CACs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case			Future Case		
	EPC (µg/m³)	Air Quality Standard (µg/m³)	CR	EPC (µg/m³)	Air Quality Standard (µg/m³)	CR
SO_2[a]	6.00E+00	1.7E+02	3.5E-02	4.47E+01	1.7E+02	2.6E-01
NO_2[b]	7.50E+00	7.9E+01	9.5E-02	9.55E+01	7.9E+01	**1.2E+00**

NOTES:

[a] EPC based on the Maximum 99th Percentile Daily Maximum 1-hour concentrations

[b] EPC Based on the Maximum 98th Percentile Dailu Maximum 1-hour concentrations

Bold Risk exceeds the acceptability benchmark of 1.0.

Table 5-18 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 24-hour Concentrations of CACs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case			Future Case		
	EPC (µg/m³)	Air Quality Standard (µg/m³)	CR	EPC (µg/m³)	Air Quality Standard (µg/m³)	CR
SO_2	6.00E+00	1.3E+02	4.8E-02	1.35E+01	1.3E+02	1. 1E-01
$PM_{2.5}$ [a]	2.90E+00	2.7E+01	1.1E-01	8.50E+00	2.7E+01	3.1E-01

NOTE:

[a] EPC based on the 3-year average of the 98th percentile of 24-hour average concentrations

Table 5-19 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of CACs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case			Future Case		
	EPC (µg/m³)	Air Quality Standard (µg/m³)	CR	EPC (µg/m³)	Air Quality Standard (µg/m³)	CR
NO_2 [a]	1.90E+00	2.3E+01	8.3E-02	3.61E+00	2.3E+01	1.6E-01
$PM_{2.5}$ [b]	2.90E+00	8.8E+00	3.3E-01	3.54E+00	8.8E+00	4.0E-01

NOTES:

[a] EPC based on the maximum 5-year annual average concentrations

[b] EPC based on the maximum 3-year average concentrations

MacLellan Region

Non-cancer risks for CACs such as SO_2, NO_2 and $PM_{2.5}$ were calculated for Baseline Case and/or Future Case for the Maclellan region, as provided in Table 5-20 to Table 5-22.

With the exception of exposure to 1-hour NO_2, the CRs associated with inhalation exposures for the non-carcinogenic CACs in the MacLellan region are below the benchmark of 1.0. A frequency analysis of the inhalation exposures to 1-hour NO_2 concentrations is provided below.

The air quality assessment provided the measured and predicted NO_2 concentrations for the Baseline Case and Future Case of the Project in the MacLellan region (Stantec 2020a). The assessment of potential human health risk considered 1-hour and annual average NO_2 concentrations at 114 special receptor locations in the Maclellan region. At each of the 114 receptor locations predicted annual average NO_2 concentrations (including background NO_2) were below the 2025 annual average NO_2 CAAQS. At four special receptor locations (Map 9 Appendix A), Potential Indigenous Receptor 36 (north of the MacLellan PDA), Potential Indigenous Receptor 37, Potential Indigenous Receptor 38 (both located southwest of the MacLellan PDA) and Waste Disposal Site 1 (located southeast of the MacLellan PDA), the maximum predicted 1-hour NO_2 concentration exceeded the 2025 1-hour NO_2 CAAQS. As noted above in the discussion for the Gordon region, at receptor locations where 1-hour NO_2 concentrations are predicted to exceed the 1-hour NO_2 2025 CAAQS (79 µg/m³), consideration is given to the magnitude, frequency and the patterns of 1-Hour NO_2 exceedances in the evaluation of potential human health risks.

The air quality assessment (Stantec 2020a) modelled 1-hour NO_2 concentrations over a 5-year period (43,800 1-hour NO_2 results per special receptor location). The maximum number of exceedances of the 2025 1-hour NO_2 CAAQS over the 5-year modelling period, are predicted to occur at the Waste Disposal Site 1 special receptor, located southeast of the MacLellan PDA (167 over the 5-year modelling period). However, of the four special receptor locations within the MacLellan region where 1-hour NO_2 exceedances were predicted to occur, the Waste Disposal Site 1 location is unlikely to represent a location people would be expected to frequent. The three remaining special receptor locations where 1-hour NO_2 exceedances are predicted to occur represent locations that people could reasonably be expected to frequent (Map 9

Appendix A). Of these three locations, the highest number of exceedances of the 1-hour NO_2 2025 CAAQS are predicted to occur at Potential Indigenous Receptor 37 (163 exceedances over the 43,800 hours modelled over the 5-year modelling period). This represents 0.37% of the time. Therefore, the assessment of potential human health risks has focused on the Potential Indigenous Receptor 37 special receptor location to represent the reasonable worst-case exposure. At Potential Indigenous Receptor 37, exceedances occur predominantly as single events of one or two hours, separated by prolonged periods where the 1-hour NO_2 concentrations are below the 2025 1-hour NO_2 CAAQS. There is one instance (March 24 in year 2) where exceedances of the 2025 1-hour NO_2 CAAQS are predicted to occur over 7 consecutive hours. Within this 7-hour period, there are 2 hours where the 1-hour NO_2 concentrations are predicted to exceed the 2020 1-hour NO_2 CAAQS of 113 μg/m^3 (140 μg/m^3 and 132 μg/m^3). The predicted 1-hour NO_2 concentrations in the remaining 5 hours of this 7-hour period are below 113 μg/m^3. The 1-hour NO_2 concentrations in this 7-hour period are below the Health Canada short-term RIAQG of 170 μg/m^3 (Health Canada, 2018b). There is one instance where exceedances are predicted to occur over a 5-hour period (Jan 5 in year 1) and three instances where exceedances are predicted to occur over a 4-hour period (December 12 in year 1, February 16 in year 2 and March 15 in year 3). In these periods, the maximum predicted 1-hour NO_2 concentrations were above the 2025 1-hour NO_2 CAAQS but below the 2020 1-hour NO_2 CAAQS, and the maximum concentrations were below the Health Canada short-term RIAQG (Health Canada, 2018b). In addition, the predicted exceedances occur between 20:00 and 6:00 the following morning. Within this period, there is no fixed pattern to when individual exceedances happen. No habitations have been identified in the area of Potential Indigenous Receptor 37 (SVS 2020). In the absence of habitation near these special receptor locations, it is less likely that people would be present in these areas at the time of day when then these exceedances are predicted to occur, than if the exceedances were to occur during daylight hours. In addition, the predicted annual average NO_2 concentrations were below the 2025 annual average NO_2 CAAQS of 23 ug/m^3.

Based on the results, it is reasonable to conclude that occasional exceedances of the 2025 1-hour NO_2 CAAQS represent a negligible human health risk for people who may be in the area. As noted above, the CRs for the other non-carcinogenic COPC are below 1.0. Therefore, Project related health risks associated with inhalation exposures to the non-carcinogenic CACs are negligible.

Table 5-20 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of CACs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case			Future Case		
	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR
SO_2[a]	6.00E+00	1.7E+02	3.5E-02	3.62E+01	1.7E+02	2.1E-01
NO_2[b]	7.50E+00	7.9E+01	9.5E-02	9.15E+01	7.9E+01	**1.2E+00**

NOTES:

[a] EPC based on the 99th Percentile Daily Maximum 1-hour concentrations

[b] EPC Based on the 98th Percentile Daily Maximum 1-hour concentrations

Bold Risk exceeds the acceptability benchmark of 1.0.

Table 5-21 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 24-hour Concentrations of CACs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case			Future Case		
	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR
SO_2	6.00E+00	1.3E+02	4.8E-02	1.57E+01	1.3E+02	1.3E-01
$PM_{2.5}$ [a]	2.90E+00	2.7E+01	1.1E-01	8.40E+00	2.7E+01	3.1E-01

NOTE:

[a] EPC based on the 3-year average of the 98th percentile of 24-hour average concentrations

Table 5-22 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of CACs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case			Future Case		
	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR
NO_2 [a]	1.90E+00	2.3E+01	8.3E-02	3.96E+00	2.3E+01	1.7E-01
$PM_{2.5}$ [b]	2.90E+00	8.8E+00	3.3E-01	3.74E+00	8.8E+00	4.3E-01

NOTES:

[a] EPC based on the maximum annual average concentrations calculated from 5-years of modelled concentrations.

[b] EPC based on the 3-year average concentrations.

Work Camp

Non-cancer risks for CACs (SO_2, NO_2 and $PM_{2.5}$) were calculated for Baseline Case and/or Future Case for the Off-Duty Worker at the work camp, as provided in Table 5-23 to Table 5-25.

With the exception of 1-hour exposure to NO_2, the CRs associated with inhalation exposures of CACs for the Off-Duty Worker do not exceed the benchmark of 1.0. A frequency analysis of the inhalation exposures to 1-hour NO_2 concentrations is provided below.

The 98^{th} percentile of the 1-hour daily maximum NO_2 concentration exceeded the 2025 CAAQS of 79 µg/m^3 (maximum CR of 1.66). The 1-hour NO_2 concentrations were modelled over a 5-year period. Over this 5-year period 1-hour NO_2 concentrations were predicted to exceed the 2025 CAAQS 695 times (1.6% of the time). In general, the predicted exceedances do not occur in blocks of more than 3 consecutive hours, and these are separated by periods where the 1-hour NO_2 concentrations are below the 2020 1-hour NO_2 CAAQS. Exceedances of the 1-hour NO_2 CAAQS could result in increases in respiratory responses such as increased respiratory tract resistance in sensitive members of the workforce (asthmatics). Individual exceedances of the 1-hour NO_2 CAAQS that are separated by periods of time when the 1-hour NO_2 concentrations are below the CAAQS allow for recovery from the respiratory effects associated with the exposure. Respiratory recovery would be delayed in situations where multiple exceedances of the 1-hour NO_2 CAAQS occur in consecutive hours. Prolonged exposures to 1-hour NO_2 concentrations above the CAAQS could result in increased respiratory effects compared to shorter-term exposures. Thus, exceedances of the 1-hour NO_2 that occur in blocks of time may represent a greater potential human health risk than exceedances that occur on an individual (single hours) or a short-term basis (blocks of several hours).

Exceedances of the 1-hour NO_2 CAAQS that occur over more than 3 hours range in duration from 4 hours (80 times) to 11 hours (2 times) and account for a total of 276 hours over the 43,800 hours of the 5-year modelling period. During these periods, particularly sensitive members of the workforce (those with asthma) who are directly exposed to 1-hour NO_2 concentrations above the CAAQS, may experience respiratory effects such as shortness of breath, that would be expected to subside as NO_2 concentrations decline.

The predicted 1-hour NO_2 exceedances usually occur in winter months (December–March). These exceedances generally happen overnight, occurring sometime between 19:00 and 6:00 the following morning. Within this period, there is no fixed pattern to when individual exceedances happen. In addition, in the winter months, between 19:00 and 6:00 workers would generally be expected to spend off-duty time indoors, and thus would not be expected to experience prolonged exposures to NO_2 concentrations that exceed the 1-hour CAAQS.

Considering the results of the assessment of potential health risks associated with inhalation exposures to NO_2, it is reasonable to conclude that inhalation exposure to NO_2 represents a negligible human health risk for Off-Duty Workers housed at the work camp.

Table 5-23 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of CACs - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR
SO_2	9.62E+01	1.7E+02	5.7E-01
NO_2	1.31E+02	7.9E+01	**1.7E+00**

NOTE:
Bold Risk exceeds the acceptability benchmark of 1.0.

Table 5-24 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 24-hour Concentrations of CACs - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR
SO_2	2.24E+01	1.3E+02	1.8E-01
$PM_{2.5}$	2.76E+01	2.7E+01	1.0E+00

Table 5-25 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of CACs - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)	CR
NO_2	9.06E+00	2.3E+01	3.9E-01
$PM_{2.5}$	7.18E+00	8.8E+00	8.2E-01

5.4.3.2 Inhalation Risk – DPM

Gordon Region

Non-cancer risks for DPM inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case DPM concentrations at the Gordon region, as provided in Table 5-26 and Table 5-27. The CRs associated with inhalation exposures to 2-hour concentrations of DPM and annual average concentrations of DPM do not exceed the benchmark of 1.0.

Table 5-26 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 2-hour Concentrations of Diesel Particulate Matter - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Future Case		
	EPC (µg/m^3)	TRV (µg/m^3)	CR
DPM	2.90E+00	1.0E+01	2.9E-01

Table 5-27 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Average Concentrations of Diesel Particulate Matter - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Future Case		
	EPC (µg/m^3)	TRV (µg/m^3)	CR
DPM	2.13E-02	5.0E+00	4.3E-03

MacLellan Region

Non-cancer risks for DPM inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case DPM concentrations at the MacLellan region, as provided in Table 5-28 and Table 5-29. The CRs associated with inhalation exposures to 2-hour concentrations of DPM and annual average concentrations of DPM were below the benchmark of 1.0.

Table 5-28 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 2-hour Concentrations of Diesel Particulate Matter - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Future Case		
	EPC (µg/m^3)	TRV (µg/m^3)	CR
DPM	2.78E+00	1.0E+01	2.8E-01

Table 5-29 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Average Concentrations of Diesel Particulate Matter - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Future Case		
	EPC (µg/m^3)	TRV (µg/m^3)	CR
DPM	2.59E-02	5.0E+00	5.2E-03

Work Camp

Non-cancer risks for DPM inhalation of 2-hour and annual average exposures to Off-Duty Worker Receptor at the work camp were calculated for Future Case, as provided in Table 5-30 and Table 5-31. The CRs associated with 2-hour DPM exposures exceeded the benchmark of 1.0, whereas the CRs associated with annual average exposures was below the benchmark of 1.0. Frequency analysis of inhalation exposures to 2-hour DPM concentrations is provided below.

The DPM concentrations are predicted to exceed the 2-hour air quality standard of 10 µg/m^3 on two occasions (10.4 µg/m^3 and 11.5 µg/m^3). DPM concentrations were modelled over a 5-year period representing a total of 21,900 2-hour periods. Thus, 2-hour DPM concentrations are predicted to exceed the air quality standard 0.009% of the time. The 2-hour DPM air quality standard is based on a lowest observable adverse effect level (LOAEL) of 100 µg/m^3 from studies where increased respiratory resistance was reported in study groups that included subjects that were mildly asthmatic (Health Canada, 2016c). Health Canada applied an uncertainty factor of 10 to the LOAEL to derive the 2-hour exposure limit of 10 µg/m^3 noting that the reported effects were considered mild and reversible (Health Canada 2016c). The predicted 2-hour DPM concentrations in the hours preceding and following the exceedances were below the 2-hour DPM.

Thus, given that the predicted exceedances of the short-term (2-hour) exposure limit are limited (i.e., two occurrences slightly above threshold) and that the health effects associated the 2-hour limit are based on mild and reversible effects in sensitive members of the population (asthmatics), and the maximum predicted annual average exposure for an Off-Duty Worker is below the annual average exposure limit, it is reasonable to conclude that for Off-Duty Workers, short-term and long-term inhalation exposures to DPM represent a negligible human health risk.

Table 5-30 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 2-hour Concentrations of Diesel Particulate Matter - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC (µg/m³)	TRV (µg/m³)	CR
DPM	1.15E+01	1.0E+01	**1.2E+00**

NOTE:
Bold Risk exceeds the acceptability benchmark of 1.0.

Table 5-31 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Average Concentrations of Diesel Particulate Matter - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC [a] (µg/m³)	TRV (µg/m³)	CR
DPM	6.2E-02	5.0E+00	1.2E-02

NOTE:
[a] Adjusted EPC based Annual Average Adjusmment for Off-Duty Workers of 0.031

5.4.3.3 Inhalation Risk – Hydrogen Cyanide

As provided in Table 5-32 to Table 5-37, CRs based on non-carcinogenic effects were below the target benchmark of 1.0 for the modelled receptor locations and exposure durations (1-hour, and annual). Therefore, inhalation exposures to HCN would present a negligible non-cancer human health risk for receptors located at Gordon and MacLellan Study areas and for Off-Duty Workers in the work camp.

Gordon Region

Non-cancer risks for HCN inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case HCN concentrations at the Gordon region, as provided in Table 5-32 and Table 5-33. The CRs associated with inhalation exposures to 1-hour, and annual average concentrations of HCN were below the benchmark of 1.0.

Table 5-32 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of HCN - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case			Future Case		
	EPC (µg/m³)	TRV (µg/m³)	CR	EPC (µg/m³)	TRV (µg/m³)	CR
HCN	--	3.4E+02	--	4.81E-01	3.4E+02	1.4E-03

NOTE:
-- Concentrations not available

Table 5-33 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of HCN - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case			Future Case		
	EPC (µg/m³)	TRV (µg/m³)	CR	EPC (µg/m³)	TRV (µg/m³)	CR
HCN	--	2.5E+00	--	8.44E-03	2.5E+00	3.4E-03

NOTE:
-- Concentrations not available

MacLellan Region

Non-cancer risks for HCN inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case HCN concentrations at the MacLellan region, as provided in Table 5-34 and Table 5-35. The CRs associated with inhalation exposures to 1-hour, and annual average concentrations of HCN were below the benchmark of 1.0.

Table 5-34 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of HCN - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case			Future Case		
	EPC (µg/m³)	TRV (µg/m³)	CR	EPC (µg/m³)	TRV (µg/m³)	CR
HCN	--	3.4E+02	--	7.15E+00	3.4E+02	2.1E-02

NOTE:
-- Concentrations not available

Table 5-35 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of HCN - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case			Future Case		
	EPC (μg/m^3)	TRV (μg/m^3)	CR	EPC (μg/m^3)	TRV (μg/m^3)	CR
HCN	--	2.5E+00	--	2.24E-01	2.5E+00	9.0E-02

NOTE:
-- Concentrations not available

Work Camp

Non-cancer risks for HCN inhalation exposures to Off-Duty Worker Receptors were calculated for Future Case HCN concentrations at the work camp, as provided in Table 5-36 and Table 5-37. The CR associated with inhalation exposures to 1-hour HCN was below the benchmark of 1.0 and the CRs associated with the adjusted and annual average concentrations of HCN were below the benchmark of 1.0.

Table 5-36 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentration of HCN - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC (μg/m^3)	**TRV (μg/m^3)**	**CR**
HCN	3.09E+01	3.4E+02	9.1E-02

Table 5-37 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentration of HCN - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	EPC (μg/m^3)	**TRV (μg/m^3)**	**CR**
HCN	6.42E-02	2.5E+00	2.6E-01

NOTE:
[a] Adjusted EPC based on Annual Average Adjusmment for Off-Duty Workers of 0.50 (**Table 5-5**)

5.4.3.4 Inhalation Risk – VOCs

Inhalation risks for non-carcinogenic and carcinogenic VOCs were calculated by comparing the maximum predicted concentrations in air for 1-hour, 24-hour, annual average and lifetime averaged daily concentrations with applicable non-carcinogenic and carcinogenic TRV provided in Section 5.3.3.

As presented in Table 5-38 to Table 5-49, CRs based on non-carcinogenic and carcinogenic effects were below the target benchmark of 1.0 for Gordon region, MacLellan region and the work camp for the relevant exposure durations (1-hour, 24-hour, annual and lifetime averaged daily).

Gordon Region

Non-cancer risks for VOC inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case VOC concentrations at the Gordon region, as provided in Table 5-38 to Table 5-40. The CRs associated with inhalation exposures to 1-hour, 24-hour and annual average concentrations were below the benchmark of 1.0.

The CRs associated with lifetime averaged daily exposures to carcinogenic VOCs were below 1.0, as provided in Table 5-41.

Table 5-38 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of VOCs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (µg/m^3)	TRV (µg/m^3)	CR
Acetaldehyde	--	1.04E+00	1.4E+03	7.3E-04
Benzene	--	4.06E-01	5.8E+02	7.0E-04
1,3-Butadiene	--	2.02E-02	3.7E+03	5.5E-06
Ethylbenzene	--	6.99E-02	8.6E+04	8.1E-07
Formaldehyde	--	2.95E+00	1.2E+02	2.4E-02
Propionaldehyde	--	2.35E-01	1.8E+03	1.3E-04
Toluene	--	3.32E-01	3.7E+04	9.0E-06
2,2,4-Trimethylpentane	--	9.22E-02	1.9E+04	4.9E-06
Xylenes	--	2.29E-01	2.2E+04	1.0E-05

NOTE:
-- Concentrations not measured

Table 5-39 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 24-hour Concentrations of VOCs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (µg/m^3)	TRV (µg/m^3)	CR
Acetaldehyde	--	1.95E-01	2.8E+02	7.0E-04
Acrolein	--	2.87E-02	1.1E+01	2.6E-03
Benzene	--	4.93E-02	3.2E+02	1.5E-04
1,3-Butadiene	--	2.45E-03	9.5E+02	2.6E-06
Formaldehyde	--	3.59E-01	5.0E+01	7.2E-03
Toluene	--	4.04E-02	2.3E+03	1.8E-05
Xylenes	--	2.78E-02	7.3E+02	3.8E-05

NOTE:
-- Concentrations not measured

Table 5-40 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of VOCs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Base Case	Future Case		
		Maximum EPC (µg/m^3)	TRV (µg/m^3)	CR
Acetaldehyde	--	7.66E-03	9.0E+00	8.5E-04
Acrolein	--	1.73E-03	2.0E-02	8.7E-02
Benzene	--	2.98E-03	3.0E+01	9.9E-05
1,3-Butadiene	--	1.48E-04	2.0E+00	7.4E-05
Ethylbenzene	--	5.13E-04	1.0E+03	5.1E-07
Formaldehyde	--	2.17E-02	1.0E+01	2.2E-03
Propionaldehyde	--	1.73E-03	8.0E+00	2.2E-04
Toluene	--	2.44E-01	3.8E+03	6.5E-05
2,2,4-Trimethylpentane	--	6.77E-04	1.8E+03	3.8E-07
Xylenes	--	1.68E-02	1.8E+02	9.3E-05

NOTE:
-- Concentrations not measured

Table 5-41 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of VOCs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Project Alone Case		
	Maximum LADC (µg/m³)	TRV-RSC (µg/m³)	CR
Acetaldehyde	1.24E-03	4.6E+00	2.7E-04
Benzene	4.84E-04	3.0E+00	1.6E-04
1,3-Butadiene	2.41E-05	3.3E-01	7.3E-05
Formaldehyde	3.53E-03	7.7E-01	4.6E-03
2,2,4-Trimethylbenzene	1.10E-04	1.8E+03	6.1E-08

MacLellan Region

Non-cancer risks for VOC inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case VOC concentrations at MacLellan region, as provided in Table 5-42 to Table 5-44. The CRs associated with inhalation exposures to 1-hour, 24-hour and annual average concentrations were below the benchmark of 1.0.

The CRs associated with lifetime averaged daily exposures to carcinogenic VOCs were below the benchmark of 1.0, as provided in Table 5-45.

Table 5-42 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of VOCs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (µg/m³)	TRV (µg/m³)	CR
Acetaldehyde	--	8.79E-01	1.4E+03	6.2E-04
Benzene	--	3.44E-01	5.8E+02	5.9E-04
1,3-Butadiene	--	1.71E-02	3.7E+03	4.6E-06
Ethylbenzene	--	5.93E-02	8.6E+04	6.9E-07
Formaldehyde	--	2.51E-00	1.2E+02	2.0E-02
Propionaldehyde	--	1.99E-01	1.8E+03	1.1E-04
Toluene	--	2.82E-01	3.7E+04	7.6E-06
2,2,4-Trimethylpentane	--	7.83E-02	1.9E+04	4.1E-06
Xylenes	--	1.94E-01	2.2E+04	8.8E-06
NOTE: -- Concentrations not measured				

Table 5-43 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 24-hour Concentrations of VOCs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (μg/m³)	TRV (μg/m³)	CR
Acetaldehyde	--	1.95E-01	2.8E+02	7.0E-04
Acrolein	--	1.86E-01	1.1E+01	1.7E-02
Benzene	--	7.65E-02	3.2E+02	2.4E-04
1,3-Butadiene	--	3.80E-03	9.5E+02	4.0E-06
Formaldehyde	--	5.57E-01	5.0E+01	1.1E-02
Toluene	--	6.27E-02	2.3E+03	2.7E-05
Xylenes	--	4.32E-02	7.3E+02	5.9E-05

NOTE:
-- Concentrations not measured

Table 5-44 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of VOCs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Base Case	Future Case		
		Maximum EPC (μg/m³)	TRV (μg/m³)	CR
Acetaldehyde	--	7.66E-03	9.0E+00	8.5E-04
Acrolein	--	1.75E-03	2.0E-02	8.8E-02
Benzene	--	3.00E-03	3.0E+01	1.0E-04
1,3-Butadiene	--	1.49E-04	2.0E+00	7.5E-05
Ethylbenzene	--	5.17E-04	1.0E+03	5.2E-07
Formaldehyde	--	2.18E-02	1.0E+01	2.2E-03
Propionaldehyde	--	1.74E-03	8.0E+00	2.2E-04
Toluene	--	2.46E-03	3.8E+03	6.6E-07
2,2,4-Trimethylpentane	--	6.82E-04	1.8E+03	3.8E-07
Xylenes	--	1.69E-03	1.8E+02	9.4E-06

NOTE:
-- Concentrations not measured

Table 5-45 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of VOCs - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Project Alone		
	LADC (µg/m^3)	TRV-RSC (µg/m^3)	CR
Acetaldehyde	1.24E-03	4.6E+00	2.7E-04
Benzene	4.88E-04	3.0E+00	1.6E-04
1,3-Butadiene	2.42E-05	3.3E-01	7.3E-05
Formaldehyde	3.54E-03	7.7E-01	4.6E-03
2,2,4-Trimethylbenzene	1.11E-04	1.8E+03	6.2E-08

Work Camp

Non-cancer risks for VOC inhalation exposures to Off-Duty Worker Receptors were calculated for Future Case VOC concentrations at work camp, as provided in Table 5-46 to Table 5-48. The CRs associated with inhalation exposures to 1-hour, 24-hour and annual average concentrations were below the benchmark of 1.0

The CR associated with lifetime averaged daily exposures to carcinogenic VOCs were below 1.0, as provided in Table 5-49.

Table 5-46 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 1-hour Concentrations of VOCs - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	Maximum EPC (µg/m^3)	TRV (µg/m^3)	CR
Acetaldehyde	3.52E+00	1.4E+03	2.5E-03
Benzene	1.37E+00	5.8E+02	2.4E-03
1,3-Butadiene	6.85E-02	3.7E+03	1.9E-05
Ethylbenzene	2.37E-01	8.6E+04	2.8E-06
Formaldehyde	1.00E+01	1.2E+02	8.1E-02
Propionaldehyde	7.97E-01	1.8E+03	4.4E-04
Toluene	1.13E+00	3.7E+04	3.1E-05
2,2,4-Trimethylpentane	3.13E-01	1.9E+04	1.6E-05
Xylenes	7.78E-01	2.2E+04	3.5E-05

Table 5-47 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to 24-hour Concentrations of VOCs - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	Maximum EPC (μg/m^3)	TRV (μg/m^3)	CR
Acetaldehyde	8.18E-01	2.8E+02	2.9E-03
Acrolein	1.86E-01	1.1E+01	1.7E-02
Benzene	3.20E-01	3.2E+02	1.0E-03
1,3-Butadiene	1.59E-02	9.5E+02	1.7E-05
Formaldehyde	2.34E+00	5.0E+01	4.7E-02
Toluene	2.62E-01	2.3E+03	1.1E-04
Xylenes	1.81E-01	7.3E+02	2.5E-04

Table 5-48 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of VOCs - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	Maximum EPC [a] (μg/m^3)	TRV (μg/m^3)	CR
Acetaldehyde	2.42E-02	9.0E+00	2.7E-03
Acrolein	5.50E-03	2.0E-02	2.8E-01
Benzene	9.44E-03	3.0E+01	3.1E-04
1,3-Butadiene	4.70E-04	2.0E+00	2.4E-04
Ethylbenzene	1.63E-03	1.0E+03	1.6E-06
Formaldehyde	6.88E-02	1.0E+01	6.9E-03
Propionaldehyde	5.46E-03	8.0E+00	6.8E-04
Toluene	7.74E-03	3.8E+03	2.1E-06
2,2,4-Trimethylpentane	2.14E-03	1.8E+03	1.2E-06
Xylenes	5.32E-03	1.8E+02	3.0E-05

NOTE:
[a] Adjusted EPC based Annual Average Adjusmment for Off-Duty Workers of 0.50 (Table 5-5)

Table 5-49 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of VOCs - Off-Duty Worker Receptor (Work Camp)

COPC	Project Alone Case		
	Maximum LADC [a] (µg/m^3)	TRV-RSC (µg/m^3)	CR
Acetaldehyde	3.92E-03	4.6E+00	1.8E-02
Benzene	1.54E-03	3.0E+00	4.6E-03
1,3-Butadiene	7.63E-05	3.3E-01	2.5E-05
Formaldehyde	1.12E-02	7.7E-01	8.6E-03
2,2,4-Trimethylbenzene	3.49E-04	1.8E+03	6.3E-01

NOTE:
[a] Adjusted EPC based Lifetime Averagede Adjusmment for Off-Duty Workers of 0.081 (**Table 5-5**).

5.4.3.5 Inhalation Risk – PAH

Inhalation risks for non-carcinogenic and carcinogenic PAHs were calculated by comparing the maximum predicted concentrations in air for annual average and lifetime averaged daily PAH concentrations with applicable non-carcinogenic and carcinogenic TRVs provided in Section 5.3.

As presented in Table 5-50 to Table 5-55**,** CRs based on non-carcinogenic and carcinogenic effects were below the target benchmark of 1.0 for the Gordon region, MacLellan region and work camp.

Gordon Region

Non-cancer risks for PAH inhalation exposures to Indigenous Receptors and Residential Receptors were calculated for Future Case PAH concentrations at the Gordon region, as provided in Table 5-50. The CR associated with inhalation exposures to annual average concentrations were below 1.0.

The CR associated with lifetime averaged daily exposures to carcinogenic PAHs was below 1.0, as provided in Table 5-51.

Table 5-50 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of PAHs - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (µg/m^3)	TRV (µg/m^3)	CR
Acenaphthene	--	5.01E-05	1.0E+01	5.0E-06
Acenaphthylene	--	6.53E-05	1.0E+01	6.5E-06
Anthracene	--	7.10E-06	5.0E-02	1.4E-04
Fluoranthene	--	8.26E-06	5.0E-02	1.7E-04
Fluorene	--	6.77E-05	1.0E+00	6.8E-05
Naphthalene	--	5.19E-04	3.7E+00	1.4E-04
Phenanthrene	--	1.17E-04	8.0E-01	1.5E-04
Pyrene	--	9.30E-06	5.0E-02	1.9E-04

NOTE:
-- Concentrations not available

Table 5-51 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of B[a]P$_{TPE}$ - Indigenous Receptor and Residential Receptor (Gordon Region)

PAH	Project Alone Case		
	Maximum LADC (µg/m^3)	TRV (µg/m^3)	CR
B[a]P$_{TPE}$	1.50E-07	3.2E-01	4.6E-07

MacLellan Region

Non-cancer risks for PAH inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case PAH concentrations at MacLellan region, as provided in Table 5-52. The CRs associated with inhalation exposures to annual average concentrations were below 1.0.

The CR associated with lifetime averaged daily exposures to carcinogenic PAHs was below 1.0 as provided in Table 5-53.

Table 5-52 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of PAHs - Indigenous Receptor and Residential Receptor (MacLellan Region)

PAH	Baseline Case	Future Case		
		Maximum EPC (µg/m³)	TRV (µg/m³)	CR
Acenaphthene	--	5.04E-05	1.0E+01	5.0E-06
Acenaphthylene	--	6.57E-05	1.0E+01	6.6E-06
Anthracene	--	7.35E-05	5.0E-02	1.5E-03
Fluoranthene	--	8.52E-06	5.0E-02	1.7E-04
Fluorene	--	6.88E-05	1.0E+00	6.9E-05
Naphthalene	--	5.23E-04	3.7E+00	1.4E-04
Phenanthrene	--	1.19E-04	8.0E-01	1.5E-04
Pyrene	--	9.69E-06	5.0E-02	1.9E-04
NOTE: -- Concentrations not available				

Table 5-53 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of B[a]P$_{TPE}$ - Indigenous Receptor and Residential Receptor (MacLellan Region)

PAH	Project Alone Case		
	Maximum LADC (µg/m³)	TRV (µg/m³)	CR
B[a]P$_{TPE}$	1.58E-07	3.2E-01	4.9E-07

Work Camp

Non-cancer risks for PAH inhalation exposures to Off-Duty Workers were calculated for Future Case PAH concentrations at work camp, as provided in Table 5-54. The CRs associated with inhalation exposures to annual average concentrations were below 1.0.

The CR associated with lifetime averaged daily exposures to carcinogenic PAHs was below 1.0, as provided in Table 5-55.

Table 5-54 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of PAHs - Off-Duty Worker Receptor (Work Camp)

PAH	Future Case		
	Maximum EPC [a] (µg/m^3)	TRV (µg/m^3)	CR
Acenaphthene	1.59E-04	1.0E+01	1.6E-05
Acenaphthylen	2.06E-04	1.0E+01	2.1E-05
Anthracene	2.22E-05	5.0E-02	4.4E-04
Fluoranthene	2.60E-05	5.0E-02	5.2E-04
Fluorene	2.14E-04	1.0E+00	2.1E-04
Naphthalene	1.65E-03	3.7E+00	4.4E-04
Phenanthrene	3.68E-04	8.0E-01	4.6E-04
Pyrene	2.92E-05	5.0E-02	5.8E-04

NOTE:
[a] Adjusted EPC based Annual Average Adjusmment for Off-Duty Workers of 0.50 (**Table 5-5**)

Table 5-55 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of PAHs B[a]P$_{TPE}$ - Off-Duty Worker Receptor (Work Camp)

PAH	Project Alone Case		
	Maximum LADC (µg/m^3)	TRV (µg/m^3)	CR
B[a]P$_{TPE}$	4.67E-07	3.2E-01	1.4E-06

NOTE:
[a] Adjusted EPC based Lifetime Averaged Adjusmment for Off-Duty Workers of 0.081 (**Table 5-5**)

5.4.3.6 Inhalation Risk – Metals

Inhalation risks for non-carcinogenic and carcinogenic metals were calculated by comparing the maximum predicted concentrations in air for annual average and lifetime averaged daily concentrations with applicable non-carcinogenic and carcinogenic TRVs provided in Section 5.3.3. Concentrations of antimony, barium and strontium are not expected to be emitted to the air by the Project and therefore were not modelled.

As presented in Table 5-56 to Table 5-61, CRs based on non-carcinogenic and carcinogenic risks were below the target benchmark of 1.0 for Gordon region, MacLellan region and the work camp, the relevant exposure durations (annual and lifetime average daily).

Gordon Region

Non-cancer risks for metal particulate inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case metal concentrations at the Gordon region, as provided in Table 5-56. The CRs associated with inhalation exposures to annual average concentrations were below 1.0.

The CRs associated with lifetime averaged daily exposures to carcinogenic metals were below 1.0, as provided in Table 5-57.

Table 5-56 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of Metals - Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (μg/m^3)	TRV (μg/m^3)	CR
Antimony	--	--	2.0E-01	--
Arsenic	--	5.59E-05	1.0E+00	5.6E-05
Barium	--	--	1.0E+00	--
Beryllium	--	3.96E-07	2.0E-02	2.0E-05
Cadmium	--	3.69E-07	1.0E-02	3.7E-05
Chromium Total	--	4.97E-05	2.0E-03	--
Cobalt	--	1.30E-05	5.0E-01	2.6E-05
Copper	--	4.33E-05	1.0E+00	4.3E-05
Lead	--	1.13E-05	2.0E-01	5.7E-05
Manganese	--	1.61E-07	5.0E-02	3.2E-06
Mercury	--	7.36E-09	3.0E-01	2.5E-08
Molybdenum	--	9.91E-07	1.2E+01	8.3E-08
Nickel	--	3.46E-05	2.0E-02	1.7E-03
Selenium	--	4.29E-07	2.0E-01	2.1E-06
Silver	--	1.99E-07	1.0E-02	2.0E-05
Strontium	--	--	2.0E+00	--
Thallium	--	1.90E-07	1.0E-01	1.9E-06
Uranium	--	8.95E-07	3.0E-01	3.0E-06
Vanadium	--	5.65E-05	1.0E+00	5.7E-05
Zinc	--	6.78E-05	2.0E+00	3.4E-05

NOTE:
-- Concentrations not available

Table 5-57 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of Metals – Indigenous Receptor and Residential Receptor (Gordon Region)

COPC	Project Alone Case		
	Maximum LADC (μg/m^3)	TRV-RsC (μg/m^3)	CR
Arsenic	9.08E-06	1.6E-03	5.8E-03
Beryllium	6.44E-08	4.2E-03	1.5E-05
Cadmium	6.00E-08	1.0E+03	5.9E-11
Chromium VI	2.99E-10	1.3E-04	2.3E-06
Nickel	5.62E-06	7.7E-03	7.3E-04

MacLellan Region

Non-cancer risks for metal particulate inhalation exposures to Residential Receptors and Indigenous Receptors were calculated for Future Case metal concentrations at the MacLellan region, as provided in Table 5-58. The CRs associated with inhalation exposures to annual avererage concentrations were below 1.0.

The CRs associated with lifetime averaged daily exposures to carcinogenic metals were below 1.0, as provided in Table 5-59.

Work Camp

Non-cancer risks for metal particulate inhalation exposures to Off-Duty Worker Receptors were calculated for Future Case metal concentrations at the work camp, as provided in Table 5-60. The CRs associated with inhalation exposures to annual avererage concentrations were below 1.0.

The CRs associated with lifetime averaged daily exposures to carcinogenic metals were below 1.0, as provided in Table 5-61.

Table 5-58 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of Metals - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Baseline Case	Future Case		
		Maximum EPC (µg/m^3)	TRV (µg/m^3)	CR
Antimony	--	--	2.0E-01	--
Arsenic	--	4.30E-04	1.0E+00	4.3E-04
Barium	--	--	1.0E+00	--
Beryllium	--	3.17E-07	2.0E-02	1.6E-05
Cadmium	--	5.13E-06	1.0E-02	5.1E-04
Chromim Total	--	2.72E-04	2.0E-03	1.4E-01
Cobalt	--	4.54E-05	5.0E-01	9.1E-05
Copper	--	1.80E-04	1.0E+00	1.8E-04
Lead	--	1.49E-04	2.0E-01	7.5E-04
Manganese	--	2.02E-07	5.0E-02	4.0E-06
Mercury	--	4.97E-08	3.0E-01	1.7E-07
Molybdenum	--	1.16E-06	1.2E+01	9.7E-08
Nickel	--	3.23E-04	2.0E-02	1.6E-02
Selenium	--	2.56E-06	2.0E-01	1.3E-05
Silver	--	2.50E-06	1.0E-02	2.5E-04
Strontium	--	--	2.0E+00	--
Thallium	--	2.36E-06	1.0E-01	2.4E-05
Uranium	--	2.50E-06	3.0E-01	8.3E-06
Vanadium	--	1.09E-04	1.0E+00	1.1E-04
Zinc	--	9.73E-04	2.0E+00	4.9E-04

NOTE:
-- Concentrations not available

Table 5-59 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of Metals - Indigenous Receptor and Residential Receptor (MacLellan Region)

COPC	Project Alone Case		
	Maximum LADC (µg/m^3)	TRV-RsC (µg/m^3)	CR
Arsenic	7.01E-05	1.6E-03	4.5E-02
Beryllium	5.17E-08	4.2E-03	1.2E-05
Cadmium	8.36E-07	1.0E+03	8.2E-10
Chromium VI	3.78E-10	1.3E-04	2.9E-06
Nickel	5.26E-05	7.7E-03	6.8E-03

Table 5-60 Non-carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of Metals - Off-Duty Worker Receptor (Work Camp)

COPC	Future Case		
	Maximum EPC [a] (µg/m^3)	TRV (µg/m^3)	CR
Antimony	--	2.0E-01	--
Arsenic	2.66E-03	1.0E+00	2.7E-03
Barium	--	1.0E+00	--
Beryllium	1.52E-06	2.0E-02	7.6E-05
Cadmium	2.80E-05	1.0E-02	2.8E-03
Chromium Total	6.84E-04	2.0E-03	3.4E-01
Cobalt	1.15E-04	5.0E-01	2.3E-04
Copper	4.42E-04	1.0E+00	4.4E-04
Lead	9.86E-04	2.0E-01	4.9E-03
Manganese	4.66E-07	5.0E-02	9.3E-06
Mercury	4.16E-07	3.0E-01	1.4E-06
Molybdenum	4.88E-06	1.2E+01	4.1E-07
Nickel	8.76E-04	2.0E-02	4.4E-02
Selenium	1.84E-05	2.0E-01	9.2E-05
Silver	1.74E-05	1.0E-02	1.7E-03
Strontium	--	2.0E+00	--
Thallium	2.02E-05	1.0E-01	2.0E-04
Uranium	2.06E-05	3.0E-01	6.9E-05
Vanadium	2.94E-04	1.0E+00	2.9E-04
Zinc	3.92E-03	2.0E+00	2.0E-03

NOTES:

-- Concentrations not available

[a] Adjusted EPC based Annual Average Adjusmment for Off-Duty Workers of 0.5 (Table 5-5)

Table 5-61 Carcinogenic Human Health Risks Associated with Inhalation Exposures to Annual Concentrations of Metals - Off-Duty Worker Receptor (Work Camp)

COPC	Project Alone Case		
	Maximum LADC [a] (µg/m^3)	TRV-RsC (µg/m^3)	CR
Arsenic	4.31E-04	1.6E-03	2.8E-01
Beryllium	2.47E-07	4.2E-03	5.9E-05
Cadmium	4.55E-06	1.0E+03	4.5E-09
Chromium VI	8.69E-10	1.3E-04	6.6E-06
Nickel	1.42E-04	7.7E-03	1.8E-02

NOTE:
[a] Adjusted EPC based Lifetime Averaged Adjusmment for Off-Duty Workers of 0.081 (Table 5-5)

5.4.4 Human Health Risk via Direct Soil Contact

As noted in Section 4.2 dust deposition predictions were used to estimate potential changes to soil quality. It was assumed that the metal that was deposited to the soil remains in the top 2 cm of the soil and there is no loss throughout the typical human lifetime (i.e., 80 years). Human receptors (i.e., Indigenous Receptor and Residential Receptor) may be exposed to metal COPC within the Gordon region and MacLellan region through incidental ingestion of soil and dermal contact with these soils (i.e., soil contact). Off-Duty Workers are only evaluated for inhalation exposures, as ingestion exposures are assumed to be comparable to those of the general population because this receptor will not consume country foods, backyard foods or untreated water from the LAA. The following assumptions were used to estimate changes in metal concentrations in soil:

- Human receptors were assumed to spend 100% of their time within their particular region.
- Human receptors were assumed to be exposed to the maximum concentration of each COPC predicted in their region (i.e., Gordon region and MacLellan region).
- The combined dust deposition estimates for the Gordon site and the MacLellan site provided by the air quality modelling were assumed to represent the dust and metal deposition rate over the 5-year operational life of the Gordon site and the 13-year operational life of the MacLellan site. The 95% UCLM deposition rate for locations within a given region was used as the deposition rate across the entire region. This approach provides reasonable upper-bound estimates of increases in metal concentrations in soil and therefore the potential exposure to COPC in soil.

As presented in Table 5-62 to Table 5-69, HQs for soil contact were below the target benchmark of 0.2. Therefore, metal concentrations in soil represents a negligible human health risk.

Table 5-62 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Indigenous Receptor (Gordon Region) (Toddler)

COPC	Gordon Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.5E-03	1.5E-03	1.3E-05	1.3E-05	1.5E-03	1.5E-03
Arsenic	1.8E-02	1.9E-02	4.5E-04	4.8E-04	1.8E-02	1.9E-02
Barium	1.2E-03	1.2E-03	1.0E-04	1.0E-04	1.3E-03	1.3E-03
Beryllium	7.2E-04	7.3E-04	6.2E-06	6.2E-06	7.3E-04	7.3E-04
Cadmium	1.7E-03	1.7E-03	1.5E-05	1.5E-05	1.8E-03	1.8E-03
Chromium	2.5E-05	2.5E-05	2.1E-06	2.2E-06	2.7E-05	2.7E-05
Cobalt	1.5E-03	1.5E-03	1.3E-05	1.3E-05	1.5E-03	1.5E-03
Copper	2.0E-03	2.0E-03	1.0E-04	1.0E-04	2.1E-03	2.1E-03
Lead	1.1E-02	1.1E-02	9.4E-05	9.5E-05	1.1E-02	1.1E-02
Manganese	2.8E-03	2.8E-03	2.4E-05	2.4E-05	2.9E-03	2.9E-03
Mercury	1.8E-03	1.8E-03	1.5E-03	1.5E-03	3.3E-03	3.3E-03
Molybdenum	1.7E-03	1.7E-03	1.5E-05	1.5E-05	1.7E-03	1.7E-03
Nickel	2.3E-03	2.3E-03	1.8E-04	1.8E-04	2.5E-03	2.5E-03
Selenium	2.0E-04	2.0E-04	1.7E-06	1.7E-06	2.0E-04	2.0E-04
Silver	1.5E-04	1.5E-04	1.3E-06	1.3E-06	1.5E-04	1.5E-04
Strontium	1.7E-04	1.7E-04	1.4E-06	1.4E-06	1.7E-04	1.7E-04
Thallium	6.3E-02	6.3E-02	5.4E-04	5.4E-04	6.4E-02	6.4E-02
Uranium	3.6E-03	3.6E-03	3.1E-04	3.1E-04	4.0E-03	4.0E-03
Vanadium	6.6E-03	6.6E-03	5.6E-05	5.7E-05	6.6E-03	6.6E-03
Zinc	4.5E-04	4.5E-04	3.9E-05	3.9E-05	4.9E-04	4.9E-04

Table 5-63 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Indigenous Receptor (Gordon Region) (Adult)

COPC	Gordon Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	8.6E-05	8.6E-05	7.3E-06	7.3E-06	9.3E-05	9.3E-05
Arsenic	1.0E-03	1.1E-03	2.6E-04	2.8E-04	1.3E-03	1.4E-03
Barium	6.9E-05	6.9E-05	5.9E-05	5.9E-05	1.3E-04	1.3E-04
Beryllium	4.2E-05	4.2E-05	3.6E-06	3.6E-06	4.6E-05	4.6E-05
Cadmium	1.0E-04	1.0E-04	8.7E-06	8.7E-06	1.1E-04	1.1E-04
Chromium	1.5E-06	1.5E-06	1.2E-06	1.3E-06	2.7E-06	2.7E-06
Cobalt	8.8E-05	8.8E-05	7.5E-06	7.6E-06	9.6E-05	9.6E-05
Copper	7.6E-05	7.7E-05	3.9E-05	3.9E-05	1.2E-04	1.2E-04
Lead	6.4E-04	6.4E-04	5.5E-05	5.5E-05	7.0E-04	7.0E-04
Manganese	1.4E-04	1.4E-04	1.2E-05	1.2E-05	1.6E-04	1.6E-04
Mercury	1.0E-04	1.0E-04	8.9E-04	8.9E-04	9.9E-04	9.9E-04
Molybdenum	8.3E-05	8.3E-05	7.1E-06	7.1E-06	9.0E-05	9.0E-05
Nickel	1.3E-04	1.3E-04	1.0E-04	1.1E-04	2.4E-04	2.4E-04
Selenium	1.2E-05	1.2E-05	1.1E-06	1.1E-06	1.3E-05	1.3E-05
Silver	8.9E-06	9.0E-06	7.7E-07	7.7E-07	9.7E-06	9.7E-06
Strontium	9.7E-06	9.7E-06	8.3E-07	8.3E-07	1.1E-05	1.1E-05
Thallium	3.7E-03	3.7E-03	3.1E-04	3.2E-04	4.0E-03	4.0E-03
Uranium	2.1E-04	2.1E-04	1.8E-04	1.8E-04	3.9E-04	4.0E-04
Vanadium	3.8E-04	3.8E-04	3.3E-05	3.3E-05	4.1E-04	4.2E-04
Zinc	2.2E-05	2.2E-05	1.9E-05	1.9E-05	4.1E-05	4.1E-05

Table 5-64 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Residential Receptor (Gordon Region) (Toddler)

COPC	Gordon Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.5E-03	1.5E-03	1.3E-05	1.3E-05	1.5E-03	1.5E-03
Arsenic	1.8E-02	1.9E-02	4.5E-04	4.8E-04	1.8E-02	1.9E-02
Barium	1.2E-03	1.2E-03	1.0E-04	1.0E-04	1.3E-03	1.3E-03
Beryllium	7.2E-04	7.3E-04	6.2E-06	6.2E-06	7.3E-04	7.3E-04
Cadmium	1.7E-03	1.7E-03	1.5E-05	1.5E-05	1.8E-03	1.8E-03
Chromium	2.5E-05	2.5E-05	2.1E-06	2.2E-06	2.7E-05	2.7E-05
Cobalt	1.5E-03	1.5E-03	1.3E-05	1.3E-05	1.5E-03	1.5E-03
Copper	2.0E-03	2.0E-03	1.0E-04	1.0E-04	2.1E-03	2.1E-03
Lead	1.1E-02	1.1E-02	9.4E-05	9.5E-05	1.1E-02	1.1E-02
Manganese	2.8E-03	2.8E-03	2.4E-05	2.4E-05	2.9E-03	2.9E-03
Mercury	1.8E-03	1.8E-03	1.5E-03	1.5E-03	3.3E-03	3.3E-03
Molybdenum	1.7E-03	1.7E-03	1.5E-05	1.5E-05	1.7E-03	1.7E-03
Nickel	2.3E-03	2.3E-03	1.8E-04	1.8E-04	2.5E-03	2.5E-03
Selenium	2.0E-04	2.0E-04	1.7E-06	1.7E-06	2.0E-04	2.0E-04
Silver	1.5E-04	1.5E-04	1.3E-06	1.3E-06	1.5E-04	1.5E-04
Strontium	1.7E-04	1.7E-04	1.4E-06	1.4E-06	1.7E-04	1.7E-04
Thallium	6.3E-02	6.3E-02	5.4E-04	5.4E-04	6.4E-02	6.4E-02
Uranium	3.6E-03	3.6E-03	3.1E-04	3.1E-04	4.0E-03	4.0E-03
Vanadium	6.6E-03	6.6E-03	5.6E-05	5.7E-05	6.6E-03	6.6E-03
Zinc	4.5E-04	4.5E-04	3.9E-05	3.9E-05	4.9E-04	4.9E-04

Table 5-65 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Residential Receptor (Gordon Region) (Adult)

COPC	Gordon Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	8.6E-05	8.6E-05	7.3E-06	7.3E-06	9.3E-05	9.3E-05
Arsenic	1.0E-03	1.1E-03	2.6E-04	2.8E-04	1.3E-03	1.4E-03
Barium	6.9E-05	6.9E-05	5.9E-05	5.9E-05	1.3E-04	1.3E-04
Beryllium	4.2E-05	4.2E-05	3.6E-06	3.6E-06	4.6E-05	4.6E-05
Cadmium	1.0E-04	1.0E-04	8.7E-06	8.7E-06	1.1E-04	1.1E-04
Chromium	1.5E-06	1.5E-06	1.2E-06	1.3E-06	2.7E-06	2.7E-06
Cobalt	8.8E-05	8.8E-05	7.5E-06	7.6E-06	9.6E-05	9.6E-05
Copper	7.6E-05	7.7E-05	3.9E-05	3.9E-05	1.2E-04	1.2E-04
Lead	6.4E-04	6.4E-04	5.5E-05	5.5E-05	7.0E-04	7.0E-04
Manganese	1.4E-04	1.4E-04	1.2E-05	1.2E-05	1.6E-04	1.6E-04
Mercury	1.0E-04	1.0E-04	8.9E-04	8.9E-04	9.9E-04	9.9E-04
Molybdenum	8.3E-05	8.3E-05	7.1E-06	7.1E-06	9.0E-05	9.0E-05
Nickel	1.3E-04	1.3E-04	1.0E-04	1.1E-04	2.4E-04	2.4E-04
Selenium	1.2E-05	1.2E-05	1.1E-06	1.1E-06	1.3E-05	1.3E-05
Silver	8.9E-06	9.0E-06	7.7E-07	7.7E-07	9.7E-06	9.7E-06
Strontium	9.7E-06	9.7E-06	8.3E-07	8.3E-07	1.1E-05	1.1E-05
Thallium	3.7E-03	3.7E-03	3.1E-04	3.2E-04	4.0E-03	4.0E-03
Uranium	2.1E-04	2.1E-04	1.8E-04	1.8E-04	3.9E-04	4.0E-04
Vanadium	3.8E-04	3.8E-04	3.3E-05	3.3E-05	4.1E-04	4.2E-04
Zinc	2.2E-05	2.2E-05	1.9E-05	1.9E-05	4.1E-05	4.1E-05

Table 5-66 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Indigenous Receptor (MacLellan Region) (Toddler)

COPC	MacLellan Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.8E-03	1.8E-03	1.6E-05	1.6E-05	1.8E-03	1.8E-03
Arsenic	2.6E-02	3.3E-02	6.6E-04	8.6E-04	2.6E-02	3.4E-02
Barium	9.0E-04	9.0E-04	7.8E-05	7.8E-05	9.8E-04	9.8E-04
Beryllium	3.1E-04	3.1E-04	2.7E-06	2.7E-06	3.1E-04	3.1E-04
Cadmium	1.7E-03	1.7E-03	1.5E-05	1.5E-05	1.7E-03	1.7E-03
Chromium	1.6E-05	1.7E-05	1.4E-06	1.4E-06	1.7E-05	1.8E-05
Cobalt	1.0E-03	1.0E-03	8.7E-06	8.9E-06	1.0E-03	1.0E-03
Copper	4.2E-03	4.2E-03	2.2E-04	2.2E-04	4.4E-03	4.4E-03
Lead	1.1E-02	1.1E-02	9.2E-05	9.4E-05	1.1E-02	1.1E-02
Manganese	1.8E-03	1.8E-03	1.6E-05	1.6E-05	1.8E-03	1.8E-03
Mercury	3.3E-03	3.3E-03	2.8E-03	2.8E-03	6.1E-03	6.1E-03
Molybdenum	1.5E-04	1.5E-04	1.3E-06	1.3E-06	1.5E-04	1.6E-04
Nickel	1.5E-02	1.5E-02	1.2E-03	1.2E-03	1.6E-02	1.7E-02
Selenium	7.4E-04	7.5E-04	6.4E-06	6.4E-06	7.5E-04	7.5E-04
Silver	2.0E-04	2.1E-04	1.8E-06	1.8E-06	2.1E-04	2.1E-04
Strontium	1.2E-04	1.2E-04	1.0E-06	1.0E-06	1.2E-04	1.2E-04
Thallium	4.5E-02	4.6E-02	3.9E-04	3.9E-04	4.5E-02	4.6E-02
Uranium	3.2E-03	3.3E-03	2.8E-04	2.8E-04	3.5E-03	3.5E-03
Vanadium	3.0E-03	3.1E-03	2.6E-05	2.6E-05	3.0E-03	3.1E-03
Zinc	8.0E-04	8.1E-04	6.9E-05	7.0E-05	8.7E-04	8.8E-04

Table 5-67 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Indigenous Receptor (MacLellan Region) (Adult)

COPC	MacLellan Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.1E-04	1.1E-04	9.1E-06	9.1E-06	1.2E-04	1.2E-04
Arsenic	1.5E-03	1.9E-03	3.8E-04	5.0E-04	1.9E-03	2.4E-03
Barium	5.3E-05	5.3E-05	4.5E-05	4.5E-05	9.8E-05	9.8E-05
Beryllium	1.8E-05	1.8E-05	1.5E-06	1.6E-06	2.0E-05	2.0E-05
Cadmium	9.9E-05	1.0E-04	8.5E-06	8.6E-06	1.1E-04	1.1E-04
Chromium	9.2E-07	9.7E-07	7.9E-07	8.3E-07	1.7E-06	1.8E-06
Cobalt	5.9E-05	6.0E-05	5.0E-06	5.1E-06	6.4E-05	6.5E-05
Copper	1.6E-04	1.6E-04	8.1E-05	8.1E-05	2.4E-04	2.4E-04
Lead	6.3E-04	6.4E-04	5.4E-05	5.5E-05	6.8E-04	6.9E-04
Manganese	9.3E-05	9.3E-05	8.0E-06	8.0E-06	1.0E-04	1.0E-04
Mercury	1.9E-04	1.9E-04	1.6E-03	1.6E-03	1.8E-03	1.8E-03
Molybdenum	7.4E-06	7.4E-06	6.3E-07	6.3E-07	8.0E-06	8.0E-06
Nickel	8.9E-04	8.9E-04	6.9E-04	7.0E-04	1.6E-03	1.6E-03
Selenium	4.7E-05	4.7E-05	4.0E-06	4.0E-06	5.1E-05	5.1E-05
Silver	1.2E-05	1.2E-05	1.0E-06	1.0E-06	1.3E-05	1.3E-05
Strontium	7.0E-06	7.0E-06	6.0E-07	6.0E-07	7.6E-06	7.6E-06
Thallium	2.6E-03	2.7E-03	2.2E-04	2.3E-04	2.9E-03	2.9E-03
Uranium	1.9E-04	1.9E-04	1.6E-04	1.6E-04	3.5E-04	3.5E-04
Vanadium	1.8E-04	1.8E-04	1.5E-05	1.5E-05	1.9E-04	1.9E-04
Zinc	3.9E-05	4.0E-05	3.3E-05	3.4E-05	7.3E-05	7.3E-05

Table 5-68 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Residential Receptor (MacLellan Region) (Toddler)

COPC	MacLellan Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.8E-03	1.8E-03	1.6E-05	1.6E-05	1.8E-03	1.8E-03
Arsenic	2.6E-02	3.3E-02	6.6E-04	8.6E-04	2.6E-02	3.4E-02
Barium	9.0E-04	9.0E-04	7.8E-05	7.8E-05	9.8E-04	9.8E-04
Beryllium	3.1E-04	3.1E-04	2.7E-06	2.7E-06	3.1E-04	3.1E-04
Cadmium	1.7E-03	1.7E-03	1.5E-05	1.5E-05	1.7E-03	1.7E-03
Chromium	1.6E-05	1.7E-05	1.4E-06	1.4E-06	1.7E-05	1.8E-05
Cobalt	1.0E-03	1.0E-03	8.7E-06	8.9E-06	1.0E-03	1.0E-03
Copper	4.2E-03	4.2E-03	2.2E-04	2.2E-04	4.4E-03	4.4E-03
Lead	1.1E-02	1.1E-02	9.2E-05	9.4E-05	1.1E-02	1.1E-02
Manganese	1.8E-03	1.8E-03	1.6E-05	1.6E-05	1.8E-03	1.8E-03
Mercury	3.3E-03	3.3E-03	2.8E-03	2.8E-03	6.1E-03	6.1E-03
Molybdenum	1.5E-04	1.5E-04	1.3E-06	1.3E-06	1.5E-04	1.6E-04
Nickel	1.5E-02	1.5E-02	1.2E-03	1.2E-03	1.6E-02	1.7E-02
Selenium	7.4E-04	7.5E-04	6.4E-06	6.4E-06	7.5E-04	7.5E-04
Silver	2.0E-04	2.1E-04	1.8E-06	1.8E-06	2.1E-04	2.1E-04
Strontium	1.2E-04	1.2E-04	1.0E-06	1.0E-06	1.2E-04	1.2E-04
Thallium	4.5E-02	4.6E-02	3.9E-04	3.9E-04	4.5E-02	4.6E-02
Uranium	3.2E-03	3.3E-03	2.8E-04	2.8E-04	3.5E-03	3.5E-03
Vanadium	3.0E-03	3.1E-03	2.6E-05	2.6E-05	3.0E-03	3.1E-03
Zinc	8.0E-04	8.1E-04	6.9E-05	7.0E-05	8.7E-04	8.8E-04

Table 5-69 Non-carcinogenic Human Health Risks Associated with Soil Exposure – Residential Receptor (MacLellan Region) (Adult)

COPC	MacLellan Region					
	Incidental Ingestion HQ		Dermal Contact HQ		Total Soil Contact HQ	
	Baseline Case	Future Case	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.1E-04	1.1E-04	9.1E-06	9.1E-06	1.2E-04	1.2E-04
Arsenic	1.5E-03	1.9E-03	3.8E-04	5.0E-04	1.9E-03	2.4E-03
Barium	5.3E-05	5.3E-05	4.5E-05	4.5E-05	9.8E-05	9.8E-05
Beryllium	1.8E-05	1.8E-05	1.5E-06	1.6E-06	2.0E-05	2.0E-05
Cadmium	9.9E-05	1.0E-04	8.5E-06	8.6E-06	1.1E-04	1.1E-04
Chromium	9.2E-07	9.7E-07	7.9E-07	8.3E-07	1.7E-06	1.8E-06
Cobalt	5.9E-05	6.0E-05	5.0E-06	5.1E-06	6.4E-05	6.5E-05
Copper	1.6E-04	1.6E-04	8.1E-05	8.1E-05	2.4E-04	2.4E-04
Lead	6.3E-04	6.4E-04	5.4E-05	5.5E-05	6.8E-04	6.9E-04
Manganese	9.3E-05	9.3E-05	8.0E-06	8.0E-06	1.0E-04	1.0E-04
Mercury	1.9E-04	1.9E-04	1.6E-03	1.6E-03	1.8E-03	1.8E-03
Molybdenum	7.4E-06	7.4E-06	6.3E-07	6.3E-07	8.0E-06	8.0E-06
Nickel	8.9E-04	8.9E-04	6.9E-04	7.0E-04	1.6E-03	1.6E-03
Selenium	4.7E-05	4.7E-05	4.0E-06	4.0E-06	5.1E-05	5.1E-05
Silver	1.2E-05	1.2E-05	1.0E-06	1.0E-06	1.3E-05	1.3E-05
Strontium	7.0E-06	7.0E-06	6.0E-07	6.0E-07	7.6E-06	7.6E-06
Thallium	2.6E-03	2.7E-03	2.2E-04	2.3E-04	2.9E-03	2.9E-03
Uranium	1.9E-04	1.9E-04	1.6E-04	1.6E-04	3.5E-04	3.5E-04
Vanadium	1.8E-04	1.8E-04	1.5E-05	1.5E-05	1.9E-04	1.9E-04
Zinc	3.9E-05	4.0E-05	3.3E-05	3.4E-05	7.3E-05	7.3E-05

Health risks associated with the metal COPC that are considered carcinogens (e.g.., arsenic) were also assessed at each of the selected deposition receptor locations to evaluate the soil exposure pathway for the two types of human receptors. The ILCRs based on the Project Alone Case are provided in Table 5-70 to Table 5-73. ILCRs for the soil exposure pathway for the two types of human receptors were below the target benchmark of 1.0E-05, indicating that Project-related increase in metal concentrations in soil represents a negligible human health risk.

Table 5-70 Carcinogenic Human Health Risks Associated with Soil Exposure – Indigenous Receptor (Gordon Region) (Lifetime Receptor)

COPC	Gordon Region		
	Incidental Soil Ingestion ILCR	Dermal Contact with Soil ILCR	Total Soil Contact ILCR
	Project Alone Case		
Arsenic	6.5E-08	8.8E-09	7.4E-08

Table 5-71 Carcinogenic Human Health Risks Associated with Soil Exposure – Residential Receptor (Gordon Region) (Lifetime Receptor)

COPC	Gordon Region		
	Incidental Soil Ingestion ILCR	Dermal Contact with Soil ILCR	Total Soil Contact ILCR
	Project Alone Case		
Arsenic	6.5E-08	8.8E-09	7.4E-08

Table 5-72 Carcinogenic Human Health Risks Associated with Soil Exposure – Indigenous Receptor (MacLellan Region) (Lifetime Receptor)

COPC	MacLellan Region		
	Incidental Soil Ingestion ILCR	Dermal Contact with Soil ILCR	Total Soil Contact ILCR
	Project Alone Case		
Arsenic	5.0E-07	6.7E-08	5.6E-07

Table 5-73 Carcinogenic Human Health Risks Associated with Soil Exposure – Residential Receptor (MacLellan Region) (Lifetime Receptor)

COPC	MacLellan Region		
	Incidental Soil Ingestion ILCR	Dermal Contact with Soil ILCR	Total Soil Contact ILCR
	Project Alone Case		
Arsenic	5.0E-07	6.7E-08	5.6E-07

5.4.5 Human Health Risks via Ingestion of Food

The HQs for the consumption of foods (i.e., fish, wild meat, traditional plant and garden produce) were estimated for the Indigenous Receptors and Residential Receptors in the Gordon region and MacLellan region. Indigenous Receptors are assumed to consume higher levels of country foods, harvested from within their region, compared to the Residential Receptors. The Indigenous Receptors and Residential Receptors were assumed to consume fish, wild meat, traditional plants (i.e., berries and tea) and garden produce from the LAA. As noted in Section 5.4.4, ingestion exposure pathways are not complete for Off-Duty Workers. It is recognized that differences exist in the types and amounts of country foods consumed by individuals. The species and tissues chosen for inclusion in the assessment are representative of the most commonly consumed by receptor groups (Indigenous, Métis, public). Although not all species listed by Indigenous and Métis groups could be included in the assessment, the species selected were chosen as being the most abundant and likely to be the most commonly consumed, thereby providing a reasonable upper bound estimate of potential exposure for the receptor groups considered.

5.4.5.1 Non-Carcinogenic Risks for Ingestion of Food

A summary of HQs for food consumption for the Indigenous Receptors and the Residential Receptors are provided in Table 5-74 to Table 5-81.

Gordon Region

Toddler Indigenous Receptor

HQ for manganese in traditional plants, methylmercury in fish and thallium in wild meat, traditional plants and garden produce exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-74). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese, methylmercury and thallium were less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Adult Indigenous Receptor

HQ for manganese in traditional plants, methylmercury in fish and thallium in wild meat and traditional plants exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-75). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese, methylmercury and thallium were less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Toddler Residential Receptor

HQ for manganese in traditional plants and thallium in wild meat, traditional plants and garden produce exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-76). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese and thallium were less than the benchmark of 0.2 indicating a negligible health risk.

Adult Residential Receptor

HQ for thallium in wild meat exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-77). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for thallium were less than the benchmark of 0.2 indicating a negligible health risk.

MacLellan Region

Toddler Indigenous Receptor

HQ for manganese in traditional plants, methylmercury in fish and thallium in wild meat, traditional plants and garden produce exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-78). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese, methylmercury and thallium were less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Adult Indigenous Receptor

HQ for manganese in traditional plants and thallium in wild meat and traditional plants exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-79). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese and thallium were less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Toddler Residential Receptor

HQ for manganese in traditional plants and thallium in wild meat, traditional plants and garden produce exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-80). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese and thallium were less than the benchmark of 0.2 indicating a negligible health risk.

Adult Residential Receptor

HQ for thallium in wild meat exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-81). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for thallium were less than the benchmark of 0.2 indicating a negligible health risk.

Table 5-74 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Indigenous Receptor (Toddler) (Gordon Region)

COPC	Gordon Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	5.5E-03	1.6E-03	4.8E-02	2.2E-02	1.1E-02	1.6E-03	4.8E-02	2.2E-02
Arsenic	1.8E-02	5.0E-03	4.5E-02	2.9E-02	4.4E-02	5.3E-03	4.7E-02	3.1E-02
Barium	2.7E-04	3.8E-04	6.9E-02	1.8E-02	4.4E-04	3.8E-04	6.9E-02	1.8E-02
Beryllium	2.4E-04	4.7E-04	6.7E-03	4.4E-03	2.5E-04	4.8E-04	6.7E-03	4.4E-03
Cadmium	2.7E-03	3.6E-04	7.5E-02	1.5E-02	2.9E-03	3.6E-04	7.5E-02	1.5E-02
Chromium	1.1E-05	2.4E-05	8.9E-05	5.8E-05	1.1E-05	2.4E-05	9.0E-05	5.8E-05
Cobalt	4.9E-04	6.4E-03	4.9E-03	1.7E-03	5.0E-04	6.5E-03	4.9E-03	1.7E-03
Copper	5.8E-03	5.1E-03	1.4E-02	1.9E-02	5.8E-03	5.1E-03	1.4E-02	1.9E-02
Lead	1.5E-03	4.3E-04	1.5E-02	9.7E-03	1.5E-03	4.3E-04	1.5E-02	9.7E-03
Manganese	1.7E-03	1.9E-02	**1.0E+00**	1.4E-02	2.3E-03	1.9E-02	**1.0E+00**	1.4E-02
Mercury	---	7.5E-03	4.5E-02	2.9E-02	---	7.5E-03	4.5E-02	2.9E-02
Methylmercury	**3.8E-01**	---	---	---	**3.8E-01**	---	---	---
Molybdenum	3.1E-04	3.3E-03	4.0E-03	1.1E-02	4.3E-04	3.3E-03	4.0E-03	1.1E-02
Nickel	6.3E-04	7.0E-03	2.5E-02	3.5E-02	6.8E-04	7.0E-03	2.6E-02	3.5E-02
Selenium	7.2E-03	1.4E-03	2.2E-02	1.4E-02	1.2E-02	1.4E-03	2.2E-02	1.4E-02
Silver	1.2E-03	4.1E-04	5.4E-03	3.5E-03	1.3E-03	4.1E-04	5.4E-03	3.5E-03
Strontium	3.7E-04	7.0E-05	4.5E-03	3.1E-03	7.3E-04	7.1E-05	4.5E-03	3.1E-03
Thallium	6.3E-02	**1.5E+00**	**1.2E+00**	**3.7E-01**	6.7E-02	**1.5E+00**	**1.2E+00**	**3.7E-01**
Uranium	5.1E-04	7.2E-05	4.5E-03	4.8E-03	2.7E-03	8.2E-05	4.5E-03	4.8E-03

Table 5-74 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Indigenous Receptor (Toddler) (Gordon Region)

COPC	Gordon Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produc e HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Vanadium	1.4E-03	1.4E-03	1.5E-02	9.7E-03	1.5E-03	1.4E-03	1.5E-02	9.7E-03
Zinc	2.8E-02	8.4E-05	1.2E-02	9.6E-03	2.8E-02	8.5E-05	1.2E-02	9.6E-03

NOTE:
Bold HQ exceeds target benchmark of 0.2
--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-75 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Indigenous Receptor (Adult) (Gordon Region)

COPC	Gordon Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditio nal Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Tradition al Plant HQ	Garden Produce HQ
Antimony	3.0E-03	1.2E-03	2.1E-02	9.6E-03	6.1E-03	1.2E-03	2.1E-02	9.6E-03
Arsenic	9.7E-03	3.7E-03	2.0E-02	1.3E-02	2.4E-02	3.9E-03	2.1E-02	1.4E-02
Barium	1.4E-04	2.8E-04	3.0E-02	8.0E-03	2.4E-04	2.8E-04	3.0E-02	8.0E-03
Beryllium	1.3E-04	3.5E-04	3.0E-03	1.9E-03	1.4E-04	3.5E-04	3.0E-03	1.9E-03
Cadmium	1.5E-03	2.7E-04	3.3E-02	6.6E-03	1.5E-03	2.7E-04	3.3E-02	6.6E-03
Chromium	5.8E-06	1.8E-05	3.9E-05	2.6E-05	6.0E-06	1.8E-05	4.0E-05	2.6E-05
Cobalt	2.6E-04	4.8E-03	2.1E-03	7.7E-04	2.7E-04	4.8E-03	2.2E-03	7.7E-04
Copper	2.0E-03	2.5E-03	3.9E-03	5.4E-03	2.0E-03	2.5E-03	3.9E-03	5.4E-03
Lead	8.3E-04	3.2E-04	6.6E-03	4.3E-03	8.3E-04	3.2E-04	6.6E-03	4.3E-03
Manganes e	8.0E-04	1.2E-02	**3.9E-01**	5.5E-03	1.1E-03	1.2E-02	**3.9E-01**	5.5E-03
Mercury	---	5.6E-03	2.0E-02	1.3E-02	---	5.6E-03	2.0E-02	1.3E-02
Methylmer cury	**2.0E-01**	---	---	---	**2.0E-01**	---	---	---
Molybden um	1.4E-04	2.0E-03	1.4E-03	4.0E-03	1.9E-04	2.0E-03	1.4E-03	4.0E-03
Nickel	3.4E-04	5.2E-03	1.1E-02	1.5E-02	3.7E-04	5.2E-03	1.1E-02	1.6E-02
Selenium	4.2E-03	1.1E-03	1.0E-02	6.7E-03	6.9E-03	1.1E-03	1.0E-02	6.7E-03
Silver	6.7E-04	3.0E-04	2.4E-03	1.5E-03	6.9E-04	3.0E-04	2.4E-03	1.5E-03

Table 5-75 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Indigenous Receptor (Adult) (Gordon Region)

COPC	Gordon Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Strontium	2.0E-04	5.2E-05	2.0E-03	1.4E-03	3.9E-04	5.3E-05	2.0E-03	1.4E-03
Thallium	3.4E-02	**1.1E+00**	**5.1E-01**	1.6E-01	3.6E-02	**1.1E+00**	**5.1E-01**	1.6E-01
Uranium	2.7E-04	5.3E-05	2.0E-03	2.1E-03	1.5E-03	6.1E-05	2.0E-03	2.1E-03
Vanadium	7.7E-04	1.1E-03	6.6E-03	4.3E-03	8.3E-04	1.1E-03	6.6E-03	4.3E-03
Zinc	1.2E-02	5.2E-05	4.5E-03	3.5E-03	1.3E-02	5.2E-05	4.5E-03	3.5E-03

NOTE:
Bold HQ exceeds target benchmark of 0.2
--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-76 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Residential Receptor (Toddler) (Gordon Region)

COPC	Gordon Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	1.4E-03	4.7E-04	1.2E-02	2.2E-02	2.9E-03	4.8E-04	1.2E-02	2.2E-02
Arsenic	4.6E-03	1.4E-03	1.1E-02	2.9E-02	1.1E-02	1.5E-03	1.2E-02	3.1E-02
Barium	6.9E-05	1.1E-04	1.9E-02	1.8E-02	1.1E-04	1.1E-04	1.9E-02	1.8E-02
Beryllium	6.1E-05	1.4E-04	1.7E-03	4.4E-03	6.5E-05	1.4E-04	1.7E-03	4.4E-03
Cadmium	7.0E-04	1.1E-04	2.0E-02	1.5E-02	7.3E-04	1.1E-04	2.0E-02	1.5E-02
Chromium	2.8E-06	7.1E-06	2.2E-05	5.8E-05	2.8E-06	7.1E-06	2.3E-05	5.8E-05
Cobalt	1.3E-04	1.9E-03	1.2E-03	1.7E-03	1.3E-04	1.9E-03	1.2E-03	1.7E-03
Copper	1.5E-03	1.5E-03	3.5E-03	1.9E-02	1.5E-03	1.5E-03	3.5E-03	1.9E-02
Lead	3.9E-04	1.3E-04	3.7E-03	9.7E-03	3.9E-04	1.3E-04	3.7E-03	9.7E-03
Manganese	4.4E-04	5.7E-03	**2.7E-01**	1.4E-02	5.9E-04	5.7E-03	**2.7E-01**	1.4E-02
Mercury	---	2.3E-03	1.1E-02	2.9E-02	---	2.3E-03	1.1E-02	2.9E-02
Methylmercury	9.7E-02	---	---	---	9.7E-02	---	---	---
Molybdenum	8.0E-05	9.9E-04	1.0E-03	1.1E-02	1.1E-04	9.9E-04	1.0E-03	1.1E-02
Nickel	1.6E-04	2.1E-03	6.5E-03	3.5E-02	1.7E-04	2.1E-03	6.5E-03	3.5E-02
Selenium	1.8E-03	4.1E-04	5.4E-03	1.4E-02	3.0E-03	4.1E-04	5.4E-03	1.4E-02
Silver	3.2E-04	1.2E-04	1.3E-03	3.5E-03	3.3E-04	1.2E-04	1.3E-03	3.5E-03
Strontium	9.4E-05	2.1E-05	1.2E-03	3.1E-03	1.9E-04	2.1E-05	1.2E-03	3.1E-03
Thallium	1.6E-02	**4.6E-01**	**3.1E-01**	**3.7E-01**	1.7E-02	**4.6E-01**	**3.1E-01**	**3.7E-01**
Uranium	1.3E-04	2.1E-05	1.1E-03	4.8E-03	6.9E-04	2.4E-05	1.1E-03	4.8E-03
Vanadium	3.6E-04	4.3E-04	3.7E-03	9.7E-03	3.9E-04	4.3E-04	3.7E-03	9.7E-03
Zinc	7.1E-03	2.5E-05	3.2E-03	9.6E-03	7.1E-03	2.5E-05	3.2E-03	9.6E-03

NOTE:

Bold HQ exceeds target benchmark of 0.2

--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-77 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Residential Receptor (Adult) (Gordon Region)

COPC	Gordon Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	7.6E-04	3.5E-04	5.4E-03	9.6E-03	1.6E-03	3.5E-04	5.4E-03	9.6E-03
Arsenic	2.5E-03	9.9E-04	4.9E-03	1.3E-02	6.2E-03	1.1E-03	5.2E-03	1.4E-02
Barium	3.7E-05	8.5E-05	8.2E-03	8.0E-03	6.1E-05	8.5E-05	8.2E-03	8.0E-03
Beryllium	3.3E-05	1.0E-04	7.4E-04	1.9E-03	3.5E-05	1.1E-04	7.4E-04	1.9E-03
Cadmium	3.8E-04	7.9E-05	8.7E-03	6.6E-03	4.0E-04	7.9E-05	8.7E-03	6.6E-03
Chromium	1.5E-06	5.1E-06	9.9E-06	2.6E-05	1.5E-06	5.1E-06	9.9E-06	2.6E-05
Cobalt	6.8E-05	1.4E-03	5.3E-04	7.7E-04	7.0E-05	1.4E-03	5.3E-04	7.7E-04
Copper	5.2E-04	7.1E-04	9.9E-04	5.4E-03	5.2E-04	7.1E-04	9.9E-04	5.4E-03
Lead	2.1E-04	9.4E-05	1.6E-03	4.3E-03	2.1E-04	9.4E-05	1.6E-03	4.3E-03
Manganese	2.1E-04	3.7E-03	1.0E-01	5.5E-03	2.8E-04	3.7E-03	1.0E-01	5.5E-03
Mercury	---	1.7E-03	4.9E-03	1.3E-02	---	1.7E-03	4.9E-03	1.3E-02
Methylmercury	5.3E-02	---	---	---	5.3E-02	---	---	---
Molybdenum	3.6E-05	6.0E-04	3.6E-04	4.0E-03	4.9E-05	6.0E-04	3.6E-04	4.0E-03
Nickel	8.8E-05	1.5E-03	2.9E-03	1.5E-02	9.5E-05	1.5E-03	2.9E-03	1.6E-02
Selenium	1.1E-03	3.3E-04	2.6E-03	6.7E-03	1.8E-03	3.3E-04	2.6E-03	6.7E-03
Silver	1.7E-04	9.1E-05	5.9E-04	1.5E-03	1.8E-04	9.1E-05	5.9E-04	1.5E-03
Strontium	5.1E-05	1.6E-05	5.2E-04	1.4E-03	1.0E-04	1.6E-05	5.2E-04	1.4E-03
Thallium	8.8E-03	**3.4E-01**	1.4E-01	1.6E-01	9.3E-03	**3.4E-01**	1.4E-01	1.6E-01
Uranium	7.0E-05	1.5E-05	4.9E-04	2.1E-03	3.7E-04	1.8E-05	4.9E-04	2.1E-03
Vanadium	2.0E-04	3.1E-04	1.6E-03	4.3E-03	2.1E-04	3.1E-04	1.7E-03	4.3E-03
Zinc	3.2E-03	1.5E-05	1.2E-03	3.5E-03	3.2E-03	1.5E-05	1.2E-03	3.5E-03

NOTE:
Bold HQ exceeds target benchmark of 0.2
--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-78 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Indigenous Receptor (Toddler) (MacLellan Region)

COPC	MacLellan Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	5.2E-03	1.6E-03	3.8E-02	2.2E-02	6.6E-03	1.6E-03	3.8E-02	2.2E-02
Arsenic	5.8E-03	4.0E-03	3.4E-02	2.9E-02	8.2E-03	4.9E-03	4.4E-02	3.8E-02
Barium	2.6E-04	3.6E-04	6.3E-02	1.8E-02	2.7E-04	3.6E-04	6.3E-02	1.8E-02
Beryllium	2.4E-04	4.0E-04	5.1E-03	4.4E-03	2.4E-04	4.0E-04	5.1E-03	4.4E-03
Cadmium	6.8E-03	2.5E-04	4.8E-02	1.5E-02	7.4E-03	2.5E-04	4.8E-02	1.5E-02
Chromium	5.1E-06	3.4E-05	6.7E-05	5.8E-05	5.5E-06	3.4E-05	7.1E-05	6.1E-05
Cobalt	8.3E-04	7.2E-03	3.3E-03	1.7E-03	9.4E-04	7.4E-03	3.4E-03	1.8E-03
Copper	7.7E-03	6.2E-03	1.4E-02	1.9E-02	7.7E-03	6.2E-03	1.4E-02	1.9E-02
Lead	5.3E-04	2.4E-04	1.1E-02	9.7E-03	5.8E-04	2.4E-04	1.1E-02	9.8E-03
Manganese	2.3E-03	1.8E-02	**1.1E+00**	1.4E-02	2.4E-03	1.8E-02	**1.1E+00**	1.4E-02
Mercury	---	5.9E-03	3.4E-02	2.9E-02	---	5.9E-03	3.4E-02	2.9E-02
Methylmercury	**3.4E-01**	---	---	---	**3.5E-01**	---	---	---
Molybdenum	2.4E-04	3.1E-04	1.4E-03	1.1E-02	3.5E-04	3.1E-04	1.5E-03	1.1E-02
Nickel	2.6E-03	4.2E-02	1.1E-01	3.5E-02	2.6E-03	4.2E-02	1.1E-01	3.5E-02
Selenium	1.0E-02	1.2E-03	1.6E-02	1.4E-02	1.1E-02	1.2E-03	1.6E-02	1.4E-02
Silver	5.8E-04	3.7E-04	4.0E-03	3.5E-03	5.9E-04	3.8E-04	4.1E-03	3.5E-03
Strontium	5.6E-04	1.5E-04	4.3E-03	3.1E-03	6.2E-04	1.5E-04	4.3E-03	3.1E-03
Thallium	7.4E-02	**1.9E+00**	**1.3E+00**	**3.7E-01**	7.4E-02	**1.9E+00**	**1.3E+00**	**3.8E-01**
Uranium	2.5E-04	5.0E-05	3.4E-03	4.8E-03	3.1E-04	5.1E-05	3.4E-03	4.9E-03
Vanadium	1.1E-03	1.1E-03	1.1E-02	9.7E-03	1.2E-03	1.1E-03	1.1E-02	9.9E-03
Zinc	5.3E-03	1.1E-04	1.2E-02	9.6E-03	5.3E-03	1.1E-04	1.3E-02	9.6E-03

NOTE:
Bold HQ exceeds target benchmark of 0.2
--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-79 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Indigenous Receptor (Adult) (MacLellan Region)

COPC	MacLellan Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	2.8E-03	1.2E-03	1.7E-02	9.6E-03	3.6E-03	1.2E-03	1.7E-02	9.6E-03
Arsenic	3.1E-03	3.0E-03	1.5E-02	1.3E-02	4.4E-03	3.7E-03	1.9E-02	1.7E-02
Barium	1.4E-04	2.7E-04	2.8E-02	8.0E-03	1.4E-04	2.7E-04	2.8E-02	8.0E-03
Beryllium	1.3E-04	2.9E-04	2.2E-03	1.9E-03	1.3E-04	3.0E-04	2.2E-03	1.9E-03
Cadmium	3.7E-03	1.8E-04	2.1E-02	6.6E-03	4.0E-03	1.8E-04	2.1E-02	6.6E-03
Chromium	2.7E-06	2.5E-05	3.0E-05	2.6E-05	3.0E-06	2.5E-05	3.1E-05	2.7E-05
Cobalt	4.5E-04	5.4E-03	1.5E-03	7.7E-04	5.1E-04	5.5E-03	1.5E-03	7.8E-04
Copper	2.7E-03	3.0E-03	3.9E-03	5.4E-03	2.7E-03	3.0E-03	3.9E-03	5.4E-03
Lead	2.9E-04	1.8E-04	5.0E-03	4.3E-03	3.1E-04	1.8E-04	5.0E-03	4.3E-03
Manganese	1.1E-03	1.2E-02	**4.2E-01**	5.5E-03	1.2E-03	1.2E-02	**4.2E-01**	5.5E-03
Mercury	---	4.4E-03	1.5E-02	1.3E-02	---	4.4E-03	1.5E-02	1.3E-02
Methylmercury	1.9E-01	---	---	---	1.9E-01	---	---	---
Molybdenum	1.1E-04	1.9E-04	5.2E-04	4.0E-03	1.6E-04	1.9E-04	5.3E-04	4.0E-03
Nickel	1.4E-03	3.1E-02	5.0E-02	1.5E-02	1.4E-03	3.1E-02	5.0E-02	1.6E-02
Selenium	6.1E-03	9.8E-04	7.8E-03	6.7E-03	6.4E-03	9.9E-04	7.8E-03	6.8E-03
Silver	3.1E-04	2.8E-04	1.8E-03	1.5E-03	3.2E-04	2.8E-04	1.8E-03	1.6E-03
Strontium	3.0E-04	1.1E-04	1.9E-03	1.4E-03	3.4E-04	1.1E-04	1.9E-03	1.4E-03
Thallium	4.0E-02	**1.4E+00**	**5.8E-01**	1.6E-01	4.0E-02	**1.4E+00**	**5.9E-01**	1.7E-01
Uranium	1.3E-04	3.7E-05	1.5E-03	2.1E-03	1.7E-04	3.8E-05	1.5E-03	2.1E-03
Vanadium	6.0E-04	8.1E-04	5.0E-03	4.3E-03	6.3E-04	8.3E-04	5.0E-03	4.3E-03
Zinc	2.4E-03	6.7E-05	4.6E-03	3.5E-03	2.4E-03	6.7E-05	4.6E-03	3.5E-03

NOTE:

Bold HQ exceeds target benchmark of 0.2

--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-80 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Residential Receptor (Toddler) (MacLellan Region)

COPC	MacLellan Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	1.3E-03	4.7E-04	1.0E-02	2.2E-02	1.7E-03	4.8E-04	1.0E-02	2.2E-02
Arsenic	1.5E-03	1.2E-03	8.6E-03	2.9E-02	2.1E-03	1.4E-03	1.1E-02	3.8E-02
Barium	6.6E-05	1.1E-04	1.7E-02	1.8E-02	6.8E-05	1.1E-04	1.7E-02	1.8E-02
Beryllium	6.1E-05	1.2E-04	1.3E-03	4.4E-03	6.2E-05	1.2E-04	1.3E-03	4.4E-03
Cadmium	1.7E-03	7.4E-05	1.2E-02	1.5E-02	1.9E-03	7.5E-05	1.2E-02	1.5E-02
Chromium	1.3E-06	9.9E-06	1.7E-05	5.8E-05	1.4E-06	1.0E-05	1.8E-05	6.1E-05
Cobalt	2.1E-04	2.2E-03	8.5E-04	1.7E-03	2.4E-04	2.2E-03	8.7E-04	1.8E-03
Copper	2.0E-03	1.8E-03	3.5E-03	1.9E-02	2.0E-03	1.8E-03	3.5E-03	1.9E-02
Lead	1.4E-04	7.2E-05	2.9E-03	9.7E-03	1.5E-04	7.2E-05	2.9E-03	9.8E-03
Manganese	5.9E-04	5.4E-03	**2.9E-01**	1.4E-02	6.3E-04	5.4E-03	**2.9E-01**	1.4E-02
Mercury	---	1.8E-03	8.6E-03	2.9E-02	---	1.8E-03	8.6E-03	2.9E-02
Methylmercury	8.8E-02	---	---	---	9.1E-02	---	---	---
Molybdenum	6.2E-05	9.1E-05	3.6E-04	1.1E-02	9.1E-05	9.2E-05	3.6E-04	1.1E-02
Nickel	6.6E-04	1.2E-02	2.9E-02	3.5E-02	6.6E-04	1.3E-02	3.0E-02	3.5E-02
Selenium	2.7E-03	3.7E-04	4.2E-03	1.4E-02	2.8E-03	3.7E-04	4.2E-03	1.4E-02
Silver	1.5E-04	1.1E-04	1.0E-03	3.5E-03	1.5E-04	1.1E-04	1.0E-03	3.5E-03
Strontium	1.4E-04	4.6E-05	1.2E-03	3.1E-03	1.6E-04	4.6E-05	1.2E-03	3.1E-03
Thallium	1.9E-02	**5.6E-01**	**3.6E-01**	**3.7E-01**	1.9E-02	**5.7E-01**	**3.6E-01**	**3.8E-01**
Uranium	6.4E-05	1.5E-05	8.6E-04	4.8E-03	7.9E-05	1.5E-05	8.7E-04	4.9E-03
Vanadium	2.9E-04	3.3E-04	2.9E-03	9.7E-03	3.0E-04	3.3E-04	2.9E-03	9.9E-03
Zinc	1.4E-03	3.2E-05	3.2E-03	9.6E-03	1.4E-03	3.3E-05	3.2E-03	9.6E-03

NOTE:
Bold HQ exceeds target benchmark of 0.2
--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

Table 5-81 Non-carcinogenic Human Health Risks Associated with Food Ingestion – Residential Receptor (Adult) (MacLellan Region)

COPC	MacLellan Region							
	Baseline Case				Future Case			
	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ	Fish HQ	Wild Meat HQ	Traditional Plant HQ	Garden Produce HQ
Antimony	7.3E-04	3.5E-04	4.5E-03	9.6E-03	9.2E-04	3.5E-04	4.5E-03	9.6E-03
Arsenic	8.1E-04	8.2E-04	3.8E-03	1.3E-02	1.1E-03	1.0E-03	4.9E-03	1.7E-02
Barium	3.6E-05	8.0E-05	7.5E-03	8.0E-03	3.7E-05	8.1E-05	7.5E-03	8.0E-03
Beryllium	3.3E-05	8.8E-05	5.7E-04	1.9E-03	3.3E-05	8.8E-05	5.7E-04	1.9E-03
Cadmium	9.5E-04	5.4E-05	5.2E-03	6.6E-03	1.0E-03	5.5E-05	5.2E-03	6.6E-03
Chromium	7.0E-07	7.1E-06	7.6E-06	2.6E-05	7.6E-07	7.2E-06	8.0E-06	2.7E-05
Cobalt	1.2E-04	1.6E-03	3.8E-04	7.7E-04	1.3E-04	1.6E-03	3.8E-04	7.8E-04
Copper	6.9E-04	8.5E-04	1.0E-03	5.4E-03	6.9E-04	8.5E-04	1.0E-03	5.4E-03
Lead	7.3E-05	5.2E-05	1.3E-03	4.3E-03	8.0E-05	5.3E-05	1.3E-03	4.3E-03
Manganese	2.8E-04	3.5E-03	1.1E-01	5.5E-03	3.0E-04	3.5E-03	1.1E-01	5.5E-03
Mercury	---	1.3E-03	3.8E-03	1.3E-02	---	1.3E-03	3.8E-03	1.3E-02
Methylmercury	4.8E-02	---	---	---	4.9E-02	---	---	---
Molybdenum	2.8E-05	5.5E-05	1.3E-04	4.0E-03	4.0E-05	5.5E-05	1.3E-04	4.0E-03
Nickel	3.6E-04	9.1E-03	1.3E-02	1.5E-02	3.6E-04	9.2E-03	1.3E-02	1.6E-02
Selenium	1.6E-03	2.9E-04	2.0E-03	6.7E-03	1.7E-03	3.0E-04	2.0E-03	6.8E-03
Silver	8.0E-05	8.3E-05	4.6E-04	1.5E-03	8.3E-05	8.4E-05	4.6E-04	1.6E-03
Strontium	7.8E-05	3.4E-05	5.1E-04	1.4E-03	8.6E-05	3.4E-05	5.1E-04	1.4E-03
Thallium	1.0E-02	**4.2E-01**	1.6E-01	1.6E-01	1.0E-02	**4.3E-01**	1.6E-01	1.7E-01
Uranium	3.4E-05	1.1E-05	3.8E-04	2.1E-03	4.3E-05	1.1E-05	3.8E-04	2.1E-03
Vanadium	1.6E-04	2.4E-04	1.3E-03	4.3E-03	1.6E-04	2.5E-04	1.3E-03	4.3E-03
Zinc	6.2E-04	2.0E-05	1.2E-03	3.5E-03	6.2E-04	2.0E-05	1.2E-03	3.5E-03

NOTE:
Bold HQ exceeds target benchmark of 0.2
--- Mercury in fish was assumed to be methylmercury. Methylmercury was not present in wild meat

5.4.5.2 Carcinogenic Risks for Ingestion of Food

A summary of ILCRs for exposure to arsenic in country food for the lifetime Indigenous Receptor and lifetime Residential Receptor is provided in Table 5-82 to Table 5-85. ILCRs for the food exposure pathway for the lifetime receptors in both human receptors were below the target benchmark of 1.0E-05, indicating that Project-related increase in metal concentrations in food represents a negligible human health risk.

Table 5-82 Carcinogenic Health Risks Associated with Ingestion of Food – Indigenous Receptor (Lifetime Receptor) (Gordon Region)

COPC	Gordon Region			
	Fish ILCR	Wild Meat ILCR	Traditional Plant ILCR	Garden Produce ILCR
	Project Alone Case			
Arsenic	8.5E-06	1.2E-07	7.1E-07	4.4E-07

Table 5-83 Carcinogenic Health Risks Associated with Ingestion of Food – Residential Receptor (Lifetime Receptor) (Gordon Region)

COPC	Gordon Region			
	Fish ILCR	Wild Meat ILCR	Traditional Plant ILCR	Garden Produce ILCR
	Project Alone Case			
Arsenic	2.2E-06	3.4E-08	2.0E-07	4.4E-07

Table 5-84 Carcinogenic Health Risks Associated with Ingestion of Food – Indigenous Receptor (Lifetime Receptor) (MacLellan Region)

COPC	MacLellan Region			
	Fish ILCR	Wild Meat ILCR	Traditional Plant ILCR	Garden Produce ILCR
	Project Alone Case			
Arsenic	7.6E-07	3.7E-07	2.8E-06	2.3E-06

Table 5-85 Carcinogenic Health Risks Associated with Ingestion of Food – Residential Receptor (Lifetime Receptor) (MacLellan Region)

COPC	MacLellan Region			
	Fish ILCR	Wild Meat ILCR	Traditional Plant ILCR	Garden Produce ILCR
	Project Alone Case			
Arsenic	2.0E-07	1.1E-07	8.1E-07	2.3E-06

5.4.6 Human Health Risks via Total Ingestion Risks

A summary of HQs for total ingestion for the Indigenous Receptors and the Residential Receptors are provided in Table 5-86 to Table 5-93.

5.4.6.1 Gordon Region

Toddler Indigenous Receptor

The HQ for total ingestion of manganese, methylmercury and thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-86. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese, methylmercury and thallium were 0.3% or less and less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Adult Indigenous Receptor

The HQ for total ingestion of manganese, methylmercury and thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-87. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese, methylmercury and thallium were 0.3% or less and less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Toddler Residential Receptor

The HQ for total ingestion for manganese and thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-88. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese and thallium were 0.3% or less and less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Adult Residential Receptor

The HQ for total ingestion of thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-89. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for thallium was only 0.3% and also less than the benchmark of 0.2 indicating Project-related health risks are negligible.

5.4.6.2 MacLellan Region

Toddler Indigenous Receptor

The HQ for total ingestion of manganese, methylmercury, nickel and thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-90. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese, methylmercury, nickel and thallium were 3% or less and were also less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Adult Indigenous Receptor

The HQ for total ingestion of manganese and thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-91. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese and thallium were 2% or less and were also less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Toddler Residential Receptor

The HQ for total ingestion of manganese and thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case (Table 5-92). HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for manganese and thallium were 2% or less and were also less than the benchmark of 0.2 indicating Project-related health risks are negligible .

Adult Residential Receptor

The HQ for total ingestion of thallium exceeded the target benchmark of 0.2 under both Baseline Case and Future Case Table 5-93. HQs for the remaining COPC were below the target benchmark of 0.2 under both Baseline and Future Case.

The changes in HQ between Baseline Case and Future Case for thallium was only 3% and was also less than the benchmark of 0.2 indicating Project-related health risks are negligible.

Table 5-86 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Indigenous Receptor (Toddler) (Gordon Region)

COPC	Gordon Region	
	Baseline Case HQ	**Future Case HQ**
Antimony	7.8E-02	8.4E-02
Arsenic	1.1E-01	1.5E-01
Barium	8.9E-02	8.9E-02
Beryllium	1.2E-02	1.3E-02
Cadmium	9.5E-02	9.5E-02
Chromium	2.1E-04	2.1E-04
Cobalt	1.5E-02	1.5E-02
Copper	4.6E-02	4.6E-02
Lead	3.8E-02	3.8E-02
Manganese	**1.0E+00**	**1.0E+00**
Mercury	8.4E-02	8.4E-02
Methylmercury[a]	**3.8E-01**	**3.8E-01**
Molybdenum	2.0E-02	2.1E-02
Nickel	7.1E-02	7.1E-02
Selenium	4.4E-02	4.9E-02
Silver	1.1E-02	1.1E-02
Strontium	8.2E-03	8.5E-03
Thallium	**3.2E+00**	**3.2E+00**
Uranium	1.4E-02	1.6E-02
Vanadium	3.4E-02	3.4E-02
Zinc	5.0E-02	5.0E-02

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-87 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Indigenous Receptor (Adult) (Gordon Region)

COPC	Gordon Region	
	Baseline Case HQ	Future Case HQ
Antimony	3.5E-02	3.8E-02
Arsenic	4.7E-02	6.4E-02
Barium	3.9E-02	3.9E-02
Beryllium	5.4E-03	5.4E-03
Cadmium	4.1E-02	4.2E-02
Chromium	9.1E-05	9.2E-05
Cobalt	8.0E-03	8.1E-03
Copper	1.4E-02	1.4E-02
Lead	1.3E-02	1.3E-02
Manganese	**4.1E-01**	**4.1E-01**
Mercury	3.9E-02	3.9E-02
Methylmercury[a]	**2.0E-01**	**2.0E-01**
Molybdenum	7.7E-03	7.8E-03
Nickel	3.2E-02	3.3E-02
Selenium	2.2E-02	2.5E-02
Silver	4.9E-03	4.9E-03
Strontium	3.6E-03	3.8E-03
Thallium	**1.9E+00**	**1.9E+00**
Uranium	4.8E-03	6.0E-03
Vanadium	1.3E-02	1.3E-02
Zinc	2.1E-02	2.1E-02

NOTES:

Bold HQ exceeds benchmark of 0.2

[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-88 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Residential Receptor (Toddler) (Gordon Region)

COPC	Gordon Region	
	Baseline Case HQ	**Future Case HQ**
Antimony	3.7E-02	3.9E-02
Arsenic	6.4E-02	7.5E-02
Barium	3.8E-02	3.8E-02
Beryllium	7.0E-03	7.0E-03
Cadmium	3.7E-02	3.7E-02
Chromium	1.2E-04	1.2E-04
Cobalt	6.5E-03	6.6E-03
Copper	2.8E-02	2.8E-02
Lead	2.5E-02	2.5E-02
Manganese	**2.9E-01**	**2.9E-01**
Mercury	4.6E-02	4.6E-02
Methylmercury[a]	9.7E-02	9.7E-02
Molybdenum	1.5E-02	1.5E-02
Nickel	4.6E-02	4.6E-02
Selenium	2.2E-02	2.3E-02
Silver	5.4E-03	5.4E-03
Strontium	4.5E-03	4.6E-03
Thallium	**1.2E+00**	**1.2E+00**
Uranium	1.0E-02	1.1E-02
Vanadium	2.1E-02	2.1E-02
Zinc	2.0E-02	2.0E-02

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-89 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Residential Receptor (Adult) (Gordon Region)

COPC	Gordon Region	
	Baseline Case HQ	Future Case HQ
Antimony	1.6E-02	1.7E-02
Arsenic	2.3E-02	2.7E-02
Barium	1.6E-02	1.6E-02
Beryllium	2.8E-03	2.8E-03
Cadmium	1.6E-02	1.6E-02
Chromium	4.5E-05	4.5E-05
Cobalt	2.9E-03	2.9E-03
Copper	7.8E-03	7.8E-03
Lead	6.9E-03	6.9E-03
Manganese	1.1E-01	1.1E-01
Mercury	2.0E-02	2.0E-02
Methylmercury[a]	5.3E-02	5.3E-02
Molybdenum	5.1E-03	5.1E-03
Nickel	2.0E-02	2.0E-02
Selenium	1.1E-02	1.1E-02
Silver	2.4E-03	2.4E-03
Strontium	2.0E-03	2.0E-03
Thallium	**6.6E-01**	**6.6E-01**
Uranium	3.1E-03	3.4E-03
Vanadium	6.8E-03	6.9E-03
Zinc	7.9E-03	8.0E-03

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-90 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Indigenous Receptor (Toddler) (MacLellan Region)

COPC	MacLellan Region	
	Baseline Case HQ	Future Case HQ
Antimony	6.9E-02	7.0E-02
Arsenic	9.9E-02	1.3E-01
Barium	8.2E-02	8.2E-02
Beryllium	1.0E-02	1.0E-02
Cadmium	7.2E-02	7.2E-02
Chromium	1.8E-04	1.9E-04
Cobalt	1.4E-02	1.5E-02
Copper	5.1E-02	5.1E-02
Lead	3.3E-02	3.3E-02
Manganese	**1.1E+00**	**1.1E+00**
Mercury	7.5E-02	7.5E-02
Methylmercury[a]	**3.4E-01**	**3.5E-01**
Molybdenum	1.3E-02	1.3E-02
Nickel	**2.1E-01**	**2.1E-01**
Selenium	4.3E-02	4.3E-02
Silver	8.7E-03	8.8E-03
Strontium	8.1E-03	8.2E-03
Thallium	**3.7E+00**	**3.8E+00**
Uranium	1.2E-02	1.2E-02
Vanadium	2.6E-02	2.7E-02
Zinc	2.8E-02	2.8E-02

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-91 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Indigenous Receptor (Adult) (MacLellan Region)

COPC	MacLellan Region	
	Baseline Case HQ	**Future Case HQ**
Antimony	3.1E-02	3.1E-02
Arsenic	3.6E-02	4.6E-02
Barium	3.6E-02	3.6E-02
Beryllium	4.6E-03	4.6E-03
Cadmium	3.2E-02	3.2E-02
Chromium	8.5E-05	8.8E-05
Cobalt	8.1E-03	8.3E-03
Copper	1.5E-02	1.5E-02
Lead	1.0E-02	1.1E-02
Manganese	**4.4E-01**	**4.4E-01**
Mercury	3.4E-02	3.4E-02
Methylmercury[a]	1.9E-01	1.9E-01
Molybdenum	4.8E-03	4.9E-03
Nickel	9.9E-02	1.0E-01
Selenium	2.2E-02	2.2E-02
Silver	3.9E-03	4.0E-03
Strontium	3.6E-03	3.7E-03
Thallium	**2.2E+00**	**2.2E+00**
Uranium	4.1E-03	4.2E-03
Vanadium	1.1E-02	1.1E-02
Zinc	1.1E-02	1.1E-02

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-92 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Residential Receptor (Toddler) (MacLellan Region)

COPC	MacLellan Region	
	Baseline Case HQ	Future Case HQ
Antimony	3.6E-02	3.6E-02
Arsenic	6.7E-02	8.6E-02
Barium	3.6E-02	3.6E-02
Beryllium	6.1E-03	6.2E-03
Cadmium	3.0E-02	3.1E-02
Chromium	1.0E-04	1.1E-04
Cobalt	6.0E-03	6.1E-03
Copper	3.1E-02	3.1E-02
Lead	2.4E-02	2.4E-02
Manganese	**3.1E-01**	**3.1E-01**
Mercury	4.6E-02	4.6E-02
Methylmercury[a]	8.8E-02	9.1E-02
Molybdenum	1.2E-02	1.2E-02
Nickel	9.4E-02	9.5E-02
Selenium	2.2E-02	2.2E-02
Silver	5.0E-03	5.1E-03
Strontium	4.5E-03	4.5E-03
Thallium	**1.4E+00**	**1.4E+00**
Uranium	9.3E-03	9.4E-03
Vanadium	1.6E-02	1.6E-02
Zinc	1.5E-02	1.5E-02

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

Table 5-93 Non-carcinogenic Human Health Risk Associated with Total Ingestion – Residential Receptor (Adult) (MacLellan Region)

COPC	MacLellan Region	
	Baseline Case HQ	Future Case HQ
Antimony	1.5E-02	1.5E-02
Arsenic	2.0E-02	2.6E-02
Barium	1.6E-02	1.6E-02
Beryllium	2.6E-03	2.6E-03
Cadmium	1.3E-02	1.3E-02
Chromium	4.3E-05	4.5E-05
Cobalt	2.9E-03	3.0E-03
Copper	8.2E-03	8.2E-03
Lead	6.3E-03	6.4E-03
Manganese	1.2E-01	1.2E-01
Mercury	2.0E-02	2.0E-02
Methylmercury[a]	4.8E-02	4.9E-02
Molybdenum	4.2E-03	4.2E-03
Nickel	3.9E-02	4.0E-02
Selenium	1.1E-02	1.1E-02
Silver	2.2E-03	2.2E-03
Strontium	2.0E-03	2.0E-03
Thallium	**7.5E-01**	**7.7E-01**
Uranium	2.9E-03	2.9E-03
Vanadium	6.1E-03	6.2E-03
Zinc	5.4E-03	5.4E-03

NOTES:
Bold HQ exceeds benchmark of 0.2
[a] Assessment of methylmercury is limited to exposure in fish tissue

The ILCRs for total ingestion for the Indigenous Receptor and the Residential Receptor are provided in Table 5-94Error! Reference source not found. to Table 5-97 . In each case the risk for the Project Alone Case is below the benchmark of 1.0E-05. Therefore Project-related carcinogenic health risks for total ingestion are considered negligible.

Table 5-94 Total Carcinogenic Human Health Risk Associated with Ingestion – Indigenous Receptor (Lifetime Receptor) (Gordon Region)

COPC	Gordon Region
	Total Ingestion ILCR
	Project Alone Case
Arsenic	9.9E-06

Table 5-95 Total Carcinogenic Human Health Risk Associated with Ingestion – Residential Receptor (Lifetime Receptor) (Gordon Region)

COPC	Gordon Region
	Total Ingestion ILCR
	Project Alone Case
Arsenic	2.9E-06

Table 5-96 Total Carcinogenic Human Health Risk Associated with Ingestion – Indigenous Receptor (Lifetime Receptor) (MacLellan Region)

COPC	MacLellan Region
	Total Ingestion ILCR
	Project Alone Case
Arsenic	6.8E-06

Table 5-97 Total Carcinogenic Human Health Risk Associated with Ingestion – Residential Receptor (Lifetime Receptor) (MacLellan Region)

COPC	MacLellan Region
	Total Ingestion ILCR
	Project Alone Case
Arsenic	4.0E-06

5.4.7 Summary

A summary of non-carcinogenic risk estimates for each receptor in excess of the applicable benchmark, as well as a discussion of why potential unacceptable health risks are not expected is provided in Table 5-98 to Table 5-109. Overall, the increase in health risks for each receptor as a result of the Project are considered negligible.

There were no carcinogenic risk estimates for inhalation that exceeded the applicable benchmark. Arsenic is the only COPC that is considered carcinogenic via ingestion. In each case the ILCR based on Project Alone was below the benchmark of 1.0E-05. Overall, the increase in carcinogenic health risks for each receptor as a result of the Project are considered negligible.

Table 5-98 Non-carcinogenic Human Health Risk that Exceeded the Applicable Benchmark – Inhalation- Residential Receptor and Indigenous Receptor (Gordon Region)

COPC	Period	CR		Discussion
		Baseline Case	Future Case	
NO_2	1-hour	9.5E-02	**1.2E+00**	The frequency analysis (Section 5.4.3) demonstrated that the yearly frequency of exceedance is low enough that potential health risks are negligible

NOTE:
Bold CR exceeds benchmark of 1.0

Table 5-99 Non-carcinogenic Human Health Risk that Exceeded the Applicable Benchmark – Inhalation- Residential Receptor and Indigenous Receptor (MacLellan Region)

COPC	Period	CR		Discussion
		Baseline Case	Future Case	
NO_2	1-hour	9.5E-02	**1.2E+00**	The frequency analysis (Section 5.4.3) demonstrated that the yearly frequency of exceedance is low enough that potential health risks are negligible

NOTE:
Bold CR exceeds benchmark of 1.0

Table 5-100 Non-carcinogenic Human Health Risk that Exceeded the Applicable Benchmark – Inhalation - Off-Duty Worker Receptor (Work Camp)

COPC	Period	CR	Discussion
		Future Case	
NO_2	1-hour	**1.7E+00**	The frequency analysis (Section 5.4.3) demonstrated that the yearly frequency of exceedance is low enough that potential health risks are negligible
NOTE: **Bold** CR exceeds benchmark of 1.0			

Table 5-101 Non-carcinogenic Human Health Risk that Exceeded the Applicable Benchmark – Inhalation - Off-Duty Worker Receptor (Work Camp)

Parameter	Period	CR	Discussion
		Future Case	
DPM	2-hour	**1.2E+00**	The frequency analysis (Section 5.4.3) demonstrated that the yearly frequency of exceedance is low enough that potential health risks are negligible
NOTE: **Bold** CR exceeds benchmark of 1.0			

Table 5-102 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark-Ingestion- Indigenous Receptor (Toddler) (Gordon Region)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Fish Ingestion	Methylmercury	**3.8E-01**	**3.8E-01**	Negligible increase in health risk between Baseline Case and Future Case
Wild Meat Ingestion	Thallium	**1.5E+00**	**1.5E+00**	
Traditional Plant Ingestion	Manganese	**1.0E+00**	**1.0E+00**	
	Thallium	**1.2E+00**	**1.2E+00**	
Garden Produce Ingestion	Thallium	**3.7E-01**	**3.7E-01**	
Total Ingestion	Manganese	**1.0E+00**	**1.0E+00**	
	Methlymercury	**3.8E-01**	**3.8E-01**	
	Thallium	**3.2E+00**	**3.2E+00**	
NOTE: **Bold** HQ exceeds benchmark of 0.2				

Table 5-103 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark-Ingestion- Indigenous Receptor (Adult) (Gordon Region)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Fish Ingestion	Methylmercury	**2.0E-01**	**2.0E-01**	Negligible increase in health risk between Baseline Case and Future Case
Wild Meat Ingestion	Thallium	**1.1E+00**	**1.1E+00**	Negligible increase in health risk between Baseline Case and Future Case
Traditional Plant Ingestion	Manganese	**3.9E-01**	**3.9E-01**	
	Thallium	**5.1E-01**	**5.1E-01**	
Total Ingestion	Manganese	**4.1E-01**	**4.1E-01**	
	Methyl Mercury	**2.0E-01**	**2.0E-01**	
	Thallium	**1.9E+00**	**1.9E+00**	

NOTE:
Bold HQ exceeds benchmark of 0.2

Table 5-104 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark – Ingestion - Residential Receptor (Toddler) (Gordon)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Wild Meat Ingestion	Thallium	**4.6E-01**	**4.6E-01**	Negligible increase in health risk between Baseline Case and Future Case
Traditional Plant Ingestion	Manganese	**2.7E-01**	**2.7E-01**	
	Thallium	**3.1E-01**	**3.1E-01**	
Garden Produce Ingestion	Thallium	**3.7E-01**	**3.7E-01**	
Total Ingestion	Manganese	**2.9E-01**	**2.9E-01**	
	Thallium	**1.2E+00**	**1.2E+00**	

NOTE:
Bold HQ exceeds benchmark of 0.2

Table 5-105 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark – Ingestion - Residential Receptor (Adult) (Gordon)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Wild Meat Ingestion	Thallium	**3.4E-01**	**3.4E-01**	Negligible increase in health risk between Baseline Case and Future Case
Total Ingestion	Thallium	**6.6E-01**	**6.6E-01**	

NOTE:
Bold HQ exceeds benchmark of 0.2

Table 5-106 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark-Ingestion- Indigenous Receptor (Toddler) (MacLellan)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Fish Ingestion	Methylmercury	**3.4E-01**	**3.5E-01**	Negligible increase in health risk between Baseline Case and Future Case
Wild Meat Ingestion	Thallium	**1.9E+00**	**1.9E+00**	
Traditional Plant Ingestion	Manganese	**1.09E+00**	**1.09E+00**	
	Thallium	**1.3E+00**	**1.3E+00**	
Garden Produce Ingestion	Thallium	**3.7E-01**	**3.8E-01**	
Total Ingestion	Manganese	**1.1E+00**	**1.1E+00**	
	Methylmercury	**3.4E-01**	**3.5E-01**	
	Nickel	**2.1E-01**	**2.1E-01**	
	Thallium	**3.7E+00**	**3.8E+00**	

NOTE:
Bold HQ exceeds benchmark of 0.2

Table 5-107 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark-Ingestion- Indigenous Receptor (Adult) (MacLellan)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Wild Meat Ingestion	Thallium	**1.4E+00**	**1.4E+00**	Negligible increase in health risk between Baseline Case and Future Case
	Manganese	**4.2E-01**	**4.2E-01**	

Table 5-107 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark-Ingestion- Indigenous Receptor (Adult) (MacLellan)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Traditional Plant Ingestion	Thallium	**5.8E-01**	**5.9E-01**	
Total Ingestion	Manganese	**4.4E-01**	**4.4E-01**	
	Thallium	**2.2E+00**	**2.2E+00**	

NOTE:
Bold HQ exceeds benchmark of 0.2

Table 5-108 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark – Ingestion - Residential Receptor (Toddler) (MacLellan)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Wild Meat Ingestion	Thallium	**5.6E-01**	**5.7E-01**	Negligible increase in health risk between Baseline Case and Future Case
Traditional Plant Ingestion	Manganese	**3.1E-01**	**3.1E-01**	
	Thallium	**3.6E-01**	**3.6E-01**	
Garden Produce Ingestion	Thallium	**3.7E-01**	**3.8E-01**	
Total Ingestion	Manganese	**3.1E-01**	**3.1E-01**	
	Thallium	**1.4E+00**	**1.4E+00**	

NOTE:
Bold HQ exceeds benchmark of 0.2

Table 5-109 Non-carcinogenic Human Health Risks that Exceeded the Applicable Benchmark – Ingestion - Residential Receptor (Adult) (MacLellan)

Pathway	Parameter	HQ		Discussion
		Baseline Case	Future Case	
Wild Meat Ingestion	Thallium	**4.2E-01**	**4.3E-01**	Negligible increase in health risk between Baseline Case and Future Case
Total Ingestion	Thallium	**7.5E-01**	**7.7E-01**	

NOTE:
Bold HQ exceeds benchmark of 0.2

5.5 UNCERTAINTY ANALYSIS

This HHRA was conducted according to accepted risk assessment methodologies and follows guidance published and endorsed by Health Canada. This approach is consistent with previous projects that have been reviewed by the Impact Assessment Agency of Canada. Risk estimates were refined through the inclusion of baseline data from multiple types of environmental media (i.e., air, soil, water, and biota), accepted modelling techniques for the prediction of Future Case concentrations, information about likely human receptors and exposure pathways collected through surveys and public meetings, and professional judgement. HHRAs have inherent uncertainty related to the assumptions applied in the risk calculations. This uncertainty is often the result of conservative assumptions aimed at overestimating health risks. Although many factors contribute to a risk estimate, results are generally sensitive to only a few of these factors, which are described below.

5.5.1 Toxicological Information

There is limited toxicological information on the human health effects associated with low-level exposures to chemicals in the environment. Most information available is based on epidemiological studies of occupationally exposed workers. These are usually based on an 8-hour day or 40-hour week, higher level exposure regimes and do not apply well to low-level, chronic exposures. Additionally, reference doses and cancer potency estimates for many chemicals are based on laboratory dose-response estimates in animals. The use of animals requires certain assumptions to be made, which introduces further uncertainty. Assumptions include:

- The toxicological effect in animals also occurs in humans.
- The short-term exposures used in animal studies can be extrapolated to chronic or long-term human exposures.
- The toxicokinetic and toxicodynamic processes that occur in animals also occur in humans.
- The uptake of the chemical from the test vehicle (the medium within which the test compound is delivered to the animals, e.g., water) will be representative of the uptake of the chemical from real-world environmental media (e.g., soil, biota).
- The assumption that extrapolation from high-dose laboratory studies to low-dose environmental studies accurately reflects the shape of the dose response curve at the low dose-response range.

To account for these and other related uncertainties, agencies such as Health Canada and the US EPA adopt conservative assumptions to account for uncertainties. The use of Uncertainty Factors accounts for uncertainties by lowering the toxicological reference value used in the HQ calculation well below the level where no effects were seen in animals. Uncertainty Factors are applied by factors of 10 to account for uncertainties such as interspecies differences (e.g., physiology), individual variation (e.g., unusually sensitive individuals), limitations in toxicological information, and extrapolation from acute exposures to chronic exposures. Depending on the degree of uncertainty, typical factors will range from 100 to 10,000, with some being lower than 10 (i.e., in the case where reliable human data are available). The incorporation of these factors results in risk estimates that are very conservative and limited exposures above reference doses or reference concentrations would not be expected to result in adverse human health effects.

Further, the HHRA has assumed that the relative absorption rate for each COPC via inhalation and ingestion is 100%. Some of TRVs used in this HHRA were determined from studies in which the effects were based on administered doses rather than absorbed doses. Because studies administer COPC in forms that are more readily absorbed that would be found in environmental media, the TRVs derived from these studies may overestimate the amount of COPC that would be absorbed by the human receptor. Thus, using these TRVs over-predicts the potential effects associated with the exposures experienced by the human receptors.

5.5.2 Sensitive Populations

A susceptible population will exhibit a different or enhanced response to a COPC than will most persons exposed to the same level of the chemical in the environment. The reasons for this may include genetic makeup, age (e.g., children or seniors), health and nutritional status, behaviour, and exposure to other toxic substances (e.g., cigarette smoke) (ATSDR 1998). Human receptors are selected such that the most sensitive individuals and individuals having the greatest potential for exposure to COPC and adverse responses from such exposures are represented. Because it was assumed that the Indigenous Receptor will rely exclusively on locally caught meat and rely on local fish and vegetation to supplement their diets, the Indigenous Receptor represents a high-level exposure scenario. The Indigenous Toddler Receptor would represent the most sensitive individual for non-carcinogens for the reasons just mentioned plus the physiological (nutritional needs) and behavioural (frequent hand to mouth transfer) considerations associated with the toddler age range. Non-carcinogenic TRVs used in this risk assessment were estimates of a continuous exposure for the human population, including sensitive subgroups (e.g. children, women of child-bearing age), that are to be without appreciable risk of adverse non-cancer effects during a lifetime.

Carcinogenic COPC exposures were assessed over the entire lifetime of a receptor, incorporating all life stages. As noted in Section 5.5.1, TRVs including cancer slope factors used in this HHRA have been derived by health agencies to be protective of sensitive populations (through the application of uncertainty factors).

5.5.3 Exposure Assessment

The air concentrations and deposition rates used in the HHRA were obtained directly from the air dispersion and deposition modelling results while future surface water concentrations were obtained directly from water quality modelling results. Conservative assumptions were used in the development of the air model and the predictive water quality model for the Project.

Maximum predicted 1-hour, 2-hour, 24-hour, and annual average concentrations in air at each receptor location were used to evaluate inhalation health risks associated with both short-term and long-term exposures. In reality, the frequency with which the maximum concentration would occur at any one receptor location is relatively low for most COPC. Therefore, the risk estimates tend to overestimate, rather than underestimate, health risks.

Estimation of COPC uptake through the food chain involves the use of assumptions regarding many factors, including the various uptake factors. Typically, these uptake factors are conservative and tend to overestimate, rather than underestimate, concentrations in biota. In addition, these uptake factors were applied to the reasonable maximum concentrations (e.g., soil concentrations at the end of operation, maximum surface water concentrations), and are assumed to remain constant throughout the lifetime of the receptor (e.g., 80 years for lifetime exposure); thus, the resulting exposure predictions are very conservative.

5.5.3.1 Market Basket Foods

The purpose of the HHRA is to assess the potential change in health risks for occupants of the Gordon region or the MacLellan region due to contributions from the Project. Human receptors in the Gordon or MacLellan regions are expected to be exposed to the same concentrations in market basket foods (i.e., supermarket food) as a typical Manitoba resident living outside the LAA. The chemical concentrations in market basket foods are not expected to change as a result of the Project as these foods come from centralized distribution centers and are generally grown and processed at variable sources outside the LAA/RAA. A number of exposures evaluated in the HHRA were specific to Indigenous receptors (e.g., the ingestion of country food); these exposures may not be relevant for a typical Manitoba resident. Potential Project-related health risks are evaluated by comparing the calculated risks to applicable benchmarks, rather than to risks of a typical Manitoba resident.

Calculated health risks for ingestion exposures (i.e., hazard quotients) were compared to a benchmark of 0.2 to account for the multiple potential pathways that can contribute to ingestion/dermal exposure. If all potential ingestion pathways were evaluated (including ingestion of market basket food) then the overall HQ could be compared to 1.0. By comparing to a benchmark of 0.2, the assessment has accounted for potential exposures from market basket foods.

5.5.3.2 Backyard Produce Consumption

Indigenous receptors and Residential receptors were assumed to obtain 10% of their overall vegetables intake from backyard produce, consistent with CCME (2006). It is likely that receptors will obtain most of their vegetables from supermarkets therefore the assumption that 10% of their intake comes from backyard produce is realistic.

5.5.3.3 Recreational Exposure to Water

Human health-based guidelines for recreational water use have been established for biological hazards and have not been established for chemicals. In Section 8.3 of the Guidelines for Canadian Recreational Water Quality (Health Canada 2012), Health Canada notes:

> *There is insufficient information to support the establishment of guideline values for specific chemical parameters in recreational waters. Risks associated with specific chemical water quality hazards will be dependent on the particular circumstances of the area in question and should be assessed on a case-by-case basis.*

In general, potential risks from exposure to chemical parameters will be much smaller than the risks from the microbiological hazards potentially present in recreation waters (WHO 2003). With chemical concentrations typically found in water, most recreational water users will not be exposed to concentrations necessary to elicit either an acute or chronic illness response.

For this reason, recreational water quality and the risks associated with exposure to metals in recreational water has not been included in the quantitative assessment of potential human health risks.

5.5.4 Receptor Characteristics

For each receptor scenario, published characteristics and professional judgment were used in determining exposure durations, consumption patterns and ingestion rates (e.g., Health Canada 2004, 2012; Chan et al. 2012). Wild meat, fish and traditional vegetation consumption rates specific to Indigenous populations were obtained from Chan et al. (2012). For this assessment, the fraction of the total diet that an Indigenous Receptor would obtain from the LAA (i.e., 10% for fish and backyard produce and 100% for wild meat, and traditional vegetation) represents a reasonable maximum exposure and overstates the potential risk.

5.5.5 Summary of Uncertainties

A summary of the important assumptions and uncertainties in the HHRA and the implications of these assumptions on risk estimates is provided in Table 5-110.

Table 5-110 Evaluation of Assumptions and Uncertainties Applied in the HHRA

Assumptions/Uncertainty	Discussion of Conservatism	Analysis Likely to Overestimate/ Underestimate Risk
Exposure Assessment		
For analyses of non-carcinogenic exposures both toddler and adult receptors were selected.	Toddlers represent the most sensitive age group for assessing non-carcinogenic effects. Resultant risks are generally over protective for an adult population; however, the adult exposures have been included as additional information. This approach is in accordance with standard practice (i.e., Health Canada and US EPA).	Neutral for Toddlers and Adults. The risks for toddlers overestimate risks for other age groups
Project is not currently in operation; therefore, future emissions and ground level air concentrations were predicted by air dispersion models.	The air models are designed to provide a realistic prediction of future air quality related to the Project.	Neutral
Behavioural and physical characteristics were assumed for receptors.	Behavioural and physical characteristics were chosen for receptors in an attempt to overestimate potential exposures to receptors. Additional receptor assumptions are outlined below.	Overestimate
Indigenous Receptors and Residential Receptors obtain 100% of their intake of wild meat from their region.	With respect to wild meat, this assumption is considered potentially realistic as one large animal (i.e., a moose) could represent a large portion of a family's meat consumption for a one-year period.	Overestimate
Indigenous Receptors and Residential Receptors obtain 100% of their intake of traditional plants from their region.	In the absence of community-specific consumption and use details for traditional foods, the assumption of 100% of traditional plants being obtained from a receptors region is considered very conservative, or an upper-bound limit, scenario for the Indigenous Receptor and the Residential Receptor.	Overestimate
Receptors were assumed to obtain 10% of the fish they consume on a yearly basis from Swede Lake (for Gordon region receptors) or Cockeram Lake (for MacLellan region receptors).	This is considered conservative, as information gathered through community and Indigenous engagement suggests that people obtain fish from lakes across the Gordon and MacLellan regions. Therefore, the assumption that 10% the fish an individual consumes on a yearly basis is harvested from either the Gordon region (Swede Lake) or the MacLellan region (Cockeram Lake) it considered conservative.	Neutral/Overestimate
Receptors were assumed to consume backyard garden produce, and it was further assumed that the consumption of backyard garden produce accounted for 10% of the yearly combined intake of root vegetables and other vegetables identified by Health Canada (2012).	This assumption is reasonable given the CCME assessment that concluded that a typical backyard garden can reasonably be expected to yield sufficient produce to account for 10% of an individual's yearly produce intake. Thus, assuming that backyard garden produce accounts for 10% of the total yearly produce intake is likely to over-estimate potential exposures in Baseline Case and Future Case conditions.	Neutral/Overestimate
Inhalation risks for the Off-Duty Worker were based on the time workers are expected to be present in the work camp.	This receptor is assumed to spend 12 hours per day, 26 weeks per year in the work camp, based on a 12-hour work day and a 14-day on/ 14-day off-shift rotation. The health of workers when they are working on the Project and not present in the permanent work camp is protected by occupational health and safety standards, codes and regulations established by various provincial and federal governments; thus, occupational health and safety is not addressed in the scope of this assessment.	Neutral for short-term exposures Neutral for long-term residential exposures Overestimate for non-resident long-term exposures
The surface water ingestion and sediment contact were not evaluated quantitatively.	These pathways are considered minor as locals do not obtain drinking water from the Surface Water LAAs of either region. Because no public beaches or areas of shoreline where high intensity activities occur were identified in the Gordon or MacLellan regions and locations where humans could be exposed to sediment are remote, exposure to sediment would be infrequent. In addition concentrations in surface water were less than the applicalbe drinking water guidelines, the concentrations in sediment were less than the applicable soil guidelines, or the change in concentration from Base Case to Future Case was minor (i.e,. less than 1%).	Neutral
For the Indigenous Receptor and Residential Receptor, in lieu of site-specific receptor characteristics for ingestion of traditional vegetation, fish and wild meat, a recent consumption study completed by Chan et al. (2012) was used.	Site-Specific receptor characteristics were not available. Chan et al. (2012) is a comprehensive consumption study of First Nation people living in Manitoba. The intake rates in Chan et al. (2012) are assumed to be representative of Indigenous people living in Manitoba, including those that may visit the LAA. In addition, the purpose of an EA is to evaluate the change in exposure as a result of the Project. The intake rates affect the magnitude of the exposures, but do not affect the proportional changes. Therefore, the use of literature-based intake rates rather than site-specific ones is not expected to change the conclusions.	Overestimate
For assessment of carcinogenic ingestion risk, it was assumed Indigenous and Residential receptors would be present in their region 24-hours/day, 7 days/week, 52 weeks/year for 80 years (i.e., from birth to 80 years of age).	This is a conservative assumption as the assessment did not consider any time spent away from the location during the 80-year exposure period for carcinogenic compounds.	Overestimate
COPC-specific ground-level air concentrations and deposition data were used to predict various environmental media concentrations (e.g., soil, surface water, plant tissue). Environmental media concentrations were predicted assuming deposition in the regions had already occurred for 13 years (i.e., life of mine)	Region-specified 95% UCLM deposition rates and ground level air concentrations were used to predict COPC concentrations in environmental media (i.e., soil, vegetation). This is a conservative assumption in that it is likely that deposition rates would vary over the assessment area.	Overestimate

Table 5-110 Evaluation of Assumptions and Uncertainties Applied in the HHRA

Assumptions/Uncertainty	Discussion of Conservatism	Analysis Likely to Overestimate/ Underestimate Risk
	Additionally, deposition was assumed to have occurred over the 13-year operation phase of the Project. This is a conservative assumption in that it assumes the COPC concentrations would be at their maximum concentrations in environmental media over the 80-year receptor lifetime.	
Food chain uptakes	Estimation of COPC uptake through the food chain involves the use of assumptions regarding many factors, including root uptake factors, air to plant transfer factors, biotransfer and bioconcentration factors, and crop and soil ingestion rates (MOE 2008; US EPA 1997). Where it was necessary to model Baseline Case as well as Future Case concentrations, these assumptions apply equally to both cases and therefore have no net effect on the incremental change in concentrations between Baseline Case and Future Case.	Neutral
Did not evaluate infants exposed to COPC in breast milk	This is a minor pathway as metals are not expected to accumulate in breast milk. Mercury in breast milk could represent a potential health concern; however, the increases in mercury concentrations in environmental media as a result of the Project are expected to be negligible.	Neutral
Receptors present in the LAA during the winter months were assumed to be exposed to soil.	Soil exposure is unlikely to occur during the winter months when the ground is frozen and/or snow covered.	Overestimate
Exclusion of market basket foods	Concentrations in market basket food are not anticipated to be affected by the Project. Potential health risks are compared to a HQ benchmark of 0.2 due to potential contributions from multiple sources such as market basket food. Therefore, exclusion of market basket food is not anticipated to affect the conclusions of the HHERA.	Neutral
Toxicity Assessment		
Selected TRVs from the current toxicological values available (e.g., Health Canada, US EPA Integrated Risk Information System)	This approach is in accordance with standard practice, and provides the current scientific basis with which to conduct a risk assessment.	Neutral
Toxicity Reference Values (TRV)	For the derivation of TRV for use in HHRA ,regulatory bodies adopt conservative assumptions to account for uncertainties (i.e., interspecies differences, individual variation, limitations in toxicological information, and extrapolation from acute to chronic exposures). Depending on the degree of uncertainty, typical factors will range from 100 to 10,000, with some being lower than 10 (in the case where solid human data is available). The incorporation of these factors results in risk estimates that are very conservative and limited exposures above reference doses or reference concentrations would not be expected to result in adverse human health effects.	Overestimate
Risk Characterization		
For evaluating exposures non-carcinogenic COPC in air, a target benchmark CR of 1.0	CRs are only applicable to exposure to air in the inhalation assessment. Because 100% of inhalation exposure is from one media (i.e., air concentrations), the toxicity reference values or health-based benchmarks are inhalation-specific, it is appropriate to set the CR benchmark value at 1.0. The approach used is common risk assessment practice in Canada when completing an inhalation assessment.	Neutral
For evaluating exposures to non-carcinogenic COPC, a target benchmark HQ of 0.2 was used.	The use of an HQ benchmark of 0.2 is conservative as it allows 80% of the tolerable daily intake of a chemical to be received from other sources, including background.	Neutral
ILCR set to 1 in 100,000 (10^{-5}) for evaluating exposures to carcinogenic COPC at the site.	This value has been adopted by Health Canada to represent an “acceptable” benchmark risk for carcinogenic substances.	Neutral
ADAFs	Age dependent adjustment factors are applied to account for the potential increase in carcinogenic potency of a mutagenic chemical in young children (infants, toddlers, children) when exposures occur during early stages of life. The Project has a 13-year operational life which means that young children could be exposed to Project-related chemicals during early life-stages. Children born at the start of the Project could experience a maximum of 13 years of early life-stage exposure to Project-related chemicals. Using the ADAF values and age ranges for infants (10, 0.5 years), toddlers (5, 4.5 years), children (3, 7 years) and teens (2, 1 year (age 13)) (Health Canada 2013), the ADAF that would be applied to the LADDs would be calculated as follows: ((10 x 0.5) +(5 x 4.5) + (3 x 7) + (2 x 1)))/13 = 3.9. The ADAF would be applied to the CR estimates for receptors in the Gordon and MacLellan regions where young children (0 – 13 years of age) could be expected to be present. The maximum inhalaiton CR calculated for a carcinogenic COPC which is mutagenic, was 2.9E-06 (Chromium VI in the MacLellan region). A carcinogenic CR of 2.9E-06 is equivalent to a ILCR of 2.9 x 10^{-11} which is below the 10^{-5} cancer risk acceptabbility benchmark established by Health Canada. Applying an ADAF of 3.9 to this would increase the ICLR to 1.1x 10^{-10} which is also below the 10^{-5} cancer risk acceptability benchmark. The CRs for the other carcinogenic COPC, calculated for Indigenous and Residential receptors in the Gordon and MacLellan regions were all lower than the CRs calculated for Chromium VI, and ILCRs calculated for thse compounds by applying the ADAF to the ICLRs for these compounds would still be below the 10^{-5} risk acceeptability benchmark. Thus, applying the ADAF to the cancer risk calculations would not alter the conclusions of the HHRA.	Small underestimate/Neutral

5.6 HHRA SUMMARY

5.6.1 Gordon Region

The HHRA evaluated potential human health risks associated with exposures to Project-related chemicals of potential concern (COPC) under Baseline Case and Future Case conditions for Indigenous and Residential receptors in the Gordon region. The results demonstrated that the predicted changes in ingestion-related exposures to carcinogenic and non-carcinogenic COPC between Baseline Case and Future Case conditions, represents a negligible change in human health risk for the Indigenous and Residential receptors.

The HHRA identified no Project-related carcinogenic inhalation health risks above the applicable benchmark. Project-related non-carcinogenic health risk were below the applicable benchmark with the exception of 1-hour NO_2 exposures for Indigenous and Residential Receptors in the Gordon region.

In the Gordon region, exceedances of the 2025 1-hour NO_2 CAAQS are predicted at three special receptor locations, Potential Indigenous Receptor 24 (east of the Gordon PDA), Potential Indigenous Receptor 25 (northeast of the Gordon PDA) and Potential Indigenous Receptor 27 (north of the Gordon PDA). The exceedances are predicted to occur during the colder months (December through May) and to occur overnight sometime between 20:00 and 6:00 the following morning. Within this period, there is no fixed pattern to when individual exceedances happen. The maximum 1-hour NO_2 concentration was predicted to occur at Potential Indigenous Receptor 27. Information provided in the Traditional Land and Resources Use studies and in the Manitoba Métis Traditional Knowledge, Land Use, and Occupancy Study for the Lynn Lake Gold Mine Project (SVS 2020), do not identify habitations in the vicinity of the Potential Indigenous Receptor 27 special receptor location, or in the vicinities of the other two special receptor locations where exceedances of the 1-hour NO_2 2025 CAAQS, are predicted to occur. In the absence of habitation near these special receptor locations, it is less likely that people would be present in these areas at the time of day when then these exceedances are predicted to occur, than if the exceedances were to occur during daylight hours. In addition, the maximum 1-hour NO_2 concentrations for all 5 years at each of these three special receptor locations are below the Health Canada short-term Residential Indoor Air Quality Guideline (RIAQG) for NO_2 of 170 $\mu g/m^3$, and the predicted annual average NO_2 concentrations are below the 2025 annual average NO_2 CAAQS. Predicted annual average NO_2 concentrations at the remaining 44 special receptor locations within the Gordon region are also below the annual average CAAQS.

Based on the results, it is reasonable to conclude that occasional exceedances of the 2025 1-hour NO_2 CAAQS represent a negligible human health risk for people who may be in the area. Therefore, Project related health risks associated with inhalation exposures to the carcinogenic and non-carcinogenic COPC are negligible.

5.6.2 MacLellan Region

The HHRA evaluated potential human health risks associated with exposures to Project-related COPC under Baseline Case and Future Case conditions for Indigenous and Residential receptors in the MacLellan region. The results demonstrated that the predicted changes in ingestion-related exposures to carcinogenic and non-carcinogenic COPC between Baseline Case and Future Case conditions, represents a negligible change in human health risk for the Indigenous and Residential receptors.

The HHRA identified no Project-related carcinogenic inhalation health risks above the applicable benchmark. Project-related non-carcinogenic health risk were below the applicable benchmark with the exception of 1-hour NO_2 exposures for Indigenous and Residential Receptors in the MacLellan region. In the MacLellan region, exceedances of the 2025 1-hour NO_2 CAAQS are predicted at four special receptor locations, Potential Indigenous Receptor 36 (north of the MacLellan PDA), Potential Indigenous Receptor 37, Potential Indigenous Receptor 38 (both located southwest of the MacLellan PDA) and Waste Disposal Site 1 (located southeast of the MacLellan PDA), the maximum predicted 1-hour NO_2 concentration exceeded the 2025 1-hour NO_2 CAAQS. However, of the four special receptor locations within the MacLellan region where 1-hour NO_2 exceedances were predicted to occur, the Waste Disposal Site location is unlikely to represent a location people would be expected to frequent. The three remaining special receptor locations where 1-hour NO_2 exceedances are predicted to occur represent locations that people could reasonably be expected to frequent. Of these three locations, the highest number of exceedances of the 1-hour NO_2 2025 CAAQS are predicted to occur at Potential Indigenous Receptor 37 (163 exceedances over the 43,800 hours modelled over the 5-year modelling period). This represents 0.37% of the time.

At Potential Indigenous Receptor 37, and the other receptor locations, exceedances are predicted to occur during the colder months (December through May) and to occur overnight sometime between 20:00 and 6:00 the following morning. Within this period, there is no fixed pattern to when individual exceedances happen. The maximum 1-hour NO_2 concentration was predicted to occur at Potential Indigenous Receptor 37. Information provided in the Traditional Land and Resources Use studies and in the Manitoba Métis Traditional Knowledge, Land Use, and Occupancy Study for the Lynn Lake Gold Mine Project (SVS 2020), do not identify habitations in the vicinity of the Potential Indigenous Receptor 37 special receptor location, or in the vicinities of the other two special receptor locations where exceedances of the 1-hour NO_2 2025 CAAQS, are predicted to occur. In the absence of habitation near these special receptor locations, it is less likely that people would be present in these areas at the time of day when then these exceedances are predicted to occur, than if the exceedances were to occur during daylight hours. In addition, the maximum 1-hour NO_2 concentrations for all 5 years for each of these three special receptor locations are below the Health Canada short-term Residential Indoor Air Quality Guideline (RIAQG) for NO_2 of 170 $\mu g/m^3$, and the predicted annual average NO_2 concentrations are below the 2025 annual average NO_2 CAAQS. Predicted annual average NO_2 concentrations at the remaining 110 special receptor locations within the MacLellan region are also below the annual average CAAQS.

Based on the results, it is reasonable to conclude that occasional exceedances of the 2025 1-hour NO_2 CAAQS represent a negligible human health risk for people who may be in the area. Therefore, Project related health risks associated with inhalation exposures to the carcinogenic and non-carcinogenic COPC are negligible.

5.6.3 Work Camp

The HHRA identified no Project-related carcinogenic inhalation health risks above the applicable benchmark. Project-related non-carcinogenic health risk were below the applicable benchmark with the exceptions of 1-hour NO_2, and 2-hour DPM exposures for Off-Duty Workers housed at the work camp.

At the work camp the predicted 1-hour NO_2 exceedances usually occur in winter months (December–March). These exceedances generally happen overnight, occurring sometime between 19:00 and 6:00 the following morning. Within this period, there is no fixed pattern to when individual exceedances happen. In addition, in the winter months, between 19:00 and 6:00 workers would generally be expected to spend off-duty time indoors, and thus would not be expected to experience prolonged exposures to NO_2 concentrations that exceed the 1-hour CAAQS.

The DPM concentrations are predicted to exceed the 2-hour air quality standard of 10 µg/m^3 on two occasions (10.4 µg/m^3 and 11.5 µg/m^3) over a 5-year modelling period. Thus, exceedances of the 2-hour DPM air quality standard are rare. The 2-hour DPM air quality standard is based on a lowest observable adverse effect level (LOAEL) of 100 µg/m^3 from studies where increased respiratory resistance was reported in study groups that included subjects that were mildly asthmatic (Health Canada, 2016c). Thus, given that the predicted exceedances of the short-term (2-hour) exposure limit are small and of short duration, and that the health effects associated the 2-hour limit are based on mild and reversible effects in sensitive members of the population (asthmatics), and the fact that the maximum predicted annual average exposure for an Off-Duty Worker is below the annual average exposure limit, it is reasonable to conclude that for Off-Duty Workers, inhalation exposures to DPM represents a negligible human health risk.

Considering the results of the assessment of potential health risks associated with inhalation exposures to NO_2, and DPM it is reasonable to conclude that inhalation exposure to NO_2, and DPM a represent negligible human health risks for Off-Duty Workers housed at the work camp.

6.0 ECOLOGICAL RISK ASSESSMENT

The purpose of an ERA is to evaluate the potential that ecological receptors (such as mammals, birds, plants, fish) may experience adverse health effects as a result of exposure to chemical stressors. For this ERA, adverse effects refer to toxicologically induced changes in the health of ecological receptors that may be exposed to COPC released into the environment, specifically the LAA, as a result of Project-related activities. Like the HHRA, the framework used in this ERA follows the standard risk assessment paradigm comprised of five stages: Problem Formulation, Exposure Assessment, Toxicity Assessment, Quantitative Risk Characterization and an Uncertainty Assessment.

6.1 PROBLEM FORMULATION

The Problem Formulation stage is an information gathering and interpretation stage that focuses the assessment on the primary areas of concern for the Project. This stage usually includes management, assessment and protection goals (and associated acceptable effect levels), a review of the regulatory context for the ERA, site characterization, the selection of ecological receptors, the identification of COPC, and the assessment of potential exposure pathways linking the two.

The Problem Formulation culminates in a conceptual site model, which provides a visual depiction of the relevant pathways linking COPC in various environmental media and biota to the ecological receptors and biota of interest. Management goals, regulatory context, site characterization and COPC were already identified in Section 1.0 through Section 4.0, so in the following sections, the ecological receptors and exposure pathways from the Project are discussed as well as the protection goals and acceptable effect levels associated with the ERA.

6.1.1 Ecological Receptors of Concern

6.1.1.1 Selection of Ecological Receptors

Wildlife habitat in the RAA is a mosaic of terrestrial and wetland habitats intersected by extensive stream and lake systems that are relatively undisturbed. Numerous wildlife species inhabit the RAA due to the widespread availability of wetlands, rivers, lakes and forests. With the large number of wildlife species present in the RAA, it is neither practical nor necessary to conduct an assessment for each species. Rather, after reviewing the known species inventories of the RAA (Section 3.1) a representative subset of ecological receptors (also known as receptors of concern, or ROC, or valued ecosystem components, or VECs) was selected as the basis for this ERA. Ecological receptors were chosen for the ERA by considering wildlife species that are:

- Indigenous to the area.
- Most likely to receive the greatest exposure to chemical emissions due to their habitat and home range.
- Representative of various levels in the aquatic and terrestrial trophic web (e.g., carnivore, herbivore, insectivore, piscivore).
- Suitable surrogates for federal and provincial species at risk that could be in the RAA.
- Of cultural, economic, or social significance.

The selected ecological receptors are considered representative of other species occupying a similar position in the food web in order that results of the Risk Characterization stage for a selected ecological receptor can be used to make inferences about risk to other species occupying a similar trophic level or guild. For example, if results of the ERA indicate that no unacceptable risk is expected for American robin, a species that relies on a diet of soil invertebrates, then no unacceptable risks would be expected for other insectivorous bird species. Using these criteria, the ecological receptors assessed in the ERA (Table 6-1) are expected to provide an adequate and conservative representation of the faunal and floral diversity in the RAA. Reptiles (e.g., turtles and snakes) are not expected to occur in the RAA, and thus are not included in this assessment.

Table 6-1 Ecological Receptors Selected for the ERA

Common Name of Ecological Receptor	Scientific Name of Ecological Receptor	Feeding Guild
Mammals		
American beaver	*Castor canadensis*	Herbivorous mammal (aquatic)
American mink	*Neovison vison*	Omnivorous mammal (semi-aquatic)
Black bear	*Ursus americanus*	Omnivorous large mammal (terrestrial)
Common masked shrew	*Sorex cinereus*	Insectivorous mammal (terrestrial)
Deer mouse	*Peromyscus maniculatus*	Omnivorous small mammal (terrestrial)
Meadow vole	*Microtus pennsylvanicus*	Herbivorous small mammal (terrestrial)
Moose	*Alces alces*	Herbivorous large mammal (terrestrial)
Muskrat	*Ondatra zibethicus*	Herbivorous mammal (aquatic)
Northern river otter	*Lontra canadensis*	Piscivorous mammal (aquatic)
Short-tailed weasel	*Mustela erminea*	Carnivorous mammal (terrestrial)
Snowshoe hare	*Lepus americanus*	Herbivorous small mammal (terrestrial)
Woodland caribou	*Rangifer tarandus caribou*	Herbivorous large mammal (terrestrial)
Birds		
American robin	*Turdus migratorius*	Omnivorous bird (terrestrial)
Barn swallow	*Hirundo rustica*	Insectivorous bird (terrestrial)
Common loon	*Gavia immer*	Piscivorous bird (aquatic)
Lesser scaup	*Aythya affinis*	Insectivorous bird (aquatic)
Mallard	*Anas platyrhynchos*	Omnivorous bird (aquatic)
Red-tailed hawk	*Buteo jamaicensis*	Carnivorous bird (terrestrial)
Spotted sandpiper	*Actitis macularius*	Omnivorous bird (aquatic)
Spruce grouse	*Falcipennis canadensis*	Herbivorous bird (terrestrial)
Herptiles		
Wood frog	*Lithobates sylvaticus*	Insectivorous amphibian (terrestrial)
Community Receptors		
Terrestrial plant communities	Various	Various
Terrestrial invertebrate communities	Various	Various
Benthic communities	Various	Various
Aquatic communities	Various	Various

6.1.2 Mammalian Ecological Receptor Profiles

6.1.2.1 American Beaver

The American beaver (*Castor canadensis*) is primarily a nocturnal mammal that lives a semi-aquatic lifestyle. Beavers construct bank dens and lodges, which are used for protection from predators and weather. Where beavers live exclusively in rivers or deep lakes, bank dens are typical, while lodges are built in ponds, shallow lakes, or on the shore. Individual beavers spend most of their lives in small extended-family units traditionally called colonies. Established colonies inhabit discrete and defended territories; therefore, beaver activity is restricted to a well-defined area within close range of the lodge (Baker and Hill, 2003). The home range of a beaver depends on sex, age, social organization of the family unit, type of occupied habitat, and seasonal constraints. The home range in the summer is 0.08 to 0.18 km^2, with smaller ranges in fall and winter (Baker and Hill, 2003). An adult beaver weighs from 16 to 32 kg (CWS & CWF, 2005). Beavers are generalist herbivores that feed on a wide variety of herbaceous and woody terrestrial plants. Herbaceous plants can account for up to 90% of the diet in summer and up to 50% during spring and fall. Woody material may constitute up to 86% of the diet in winter and 16% in summer (Svendsen, 1980). Beavers also consume aquatic plants. Beavers occupying ponds appear to shift to a more aquatic diet in winter. Studies show that aquatic plants may compose 12% to 80% of the beaver's diet, depending on the season and the type of habitat occupied (Milligan and Humphries, 2010). For the present assessment, the beaver's diet was assumed to be 55% terrestrial plants and 45% aquatic plants. Based on the US EPA's food ingestion rates for rodents (US EPA, 1993b) and an average body weight of 24 kg, for this assessment a beaver is assumed to consume 0.022 kg of wet weight food, per kg body weight, per day and 0.072 L of water, per kg body weight, per day. The beaver is estimated to incidentally ingest approximately 3.9E-03 kg/day of dry soil and 6.2E-03 kg/day of dry sediment.

6.1.2.2 American Mink

The American mink (*Neovison vison*) is a small member of the weasel family and is the most abundant and widely distributed carnivorous mammal in North America (US EPA, 1993b). Mink are active year-round and occupy aquatic habitats such as rivers, streams, lakes, ditches, swamps, marshes and backwater areas (US EPA, 1993b). In winter, mink spend more time near dens and use a smaller portion of their home range than in summer. Adult male home ranges are generally larger than adult female home ranges. The average home range for females is 0.08 to 0.2 km^2, while that of males may be more than 7 km^2 (NatureServe, 2019). The area of their foraging range varies from 0.06 to 16.3 km^2 (FCSAP, 2012). Mink are skilled swimmers and climbers. In searching for food, they can swim up to 30 meters underwater and dive to depths of 5 meters (Schlimme, 2003). An average sized American mink weighs approximately 0.82 kg (FCSAP, 2012). The diet of mink varies with the season. During the summer it consists of crayfish, fish, frogs, small mammals such as shrews, rabbits, mice, muskrats and water fowl. In the winter, they primarily prey on mammals (US EPA, 1993b; Schlimme, 2003). Mink consume approximately 0.14 kg of wet weight food, per kg body weight, per day and 0.037 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the mink's diet was assumed to be 25% terrestrial prey items, 10% benthic invertebrates and 65% fish. The mink is estimated to incidentally ingest approximately 1.8E-04 kg/day of dry soil and 4.3E-04 kg/day of dry sediment.

6.1.2.3 Black Bear

The American black bear (*Ursus americanus*) is found throughout most of Canada. Black bears prefer heavily wooded areas and dense bushland (CWS & CWF, 2007). Not a true hibernator, the black bear enters its den in October to December and emerges in March to early May (Kronk, 2007). Mean home ranges are 10 to 40 km^2 for females and often more than 100 km^2 for males (CWS & CWF 2007). Their foraging range varies from 3 to 1147 km^2 (FCSAP, 2012). An average sized black bear weighs approximately 68 kg (FCSAP, 2012). Black bears consume primarily grasses and forbs in spring, shrub and tree-borne fruits in summer, and a mixture of hard and soft mast in fall. Only a small portion of the diet consists of animal matter, colonial insects (e.g., ants) and beetles. Most vertebrates are consumed in the form of carrion (Kronk, 2007). When available, they may also supplement their diet with fish (CWS & CWF, 2007). Black bears consume approximately 0.03 kg of dry weight food (or 0.19 kg of wet weight food), per kg body weight, per day and 0.064 L of water per kg body weight, per day (FCSAP, 2012). For the present assessment, the black bear's diet was assumed to be 80% terrestrial plants, 5% terrestrial invertebrates, 10% terrestrial prey and 5% freshwater fish. Based on the consumption of these foods, the black bear is estimated to incidentally ingest approximately 4.1E-02 kg/day of dry soil and 3.2E-03 kg/day of dry sediment.

6.1.2.4 Common Masked Shrew

The masked shrew (*Sorex cinereus*) is the most widely distributed shrew in North America, and is found throughout most of Canada (Lee, 2001). It is common in open and closed forests, meadows, riverbanks, lakeshores, and willow thickets (Lee, 2001). The average home and foraging range of the masked shrew is 0.006 km^2 (Lee, 2001; FCSAP, 2012). An average sized masked shrew weighs approximately 0.004 kg (FCSAP, 2012). Shrews are prey for many small predators such as weasels, hawks, falcons, owls, domestic cats, foxes, snakes, and short-tailed shrews (Lee, 2001). Although not strictly nocturnal, most of their activity takes place at night, hunting primarily on the ground and sometimes climbing into low vegetation and shrubs. The masked shrew primarily feeds on invertebrates including, insect larvae, ants, beetles, crickets, grasshoppers, spiders, harvestmen, centipedes, slugs, and snails. They also opportunistically consume seeds and fungi (Lee, 2001). Masked shrew consume approximately

0.34 kg of dry weight food (or 2.1 kg of wet weight food), per kg body weight, per day and 0.17 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the masked shrew's diet was assumed to be 5% terrestrial plants and 95% terrestrial invertebrates. Based on its consumption of these foods, the masked shrew is estimated to incidentally ingest about 2.8E-05 kg/day of dry soil.

6.1.2.5 Deer Mouse

The deer mouse (*Peromyscus maniculatus*) is a small rodent, common in woodland ecosystems throughout North America. An average sized deer mouse weighs 0.02 kg (FCSAP, 2012). The home range of the deer mouse varies from 0.0002 to 0.003 km^2 (Bunker, 2001) and foraging ranges vary from 0.0001 to 0.004 km^2 (FCSAP, 2012). Deer mice move along the forest floor beneath the concealing cover of the leaf litter, and they nest in well hidden burrows, rock crevices, brush piles and tree holes. Deer mice are nocturnal. They are a semi-arboreal species and can also swim, sometimes foraging in shallow water (Saunders, 1988; Bunker, 2001). Deer mice are prey items for night-hunting predators such as snakes, owls, and various carnivorous mammals. Deer mice are omnivorous; their diet consists of insects and other invertebrates, seeds, fruits, grains, fungi, flowers and nuts (Bunker, 2001). Deer mice consume approximately 0.27 kg of wet weight food, per kg body weight, per day and 0.19 L of water per kg body weight, per day (FCSAP, 2012). For the present assessment, the deer mouse's diet was assumed to be 50% terrestrial plants and 50% terrestrial invertebrates. Based on the consumption of these foods, the deer mouse is estimated to incidentally ingest approximately 1.8E-05 kg/day of dry soil.

6.1.2.6 Meadow Vole

The meadow vole (*Microtus pennsylvanicus*) is the most widely distributed small grazing herbivore in North America. It inhabits moist to wet habitats including grassy fields, marshes, and bogs (US EPA 1993b). It is a small rodent (approximately 0.035 kg) that is active year-round, making its burrows along surface runways in grasses or other herbaceous vegetation (US EPA, 1993b; FCSAP, 2012). The home range of the meadow vole varies from 2.0E-06 km^2 in winter to 8.0E-04 km^2 in summer (US EPA 1993b) and their mean foraging range is 6.9E-05 km^2 (FCSAP, 2012). Meadow voles are a major prey item for predators such as hawks and foxes. They feed primarily on vegetation such as grasses, leaves, sedges, seeds, roots, bark, fruits, and fungi, but will occasionally feed on insects and animal matter (US EPA, 1993b). The meadow vole consumes approximately 0.33 kg of wet weight food, per kg body weight, per day and 0.21 L of water per kg body weight, per day (FCSAP, 2012). For the present assessment, the meadow vole's diet was assumed to be 100% terrestrial plants. Based on its consumption of these foods, the meadow vole is estimated to incidentally ingest approximately 4.1E-05 g/day of dry soil.

6.1.2.7 Moose

The moose (*Alces alces*) can be found inhabiting forests from the Alaskan boundary to the eastern tip of Newfoundland and Labrador (CWS & CWF, 1997). Their geographic distribution follows, but is not confined to, the boundaries of the boreal forest. Moose are highly dimorphic between sexes, with cows weighing much less than bulls. The mean body weight (for both sexes) is 400 kg, although bulls of the northern sub-species, *A. A. gigans*, can weigh as much as 800 kg (CWS & CWF, 1997; FCSAP, 2012). Seasonal home ranges seldomly exceed 51 km^2, while annual home ranges can be up to 1932 km^2 depending on habitat and food availability (Hundertmark, 2007). Their foraging range varies from 4.6 to 262 km^2 (FCSAP, 2012). Seasonal migration usually follows an elevational gradient, as moose seek higher grounds in summer and lower elevations in winter (Innes, 2010). Moose are entirely herbivorous, consuming a mixture of terrestrial and aquatic vegetation. In the summer, moose prefer to browse on new growth of trees and shrubs (leaves, twigs, and bark), and vegetation associated with water (high-sodium aquatic plants). In the winter, their diet is typically restricted to conifer and hardwood twigs (NatureServe, 2019). A moose will consume approximately 0.02 kg of dry weight food (or 0.13 kg of wet weight food), per kg body weight, per day and 0.054 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the moose's diet was assumed to be 80% terrestrial plants and 20% aquatic plants. Based on its consumption of these foods, the moose was estimated to incidentally ingest 1.2E-01 kg/day of dry soil and 2.6E-02 kg/day of dry sediment.

6.1.2.8 Muskrat

The muskrat (*Ondatra zibethicus*) is an aquatic rodent that is common throughout Canada, living in saltwater and brackish marshes, freshwater creeks, streams, lakes, marshes, and ponds (US EPA, 1993b). Muskrats use space within linear home ranges, with most movements occurring near established dens or burrows. The average linear home range in a riparian habitat is reported to be 0.58 km (Ahlers et al., 2010). The area of their foraging range varies from 0.0003 to 0.008 km^2 (FCSAP, 2012). An average sized muskrat weighs approximately 1.0 kg (FCSAP, 2012). Muskrat are prey for many species including foxes, hawks, minks, and otters. Muskrats are primarily herbivorous and usually feed at night on aquatic vegetation growing near their dens. The roots and basal portions of aquatic plants make up most of the muskrat's diet, although shoots, bulbs, tubers, stems, and leaves also are eaten. They may also consume crayfish, molluscs, fish, frogs, turtles, and young birds (US EPA, 1993b). Active year-round, muskrats consume approximately 0.07 kg of dry weight food (or 0.46 kg of wet weight food), per kg body weight, per day and 0.099 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the muskrat's diet was assumed to be 80% aquatic plants, 15% benthic invertebrates and 5% fish. Based on its consumption of these foods, the muskrat was estimated to incidentally ingest 1.4E-03 kg/day of dry sediment.

6.1.2.9 Northern River Otter

The northern river otter (*Lontra canadensis*) occurs throughout Canada. It inhabits streams, rivers, estuaries, lakes, marshes and swamps (US EPA, 1993b; Ellis 2003). Their home range is typically linear and can vary from 2 to 78 km depending on the habitat type and the availability of food resources (Ellis, 2003). The area of their foraging range varies from 9 to 231 km^2 (FCSAP, 2012). An average sized river otter weighs approximately 7.5 kg (FCSAP, 2012). Otters are preyed upon by bigger mammals and birds of prey. They primarily eat fish but may also opportunistically consume crustaceans (e.g., crayfish), benthic invertebrates, birds, small mammals, reptiles and amphibians (US EPA, 1993b; Ellis, 2003). Active year-round (US EPA, 1993b), river otters consume approximately 0.03 kg of dry weight food (or 0.12 kg wet weight food), per kg body weight, per day and 0.081 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the river otter's diet was assumed to be 5% terrestrial prey, 15% benthic invertebrates and 80% fish. Based on its consumption of these foods, the river otter was estimated to incidentally ingest 2.9E-04 kg/day of dry soil, and 4.2E-03 kg/day of dry sediment.

6.1.2.10 Short-tailed Weasel

The short-tailed weasel or ermine (*Mustela erminea*) is found in the north temperate regions of North America in riparian woodlands, marshes, shrubby fencerows, and open areas adjacent to forests or shrub borders (Loso, 1999). An average sized ermine weighs 0.09 kg (FCSAP, 2012). Ermine home ranges vary from 0.1 to 0.2 km^2; home ranges of males are usually twice the size of female home ranges (Loso, 1999). Foraging ranges vary from 0.01 to 0.87 km^2 (FCSAP, 2012). Ermine are carnivores that hunt primarily at night. They mainly prey on small, warm-blooded vertebrates, preferring mammals of rabbit size and smaller. When mammalian prey is scarce, ermine may eat birds, eggs, frogs, fish, and insects (Loso, 1999). On average, ermine will consume approximately 0.11 kg of dry weight food (or 0.33 kg wet weight food), per kg body weight, per day and 0.13 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the ermine's diet was assumed to be 100% terrestrial prey items. Based on this diet, the ermine is estimated to incidentally ingest 1.9E-04 kg/day of dry soil.

6.1.2.11 Snowshoe Hare

The snowshoe hare (*Lepus americanus*) is found in every province and territory throughout Canada (CWS & CWF, 2005). Snowshoe hares weigh approximately 1.3 kg (FCSAP, 2012). The snowshoe hare tends to inhabit forests, swamps, and riverside thickets (US EPA, 1993b). It has a home range of approximately 0.04 km^2 (US EPA, 1993b) and a foraging range from 0.016 to 0.10 km^2 (FCSAP, 2012). The snowshoe hare is a frequent prey item, making it a keystone species in boreal forest food webs (CWS & CWF, 2005). Active year-round, it feeds on herbaceous plants and leaves in summer, and small twigs, buds, and bark in winter (CWS & CWF, 2005). The snowshoe hare consumes approximately 0.06 kg of dry weight food (or 0.40 kg wet weight food), per kg body weight, per day and 0.096 L of water per kg body weight, per day (FCSAP, 2012). For the present assessment, the snowshoe hare's diet was assumed to be 100% terrestrial plants. Based on its consumption of these foods, the snowshoe hare is estimated to incidentally ingest 4.9E-03 kg/day of dry soil.

6.1.2.12 Woodland Caribou

The woodland caribou (*Rangifer tarandus caribou)* includes several ecotypes (e.g., boreal, northern, mountain), which are defined on the basis of distinct patterns of habitat use and diet/feeding behaviour. The RAA lies within Environment Canada's Manitoba North boreal caribou range. Boreal caribou require large tracts of uninterrupted, lichen-rich mature coniferous forests interspersed by peatland complexes (Government of Canada, 2012). Boreal Caribou exist in small, dispersed, relatively sedentary bands throughout the year. The winter and summer ranges typically overlap and habitat use does not differ by season. The average home range of the boreal caribou is 710 km^2. Caribou are herbivores, foraging primarily on terrestrial lichens and to a lesser extent on arboreal lichens during winter. Winter foraging occurs primarily in open forests in peatlands and in nearby lichen-rich pine stands where available. Their summer diet consists of a wide variety of vegetation (BC MOE, 2004). A woodland caribou will consume approximately 0.051 kg of wet weight food, per kg body weight, per day and 0.059 L of water, per kg body weight, per day (Nagy, 1987). For the present assessment, the caribou's diet was assumed to be 100% terrestrial plants. Based on its consumption of these foods, the caribou was estimated to incidentally ingest 1.7E-01 kg/day of dry soil.

6.1.3 Avian Ecological Receptor Profiles

6.1.3.1 American Robin

The American robin (*Turdus migratorius*) is the largest, most abundant and broadly distributed thrush in North America. The breeding habitat of the robin includes moist forest, swamps, open woodlands, orchards, parks and lawns (US EPA, 1993b). During the non-breeding season, robins migrate to lower elevations and latitudes. However, not all populations are migratory-some spend the winter months close to their breeding grounds (Vanderhoff et al., 2016). The robin's home range is approximately 0.002 to 0.008 km^2 (US EPA, 1993b), while the foraging range varies from 0.007 to 0.28 km^2 (FCSAP, 2012). An average sized American robin weighs 0.08 kg (FCSAP, 2012). Its diet is highly variable throughout the year, changing from primarily soft-bodied invertebrates (e.g., earthworms) in spring and summer, to primarily fruit in autumn and winter (Vanderhoff et al., 2016).The American robin consumes approximately 1.2 kg of wet weight food, per kg body weight, per day and 0.14 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the robin's diet was assumed to be 60% terrestrial plants and 40% terrestrial invertebrates. Based on its consumption of these foods, the American robin was estimated to incidentally ingest 5.9E-04 kg/day of dry soil.

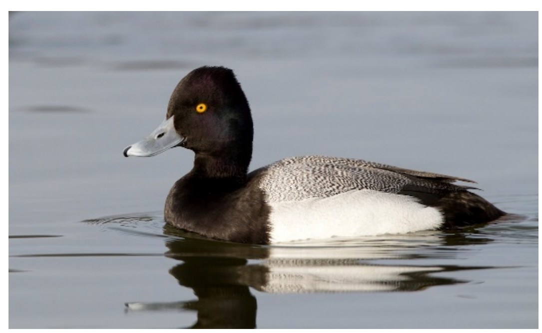
6.1.3.2 Barn Swallow

The barn swallow (*Hirundo rustica*) is a long-distance migrant moving between its breeding range in North America and overwintering range in Central and South America (Brown & Brown, 2019). Breeding habitats include open areas (e.g., fields, meadows, wetlands) for foraging, a nest site that includes a vertical or horizontal substrate with some type of roof or ceiling, and a body of water that provides mud for nest building (Brown & Brown, 2019). Barn swallows are not territorial while foraging. Foraging ranges vary from 0.8 to 4.5 km^2 (FCSAP, 2012). An average sized barn swallow weighs 0.02 kg (FCSAP, 2012). The barn swallow's diet consists primarily of aerial insects year-round. Seeds may also be consumed to a lesser extent. Grit or small pebbles are often consumed to aid digestion of insects and possibly also for calcium (Brown & Brown, 2019). Barn swallows consume approximately 0.26 kg of dry weight food (or 1.6 kg wet weight food), per kg body weight, per day and 0.22 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the barn swallow's diet was assumed to be 1% terrestrial plants and 99% terrestrial invertebrates. Based on its consumption of these foods, the barn swallow is estimated to incidentally ingest approximately 9.6E-05 kg/day of dry soil.

6.1.3.3 Common Loon

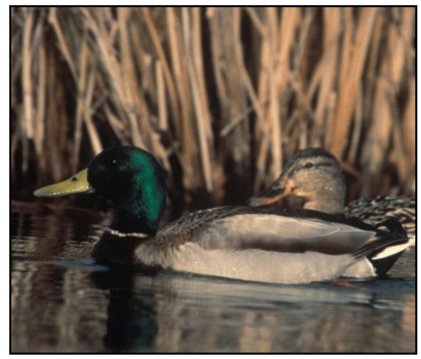
The common loon (*Gavia immer*) lives in freshwater habitats of North America. It is a medium-distance migrant. Most of the loon population shifts from freshwater inland breeding locations to coastal marine wintering locations, although some remain at inland freshwater sites throughout winter. Fall migration generally begins in September and October and by late November most migrants have arrived in their wintering areas (Evers et al., 2010). The common loon prefers lakes larger than 0.24 km^2 with clear water, an abundance of small fish, numerous small islands and an irregular shoreline that creates coves. However, it can use a wide variety of freshwater aquatic habitats, even when water level fluctuations vary regularly (Evers et al., 2010). The loon's foraging range varies from 0.04 to 0.6 km^2 (FCSAP, 2012). Loons are visual predators, preferring clear waters of littoral zones and tend to avoid foraging in deeper parts of lakes. They generally forage in relatively shallow areas (< 5 m in depth) and within 50 to 150 m of the shoreline. An average sized loon weighs 5.3 kg (FCSAP, 2012). Loons primarily eat fish, preferring prey species size classes in the range of 10 to 15 cm (e.g., perch, chubs, sucker and salmonid species). Fish larger than 30 cm (e.g., northern pike, chain pickerel and lake trout) may also be consumed (Evers et al., 2010). The common loon consumes approximately 0.19 kg of wet weight food, per kg body weight, per day and 0.034 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the loon's diet was assumed to be 10% benthic invertebrates and 90% fish. Based on its consumption of these foods, the loon is estimated to incidentally ingest 5.0E-03 kg/day of dry sediment.

6.1.3.4 Lesser Scaup



The lesser scaup (*Aythya affinis*) is one of the most abundant and widespread diving ducks in North American. The lesser scaup is a late fall migrant, one of the last waterfowl to leave an area at freeze-up (Anteau et al., 2014). They winter along coastal areas in the southern states and into Mexico. The core nesting habitats of the lesser scaup are in boreal forests and parklands. Their primary brood habitat is characterized by permanent wetlands dominated by emergent vegetation. Females nest in late May through June and build nests on the ground near or over water, as well as in uplands (US EPA, 1993b). The average size of their home range is 0.9 km^2 (US EPA, 1993b), while their foraging range varies from 0.1 to 17.1 km^2 (FCSAP, 2012). An average sized lesser scaup weighs 0.7 kg (FCSAP, 2012). During spring and summer, lesser scaup forage in the open-water zone of shallow wetlands and lakes (generally <3 m deep). Lesser scaup are mainly carnivorous, consuming mostly aquatic invertebrates (e.g., crustaceans, insects, molluscs, snails, polychaetes). Seeds and vegetative parts of aquatic plants may also be part of the diet in certain areas (Anteau et al., 2014). The lesser scaup consumes approximately 0.07 kg of dry weight food (or 0.29 kg wet weight food), per kg body weight, per day and 0.066 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the lesser scaup's diet was assumed to be 10% aquatic plants and 90% benthic invertebrates. Based on its consumption of these foods, the lesser scaup was estimated to incidentally ingest 9.3E-04 kg/day of dry sediment.

6.1.3.5 Mallard



The mallard (*Anas platyrhynchos*) is the most abundant dabbling duck species in North America. Most mallard populations in North America are sedentary, undergoing only short to medium-distance migrations during winter (Drilling et al., 2018). Their preferred foraging habitats are natural bottomland wetlands and rivers with water depths of 0.2 to 0.4 m. Their nesting habitat consists of dense grassy vegetation that provides concealment from predators. Their home ranges vary from 5.4 to 6.2 km^2 (US EPA, 1993b), while their foraging range varies from 0.09 to 2.4 km^2 (FCSAP, 2012). An average sized mallard weighs approximately 1.2 kg (FCSAP, 2012). The mallard feeds primarily on aquatic invertebrates during the breeding season and on aquatic and terrestrial plants during the non-breeding season (CWS & CWF, 1996). The mallard consumes approximately 0.05 kg of dry weight food (or 0.31 kg wet weight food), per kg body weight, per day and 0.056 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the mallards' diet was assumed to be 5% terrestrial plants, 5% terrestrial invertebrates, 50% aquatic plants and 40% benthic invertebrates. Based on its consumption of these foods, the mallard was estimated to incidentally ingest 1.9E-04 kg/day of dry soil and 2.0E-03 kg/day of dry sediment.

6.1.3.6 Red-tailed Hawk

The red-tailed hawk (*Buteo jamaicensis*) is the most common and widespread hawk in North America. It is typically found in open areas with scattered, elevated perches in diverse habitats including scrub deserts, plains and montane grasslands, agricultural fields, pastures, urban parks, patchy coniferous and deciduous woodlands. The red-tailed hawk makes diurnal, short- to intermediate distance migrations (<1500 km) (Preston & Beane, 2009). Northern populations of the red-tailed hawk are migratory, while populations from southern Canada may be year-round residents (US EPA, 1993b). Home range size can vary from 2 to >15 km^2, depending on the habitat (US EPA 1993b; Stout et al., 2006). The area of their foraging range varies from 0.2 to 50 km^2 (FCSAP, 2012). An average sized red-tailed hawk weighs approximately 1.1 kg (FCSAP, 2012). Red-tailed hawks generally hunt from an elevated perch, foraging primarily on small rodents such as mice, voles, shrews, rabbits, and squirrels, as well as birds and reptiles (US EPA, 1993b). They consume approximately 0.1 kg of wet weight food, per kg body weight, per day and 0.06 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the red-tailed hawk's diet was assumed to be 100% terrestrial prey items. Based on its consumption of these foods, the red-tailed hawk was estimated to incidentally ingest approximately 0.70 g/day of dry soil.

6.1.3.7 Spotted Sandpiper

The spotted sandpiper (*Actitis macularius*) is one of the most widespread shorebirds in North America. It is found east to west across the continent and north to south from the southern edge of the Arctic to the southern states. Spotted sandpipers are considered intermediate- to long-distance migrants. In the winter, they migrate to the southern United States and South America (Reed et al., 2013). The spotted sandpiper prefers open water for bathing and drinking, semi-open habitat for nesting and dense vegetation along the edges of bodies of water for breeding (US EPA, 1993b). Their mean home range is 0.003 km² (US EPA, 1993b), while their foraging range varies from 0.0008 to 0.012 km^2 (FCSAP, 2012). In inland areas, spotted sandpipers feed along the shores of sandy ponds and streams, sometimes straying into meadows and fields. An average sized spotted sandpiper weighs 0.038 kg (FCSAP, 2012). Their diet is composed primarily of terrestrial and aquatic insects. While flying insects comprise the bulk of the diet, crustaceans, leeches, molluscs, small fish, and carrion also are eaten (US EPA, 1993b). The spotted sandpiper consumes approximately 0.18 kg of dry weight food (or 0.98 kg wet weight food), per kg body weight, per day and 0.17 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the spotted sandpiper's diet was assumed to be 60% terrestrial invertebrates, 5% aquatic plants, 30% benthic invertebrates and 5% fish. Based on its consumption of these foods, the spotted sandpiper is estimated to incidentally ingest 7.0E-05 kg/day of dry soil and 6.7E-05 kg/day of dry sediment.

6.1.3.8 Spruce Grouse

The spruce grouse (*Falcipennis canadensis*) is a non-migratory year-round resident species that almost exclusively inhabits coniferous forests. Spruce grouse prefer relatively young stands over more mature conifer forest. Their home range varies from 0.03 to 3.5 km^2 (USDA Forest Service, 2004). Females nest on the ground in a small depression at the base of a tree with overhanging branches that conceal the nest. Spruce Grouse sometimes gather in small flocks in autumn but become solitary by spring; some remain solitary year-round. They do not undergo long-distance movements out of their northern forest habitats but can have localized seasonal movements (short-distance migratory movements of up to 11 km) between breeding and wintering ranges (Schroeder et al., 2018). An average sized spruce grouse weighs 0.6 kg (FCSAP, 2012). Their diet consists mainly of conifer needles. Spruce grouse usually forage higher in trees, where they can access newer needles, but may also forage on the ground, eating growing tips, flowers, fruit of small plants, mushrooms, small arthropods and terrestrial snails (Schroeder et al., 2018). Their foraging range varies from 0.03 to 0.24 km^2 (FCSAP, 2012). Spruce grouse consume approximately 0.07 kg of dry weight food (or 0.46 kg wet weight food), per kg body weight, per day and 0.07 L of water, per kg body weight, per day (FCSAP, 2012). For the present assessment, the spruce grouse's diet was assumed to be 95% terrestrial plants and 5% terrestrial invertebrates. Based on its consumption of these foods, the spruce grouse is estimated to incidentally ingest approximately 8.3E-04 kg/day of dry soil.

6.1.4 Herptiles

The RAA provides suitable habitat for amphibians. The 2015/2016 amphibian baseline studies indicate that boreal chorus frogs (*Pseudacris maculate)* and wood frogs (*Lithobates sylvaticus)* are widely dispersed in well-vegetated wetlands throughout the RAA. During the peak frog breeding period in May, both species were observed using the same breeding ponds, indicating overlapping habitat preferences in the RAA. No reptile ranges overlap with the RAA; therefore, only amphibians will be assessed qualitatively in the ERA.

The wood frog was chosen to represent amphibians in the ERA because it is a FCSAP-listed receptor that is present in the RAA. The wood frog is the second most widely distributed frog in North America. Wood frogs use a variety of habitats and have a multiphasic life history (i.e., obligatory aquatic egg and tadpole phases plus terrestrial adult). Their preferred breeding habitats include ponds that have emergent vegetation, still water, and shallow, sloping shores, as well as moist grassy meadows, willow bogs, or forests with moderate to thick leaf litter (USDA, 2005). Their average foraging range is 0.25 km^2 (FCSAP, 2012). An average sized wood frog weighs 0.008 kg (FCSAP, 2012). Adult wood frogs are carnivorous, feeding primarily on arthropods such as ants, flies, beetles, spiders and to a lesser extent snails, slugs and earthworms. Tadpoles are omnivorous, feeding on algae, bacteria, and periphyton (USDA, 2005). Food and water ingestion rates for the wood frog are unknown (FCSAP, 2012).

6.1.5 Community Based Ecological Receptors

The primary exposure pathway for some flora and fauna is from direct contact with a single abiotic environmental medium (e.g., soil). Accordingly, toxicity benchmarks are commonly derived based on COPC media concentrations and the adverse environmental effects thresholds for organisms that reside/rely on those media. Additionally, these benchmarks are typically generated using toxicity data for not one, but several species that rely on that medium, and are intended to represent a COPC concentration that will be protective of most, if not all species associated with that medium. For these reasons, the following ecological receptors were evaluated in this ERA at the community level, rather than as individual species:

- Terrestrial plants
- Terresrial invertebrates
- Benthic invertebrates

- Freshwater aquatic life.

6.1.6 Species at Risk

Species at Risk (SAR) are those species designated under Schedule 1 of the federal *Species at Risk Act* (SARA). Species of Conservation Concern (SOCC) are those species listed under *The Endangered Species and Ecosystems Act* (ESEA) in Manitoba, those identified as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or as provincially rare (Ranks S1, S2, and S3) by the Manitoba Conservation Data Centre (MB CDC) (Stantec 2020d).

The RAA overlaps the current or historical ranges of 14 SAR and four SOCC (Stantec, 2020d). There are:

- Five mammals (little brown myotis [Myotis lucifugus], northern myotis [Myotis septentrionalis], wolverine [Gulo gulo], woodland caribou [Rangifer tarandus caribou] and barren-ground caribou [*Rangifer tarandus groenlandicus*]).
- Ten birds (trumpeter swan [*Cygnus buccinator*], horned grebe *[Podiceps auratus*], yellow rail [*Coturnicops noveboracensis*], short-eared owl [*Asio flammeus*], common nighthawk [*Chordeiles minor*], olive-sided flycatcher [*Contopus cooperi*], bank swallow [*Riparia riparia*], barn swallow [*Hirundo rustica*], evening grosbeak [*Coccothraustes vespertinus*], and rusty blackbird [*Euphagus carolinus*]);
- One amphibian (northern leopard frog [*Lithobates pipiens*]); and
- Two insects (yellow-banded bumble bee [*Bombus terricola*] and transverse lady beetle [*Coccinella transversoguttata*]).

Of the five SAR/SOCC mammals with potential to occur in the RAA, three were observed during baseline surveys: little brown myotis, wolverine, and the woodland caribou (Stantec, 2020d). Field surveys confirmed the presence of little brown myotis foraging at the MacLellan region. Although not observed through field surveys, the northern myotis also has potential to inhabit the existing mine infrastructure. Wolverine were observed at three cameras trap sites and throughout the RAA during aerial track surveys. Woodland caribou were detected in the RAA in April 2019; results from the baseline remote camera survey provided a recent observation of several individuals in the RAA west of Lynn Lake, which indicates woodland caribou may occasionally occur in the RAA. Traditional ecological knowledge indicates that barren-ground caribou were hunted in the northern portion of the RAA until the early 1950s and are now harvested outside of the RAA. The occurrence of barren-ground caribou range in the RAA is considered historical (Stantec 2020d).

Of the ten bird SAR/SOCC with potential to occur within the RAA, four species (common nighthawk, olive-sided flycatcher, barn swallow and rusty blackbird) were observed during baseline surveys within the RAA. Yellow rail, short-eared owl, bank swallow, evening grosbeak, trumpeter swan, and horned grebe are not expected to regularly occur in the RAA, based on range distributions and limited occurrences in this region, as well as a lack of suitable breeding habitat (Stantec 2020d).

Though the current or historical range of northern leopard frogs overlap the RAA, they are unlikely to regularly occupy the RAA and they have not been detected in waterbodies with the potential to be affected by the Project (Stantec, 2020d).

Although there have been no incidental observations of the yellow-banded bumble bee and the transverse lady beetle during baseline field surveys, both species remains relatively common in the northern, boreal extent of its range (Stantec, 2020d). Sufficient information is not available to assess insects at the species level within the ERA. Rather these species will be assessed on a community-level as part of terrestrial invertebrates.

It is difficult in ERA to quantitatively address COPC risk to SAR/SOCC because quantitative information is often lacking on diet, inadvertent soil ingestion, water intake and toxicological reference data. To accommodate SAR in this ERA, ecological receptors found within the same class and within a similar trophic level or feeding guild were used as surrogates to assess toxicological risk from exposure to COPC (Table 6-2). The results of the ERA for those species can be applied to the SAR.

6.1.7 Ecological Receptor Locations

Potential risks to ecological receptors were assessed for the Gordon region and the MacLellan region separately. Unlike the HHRA, these two regions were not further subdivided to assess risk at specific locations. Rather, exposures within the Gordon region and the MacLellan region were assessed using a hybrid approach representative of potential upper limit exposures for each media at each region such that risk for ecological receptors (as populations, communities or individual SOCC) are derived. Where measured baseline data were available/applicable, the EPCs were based on the 95 percent (%) upper confidence limit of the mean (UCLM) or maximum concentrations. The 95% UCLMs represent reasonably expected and spatially distributed COPC exposure concentrations for ecological receptors. As such, instead of assessing potential risks to ecological receptors at a number of specific locations, both the Gordon region and the MacLellan region were conservatively assessed using upper limit exposures to represent one single assessment of overall potential ecological risks at each region.

6.1.8 Summary of Ecological Receptors

The ecological receptor profiles are summarized in Table 6-3, below. Where possible, preference was given to life history parameters for receptors as published by FCSAP in the Ecological Risk Assessment Guidance, Module 3 (FCSAP 2012). Deviations from FCSAP guidance are explained in the species profiles above.

Table 6-2 Species at Risk and Surrogate Ecological Receptors used in ERA

Common Name of Species at Risk	Scientific Name of Species at Risk	Common Name of Ecological Receptor used as Surrogate in ERA	Scientific Name of Ecological Receptor used as Surrogate in ERA
Mammals			
Little brown myotis	*Myotis lucifugus*	Common masked shrew	*Sorex cinereus*
Northern myotis	*Myotis septentrionalis*	Common masked shrew	*Sorex cinereus*
Wolverine	*Gulo gulo*	Short-tailed weasel	*Mustela erminea*
Woodland caribou	*Rangifer tarandus caribou*	Woodland caribou	*Rangifer tarandus caribou*
Birds			
Barn swallow	*Hirundo rustica*	Barn swallow	*Hirundo rustica*
Common nighthawk	*Chordeiles minor*	Barn swallow	*Hirundo rustica*
Olive-sided flycatcher	*Contopus cooperi*	Barn swallow/American robin	*Hirundo rustica* / *Turdus migratorius*
Rusty blackbird	*Euphagus carolinus*	Barn swallow/American robin	*Hirundo rustica* / *Turdus migratorius*
Terrestrial Invertebrates			
Yellow-banded bumble bee	*Bombus terricola*	Terrestrial invertebrate community	Terrestrial invertebrate community
Transverse lady beetle	*Coccinella transversoguttata*	Terrestrial invertebrate community	Terrestrial invertebrate community

Table 6-3 Summary of Ecological Receptor Profiles

Receptor	Average Weight (kg)	Foraging Range (km^2)	Food Ingestion (kg wet weight food/kg BW/day)	Water Ingestion (L/kg BW/day)	Soil/ Sediment Ingestion (kg dry weight/day)	Diet (Specific to Assessment)
Mammals						
American Beaver	24	0.08 to 0.18	0.022	0.072	3.9E-03 (soil) 6.2E-03 (sediment)	55% Terrestrial plants 45% Aquatic plants
American Mink	0.82	0.06 to 16.3	0.14	0.037	1.8E-04 (soil) 4.3E-04 (sediment)	25% Terrestrial prey 10% Benthic invertebrates 65% Freshwater fish
Black Bear	68	3.0 to 1147	0.19	0.064	4.1E-02 (soil) 3.2E-03 (sediment)	80% Terrestrial plants 5% Terrestrial invertebrates 10% Terrestrial prey 5% Freshwater fish
Common Masked Shrew	0.0041	0.006	2.1	0.17	2.8E-05 (soil)	5% Terrestrial plants 95% Terrestrial invertebrates
Deer Mouse	0.022	0.0001 to 0.004	0.27	0.19	1.8E-05 (soil)	50% Terrestrial plants 50% Terrestrial invertebrates
Meadow Vole	0.035	0.00007 to 0.0035	0.33	0.21	4.1E-05 (soil)	100% Terrestrial plants
Moose	400	4.6 to 262	0.13	0.054	1.2E-01 (soil) 2.6E-02 (sediment)	80% Terrestrial plants 20% Aquatic plants
Muskrat	1.0	0.0003 to 0.008	0.46	0.099	1.4E-03 (sediment)	80% Aquatic plants 15% Benthic invertebrates 5% Freshwater fish
Northern River Otter	7.5	9.0 to 231	0.12	0.08	2.9E-04 (soil) 4.2E-03 (sediment)	5% Terrestrial prey 15% Benthic invertebrates 80% Freshwater fish
Short-tailed Weasel	0.089	0.01 to 0.87	0.33	0.13	1.9E-04 (soil)	100% Terrestrial prey
Snowshoe Hare	1.3	0.02 to 0.10	0.40	0.096	4.9E-03 (soil)	100% Terrestrial plants

Table 6-3 Summary of Ecological Receptor Profiles

Receptor	Average Weight (kg)	Foraging Range (km^2)	Food Ingestion (kg wet weight food/kg BW/day)	Water Ingestion (L/kg BW/day)	Soil/ Sediment Ingestion (kg dry weight/day)	Diet (Specific to Assessment)
Woodland Caribou	160	710	0.05	0.059	1.7E-01 (soil)	100% Terrestrial plants
Birds						
American Robin	0.079	0.007 to 0.28	1.2	0.14	5.9E-04 (soil)	60% Terrestrial plants 40% Terrestrial invertebrates
Barn Swallow	0.019	0.8 to 4.5	1.6	0.22	9.6E-05 (soil)	1% Terrestrial plants 99% Terrestrial invertebrates
Common Loon	5.3	0.04 to 0.60	0.19	0.034	5.0E-03 (sediment)	10% Benthic invertebrates 90% Freshwater fish
Lesser Scaup	0.71	0.10 to 17	0.29	0.066	9.3E-04 (sediment)	10% Aquatic plants 90% Benthic Invertebrates
Mallard	1.2	0.09 to 2.4	0.31	0.056	1.9E-04 (soil) 2.0E-03 (sediment)	5% Terrestrial plants 5% Terrestrial invertebrates 50% Aquatic plants 40% Benthic invertebrates
Red-tailed Hawk	1.1	0.2 to 50	0.10	0.057	7.0E-04 (soil)	100% Terrestrial prey
Spotted Sandpiper	0.038	0.0008 to 0.012	0.98	0.17	7.0E-05 (soil) 6.7E-05 (sediment)	60% Terrestrial invertebrates 5% Aquatic plants 30% Benthic invertebrates 5% Freshwater fish
Spruce Grouse	0.60	0.03 to 0.24	0.46	0.070	8.3E-04 (soil)	95% Terrestrial plants 5% Terrestrial invertebrates
Amphibians						
Wood Frog*	0.008	0.25	n/a	n/a	n/a	100% Terrestrial invertebrates

NOTES:
n/a- information is not available
* There are not sufficient exposure and toxicity data to evaluate amphibians quantitatively, thus a qualitative assessment will be conducted.

Table 6-4 Rationale for Exposure Pathway Inclusion in the ERA

Exposure Pathway	Carried Forward in the ERA	Rationale
Direct Exposure from Air	Yes	Some COPC (e.g., NO_2 and SO_2) may be directly absorbed from the air by terrestrial plants.
Soil Ingestion	Yes	Soil ingestion is an important dietary component for many ecological receptors including herbivores and ungulates. Direct ingestion of soil provides essential minerals such as sodium, calcium, iron and zinc to supplement diets that are naturally low in mineral content. Incidental soil ingestion may occur through the ingestion of food items. Examples include soil bound to browse, forage and root vegetation when consumed by herbivores; or soil bound to prey items on the ground. Incidental soil ingestion may also occur through grooming activities. Therefore, the ingestion of soil constitutes a potential source of exposure to mammalian and avian receptors.
Soil Contact	Yes	Direct contact with soil is the primary exposure pathway for soil invertebrates and plants. Direct (dermal) contact with soil could be a potential exposure pathway for mammals and birds. However, it is not expected to represent a major source of exposure for most mammalian and avian receptors because fur and feathers will significantly reduce soil contact with skin (Sample and Suter 1994). Soil adhering to fur and feathers may be ingested during grooming activity which is included in the incidental soil ingestion estimates.
Inhalation	No	Ecological receptors may be exposed to COPC through the inhalation of dust. However, this exposure pathway is included with soil ingestion since it was assumed that the majority of inhaled particulates will be caught in the mucus membrane, coughed up and swallowed by the animal. With respect to potential effects on the respiratory system, there is insufficient toxicological dose-response information available to properly evaluate the potential effects associated with inhalation exposures to COPC for ecological receptors and the biological mechanisms of action associated with inhalation exposures often differ from those associated with ingestion exposures. Thus, using exposure benchmarks derived for ingestion exposures to assess potential risks associated with inhalation exposures is often incorrect. Therefore, inhalation is not considered further in the ERA.
Ingestion of Terrestrial Foods	Yes	The consumption of terrestrial plants, terrestrial invertebrates and terrestrial prey can be a source of exposure for mammals and birds.
Surface Water Ingestion	Yes	The ingestion of surface water containing COPC can be an exposure pathway for mammals and birds.
Ingestion of Aquatic Foods	Yes	The ingestion of aquatic plants, invertebrates and fish can be an exposure pathway for mammals and birds.
Direct Contact with Surface Water	Yes	Direct contact with surface water is an exposure pathway to aquatic receptors such as fish, aquatic plants and benthic invertebrates. Exposure to COPC from direct contact with water was assumed to be a minor exposure pathway relative to direct ingestion of water and ingestion of foods (e.g., fish) from the aquatic environment, both of which have been included in the ERA.

Table 6-4 Rationale for Exposure Pathway Inclusion in the ERA

Exposure Pathway	Carried Forward in the ERA	Rationale
Ingestion of Sediment	Yes	Ecological receptors that consume aquatic plants and benthic invertebrates may also ingest sediments incidentally. Other activities such as grooming and constructing nests or dens may also result in incidental sediment ingestion. Therefore, this exposure pathway is considered in the ERA.
Ingestion of Benthic Aquatic Foods	Yes	The diets of some mammalian and avian receptors include a proportion of benthic invertebrates. Therefore, this exposure pathway is considered in the ERA.
Direct Contact with Sediment	Yes	Benthic invertebrates live in or are associated with sediments for most of their lifespan. Therefore, direct contact with sediments is the primary exposure pathway for benthic invertebrates. For mammalian and avian receptors, direct contact with sediment is considered to be minor exposure pathway relative to the exposures from ingestion of sediment benthic foods.

6.1.9 Conceptual Site Model

The objective of the Problem Formulation stage is to develop a CSM that will aid in subsequent stages of quantitative analyses. The CSM illustrates the pathways by which ecological receptors could be exposed to COPC released into the environment from the Project. Chemical transport and exposure pathways are used to describe the movement of COPC from a release point or source (e.g., dust released by Project activities and treated effluent discharge or other releases to watercourses) to the point where an ecological receptor may come into contact with the COPC (e.g., direct exposure or ingestion). The exposure pathway screening process incorporates information about the Project-related COPC emissions, activities in the area, receptor characteristics and the exposure pathways. The chemical exposure pathways considered in the ERA, and the rationale for the exposure pathway being included or excluded in the assessment, is found in Table 6-4 above.

The CSM for the ERA represents the interactions between the receptors and the COPC, via the identified exposure pathways. The relevant exposure pathways are designated by arrows from the source media leading to the receptor by various exposure pathways (i.e., direct exposure or ingestion). Pathway exposure boxes marked with an "✓" indicate pathways that have been quantitatively evaluated in the ERA, while those marked with an "o" indicate pathways that have been qualitatively evaluated.

Figure 6-1 Conceptual Site Model for the Ecological Risk Assessment

Source Media	Transport Mechanisms	Exposure Pathway	COPC	American Mink Omnivorous mammal (semi-aquatic)	Beaver Herbivorous mammal (aquatic)	Black Bear Omnivorous mammal (terrestrial)	Common (Masked) Shrew Insectivorous mammal (terrestrial)	Deer Mouse Omnivorous mammal (terrestrial)	Ermine or Short-tailed Weasel Carnivorous mammal (terrestrial)	Meadow Vole Herbivorous mammal (terrestrial)	Moose Herbivorous mammal (terrestrial)	Muskrat Herbivorous mammal (aquatic)	Northern River Otter Piscivorous Mammal (aquatic)	Snowshoe Hare Herbivorous mammal (terrestrial)	Woodland Caribou Herbivorous mammal (terrestrial)	American Robin Omnivorous bird (terrestrial)	Barn Swallow Insectivorous Bird (terrestrial)	Common Loon Piscivorous bird (aquatic)	Lesser Scaup Insectivorous bird (aquatic)	Mallard Herbivorous bird (semi-aquatic)	Red-tailed Hawk Carnivorous bird (terrestrial)	Spotted Sandpiper Omnivorous bird (aquatic)	Spruce Grouse Herbivorous bird (terrestrial)	Wood Frog Insectivorous amphibian	Terrestrial plant communities	Terrestrial invertebrate communities	Benthic communities	Aquatic communities
Air	Direct Exposure	Foliar Uptake	NO_2 and SO_2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	✔	---	---	---
Atmospheric Deposition → Soil	Direct Exposure	Soil Ingestion	Metals	✔	✔	✔	✔	✔	✔	✔	✔	---	✔	✔	✔	✔	✔	---	---	✔	✔	✔	✔	O	---	---	---	---
Soil	Direct Exposure	Soil Contact	Metals	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	✔	✔	---	---
Soil	Uptake by Terrestrial Plants	Terrestrial Plant Ingestion	Metals	---	✔	✔	✔	✔	---	✔	✔	---	---	✔	✔	✔	✔	---	---	✔	---	---	✔	---	---	---	---	---
Soil	Uptake by Terrestrial Invertebrates	Ingestion of Terrestrial Invertebrates	Metals	---	---	✔	✔	✔	---	---	---	---	---	---	---	✔	✔	---	---	✔	---	✔	✔	O	---	---	---	---
Soil	Uptake by Terrestrial Prey	Ingestion of Terrestrial Prey	Metals	✔	---	✔	---	---	✔	---	---	---	✔	---	---	---	---	---	---	---	✔	---	---	---	---	---	---	---
Releases to Surface Water → Surface Water	Direct Exposure	Surface Water Ingestion	Metals	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	---	---	---	---	---
Surface Water	Direct Exposure	Surface Water Contact	Metals	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	✔
Surface Water	Uptake by Fish	Ingestion of Fish	Metals	✔	---	✔	---	---	---	---	---	✔	✔	---	---	---	---	✔	---	---	---	✔	---	---	---	---	---	---
Sediment (↔ Surface Water)	Direct Exposure	Sediment Ingestion	Metals	✔	✔	✔	---	---	---	---	✔	✔	✔	---	---	---	---	✔	✔	✔	---	✔	---	---	---	---	---	---
Sediment	Direct Exposure	Sediment Contact	Metals	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	✔	---
Sediment	Uptake by Aquatic Plants	Ingestion of Aquatic Plants	Metals	---	✔	---	---	---	---	---	✔	✔	---	---	---	---	---	---	✔	✔	---	✔	---	---	---	---	---	---
Sediment	Uptake by Benthic Invertebrates	Ingestion of Benthic Invertebrates	Metals	✔	---	---	---	---	---	---	---	✔	✔	---	---	---	---	✔	✔	✔	---	✔	---	---	---	---	---	---

SOURCE → RECEPTORS

✔ Pathway quantitatively assessed in ERA
O Pathway qualitatively assessed in ERA
--- Pathway not applicable

6.1.10 Protection Goals and Acceptable Effect Levels

Changes to individual health do not necessarily equate to eventual changes in population health over time. The goal of an ERA is typically to identify potential risks to ecological receptors at the population/community level rather than at the individual level, with the notable exception being species protected under federal or provincial legislation (e.g., ESEA in Manitoba and the federal SARA). As mentioned in Section 6.1.6, SOCC have been reported the RAA overlaps the current or historical ranges of 16 SOCC. Consequently, for the purpose of this ERA, the primary assessment endpoints were the protection of populations and communities for standard species (i.e., not species at risk) and the protection of individuals for species at risk (i.e., SOCC), based on predicted changes to growth, reproduction, or survival (CCME 2020).

6.2 EXPOSURE ASSESSMENT

The purpose of the exposure assessment is to quantify an ecological receptor's total exposure to a COPC. The total exposure to a COPC is calculated as the sum of exposures (i.e., EPC) from the contributing exposure pathways identified in the CSM and Table 6-4 (e.g., soil ingestion). The determination of EPCs used in the ERA to predict risk resulting from the Baseline Case and Future Case were previously discussed in Section 4.0.

6.2.1 Calculation of Average Daily Dose

To conduct a quantitative risk assessment for birds and mammals, it is necessary to estimate the rate of exposure to a COPC on a mg/kg-day basis (referred to as the average daily dose or ADD). The exposure assessment estimates the ADD of each COPC to a receptor based on the sum of the contribution from each complete exposure pathway illustrated in the CSM and described in Table 6-4. It is conservatively assumed in this ERA that the ingested COPC contained in food, water, soil and sediment will be completely absorbed. The generalized formula to estimate ADD is:

$$\boldsymbol{ADD_i = IF \times AF \times EPC_i} \quad \text{Equation 6-1}$$

where:

- ADD_i = Average daily dose for COPC "i" (mg COPC/kg body weight/day);
- IF = Intake factor (kg medium/kg body weight/day);
- AF = Absorption factor for COPC (unitless; assumed to be 1 or 100% absorption); and
- EPC_i = Exposure point concentration for COPC "i" (mg COPC/kg medium).

The IF is calculated based on the ingestion rate of each media type (i.e., ingestion of food, water, soil and sediment) for each ecological receptor, the fraction of time each receptor spends at the site (f_{SITE}), and the receptor's body weight (BW). The f_{SITE} is conservatively set at 1.0 for this ERA, which assumes that receptors spend 100% of their time within the LAA, and a function of the receptor's body weight (BW) in kilograms, as follows:

Equation 6-2

$$IF = \frac{(IR \times f_{site})}{BW}$$

The generalized formula for ADD applies to a single exposure pathway (e.g., ingestion of water or small mammals). The total ADD that is used to compare against the TRV is the sum of the ADDs for the relevant exposure pathways. The results of the calculation of the ADD for each ecological receptor and COPC are provided in Appendix G.

6.3 TOXICITY ASSESSMENT

The objective of the Toxicity Assessment is to identify the potential adverse effects associated with chronic exposure of ecological receptors to each COPC. The amount of a substance that can be tolerated, below which adverse effects are not expected to be observed in a population, is referred to as the toxicity reference value, or TRV. For community receptors screening benchmarks are used as markers of toxicity, below which adverse effects are not expected to be observed at a community level.

The TRVs and screening benchmarks for each COPC applicable to ecological receptors are presented in Appendix G. Numerous literature sources were reviewed to obtain the most applicable TRV/benchmarks for ecological receptors including, but not limited to:

- CCME Environmental Quality Guidelines (CCME 1999f, g and updates)
- Manitoba Water Quality Standards, Objectives and Guidelines (MWQSOG 2011)
- Guidance for Developing Ecological Soil Screening Levels (US EPA 2007 (Eco-SSL))
- Contaminant-Specific Ecological Soil Screening Levels Documents (US EPA various dates)
- Oak Ridge National Laboratory (ORNL various dates)
- National Institute for Public Health and the Environment, The Netherlands
- primary scientific literature

6.3.1 Mammals and Birds

For mammals and birds, TRVs for this ERA were mainly derived using the US EPA Guidance for Developing Ecological Soil Screening Levels (2007) and Ecological Soil Screening Levels Documents specific to each metal (US EPA various dates), although primary scientific literature was also consulted. TRVs used in this ERA were based on dose response studies, typically conducted with laboratory animals, where the lowest observed adverse effects level (LOAEL) or no observed adverse effects level (NOAEL) has been quantified. The preferred toxicity measure used in this ERA is the LOAEL; however, in the absence of a suitable value, NOAEL-based TRVs were used.

As noted in Section 6.1.10, the focus of an ERA is to assess the risk for receptors at the population level. The application of TRVs derived from LOAELs is preferred in the calculation of risk. LOAELs are based on long-term growth or survival, or sub-lethal reproductive outcomes determined from chronic exposure studies. As such, these endpoints are relevant to the maintenance of wildlife populations. This is in contrast to human toxicology and human health risk assessment, where protection of individuals is of paramount concern. An exception to this occurs in ERA when federally or provincially designated SAR or SOCC are evaluated. To afford these species an appropriate level of protection in the ERA, TRVs that are NOAEL based are preferred; if NOAELs are not available then a sensitive species factor (a numerical value of 3) is applied to LOAELs.

In addition to the sensitive species factor, other uncertainty factors were applied as deemed necessary. If the TRV was based on an acute lethal dose (LD_{50}, the amount of an ingested substance that kills 50 percent of a test sample), then it was adjusted by a factor of 100 to make it comparable to a chronic LOAEL. A subchronic LOAEL or NOAEL was adjusted by 3 to make it comparable to a chronic LOAEL. A body mass scaling factor was also applied to extrapolate toxicity data between species with different body masses. The application of this factor only applies when TRVs were based on individual studies (rather than geometric means from numerous animals) and only when the test organism was smaller than the ecological receptor. Body-mass scaling or “dose-scaling” (as it is often referred) provides a more conservative estimate of the TRV when the toxic response observed for small animals is used to extrapolate the expected response for larger animals (Knopper et al. 2009). This was the only circumstance under which it was applied. Therefore, the primary uncertainty was that the assessment would potentially overestimate the health risks to the ecological receptors. The uncertainty factor scheme outlined here is based on guidance provided by Ohio EPA (2003, 2008), US EPA (2002), Sample and Arenal (1999) and the professional judgement of the Study Team.

The scaling process itself is described by Sample et al. (1996). If a toxicity value for a given test species (At), an allometric scaling factor (b), and the body weights of the test species (BWt) and a selected wildlife species (BWw) are known, then the unknown toxicity value for a particular wildlife species (Aw) may be estimated using the following equation:

Equation 6-3

$$\mathrm{Aw} = \mathrm{At} \times \left(\frac{\mathrm{BWt}}{\mathrm{BWw}}\right)^{(1-\mathrm{b})}$$

For both birds and mammals, (b) was assigned a value of 0.75.

6.3.2 Community Receptors

For community receptors, regulatory benchmarks protective of vegetation, soil invertebrates, benthic invertebrates and freshwater aquatic life were used in the ERA when available. Information from the primary literature was used when regulatory benchmarks were not available for a specific COPC and community receptor. Regulatory benchmarks are based on toxicity studies for multiple species; to establish the adverse environmental effects thresholds for organisms that reside or rely on these media. They are intended to represent a COPC concentration that will be protective of most species associated with that medium.

6.3.2.1 Terrestrial Plants and Soil Invertebrates

When selecting soil screening benchmarks for the terrestrial plant and soil invertebrate community, priority was given to CCME Soil Quality Guidelines for the protection of Environmental Health (SQG_E) for the most sensitive land use, agricultural. The SQGs for agricultural land use were developed to ensure that the soil is capable of sustaining soil-dependent species and considers direct soil contact by microbes (and their effect on nutrient cycling), soil invertebrates, crops and plants. Manitoba Sustainable Development accepts the use of criteria from the CCME as well as from other sources and jurisdictions (Government of Manitoba 2020). In the event that guidelines were not available from CCME (i.e., for manganese), the US EPA Ecological Soil Screening Levels (Eco-SSL) were used. The soil screening benchmarks for each COPC are summarized in Appendix G.

6.3.2.2 Benthic Invertebrates

When selecting sediment screening benchmarks for the benthic invertebrate community, priority was given to CCME Sediment Quality Guidelines for the Protection of Aquatic Life, Freshwater Probable Effect Level (PEL), followed by MWQSOG (2011) for Sediment. In the event that guidelines were not available from these two sources, sediment screening benchmarks were based on guidelines from Verbruggen *et al.* (2001) and van Vlaardingen *et al.* (2005) for the National Institute for Public Health and the Environment, The Netherlands (hereafter, RIVM).

The RIVM sediment screening benchmarks are based on the ecotoxicological serious risk concentration (SRC_{eco}) which they defined as the “concentration of a substance in the soil, sediment or groundwater at which functions in these compartments will be seriously affected or are threatened to be negatively affected. This is assumed to occur when 50% of the species and/or 50% of the microbial and enzymatic processes are possibly affected”. Therefore, the SRC_{eco} is similar to the PEL as defined in the CCME sediment quality guidelines (i.e., it is expected that adverse effects occur more than half the time at concentrations above the PEL). However, recognizing the potential uncertainty associated with the SRC_{eco} values for these elements, the SRC_{eco} values were modified by dividing them by an additional factor of 10 before using them as screening benchmarks.

The sediment screening benchmarks for each COPC are summarized in Appendix G.

6.3.2.3 Freshwater Aquatic Life

When selecting surface water screening benchmarks for the freshwater aquatic community, priority was given to CCME Water Quality Guidelines for the Protection of Aquatic Life (CWQG-FAL). The CWQG-FALs are intended to be protective of all forms of aquatic life and all aspects of the aquatic life cycle during acute and/or chronic exposure regimes (i.e., short-term or long-term exposure). In the absence of a CWQG-FAL, the most stringent of the Tier II and III MWQSOG (2011) for the protection of aquatic life were used. Priority was given to guidelines based on long-term exposure. In the event that guidelines were not available from these two sources, freshwater aquatic life benchmarks were obtained from the US EPA and RIVM.

The water screening benchmarks for each COPC are summarized in Appendix G.

6.4 RISK CHARACTERIZATION

The purpose of the Risk Characterization step in ERA is to evaluate potential adverse effects of identified COPC by combining information from the Exposure and Toxicity Assessments. For the assessment of mammalian and avian receptors, the potential for adverse effects is quantified by comparing the dose of a substance that can be tolerated on a daily basis, or below which adverse environmental effects are not expected (i.e., TRV), to the expected daily dose, which is the amount of a COPC an organism is expected to be exposed to on a daily basis (i.e., the ADD). The quotient of the two is unitless and referred to as a risk quotient (RQ). The magnitude by which RQ values differ from parity (i.e., TRV = ADD, target RQ of 1.0) is used to make inferences about the magnitude of ecological risks. For the assessment of potential risk to community-based receptors, a screening ratio (SR) is calculated rather than an RQ. The SR is defined as the EPC of the COPC in the associated environmental media (e.g., soil) divided by a toxicological benchmark for the community receptors (e.g., terrestrial plants).

When the change in RQ or SR between Baseline Case and Future Case is less than 1.0, the probability of unacceptable levels of risk to ecological receptors at the population level, as a result of the Project, is expected to be negligible. When the change in RQ or SR between Baseline Case and Future Case is greater than 1.0, there is a potential (but not a certainty) that adverse effects to the ecological receptor as a result of the Project may exist. In these cases, additional analysis and considerations are required including a review of the assumptions applied in the assessment to provide a more accurate prediction of ecological risk. If it is ultimately determined that the RQ or SR indicates an unacceptable ecological health risk, mitigation or remediation activities may be recommended to reduce potential risks to ecological receptors.

6.4.1 Ecological Risk Characterization Results

6.4.1.1 Mammals and Birds

The RQs for mammalian and avian receptors exposed to COPC throughout the LAA are summarized in Table 6-5 through Table 6-29. RQs greater than 1.0 are noted in bold text. The detailed RQ contribution from each exposure pathway for each ecological receptor species are provided in Appendix G.

Changes in calculated RQs between the Baseline Case and the Future Cases were less than 1.0 for all COPC and all ecological receptors VECs assessed at both the Gordon region and the MacLellan region. As such, predicted Project-related increases in risks between Baseline Case and Future Case for mammals and birds are considered negligible.

Even when considering the Baseline Case and the Future Case separately (i.e., not considering the changes in RQs between the two cases), most of the calculated RQs for COPC and ecological receptors assessed were less than 1.0. The following exceptions were however noted.

For the Gordon region, RQs higher than 1.0 were calculated for both the Baseline Case and the Future Case for copper, nickel, molybdenum, selenium, vanadium and/or zinc for several ecological receptors. In most of these cases, the Project-related contribution to the RQ is negligible (generally less than 1%). Only one noticeable increase was noted at the Gordon region. For the northern river otter exposed to selenium (Table 6-14) an RQ of 0.74 for the Baseline Case increased to an RQ of 1.1 for the Future Case. However, the Future Case RQ of 1.1 is only marginally above the target RQ of 1.0. Therefore, calculated Project-related increases in the risks for these ecological receptors at the Gordon region due to exposure to metals assessed are considered negligible.

For the MacLellan region, RQs higher than 1.0 were calculated for both the Baseline Case and the Future Case for chromium, copper, nickel, selenium, vanadium and/or zinc for several ecological receptors. In most cases, the Project-related contribution to the RQ is negligible (generally less than 1%). Similar to the Gordon region, only one noticeable increase was noted at the MacLellan region. For the northern river otter exposed to selenium (Table 6-14) an RQ of 0.90 for the Baseline Case increased to an RQ of 1.1 for the Future Case. However, the Future Case RQ of 1.1 is only marginally above the target RQ of 1.0. Therefore, Project-related increases in the risks for these ecological receptors at the MacLellan region due to exposure to these metals are considered negligible.

RQs higher than 10 were calculated for nickel at the MacLellan region under the Baseline and Future Case for three receptors: masked shrew (Table 6-8) and the little brown myotis and the northern myotis SAR (Table 6-9). However, the predicted RQ exceedances for nickel for these receptors of the threshold of 1.0 exist under the Baseline Case, and the Project-related contribution to the Future Case is negligible (i.e., the percent increase in RQ between Baseline Case and Future Case is less than 1%). For these ecological receptors, the terrestrial invertebrate ingestion pathway represents a substantial contribution to the overall RQ (more than 95%). As measured data were not available for terrestrial invertebrates, COPC concentrations in terrestrial invertebrates were estimated by applying soil-to-terrestrial invertebrate uptake factors obtained from Sample et al., (1998a). These uptake factors are predictive of COPC concentrations in earthworms based on soil EPCs. Due to the differences in habitat and diet of invertebrate taxa, some soil invertebrate species are more likely to accumulate metals in greater amount than others (Heikens et al., 2001). In general, the most important route for assimilation of metals by soil invertebrates is through ingestion (Efroymson et al., 1997b). Earthworms are geophagus organisms that ingest a large amount of soil during feeding and therefore, are more highly exposed to soil contaminants than other species which have less intensive contact with contaminated soil (Gall et al., 2015). Moreover, earthworms can constitute a large fraction of the biomass of soil-dwelling invertebrates, are important in the formation of soils, and constitute a significant fraction of the diet of some vertebrates (Nahmani et al., 2007). As such, earthworms serve as model organisms in toxicology studies and are considered to be representative of soil invertebrates in ERAs. The common masked shrew may consume earthworms; however, the calculated increase in metal concentrations in earthworms as a result of Project activities is negligible, therefore the corresponding changes in exposure between Baseline Case and Future Case are also expected to be negligible. The little brown myotis and northern myotis generally capture insects in flight. They feed on a variety of small, flying insects such as moths, flies, mosquitoes, mayflies, caddisflies, beetles, and midges; many of which have aquatic life stages (COSEWIC, 2013; Pennsylvania State University 2002). Aerial insects have minimal contact with soil and are thus not expected to be highly exposed to soil COPC. Therefore, exposure estimates for the insectivorous bat based on consumption of earthworms likely overestimate their exposures. Given that the modelled COPC concentrations in terrestrial invertebrates are based on earthworms, and that bats do not actually consume earthworms, it expected that the exposure that a bat would receive from consuming aerial invertebrates at the MacLellan region would be much less than predicted based on earthworm ingestion and thus unacceptable risks to bats due to exposure to nickel are also not expected.

Table 6-5 Risk Quotients for the American Beaver

COPC	Risk Quotients for the Beaver (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.9E-03	2.4E-03	1.8E-03	1.9E-03
Arsenic	3.8E-03	4.1E-03	2.5E-03	3.0E-03
Barium	6.2E-04	6.5E-04	5.4E-04	5.4E-04
Beryllium	6.2E-03	6.3E-03	4.2E-03	4.2E-03
Cadmium	1.0E-03	1.0E-03	8.0E-04	8.0E-04
Chromium	6.8E-03	6.8E-03	1.4E-02	1.4E-02
Cobalt	6.3E-04	6.3E-04	1.7E-03	1.7E-03
Copper	1.2E-02	1.2E-02	2.6E-02	2.6E-02
Lead	1.6E-04	1.6E-04	1.2E-04	1.2E-04
Manganese	6.7E-03	6.7E-03	6.3E-03	6.4E-03
Mercury	7.2E-04	7.2E-04	6.1E-04	6.1E-04
Molybdenum	2.2E-02	2.2E-02	2.1E-03	2.1E-03
Nickel	2.0E-02	2.0E-02	1.6E-01	1.6E-01
Selenium	2.1E-02	2.1E-02	1.9E-02	1.9E-02
Silver	2.4E-05	2.4E-05	2.5E-05	2.5E-05
Strontium	1.1E-03	1.6E-03	1.9E-03	1.9E-03
Thallium	4.1E-03	4.2E-03	4.5E-03	4.6E-03
Uranium	8.4E-04	1.0E-03	4.7E-04	4.9E-04
Vanadium	2.6E-02	2.6E-02	1.6E-02	1.6E-02
Zinc	4.1E-03	4.1E-03	5.3E-03	5.4E-03

Table 6-6 Risk Quotients for the American Mink

COPC	Risk Quotients for the American Mink (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	6.8E-03	2.1E-02	5.6E-03	1.0E-02
Arsenic	7.9E-02	1.0E-01	4.2E-02	5.5E-02
Barium	2.6E-03	2.9E-03	4.2E-03	4.3E-03
Beryllium	6.3E-03	6.5E-03	3.8E-03	3.9E-03
Cadmium	1.0E-02	1.1E-02	1.8E-02	2.4E-02
Chromium	6.0E-02	6.1E-02	7.9E-02	8.0E-02
Cobalt	2.9E-03	3.0E-03	4.8E-03	5.9E-03
Copper	6.8E-01	7.2E-01	9.4E-01	9.6E-01
Lead	8.4E-04	8.6E-04	9.1E-04	1.0E-03
Manganese	5.3E-03	5.6E-03	5.3E-03	5.5E-03
Mercury	4.7E-02	4.8E-02	4.0E-02	4.2E-02
Molybdenum	7.9E-02	9.8E-02	2.4E-02	3.8E-02
Nickel	1.4E-01	1.5E-01	8.0E-01	8.1E-01
Selenium	4.5E-01	6.5E-01	5.5E-01	6.4E-01
Silver	8.3E-04	9.1E-04	3.0E-04	3.2E-04
Strontium	4.7E-03	7.9E-03	6.5E-03	8.8E-03
Thallium	2.5E-02	2.7E-02	1.1E-02	1.1E-02
Uranium	1.2E-03	2.1E-03	6.0E-04	7.2E-04
Vanadium	5.1E-02	5.5E-02	3.1E-02	3.2E-02
Zinc	5.1E-01	5.1E-01	1.0E-01	1.0E-01

Table 6-7 Risk Quotients for the Black Bear

COPC	Risk Quotients for the Black Bear (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	2.8E-02	3.3E-02	2.8E-02	2.9E-02
Arsenic	2.1E-02	2.5E-02	1.3E-02	1.7E-02
Barium	6.7E-03	6.7E-03	7.3E-03	7.4E-03
Beryllium	2.1E-02	2.1E-02	2.3E-02	2.3E-02
Cadmium	1.3E-02	1.3E-02	1.3E-02	1.3E-02
Chromium	1.5E-02	1.5E-02	1.3E-02	1.3E-02
Cobalt	3.0E-03	3.1E-03	2.9E-03	3.1E-03
Copper	1.7E-01	1.7E-01	1.7E-01	1.8E-01
Lead	8.9E-04	8.9E-04	5.8E-04	6.0E-04
Manganese	7.6E-02	7.6E-02	7.3E-02	7.3E-02
Mercury	2.2E-02	2.2E-02	2.0E-02	2.0E-02
Molybdenum	2.3E-01	2.3E-01	3.2E-02	3.6E-02
Nickel	1.0E-01	1.0E-01	5.7E-01	5.8E-01
Selenium	4.5E-01	5.2E-01	4.8E-01	5.1E-01
Silver	5.4E-04	5.6E-04	4.3E-04	4.4E-04
Strontium	1.4E-02	1.5E-02	2.9E-02	3.0E-02
Thallium	7.1E-02	7.1E-02	6.4E-02	6.5E-02
Uranium	1.1E-03	1.4E-03	8.5E-04	8.8E-04
Vanadium	8.0E-02	8.1E-02	5.7E-02	5.9E-02
Zinc	9.4E-02	9.4E-02	6.2E-02	6.3E-02

Table 6-8 Risk Quotients for the Common Masked Shrew

COPC	Risk Quotients for the Common Masked Shrew (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	7.1E-02	7.1E-02	8.7E-02	8.7E-02
Arsenic	1.6E-01	1.7E-01	2.2E-01	2.6E-01
Barium	5.7E-03	5.8E-03	5.2E-03	5.2E-03
Beryllium	1.5E-02	1.5E-02	9.1E-03	9.1E-03
Cadmium	6.4E-01	6.4E-01	6.3E-01	6.3E-01
Chromium	3.4E-01	3.4E-01	2.2E-01	2.3E-01
Cobalt	2.1E-02	2.1E-02	1.5E-02	1.5E-02
Copper	**1.6E+00**	**1.6E+00**	**2.0E+00**	**2.0E+00**
Lead	3.6E-02	3.6E-02	3.5E-02	3.6E-02
Manganese	5.6E-02	5.6E-02	5.3E-02	5.3E-02
Mercury	6.1E-02	6.1E-02	1.1E-01	1.1E-01
Molybdenum	1.0E+00	1.0E+00	8.9E-02	8.9E-02
Nickel	**2.3E+00**	**2.3E+00**	**1.5E+01**	**1.5E+01**
Selenium	2.9E-01	2.9E-01	9.7E-01	9.7E-01
Silver	5.4E-03	5.4E-03	7.0E-03	7.1E-03
Strontium	4.8E-03	4.9E-03	6.7E-03	6.7E-03
Thallium	2.5E-02	2.5E-02	2.3E-02	2.3E-02
Uranium	1.3E-03	1.3E-03	1.2E-03	1.2E-03
Vanadium	1.5E-01	1.5E-01	7.3E-02	7.5E-02
Zinc	**1.3E+00**	**1.3E+00**	**1.6E+00**	**1.6E+00**

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-9 Risk Quotients for the Common Masked Shrew (SAR)

COPC	Risk Quotients for the Common Masked Shrew (SAR) (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	2.1E-01	2.1E-01	2.6E-01	2.6E-01
Arsenic	4.9E-01	5.1E-01	6.4E-01	7.8E-01
Barium	5.7E-03	5.8E-03	5.2E-03	5.2E-03
Beryllium	1.5E-02	1.5E-02	9.1E-03	9.1E-03
Cadmium	6.4E-01	6.4E-01	6.3E-01	6.3E-01
Chromium	3.4E-01	3.4E-01	2.2E-01	2.3E-01
Cobalt	2.1E-02	2.1E-02	1.5E-02	1.5E-02
Copper	**4.7E+00**	**4.7E+00**	**5.9E+00**	**5.9E+00**
Lead	3.6E-02	3.6E-02	3.5E-02	3.6E-02
Manganese	5.6E-02	5.6E-02	5.3E-02	5.3E-02
Mercury	6.1E-02	6.1E-02	1.1E-01	1.1E-01
Molybdenum	**3.0E+00**	**3.0E+00**	2.7E-01	2.7E-01
Nickel	**6.8E+00**	**6.9E+00**	**4.5E+01**	**4.6E+01**
Selenium	8.6E-01	8.6E-01	**2.9E+00**	**2.9E+00**
Silver	1.6E-02	1.6E-02	2.1E-02	2.1E-02
Strontium	4.8E-03	4.9E-03	6.7E-03	6.7E-03
Thallium	7.5E-02	7.5E-02	6.8E-02	6.9E-02
Uranium	4.0E-03	4.0E-03	3.5E-03	3.5E-03
Vanadium	4.6E-01	4.6E-01	2.2E-01	2.2E-01
Zinc	**3.9E+00**	**3.9E+00**	**4.7E+00**	**4.7E+00**

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-10 Risk Quotients for the Deer Mouse

COPC	Risk Quotients for the Deer Mouse (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.0E-02	1.0E-02	1.1E-02	1.1E-02
Arsenic	1.5E-02	1.6E-02	1.9E-02	2.3E-02
Barium	5.3E-03	5.4E-03	5.1E-03	5.1E-03
Beryllium	5.4E-03	5.4E-03	5.5E-03	5.5E-03
Cadmium	5.0E-02	5.0E-02	4.7E-02	4.7E-02
Chromium	3.2E-02	3.2E-02	2.2E-02	2.3E-02
Cobalt	3.5E-03	3.6E-03	2.9E-03	3.0E-03
Copper	1.7E-01	1.7E-01	2.0E-01	2.0E-01
Lead	3.0E-03	3.0E-03	2.6E-03	2.7E-03
Manganese	6.8E-02	6.8E-02	6.5E-02	6.5E-02
Mercury	5.9E-03	5.9E-03	8.9E-03	8.9E-03
Molybdenum	8.9E-02	8.9E-02	8.0E-03	8.0E-03
Nickel	2.2E-01	2.3E-01	**1.4E+00**	**1.4E+00**
Selenium	7.2E-02	7.2E-02	1.1E-01	1.1E-01
Silver	5.4E-04	5.4E-04	6.4E-04	6.4E-04
Strontium	2.9E-03	3.0E-03	6.2E-03	6.2E-03
Thallium	1.3E-02	1.3E-02	1.5E-02	1.6E-02
Uranium	1.8E-04	1.8E-04	1.6E-04	1.6E-04
Vanadium	2.3E-02	2.3E-02	1.5E-02	1.6E-02
Zinc	1.2E-01	1.2E-01	1.4E-01	1.4E-01

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-11 Risk Quotients for the Meadow Vole

COPC	Risk Quotients for the Meadow Vole (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.4E-02	1.4E-02	1.4E-02	1.4E-02
Arsenic	1.0E-02	1.1E-02	1.1E-02	1.4E-02
Barium	1.3E-02	1.3E-02	1.2E-02	1.2E-02
Beryllium	1.1E-02	1.1E-02	1.3E-02	1.3E-02
Cadmium	1.9E-02	1.9E-02	1.2E-02	1.2E-02
Chromium	2.2E-02	2.2E-02	1.9E-02	2.0E-02
Cobalt	5.5E-03	5.5E-03	5.0E-03	5.1E-03
Copper	1.7E-01	1.7E-01	1.7E-01	1.7E-01
Lead	1.4E-03	1.4E-03	6.8E-04	6.9E-04
Manganese	1.6E-01	1.6E-01	1.6E-01	1.6E-01
Mercury	4.5E-03	4.5E-03	3.4E-03	3.4E-03
Molybdenum	5.7E-02	5.7E-02	5.2E-03	5.2E-03
Nickel	1.8E-01	1.8E-01	**1.0E+00**	**1.0E+00**
Selenium	1.4E-01	1.4E-01	1.2E-01	1.2E-01
Silver	4.5E-04	4.5E-04	4.1E-04	4.1E-04
Strontium	6.5E-03	6.6E-03	1.5E-02	1.5E-02
Thallium	2.9E-02	2.9E-02	3.5E-02	3.6E-02
Uranium	2.4E-04	2.5E-04	2.2E-04	2.2E-04
Vanadium	3.4E-02	3.4E-02	2.7E-02	2.8E-02
Zinc	7.0E-02	7.0E-02	9.1E-02	9.1E-02

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-12 Risk Quotients for the Moose

COPC	Risk Quotients for the Moose (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	2.6E-02	2.6E-02	2.6E-02	2.6E-02
Arsenic	1.1E-02	1.2E-02	9.2E-03	1.2E-02
Barium	4.1E-03	4.1E-03	3.8E-03	3.8E-03
Beryllium	4.0E-02	4.0E-02	3.4E-02	3.4E-02
Cadmium	6.5E-03	6.5E-03	4.4E-03	4.4E-03
Chromium	1.0E-02	1.0E-02	1.4E-02	1.5E-02
Cobalt	1.8E-03	1.8E-03	2.0E-03	2.1E-03
Copper	8.3E-02	8.4E-02	9.8E-02	9.8E-02
Lead	5.1E-04	5.1E-04	2.8E-04	2.8E-04
Manganese	5.1E-02	5.2E-02	4.9E-02	4.9E-02
Mercury	7.7E-03	7.7E-03	6.0E-03	6.0E-03
Molybdenum	2.1E-01	2.1E-01	1.9E-02	2.0E-02
Nickel	6.4E-02	6.4E-02	3.8E-01	3.8E-01
Selenium	2.7E-01	2.7E-01	2.4E-01	2.4E-01
Silver	3.7E-04	3.7E-04	3.3E-04	3.4E-04
Strontium	1.3E-02	1.4E-02	2.8E-02	2.8E-02
Thallium	5.2E-02	5.3E-02	6.4E-02	6.5E-02
Uranium	1.5E-03	1.7E-03	1.1E-03	1.1E-03
Vanadium	7.3E-02	7.3E-02	5.6E-02	5.6E-02
Zinc	2.5E-02	2.5E-02	3.2E-02	3.2E-02

Table 6-13 Risk Quotients for the Muskrat

COPC	Risk Quotients for the Muskrat (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	3.0E-03	9.3E-03	2.4E-03	4.0E-03
Arsenic	2.5E-01	2.6E-01	1.5E-01	1.6E-01
Barium	5.0E-03	5.5E-03	3.4E-03	3.5E-03
Beryllium	8.2E-02	8.4E-02	4.7E-02	4.7E-02
Cadmium	3.2E-02	3.2E-02	3.5E-02	3.7E-02
Chromium	2.5E-01	2.5E-01	3.9E-01	3.9E-01
Cobalt	3.1E-03	3.2E-03	1.1E-02	1.1E-02
Copper	9.4E-01	9.5E-01	**1.8E+00**	**1.8E+00**
Lead	3.0E-03	3.0E-03	2.7E-03	2.8E-03
Manganese	2.3E-02	2.4E-02	2.0E-02	2.0E-02
Mercury	1.7E-02	1.7E-02	1.4E-02	1.5E-02
Molybdenum	3.6E-01	3.7E-01	3.8E-02	4.3E-02
Nickel	4.9E-01	4.9E-01	**3.7E+00**	**3.7E+00**
Selenium	3.1E-01	3.6E-01	2.8E-01	3.0E-01
Silver	2.4E-04	2.6E-04	1.6E-04	1.6E-04
Strontium	4.8E-03	1.2E-02	5.5E-03	6.5E-03
Thallium	2.2E-02	2.4E-02	1.7E-02	1.7E-02
Uranium	3.7E-03	4.7E-03	2.0E-03	2.1E-03
Vanadium	1.0E-01	1.1E-01	6.2E-02	6.2E-02
Zinc	3.1E-01	3.1E-01	2.3E-01	2.3E-01

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-14 Risk Quotients for the Northern River Otter

COPC	Risk Quotients for the Northern River Otter (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.1E-02	3.7E-02	9.5E-03	1.8E-02
Arsenic	8.2E-02	1.0E-01	4.7E-02	6.0E-02
Barium	1.4E-03	1.7E-03	1.6E-03	1.7E-03
Beryllium	1.2E-02	1.3E-02	7.0E-03	7.1E-03
Cadmium	9.9E-03	1.1E-02	1.4E-02	2.0E-02
Chromium	6.9E-02	7.0E-02	9.4E-02	9.5E-02
Cobalt	2.7E-03	2.8E-03	4.9E-03	6.0E-03
Copper	6.9E-01	7.3E-01	**1.0E+00**	**1.0E+00**
Lead	8.7E-04	8.9E-04	9.2E-04	1.0E-03
Manganese	5.8E-03	6.2E-03	5.7E-03	5.9E-03
Mercury	7.9E-02	8.2E-02	6.7E-02	7.0E-02
Molybdenum	1.5E-01	1.8E-01	3.7E-02	6.2E-02
Nickel	1.6E-01	1.7E-01	9.5E-01	9.6E-01
Selenium	7.4E-01	**1.1E+00**	9.0E-01	**1.1E+00**
Silver	8.5E-04	9.4E-04	3.0E-04	3.2E-04
Strontium	7.0E-03	1.3E-02	9.5E-03	1.4E-02
Thallium	3.0E-02	3.4E-02	2.0E-02	2.1E-02
Uranium	2.2E-03	3.9E-03	1.1E-03	1.3E-03
Vanadium	8.9E-02	9.5E-02	5.5E-02	5.7E-02
Zinc	5.3E-01	5.3E-01	1.0E-01	1.0E-01

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-15 Risk Quotients for the Short-tailed Weasel

COPC	Risk Quotients for the Ermine/Short-tailed Weasel (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	6.6E-03	6.7E-03	3.3E-03	3.4E-03
Arsenic	1.2E-01	1.2E-01	3.4E-02	4.4E-02
Barium	1.6E-02	1.6E-02	3.1E-02	3.1E-02
Beryllium	4.3E-03	4.3E-03	3.6E-03	3.6E-03
Cadmium	1.8E-02	1.8E-02	6.3E-02	6.4E-02
Chromium	2.6E-02	2.6E-02	1.1E-02	1.2E-02
Cobalt	3.8E-03	3.8E-03	3.4E-03	3.4E-03
Copper	6.1E-01	6.1E-01	4.1E-01	4.1E-01
Lead	9.5E-04	9.5E-04	1.1E-03	1.1E-03
Manganese	5.9E-03	5.9E-03	5.7E-03	5.7E-03
Mercury	9.7E-03	9.7E-03	1.5E-02	1.5E-02
Molybdenum	5.9E-02	5.9E-02	3.0E-02	3.0E-02
Nickel	7.5E-02	7.5E-02	1.5E-01	1.5E-01
Selenium	4.8E-01	4.8E-01	5.3E-01	5.3E-01
Silver	1.8E-04	1.8E-04	1.9E-04	1.9E-04
Strontium	8.1E-03	8.1E-03	1.2E-02	1.2E-02
Thallium	8.3E-02	8.4E-02	5.2E-03	5.3E-03
Uranium	5.9E-04	5.9E-04	2.5E-04	2.6E-04
Vanadium	4.4E-02	4.4E-02	1.7E-02	1.7E-02
Zinc	1.3E-01	1.3E-01	1.4E-01	1.4E-01

Table 6-16 Risk Quotients for the Short-tailed Weasel (SAR)

COPC	Risk Quotients for the Ermine/Short-tailed Weasel (SAR)(Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	2.0E-02	2.0E-02	1.0E-02	1.0E-02
Arsenic	3.5E-01	3.7E-01	1.0E-01	1.3E-01
Barium	1.6E-02	1.6E-02	3.1E-02	3.1E-02
Beryllium	4.3E-03	4.3E-03	3.6E-03	3.6E-03
Cadmium	1.8E-02	1.8E-02	6.3E-02	6.4E-02
Chromium	2.6E-02	2.6E-02	1.1E-02	1.2E-02
Cobalt	3.8E-03	3.8E-03	3.4E-03	3.4E-03
Copper	**1.8E+00**	**1.8E+00**	**1.2E+00**	**1.2E+00**
Lead	9.5E-04	9.5E-04	1.1E-03	1.1E-03
Manganese	5.9E-03	5.9E-03	5.7E-03	5.7E-03
Mercury	9.7E-03	9.7E-03	1.5E-02	1.5E-02
Molybdenum	1.8E-01	1.8E-01	9.0E-02	9.1E-02
Nickel	2.2E-01	2.3E-01	4.6E-01	4.6E-01
Selenium	**1.5E+00**	**1.5E+00**	**1.6E+00**	**1.6E+00**
Silver	5.4E-04	5.5E-04	5.6E-04	5.7E-04
Strontium	8.1E-03	8.1E-03	1.2E-02	1.2E-02
Thallium	2.5E-01	2.5E-01	1.5E-02	1.6E-02
Uranium	1.8E-03	1.8E-03	7.6E-04	7.7E-04
Vanadium	1.3E-01	1.3E-01	5.0E-02	5.1E-02
Zinc	4.0E-01	4.0E-01	4.1E-01	4.1E-01

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-17 Risk Quotients for the Snowshoe Hare

COPC	Risk Quotients for the Snowshoe Hare (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	2.5E-02	2.5E-02	2.5E-02	2.5E-02
Arsenic	1.7E-02	1.8E-02	2.0E-02	2.6E-02
Barium	1.5E-02	1.5E-02	1.5E-02	1.5E-02
Beryllium	2.1E-02	2.1E-02	2.2E-02	2.2E-02
Cadmium	2.3E-02	2.3E-02	1.5E-02	1.5E-02
Chromium	3.5E-02	3.5E-02	2.8E-02	2.9E-02
Cobalt	7.7E-03	7.8E-03	6.8E-03	6.9E-03
Copper	2.4E-01	2.4E-01	2.7E-01	2.7E-01
Lead	2.2E-03	2.2E-03	1.3E-03	1.3E-03
Manganese	2.0E-01	2.0E-01	1.9E-01	1.9E-01
Mercury	6.2E-03	6.2E-03	5.0E-03	5.0E-03
Molybdenum	1.9E-01	1.9E-01	1.7E-02	1.8E-02
Nickel	2.3E-01	2.4E-01	**1.4E+00**	**1.4E+00**
Selenium	2.3E-01	2.3E-01	2.2E-01	2.2E-01
Silver	5.7E-04	5.7E-04	5.2E-04	5.3E-04
Strontium	1.1E-02	1.1E-02	2.5E-02	2.5E-02
Thallium	5.1E-02	5.2E-02	6.2E-02	6.3E-02
Uranium	1.2E-03	1.2E-03	1.0E-03	1.1E-03
Vanadium	8.2E-02	8.2E-02	5.7E-02	5.8E-02
Zinc	8.7E-02	8.7E-02	1.1E-01	1.2E-01

NOTE:
Bold RQ exceeds benchmark of 1.0

Table 6-18 Risk Quotients for the Woodland Caribou

COPC	Risk Quotients for the Woodland Caribou (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Arsenic	6.1E-03	6.5E-03	7.6E-03	9.9E-03
Barium	2.0E-03	2.0E-03	1.9E-03	1.9E-03
Beryllium	1.1E-02	1.1E-02	1.0E-02	1.0E-02
Cadmium	3.1E-03	3.1E-03	2.0E-03	2.0E-03
Chromium	6.3E-03	6.4E-03	4.8E-03	5.0E-03
Cobalt	1.2E-03	1.2E-03	1.0E-03	1.1E-03
Copper	4.2E-02	4.2E-02	5.6E-02	5.6E-02
Lead	4.0E-04	4.0E-04	2.8E-04	2.9E-04
Manganese	2.6E-02	2.6E-02	2.5E-02	2.5E-02
Mercury	2.9E-03	2.9E-03	2.6E-03	2.6E-03
Molybdenum	9.8E-02	9.8E-02	8.9E-03	8.9E-03
Nickel	3.4E-02	3.4E-02	2.0E-01	2.0E-01
Selenium	1.0E-01	1.0E-01	1.0E-01	1.0E-01
Silver	1.6E-04	1.6E-04	1.5E-04	1.5E-04
Strontium	5.1E-03	5.2E-03	1.1E-02	1.1E-02
Thallium	2.4E-02	2.4E-02	2.8E-02	2.8E-02
Uranium	8.7E-04	8.9E-04	7.7E-04	7.8E-04
Vanadium	5.4E-02	5.4E-02	3.3E-02	3.4E-02
Zinc	1.2E-02	1.2E-02	1.5E-02	1.5E-02

Table 6-19 Risk Quotients for the Woodland Caribou (SAR)

COPC	Risk Quotients for the Woodland Caribou (SAR) (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	3.3E-02	3.3E-02	3.4E-02	3.4E-02
Arsenic	1.8E-02	2.0E-02	2.3E-02	3.0E-02
Barium	2.0E-03	2.0E-03	1.9E-03	1.9E-03
Beryllium	1.1E-02	1.1E-02	1.0E-02	1.0E-02
Cadmium	3.1E-03	3.1E-03	2.0E-03	2.0E-03
Chromium	6.3E-03	6.4E-03	4.8E-03	5.0E-03
Cobalt	1.2E-03	1.2E-03	1.0E-03	1.1E-03
Copper	1.3E-01	1.3E-01	1.7E-01	1.7E-01
Lead	4.0E-04	4.0E-04	2.8E-04	2.9E-04
Manganese	2.6E-02	2.6E-02	2.5E-02	2.5E-02
Mercury	2.9E-03	2.9E-03	2.6E-03	2.6E-03
Molybdenum	2.9E-01	2.9E-01	2.7E-02	2.7E-02
Nickel	1.0E-01	1.0E-01	6.0E-01	6.0E-01
Selenium	3.0E-01	3.0E-01	3.1E-01	3.1E-01
Silver	4.8E-04	4.8E-04	4.5E-04	4.6E-04
Strontium	5.1E-03	5.2E-03	1.1E-02	1.1E-02
Thallium	7.2E-02	7.2E-02	8.3E-02	8.5E-02
Uranium	2.6E-03	2.7E-03	2.3E-03	2.4E-03
Vanadium	1.6E-01	1.6E-01	9.9E-02	1.0E-01
Zinc	3.5E-02	3.5E-02	4.6E-02	4.6E-02

Table 6-20 Risk Quotients for the American Robin

COPC	Risk Quotients for the American Robin (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	3.0E-03	3.1E-03	3.6E-03	4.5E-03
Barium	1.1E-02	1.1E-02	1.0E-02	1.0E-02
Beryllium	---	---	---	---
Cadmium	2.5E-01	2.5E-01	2.2E-01	2.3E-01
Chromium	1.3E-01	1.3E-01	9.0E-02	9.5E-02
Cobalt	5.3E-02	5.3E-02	4.4E-02	4.5E-02
Copper	1.3E-01	1.3E-01	1.6E-01	1.6E-01
Lead	4.6E-02	4.6E-02	4.0E-02	4.0E-02
Manganese	1.1E-01	1.1E-01	1.0E-01	1.0E-01
Mercury	2.8E-02	2.8E-02	3.9E-02	3.9E-02
Molybdenum	2.7E-02	2.7E-02	2.4E-03	2.5E-03
Nickel	1.2E-01	1.2E-01	7.2E-01	7.3E-01
Selenium	1.2E-01	1.2E-01	1.7E-01	1.7E-01
Silver	6.8E-03	6.8E-03	7.8E-03	7.9E-03
Strontium	---	---	---	---
Thallium	5.2E-02	5.2E-02	6.1E-02	6.2E-02
Uranium	1.2E-04	1.2E-04	1.1E-04	1.1E-04
Vanadium	1.0E+00	1.0E+00	6.5E-01	6.6E-01
Zinc	4.0E-01	4.0E-01	4.9E-01	5.0E-01

NOTE:
--- RQ was not calculated because TRV was not available

Table 6-21 Risk Quotients for the American Robin (SAR)

COPC	Risk Quotients for the American Robin (SAR) (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	8.8E-03	9.3E-03	1.1E-02	1.4E-02
Barium	3.2E-02	3.2E-02	3.0E-02	3.0E-02
Beryllium	---	---	---	---
Cadmium	2.5E-01	2.5E-01	2.2E-01	2.3E-01
Chromium	1.3E-01	1.3E-01	9.0E-02	9.5E-02
Cobalt	5.3E-02	5.3E-02	4.4E-02	4.5E-02
Copper	1.3E-01	1.3E-01	1.6E-01	1.6E-01
Lead	4.6E-02	4.6E-02	4.0E-02	4.0E-02
Manganese	1.1E-01	1.1E-01	1.0E-01	1.0E-01
Mercury	8.4E-02	8.4E-02	1.2E-01	1.2E-01
Molybdenum	8.2E-02	8.2E-02	7.3E-03	7.3E-03
Nickel	1.2E-01	1.2E-01	7.2E-01	7.3E-01
Selenium	3.6E-01	3.6E-01	5.0E-01	5.1E-01
Silver	2.1E-02	2.1E-02	2.3E-02	2.4E-02
Strontium	---	---	---	---
Thallium	1.6E-01	1.6E-01	1.8E-01	1.9E-01
Uranium	1.2E-04	1.2E-04	1.1E-04	1.1E-04
Vanadium	**3.0E+00**	**3.0E+00**	**1.9E+00**	**2.0E+00**
Zinc	4.0E-01	4.0E-01	4.9E-01	5.0E-01

NOTES:
Bold RQ exceeds benchmark of 1.0
--- RQ was not calculated because TRV was not available

Table 6-22 Risk Quotients for the Barn Swallow

COPC	Risk Quotients for the Barn Swallow (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	5.5E-03	5.8E-03	7.3E-03	8.8E-03
Barium	7.5E-04	7.7E-04	6.1E-04	6.1E-04
Beryllium	---	---	---	---
Cadmium	6.4E-01	6.4E-01	6.3E-01	6.3E-01
Chromium	2.4E-01	2.4E-01	1.5E-01	1.6E-01
Cobalt	4.5E-02	4.5E-02	3.0E-02	3.1E-02
Copper	2.0E-01	2.0E-01	2.6E-01	2.6E-01
Lead	1.1E-01	1.1E-01	1.0E-01	1.1E-01
Manganese	3.0E-03	3.0E-03	2.7E-03	2.7E-03
Mercury	5.3E-02	5.4E-02	9.8E-02	9.8E-02
Molybdenum	5.8E-02	5.8E-02	5.1E-03	5.1E-03
Nickel	2.1E-01	2.2E-01	**1.4E+00**	**1.4E+00**
Selenium	6.6E-02	6.6E-02	2.5E-01	2.5E-01
Silver	1.2E-02	1.2E-02	1.6E-02	1.7E-02
Strontium	---	---	---	---
Thallium	1.0E-02	1.0E-02	7.7E-03	7.8E-03
Uranium	1.2E-04	1.2E-04	1.0E-04	1.0E-04
Vanadium	8.5E-01	8.5E-01	3.9E-01	4.0E-01
Zinc	8.7E-01	8.7E-01	**1.1E+00**	**1.1E+00**

NOTES:
Bold RQ exceeds benchmark of 1.0
--- RQ was not calculated because TRV was not available

Table 6-23 Risk Quotients for the Barn Swallow (SAR)

COPC	Risk Quotients for the Barn Swallow (SAR) (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	1.7E-02	1.7E-02	2.2E-02	2.6E-02
Barium	2.3E-03	2.3E-03	1.8E-03	1.8E-03
Beryllium	---	---	---	---
Cadmium	6.4E-01	6.4E-01	6.3E-01	6.3E-01
Chromium	2.4E-01	2.4E-01	1.5E-01	1.6E-01
Cobalt	4.5E-02	4.5E-02	3.0E-02	3.1E-02
Copper	2.0E-01	2.0E-01	2.6E-01	2.6E-01
Lead	1.1E-01	1.1E-01	1.0E-01	1.1E-01
Manganese	3.0E-03	3.0E-03	2.7E-03	2.7E-03
Mercury	1.6E-01	1.6E-01	3.0E-01	3.0E-01
Molybdenum	1.7E-01	1.7E-01	1.5E-02	1.5E-02
Nickel	2.1E-01	2.2E-01	**1.4E+00**	**1.4E+00**
Selenium	2.0E-01	2.0E-01	7.3E-01	7.4E-01
Silver	3.7E-02	3.7E-02	4.9E-02	5.0E-02
Strontium	---	---	---	---
Thallium	3.0E-02	3.0E-02	2.3E-02	2.3E-02
Uranium	1.2E-04	1.2E-04	1.0E-04	1.0E-04
Vanadium	**2.5E+00**	**2.6E+00**	**1.2E+00**	**1.2E+00**
Zinc	8.7E-01	8.7E-01	**1.1E+00**	**1.1E+00**

NOTES:
Bold RQ exceeds benchmark of 1.0
--- RQ was not calculated because TRV was not available

Table 6-24 Risk Quotients for the Common Loon

COPC	Risk Quotients for the Common Loon (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	6.7E-03	9.1E-03	3.7E-03	5.2E-03
Barium	1.5E-03	1.9E-03	1.5E-03	1.6E-03
Beryllium	---	---	---	---
Cadmium	1.7E-02	1.8E-02	2.4E-02	3.7E-02
Chromium	7.9E-02	8.0E-02	1.1E-01	1.1E-01
Cobalt	1.3E-02	1.4E-02	2.3E-02	2.9E-02
Copper	1.8E-01	1.9E-01	2.6E-01	2.6E-01
Lead	4.5E-03	4.7E-03	5.0E-03	5.5E-03
Manganese	2.1E-03	2.2E-03	2.1E-03	2.2E-03
Mercury	2.3E-01	2.4E-01	2.0E-01	2.1E-01
Molybdenum	4.5E-03	6.0E-03	1.4E-03	2.6E-03
Nickel	2.6E-02	2.8E-02	1.4E-01	1.5E-01
Selenium	2.9E-01	4.4E-01	3.6E-01	4.3E-01
Silver	7.6E-03	8.4E-03	2.6E-03	2.8E-03
Strontium	---	---	---	---
Thallium	4.2E-02	4.8E-02	3.1E-02	3.2E-02
Uranium	1.3E-04	2.6E-04	6.9E-05	8.4E-05
Vanadium	**1.2E+00**	**1.3E+00**	7.8E-01	8.0E-01
Zinc	9.9E-01	1.0E+00	1.6E-01	1.6E-01

NOTES:
Bold RQ exceeds benchmark of 1.0
--- RQ was not calculated because TRV was not available

Table 6-25 Risk Quotients for the Lesser Scaup

COPC	Risk Quotients for the Lesser Scaup (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	3.5E-02	3.7E-02	2.2E-02	2.3E-02
Barium	5.7E-03	6.3E-03	3.9E-03	3.9E-03
Beryllium	---	---	---	---
Cadmium	1.0E-01	1.0E-01	1.1E-01	1.1E-01
Chromium	6.5E-01	6.5E-01	9.0E-01	9.0E-01
Cobalt	8.0E-03	8.0E-03	3.1E-02	3.1E-02
Copper	4.5E-01	4.5E-01	8.9E-01	8.9E-01
Lead	2.4E-02	2.4E-02	2.1E-02	2.1E-02
Manganese	1.7E-02	1.8E-02	1.5E-02	1.5E-02
Mercury	5.1E-03	5.1E-03	4.0E-03	4.0E-03
Molybdenum	3.0E-02	3.1E-02	3.0E-03	3.1E-03
Nickel	1.6E-01	1.6E-01	**1.2E+00**	**1.3E+00**
Selenium	1.3E-01	1.3E-01	9.6E-02	9.6E-02
Silver	2.7E-04	2.7E-04	7.0E-04	7.0E-04
Strontium	---	---	---	---
Thallium	6.5E-02	7.2E-02	5.1E-02	5.2E-02
Uranium	3.5E-04	4.4E-04	1.8E-04	1.9E-04
Vanadium	**1.8E+00**	**1.8E+00**	**1.1E+00**	**1.1E+00**
Zinc	4.9E-01	4.9E-01	5.2E-01	5.2E-01

NOTES:
Bold RQ exceeds benchmark of 1.0
--- RQ was not calculated because TRV was not available

Table 6-26 Risk Quotients for the Mallard

COPC	Risk Quotients for the Mallard (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	1.8E-02	1.9E-02	1.2E-02	1.2E-02
Barium	4.2E-03	4.6E-03	3.0E-03	3.0E-03
Beryllium	---	---	---	---
Cadmium	6.1E-02	6.1E-02	6.5E-02	6.6E-02
Chromium	3.4E-01	3.4E-01	5.0E-01	5.0E-01
Cobalt	9.8E-03	9.8E-03	3.4E-02	3.4E-02
Copper	2.3E-01	2.3E-01	4.5E-01	4.5E-01
Lead	1.5E-02	1.5E-02	1.3E-02	1.3E-02
Manganese	1.1E-02	1.2E-02	1.0E-02	1.0E-02
Mercury	7.5E-03	7.5E-03	7.1E-03	7.1E-03
Molybdenum	1.7E-02	1.7E-02	1.6E-03	1.7E-03
Nickel	8.8E-02	8.9E-02	6.9E-01	6.9E-01
Selenium	7.6E-02	7.6E-02	6.3E-02	6.4E-02
Silver	3.9E-04	3.9E-04	7.0E-04	7.0E-04
Strontium	---	---	---	---
Thallium	4.0E-02	4.3E-02	3.2E-02	3.2E-02
Uranium	2.5E-04	3.2E-04	1.3E-04	1.4E-04
Vanadium	**1.4E+00**	**1.4E+00**	8.5E-01	8.5E-01
Zinc	2.6E-01	2.6E-01	2.8E-01	2.8E-01

NOTES:
Bold RQ exceeds benchmark of 1.0
--- RQ was not calculated because TRV was not available

Table 6-27 Risk Quotients for the Red-tailed Hawk

COPC	Risk Quotients for the Red-tailed Hawk (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	1.6E-03	1.7E-03	4.5E-04	5.8E-04
Barium	3.0E-03	3.0E-03	6.1E-03	6.1E-03
Beryllium	---	---	---	---
Cadmium	7.0E-03	7.0E-03	2.4E-02	2.4E-02
Chromium	7.1E-03	7.2E-03	3.1E-03	3.2E-03
Cobalt	3.3E-03	3.3E-03	2.9E-03	3.0E-03
Copper	3.1E-02	3.1E-02	2.1E-02	2.1E-02
Lead	1.1E-03	1.1E-03	1.3E-03	1.3E-03
Manganese	5.2E-04	5.2E-04	5.0E-04	5.0E-04
Mercury	5.4E-03	5.4E-03	8.3E-03	8.3E-03
Molybdenum	1.0E-03	1.0E-03	5.1E-04	5.1E-04
Nickel	2.7E-03	2.8E-03	5.6E-03	5.6E-03
Selenium	4.9E-02	4.9E-02	5.4E-02	5.4E-02
Silver	1.9E-04	1.9E-04	1.9E-04	1.9E-04
Strontium	---	---	---	---
Thallium	3.6E-02	3.6E-02	2.2E-03	2.3E-03
Uranium	1.6E-05	1.6E-05	6.7E-06	6.8E-06
Vanadium	1.7E-01	1.7E-01	6.5E-02	6.6E-02
Zinc	3.4E-02	3.4E-02	3.5E-02	3.5E-02

NOTES:
--- RQ was not calculated because TRV was not available

Table 6-28 Risk Quotients for the Spotted Sandpiper

COPC	Risk Quotients for the Spotted Sandpiper (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	4.3E-02	4.5E-02	2.8E-02	3.0E-02
Barium	4.5E-03	5.0E-03	3.1E-03	3.2E-03
Beryllium	---	---	---	---
Cadmium	3.5E-01	3.5E-01	3.6E-01	3.7E-01
Chromium	8.4E-01	8.4E-01	**1.1E+00**	**1.1E+00**
Cobalt	2.9E-02	3.0E-02	5.3E-02	5.5E-02
Copper	6.3E-01	6.4E-01	**1.2E+00**	**1.2E+00**
Lead	6.7E-02	6.7E-02	6.3E-02	6.4E-02
Manganese	2.0E-02	2.1E-02	1.7E-02	1.8E-02
Mercury	5.1E-02	5.2E-02	6.3E-02	6.4E-02
Molybdenum	5.6E-02	5.7E-02	5.5E-03	5.9E-03
Nickel	2.6E-01	2.7E-01	**2.0E+00**	**2.0E+00**
Selenium	2.2E-01	2.5E-01	2.7E-01	2.8E-01
Silver	6.1E-03	6.3E-03	7.3E-03	7.4E-03
Strontium	---	---	---	---
Thallium	4.8E-02	5.3E-02	3.7E-02	3.8E-02
Uranium	4.6E-04	5.9E-04	2.5E-04	2.7E-04
Vanadium	**1.8E+00**	**1.8E+00**	**1.0E+00**	**1.0E+00**
Zinc	**1.1E+00**	**1.1E+00**	**1.0E+00**	**1.0E+00**

NOTES: **Bold** RQ exceeds benchmark of 1.0;
--- RQ was not calculated because TRV was not available

Table 6-29 Risk Quotients for the Spruce Grouse

COPC	Risk Quotients for the Spruce Grouse (Unitless)			
	Gordon Region		Region MacLellan	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	---	---	---	---
Arsenic	6.6E-04	7.0E-04	6.8E-04	8.8E-04
Barium	9.3E-03	9.3E-03	8.9E-03	8.9E-03
Beryllium	---	---	---	---
Cadmium	4.1E-02	4.1E-02	2.9E-02	2.9E-02
Chromium	3.0E-02	3.0E-02	2.5E-02	2.6E-02
Cobalt	2.2E-02	2.2E-02	2.0E-02	2.0E-02
Copper	4.1E-02	4.1E-02	4.2E-02	4.2E-02
Lead	8.3E-03	8.4E-03	4.8E-03	4.8E-03
Manganese	6.3E-02	6.3E-02	6.1E-02	6.1E-02
Mercury	1.1E-02	1.1E-02	9.3E-03	9.3E-03
Molybdenum	6.2E-03	6.2E-03	5.6E-04	5.7E-04
Nickel	3.2E-02	3.2E-02	1.9E-01	1.9E-01
Selenium	6.1E-02	6.1E-02	5.8E-02	5.8E-02
Silver	2.0E-03	2.0E-03	1.9E-03	1.9E-03
Strontium	---	---	---	---
Thallium	4.7E-02	4.7E-02	5.8E-02	5.9E-02
Uranium	3.5E-05	3.6E-05	3.1E-05	3.2E-05
Vanadium	5.1E-01	5.1E-01	4.0E-01	4.1E-01
Zinc	9.3E-02	9.3E-02	1.2E-01	1.2E-01

NOTES:
--- RQ was not calculated because TRV was not available

6.4.1.2 Plant and Terrestrial Invertebrate Communities

Screening ratios for terrestrial plant and invertebrate communities exposed to COPC in soil were calculated by comparing soil EPCs to the applicable soil quality guidelines outlined in Section 6.3.2. The SRs for terrestrial plants and invertebrates, for the Baseline Case (based on measured baseline soil data) and the Future Case (based on predicted deposition) are summarized in Table 6-34. The SRs for terrestrial plant and invertebrate communities were below 1.0 for both the Baseline Case and the Future Case for COPC assessed with the exception of molybdenum at the Gordon region and copper at the MacLellan region.

Due to the very small contribution of dust deposition to the Future Case concentrations of COPC, there was no substantive difference in risks to terrestrial plants and invertebrates exposed to molybdenum and copper in soil between the Baseline Case and the Future Case. The identified exceedances of the target benchmark of 1.0 are related to pre-existing baseline metal concentrations in the soil, and the Project-related contribution to these environmental effects is negligible (i.e., <1%). As such, unacceptable risks to terrestrial plants and invertebrates as a result of project-related contributions of molybdenum and copper to soil are not expected. Toxicity benchmarks were not identified for strontium, therefore a SR could not be calculated. However, inferences about the magnitude of risk for terrestrial plants and invertebrates from exposure to strontium in the soil as a result of the project, can be made by looking at the difference in the strontium concentration in soil between Baseline Case and Future Case. The increase in the concentration of strontium in soil as a result of Project-related activities is negligible (<1%). As such, baseline risks and future risks are expected to remain essentially unchanged; thus, unacceptable risks to terrestrial plants and invertebrates as a result of project-related contributions of strontium to soil are not expected.

Screening ratios for terrestrial plant communities exposed to NO_2 and SO_2 in air were calculated by comparing the maximum annual average air EPCs to the applicable CAAQs meant to be protective of environmental (and human) health. The SRs for terrestrial plant communities were below 1.0 for both the Baseline Case and the Future Case at the Gordon and MacLellan regions (Table 6-35). As such, unacceptable risks to terrestrial plants from exposure to NO_2 and SO_2 in air are not expected.

Table 6-30 Screening Ratios for Terrestrial Plant and Soil Invertebrates - Metals

COPC	Screening Ratios for Terrestrial Plants and Soil Invertebrates (unitless)			
	Gordon Region		MacLellan Region	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	6.1E-03	6.1E-03	7.5E-03	7.5E-03
Arsenic	6.4E-02	6.8E-02	9.3E-02	1.2E-01
Barium	6.5E-02	6.5E-02	5.0E-02	5.0E-02
Beryllium	7.5E-02	7.5E-02	3.2E-02	3.2E-02
Cadmium	3.6E-02	3.6E-02	3.5E-02	3.6E-02
Chromium	1.2E-01	1.2E-01	7.6E-02	8.0E-02
Cobalt	7.8E-02	7.8E-02	5.2E-02	5.3E-02
Copper	6.1E-01	6.1E-01	**1.3E+00**	**1.3E+00**
Lead	2.7E-02	2.7E-02	2.7E-02	2.7E-02
Manganese	3.6E-01	3.6E-01	2.3E-01	2.3E-01
Mercury	9.2E-03	9.2E-03	1.7E-02	1.7E-02
Molybdenum	**1.6E+00**	**1.6E+00**	1.5E-01	1.5E-01
Nickel	1.2E-01	1.2E-01	7.7E-01	7.7E-01
Selenium	2.5E-01	2.5E-01	9.5E-01	9.5E-01
Silver	7.9E-03	7.9E-03	1.1E-02	1.1E-02
Strontium	---	---	---	---
Thallium	1.3E-01	1.3E-01	9.3E-02	9.5E-02
Uranium	9.0E-04	9.0E-04	8.0E-04	8.1E-04
Vanadium	9.4E-02	9.4E-02	4.3E-02	4.4E-02
Zinc	1.9E-01	1.9E-01	3.3E-01	3.4E-01

NOTES: **Bold** SR exceeds benchmark of 1.0
" ---"- not calculated because a toxicity benchmark was not available

Table 6-31 Screening Ratios for Terrestrial Plants- CACs

COPC	Screening Ratios for Terrestrial Plants (unitless)			
	Gordon Region		MacLellan Region	
	Baseline Case	Future Case	Baseline Case	Future Case
NO_2	8.2E-02	1.6E-01	8.2E-02	1.7E-01
SO_2	1.5E-01	1.6E-01	1.5E-01	1.6E-01

6.4.1.3 Benthic Invertebrate Communities

Screening ratios for benthic invertebrate communities exposed to COPC in sediment were calculated by comparing sediment concentrations to sediment quality guidelines as outlined in **Section 6.3.2**. The SR for the Baseline Case and the Future Case are provided in **Table 6-36**. The SRs for benthic invertebrate communities were below 1.0 for both the Baseline Case and the Future Case for COPC assessed, with the exception of chromium and nickel at the MacLellan region. The predicted SR exceedances for chromium and nickel for these receptors were identified for the Baseline Case, and the Project-related contributions to the Future Case are negligible (i.e., percent increases in SR between Baseline Case and Future Case are less than 1% for chromium and less than 2% for nickel). As such, unacceptable risks to benthic invertebrates as a result of project-related contributions of chromium and nickel to sediment are not expected.

Toxicity benchmarks were not identified for manganese, silver, strontium, thallium and uranium in sediment; therefore, SRs could not be calculated. However, inferences about the magnitude of risk for benthic invertebrate communities from exposure to these COPC in the sediment as a result of the project, can be made by looking at the differences in the sediment concentrations between Baseline Case and Future Case.

The increase in the concentration of silver in sediment as a result of Project-related activities at both the Gordon and MacLellan regions is expected to be negligible (<1%). As such, unacceptable risks to benthic invertebrate communities as a result of project-related contributions of silver to sediment are not expected.

The increase in the concentration of manganese in sediment as a result of Project-related activities is 5% for the Gordon region and 2% for the MacLellan region. Manganese is a naturally occurring element that is ubiquitous in the environment. It is also an essential micronutrient for biota (MOEE, 1993). The Baseline Case and Future Case concentrations of manganese in sediment at the Gordon region are 737 mg/kg and 771 mg/kg, respectively. The Baseline Case and Future Case concentrations of manganese in sediment at the MacLellan region are 646 mg/kg and 658 mg/kg, respectively. As a comparison, sediment concentrations from 256 locations in the Great Lakes region of Ontario ranged from 30 mg/kg to 2,000 mg/kg (MOEE, 1993). The Baseline Case and Future Case concentrations are well within the ranges reported by the MOEE. Furthermore, the MOEE determined that the Lowest Effect Level (LEL) for benthic organisms was 460 mg/kg, while the Severe Effect Level (SEL) was 1,100 mg/kg (MOEE, 1993). Using the LEL as a toxicity threshold, SR are calculated as follows: for the Gordon region a SR of 1.6 for the Baseline Case and a SR of 1.7 for the Future Case (change of 0.1); and for the MacLellan region a SR of 1.4 for the Baseline Case and a SR of 1.4 for the Future Case (change of less than 0.1). As the changes in SR between

Baseline Case and Future Case are less than 1.0 for both the Gordon and MacLellan regions, unacceptable levels of risk to benthic invertebrates from exposure to manganese in sediment as a result of Project-related activities are not expected.

The increase in the concentration of strontium in sediment as a result of Project-related activities is 165% for the Gordon region and 9% for the MacLellan region. Strontium is a natural and commonly occurring element (ATSDR 2004). Strontium is a component of igneous rocks (average concentration of 375 mg/kg) and of various types of mineral deposits and is commonly associated with or near sedimentary rocks (ATSDR 2004). The Forum of European Geological Surveys collected stream bed sediment samples from nearly 900 stations across Europe to establish a global geochemical reference baseline concentration for various metals in sediment, including strontium. The median strontium concentration in stream sediments across Europe was 126 mg/kg, with a range from 31 to 1,352 mg/kg (Geochemical Atlas of Europe, 2006). Similarly, Environment Canada and Ministère du Développement durable, de l'Environnement et des Parcs du Québec (2007) collected sediment samples from the St. Lawrence to establish natural and ambient concentrations of various metals in sediment, including strontium. The 90th percentile was adapted to establish natural concentrations in pre-industrial sediment of 59 mg/kg and in postglacial clays of 110 mg/kg, while the 75th percentile was adapted to establish ambient concentrations in surficial sediment of three fluvial lakes, ranging from 320 to 400 mg/kg (EC and MDDEP 2007). Canadian Nuclear Laboratories (2018 and 2019) have also established background concentrations of several metals (and other chemicals) in sediment, including strontium. CNL (2018; 2019) have established a sediment upper limit background concentration of 370 mg/kg for strontium. Closer to the Gordon and MacLellan regions, sediment quality was assessed at various watercourses/lakes in Saskatchewan and Manitoba. Concentrations of strontium in these sediments ranged from 4 to 110 mg/kg (Stantec 2009). The Baseline Case and Future Case concentrations of strontium in sediment at the Gordon region is 31.1 mg/kg and 82.4 mg/kg, respectively. The Baseline Case and Future Case concentrations of strontium in sediment at the MacLellan region is 34.7 mg/kg and 37.8 mg/kg, respectively. These concentrations are within the typical concentration ranges observed for various waterbodies throughout Europe and Canada. Therefore, unacceptable risks to benthic invertebrates from exposure to strontium in sediments are not expected.

The increase in the concentration of thallium in sediment as a result of Project-related activities is 10% for the Gordon region and 2% for the MacLellan region. Thallium is ubiquitous in nature and is found especially in sulphide ores (van Vlaardingen et al. 2005). Thallium concentrations in surface and subsurface sediments at four remote Rocky Mountain National Park lakes, ranged from 0.13 to 0.27 mg/kg and from 0.14 to 0.30 mg/kg, respectively. Higher thallium concentrations (5.8 to 10.0 mg/kg) were observed in sediments from two Adirondack lakes (CCME, 1999e). The Baseline Case and Future Case concentrations of thallium in sediment at the Gordon region is 0.24 and 0.27 mg/kg respectively. The Baseline Case and Future Case concentrations of thallium in sediment at the MacLellan region is 0.189 and 0.192 mg/kg respectively. These concentrations are within the natural thallium concentrations in freshwater sediments as reported by CCME (1999e). Furthermore, van Vlaardingen et al. (2005) derived a maximum permissible concentration (MPC) in sediment, which represents the concentration that protects all species in the ecosystem from adverse effects of 1.2 mg/kg. Concentrations of thallium in sediment at the Gordon and MacLellan regions under both Baseline and Future Case are well below the MPC reported by van Vlaardingen et al. (2005). Using the MPC as a toxicity threshold, SR are calculated as follows: for the

Gordon region a SR of 0.20 for the Baseline Case and a SR of 0.23 for the Future Case (change of less than 0.1); and for the MacLellan region a SR of 0.16 for the Baseline Case and a SR of 0.16 for the Future Case (change of less than 0.1). As the changes in SR between Baseline Case and Future Case are less than 1.0 for both the Gordon and MacLellan regions, unacceptable levels of risk to benthic invertebrates from exposure to thallium in sediment as a result of Project-related activities are not expected.

The increase in the concentration of uranium in sediment as a result of Project-related activities is 25% for the Gordon region and 6% for the MacLellan region. Natural uranium concentrations in freshwater sediments are generally below 10 mg/kg; however, concentrations between 450 and 18,000 mg/kg have been measured near mining sites (CCME, 2011). The Baseline Case and Future Case concentrations of uranium in sediment at the Gordon region are 3.2 and 4.1 mg/kg respectively. The Baseline Case and Future Case concentrations of uranium in sediment at the MacLellan region are 1.6 and 1.7 mg/kg respectively. These concentrations are well within the natural uranium concentrations in freshwater sediment as reported by CCME (2011). Furthermore, Sheppard et al. (2005) derived a predicted no effect concentration (PNEC) for uranium toxicity for benthic organisms of 100 mg/kg. Concentrations of uranium in sediment at the Gordon and MacLellan regions are well below the PNEC reported by Sheppard et al. (2005). Using the PNEC as a toxicity threshold, SR are calculated as follows: for the Gordon region a SR of 0.032 for the Baseline Case and a SR of 0.041 for the Future Case (change of less than 0.1); and for the MacLellan region a SR of 0.016 for the Baseline Case and a SR of 0.017 for the Future Case (change of less than 0.1). As the changes in SR between Baseline Case and Future Case are less than 1.0 for both the Gordon and MacLellan regions, unacceptable levels of risk to benthic invertebrates from exposure to uranium in sediment as a result of Project-related activities are not expected.

Table 6-32 Screening Ratios for Benthic Invertebrate Communities

COPC	Screening Ratios for Benthic Invertebrate Communities (unitless)			
	Gordon Region		MacLellan Region	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	4.1E-05	1.1E-04	2.9E-05	4.2E-05
Arsenic	2.9E-01	3.1E-01	1.6E-01	1.7E-01
Barium	5.6E-02	6.2E-02	3.8E-02	3.9E-02
Beryllium	1.6E-01	1.6E-01	7.7E-02	7.8E-02
Cadmium	1.1E-01	1.1E-01	1.3E-01	1.3E-01
Chromium	4.9E-01	4.9E-01	**1.1E+00**	**1.1E+00**
Cobalt	2.3E-02	2.3E-02	8.6E-02	8.8E-02
Copper	1.0E-01	1.0E-01	6.7E-01	6.7E-01
Lead	9.6E-02	9.6E-02	8.1E-02	8.2E-02
Manganese	---	---	---	---
Mercury	1.7E-01	1.7E-01	1.3E-01	1.3E-01
Molybdenum	1.1E-03	1.2E-03	1.1E-04	1.1E-04
Nickel	1.1E-01	1.1E-01	**1.1E+00**	**1.1E+00**
Selenium	5.3E-02	5.3E-02	3.9E-02	3.9E-02

Table 6-32 Screening Ratios for Benthic Invertebrate Communities

COPC	Screening Ratios for Benthic Invertebrate Communities (unitless)			
	Gordon Region		MacLellan Region	
	Baseline Case	Future Case	Baseline Case	Future Case
Silver	---	---	---	---
Strontium	---	---	---	---
Thallium	---	---	---	---
Uranium	---	---	---	---
Vanadium	4.4E-01	4.4E-01	2.6E-01	2.6E-01
Zinc	3.4E-01	3.4E-01	4.8E-01	4.8E-01

NOTES:
Bold SR exceeds benchmark of 1.0
” **---**"- not calculated because a toxicity benchmark was not available.

6.4.1.4 Freshwater Aquatic Communities

Screening ratios (SR) for freshwater aquatic communities (i.e., aquatic plants, aquatic invertebrates and fish) exposed to COPC in surface water were calculated by comparing surface water concentrations to freshwater aquatic life quality guidelines as outlined in Section 6.3.2. In cases where the benchmark was dependent on hardness, pH and/or dissolved organic carbon (DOC), conservative assumptions were used to derived site-specific guidelines, which include the use of the minimum measured hardness, the maximum measured pH and a DOC of 0.5 mg/L (default value as recommended by CCME). This was considered to be a conservative approach because anticipated Project-related increases in hardness and decreases in pH would result in higher, less conservative guideline values. DOC was conservatively assigned a value of 0.5 mg/L, which is well below the minimum observed value for DOC among baseline monitoring sites in the RAA.

The SRs for the Baseline Case and the Future Case, which are based on the freshwater aquatic life benchmarks provided in Appendix G, are provided in Table 6-37. The SRs for both the Baseline Case and the Future Case were below the threshold of 1.0, suggesting that Project-related activities are not anticipated to result in unacceptable health risks for freshwater aquatic communities.

An aquatic life toxicity benchmark was not identified for strontium; therefore, a SR was not calculated. However, inferences about the magnitude of risk for freshwater aquatic communities from exposure to strontium in surface water as a result of the project, can be made by looking at the difference in the water concentrations between Baseline Case and Future Case. The increase in the concentration of strontium in surface water as a result of Project-related activities is 84% for the Gordon region and 49% for the MacLellan region. Strontium is present in nearly all fresh waters in amounts generally ranging between 0.5 and 1.5 mg/L, with higher levels occurring where there are celestite-rich limestone deposits (ATSDR, 2004). Baseline concentrations of strontium in surface water at the Gordon and MacLellan regions were 0.09 mg/L and 0.02 mg/L, respectively. Future case concentrations of strontium in surface water at the Gordon and MacLellan regions were 0.17 and 0.02 mg/L, respectively. These concentrations are well within the strontium concentrations in freshwaters as reported by the ATSDR. Furthermore, Environment and Climate Change Canada (ECCC) has drafted a federal environmental quality guideline (FEQG) for strontium in freshwater for the protection of aquatic life of 1.7 mg/L (ECCC 2019). Also, the European Chemicals Agency (ECHA), an agency of the European Union (EU) that manages registration, evaluations, authorization, and restriction of chemicals within the EU, reports chronic NOECs for aquatic organisms that are greater than or equal to 21 mg/L (ECHA 2019). Again, concentrations of strontium in surface waters at the Gordon and MacLellan regions are well below the aquatic toxicity benchmarks drafted by ECCC and reported by the ECHA. Using the draft FEQG as a toxicity threshold, SR are calculated as follows: for the Gordon region a SR of 0.053 for the Baseline Case and a SR of 0.10 for the Future Case (change of less than 0.1); and for the MacLellan region a SR of 0.012 for the Baseline Case and a SR of 0.012 for the Future Case (change of less than 0.1). As the changes in SR between Baseline Case and Future Case are less than 1.0 for both the Gordon and MacLellan regions, unacceptable levels of risk to freshwater aquatic communities from exposure to strontium in surface water as a result of Project-related activities are not expected.

Table 6-33 Screening Ratios for Freshwater Aquatic Communities

COPC	Screening Ratios for Freshwater Aquatic Communities (unitless)			
	Gordon Region		MacLellan Region	
	Baseline Case	Future Case	Baseline Case	Future Case
Antimony	3.5E-03	1.2E-02	2.9E-03	5.4E-03
Arsenic	5.9E-02	1.2E-01	5.3E-02	1.2E-01
Barium	9.4E-02	1.6E-01	3.9E-02	4.5E-02
Beryllium	1.3E-02	1.5E-02	2.4E-02	2.5E-02
Cadmium[a]	6.1E-02	7.1E-02	1.4E-01	2.9E-01
Chromium	9.7E-03	1.1E-02	2.0E-02	2.3E-02
Cobalt	1.7E-02	1.9E-02	6.9E-02	1.2E-01
Copper[a]	1.1E-01	1.3E-01	5.6E-01	6.1E-01
Lead[a]	3.6E-02	3.9E-02	6.4E-02	7.5E-02
Manganese[ab]	6.5E-04	7.4E-04	5.1E-04	5.7E-04
Mercury	2.8E-05	2.9E-05	5.5E-05	5.7E-05
Molybdenum	4.4E-03	9.9E-03	1.4E-03	2.9E-03
Nickel[a]	7.3E-03	8.4E-03	3.6E-01	3.9E-01
Selenium	2.9E-02	4.6E-02	4.9E-02	5.9E-02
Silver	1.4E-02	1.6E-02	2.0E-02	2.2E-02
Strontium	---	---	---	---
Thallium	2.5E-02	2.9E-02	4.4E-02	4.5E-02
Uranium	3.5E-03	1.8E-02	3.3E-03	6.3E-03
Vanadium	9.4E-03	1.1E-02	1.6E-02	1.7E-02
Zinc[abc]	3.9E-04	4.2E-04	1.8E-03	1.9E-03

Table 6-33 Screening Ratios for Freshwater Aquatic Communities

COPC	Screening Ratios for Freshwater Aquatic Communities (unitless)			
	Gordon Region		MacLellan Region	
	Baseline Case	Future Case	Baseline Case	Future Case

NOTES

[a] Benchmark was conservatively based on minimum measured water hardness of 10.9 mg/L $CaCO_3$ at the Gordon region and 4.5 mg/L $CaCO_3$ at the MacLellan region.

[b] Benchmark was conservatively based on maximum measured pH of 8.84 at the Gordon region and 8.94 at the MacLellan region.

[c] Benchmark was based on the default DOC value of 0.5 mg/L as recommended by CCME.

"---" not calculated because a toxicity benchmark was not available.

6.4.1.5 Herptiles

There is limited exposure and toxicity data to support the assessment of amphibians. Therefore, amphibians were evaluated qualitatively. Most amphibians require water for survival and reproduction. Early life stages of most amphibians live completely in permanent or temporary water bodies. Direct contact with surface water is one of the most important exposure pathways for early life stages because the skin of amphibians can absorb waterborne contaminants. Sediment and sediment porewater are also major exposure pathways for early amphibian life stages as well as for mature life stages. Some amphibian species deposit their embryos directly in sediment. Once hatched, the larvae can forage in sediment and are thus exposed to contaminants through direct contact and incidental ingestion. When amphibians complete metamorphosis, they reside mostly in the terrestrial environment. Direct contact with soil is a major exposure pathway for adults because some amphibians bury themselves in soil to stay moist during dry seasons or hibernate in the soil during winter. Amphibians also absorb much of the water in the soil through their skin as a way to remain hydrated in the terrestrial environment; thus, dermal uptake of dissolved contaminants from soil porewater is a significant exposure pathway. Adult amphibians rarely ingest water, except under extremely dry conditions (FCSAP, 2019).

Dietary information on amphibians is extremely limited and food and water intake rates are unknown. Most amphibian larvae are herbivorous, but a few species become omnivorous. Most amphibian adults are carnivorous, feeding on a variety of aquatic and terrestrial invertebrates, fish and other amphibians, and occasionally on small mammals, such as mice and birds (FCSAP, 2019).

The most sensitive life stage for amphibians is the tadpole stage, during which the amphibian is immersed in water. As such, fish may be a suitable surrogate for amphibian exposure. Aquatic receptors were evaluated in Section 6.4.1.4 and risks to fish and freshwater aquatic life from the construction and operation of the Project were acceptable. Thus, unacceptable risks to amphibians are not anticipated either.

Reptiles (e.g., turtles and snakes) are not expected to occur in the RAA and thus were not included in this assessment.

6.5 UNCERTAINTY ANALYSIS

6.5.1 Modelling Techniques

This ERA was conducted according to accepted risk assessment methodologies and follows guidance published and endorsed by regulatory agencies such as the CCME and the FCSAP. This approach is consistent with previous projects that have been reviewed by the Canadian Environmental Assessment Agency (CEAA). Risk estimates were derived through the inclusion of baseline data from multiple media (soil, water, tissue), modelling techniques following federal ERA guidance (CCME 1996, 2020; FCSAP 2012) for the prediction of Future Case concentrations as well as Baseline Case concentrations for parameters/media not measured, information about likely species of interest through engagement of local Indigenous communities and professional judgement. ERAs have inherent uncertainty related to the assumptions applied in the risk calculations. This uncertainty is often the result of conservative assumptions aimed at overestimating predictions of risks. This section provides more details on the nature of the uncertainties and the conservative approach that was used.

6.5.2 Modelling Scenario

There are uncertainties inherent to all types of predictive modelling techniques. There are uncertainties associated with data inputs that are modelled independently of the ERA (i.e., deposition, surface water and sediment quality modelling). These data inputs introduce uncertainties that are independent of the ERA process, but affect the final risk estimate to ecological receptors. Differences between modelled and actual Future Case conditions for climate, wind, weather and project influences may result in uncertainties. As part of the conservative approach to risk assessments, the worst-case modelling conditions are typically selected for application into the ERA.

6.5.3 Receptor Selection

The ecological receptors that were selected are known to be present, or can reasonably be expected to be present, near the Project, either at the Gordon region, the MacLellan region or both. These receptors are also suitable surrogates for other species that may be present, including species at risk. The use of site-specific receptors decreases the uncertainty in the assessment.

6.5.4 Use of Ecological Receptors to Represent Other Organisms

The use of receptors as sentinels is intended to limit the number of ecological receptors evaluated. The receptors selected are considered to be sensitive, regularly present at or near the Project, and to be exposed to the COPC via relevant exposure pathways. Therefore, it is reasonable to assume that conclusions that are reached in respect of the modelled receptor organisms can be generalized to other biota that might use the region near the Project.

6.5.5 Receptor-Specific Toxicity Data

For most COPC and receptors, toxicity data are available in some form. However, toxicity data are not necessarily available for the particular receptor species under consideration (e.g., black bear), or to a reproductive or population-level endpoint. As a result, there is uncertainty associated with the extrapolations that may be used to translate toxicity data for one species into a TRV for a second species. The toxicity data represent an organism or organisms that are expected to be sensitive to the COPC. The conversion factors that are used are scientifically based and are applied in a reasonable manner.

6.5.6 Food Chain Interactions

Very limited "real world" data exist that allow quantification of the true relationship between a COPC in an environmental medium and chemical transfer through the food chain. Only a few classes of chemicals (excluding metals) appear to be magnified through the food chain. The extent of food chain magnification is another uncertainty that is generally treated in a conservative manner. Baseline concentrations of trace metals in a wide variety of environmental media and food items were measured, including soil, surface water, sediment, small mammals, fish, forage, browse, and berries. Future concentrations of trace metals in these environmental media and food items were predicted using methods and models that are considered to be realistic and/or conservative.

6.5.7 Wildlife Exposure Factors

Most factors incorporated into dose calculations for ecological receptor species possess a site-specific component. Validity of each exposure factor is dependent on consideration of the site-specific nature of these factors. In the absence of site-specific validation, exposure factors are incorporated based on validations performed elsewhere for other cases and sometimes for other species. Considerations such as food ingestion rates, water ingestion rates, incidental soil ingestion rates, dietary composition, home range, and time spent near the Project were collected from the scientific literature based on other sites and locations.

6.5.8 Measurement Endpoints from the Toxicity Data

The limited amount of toxicity data available for many chemicals restricted the measurement endpoints that were available. Given the overall tendency to introduce conservatism (through the use of data or assumptions that are likely to overstate, rather than understate risk) into risk assessments, it is highly likely that no adverse environmental effect will exist below the RQ (or SR) target value of less than 1.0. However, an RQ (or SR) value greater than 1.0 is not by itself an indication that harm to receptor organisms will occur. The conservatisms inherent in the model development mitigate this conclusion, and the movements of wildlife receptors and consequent risk-averaging tend to reduce their actual exposure level in comparison with the exposure level predicted at point locations.

6.5.9 Exposure Assumptions

Generally, uncertainties are addressed by incorporating conservative assumptions (i.e., assumptions that are likely to overstate risk) in the analysis. Where several conservative assumptions are involved in the same calculation, a high level of conservatism can result from the combination of the assumptions. As a result, risk assessments tend to overstate the actual risk with the result that conclusions are robust. Although many factors are considered in preparation of a risk assessment, the results are generally most sensitive to a few key assumptions. Some of these modelling assumptions related to exposures include:

- The uptake rate of COPC from ingestion and dermal exposure to environmental media is assumed to be 100% (i.e., AF = 1.0).
- Ecological receptors are assumed to spend their entire lifetime in the area that could be affected by the Project.
- For the Baseline Case, ecological receptors were assumed to be exposed to measured concentrations of COPC in baseline environmental media based upon the 95% UCLM or maximum concentrations (soil, sediment, surface water, small mammals, fish, terrestrial plants).
- For the Future Case, ecological receptors were assumed to be exposed to predicted concentrations of COPC in environmental media based upon the 95% UCLM (soil, sediment, surface water, small mammals, fish, terrestrial plants).
- Ecological receptors were assumed to be exposed to 95% UCLM or maximum concentrations in environmental media regardless of their relative geographical proximity (e.g., surface water and sediment concentrations may be at distance from soil concentrations).
- Predicted concentrations of COPC in sediment are based on site-adjusted partitioning factors between surface water and sediment. Predicted concentrations of COPC in other media are also based on site-adjusted partitioning factors.
- Predicted concentrations of COPC in biota are based on exposure to COPC in environmental media. Biota are assumed to have been exposed to concentrations in environmental media long enough for their tissues to equilibrate with the surrounding media. For example, predicted concentrations of COPC in fish are based on exposure to COPC in the water column. Fish are assumed to have been exposed to these concentrations long enough for their tissues to equilibrate with the surrounding water.

6.5.10 Chemical Interactions from Multiple COPC

Ecological receptors are exposed to multiple COPC in the environment. The chemical interaction between multiple COPC or modifying factors (e.g., pH or water hardness) may result in additive, synergistic or antagonistic effects that are not distinguishable when evaluating the toxicity of COPC individually. Similar to the situation for human health, there is only a weak scientific understanding of the interaction and effects of multiple COPC and related modifying factors. Due to the lack of scientific evidence and approved assessment tools associated with modelling chemical interactions, these interactions were not evaluated in the ERA. However, this does not make the ERA non-conservative. Both interactions and modifying factors can influence the evaluation of potential risk. However, one of the main goals of the ERA is to conservatively assess potential risks by adopting numerous conservative biases in the risk assessment approach, such as using a maximum or 95% UCLM to represent the concentration over the entire area and using the most sensitive endpoint for the most sensitive species to represent the potential dose-response for all species within the study area. Efforts are made to err on the side of caution, providing a conservative level of risk without being unreasonable.

6.5.11 Summary of Uncertainties

A summary of the important assumptions and uncertainties in the ERA and the implications of these assumptions on risk estimates is provided in Table 6-38.

6.6 ERA SUMMARY

In general, Project-related contributions of COPC are not expected to result in unacceptable levels of risk to birds and mammals based on a comparison of RQs to a threshold of 1.0. In some cases RQs exceed the threshold of 1.0 in both the Baseline Case and the Future Case, with potential Future Case risks driven largely by baseline exposures to COPC. However, the differences between RQs for the Baseline Case and the Future Case were less than 1.0 for all COPC and all ecological receptors assessed at both the Gordon region and the MacLellan region, suggesting that the Project-related risks for ecological receptors are expected to be negligible.

The SRs for freshwater aquatic life communities were less than 1.0 for both the Baseline Case and the Future Case. The SRs for benthic communities, terrestrial plant and soil invertebrate communities were generally below 1.0. In some cases the SRs exceeded for both the Baseline Case and the Future Case. However, the changes between the Baseline Case and the Future Case SRs were less than 1.0 for all COPC and communities assesed at both the Gordon region and the MacLellan region indicating that Project-related risks for community receptors are expected to be negligible.

Table 6-34 Evaluation of Assumptions and Uncertainties Applied in the ERA

Assumptions/Uncertainty	Discussion of Conservatism	Analysis Likely to Overestimate/ Underestimate Risk
Modelling Techniques	Risk estimates were derived using modelling techniques based on federal ERA guidance (CCME 1996, 2020; FCSAP 2012) for the prediction of Future Case concentrations as well as Baseline Case concentrations for parameters/media not measured.	Neutral
Modelling Scenario	As part of the conservative approach to risk assessments, the worst-case modelling conditions were selected for application into the ERA. Ecological receptors were assumed to be exposed to potential upper limit exposures for each media at each region, regardless of specific locations of these concentrations. This approach is conservative as ecological receptors would be expected to move around at the site and not necessarily be exposed to the highest concentrations at the same location.	Overestimate
Receptor Selection	The ecological receptors that were selected are known to be present, or can reasonably be expected to be present, near the Project, either at the Gordon region, the MacLellan region or both.	Neutral
Using Receptors as Sentinels for other Organisms	The receptors selected are considered to be sensitive, regularly present at or near the Project, and to be exposed to the COPC via relevant exposure pathways.	Neutral
Receptor-Specific Toxicity Data	The toxicity data represent an organism or organisms that are expected to be sensitive to the COPC. The conversion factors that are used are scientifically based and are applied in a reasonable manner. This approach is considered conservative as selected receptors may be similarly or less sensitive.	Overestimate
Food Chain Interactions	Baseline concentrations of trace metals in a wide variety of environmental media and food items were measured, including soil, surface water, sediment, small mammals, fish, forage, browse, and berries. Future concentrations of trace metals in these environmental media and food items were predicted using methods and models that are considered to be realistic and/or conservative.	Neutral
Wildlife Exposure Factors	Most factors incorporated into dose calculations for ecological receptor species possess a site-specific component. In the absence of site-specific validation, exposure factors are incorporated based on validations performed elsewhere for other cases and sometimes for other species.	Neutral
Exposure Assumptions	The uptake rate of COPC from ingestion and direct exposure to environmental media is assumed to be 100% (i.e., AF = 1.0). This approach is conservative as COPC may not be 100% bioavailable in the environmental media and may not be expected to be completely uptaken through the gut and direct exposure.	Overestimate

Table 6-34 Evaluation of Assumptions and Uncertainties Applied in the ERA

Assumptions/Uncertainty	Discussion of Conservatism	Analysis Likely to Overestimate/ Underestimate Risk
Exposure Assumptions	Ecological receptors are assumed to spend their entire lifetime in the area that could be affected by the Project. This approach is conservative as some receptors may not spend 100% of their time in the areas of highest concentrations within the Gordon or MacLellan region (i.e., their foraging/home ranges may extend beyond the area that could be affected by the Project).	Overestimate
	Ecological receptors were assumed to be exposed to measured/predicted concentrations of COPC in environmental media (e.g., soil, sediment, surface water, small mammals, fish, terrestrial plants) based upon the 95% UCLM or maximum concentrations. The 95% UCLM is a conservative upper level estimate of the mean of concentrations at each region. The use of the 95% UCLM or maximum concentrations represents a conservative approach, as the concentrations in the food items ingested by mammals and birds would likely be at a lower concentration.	Overestimate
	Ecological receptors were assumed to be exposed to 95% UCLM or maximum concentrations in environmental media regardless of their relative geographical proximity (e.g., surface water and sediment concentrations may be at distance from soil concentrations). This approach is conservative as ecological receptors would be expected to move around at the site and not necessarily be exposed to the highest concentrations in each medium at the same time or location.	Overestimate
	Predicted concentrations of COPC in sediment are based on site-adjusted partitioning factors between surface water and sediment. Predicted concentrations of COPC in other media are also based on site-adjusted partitioning factors.	Neutral
	Predicted concentrations of COPC in biota are based on exposure to COPC in environmental media. Biota are assumed to have been exposed to concentrations in environmental media long enough for their tissues to equilibrate with the surrounding media. For example, predicted concentrations of COPC in fish are based on exposure to COPC in the water column. Fish are assumed to have been exposed to these concentrations long enough for their tissues to equilibrate with the surrounding water.	Neutral
Chemical Interactions from Multiple COPC	The chemical interaction between multiple COPC and modifying factors (e.g., pH or water hardness) may result in additive, synergistic or antagonistic effects that are not distinguishable when evaluating the toxicity of COPC individually. Due to the lack of scientific evidence and approved assessment tools associated with modelling chemical interactions, these interactions were not evaluated in the ERA.	Neutral

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8.0 STANTEC QUALITY MANAGEMENT PROGRAM

This report, **Human Health and Ecological Risk Assessment Technical Modeling Report,** prepared for Alamos Gold Inc., dated April 30, 2020, was produced by Stantec Consulting Ltd.

This report was written by the following individuals:

Tony McKnight-Whitford, Ph.D.
Risk Assessor

Signature

Bryan Leece, Ph.D.
Senior Toxicologist

Signature

This report was reviewed by the following individuals:

Tania Noble, M.Eng., P. Eng.
Senior Principal

Signature

Loren Knopper, Ph.D.
Principal

Signature

Approval to transmit to client:

Karen Mathers, M.Sc., P.Geo. FGC, PMP
Senior Project Manager

Signature

This report was independently reviewed by Jennifer McPhail, M.Eng., P.Eng., Associate.

9.0 LIMITATIONS

This Technical Modelling Report entitled Lynn Lake Gold Project Human Health and Ecological Risk Assessment was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Alamos Gold Inc. (the “Client”) to support the approvals and permitting process from the Lynn Lake Gold Project in Lynn Lake, Manitoba. In connection thereto, this document may be reviewed and used by the federal and provincial government agencies participating in the approvals and permitting process in the normal course of their duties; and stakeholders may provide comment as part of the regulatory approvals process. Except as set forth in the previous sentence, any reliance on this document by any third party for any other purpose is strictly prohibited. The material in it reflects Stantec’s professional judgement in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in contents of the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any unauthorized use that a third party makes of this document is the responsibility of such third part. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on unauthorized use of this document.

Appendix A MAPS

Map 1 Human Helath Spatial Boundaries

Map 2 Ambient Air Quality Monitoring Locations

Map 3 HHERA Soil and Vegetation Sampling Locations

Map 4 HHERA Small Mammal Sampling

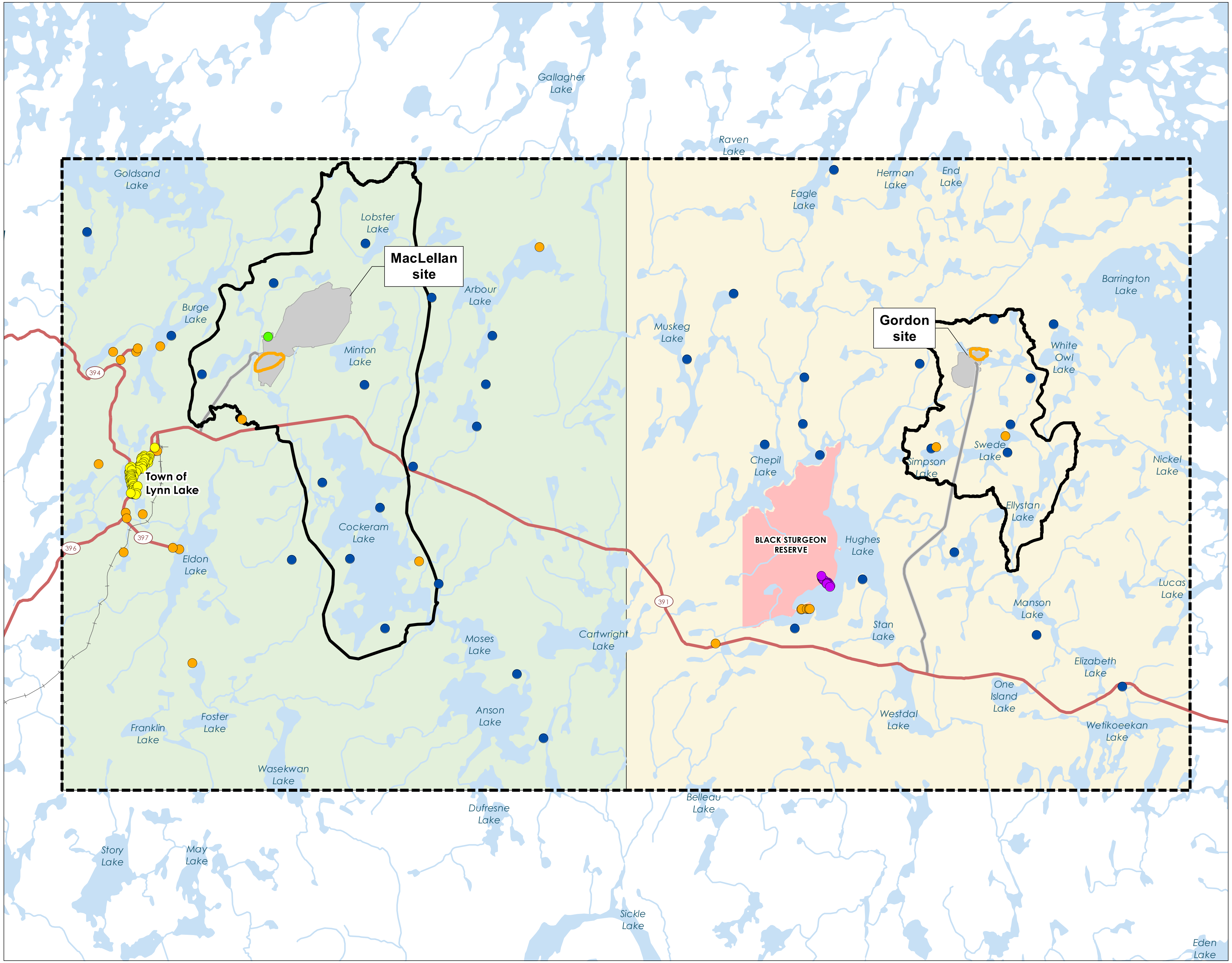
Map 5 MacLellan Water Quality

Map 6 Gordon Water Quality

Map 7 Fish Tissue Sampling Locations

Map 8 Sediment Quality Sampling Locations

Map 9 Human Health TLRU with Receptors



Stantec

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- HHRA Local Assessment Area/Regional Assessment Area (LAA/RAA)
- Surface Water Local Assessment Area (LAA)
- Gordon region
- MacLellan region

Human Receptors

- Lynn Lake Receptors
- Black Sturgeon Reserve Receptors
- Remote Cabins and Recreational Sites
- Potential Indigenous Receptors
- Worker Camp

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-05-05
Technical Review by TMcKnight-Whitford on 2020-05-05

Client/Project 111473008

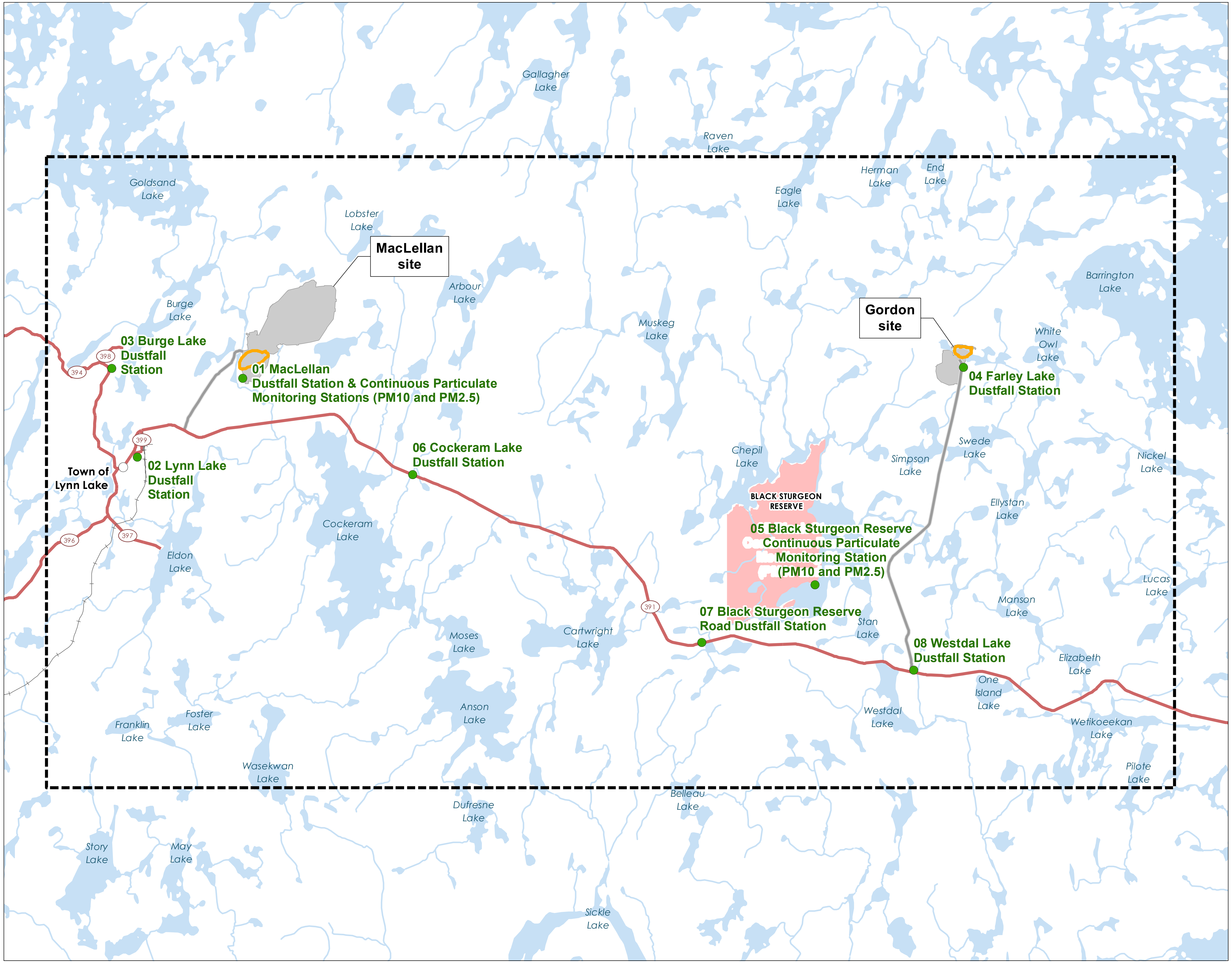
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
1

Title

Spatial Boundaries for the Human Health and Ecological Risk Assessment

\\Ca0045-pbagf01\gis\ GIS Project Folder\111440293 AuRico\Figures\HHERA\TMR\TMR Map1 HUMANHEALTH SpatialBoundaries 20200424.mxd Revised: 2020-05-05 By: ACampigotto



Stantec

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- Air Quality Local Assessment Area

Monitoring Locations

- Air Quality Monitoring Station

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

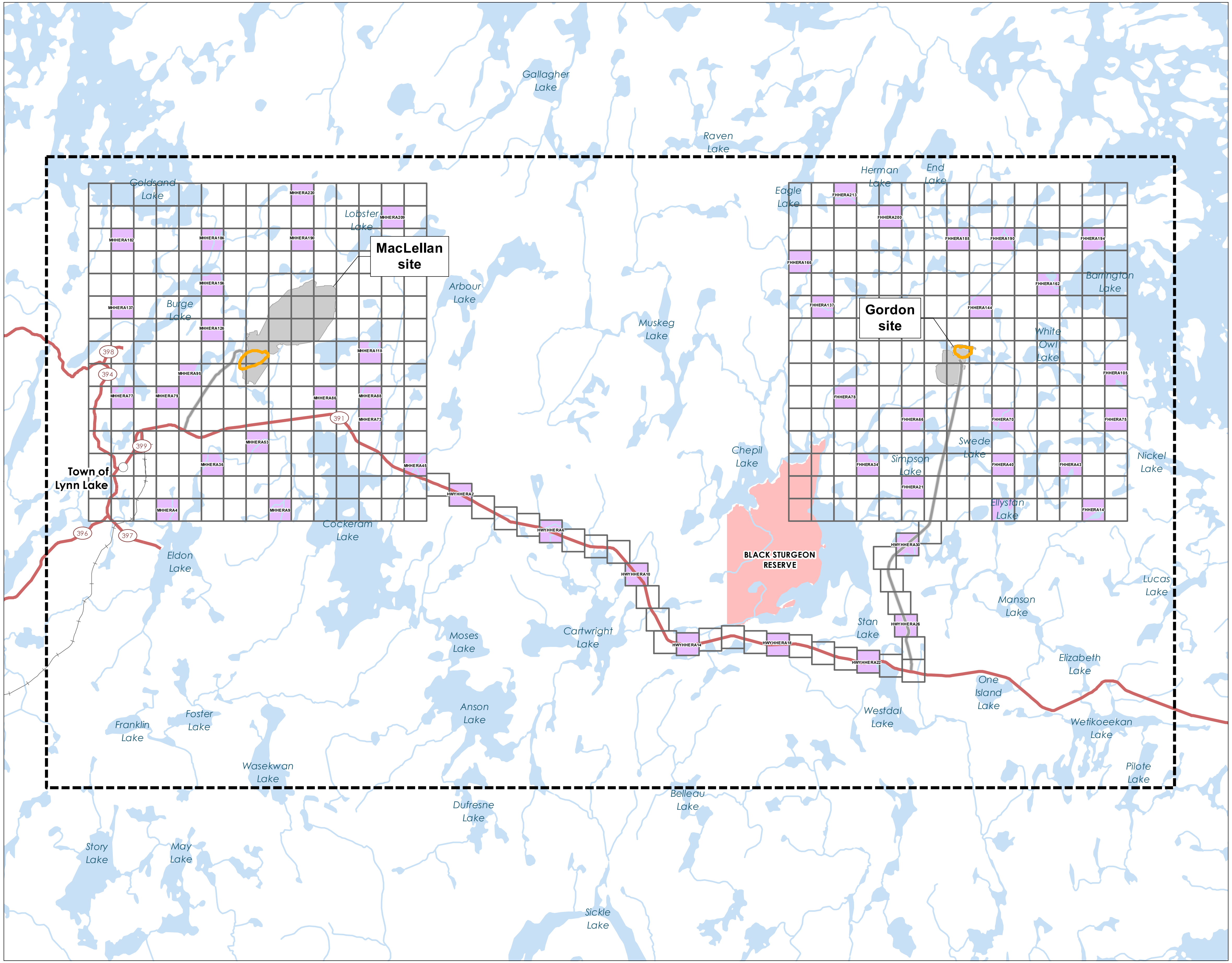
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-24
Technical Review by TMcKnight-Whitford on 2020-04-24

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
2

Title
Ambient Air Quality Monitoring Locations



Stantec

Project Infrastructure

Proposed Open Pit

Project Development Area

Study Area

Air Quality Local Assessment Area

Air Quality Monitoring Locations

Human Health & Ecological Risk Assessment (HHERA) 1km Grids

Sample Locations

Landbase

Highway

Access Road

Rail

Watercourse

Waterbody

First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

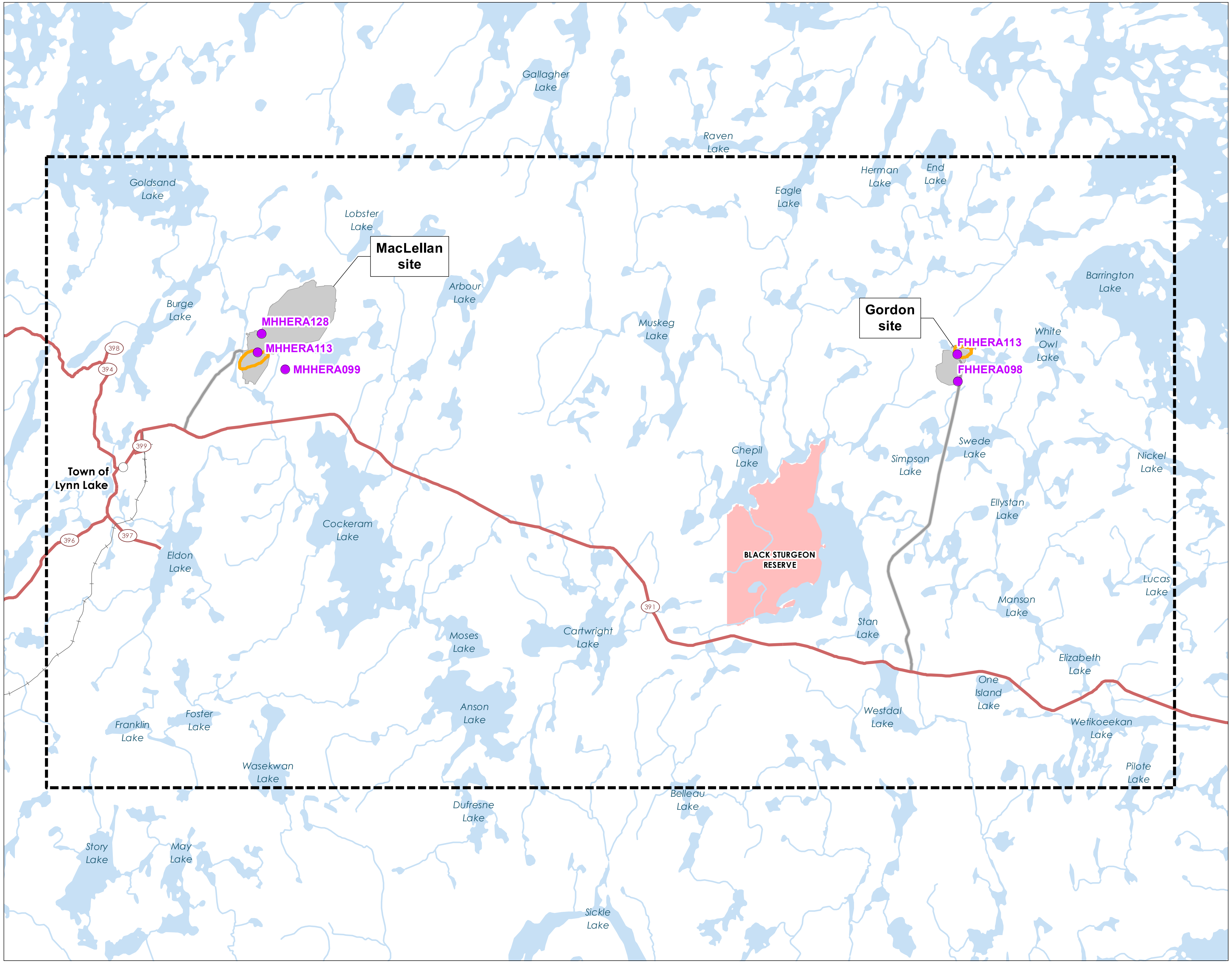
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-24
Technical Review by TMcKnight-Whitford on 2020-04-24

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
3

Title
HHERA Soil and Vegetation Sampling Locations



Stantec

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- Air Quality Local Assessment Area

Sample Locations
- Small Mammal Trapping Locations

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

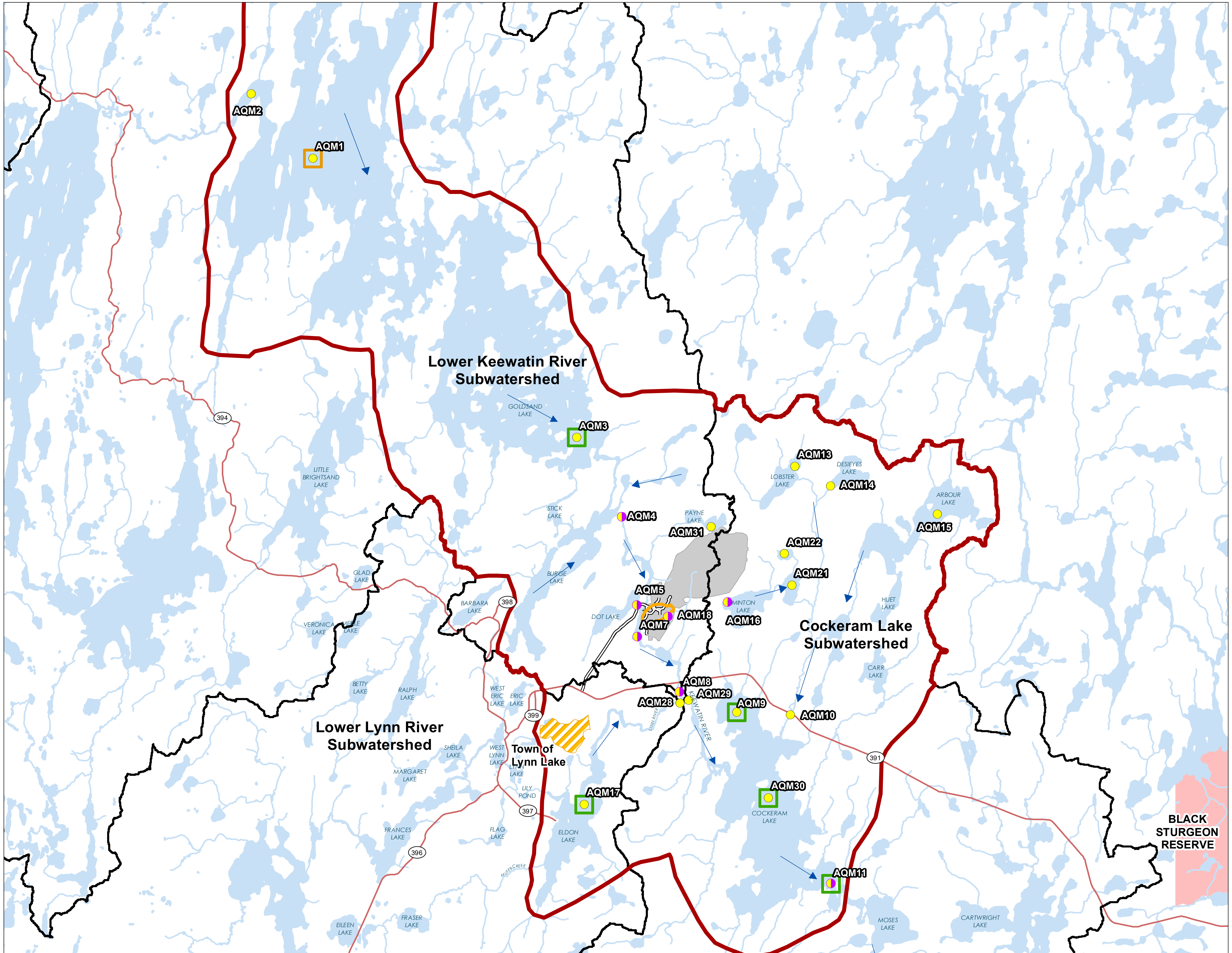
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-24
Technical Review by TMcKnight-Whitford on 2020-04-24

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
4

Title
HHERA Small Mammal Sampling Locations



Stantec

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- Study Area
- Subwatersheds

Sample Locations

- Water Quality Sample
- Water Quality Sample and Hydrology Station
- Water Quality Sample from 2 to 4 metres Deep
- Water Quality Sample Deeper than 4 metres
- Surface Water Flow Direction

Landbase

- Highway
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve
- Lynn Lake East Tailings Management Area

N

0 2 4 Kilometres

1:160,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.
3. Lynn Lake East Tailings Management Area courtesy of Lynn Lake Site-Specific Human Health and Environmental Risk Assessment; Final Report, April 2003 submitted by Dillon Consulting Limited, Acres International and ECOMatters.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-24
Technical Review by TMcKnight-Whitford on 2020-04-24

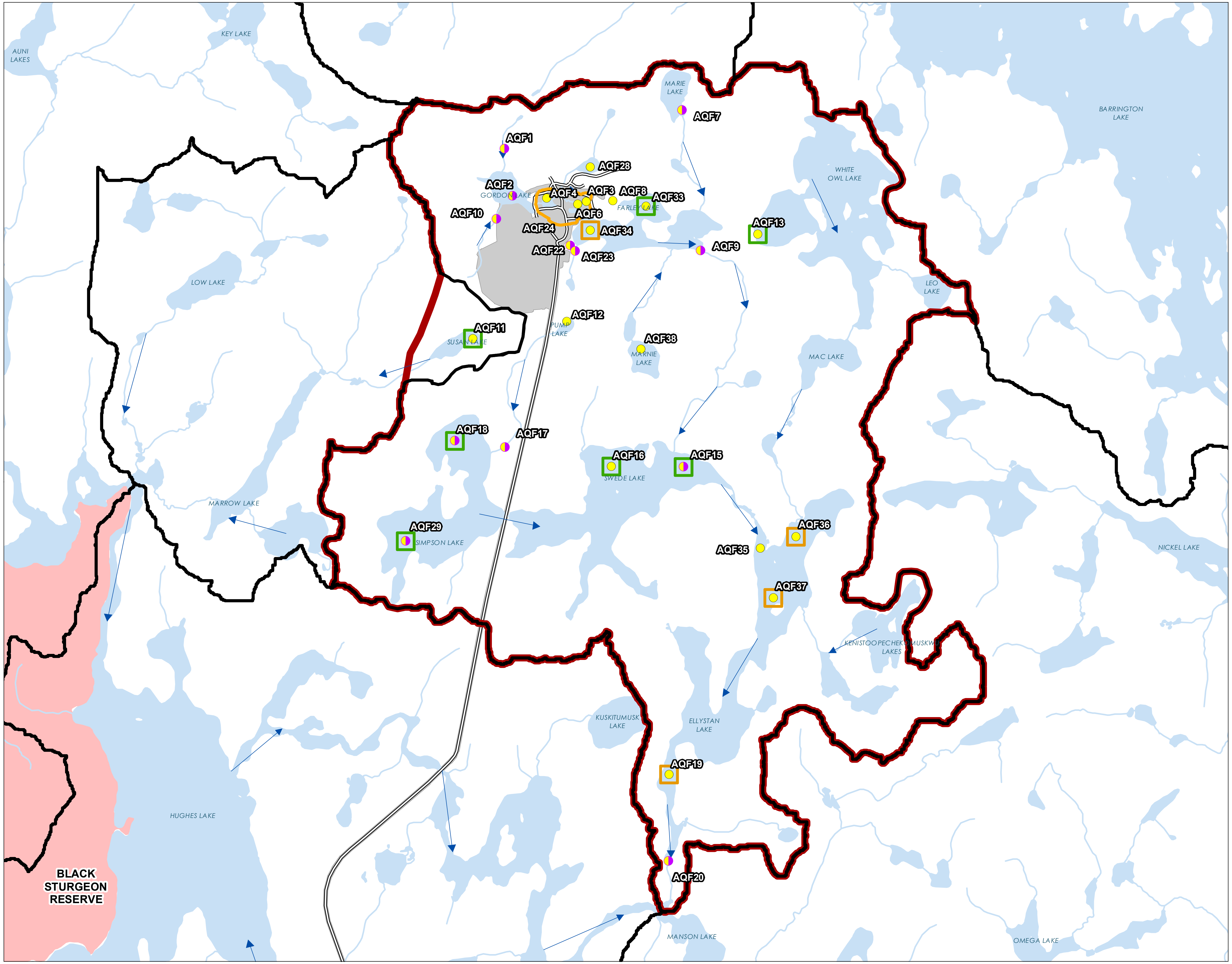
Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
5

Title

MacLellan Site Water Quality Sampling Locations



Stantec

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- Study Area
- Subwatersheds

Sample Locations
- Water Quality Sample
- Water Quality Sample and Hydrology Station
- Water Quality Sample from 2 to 4 metres Deep
- Water Quality Sample Deeper than 4 metres
- Surface Water Flow Direction

Landbase
- Access Road
- Watercourse
- Waterbody
- First Nation Reserve

N

0 1 2 Kilometres
1:55,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

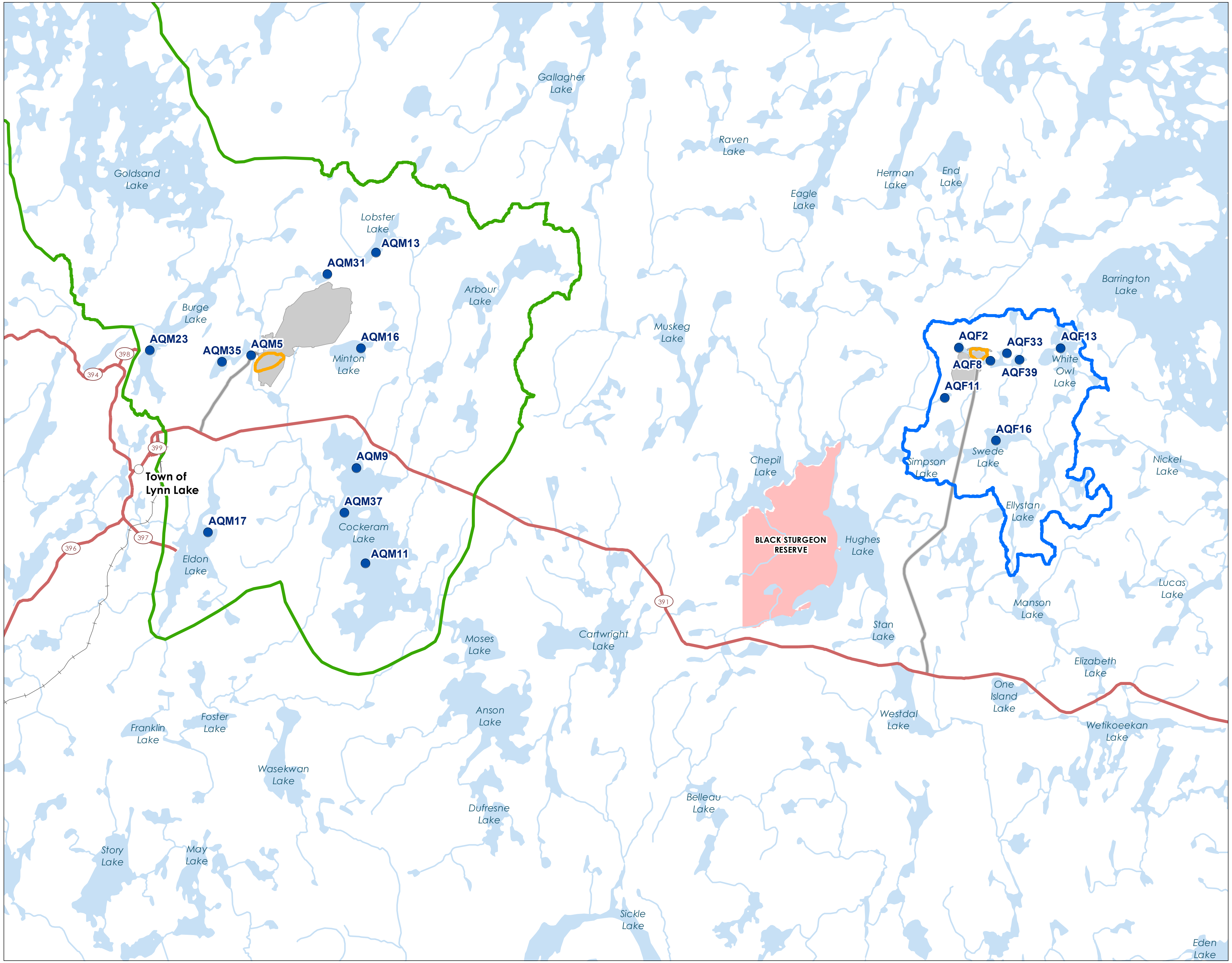
Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-24
Technical Review by TMcKnight-Whitford on 2020-04-24

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
6

Title
Gordon Site Water Quality Sampling Locations



Stantec

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- MacLellan Site Study
- Gordon Site Study

Sample Locations
- Fish Tissue Sampling Locations

Landbase
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake,
Manitoba

Prepared by ACampigotto on 2020-04-27
Technical Review by TMcKnight-Whitford on 2020-04-27

Client/Project 111473008

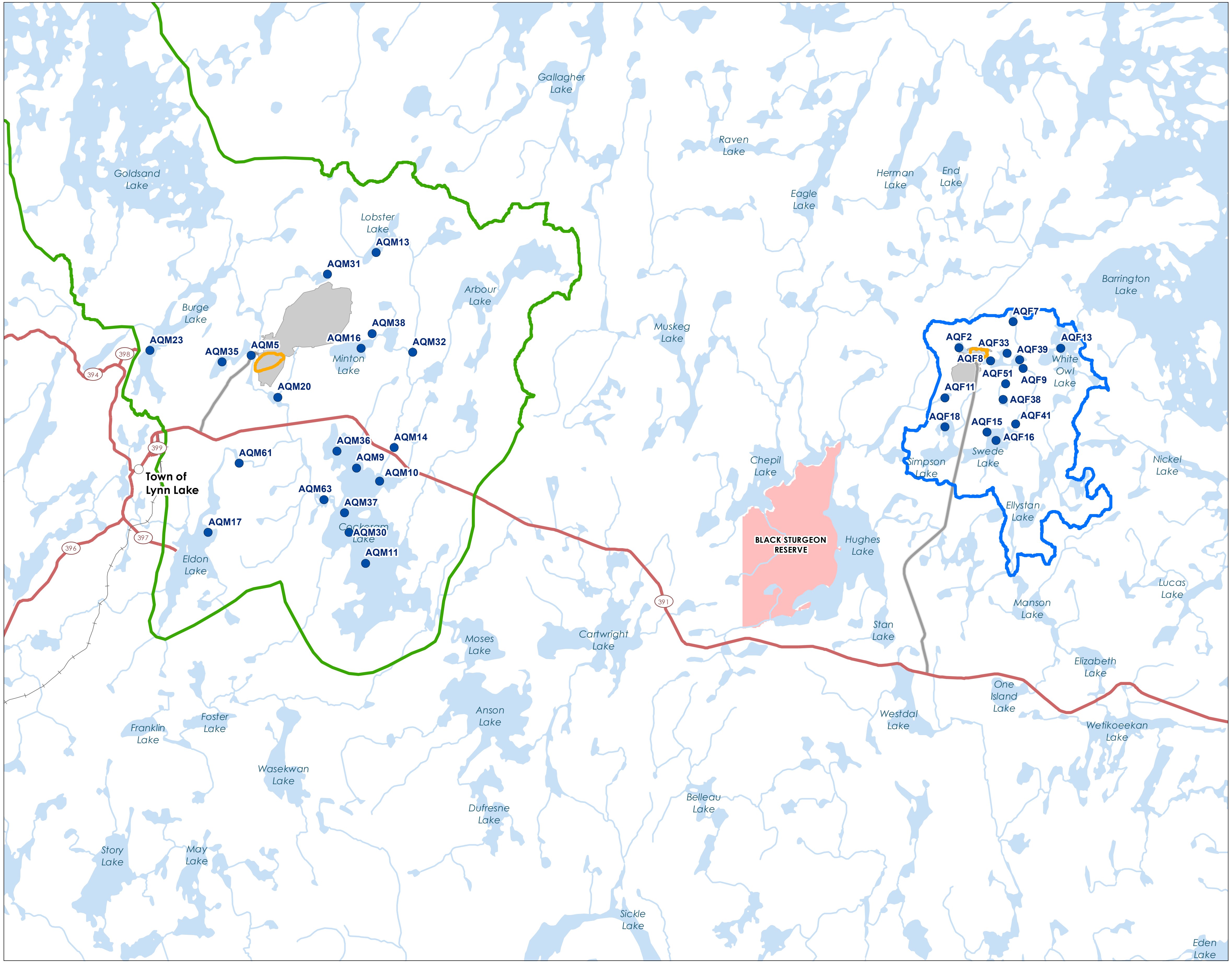
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
7

Title

MacLellan and Gordon Site
Fish Tissue Sampling Locations

\\Ca0045-pbagf01\gis_GIS_Project_Folder\111440293_AuRico\Figures\HHERA\TMR\TMR_Map7_FishTissueSampling_20200427.mxd Revised: 2020-04-27 By: ACampigotto



Stantec

Project Infrastructure

- Proposed Open Pit
- Project Development Area

Study Area

- MacLellan Site Study Area
- Gordon Site Study Area

Sample Locations

- Sediment Sampling Locations

Landbase

- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:175,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake,
Manitoba

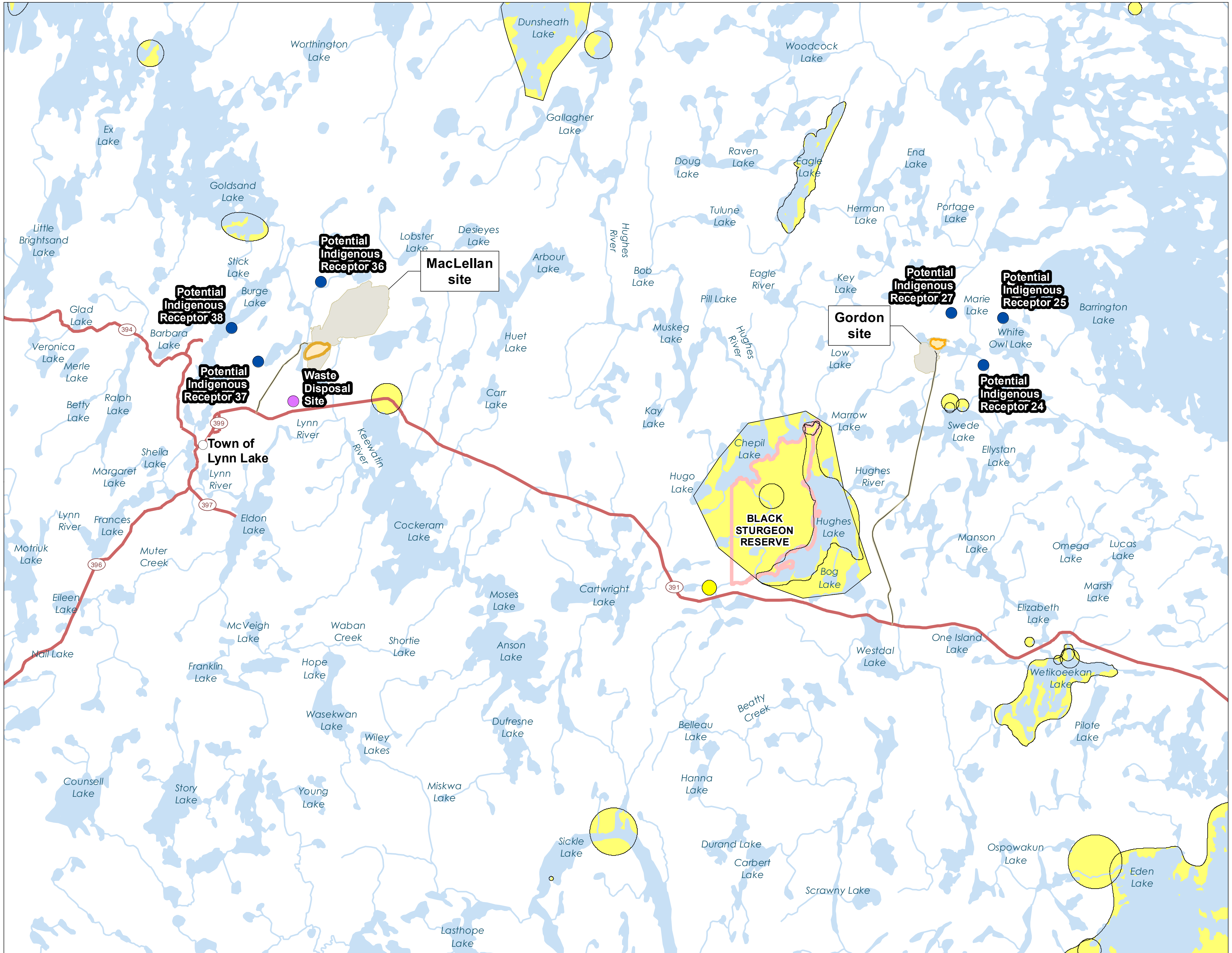
Prepared by ACampigotto on 2020-04-27
Technical Review by TMcKnight-Whitford on 2020-04-27

Client/Project 111473008

ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
8

Title
MacLellan and Gordon Site Sediment Quality Sampling Locations



Stantec

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Receptor Type
- Land Use Site
- Potential Indigenous Receptors

Survey Locations
- Habitation Area

Landbase
- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2.5 5 Kilometres

(At original document size of 11x17)
1:200,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2020-04-24
Technical Review by TMcKnight-Whitford on 2020-04-24

Client/Project 111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

Map No.
9

Title
Special Receptor Locations with Occasional 1-Hour NO_2 Exceedances

Appendix B BASELINE DATA

APPENDIX B
BASELINE DATA

APPENDIX B.1
BASELINE DATA FOR SOIL

Baseline Data for Surface Soil

Sample Name		MHHERA36-SS-1	MHHERA95-SS-1	MHHERA95-SS-1	MHHERA77-SS-1	MHHERA86-SS-1	MHHERA45-SS-1	MHHERA79-SS-1	MHHERA53-SS-1	MHHERA88-SS-1	MHHERA88-SS-1	MHHERA73-SS-1
Sample Type				Field Duplicate							Lab Dup	
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016
Laboratory Sample ID	Units	L1810653-1	L1810653-8	L1810653-8	L1810653-10	L1810653-18	L1810653-30	L1810653-34	L1810653-38	L1810653-42	L1810653-42	L1810653-47
Aluminum	mg/kg	4410	2100	2100	1580	880	944	3740	479	898	898	3130
Arsenic	mg/kg	2.47	0.8	0.8	0.62	0.73	1.45	0.95	0.52	0.43	0.43	0.73
Barium	mg/kg	44.9	63.2	63.2	36.5	27.6	27.8	49.1	6.2	13.4	13.4	81
Beryllium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	0.14
Cadmium	mg/kg	0.52	0.263	0.263	0.304	0.505	0.443	0.345	0.47	0.052	0.052	0.156
Chromium	mg/kg	26.6	3	3	2.7	<1	<1	3.4	<1	1.6	1.6	3.3
Cobalt	mg/kg	8.02	1.17	1.17	1.23	2.57	0.423	1.7	1.02	0.215	0.215	0.561
Copper	mg/kg	307	15.6	15.6	78.5	66.4	14.3	58.2	83	3.1	3.1	13.1
Lead	mg/kg	13.4	6.1	6.1	8.7	4.49	7.98	7.8	7.08	2.1	2.1	8.15
Manganese	mg/kg	54.3	20.7	20.7	19.2	158	29.6	15.1	31.7	12.9	12.9	26.4
Mercury	mg/kg	0.339	0.101	0.101	0.137	0.167	0.138	0.153	0.104	<0.05	<0.05	0.06
Molybdenum	mg/kg	0.204	0.236	0.236	0.211	0.239	0.5	0.252	0.075	0.057	0.057	0.224
Nickel	mg/kg	383	9.67	9.67	22.8	3.89	3.48	24.4	19.5	1.41	1.41	4.29
Selenium	mg/kg	0.95	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	0.21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	17.3	14.1	14.1	15.6	12.2	21.1	9.29	4.23	2.57	2.57	12.5
Thallium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	mg/kg	0.568	0.207	0.207	0.29	0.166	0.076	0.281	0.035	0.294	0.294	0.344
Vanadium	mg/kg	4.17	3.53	3.53	4.97	2.27	2.13	3.21	0.65	3.88	3.88	6.72
Zinc	mg/kg	123	20	20	55	55	32	46	110	<10	<10	13

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Surface Soil

Sample Name		FHHERA70-SS-1	FHHERA40-SS-1	FHHERA40-SS-1	FHHERA43-SS-1	FHHERA34-SS-1	FHHERA78-SS-1	FHHERA75-SS-1	FHHERA101-SS-1	FHHERA144-SS-1	FHHERA188-SS-1	FHHERA188-SS-1
Sample Type				Field Duplicate								Field Duplicate
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016
Laboratory Sample ID	Units	L1810653-52	L1810653-53	L1810653-53	L1810653-67	L1810653-72	L1810653-77	L1810653-83	L1810653-92	L1810653-100	L1810653-106	L1810653-106
Aluminum	mg/kg	1650	13800	13800	3720	456	2960	1940	345	346	417	417
Arsenic	mg/kg	1.3	1.48	1.48	0.86	0.53	0.71	0.56	1.03	0.61	0.68	0.68
Barium	mg/kg	13.8	93.1	93.1	45.2	25.7	37.7	44.4	10.7	20.8	17.6	17.6
Beryllium	mg/kg	<0.1	0.36	0.36	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/kg	0.025	0.055	0.055	0.121	0.141	0.17	0.143	0.215	0.138	0.139	0.139
Chromium	mg/kg	3.4	24.6	24.6	5.6	<1	3.8	1.6	<1	<1	<1	<1
Cobalt	mg/kg	0.448	6.73	6.73	1.43	0.512	0.477	0.765	0.205	0.264	0.255	0.255
Copper	mg/kg	1.2	9.9	9.9	6	4.7	8.3	5.2	1.3	<1	2.2	2.2
Lead	mg/kg	2.24	4.4	4.4	3.76	2.46	3.49	2	5.3	1.61	3.37	3.37
Manganese	mg/kg	18.8	189	189	58.9	76.2	17.4	35.8	15.7	8.18	9.82	9.82
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	0.088	0.117	0.063	0.101	0.062	0.092	0.092
Molybdenum	mg/kg	0.124	0.355	0.355	0.672	19.3	2.82	0.437	0.11	0.204	0.354	0.354
Nickel	mg/kg	1	14.4	14.4	3	1.2	2.75	1.62	0.91	0.51	0.88	0.88
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	3.42	19	19	23.8	28.8	13.9	17	5.29	10.2	7.28	7.28
Thallium	mg/kg	<0.1	0.16	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	mg/kg	0.574	1.3	1.3	0.518	0.056	0.574	0.266	0.038	0.079	0.035	0.035
Vanadium	mg/kg	10.8	32.3	32.3	11.8	0.82	1.9	1.82	<0.5	<0.5	0.51	0.51
Zinc	mg/kg	<10	33	33	12	11	<10	10	<10	<10	<10	<10

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Surface Soil

Sample Name		FHHERA137-SS-1	FHHERA66-SS-1	FHHERA141-SS-1	FHHERA141-SS-1	FHHERA105-SS-1	FHHERA190-SS-1	FHHERA21-SS-1	FHHERA166-SS-1	FHHERA213-SS-1	FHHERA200-SS-1	FHHERA194-SS-1
Sample Type					Lab Dup							
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016
Laboratory Sample ID	Units	L1810653-108	L1810653-114	L1810653-119	L1810653-119	L1810653-120	L1810653-125	L1812812-1	L1812812-6	L1812812-11	L1812812-17	L1812812-21
Aluminum	mg/kg	1690	27900	1120	1120	4610	324	2370	1440	640	114	3620
Arsenic	mg/kg	0.38	2.77	0.42	0.42	0.88	0.37	0.88	0.58	0.82	0.2	1.06
Barium	mg/kg	15.7	155	7.67	7.67	23	17.1	17.4	16.4	19.5	7.36	39.6
Beryllium	mg/kg	<0.1	0.78	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/kg	0.083	0.177	<0.02	<0.02	0.034	0.081	0.041	0.209	0.119	0.083	0.419
Chromium	mg/kg	2.7	40.9	5.1	5.1	6.8	<1	5.3	1.2	<1	<1	<1
Cobalt	mg/kg	0.389	7.49	0.533	0.533	2.06	0.619	0.79	0.464	0.444	0.085	7.37
Copper	mg/kg	1.2	19.9	1.1	1.1	10.7	1.5	2.3	2.8	1.9	1.1	30
Lead	mg/kg	1.8	11.1	1.42	1.42	2.48	1.36	2.28	0.71	1.76	0.92	3.71
Manganese	mg/kg	11.6	135	20.7	20.7	66.9	22	25.3	2.4	5.42	50.9	18.1
Mercury	mg/kg	<0.05	0.071	<0.05	<0.05	<0.05	0.054	---	---	---	---	---
Molybdenum	mg/kg	0.086	0.591	0.129	0.129	0.366	0.13	0.562	0.593	0.919	0.031	0.129
Nickel	mg/kg	0.92	21.3	0.95	0.95	3.37	1.06	1.75	1.13	1.34	<0.5	3.24
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	4.38	38.2	1.95	1.95	6.52	33.1	3.18	10.8	9.99	4.71	15.2
Thallium	mg/kg	<0.1	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	mg/kg	0.359	1.17	0.465	0.465	0.652	0.046	0.52	0.269	0.433	<0.02	0.207
Vanadium	mg/kg	4.74	38.1	14.4	14.4	14.5	0.85	12.1	1	1.1	<0.5	0.82
Zinc	mg/kg	<10	53	<10	<10	13	<10	<10	<10	<10	10	21

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Surface Soil

Sample Name		FHHERA162-SS-1	MHHERA209-SS-1	MHHERA190-SS-1	MHHERA190-SS-1	MHHERA186-SS-1	MHHERA182-SS-1	MHHERA137-SS-1	MHHERA126-SS-1	MHHERA156-SS-1	MHHERA220-SS-1	MHHERA118-SS-1
Sample Type					Field Duplicate							
Sampling Area		Gordon Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Aug 8, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016
Laboratory Sample ID	Units	L1812812-25	L1812812-30	L1812812-35	L1812812-35	L1812812-45	L1812812-50	L1812812-54	L1812812-58	L1812812-63	L1812812-68	L1812812-72
Aluminum	mg/kg	323	573	356	356	3740	3240	684	567	3080	1160	4180
Arsenic	mg/kg	1.29	0.46	0.56	0.56	0.79	0.55	0.51	0.49	3.68	0.53	0.84
Barium	mg/kg	10.7	7.47	13.2	13.2	18.5	9.62	11.7	15.7	65.5	4.76	13.2
Beryllium	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1
Cadmium	mg/kg	0.259	<0.02	0.194	0.194	0.023	<0.02	0.147	0.168	0.491	<0.02	0.021
Chromium	mg/kg	<1	2	<1	<1	6.5	3.8	<1	<1	4.1	2	4.4
Cobalt	mg/kg	0.26	0.154	0.86	0.86	1.1	0.463	0.394	0.778	4.75	0.173	0.383
Copper	mg/kg	1.8	<1	3	3	2.1	<1	3.4	4.9	16.3	<1	1.2
Lead	mg/kg	2.51	1.48	2.78	2.78	2.76	2.28	1.5	1.79	6.93	1.43	3.27
Manganese	mg/kg	37.3	14.2	96.1	96.1	28.1	19.6	5.38	54.6	66.8	11.1	17.7
Mercury	mg/kg	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg	0.09	0.057	0.084	0.084	0.14	0.089	0.127	0.247	1.67	0.06	0.123
Nickel	mg/kg	0.79	<0.5	2.41	2.41	3.28	1.05	2.79	3.12	10.2	<0.5	0.88
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	9.29	1.2	11.1	11.1	2.68	1.33	14.6	23.6	25.1	1.12	1.64
Thallium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	<0.1	<0.1
Uranium	mg/kg	0.021	0.667	0.026	0.026	0.589	0.651	0.063	0.038	0.484	0.389	0.84
Vanadium	mg/kg	<0.5	4.82	<0.5	<0.5	8.74	7.66	<0.5	0.54	13.6	5.22	9.53
Zinc	mg/kg	16	<10	18	18	<10	<10	<10	21	16	<10	<10

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Surface Soil

Sample Name		MHHERA4-SS-1	MHHERA9-SS-1	MHHERA36E-SS-1	FHHERA038-SS-1 SOIL	MHHERA060-SS-1 SOIL	MHHERA048-SS-1 SOIL	FHHERA039-SS-1 SOIL	FHHERA039-SS-1 SOIL	HWYHHERA 30-SS-1	HWYHHERA 26-SS-1	HWYHHERA 10-SS-1
Sample Type									Lab Dup			
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Gordon Region	Maclellan Region	Maclellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 21, 2015	Aug 25, 2015	Aug 23, 2015	Aug 21, 2015	Aug 21, 2015	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1812812-82	L1812812-87	L1812812-88	L1664180-9	L1664192-1	L1664195-5	L1664195-10	L1664195-10	L1809052-1	L1809052-6	L1809052-11
Aluminum	mg/kg	3200	991	781	4180	1750	1590	9050	9050	4360	1820	2040
Arsenic	mg/kg	0.75	0.76	0.43	0.73	0.59	0.4	1.08	1.08	1.73	1.05	0.59
Barium	mg/kg	13.8	22	24.4	12.7	12.9	8.06	41.1	41.1	56.9	67.2	22.3
Beryllium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.25	0.25	0.12	<0.1	<0.1
Cadmium	mg/kg	0.037	0.13	0.208	0.033	0.026	<0.02	0.045	0.045	0.205	0.345	0.105
Chromium	mg/kg	4.3	1.3	4	6.5	3.6	1.9	13.3	13.3	6.7	1.9	4.3
Cobalt	mg/kg	0.854	0.587	3.02	0.904	0.426	0.298	2.37	2.37	1.44	1.01	0.46
Copper	mg/kg	6.4	8.5	26	1.6	5.3	1.1	5.8	5.8	8.5	8.7	28.1
Lead	mg/kg	2.86	2.06	2.26	2.13	2.22	2.1	5.15	5.15	7.24	4.25	3.79
Manganese	mg/kg	25	10.5	94.5	22.7	14.4	10.4	50	50	44.2	54.8	22.5
Mercury	mg/kg	---	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	0.066	0.099	<0.05
Molybdenum	mg/kg	0.153	0.466	0.138	0.165	0.114	0.086	0.248	0.248	0.241	0.412	0.119
Nickel	mg/kg	5.07	9.17	37.3	1.84	2.86	0.88	5.67	5.67	4.8	3.47	1.64
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	2.33	9.65	27.8	3.06	1.54	1.26	4.52	4.52	13.5	24.1	3.17
Thallium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	0.11	<0.1	<0.1	<0.1
Uranium	mg/kg	0.632	0.18	0.039	0.398	0.418	0.34	0.603	0.603	0.47	0.173	0.319
Vanadium	mg/kg	7.15	1.05	0.99	14.1	5.82	3.59	20.9	20.9	7.38	3.57	8.44
Zinc	mg/kg	11	11	57	<10	<10	<10	19	19	13	<10	24

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Surface Soil

Sample Name		HWYHHERA 10-SS-1	HWYHHERA 6-SS-1	HWYHHERA 2-SS-1	HWYHHERA 14-SS-1	HWYHHERA 22-SS-1	HWYHHERA 22-SS-1	HWYHHERA 18-SS-1
Sample Type		Lab Dup					Field Duplicate	
Sampling Area		Gordon Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1809052-11	L1809052-16	L1809052-21	L1809052-25	L1809052-30	L1809052-30	L1809052-36
Aluminum	mg/kg	2040	5410	1320	990	3300	3300	1860
Arsenic	mg/kg	0.59	2	1.05	1.32	1.33	1.33	0.85
Barium	mg/kg	22.3	85.5	40.2	48.1	74.7	74.7	91.5
Beryllium	mg/kg	<0.1	0.18	<0.1	<0.1	0.26	0.26	<0.1
Cadmium	mg/kg	0.105	0.43	1.32	1.01	0.693	0.693	1.17
Chromium	mg/kg	4.3	7.9	1.1	<1	3.2	3.2	4.2
Cobalt	mg/kg	0.46	2.74	1.48	0.795	2.93	2.93	0.817
Copper	mg/kg	28.1	28.4	139	72.3	95.7	95.7	248
Lead	mg/kg	3.79	9.96	11.9	14	9.69	9.69	21.4
Manganese	mg/kg	22.5	50.5	53.1	370	159	159	26.3
Mercury	mg/kg	<0.05	0.133	0.177	0.198	0.237	0.237	0.2
Molybdenum	mg/kg	0.119	0.293	0.213	2.28	0.799	0.799	0.265
Nickel	mg/kg	1.64	6.38	5.01	2.85	5.05	5.05	3.14
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	0.19	0.19	0.14
Strontium	mg/kg	3.17	40.8	13.9	37.7	74	74	13.2
Thallium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	mg/kg	0.319	0.337	0.08	0.095	0.411	0.411	0.279
Vanadium	mg/kg	8.44	8.55	1.72	3.2	4.62	4.62	7.74
Zinc	mg/kg	24	56	208	77	76	76	163

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX B.2
BASELINE DATA FOR GARDEN SOIL

Baseline Data for Garden Soil

Sample Name		SZABO - SOIL POTATOES	PHILLIPS - SOIL	WATSON - SOIL FROM POTATOES	WATSON - SOIL FROM CARROTS	WATSON - SOIL FROM CARROTS	SZABO - SOIL W/ CARROTS	PHILLIPS - SOIL 2	HILDERBRANDT - SOIL - 1	HILDERBRANDT - SOIL - 2	HILDERBRANDT - SOIL - 2	SAULTER - SOIL - 1
Sample Type						Lab Dup					Lab Dup	
Sampling Area		Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake
DateSampled		Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 23, 2016	Sep 23, 2016	Sep 23, 2016	Sep 22, 2016
Laboratory Sample ID	Units	L1827796-1	L1827796-3	L1827796-6	L1827796-8	L1827796-8	L1827796-11	L1827796-12	L1837591-1	L1837591-2	L1837591-2	L1837591-5
Aluminum	mg/kg	4220	4240	4340	6020	6020	3890	4760	8080	8220	8220	4350
Arsenic	mg/kg	3.5	1.26	3.84	2.7	2.7	3.21	4.06	4.37	4.85	4.85	1.68
Barium	mg/kg	104	49.1	46.3	73.5	73.5	114	48.3	118	132	132	78.5
Beryllium	mg/kg	0.16	0.13	0.14	0.22	0.22	0.13	0.13	0.39	0.4	0.4	0.15
Cadmium	mg/kg	0.312	0.068	0.368	0.313	0.313	0.319	0.096	0.524	0.56	0.56	0.324
Chromium	mg/kg	10.1	8.1	12.2	15.2	15.2	9.6	13	16.9	17.9	17.9	9.2
Cobalt	mg/kg	2.96	1.36	3.56	4.16	4.16	2.85	1.85	5.58	5.8	5.8	2.21
Copper	mg/kg	57	25.7	77.5	87	87	58.5	47.9	82	89.9	89.9	221
Lead	mg/kg	123	3.64	15.9	16	16	10.7	4.71	10.5	10.2	10.2	10.4
Manganese	mg/kg	448	41.1	99.4	207	207	445	87.3	450	498	498	167
Mercury	mg/kg	<0.05	<0.05	0.062	0.071	0.071	<0.05	<0.05	0.0624	0.0708	0.0708	0.0604
Molybdenum	mg/kg	0.33	0.422	0.579	0.753	0.753	0.319	0.343	0.5	0.51	0.51	0.416
Nickel	mg/kg	22.6	7.29	35.1	34.8	34.8	20.7	12.8	21.2	19.6	19.6	8.39
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.56	<0.5	0.54	0.54	0.64
Silver	mg/kg	0.22	<0.1	0.12	0.16	0.16	0.22	<0.1	0.12	0.13	0.13	0.32
Strontium	mg/kg	38.7	16.3	41.7	63.4	63.4	40.8	19.6	33.8	34.1	34.1	30.1
Thallium	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.16	0.16	0.16	<0.1
Uranium	mg/kg	0.929	0.778	1.2	2.1	2.1	0.781	0.585	1.42	1.24	1.24	1.49
Vanadium	mg/kg	10.1	8.69	11	15.7	15.7	9.32	9.96	25.2	26.1	26.1	10.7
Zinc	mg/kg	115	22	89	113	113	124	32	146	159	159	85

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Garden Soil

Sample Name		SAULTER - SOIL - 2
Sample Type		
Sampling Area		Town of Lynn Lake
DateSampled		Sep 22, 2016
Laboratory Sample ID	Units	L1837591-6
Aluminum	mg/kg	5400
Arsenic	mg/kg	1.96
Barium	mg/kg	81.6
Beryllium	mg/kg	0.18
Cadmium	mg/kg	0.383
Chromium	mg/kg	11.3
Cobalt	mg/kg	2.82
Copper	mg/kg	200
Lead	mg/kg	10.7
Manganese	mg/kg	141
Mercury	mg/kg	0.0807
Molybdenum	mg/kg	0.575
Nickel	mg/kg	10.5
Selenium	mg/kg	0.57
Silver	mg/kg	0.29
Strontium	mg/kg	29.1
Thallium	mg/kg	<0.1
Uranium	mg/kg	1.94
Vanadium	mg/kg	12.6
Zinc	mg/kg	98

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX B.3
BASELINE DATA FOR BERRIES

Baseline Data for Berries

Sample Name		MHHERA95-BV-1	MHHERA95-BV-1	MHHERA86-BV-1	MHHERA86-BV-2	MHHERA36-BV-1	MHHERA36-BV-1	MHHERA77-BV-1	MHHERA53-BV-1	MHHERA79-BV-1	MHHERA45-BV-1	MHHERA88-BV-1
Sample Type			Field Duplicate				Field Duplicate					
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016
Laboratory Sample ID	Units	L1810653-3	L1810653-3	L1810653-16	L1810653-17	L1810653-23	L1810653-23	L1810653-26	L1810653-27	L1810653-32	L1810653-37	L1810653-41
Aluminum	mg/kg ww	0.425	0.425	0.8496	1.1316	1.332	1.332	1.4276	0.4556	1.2876	0.5655	1.005
Arsenic	mg/kg ww	<0.00625	<0.00625	<0.0118	<0.0082	<0.0074	<0.0074	<0.0086	<0.0067	0076642857142	<0.00725	<0.0075
Barium	mg/kg ww	<0.025	<0.025	<0.0472	1.02008	1.16328	1.16328	4.1796	<0.0268	3.019728571	1.508	2.385
Beryllium	mg/kg ww	<0.00625	<0.00625	<0.0118	<0.0082	<0.0074	<0.0074	<0.0086	<0.0067	0076642857142	<0.00725	<0.0075
Cadmium	mg/kg ww	0.064875	0.064875	0.08142	0.012792	<0.00296	<0.00296	<0.00344	0.05494	030657142857	0.05713	<0.003
Chromium	mg/kg ww	<0.0625	<0.0625	<0.118	<0.082	<0.074	<0.074	<0.086	<0.067	076642857142	<0.0725	<0.075
Cobalt	mg/kg ww	<0.0125	<0.0125	<0.0236	<0.0164	<0.0148	<0.0148	<0.0172	<0.0134	0153285714285	<0.0145	<0.015
Copper	mg/kg ww	1.10625	1.10625	1.12572	0.65764	0.43956	0.43956	0.70692	0.7839	0.685187143	0.5626	0.4605
Lead	mg/kg ww	<0.025	<0.025	<0.0472	<0.0328	<0.0296	<0.0296	<0.0344	<0.0268	0306571428571	<0.029	<0.03
Manganese	mg/kg ww	7.4	7.4	37.052	27.88	52.392	52.392	55.728	4.221	18.85414286	22.62	13.86
Mercury	mg/kg ww	<0.00625	<0.00625	<0.0118	<0.0082	<0.0074	<0.0074	<0.0086	<0.0067	0076642857142	<0.00725	<0.0075
Molybdenum	mg/kg ww	0.044625	0.044625	0.072924	<0.0082	<0.0074	<0.0074	<0.0086	0.022914	0076642857142	0.02059	0.0207
Nickel	mg/kg ww	1.05375	1.05375	0.51448	0.17712	1.31276	1.31276	0.73616	1.0452	0.449127143	0.1102	0.1665
Selenium	mg/kg ww	<0.0625	<0.0625	<0.118	<0.082	<0.074	<0.074	<0.086	<0.067	076642857142	<0.0725	<0.075
Silver	mg/kg ww	<0.0125	<0.0125	<0.0236	<0.0164	<0.0148	<0.0148	<0.0172	<0.0134	0153285714285	<0.0145	<0.015
Strontium	mg/kg ww	0.103	0.103	0.08614	0.10086	0.095312	0.095312	0.98556	0.13802	0.74037	0.1769	0.522
Thallium	mg/kg ww	<0.00375	<0.00375	<0.00708	<0.00492	<0.00444	<0.00444	<0.00516	<0.00402	045985714285	<0.00435	<0.0045
Uranium	mg/kg ww	<0.00125	<0.00125	<0.00236	<0.00164	<0.00148	<0.00148	<0.00172	<0.00134	015328571428	<0.00145	<0.0015
Vanadium	mg/kg ww	<0.0625	<0.0625	<0.118	<0.082	<0.074	<0.074	<0.086	<0.067	076642857142	<0.0725	<0.075
Zinc	mg/kg ww	3.625	3.625	6.254	3.198	0.962	0.962	1.548	3.5912	1.241614286	2.4795	0.78
Moisture Content	%	87.5	87.5	76.4	83.6	85.2	85.2	82.8	86.6	---	85.5	85

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Berries

Sample Name		MHHERA73-BV-1	FHHERA70-BV-1	FHHERA40-BV-1	FHHERA40-BV-1	FHHERA43-BV-1	FHHERA34-BV-2	FHHERA34-BV-1	FHHERA78-BV-1	FHHERA75-BV-2	FHHERA75-BV-1	FHHERA188-BV-1
Sample Type					Field Duplicate							
Sampling Area		MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 5, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 7, 2016
Laboratory Sample ID	Units	L1810653-43	L1810653-48	L1810653-55	L1810653-55	L1810653-66	L1810653-70	L1810653-71	L1810653-75	L1810653-81	L1810653-82	L1810653-84
Aluminum	mg/kg ww	0.8636	<0.435	1.0653	1.0653	1.3068	<0.336	0.9088	0.629	0.4256	1.0858	<0.627
Arsenic	mg/kg ww	<0.00635	<0.00725	<0.00795	<0.00795	<0.0066	<0.0056	<0.0071	<0.00925	<0.0056	<0.0061	<0.01045
Barium	mg/kg ww	2.9464	0.203	3.3231	3.3231	1.518	1.624	3.0956	0.0777	1.5904	1.3176	<0.0418
Beryllium	mg/kg ww	<0.00635	<0.00725	<0.00795	<0.00795	<0.0066	<0.0056	<0.0071	<0.00925	<0.0056	<0.0061	<0.01045
Cadmium	mg/kg ww	<0.00254	<0.0029	<0.00318	<0.00318	0.025344	0.002352	<0.00284	0.029045	0.002912	0.022814	0.047443
Chromium	mg/kg ww	<0.0635	<0.0725	<0.0795	<0.0795	<0.066	<0.056	<0.071	<0.0925	<0.056	<0.061	<0.1045
Cobalt	mg/kg ww	<0.0127	<0.0145	<0.0159	<0.0159	<0.0132	<0.0112	<0.0142	<0.0185	<0.0112	<0.0122	<0.0209
Copper	mg/kg ww	0.51562	0.0551	0.52311	0.52311	0.41712	0.44688	0.55948	0.5587	0.53872	0.35746	0.64372
Lead	mg/kg ww	<0.0254	<0.029	<0.0318	<0.0318	<0.0264	<0.0224	<0.0284	<0.037	<0.0224	<0.0244	<0.0418
Manganese	mg/kg ww	18.415	0.87	40.227	40.227	11.3124	43.68	14.91	10.4525	60.816	9.1012	5.7475
Mercury	mg/kg ww	<0.00635	<0.00725	<0.00795	<0.00795	<0.0066	<0.0056	<0.0071	<0.00925	<0.0056	<0.0061	<0.01045
Molybdenum	mg/kg ww	0.014097	<0.00725	0.021306	0.021306	0.018612	0.13888	0.09585	0.3256	<0.0056	0.019154	0.111188
Nickel	mg/kg ww	0.17399	<0.0725	0.10653	0.10653	0.07524	<0.056	0.11644	0.18685	<0.056	0.0793	0.46398
Selenium	mg/kg ww	<0.0635	<0.0725	<0.0795	<0.0795	<0.066	<0.056	<0.071	<0.0925	<0.056	<0.061	<0.1045
Silver	mg/kg ww	<0.0127	<0.0145	<0.0159	<0.0159	<0.0132	<0.0112	<0.0142	<0.0185	<0.0112	<0.0122	<0.0209
Strontium	mg/kg ww	0.30226	0.01885	0.18603	0.18603	0.17556	0.12544	0.19312	0.121545	0.07896	0.14762	0.127699
Thallium	mg/kg ww	<0.00381	<0.00435	<0.00477	<0.00477	<0.00396	<0.00336	<0.00426	<0.00555	<0.00336	<0.00366	<0.00627
Uranium	mg/kg ww	<0.00127	<0.00145	<0.00159	<0.00159	<0.00132	<0.00112	<0.00142	<0.00185	<0.00112	<0.00122	<0.00209
Vanadium	mg/kg ww	<0.0635	<0.0725	<0.0795	<0.0795	<0.066	<0.056	<0.071	<0.0925	<0.056	<0.061	<0.1045
Zinc	mg/kg ww	0.9525	<0.145	1.0494	1.0494	2.1384	1.3216	1.0082	4.6805	1.288	1.9398	4.5771
Moisture Content	%	87.3	85.5	84.1	84.1	86.8	88.8	85.8	81.5	88.8	87.8	79.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Berries

Sample Name		FHHERA188-BV-1	FHHERA101-BV-1	FHHERA101-BV-1	FHHERA141-BV-1	FHHERA144-BV-1	FHHERA144-BV-2	FHHERA137-BV-1	FHHERA137-BV-2	FHHERA66-BV-1	FHHERA105-BV-1	FHHERA190-BV-1
Sample Type		Field Duplicate		Lab Dup								
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016
Laboratory Sample ID	Units	L1810653-84	L1810653-93	L1810653-93	L1810653-96	L1810653-101	L1810653-102	L1810653-109	L1810653-110	L1810653-115	L1810653-121	L1810653-126
Aluminum	mg/kg ww	<0.627	0.7144	0.7144	1.2425	1.104	<0.336	0.4142	1.6956	<0.342	1.5456	<0.36
Arsenic	mg/kg ww	<0.01045	<0.0076	<0.0076	<0.00875	<0.0069	<0.0056	<0.00545	<0.00785	<0.0057	<0.00805	<0.006
Barium	mg/kg ww	<0.0418	<0.0304	<0.0304	2.905	0.95772	1.9488	1.5914	2.4649	2.1546	3.0429	1.416
Beryllium	mg/kg ww	<0.01045	<0.0076	<0.0076	<0.00875	<0.0069	<0.0056	<0.00545	<0.00785	<0.0057	<0.00805	<0.006
Cadmium	mg/kg ww	0.047443	0.032984	0.032984	<0.0035	0.043746	0.003136	0.002507	<0.00314	0.003078	<0.00322	<0.0024
Chromium	mg/kg ww	<0.1045	<0.076	<0.076	<0.0875	<0.069	<0.056	<0.0545	<0.0785	<0.057	<0.0805	<0.06
Cobalt	mg/kg ww	<0.0209	<0.0152	<0.0152	<0.0175	<0.0138	<0.0112	<0.0109	<0.0157	<0.0114	<0.0161	<0.012
Copper	mg/kg ww	0.64372	0.34504	0.34504	0.71575	0.41124	0.52304	0.42074	0.50711	0.55632	0.60053	0.4692
Lead	mg/kg ww	<0.0418	<0.0304	<0.0304	<0.035	<0.0276	<0.0224	<0.0218	<0.0314	<0.0228	<0.0322	<0.024
Manganese	mg/kg ww	5.7475	21.736	21.736	18.55	9.1218	62.832	62.239	38.308	60.876	49.749	47.4
Mercury	mg/kg ww	<0.01045	<0.0076	<0.0076	<0.00875	<0.0069	<0.0056	<0.00545	<0.00785	<0.0057	<0.00805	<0.006
Molybdenum	mg/kg ww	0.111188	<0.0076	<0.0076	0.019425	0.01725	0.006272	<0.00545	<0.00785	<0.0057	0.009338	0.01224
Nickel	mg/kg ww	0.46398	0.1748	0.1748	0.1365	<0.069	<0.056	<0.0545	0.14444	<0.057	0.11753	<0.06
Selenium	mg/kg ww	<0.1045	<0.076	<0.076	<0.0875	<0.069	<0.056	<0.0545	<0.0785	<0.057	<0.0805	<0.06
Silver	mg/kg ww	<0.0209	<0.0152	<0.0152	<0.0175	<0.0138	<0.0112	<0.0109	<0.0157	<0.0114	<0.0161	<0.012
Strontium	mg/kg ww	0.127699	0.02888	0.02888	0.15925	0.09798	0.092176	0.082513	0.52595	0.24624	0.25277	0.1656
Thallium	mg/kg ww	<0.00627	<0.00456	<0.00456	<0.00525	<0.00414	<0.00336	<0.00327	<0.00471	<0.00342	<0.00483	<0.0036
Uranium	mg/kg ww	<0.00209	<0.00152	<0.00152	<0.00175	<0.00138	<0.00112	<0.00109	<0.00157	<0.00114	<0.00161	<0.0012
Vanadium	mg/kg ww	<0.1045	<0.076	<0.076	<0.0875	<0.069	<0.056	<0.0545	<0.0785	<0.057	<0.0805	<0.06
Zinc	mg/kg ww	4.5771	3.3136	3.3136	1.1025	2.1252	1.3888	1.2208	0.8478	1.3452	1.0626	1.488
Moisture Content	%	79.1	84.8	84.8	82.5	86.2	88.8	89.1	84.3	88.6	83.9	88

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Berries

Sample Name		FHHERA21-BV-1	FHHERA166-BV-1	FHHERA213-BV-1	FHHERA213-BV-2	FHHERA200-BV-1	FHHERA194-BV-1	FHHERA162-BV-1	MHHERA209-BV-1	MHHERA190-BV-1	MHHERA190-BV-1	MHHERA186-BV-1
Sample Type											Field Duplicate	
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016
Laboratory Sample ID	Units	L1812812-2	L1812812-7	L1812812-12	L1812812-13	L1812812-18	L1812812-22	L1812812-26	L1812812-31	L1812812-37	L1812812-37	L1812812-46
Aluminum	mg/kg ww	1.422	0.682	1.1172	<0.345	<0.477	<0.492	<0.708	0.858	0.4107	0.4107	1.1856
Arsenic	mg/kg ww	<0.009	<0.0062	<0.00735	<0.00575	<0.00795	<0.0082	<0.0118	<0.0078	<0.00555	<0.00555	<0.0076
Barium	mg/kg ww	2.538	0.67828	3.1164	2.0125	0.04134	<0.0328	<0.0472	2.5272	1.2654	1.2654	2.2952
Beryllium	mg/kg ww	<0.009	<0.0062	<0.00735	<0.00575	<0.00795	<0.0082	<0.0118	<0.0078	<0.00555	<0.00555	<0.0076
Cadmium	mg/kg ww	<0.0036	0.024304	<0.00294	0.00322	0.040386	0.085116	0.061596	<0.00312	0.002553	0.002553	<0.00304
Chromium	mg/kg ww	<0.09	<0.062	<0.0735	<0.0575	<0.0795	<0.082	<0.118	<0.078	<0.0555	<0.0555	<0.076
Cobalt	mg/kg ww	<0.018	<0.0124	<0.0147	<0.0115	<0.0159	0.06068	<0.0236	<0.0156	<0.0111	<0.0111	<0.0152
Copper	mg/kg ww	0.5184	0.4092	0.59094	0.5106	0.70755	1.41696	0.97704	0.46488	0.43401	0.43401	0.55632
Lead	mg/kg ww	<0.036	<0.0248	<0.0294	<0.023	<0.0318	<0.0328	<0.0472	<0.0312	<0.0222	<0.0222	<0.0304
Manganese	mg/kg ww	30.42	16.244	57.477	56.81	10.7484	13.12	22.0424	106.08	55.944	55.944	40.128
Mercury	mg/kg ww	<0.009	<0.0062	<0.00735	<0.00575	<0.00795	<0.0082	<0.0118	<0.0078	<0.00555	<0.00555	<0.0076
Molybdenum	mg/kg ww	0.2556	0.007564	0.013524	0.013225	0.067416	<0.0082	0.039648	0.010296	<0.00555	<0.00555	0.01216
Nickel	mg/kg ww	<0.09	0.08308	0.15729	<0.0575	0.18603	0.39524	0.42716	0.10608	0.0888	0.0888	0.228
Selenium	mg/kg ww	<0.09	<0.062	<0.0735	<0.0575	<0.0795	<0.082	<0.118	<0.078	<0.0555	<0.0555	<0.076
Silver	mg/kg ww	<0.018	<0.0124	<0.0147	<0.0115	<0.0159	<0.0164	<0.0236	<0.0156	<0.0111	<0.0111	<0.0152
Strontium	mg/kg ww	0.14022	0.111724	0.441	0.1955	0.056445	0.12054	0.09322	0.2652	0.069597	0.069597	0.22952
Thallium	mg/kg ww	<0.0054	<0.00372	<0.00441	<0.00345	<0.00477	<0.00492	<0.00708	<0.00468	<0.00333	<0.00333	<0.00456
Uranium	mg/kg ww	<0.0018	<0.00124	<0.00147	<0.00115	<0.00159	<0.00164	<0.00236	<0.00156	<0.00111	<0.00111	<0.00152
Vanadium	mg/kg ww	<0.09	<0.062	<0.0735	<0.0575	<0.0795	<0.082	<0.118	<0.078	<0.0555	<0.0555	<0.076
Zinc	mg/kg ww	0.846	2.2072	1.1613	1.3225	4.7541	4.3952	5.7584	0.9828	1.2654	1.2654	1.0184
Moisture Content	%	82	87.6	85.3	88.5	84.1	83.6	76.4	84.4	88.9	88.9	84.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Berries

Sample Name		MHHERA182-BV-1	MHHERA137-BV-1	MHHERA126-BV-1	MHHERA156-BV-1	MHHERA220-BV-1	MHHERA118-BV-1	MHHERA118-BV-2	MHHERA4-BV-1	MHHERA4-BV-2	MHHERA9-BV-1	MHHERA36E-BV-1
Sample Type												
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016
Laboratory Sample ID	Units	L1812812-51	L1812812-55	L1812812-59	L1812812-64	L1812812-69	L1812812-73	L1812812-74	L1812812-79	L1812812-81	L1812812-85	L1812812-90
Aluminum	mg/kg ww	0.8305	<0.435	<0.342	0.693	0.7905	0.5616	0.798	1.025	1.288	<0.381	0.3861
Arsenic	mg/kg ww	<0.00755	<0.00725	<0.0057	<0.00825	<0.00775	<0.0072	<0.007	<0.00625	<0.00805	<0.00635	<0.00585
Barium	mg/kg ww	2.2197	<0.029	1.311	<0.033	2.6195	0.03312	2.632	1.14625	3.1073	0.79883	1.287
Beryllium	mg/kg ww	<0.00755	<0.00725	<0.0057	<0.00825	<0.00775	<0.0072	<0.007	<0.00625	<0.00805	<0.00635	<0.00585
Cadmium	mg/kg ww	<0.00302	0.03161	<0.00228	0.046035	<0.0031	0.033984	<0.0028	0.01125	0.009499	0.004572	<0.00234
Chromium	mg/kg ww	<0.0755	<0.0725	<0.057	<0.0825	<0.0775	<0.072	<0.07	<0.0625	<0.0805	<0.0635	<0.0585
Cobalt	mg/kg ww	<0.0151	<0.0145	<0.0114	<0.0165	<0.0155	<0.0144	<0.014	<0.0125	<0.0161	<0.0127	<0.0117
Copper	mg/kg ww	0.55417	0.8323	0.6042	0.96855	0.5952	0.58464	0.5278	0.35625	0.69069	0.70485	0.55575
Lead	mg/kg ww	<0.0302	<0.029	<0.0228	<0.033	<0.031	<0.0288	<0.028	<0.025	<0.0322	<0.0254	<0.0234
Manganese	mg/kg ww	63.571	7.134	56.772	16.995	53.165	8.6544	21.84	5.875	71.001	41.529	44.577
Mercury	mg/kg ww	<0.00755	<0.00725	<0.0057	<0.00825	<0.00775	<0.0072	<0.007	<0.00625	<0.00805	<0.00635	<0.00585
Molybdenum	mg/kg ww	<0.00755	0.011745	0.015162	0.034815	0.012865	0.029232	<0.007	<0.00625	<0.00805	<0.00635	<0.00585
Nickel	mg/kg ww	0.34579	1.00195	0.07524	0.6138	0.1302	0.42336	0.1582	0.6675	0.37835	0.1524	0.19656
Selenium	mg/kg ww	<0.0755	<0.0725	<0.057	<0.0825	<0.0775	<0.072	<0.07	<0.0625	<0.0805	<0.0635	<0.0585
Silver	mg/kg ww	<0.0151	<0.0145	<0.0114	<0.0165	<0.0155	<0.0144	<0.014	<0.0125	<0.0161	<0.0127	<0.0117
Strontium	mg/kg ww	0.51491	0.055535	0.1311	0.076065	0.3472	0.111024	0.6328	0.26375	0.38962	0.069088	0.17316
Thallium	mg/kg ww	<0.00453	<0.00435	<0.00342	<0.00495	<0.00465	<0.00432	<0.0042	<0.00375	<0.00483	<0.00381	<0.00351
Uranium	mg/kg ww	<0.00151	<0.00145	<0.00114	<0.00165	<0.00155	<0.00144	<0.0014	<0.00125	<0.00161	<0.00127	<0.00117
Vanadium	mg/kg ww	<0.0755	<0.0725	<0.057	<0.0825	<0.0775	<0.072	<0.07	<0.0625	<0.0805	<0.0635	<0.0585
Zinc	mg/kg ww	1.1325	3.9585	1.2882	3.927	1.054	3.96	0.924	1.8625	1.771	1.5875	1.2987
Moisture Content	%	84.9	85.5	88.6	83.5	84.5	85.6	86	87.5	83.9	87.3	88.3

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Berries

Sample Name		FHHERA038-BV-1 BAY-BERRIES	MHHERA060-BV-1 BAG - BLUEBERRIES	MHHERA060-BV-1 BAG - BLUEBERRIES	MHHERA048-BV-1 BERRIES	FHHERA039-BV-1 BERRIES	HWYHHERA 30-BV-1	HWYHHERA 30-BV-1	HWYHHERA 26-BV-1	HWYHHERA 10-BV-1	HWYHHERA 6-BV-1	HWYHHERA 2-BV-1
Sample Type				Lab Dup				Field Duplicate				
Sampling Area		Gordon Region	MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	MacLellan Region	MacLellan Region
DateSampled		Aug 21, 2015	Aug 25, 2015	Aug 25, 2015	Aug 23, 2015	Aug 21, 2015	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1664180-7	L1664192-5	L1664192-5	L1664195-1	L1664195-6	L1809052-2	L1809052-2	L1809052-7	L1809052-12	L1809052-17	L1809052-22
Aluminum	mg/kg ww	0.716	1.5399	1.5399	0.9308	0.8372	12.8256	12.8256	0.4576	0.7381	0.4251	<0.456
Arsenic	mg/kg ww	<0.00895	<0.00885	<0.00885	<0.00895	<0.00805	<0.0192	<0.0192	<0.0044	<0.00605	<0.00545	<0.0076
Barium	mg/kg ww	4.1707	3.186	3.186	2.8103	2.1413	27.2256	27.2256	0.61864	1.8392	2.3762	0.03952
Beryllium	mg/kg ww	<0.00895	<0.00885	<0.00885	<0.00895	<0.00805	<0.0192	<0.0192	<0.0044	<0.00605	<0.00545	<0.0076
Cadmium	mg/kg ww	<0.00358	<0.00354	<0.00354	<0.00358	<0.00322	<0.00768	<0.00768	0.023936	<0.00242	0.003052	0.099408
Chromium	mg/kg ww	<0.0895	<0.0885	<0.0885	<0.0895	<0.0805	<0.192	<0.192	<0.044	<0.0605	<0.0545	<0.076
Cobalt	mg/kg ww	<0.0179	<0.0177	<0.0177	<0.0179	<0.0161	<0.0384	<0.0384	<0.0088	<0.0121	<0.0109	0.01824
Copper	mg/kg ww	0.66946	0.65313	0.65313	0.5907	0.44597	1.22496	1.22496	0.30448	0.50457	0.53301	1.51392
Lead	mg/kg ww	<0.0358	<0.0354	<0.0354	<0.0358	<0.0322	<0.0768	<0.0768	<0.0176	<0.0242	<0.0218	<0.0304
Manganese	mg/kg ww	7.2674	29.205	29.205	19.69	28.98	468.48	468.48	12.76	8.8693	60.386	12.9504
Mercury	mg/kg ww	<0.00179	<0.00177	<0.00177	<0.00179	<0.00161	<0.0192	<0.0192	<0.0044	<0.00605	<0.00545	<0.0076
Molybdenum	mg/kg ww	0.038664	<0.00885	<0.00885	0.026313	<0.00805	<0.0192	<0.0192	0.01144	0.010164	<0.00545	0.039064
Nickel	mg/kg ww	0.09845	0.4956	0.4956	0.15931	0.13202	0.44928	0.44928	0.08536	0.10043	0.06758	0.5624
Selenium	mg/kg ww	<0.0895	<0.0885	<0.0885	<0.0895	<0.0805	<0.192	<0.192	<0.044	<0.0605	<0.0545	<0.076
Silver	mg/kg ww	<0.0179	<0.0177	<0.0177	<0.0179	<0.0161	<0.0384	<0.0384	<0.0088	<0.0121	<0.0109	<0.0152
Strontium	mg/kg ww	0.42244	0.56994	0.56994	0.28103	0.16422	2.89152	2.89152	0.057024	0.31339	0.12426	0.2356
Thallium	mg/kg ww	<0.00537	<0.00531	<0.00531	<0.00537	<0.00483	<0.01152	<0.01152	<0.00264	<0.00363	<0.00327	<0.00456
Uranium	mg/kg ww	<0.00179	<0.00177	<0.00177	<0.00179	<0.00161	<0.00384	<0.00384	<0.00088	<0.00121	<0.00109	<0.00152
Vanadium	mg/kg ww	<0.0895	<0.0885	<0.0885	<0.0895	<0.0805	<0.192	<0.192	<0.044	<0.0605	<0.0545	<0.076
Zinc	mg/kg ww	1.1635	1.2921	1.2921	0.9666	0.8855	7.296	7.296	1.5488	0.8228	1.5151	5.6544
Moisture Content	%	82.1	82.3	82.3	82.1	83.9	61.6	61.6	91.2	87.9	89.1	84.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Berries

Sample Name		HWYHHERA 14-BV-1	HWYHHERA 14-BV-2	HWYHHERA 22-BV-1	HWYHHERA 18-BV-1
Sample Type					
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1809052-26	L1809052-27	L1809052-32	L1809052-37
Aluminum	mg/kg ww	0.8046	0.4032	0.8456	1.4742
Arsenic	mg/kg ww	<0.00745	<0.0063	<0.00755	<0.0081
Barium	mg/kg ww	0.06109	0.87948	1.08871	2.3814
Beryllium	mg/kg ww	<0.00745	<0.0063	<0.00755	<0.0081
Cadmium	mg/kg ww	0.053342	0.03906	0.043035	<0.00324
Chromium	mg/kg ww	<0.0745	<0.063	<0.0755	<0.081
Cobalt	mg/kg ww	0.0149	<0.0126	<0.0151	<0.0162
Copper	mg/kg ww	0.9834	0.46998	0.52548	0.73872
Lead	mg/kg ww	<0.0298	<0.0252	<0.0302	<0.0324
Manganese	mg/kg ww	15.794	9.9666	16.459	6.4152
Mercury	mg/kg ww	<0.00745	<0.0063	<0.00755	<0.0081
Molybdenum	mg/kg ww	0.098638	0.02205	<0.00755	<0.0081
Nickel	mg/kg ww	0.1639	0.09828	0.08154	0.16038
Selenium	mg/kg ww	<0.0745	<0.063	<0.0755	<0.081
Silver	mg/kg ww	<0.0149	<0.0126	<0.0151	<0.0162
Strontium	mg/kg ww	0.19817	0.21042	0.23707	2.6406
Thallium	mg/kg ww	<0.00447	<0.00378	<0.00453	<0.00486
Uranium	mg/kg ww	<0.00149	<0.00126	<0.00151	<0.00162
Vanadium	mg/kg ww	<0.0745	<0.063	<0.0755	<0.081
Zinc	mg/kg ww	4.6935	2.7846	2.718	1.2798
Moisture Content	%	85.1	87.4	84.9	83.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX B.4
BASELINE
DATA FOR
LABRADOR TEA

Baseline Data for Labrador tea

Sample Name		MHHERA95-LV-1	MHHERA95-LV-1	MHHERA77-LV-1	MHHERA86-LV-1	MHHERA36-LV-1	MHHERA36-LV-1	MHHERA53-LV-1	MHHERA79-LV-1	MHHERA45-LV-1	MHHERA88-LV-1	MHHERA73-LV-1
Sample Type			Field Duplicate				Lab Dup					
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016
Laboratory Sample ID	Units	L1810653-5	L1810653-5	L1810653-12	L1810653-13	L1810653-22	L1810653-22	L1810653-28	L1810653-31	L1810653-35	L1810653-39	L1810653-45
Aluminum	mg/kg ww	17.9402	17.9402	16.0225	15.5064	29.402	29.402	15.6648	22.3236	6.596	19.5525	13.0016
Arsenic	mg/kg ww	<0.0271	<0.0271	<0.02125	<0.02485	<0.0241	<0.0241	<0.0244	<0.02385	<0.0194	<0.02475	<0.0239
Barium	mg/kg ww	26.1786	26.1786	38.6325	28.329	29.5948	29.5948	17.08	53.901	34.0276	51.48	32.504
Beryllium	mg/kg ww	<0.0271	<0.0271	<0.02125	<0.02485	<0.0241	<0.0241	<0.0244	<0.02385	<0.0194	<0.02475	<0.0239
Cadmium	mg/kg ww	<0.01084	<0.01084	<0.0085	<0.00994	<0.00964	<0.00964	<0.00976	<0.00954	<0.00776	<0.0099	<0.00956
Chromium	mg/kg ww	<0.271	<0.271	<0.2125	<0.2485	<0.241	<0.241	<0.244	<0.2385	<0.194	<0.2475	<0.239
Cobalt	mg/kg ww	<0.0542	<0.0542	<0.0425	<0.0497	0.05302	0.05302	<0.0488	<0.0477	<0.0388	<0.0495	<0.0478
Copper	mg/kg ww	1.82112	1.82112	1.47475	1.43633	1.4942	1.4942	1.1712	1.54071	1.28816	1.5939	1.51526
Lead	mg/kg ww	<0.1084	<0.1084	<0.085	<0.0994	<0.0964	<0.0964	<0.0976	<0.0954	<0.0776	<0.099	<0.0956
Manganese	mg/kg ww	227.64	227.64	140.25	656.04	317.156	317.156	190.808	141.669	399.64	155.925	165.388
Mercury	mg/kg ww	<0.0271	<0.0271	<0.02125	<0.02485	<0.0241	<0.0241	<0.0244	<0.02385	<0.0194	<0.02475	<0.0239
Molybdenum	mg/kg ww	<0.0271	<0.0271	<0.02125	<0.02485	<0.0241	<0.0241	<0.0244	<0.02385	<0.0194	0.03069	<0.0239
Nickel	mg/kg ww	1.84822	1.84822	2.1505	0.43736	8.5796	8.5796	1.71776	4.0545	0.30652	0.97515	0.74568
Selenium	mg/kg ww	<0.271	<0.271	<0.2125	<0.2485	<0.241	<0.241	<0.244	<0.2385	<0.194	<0.2475	<0.239
Silver	mg/kg ww	<0.0542	<0.0542	<0.0425	<0.0497	<0.0482	<0.0482	<0.0488	<0.0477	<0.0388	<0.0495	<0.0478
Strontium	mg/kg ww	3.02436	3.02436	13.515	2.41045	4.72842	4.72842	2.0252	8.1567	1.98268	9.306	8.126
Thallium	mg/kg ww	<0.01626	<0.01626	0.0136	<0.01491	0.13255	0.13255	<0.01464	<0.01431	<0.01164	<0.01485	0.043976
Uranium	mg/kg ww	<0.00542	<0.00542	<0.00425	<0.00497	<0.00482	<0.00482	<0.00488	<0.00477	<0.00388	<0.00495	<0.00478
Vanadium	mg/kg ww	<0.271	<0.271	<0.2125	<0.2485	<0.241	<0.241	<0.244	<0.2385	<0.194	<0.2475	<0.239
Zinc	mg/kg ww	9.3224	9.3224	9.18	7.8526	9.0616	9.0616	7.564	9.5877	9.8552	9.0585	7.5524
Moisture Content	%	45.8	45.8	57.5	50.3	51.8	51.8	51.2	52.3	61.2	50.5	52.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Labrador tea

Sample Name		FHHERA70-LV-1	FHHERA40-LV-1	FHHERA40-LV-1	FHHERA43-LV-1	FHHERA78-LV-1	FHHERA78-LV-1	FHHERA75-LV-1	FHHERA188-LV-1	FHHERA188-LV-1	FHHERA101-LV-1	FHHERA101-LV-1
Sample Type				Field Duplicate			Lab Dup			Field Duplicate		Lab Dup
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016
Laboratory Sample ID	Units	L1810653-50	L1810653-58	L1810653-58	L1810653-64	L1810653-74	L1810653-74	L1810653-79	L1810653-86	L1810653-86	L1810653-94	L1810653-94
Aluminum	mg/kg ww	10.1806	6.4584	6.4584	11.198	11.5648	11.5648	16.2304	15.5288	15.5288	11.9448	11.9448
Arsenic	mg/kg ww	<0.02335	<0.0276	<0.0276	<0.02545	<0.0208	<0.0208	<0.0256	<0.0236	<0.0236	<0.0237	<0.0237
Barium	mg/kg ww	34.6047	34.9968	34.9968	34.5611	28.7456	28.7456	49.2544	26.7152	26.7152	24.8376	24.8376
Beryllium	mg/kg ww	<0.02335	<0.0276	<0.0276	<0.02545	<0.0208	<0.0208	<0.0256	<0.0236	<0.0236	<0.0237	<0.0237
Cadmium	mg/kg ww	<0.00934	<0.01104	<0.01104	<0.01018	<0.00832	<0.00832	<0.01024	<0.00944	<0.00944	<0.00948	<0.00948
Chromium	mg/kg ww	<0.2335	<0.276	<0.276	<0.2545	<0.208	<0.208	<0.256	<0.236	<0.236	<0.237	<0.237
Cobalt	mg/kg ww	<0.0467	<0.0552	<0.0552	<0.0509	<0.0416	<0.0416	<0.0512	<0.0472	<0.0472	<0.0474	<0.0474
Copper	mg/kg ww	1.67186	1.9596	1.9596	1.41502	1.27296	1.27296	1.19808	1.32632	1.32632	1.36038	1.36038
Lead	mg/kg ww	<0.0934	<0.1104	<0.1104	<0.1018	<0.0832	<0.0832	<0.1024	<0.0944	<0.0944	<0.0948	<0.0948
Manganese	mg/kg ww	115.349	249.504	249.504	318.634	162.24	162.24	366.08	258.184	258.184	365.928	365.928
Mercury	mg/kg ww	<0.02335	<0.0276	<0.0276	<0.02545	<0.0208	<0.0208	<0.0256	<0.0236	<0.0236	<0.0237	<0.0237
Molybdenum	mg/kg ww	0.025218	<0.0276	<0.0276	<0.02545	<0.0208	<0.0208	<0.0256	<0.0236	<0.0236	<0.0237	<0.0237
Nickel	mg/kg ww	0.45299	<0.276	<0.276	<0.2545	0.25792	0.25792	0.3584	0.31624	0.31624	<0.237	<0.237
Selenium	mg/kg ww	<0.2335	<0.276	<0.276	<0.2545	<0.208	<0.208	<0.256	<0.236	<0.236	<0.237	<0.237
Silver	mg/kg ww	<0.0467	<0.0552	<0.0552	<0.0509	<0.0416	<0.0416	<0.0512	<0.0472	<0.0472	<0.0474	<0.0474
Strontium	mg/kg ww	4.8101	3.48864	3.48864	4.65735	2.8288	2.8288	4.80256	2.14288	2.14288	1.6116	1.6116
Thallium	mg/kg ww	0.03736	<0.01656	<0.01656	<0.01527	<0.01248	<0.01248	0.055808	0.021712	0.021712	<0.01422	<0.01422
Uranium	mg/kg ww	<0.00467	<0.00552	<0.00552	<0.00509	<0.00416	<0.00416	<0.00512	<0.00472	<0.00472	<0.00474	<0.00474
Vanadium	mg/kg ww	<0.2335	<0.276	<0.276	<0.2545	<0.208	<0.208	<0.256	<0.236	<0.236	<0.237	<0.237
Zinc	mg/kg ww	7.6121	11.8128	11.8128	10.0782	7.904	7.904	8.448	6.9856	6.9856	8.295	8.295
Moisture Content	%	53.3	44.8	44.8	49.1	58.4	58.4	48.8	52.8	52.8	52.6	52.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Labrador tea

Sample Name		FHHERA141-LV-1	FHHERA144-LV-1	FHHERA137-LV-1	FHHERA66-LV-1	FHHERA66-LV-1	FHHERA105-LV-1	FHHERA190-LV-1	FHHERA21-LV-1	FHHERA21-LV-1	FHHERA166-LV-1	FHHERA213-LV-1
Sample Type						Lab Dup				Lab Dup		
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016
Laboratory Sample ID	Units	L1810653-97	L1810653-103	L1810653-111	L1810653-116	L1810653-116	L1810653-122	L1810653-127	L1812812-3	L1812812-3	L1812812-8	L1812812-14
Aluminum	mg/kg ww	13.0815	8.6688	17.0185	7.9488	7.9488	6.9641	12.5223	11.5656	11.5656	12.4215	9.191
Arsenic	mg/kg ww	<0.02295	<0.0258	<0.02525	<0.0207	<0.0207	<0.02435	<0.02345	<0.0237	<0.0237	<0.02535	<0.02525
Barium	mg/kg ww	41.1723	35.1396	44.8945	53.406	53.406	42.7586	47.369	23.5104	23.5104	37.518	32.1685
Beryllium	mg/kg ww	<0.02295	<0.0258	<0.02525	<0.0207	<0.0207	<0.02435	<0.02345	<0.0237	<0.0237	<0.02535	<0.02525
Cadmium	mg/kg ww	<0.00918	<0.01032	<0.0101	<0.00828	<0.00828	<0.00974	<0.00938	<0.00948	<0.00948	<0.01014	<0.0101
Chromium	mg/kg ww	<0.2295	<0.258	<0.2525	<0.207	<0.207	<0.2435	<0.2345	<0.237	<0.237	<0.2535	<0.2525
Cobalt	mg/kg ww	<0.0459	<0.0516	<0.0505	<0.0414	<0.0414	<0.0487	<0.0469	<0.0474	<0.0474	<0.0507	<0.0505
Copper	mg/kg ww	1.87731	1.37256	1.46955	1.7802	1.7802	1.81651	1.95104	1.65426	1.65426	2.02293	1.9291
Lead	mg/kg ww	<0.0918	<0.1032	<0.101	<0.0828	<0.0828	<0.0974	<0.0938	<0.0948	<0.0948	<0.1014	<0.101
Manganese	mg/kg ww	155.142	358.62	382.285	156.906	156.906	229.864	211.519	212.826	212.826	577.98	216.645
Mercury	mg/kg ww	<0.02295	<0.0258	<0.02525	<0.0207	<0.0207	<0.02435	<0.02345	<0.0237	<0.0237	<0.02535	<0.02525
Molybdenum	mg/kg ww	0.023868	<0.0258	<0.02525	<0.0207	<0.0207	<0.02435	<0.02345	0.188178	0.188178	<0.02535	<0.02525
Nickel	mg/kg ww	0.51408	<0.258	0.53025	0.2277	0.2277	<0.2435	0.2345	<0.237	<0.237	0.4056	0.38885
Selenium	mg/kg ww	<0.2295	<0.258	<0.2525	<0.207	<0.207	<0.2435	<0.2345	<0.237	<0.237	<0.2535	<0.2525
Silver	mg/kg ww	<0.0459	<0.0516	<0.0505	<0.0414	<0.0414	<0.0487	<0.0469	<0.0474	<0.0474	<0.0507	<0.0505
Strontium	mg/kg ww	5.2326	2.22912	7.9285	7.2036	7.2036	2.50805	6.1439	3.82044	3.82044	3.08256	2.4139
Thallium	mg/kg ww	0.029376	0.03096	0.0303	<0.01242	<0.01242	<0.01461	<0.01407	<0.01422	<0.01422	0.038025	<0.01515
Uranium	mg/kg ww	<0.00459	<0.00516	<0.00505	<0.00414	<0.00414	<0.00487	<0.00469	<0.00474	<0.00474	<0.00507	<0.00505
Vanadium	mg/kg ww	<0.2295	<0.258	<0.2525	<0.207	<0.207	<0.2435	<0.2345	<0.237	<0.237	<0.2535	<0.2525
Zinc	mg/kg ww	8.8587	8.5656	9.8475	8.3214	8.3214	10.9088	9.1455	8.1528	8.1528	9.2781	8.181
Moisture Content	%	54.1	48.4	49.5	58.6	58.6	51.3	53.1	52.6	52.6	49.3	49.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Labrador tea

Sample Name		FHHERA200-LV-1	FHHERA194-LV-1	FHHERA162-LV-1	FHHERA162-LV-1	MHHERA209-LV-1	MHHERA190-LV-1	MHHERA190-LV-1	MHHERA186-LV-1	MHHERA182-LV-1	MHHERA182-LV-1	MHHERA137-LV-1
Sample Type					Lab Dup			Field Duplicate			Lab Dup	
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016
Laboratory Sample ID	Units	L1812812-19	L1812812-23	L1812812-27	L1812812-27	L1812812-32	L1812812-39	L1812812-39	L1812812-47	L1812812-52	L1812812-52	L1812812-56
Aluminum	mg/kg ww	16.6992	16.4125	13.4	13.4	12.9495	14.7936	14.7936	17.8242	13.4835	13.4835	13.1054
Arsenic	mg/kg ww	<0.02485	<0.02525	<0.0268	<0.0268	<0.02425	<0.0268	<0.0268	<0.02435	<0.02525	<0.02525	<0.0253
Barium	mg/kg ww	23.6075	29.593	25.46	25.46	35.308	17.956	17.956	46.9468	37.7235	37.7235	26.8686
Beryllium	mg/kg ww	<0.02485	<0.02525	<0.0268	<0.0268	<0.02425	<0.0268	<0.0268	<0.02435	<0.02525	<0.02525	<0.0253
Cadmium	mg/kg ww	<0.00994	<0.0101	<0.01072	<0.01072	<0.0097	<0.01072	<0.01072	<0.00974	<0.0101	<0.0101	<0.01012
Chromium	mg/kg ww	<0.2485	<0.2525	<0.268	<0.268	<0.2425	<0.268	<0.268	<0.2435	<0.2525	<0.2525	<0.253
Cobalt	mg/kg ww	<0.0497	0.0606	<0.0536	<0.0536	<0.0485	<0.0536	<0.0536	<0.0487	<0.0505	<0.0505	<0.0506
Copper	mg/kg ww	1.26735	1.3938	1.80632	1.80632	2.0564	1.5812	1.5812	1.20776	1.717	1.717	1.24476
Lead	mg/kg ww	<0.0994	<0.101	<0.1072	<0.1072	<0.097	<0.1072	<0.1072	<0.0974	<0.101	<0.101	<0.1012
Manganese	mg/kg ww	591.43	530.25	233.16	233.16	477.725	723.6	723.6	206.975	343.4	343.4	375.958
Mercury	mg/kg ww	<0.02485	<0.02525	<0.0268	<0.0268	<0.02425	<0.0268	<0.0268	<0.02435	<0.02525	<0.02525	<0.0253
Molybdenum	mg/kg ww	<0.02485	<0.02525	<0.0268	<0.0268	<0.02425	<0.0268	<0.0268	<0.02435	<0.02525	<0.02525	<0.0253
Nickel	mg/kg ww	0.26838	0.5252	0.36448	0.36448	0.4365	0.39664	0.39664	1.23698	1.0302	1.0302	0.75394
Selenium	mg/kg ww	<0.2485	<0.2525	<0.268	<0.268	<0.2425	<0.268	<0.268	<0.2435	<0.2525	<0.2525	<0.253
Silver	mg/kg ww	<0.0497	<0.0505	<0.0536	<0.0536	<0.0485	<0.0536	<0.0536	<0.0487	<0.0505	<0.0505	<0.0506
Strontium	mg/kg ww	1.92339	2.58055	2.56208	2.56208	3.7733	1.9028	1.9028	6.4771	4.6561	4.6561	2.41868
Thallium	mg/kg ww	0.019383	0.02121	0.01876	0.01876	0.169265	<0.01608	<0.01608	0.018993	<0.01515	<0.01515	0.01518
Uranium	mg/kg ww	<0.00497	<0.00505	<0.00536	<0.00536	<0.00485	<0.00536	<0.00536	<0.00487	<0.00505	<0.00505	<0.00506
Vanadium	mg/kg ww	<0.2485	<0.2525	<0.268	<0.268	<0.2425	<0.268	<0.268	<0.2435	<0.2525	<0.2525	<0.253
Zinc	mg/kg ww	9.9897	8.181	7.6648	7.6648	10.6215	9.9696	9.9696	9.253	8.181	8.181	6.578
Moisture Content	%	50.3	49.5	46.4	46.4	51.5	46.4	46.4	51.3	49.5	49.5	49.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Labrador tea

Sample Name		MHHERA126-LV-1	MHHERA156-LV-1	MHHERA220-LV-1	MHHERA118-LV-1	MHHERA4-LV-1	MHHERA9-LV-1	MHHERA36E-LV-1	FHHERA038-LV-1 BAY - LAB TEA	MHHERA060-LV-1 BAG - LAB TEA	MHHERA060-LV-1 BAG - LAB TEA	MHHERA048-LV-1 LAB TEA
Sample Type											Lab Dup	
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 21, 2015	Aug 25, 2015	Aug 25, 2015	Aug 23, 2015
Laboratory Sample ID	Units	L1812812-60	L1812812-65	L1812812-70	L1812812-75	L1812812-80	L1812812-86	L1812812-91	L1664180-3	L1664192-4	L1664192-4	L1664195-3
Aluminum	mg/kg ww	21.8163	11.092	14.8816	24.85	5.626	9.071	11.094	5.8566	8.0652	8.0652	5.2065
Arsenic	mg/kg ww	<0.03005	<0.0235	<0.0284	<0.025	<0.02425	<0.0235	<0.0258	<0.0227	<0.02585	<0.02585	<0.02225
Barium	mg/kg ww	31.4924	20.398	38.624	53	3.26405	25.38	21.1044	39.5888	43.2729	43.2729	24.119
Beryllium	mg/kg ww	<0.03005	<0.0235	<0.0284	<0.025	<0.02425	<0.0235	<0.0258	<0.0227	<0.02585	<0.02585	<0.02225
Cadmium	mg/kg ww	0.028848	<0.0094	<0.01136	<0.01	<0.0097	<0.0094	<0.01032	<0.00908	<0.01034	<0.01034	<0.0089
Chromium	mg/kg ww	<0.3005	<0.235	<0.284	<0.25	<0.2425	<0.235	<0.258	<0.227	<0.2585	<0.2585	<0.2225
Cobalt	mg/kg ww	<0.0601	<0.047	<0.0568	<0.05	<0.0485	<0.047	<0.0516	<0.0454	<0.0517	<0.0517	<0.0445
Copper	mg/kg ww	1.5025	2.4628	1.68128	1.55	1.1543	1.4993	1.43964	2.57872	2.33684	2.33684	1.99805
Lead	mg/kg ww	<0.1202	<0.094	<0.1136	<0.1	<0.097	<0.094	<0.1032	<0.0908	<0.1034	<0.1034	<0.089
Manganese	mg/kg ww	563.137	207.74	438.496	127.5	266.75	366.13	434.472	82.628	121.495	121.495	60.52
Mercury	mg/kg ww	<0.03005	<0.0235	<0.0284	<0.025	<0.02425	<0.0235	<0.0258	<0.00454	<0.00517	<0.00517	<0.00445
Molybdenum	mg/kg ww	<0.03005	<0.0235	<0.0284	<0.025	<0.02425	<0.0235	<0.0258	0.0454	<0.02585	<0.02585	<0.02225
Nickel	mg/kg ww	0.95559	0.8554	0.35784	1.665	3.8703	2.3641	2.40972	0.33142	3.45356	3.45356	0.5607
Selenium	mg/kg ww	<0.3005	<0.235	<0.284	<0.25	<0.2425	<0.235	<0.258	<0.227	<0.2585	<0.2585	<0.2225
Silver	mg/kg ww	<0.0601	<0.047	<0.0568	<0.05	<0.0485	<0.047	<0.0516	<0.0454	<0.0517	<0.0517	<0.0445
Strontium	mg/kg ww	4.36326	3.2383	7.0432	27.2	0.8051	2.1526	3.32304	5.8112	8.7373	8.7373	7.031
Thallium	mg/kg ww	0.018631	0.02209	0.035784	<0.015	<0.01455	0.01645	<0.01548	<0.01362	0.017578	0.017578	0.06408
Uranium	mg/kg ww	<0.00601	<0.0047	<0.00568	<0.005	<0.00485	<0.0047	<0.00516	<0.00454	<0.00517	<0.00517	<0.00445
Vanadium	mg/kg ww	<0.3005	<0.235	<0.284	<0.25	<0.2425	<0.235	<0.258	<0.227	<0.2585	<0.2585	<0.2225
Zinc	mg/kg ww	11.7195	7.849	8.2928	6.75	14.259	7.849	8.2044	7.5818	13.1835	13.1835	8.099
Moisture Content	%	39.9	53	43.2	50	51.5	53	48.4	54.6	48.3	48.3	55.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Labrador tea

Sample Name		FHHERA039-LV1 LAB TEA	HWYHHERA 30-LV-1	HWYHHERA 26-LV-1	HWYHHERA 10-LV-1	HWYHHERA 10-LV-1	HWYHHERA 6-LV-1	HWYHHERA 2-LV-1	HWYHHERA 14-LV-1	HWYHHERA 22-LV-1	HWYHHERA 22-LV-1	HWYHHERA 18-LV-1
Sample Type						Lab Dup					Lab Dup	
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 21, 2015	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1664195-8	L1809052-3	L1809052-8	L1809052-13	L1809052-13	L1809052-18	L1809052-23	L1809052-28	L1809052-33	L1809052-33	L1809052-38
Aluminum	mg/kg ww	7.3008	0.5436	8.3316	14.8938	14.8938	10.2672	14.5743	9.69	16.7056	16.7056	12.204
Arsenic	mg/kg ww	<0.02535	<0.00755	<0.01965	<0.0241	<0.0241	<0.0248	<0.02405	<0.02375	<0.0212	<0.0212	<0.0226
Barium	mg/kg ww	34.2225	0.03171	35.2914	40.1988	40.1988	24.1552	22.7032	37.24	38.7112	38.7112	33.9904
Beryllium	mg/kg ww	<0.02535	<0.00755	<0.01965	<0.0241	<0.0241	<0.0248	<0.02405	<0.02375	<0.0212	<0.0212	<0.0226
Cadmium	mg/kg ww	<0.01014	0.15553	<0.00786	<0.00964	<0.00964	<0.00992	<0.00962	<0.0095	<0.00848	<0.00848	<0.00904
Chromium	mg/kg ww	<0.2535	<0.0755	<0.1965	<0.241	<0.241	<0.248	<0.2405	<0.2375	<0.212	<0.212	<0.226
Cobalt	mg/kg ww	<0.0507	0.01963	<0.0393	<0.0482	<0.0482	<0.0496	<0.0481	<0.0475	<0.0424	<0.0424	<0.0452
Copper	mg/kg ww	2.028	0.84711	1.2969	1.72074	1.72074	1.58224	1.76046	1.425	1.05152	1.05152	1.73568
Lead	mg/kg ww	<0.1014	<0.0302	<0.0786	<0.0964	<0.0964	<0.0992	<0.0962	<0.095	<0.0848	<0.0848	<0.0904
Manganese	mg/kg ww	210.405	25.972	400.86	81.458	81.458	334.304	414.141	424.65	348.952	348.952	129.724
Mercury	mg/kg ww	<0.00507	<0.00755	<0.01965	<0.0241	<0.0241	<0.0248	<0.02405	<0.02375	<0.0212	<0.0212	<0.0226
Molybdenum	mg/kg ww	<0.02535	0.147829	<0.01965	<0.0241	<0.0241	0.02976	<0.02405	<0.02375	<0.0212	<0.0212	<0.0226
Nickel	mg/kg ww	0.58305	0.36391	0.29868	0.56876	0.56876	0.33232	0.50024	0.31825	0.3604	0.3604	0.37516
Selenium	mg/kg ww	<0.2535	<0.0755	<0.1965	<0.241	<0.241	<0.248	<0.2405	<0.2375	<0.212	<0.212	<0.226
Silver	mg/kg ww	<0.0507	<0.0151	<0.0393	<0.0482	<0.0482	<0.0496	<0.0481	<0.0475	<0.0424	<0.0424	<0.0452
Strontium	mg/kg ww	4.44639	0.17969	2.22831	17.834	17.834	2.21216	2.31361	3.2585	4.24	4.24	10.5768
Thallium	mg/kg ww	0.121173	<0.00453	<0.01179	<0.01446	<0.01446	<0.01488	0.03367	<0.01425	<0.01272	<0.01272	0.0226
Uranium	mg/kg ww	<0.00507	<0.00151	<0.00393	<0.00482	<0.00482	<0.00496	<0.00481	<0.00475	<0.00424	<0.00424	<0.00452
Vanadium	mg/kg ww	<0.2535	<0.0755	<0.1965	<0.241	<0.241	<0.248	<0.2405	<0.2375	<0.212	<0.212	<0.226
Zinc	mg/kg ww	12.9792	3.9864	7.6635	14.2672	14.2672	8.432	9.9567	11.4	9.964	9.964	14.5996
Moisture Content	%	49.3	84.9	60.7	51.8	51.8	50.4	51.9	52.5	57.6	57.6	54.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX B.5
BASELINE DATA FOR CONIFEROUS AND DECIDUOUS VEGETATION

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		MHHERA95-CV-1	MHHERA95-CV-1	MHHERA77-CV-1	MHHERA86-CV-1	MHHERA86-DV-1	MHHERA36-DV-1	MHHERA36-DV-1	MHHERA36-DV-1	MHHERA36-CV-1	MHHERA77-DV-1	MHHERA53-CV-1
Sample Type			Field Duplicate					Lab Dup	Field Duplicate			
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 4, 2016	Aug 5, 2016
Laboratory Sample ID	Units	L1810653-2	L1810653-2	L1810653-11	L1810653-14	L1810653-15	L1810653-19	L1810653-19	L1810653-19	L1810653-21	L1810653-25	L1810653-29
Aluminum	mg/kg ww	4.0488	4.0488	21.9566	5.2815	---	9.4176	9.4176	9.4176	9.4478	---	11.34
Arsenic	mg/kg ww	<0.0241	<0.0241	<0.0311	<0.02515	---	<0.0218	<0.0218	<0.0218	<0.02435	---	<0.0252
Barium	mg/kg ww	3.74996	3.74996	18.7844	6.3378	---	2.81656	2.81656	2.81656	4.19794	---	5.8464
Beryllium	mg/kg ww	<0.0241	<0.0241	<0.0311	<0.02515	---	<0.0218	<0.0218	<0.0218	<0.02435	---	<0.0252
Cadmium	mg/kg ww	<0.00964	<0.00964	<0.01244	<0.01006	---	0.116412	0.116412	0.116412	<0.00974	---	<0.01008
Chromium	mg/kg ww	<0.241	<0.241	<0.311	<0.2515	---	<0.218	<0.218	<0.218	<0.2435	---	<0.252
Cobalt	mg/kg ww	<0.0482	<0.0482	<0.0622	<0.0503	---	0.4142	0.4142	0.4142	0.06331	---	<0.0504
Copper	mg/kg ww	0.99774	0.99774	1.68562	0.82492	---	2.12768	2.12768	2.12768	1.10549	---	0.82152
Lead	mg/kg ww	<0.0964	<0.0964	<0.1244	<0.1006	---	<0.0872	<0.0872	<0.0872	<0.0974	---	<0.1008
Manganese	mg/kg ww	259.316	259.316	177.27	759.53	---	302.584	302.584	302.584	166.067	---	364.896
Mercury	mg/kg ww	<0.0241	<0.0241	<0.0311	<0.02515	---	<0.0218	<0.0218	<0.0218	<0.02435	---	<0.0252
Molybdenum	mg/kg ww	<0.0241	<0.0241	<0.0311	<0.02515	---	<0.0218	<0.0218	<0.0218	<0.02435	---	<0.0252
Nickel	mg/kg ww	2.91128	2.91128	6.9042	0.37725	---	25.6804	25.6804	25.6804	9.7887	---	1.5372
Selenium	mg/kg ww	<0.241	<0.241	<0.311	<0.2515	---	<0.218	<0.218	<0.218	<0.2435	---	<0.252
Silver	mg/kg ww	<0.0482	<0.0482	<0.0622	<0.0503	---	<0.0436	<0.0436	<0.0436	<0.0487	---	<0.0504
Strontium	mg/kg ww	0.90616	0.90616	9.8276	2.19308	---	4.24228	4.24228	4.24228	2.45935	---	1.52712
Thallium	mg/kg ww	<0.01446	<0.01446	<0.01866	<0.01509	---	<0.01308	<0.01308	<0.01308	<0.01461	---	<0.01512
Uranium	mg/kg ww	<0.00482	<0.00482	<0.00622	<0.00503	---	<0.00436	<0.00436	<0.00436	<0.00487	---	<0.00504
Vanadium	mg/kg ww	<0.241	<0.241	<0.311	<0.2515	---	<0.218	<0.218	<0.218	<0.2435	---	<0.252
Zinc	mg/kg ww	13.1104	13.1104	21.7078	20.7236	---	83.276	83.276	83.276	14.7074	---	26.3088
Moisture Content	%	51.8	51.8	37.8	49.7	56.7	56.4	56.4	56.4	51.3	62.3	49.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		MHHERA79-CV-1	MHHERA45-DV-1	MHHERA88-CV-1	MHHERA73-CV-1	MHHERA73-DV-1	FHHERA70-CV-1	FHHERA70-DV-1	FHHERA40-CV-1	FHHERA40-CV-1	FHHERA40-CV-1	FHHERA40-DV-1
Sample Type										Lab Dup	Field Duplicate	
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 5, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016
Laboratory Sample ID	Units	L1810653-33	L1810653-36	L1810653-40	L1810653-44	L1810653-46	L1810653-49	L1810653-51	L1810653-57	L1810653-57	L1810653-57	L1810653-59
Aluminum	mg/kg ww	20.4352	7.1632	21.614	---	8.55	---	29.2866	8.0199	8.0199	8.0199	4.361
Arsenic	mg/kg ww	<0.0248	<0.02035	<0.0214	---	<0.019	---	<0.01835	<0.03015	<0.03015	<0.03015	<0.02225
Barium	mg/kg ww	7.1424	8.2214	23.5828	---	22.344	---	5.505	17.6076	17.6076	17.6076	6.675
Beryllium	mg/kg ww	<0.0248	<0.02035	<0.0214	---	<0.019	---	<0.01835	<0.03015	<0.03015	<0.03015	<0.02225
Cadmium	mg/kg ww	<0.00992	0.103785	<0.00856	---	0.04484	---	<0.00734	<0.01206	<0.01206	<0.01206	<0.0089
Chromium	mg/kg ww	<0.248	<0.2035	<0.214	---	<0.19	---	<0.1835	<0.3015	<0.3015	<0.3015	<0.2225
Cobalt	mg/kg ww	<0.0496	0.0407	<0.0428	---	0.0532	---	0.46609	<0.0603	<0.0603	<0.0603	0.24475
Copper	mg/kg ww	1.10608	1.72568	0.91592	---	2.0786	---	1.26248	1.19394	1.19394	1.19394	2.0381
Lead	mg/kg ww	<0.0992	<0.0814	<0.0856	---	<0.076	---	<0.0734	<0.1206	<0.1206	<0.1206	<0.089
Manganese	mg/kg ww	110.608	146.52	137.816	---	70.68	---	39.269	381.699	381.699	381.699	76.985
Mercury	mg/kg ww	<0.0248	<0.02035	<0.0214	---	<0.019	---	<0.01835	<0.03015	<0.03015	<0.03015	<0.02225
Molybdenum	mg/kg ww	<0.0248	<0.02035	<0.0214	---	<0.019	---	0.218732	<0.03015	<0.03015	<0.03015	0.19224
Nickel	mg/kg ww	5.208	0.4477	0.88596	---	1.0792	---	1.08265	<0.3015	<0.3015	<0.3015	0.445
Selenium	mg/kg ww	<0.248	<0.2035	<0.214	---	<0.19	---	<0.1835	<0.3015	<0.3015	<0.3015	<0.2225
Silver	mg/kg ww	<0.0496	<0.0407	<0.0428	---	<0.038	---	<0.0367	<0.0603	<0.0603	<0.0603	<0.0445
Strontium	mg/kg ww	4.6624	3.12983	6.5912	---	10.716	---	12.111	4.83606	4.83606	4.83606	8.4995
Thallium	mg/kg ww	<0.01488	<0.01221	<0.01284	---	<0.0114	---	<0.01101	<0.01809	<0.01809	<0.01809	<0.01335
Uranium	mg/kg ww	<0.00496	<0.00407	<0.00428	---	<0.0038	---	<0.00367	<0.00603	<0.00603	<0.00603	<0.00445
Vanadium	mg/kg ww	<0.248	<0.2035	<0.214	---	<0.19	---	<0.1835	<0.3015	<0.3015	<0.3015	<0.2225
Zinc	mg/kg ww	14.9296	94.831	18.19	---	12.578	---	5.6885	21.2256	21.2256	21.2256	9.9235
Moisture Content	%	50.4	59.3	57.2	58.4	62	55.5	63.3	39.7	39.7	39.7	55.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		FHHERA40-DV-1	FHHERA43-DV-1	FHHERA43-CV-1	FHHERA34-DV-1	FHHERA34-CV-1	FHHERA34-CV-1	FHHERA78-DV-1	FHHERA78-CV-1	FHHERA75-DV-1	FHHERA75-CV-1	FHHERA188-DV-1
Sample Type		Field Duplicate					Lab Dup					
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 6, 2016	Aug 7, 2016
Laboratory Sample ID	Units	L1810653-59	L1810653-63	L1810653-65	L1810653-68	L1810653-69	L1810653-69	L1810653-73	L1810653-76	L1810653-78	L1810653-80	L1810653-85
Aluminum	mg/kg ww	4.361	---	3.6855	2.4035	---	---	---	5.3298	6.6331	---	5.2982
Arsenic	mg/kg ww	<0.02225	---	<0.02275	<0.02185	---	---	---	<0.02115	<0.02935	---	<0.02245
Barium	mg/kg ww	6.675	---	16.7895	6.2054	---	---	---	4.9491	30.4653	---	13.1108
Beryllium	mg/kg ww	<0.02225	---	<0.02275	<0.02185	---	---	---	<0.02115	<0.02935	---	<0.02245
Cadmium	mg/kg ww	<0.0089	---	<0.0091	<0.00874	---	---	---	<0.00846	0.125031	---	0.065554
Chromium	mg/kg ww	<0.2225	---	<0.2275	<0.2185	---	---	---	<0.2115	<0.2935	---	<0.2245
Cobalt	mg/kg ww	0.24475	---	<0.0455	<0.0437	---	---	---	<0.0423	0.13501	---	0.18409
Copper	mg/kg ww	2.0381	---	0.96915	0.7866	---	---	---	0.63873	2.4067	---	0.92045
Lead	mg/kg ww	<0.089	---	<0.091	<0.0874	---	---	---	<0.0846	<0.1174	---	<0.0898
Manganese	mg/kg ww	76.985	---	344.89	80.408	---	---	---	444.15	480.166	---	362.343
Mercury	mg/kg ww	<0.02225	---	<0.02275	<0.02185	---	---	---	<0.02115	<0.02935	---	<0.02245
Molybdenum	mg/kg ww	0.19224	---	<0.02275	7.2979	---	---	---	<0.02115	<0.02935	---	<0.02245
Nickel	mg/kg ww	0.445	---	0.2366	<0.2185	---	---	---	0.23688	0.72201	---	0.38165
Selenium	mg/kg ww	<0.2225	---	<0.2275	<0.2185	---	---	---	<0.2115	<0.2935	---	<0.2245
Silver	mg/kg ww	<0.0445	---	<0.0455	<0.0437	---	---	---	<0.0423	<0.0587	---	<0.0449
Strontium	mg/kg ww	8.4995	---	5.0505	5.2003	---	---	---	1.33668	4.36728	---	5.2084
Thallium	mg/kg ww	<0.01335	---	<0.01365	<0.01311	---	---	---	<0.01269	<0.01761	---	<0.01347
Uranium	mg/kg ww	<0.00445	---	<0.00455	<0.00437	---	---	---	<0.00423	<0.00587	---	<0.00449
Vanadium	mg/kg ww	<0.2225	---	<0.2275	<0.2185	---	---	---	<0.2115	<0.2935	---	<0.2245
Zinc	mg/kg ww	9.9235	---	17.4265	36.5332	---	---	---	18.612	82.18	---	47.594
Moisture Content	%	55.5	55.2	54.5	56.3	52.9	52.9	71.1	57.7	41.3	54.9	55.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		FHHERA188-DV-1	FHHERA188-CV-1	FHHERA188-CV-1	FHHERA101-CV-1	FHHERA141-DV-1	FHHERA141-CV-1	FHHERA144-DV-1	FHHERA144-CV-1	FHHERA137-DV-1	FHHERA137-CV-1	FHHERA66-DV-1
Sample Type		Field Duplicate		Field Duplicate								
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016
Laboratory Sample ID	Units	L1810653-85	L1810653-90	L1810653-90	L1810653-95	L1810653-98	L1810653-99	L1810653-104	L1810653-105	L1810653-112	L1810653-113	L1810653-117
Aluminum	mg/kg ww	5.2982	8.2739	8.2739	11.7624	---	29.4886	14.157	---	24.009	---	---
Arsenic	mg/kg ww	<0.02245	<0.02635	<0.02635	<0.02535	---	<0.0283	<0.02925	---	<0.02265	---	---
Barium	mg/kg ww	13.1108	4.34775	4.34775	2.3829	---	22.074	15.093	---	18.12	---	---
Beryllium	mg/kg ww	<0.02245	<0.02635	<0.02635	<0.02535	---	<0.0283	<0.02925	---	<0.02265	---	---
Cadmium	mg/kg ww	0.065554	<0.01054	<0.01054	<0.01014	---	<0.01132	0.101205	---	0.180747	---	---
Chromium	mg/kg ww	<0.2245	<0.2635	<0.2635	<0.2535	---	<0.283	<0.2925	---	<0.2265	---	---
Cobalt	mg/kg ww	0.18409	<0.0527	<0.0527	<0.0507	---	<0.0566	0.1638	---	0.38958	---	---
Copper	mg/kg ww	0.92045	0.73253	0.73253	0.84162	---	1.1886	1.755	---	2.73159	---	---
Lead	mg/kg ww	<0.0898	<0.1054	<0.1054	<0.1014	---	<0.1132	<0.117	---	0.33975	---	---
Manganese	mg/kg ww	362.343	416.857	416.857	608.4	---	175.46	287.82	---	58.89	---	---
Mercury	mg/kg ww	<0.02245	<0.02635	<0.02635	<0.02535	---	<0.0283	<0.02925	---	<0.02265	---	---
Molybdenum	mg/kg ww	<0.02245	<0.02635	<0.02635	<0.02535	---	<0.0283	0.054405	---	<0.02265	---	---
Nickel	mg/kg ww	0.38165	<0.2635	<0.2635	0.28899	---	0.97918	0.29835	---	0.4983	---	---
Selenium	mg/kg ww	<0.2245	<0.2635	<0.2635	<0.2535	---	<0.283	<0.2925	---	<0.2265	---	---
Silver	mg/kg ww	<0.0449	<0.0527	<0.0527	<0.0507	---	<0.0566	<0.0585	---	<0.0453	---	---
Strontium	mg/kg ww	5.2084	1.43871	1.43871	0.91767	---	10.0182	4.2588	---	24.7791	---	---
Thallium	mg/kg ww	<0.01347	<0.01581	<0.01581	<0.01521	---	<0.01698	<0.01755	---	<0.01359	---	---
Uranium	mg/kg ww	<0.00449	<0.00527	<0.00527	<0.00507	---	<0.00566	<0.00585	---	<0.00453	---	---
Vanadium	mg/kg ww	<0.2245	<0.2635	<0.2635	<0.2535	---	<0.283	<0.2925	---	<0.2265	---	---
Zinc	mg/kg ww	47.594	23.5569	23.5569	21.0912	---	13.4142	101.79	---	41.7666	---	---
Moisture Content	%	55.1	47.3	47.3	49.3	55.7	43.4	41.5	57.7	54.7	54	59.3

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		FHHERA66-CV-1	FHHERA105-DV-1	FHHERA105-CV-1	FHHERA190-DV-1	FHHERA190-CV-1	FHHERA21-DV-1	FHHERA21-CV-1	FHHERA166-DV-1	FHHERA166-CV-1	FHHERA166-CV-1	FHHERA213-DV-1
Sample Type											Lab Dup	
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 7, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016
Laboratory Sample ID	Units	L1810653-118	L1810653-123	L1810653-124	L1810653-128	L1810653-129	L1812812-4	L1812812-5	L1812812-9	L1812812-10	L1812812-10	L1812812-15
Aluminum	mg/kg ww	7.3024	32.4544	---	---	8.295	4.9061	15.9616	6.758	7.2124	7.2124	4.9875
Arsenic	mg/kg ww	<0.0224	<0.0176	---	---	<0.01975	<0.03455	<0.0232	<0.02725	<0.0247	<0.0247	<0.02625
Barium	mg/kg ww	13.7088	7.3216	---	---	6.6755	36.6921	25.5664	32.5365	7.41	7.41	19.8975
Beryllium	mg/kg ww	<0.0224	<0.0176	---	---	<0.01975	<0.03455	<0.0232	<0.02725	<0.0247	<0.0247	<0.02625
Cadmium	mg/kg ww	<0.00896	<0.00704	---	---	<0.0079	0.140964	<0.00928	0.315555	<0.00988	<0.00988	0.0714
Chromium	mg/kg ww	<0.224	<0.176	---	---	<0.1975	<0.3455	<0.232	<0.2725	<0.247	<0.247	<0.2625
Cobalt	mg/kg ww	<0.0448	0.70048	---	---	<0.0395	0.29713	<0.0464	0.07085	<0.0494	<0.0494	0.0735
Copper	mg/kg ww	0.95872	1.8128	---	---	0.6873	2.8331	1.23424	2.04375	1.13126	1.13126	1.953
Lead	mg/kg ww	<0.0896	<0.0704	---	---	<0.079	<0.1382	<0.0928	<0.109	<0.0988	<0.0988	<0.105
Manganese	mg/kg ww	305.984	20.5568	---	---	231.075	431.875	227.824	1858.45	362.596	362.596	333.9
Mercury	mg/kg ww	<0.0224	<0.0176	---	---	<0.01975	<0.03455	<0.0232	<0.02725	<0.0247	<0.0247	<0.02625
Molybdenum	mg/kg ww	<0.0224	0.0176	---	---	<0.01975	1.14015	0.116	0.032155	<0.0247	<0.0247	0.108675
Nickel	mg/kg ww	0.22848	1.41504	---	---	<0.1975	1.04341	<0.232	0.6976	0.40508	0.40508	1.35975
Selenium	mg/kg ww	<0.224	<0.176	---	---	<0.1975	<0.3455	<0.232	<0.2725	<0.247	<0.247	<0.2625
Silver	mg/kg ww	<0.0448	<0.0352	---	---	<0.0395	<0.0691	<0.0464	<0.0545	<0.0494	<0.0494	<0.0525
Strontium	mg/kg ww	4.2112	8.2016	---	---	3.6103	8.4993	6.264	5.31375	2.68242	2.68242	3.969
Thallium	mg/kg ww	<0.01344	<0.01056	---	---	<0.01185	<0.02073	<0.01392	<0.01635	0.025194	0.025194	<0.01575
Uranium	mg/kg ww	<0.00448	<0.00352	---	---	<0.00395	<0.00691	<0.00464	<0.00545	<0.00494	<0.00494	<0.00525
Vanadium	mg/kg ww	<0.224	<0.176	---	---	<0.1975	<0.3455	<0.232	<0.2725	<0.247	<0.247	<0.2625
Zinc	mg/kg ww	14.56	3.4144	---	---	14.8125	76.701	23.7568	111.725	16.5984	16.5984	22.575
Moisture Content	%	55.2	64.8	52.9	62.4	60.5	30.9	53.6	45.5	50.6	50.6	47.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		FHHERA213-CV-1	FHHERA200-CV-1	FHHERA194-CV-1	FHHERA162-DV-1	FHHERA162-CV-1	MHHERA209-DV-1	MHHERA209-CV-1	MHHERA190-DV-1	MHHERA190-DV-1	MHHERA190-CV-1	MHHERA190-CV-1
Sample Type										Field Duplicate		Field Duplicate
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 8, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016
Laboratory Sample ID	Units	L1812812-16	L1812812-20	L1812812-24	L1812812-28	L1812812-29	L1812812-33	L1812812-34	L1812812-41	L1812812-41	L1812812-43	L1812812-43
Aluminum	mg/kg ww	5.8374	6.2238	7.906	1.9362	4.84	31.213	7.3428	4.235	4.235	10.1558	10.1558
Arsenic	mg/kg ww	<0.02115	<0.0253	<0.0295	<0.02305	<0.0242	<0.02275	<0.0211	<0.0275	<0.0275	<0.02465	<0.02465
Barium	mg/kg ww	7.3602	5.7178	14.809	2.77522	6.292	25.298	11.3096	4.202	4.202	5.423	5.423
Beryllium	mg/kg ww	<0.02115	<0.0253	<0.0295	<0.02305	<0.0242	<0.02275	<0.0211	<0.0275	<0.0275	<0.02465	<0.02465
Cadmium	mg/kg ww	<0.00846	<0.01012	<0.0118	<0.00922	<0.00968	<0.0091	<0.00844	0.06545	0.06545	<0.00986	<0.00986
Chromium	mg/kg ww	<0.2115	<0.253	<0.295	<0.2305	<0.242	<0.2275	<0.211	<0.275	<0.275	<0.2465	<0.2465
Cobalt	mg/kg ww	<0.0423	<0.0506	<0.059	<0.0461	<0.0484	0.0728	<0.0422	0.1705	0.1705	<0.0493	<0.0493
Copper	mg/kg ww	1.04481	0.69322	1.18	3.91389	0.90508	1.4651	1.0128	1.65	1.65	1.01558	1.01558
Lead	mg/kg ww	<0.0846	<0.1012	<0.118	<0.0922	<0.0968	<0.091	<0.0844	<0.11	<0.11	<0.0986	<0.0986
Manganese	mg/kg ww	224.613	723.58	867.3	100.037	402.688	67.795	318.188	709.5	709.5	522.58	522.58
Mercury	mg/kg ww	<0.02115	<0.0253	<0.0295	<0.02305	<0.0242	<0.02275	<0.0211	<0.0275	<0.0275	<0.02465	<0.02465
Molybdenum	mg/kg ww	<0.02115	<0.0253	<0.0295	0.108335	<0.0242	0.023205	<0.0211	<0.0275	<0.0275	<0.02465	<0.02465
Nickel	mg/kg ww	0.22419	<0.253	0.5192	0.24433	<0.242	0.9646	0.55704	1.0725	1.0725	<0.2465	<0.2465
Selenium	mg/kg ww	<0.2115	<0.253	<0.295	<0.2305	<0.242	<0.2275	<0.211	<0.275	<0.275	<0.2465	<0.2465
Silver	mg/kg ww	<0.0423	<0.0506	<0.059	<0.0461	<0.0484	<0.0455	<0.0422	<0.055	<0.055	<0.0493	<0.0493
Strontium	mg/kg ww	1.30707	1.28524	2.36	7.1455	0.86636	17.381	3.3127	1.7655	1.7655	1.44449	1.44449
Thallium	mg/kg ww	0.019881	<0.01518	<0.0177	<0.01383	<0.01452	<0.01365	0.014348	<0.0165	<0.0165	<0.01479	<0.01479
Uranium	mg/kg ww	<0.00423	<0.00506	<0.0059	<0.00461	<0.00484	<0.00455	<0.00422	<0.0055	<0.0055	<0.00493	<0.00493
Vanadium	mg/kg ww	<0.2115	<0.253	<0.295	<0.2305	<0.242	<0.2275	<0.211	<0.275	<0.275	<0.2465	<0.2465
Zinc	mg/kg ww	15.1434	14.9776	25.016	17.1031	18.4404	6.3245	15.9938	74.8	74.8	21.1497	21.1497
Moisture Content	%	57.7	49.4	41	53.9	51.6	54.5	57.8	45	45	50.7	50.7

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		MHHERA186-DV-1	MHHERA186-CV-1	MHHERA182-CV-1	MHHERA137-CV-1	MHHERA126-DV-1	MHHERA126-CV-1	MHHERA126-CV-1	MHHERA156-DV-1	MHHERA156-CV-1	MHHERA220-DV-1	MHHERA118-DV-1
Sample Type								Lab Dup				
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region
DateSampled		Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016
Laboratory Sample ID	Units	L1812812-48	L1812812-49	L1812812-53	L1812812-57	L1812812-61	L1812812-62	L1812812-62	L1812812-66	L1812812-67	L1812812-71	L1812812-76
Aluminum	mg/kg ww	31.089	23.2617	14.0936	14.0337	4.352	8.463	8.463	7.6635	8.3314	12.9504	11.7432
Arsenic	mg/kg ww	<0.0215	<0.02915	<0.0223	<0.02515	<0.0256	<0.0273	<0.0273	<0.02925	<0.02705	<0.0213	<0.0252
Barium	mg/kg ww	33.712	30.9573	12.9786	6.3378	16.64	10.2102	10.2102	20.826	6.0592	58.362	20.2608
Beryllium	mg/kg ww	<0.0215	<0.02915	<0.0223	<0.02515	<0.0256	<0.0273	<0.0273	<0.02925	<0.02705	<0.0213	<0.0252
Cadmium	mg/kg ww	<0.0086	<0.01166	<0.00892	<0.01006	0.067584	<0.01092	<0.01092	0.090675	<0.01082	0.18531	0.073584
Chromium	mg/kg ww	<0.215	<0.2915	<0.223	<0.2515	<0.256	<0.273	<0.273	<0.2925	<0.2705	<0.213	<0.252
Cobalt	mg/kg ww	0.2408	<0.0583	<0.0446	<0.0503	0.31232	<0.0546	<0.0546	0.3042	<0.0541	0.32802	<0.0504
Copper	mg/kg ww	2.6961	1.13102	1.1819	1.04624	1.536	0.9282	0.9282	2.38095	1.40119	1.18002	1.8648
Lead	mg/kg ww	<0.086	<0.1166	<0.0892	<0.1006	<0.1024	<0.1092	<0.1092	<0.117	<0.1082	<0.0852	<0.1008
Manganese	mg/kg ww	39.646	433.169	255.558	309.345	271.872	720.72	720.72	314.73	318.649	9.4146	135.072
Mercury	mg/kg ww	<0.0215	<0.02915	<0.0223	<0.02515	<0.0256	<0.0273	<0.0273	<0.02925	<0.02705	<0.0213	<0.0252
Molybdenum	mg/kg ww	0.07482	<0.02915	<0.0223	<0.02515	<0.0256	0.0273	0.0273	<0.02925	<0.02705	0.037914	<0.0252
Nickel	mg/kg ww	2.3478	0.68211	2.39948	0.62875	0.84992	0.28392	0.28392	2.2932	0.97921	0.37488	1.54728
Selenium	mg/kg ww	<0.215	<0.2915	<0.223	<0.2515	<0.256	<0.273	<0.273	<0.2925	<0.2705	<0.213	<0.252
Silver	mg/kg ww	<0.043	<0.0583	<0.0446	<0.0503	<0.0512	<0.0546	<0.0546	<0.0585	<0.0541	<0.0426	<0.0504
Strontium	mg/kg ww	24.725	7.1709	4.5492	1.32792	7.4752	5.2143	5.2143	8.541	3.64093	85.626	18.9
Thallium	mg/kg ww	<0.0129	<0.01749	<0.01338	<0.01509	<0.01536	<0.01638	<0.01638	0.01755	0.045444	<0.01278	<0.01512
Uranium	mg/kg ww	<0.0043	<0.00583	<0.00446	<0.00503	<0.00512	<0.00546	<0.00546	<0.00585	<0.00541	<0.00426	<0.00504
Vanadium	mg/kg ww	<0.215	<0.2915	<0.223	<0.2515	<0.256	<0.273	<0.273	<0.2925	<0.2705	<0.213	<0.252
Zinc	mg/kg ww	17.157	22.0374	17.9292	17.9571	93.184	24.4608	24.4608	38.7855	15.148	17.5938	13.6584
Moisture Content	%	57	41.7	55.4	49.7	48.8	45.4	45.4	41.5	45.9	57.4	49.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		MHHERA118-CV-1	MHHERA118-CV-1	MHHERA4-CV-1	MHHERA9-CV-1	MHHERA9-DV-1	MHHERA9-DV-1	MHHERA36E-CV-1	MHHERA36E-DV-1	FHHERA038-DV-1 BAY LEAVES	FHHERA038-CV-1 BAY - BSPRUCE	MHHERA060-DV-1 BAG ALDER
Sample Type			Lab Dup				Lab Dup					
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	MacLellan Region
DateSampled		Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 9, 2016	Aug 21, 2015	Aug 21, 2015	Aug 25, 2015
Laboratory Sample ID	Units	L1812812-77	L1812812-77	L1812812-78	L1812812-83	L1812812-84	L1812812-84	L1812812-89	L1812812-92	L1664180-1	L1664180-5	L1664192-2
Aluminum	mg/kg ww	18.1714	18.1714	17.3394	16.791	10.8796	10.8796	6.8068	3.1756	63.393	5.1062	84.316
Arsenic	mg/kg ww	<0.0241	<0.0241	<0.0247	<0.02175	<0.02305	<0.02305	<0.0238	<0.02335	<0.01695	<0.0211	<0.0214
Barium	mg/kg ww	8.8688	8.8688	12.4982	28.5795	12.4009	12.4009	2.2372	12.5623	10.0683	31.6078	11.2136
Beryllium	mg/kg ww	<0.0241	<0.0241	<0.0247	<0.02175	<0.02305	<0.02305	<0.0238	<0.02335	<0.01695	<0.0211	0.046224
Cadmium	mg/kg ww	<0.00964	<0.00964	<0.00988	<0.0087	0.048405	0.048405	<0.00952	0.038294	<0.00678	<0.00844	<0.00856
Chromium	mg/kg ww	<0.241	<0.241	<0.247	<0.2175	<0.2305	<0.2305	<0.238	<0.2335	<0.1695	<0.211	<0.214
Cobalt	mg/kg ww	<0.0482	<0.0482	<0.0494	<0.0435	0.11525	0.11525	<0.0476	0.16812	0.24747	<0.0422	0.25252
Copper	mg/kg ww	1.33996	1.33996	0.94354	1.52685	1.6135	1.6135	0.82348	1.9147	1.61703	1.88212	2.38824
Lead	mg/kg ww	<0.0964	<0.0964	<0.0988	<0.087	<0.0922	<0.0922	<0.0952	<0.0934	<0.0678	<0.0844	<0.0856
Manganese	mg/kg ww	120.018	120.018	165.49	130.065	165.96	165.96	322.252	214.353	57.63	76.804	10.4432
Mercury	mg/kg ww	<0.0241	<0.0241	<0.0247	<0.02175	<0.02305	<0.02305	<0.0238	<0.02335	0.004068	<0.00422	<0.00428
Molybdenum	mg/kg ww	<0.0241	<0.0241	<0.0247	<0.02175	0.032731	0.032731	<0.0238	<0.02335	0.049155	<0.0211	<0.0214
Nickel	mg/kg ww	1.6147	1.6147	5.4834	3.1668	1.39222	1.39222	1.93732	3.28301	0.43053	0.23632	6.7624
Selenium	mg/kg ww	<0.241	<0.241	<0.247	<0.2175	<0.2305	<0.2305	<0.238	<0.2335	<0.1695	<0.211	<0.214
Silver	mg/kg ww	<0.0482	<0.0482	<0.0494	<0.0435	<0.0461	<0.0461	<0.0476	<0.0467	<0.0339	<0.0422	<0.0428
Strontium	mg/kg ww	6.4106	6.4106	4.86096	5.481	2.50784	2.50784	1.57556	5.6974	18.6789	4.22	18.7464
Thallium	mg/kg ww	0.019762	0.019762	<0.01482	<0.01305	<0.01383	<0.01383	<0.01428	<0.01401	<0.01017	<0.01266	<0.01284
Uranium	mg/kg ww	<0.00482	<0.00482	<0.00494	<0.00435	<0.00461	<0.00461	<0.00476	<0.00467	<0.00339	<0.00422	<0.00428
Vanadium	mg/kg ww	<0.241	<0.241	<0.247	<0.2175	<0.2305	<0.2305	<0.238	<0.2335	<0.1695	<0.211	<0.214
Zinc	mg/kg ww	16.0506	16.0506	22.23	8.613	70.994	70.994	12.7568	65.847	5.7969	7.5116	5.8636
Moisture Content	%	51.8	51.8	50.6	56.5	53.9	53.9	52.4	53.3	66.1	57.8	57.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		MHHERA060-CV-1 BAG - BSPRUCE	MHHERA048-DV-1 LEAVES	MHHERA048-CV-1 BSPRUCE	FHHERA039-DV1 LEAVES	FHHERA039-CV-1 BSPRUCE	HWYHHERA 30-CV-1	HWYHHERA 26-CV-1	HWYHHERA 26-DV-1	HWYHHERA 26-DV-1	HWYHHERA 10-CV-1	HWYHHERA 10-DV-1
Sample Type										Lab Dup		
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 25, 2015	Aug 23, 2015	Aug 23, 2015	Aug 21, 2015	Aug 21, 2015	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1664192-3	L1664195-2	L1664195-4	L1664195-7	L1664195-9	L1809052-4	L1809052-9	L1809052-10	L1809052-10	L1809052-14	L1809052-15
Aluminum	mg/kg ww	19.4706	122.055	30.2992	74.481	21.0635	13.311	10.5534	1.806	1.806	21.3408	37.1616
Arsenic	mg/kg ww	<0.0261	<0.01975	<0.0232	<0.02035	<0.02575	<0.02465	<0.02665	<0.021	<0.021	<0.0234	<0.0196
Barium	mg/kg ww	15.4512	29.8225	31.1344	17.3382	44.496	3.72708	9.9671	2.4192	2.4192	20.6388	13.3672
Beryllium	mg/kg ww	<0.0261	0.0316	<0.0232	0.02849	<0.02575	<0.02465	<0.02665	<0.021	<0.021	<0.0234	<0.0196
Cadmium	mg/kg ww	<0.01044	<0.0079	<0.00928	<0.00814	0.01545	<0.00986	<0.01066	<0.0084	<0.0084	<0.00936	<0.00784
Chromium	mg/kg ww	<0.261	<0.1975	<0.232	<0.2035	<0.2575	<0.2465	<0.2665	<0.21	<0.21	<0.234	<0.196
Cobalt	mg/kg ww	<0.0522	0.3239	<0.0464	0.59829	0.05665	<0.0493	<0.0533	0.126	0.126	<0.0468	0.21952
Copper	mg/kg ww	1.60254	3.62215	0.88624	1.87627	3.32175	0.80852	0.89544	1.3272	1.3272	1.38528	3.81416
Lead	mg/kg ww	<0.1044	0.0869	<0.0928	<0.0814	<0.103	<0.0986	<0.1066	<0.084	<0.084	<0.0936	<0.0784
Manganese	mg/kg ww	339.3	73.865	195.808	56.166	290.975	261.29	564.98	26.208	26.208	77.22	19.208
Mercury	mg/kg ww	0.008874	0.004345	<0.00464	<0.00407	<0.00515	<0.02465	<0.02665	<0.021	<0.021	<0.0234	<0.0196
Molybdenum	mg/kg ww	<0.0261	0.04661	<0.0232	<0.02035	0.104545	<0.02465	<0.02665	0.04872	0.04872	<0.0234	0.025088
Nickel	mg/kg ww	5.5854	2.7966	0.45936	1.56288	0.515	0.43384	<0.2665	0.4326	0.4326	0.96408	1.34848
Selenium	mg/kg ww	<0.261	<0.1975	<0.232	<0.2035	<0.2575	<0.2465	<0.2665	<0.21	<0.21	<0.234	<0.196
Silver	mg/kg ww	<0.0522	<0.0395	<0.0464	<0.0407	<0.0515	<0.0493	<0.0533	<0.042	<0.042	<0.0468	<0.0392
Strontium	mg/kg ww	4.43178	21.488	8.816	14.2043	9.8365	2.55867	1.87083	3.0912	3.0912	10.1556	11.956
Thallium	mg/kg ww	<0.01566	<0.01185	0.017632	<0.01221	<0.01545	<0.01479	<0.01599	<0.0126	<0.0126	0.01638	<0.01176
Uranium	mg/kg ww	<0.00522	<0.00395	<0.00464	<0.00407	<0.00515	<0.00493	<0.00533	<0.0042	<0.0042	<0.00468	<0.00392
Vanadium	mg/kg ww	<0.261	<0.1975	<0.232	<0.2035	<0.2575	<0.2465	<0.2665	<0.21	<0.21	<0.234	<0.196
Zinc	mg/kg ww	41.1858	16.8665	19.256	11.3146	19.467	13.6561	28.8353	8.526	8.526	28.548	17.444
Moisture Content	%	47.8	60.5	53.6	59.3	48.5	50.7	46.7	58	58	53.2	60.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Coniferous and Deciduous Vegetation

Sample Name		HWYHHERA 6-CV-1	HWYHHERA 6-DV-1	HWYHHERA 6-DV-1	HWYHHERA 2-CV-1	HWYHHERA 14-CV-1	HWYHHERA 22-CV-1	HWYHHERA 22-DV-1	HWYHHERA 18-CV-1	HWYHHERA 18-DV-1
Sample Type				Lab Dup						
Sampling Area		MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016	Aug 3, 2016
Laboratory Sample ID	Units	L1809052-19	L1809052-20	L1809052-20	L1809052-24	L1809052-29	L1809052-34	L1809052-35	L1809052-39	L1809052-40
Aluminum	mg/kg ww	8.68	2.46	2.46	9.1948	6.3364	15.7781	3.1892	15.9954	31.9522
Arsenic	mg/kg ww	<0.0248	<0.0205	<0.0205	<0.0254	<0.02555	<0.03445	<0.0238	<0.02515	<0.0203
Barium	mg/kg ww	9.7216	3.5383	3.5383	6.7056	17.1696	26.3198	5.0456	23.2386	6.1712
Beryllium	mg/kg ww	<0.0248	<0.0205	<0.0205	<0.0254	<0.02555	<0.03445	<0.0238	<0.02515	<0.0203
Cadmium	mg/kg ww	<0.00992	0.5822	0.5822	<0.01016	<0.01022	<0.01378	<0.00952	<0.01006	<0.00812
Chromium	mg/kg ww	<0.248	<0.205	<0.205	<0.254	<0.2555	<0.3445	<0.238	<0.2515	<0.203
Cobalt	mg/kg ww	<0.0496	0.3977	0.3977	<0.0508	<0.0511	<0.0689	0.19992	<0.0503	0.23548
Copper	mg/kg ww	0.868	1.3243	1.3243	1.25476	0.95046	1.70183	4.66956	1.39834	2.70396
Lead	mg/kg ww	<0.0992	<0.082	<0.082	<0.1016	<0.1022	<0.1378	<0.0952	<0.1006	<0.0812
Manganese	mg/kg ww	369.024	203.77	203.77	215.9	366.387	436.137	197.064	79.977	17.7828
Mercury	mg/kg ww	<0.0248	<0.0205	<0.0205	<0.0254	<0.02555	<0.03445	<0.0238	<0.02515	<0.0203
Molybdenum	mg/kg ww	<0.0248	0.15129	0.15129	<0.0254	<0.02555	<0.03445	<0.0238	<0.02515	0.020706
Nickel	mg/kg ww	<0.248	0.2337	0.2337	0.99568	0.27083	<0.3445	0.95676	0.82995	1.45754
Selenium	mg/kg ww	<0.248	<0.205	<0.205	<0.254	<0.2555	<0.3445	<0.238	<0.2515	<0.203
Silver	mg/kg ww	<0.0496	<0.041	<0.041	<0.0508	<0.0511	<0.0689	<0.0476	<0.0503	<0.0406
Strontium	mg/kg ww	2.52464	7.872	7.872	1.73228	5.2633	10.8173	9.8532	8.6013	14.6566
Thallium	mg/kg ww	<0.01488	<0.0123	<0.0123	<0.01524	<0.01533	<0.02067	<0.01428	0.020623	<0.01218
Uranium	mg/kg ww	<0.00496	<0.0041	<0.0041	<0.00508	<0.00511	<0.00689	<0.00476	<0.00503	<0.00406
Vanadium	mg/kg ww	<0.248	<0.205	<0.205	<0.254	<0.2555	<0.3445	<0.238	<0.2515	<0.203
Zinc	mg/kg ww	27.1312	82.41	82.41	35.1028	32.2952	68.9	28.1792	33.9022	12.2612
Moisture Content	%	50.4	59	59	49.2	48.9	31.1	52.4	49.7	59.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX B.6
BASELINE DATA FOR GARDEN PRODUCE

Baseline Data for Garden Produce

Sample Name		SZABO - VEG POTATOES	PHILLIPS - VEG	PHILLIPS - VEG	SZABO - VEG CARROTS	WATSON - POTATOES	WATSON - CARROTS	WATSON - BEETS	WATSON - BEETS	HILDERBRANDT - VEG CARROTS	HILDERBRANDT - VEG POTATOES	SAULTER - VEG - POTATOES
Sample Type				Lab Dup					Lab Dup			
Sampling Area		Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake	Town of Lynn Lake
DateSampled		Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 10, 2016	Sep 23, 2016	Sep 23, 2016	Sep 22, 2016
Laboratory Sample ID	Units	L1827796-2	L1827796-4	L1827796-4	L1827796-5	L1827796-7	L1827796-9	L1827796-10	L1827796-10	L1837591-3	L1837591-4	L1837591-7
Aluminum	mg/kg ww	3.006	3.416	3.416	4.977	2.8569	8.3886	4.5825	4.5825	7.5648	3.5584	2.0003
Arsenic	mg/kg ww	<0.0167	<0.0035	<0.0035	0.006552	<0.01605	<0.00465	<0.00705	<0.00705	0.005952	<0.0128	<0.01205
Barium	mg/kg ww	0.16366	3.493	3.493	2.0727	<0.0642	0.51987	1.4241	1.4241	2.0064	0.2176	0.24341
Beryllium	mg/kg ww	<0.0167	<0.0035	<0.0035	<0.00315	<0.01605	<0.00465	<0.00705	<0.00705	<0.0048	<0.0128	<0.01205
Cadmium	mg/kg ww	<0.00668	0.00693	0.00693	0.003339	0.008988	0.007161	0.011421	0.011421	0.01296	0.014336	<0.00482
Chromium	mg/kg ww	<0.167	<0.035	<0.035	<0.0315	<0.1605	<0.0465	<0.0705	<0.0705	<0.048	<0.128	<0.1205
Cobalt	mg/kg ww	<0.0334	<0.007	<0.007	<0.0063	<0.0321	<0.0093	0.01551	0.01551	<0.0096	<0.0256	<0.0241
Copper	mg/kg ww	0.52104	0.2919	0.2919	0.38052	0.7704	0.40455	1.12518	1.12518	0.3696	0.5504	1.66531
Lead	mg/kg ww	<0.0668	<0.014	<0.014	0.01323	<0.0642	0.01953	<0.0282	<0.0282	<0.0192	<0.0512	<0.0482
Manganese	mg/kg ww	0.62792	0.6482	0.6482	1.071	1.14597	0.67053	1.31976	1.31976	1.4784	1.86112	0.76156
Mercury	mg/kg ww	<0.0167	<0.0035	<0.0035	<0.00315	<0.01605	<0.00465	<0.00705	<0.00705	<0.0048	<0.0128	<0.01205
Molybdenum	mg/kg ww	0.100868	0.01253	0.01253	0.014616	0.140919	0.015531	0.039198	0.039198	0.019776	0.101632	0.24341
Nickel	mg/kg ww	<0.167	<0.035	<0.035	<0.0315	<0.1605	0.10323	0.36942	0.36942	<0.048	<0.128	<0.1205
Selenium	mg/kg ww	<0.167	<0.035	<0.035	<0.0315	<0.1605	<0.0465	<0.0705	<0.0705	<0.048	<0.128	<0.1205
Silver	mg/kg ww	<0.0334	<0.007	<0.007	<0.0063	<0.0321	<0.0093	<0.0141	<0.0141	<0.0096	<0.0256	<0.0241
Strontium	mg/kg ww	0.19038	1.764	1.764	1.197	0.276381	1.6647	1.692	1.692	1.4304	0.47104	0.47477
Thallium	mg/kg ww	<0.01002	<0.0021	<0.0021	<0.00189	<0.00963	<0.00279	<0.00423	<0.00423	<0.00288	<0.00768	<0.00723
Uranium	mg/kg ww	<0.00334	<0.0007	<0.0007	0.00126	<0.00321	0.00279	0.002115	0.002115	0.001152	<0.00256	<0.00241
Vanadium	mg/kg ww	<0.167	<0.035	<0.035	<0.0315	<0.1605	<0.0465	<0.0705	<0.0705	<0.048	<0.128	<0.1205
Zinc	mg/kg ww	1.9038	2.261	2.261	1.4742	2.7606	1.7205	4.5825	4.5825	3.2448	3.3792	2.6992
Moisture Content	%	66.6	93	93	93.7	67.9	90.7	85.9	85.9	90.4	74.4	75.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX D.7
BASELINE DATA FOR SMALL MAMMALS

Baseline Data for Small Mammal

Sample Name		MHHERA128-SM-1	MHHERA113-SM-1	FHHERA98-SM-1	FHHERA98-SM-2	FHHERA98-SM-3	MHHERA128-SM-2	MHHERA113-SM-2	MHHERA99-SM-1	MHHERA99-SM-2	FHHERA113-SM-1	FHHERA113-SM-2
Sample Type												
Sampling Area		MacLellan Region	MacLellan Region	Gordon Region	Gordon Region	Gordon Region	MacLellan Region	MacLellan Region	MacLellan Region	MacLellan Region	Gordon Region	Gordon Region
DateSampled		Sep 12, 2016	Sep 12, 2016	Sep 13, 2016	Sep 13, 2016	Sep 13, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016
Laboratory Sample ID	Units	L1829253-1	L1829253-2	L1829253-3	L1829253-4	L1829253-5	L1829253-6	L1829253-7	L1829253-8	L1829253-9	L1829253-10	L1829253-11
Aluminum	mg/kg ww	5.64	3.44	9.83	15.7	15.7	3.61	4.38	2.4	8.11	33	36.3
Arsenic	mg/kg ww	0.013	0.023	0.02	0.056	0.02	0.013	0.046	0.042	0.022	0.189	0.074
Barium	mg/kg ww	22.1	20.2	5.81	24	5.1	18.6	48.7	21.8	20.1	4.08	5.85
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0549	0.0997	0.0596	0.1	0.0395	0.353	0.102	0.095	0.15	0.0051	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.061	0.032	0.057	0.064	0.024	0.046	0.034	0.033	0.037	0.031	0.034
Copper	mg/kg ww	3.28	3.3	4.37	2.76	3.65	3.07	2.99	3.34	3.23	5.49	3.84
Lead	mg/kg ww	0.048	<0.04	<0.04	0.065	<0.04	0.088	0.079	0.048	0.077	<0.04	<0.04
Manganese	mg/kg ww	8.48	2.65	4.19	8.75	4.64	5.33	2.8	4.17	6.93	3.2	2.55
Mercury	mg/kg ww	0.032	0.018	0.02	0.029	0.019	0.044	0.022	0.028	0.038	<0.01	<0.01
Molybdenum	mg/kg ww	0.176	0.125	0.151	0.201	0.106	0.163	0.114	0.069	0.12	0.219	0.3
Nickel	mg/kg ww	0.15	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.1
Selenium	mg/kg ww	0.52	0.3	0.36	0.48	0.32	0.37	0.35	0.3	0.37	0.14	0.17
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	6.42	3.81	2.31	4.64	4.02	2.63	9.3	6.43	4.02	4.24	6.24
Thallium	mg/kg ww	<0.006	<0.006	0.029	0.0611	0.0236	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0027	0.0029
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	29.1	28.8	25.5	27	25.6	28.9	29.3	28.9	30.6	28.1	30.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Small Mammal

Sample Name		FHHERA113-SM-3
Sample Type		
Sampling Area		Gordon Region
DateSampled		Sep 14, 2016
Laboratory Sample ID	Units	L1829253-12
Aluminum	mg/kg ww	69.1
Arsenic	mg/kg ww	0.15
Barium	mg/kg ww	3.44
Beryllium	mg/kg ww	<0.01
Cadmium	mg/kg ww	0.0093
Chromium	mg/kg ww	0.14
Cobalt	mg/kg ww	0.058
Copper	mg/kg ww	4.45
Lead	mg/kg ww	<0.04
Manganese	mg/kg ww	5.78
Mercury	mg/kg ww	<0.01
Molybdenum	mg/kg ww	0.288
Nickel	mg/kg ww	0.15
Selenium	mg/kg ww	0.12
Silver	mg/kg ww	<0.02
Strontium	mg/kg ww	3.38
Thallium	mg/kg ww	<0.006
Uranium	mg/kg ww	0.0054
Vanadium	mg/kg ww	0.15
Zinc	mg/kg ww	23.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX D.8
BASELINE DATA FOR FISH MUSCLE

Baseline Data for Fish Muscle

Sample Name		COCKERAM LAKE NORTHERN PIKE - MUSCLE 1	COCKERAM LAKE NORTHERN PIKE - MUSCLE 2	COCKERAM LAKE NORTHERN PIKE - MUSCLE 3	COCKERAM LAKE NORTHERN PIKE - MUSCLE 4	COCKERAM LAKE NORTHERN PIKE - MUSCLE 4	COCKERAM LAKE NORTHERN PIKE - MUSCLE 5	COCKERAM LAKE WALLEYE - MUSCLE	FARLEY LAKE - NORTHERN PIKE - MUSCLE 1	FARLEY LAKE - NORTHERN PIKE - MUSCLE 2	FARLEY LAKE - NORTHERN PIKE - MUSCLE 3	SWEDE LAKE - NORTHERN PIKE - MUSCLE 1
Sample Type						Lab Dup						
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Swede Lake
DateSampled		Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 29, 2015	Jun 29, 2015	Jun 29, 2015	Jul 1, 2015
Laboratory Sample ID	Units	L1635153-66	L1635153-67	L1635153-68	L1635153-69	L1635153-69	L1635153-70	L1635153-72	L1636528-4	L1636528-5	L1636528-6	L1636528-39
Aluminum	mg/kg ww	0.96	0.76	2.57	<0.6	<0.6	<0.6	<0.6	1.24	0.88	1.65	<0.6
Arsenic	mg/kg ww	0.013	0.017	0.01	0.014	0.014	<0.01	<0.01	0.062	0.067	0.046	0.017
Barium	mg/kg ww	<0.04	0.064	0.092	0.057	0.057	<0.04	<0.04	0.145	0.184	0.316	0.16
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.219	0.133	0.134	0.137	0.137	0.147	0.16	0.241	0.212	0.197	0.131
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.054	<0.04
Manganese	mg/kg ww	0.283	0.531	0.501	0.397	0.397	0.199	0.148	0.795	0.616	0.908	0.97
Mercury	mg/kg ww	0.145	0.292	0.17	0.356	0.356	0.163	0.36	0.221	0.203	0.239	0.324
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.24	0.21	0.22	0.22	0.22	0.24	0.27	0.12	0.11	<0.1	0.12
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.182	0.471	0.416	0.355	0.355	0.142	0.125	0.338	0.402	0.734	0.481
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.0061	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	4.93	5.82	4.69	4.55	4.55	4.41	4.38	5.47	5.44	6.92	5.33
Moisture Content	%	---	---	---	---	---	---	---	73.8	76.1	76.8	74.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		SWEDE LAKE - NORTHERN PIKE - MUSCLE 2	SWEDE LAKE - NORTHERN PIKE - MUSCLE 3	SWEDE LAKE - NORTHERN PIKE - MUSCLE 4	SWEDE LAKE - NORTHERN PIKE - MUSCLE 5	SWEDE LAKE - WALLEYE - MUSCLE 1	SWEDE LAKE - WALLEYE - MUSCLE 1	SWEDE LAKE - WALLEYE - MUSCLE 2	SWEDE LAKE - WALLEYE - MUSCLE 3	AQF11 PIKE 1 - MUSCLE	AQF11 PIKE 2 - MUSCLE	AQF11 PIKE 2 - MUSCLE
Sample Type							Lab Dup					Lab Dup
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake
DateSampled		Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015
Laboratory Sample ID	Units	L1636528-40	L1636528-41	L1636528-42	L1636528-43	L1636528-52	L1636528-52	L1636528-53	L1636528-54	L1651767-2	L1651767-5	L1651767-5
Aluminum	mg/kg ww	0.67	<0.6	1.02	<0.6	<0.6	<0.6	<0.6	<0.6	4.78	<0.6	<0.6
Arsenic	mg/kg ww	0.02	0.017	0.019	0.018	0.023	0.023	0.023	0.027	0.023	0.021	0.021
Barium	mg/kg ww	0.292	0.072	0.065	0.08	<0.04	<0.04	<0.04	<0.04	0.111	0.099	0.099
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.148	0.126	0.165	0.206	0.126	0.126	0.146	0.136	0.213	0.149	0.149
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	2.18	0.83	0.515	1.26	0.126	0.126	0.133	0.115	1.29	1.44	1.44
Mercury	mg/kg ww	0.551	0.352	0.557	0.145	0.756	0.756	0.529	0.765	0.177	0.218	0.218
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	<0.1	0.11	0.14	0.11	0.15	0.15	0.16	0.16	0.12	0.11	0.11
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	1.02	0.348	0.272	0.384	0.07	0.07	0.012	0.019	0.721	0.549	0.549
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	6.58	6.05	8.07	5.9	3.52	3.52	4.08	3.31	8.08	5.46	5.46
Moisture Content	%	78	77.3	76.9	74	80.4	80.4	77.6	75.9	77.1	77.2	77.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQF11 PIKE 3 - MUSCLE	AQF11 PIKE 4 - MUSCLE	AQF11 PIKE 5 - MUSCLE	AQF8 PIKE 1 - MUSCLE	AQF8 PIKE 2 - MUSCLE	AQM16-NRPK-19-MUSCLE	AQM16-NRPK-18-MUSCLE	AQM16-NRPK-14-MUSCLE	AQM16-NRPK-15-MUSCLE	AQM16-NRPK-04-MUSCLE	AQM16-NRPK-08-MUSCLE
Sample Type												
Sampling Area		Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake
DateSampled		Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016
Laboratory Sample ID	Units	L1651767-8	L1651767-11	L1651767-14	L1651767-17	L1651767-20	L1807581-2	L1807581-5	L1807581-8	L1807581-11	L1807581-14	L1807581-17
Aluminum	mg/kg ww	0.65	0.76	1.1	0.83	2.21	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.017	0.023	0.023	0.063	0.051	0.027	0.019	0.054	0.049	0.035	0.038
Barium	mg/kg ww	0.13	0.098	0.106	0.643	0.115	0.06	0.049	0.181	0.143	0.065	0.066
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.194	0.221	0.233	0.216	0.364	0.166	0.182	0.191	0.186	0.136	0.172
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.915	1.23	1.47	3.38	0.617	0.366	0.3	0.464	0.448	0.349	0.3
Mercury	mg/kg ww	0.205	0.159	0.158	0.146	0.275	0.065	0.056	0.088	0.091	0.074	0.084
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.11	0.12	0.12	0.11	0.11	0.13	0.12	0.14	0.14	0.13	0.13
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.546	0.591	0.544	2.04	0.364	0.341	0.313	0.571	0.52	0.348	0.291
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.0067	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	4.83	6.13	8.46	9.55	5.16	6.75	9.54	7.16	7.47	12.2	7.1
Moisture Content	%	76	76.4	76.6	76.9	78.8	80.5	80.8	78.6	78.8	81	82

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQM16-NRPK-12-MUSCLE	AQM16-NRPK-06-MUSCLE	AQM16-NRPK-02-MUSCLE	AQM16-NRPK-01-MUSCLE	AQM13-NRPK-07-MUSCLE	AQM13-NRPK-20-MUSCLE	AQM13-NRPK-18-MUSCLE	AQM13-NRPK-16-MUSCLE	AQM13-NRPK-13-MUSCLE	AQM13-NRPK-04-MUSCLE	AQM13-NRPK-05-MUSCLE
Sample Type												
Sampling Area		MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake
DateSampled		Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-20	L1807581-23	L1807581-26	L1807581-29	L1807581-32	L1807581-35	L1807581-38	L1807581-41	L1807581-44	L1807581-47	L1807581-50
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	1.45	<0.6	<0.6
Arsenic	mg/kg ww	0.032	0.039	0.036	0.041	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01
Barium	mg/kg ww	0.088	0.069	0.148	0.05	0.05	<0.04	<0.04	<0.04	<0.04	0.05	0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.145	0.133	0.131	0.156	0.199	0.15	0.124	0.131	0.169	0.149	0.153
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.283	0.23	0.528	0.235	0.233	0.229	0.23	0.235	0.205	0.336	0.254
Mercury	mg/kg ww	0.076	0.076	0.087	0.083	0.058	0.04	0.045	0.038	0.037	0.041	0.036
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.12	0.13	0.14	0.14	0.12	0.14	0.12	0.11	0.11	0.12	<0.1
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.267	0.21	0.738	0.279	0.353	0.251	0.269	0.221	0.136	0.387	0.274
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	7.05	7.8	7.43	8.92	5.79	6.98	4.48	5.13	5.46	5.55	5.4
Moisture Content	%	78.1	82.6	77.3	79.3	78.9	78.8	79.2	76.9	79	79.5	79.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQM13-NRPK-11-MUSCLE	AQM13-NRPK-01-MUSCLE	AQM13-NRPK-12-MUSCLE	AQF8-NRPK-16-MUSCLE	AQF8-NRPK-10-MUSCLE	AQF8-NRPK-17-MUSCLE	AQF8-NRPK-18-MUSCLE	AQF8-NRPK-19-MUSCLE	AQF8-NRPK-11-MUSCLE	AQF8-NRPK-13-MUSCLE	AQF8-NRPK-14-MUSCLE
Sample Type												
Sampling Area		MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake
DateSampled		Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016
Laboratory Sample ID	Units	L1807581-53	L1807581-56	L1807581-59	L1807581-62	L1807581-65	L1807581-68	L1807581-71	L1807581-74	L1807581-77	L1807581-80	L1807581-83
Aluminum	mg/kg ww	<0.6	<0.6	2.9	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	<0.01	<0.01	0.011	0.056	0.066	0.031	0.046	0.043	0.065	0.049	0.05
Barium	mg/kg ww	<0.04	0.042	0.04	0.042	0.087	0.128	0.106	0.053	0.141	0.341	0.043
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.156	0.153	0.154	0.151	0.142	0.107	0.139	0.178	0.193	0.142	0.177
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.173	0.331	0.26	0.668	0.812	1.01	0.902	0.512	0.569	1.32	0.25
Mercury	mg/kg ww	0.041	0.039	0.042	0.111	0.138	0.174	0.133	0.107	0.141	0.312	0.232
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.12	0.11	0.12	<0.1	0.11	<0.1	<0.1	<0.1	0.11	<0.1	0.11
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.129	0.257	0.229	0.239	0.383	0.463	0.423	0.269	0.427	0.992	0.086
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	4.88	5.61	6.24	4.84	7.47	4.02	6.45	4.54	5.18	4.58	8.27
Moisture Content	%	77.4	78.3	77.9	79.5	77.6	79.6	77.8	80.2	77.3	80.9	79.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQF8-NRPK-12-MUSCLE	AQF33-NRPK-25-MUSCLE	AQF16A-NRPK-003-MUSCLE	AQF16A-NRPK-011-MUSCLE	AQF16A-NRPK-013-MUSCLE	AQF16A-NRPK-007-MUSCLE	AQF16A-NRPK-008-MUSCLE	AQF16A-NRPK-017-MUSCLE	AQF16A-NRPK-016-MUSCLE	AQF16A-NRPK-015-MUSCLE	AQF16A-NRPK-014-MUSCLE
Sample Type												
Sampling Area		Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jul 16, 2016	Jul 16, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1807581-86	L1807581-89	L1807581-92	L1807581-95	L1807581-98	L1807581-101	L1807581-104	L1807581-107	L1807581-110	L1807581-113	L1807581-116
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.055	0.053	0.018	0.023	0.017	0.018	0.024	0.017	0.017	0.022	0.02
Barium	mg/kg ww	0.183	0.381	0.049	0.117	0.098	0.166	0.042	0.205	0.146	0.041	0.314
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.177	0.153	0.117	0.141	0.099	0.103	0.108	0.112	0.096	0.19	0.15
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.641	1.25	0.455	0.645	0.586	1.09	0.561	0.987	0.934	0.459	1.33
Mercury	mg/kg ww	0.299	0.324	0.183	0.271	0.359	0.279	0.215	0.4	0.191	0.274	0.427
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	<0.1	0.1	0.1	0.13	0.12	0.1	0.11	0.1	<0.1	0.13	0.12
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.445	1.03	0.297	0.3	0.466	0.751	0.32	0.621	0.564	0.25	0.728
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	4.24	7.07	5.15	3.98	4.45	6.91	6.92	5.35	5.99	7.04	4.8
Moisture Content	%	79.2	78.8	78	77.6	79.3	79.2	77.7	79.6	82.1	78.4	79.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQF16A-NRPK-009-MUSCLE	AQF11-NRPK-024-MUSCLE	AQF11-NRPK-025-MUSCLE	AQF11-NRPK-027-MUSCLE	AQF11-NRPK-028-MUSCLE	AQF11-NRPK-014-MUSCLE	AQF11-NRPK-015-MUSCLE	AQF11-NRPK-016-MUSCLE	AQF11-NRPK-017-MUSCLE	AQF11-NRPK-012-MUSCLE	AQF11-NRPK-020-MUSCLE
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake
DateSampled		Jul 19, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-119	L1807581-122	L1807581-125	L1807581-128	L1807581-131	L1807581-134	L1807581-137	L1807581-140	L1807581-143	L1807581-146	L1807581-149
Aluminum	mg/kg ww	0.74	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.011	0.031	0.028	0.016	0.034	0.039	0.032	0.029	0.029	0.026	0.036
Barium	mg/kg ww	0.152	0.07	0.062	<0.04	0.048	0.109	0.161	0.145	0.084	0.271	0.096
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.088	0.13	0.141	0.061	0.132	0.153	0.157	0.146	0.12	0.142	0.133
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.943	0.785	0.674	0.326	0.509	0.404	0.991	0.847	0.631	0.954	0.199
Mercury	mg/kg ww	0.88	0.116	0.103	0.09	0.186	0.212	0.194	0.197	0.315	0.284	0.406
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	<0.1	0.11	0.11	<0.1	0.13	0.12	0.12	0.12	0.12	0.11	0.12
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.631	0.28	0.325	0.127	0.246	0.236	0.481	0.428	0.264	0.596	0.089
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	4.48	4.17	3.72	1.94	3.73	3.75	4.21	3.87	3.74	5.01	6.85
Moisture Content	%	82	78.8	80.6	80.4	79.6	79.6	79.1	79.8	80.3	79.1	79.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQM9-NRPK-015-MUSCLE	AQM9-NRPK-014-MUSCLE	AQM9-NRPK-012-MUSCLE	AQM9-NRPK-011-MUSCLE	AQM9-NRPK-09-MUSCLE	AQM9-NRPK-06-MUSCLE	AQM9-NRPK-05-MUSCLE	AQM9-NRPK-04-MUSCLE	AQM9-NRPK-01-MUSCLE	AQM9-NRPK-02-MUSCLE	AQF16B-LKWH-018-MUSCLE
Sample Type												
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Swede Lake
DateSampled		Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 20, 2016
Laboratory Sample ID	Units	L1807581-152	L1807581-155	L1807581-158	L1807581-161	L1807581-164	L1807581-167	L1807581-170	L1807581-173	L1807581-176	L1807581-179	L1808034-117
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.013	0.014	0.015	0.018	0.014	0.014	0.013	<0.01	0.04	<0.01	0.046
Barium	mg/kg ww	0.112	0.101	0.097	0.043	<0.04	0.062	0.042	0.13	0.105	0.048	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.191	0.196	0.154	0.201	0.187	0.189	0.192	0.171	0.234	0.189	0.191
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.995	1.07	0.359	0.37	0.36	0.526	0.392	0.77	0.903	0.273	0.226
Mercury	mg/kg ww	0.128	0.135	0.269	0.269	0.256	0.302	0.201	<1	0.37	0.675	---
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02
Nickel	mg/kg ww	<0.1	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.21	0.29	0.14	0.25	0.25	0.25	0.25	0.2	0.23	0.21	0.2
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.909	0.866	0.364	0.414	0.347	0.561	0.415	1	1.11	0.291	0.048
Thallium	mg/kg ww	<0.006	<0.006	0.0075	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	6.04	10.9	4.69	9.49	5.33	5.83	5.87	8	6.22	5.27	3.39
Moisture Content	%	77.9	75.1	77.4	78	78.8	77.1	78.9	82.8	76.8	78.1	76.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQF16B-LKWH-019-MUSCLE	AQF16B-LKWH-020-MUSCLE	AQF16B-LKWH-021-MUSCLE	AQF16B-LKWH-022-MUSCLE	AQF16B-LKWH-023-MUSCLE	AQF16A-LKWH-009-MUSCLE	AQF16A-LKWH-008-MUSCLE	AQF16A-LKWH-010-MUSCLE	AQF16A-LKWH-011-MUSCLE	AQF16A-LKWH-012-MUSCLE	AQF16A-LKWH-006-MUSCLE
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1808034-120	L1808034-123	L1808034-126	L1808034-129	L1808034-132	L1808034-150	L1808034-153	L1808034-156	L1808034-159	L1808034-162	L1808034-165
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.085	0.087	0.062	0.09	0.108	0.074	0.099	0.066	0.068	0.052	0.033
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	0.247	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.149	0.179	0.223	0.153	0.146	0.118	0.194	0.169	0.171	0.119	0.131
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.285	0.236	0.158	0.2	0.212	0.2	0.217	0.154	0.2	0.117	0.199
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.14	0.18	0.19	0.12	0.13	0.14	0.13	0.15	0.16	0.2	0.23
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.637	0.321	0.081	0.192	0.171	0.155	0.302	0.04	0.171	0.056	0.247
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	3.94	6.4	4.83	3.55	3.52	3.11	3.73	3.69	3.52	3.18	3.44
Moisture Content	%	75	68.9	69	77.5	78.4	75	75.4	74	69.8	70.5	73.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQF16A-LKWH-004-MUSCLE	AQF16A-LKWH-007-MUSCLE	AQM11-LKWH-12-MUSCLE	AQM11-LKWH-17-MUSCLE	AQM11-LKWH-16-MUSCLE	AQM11-LKWH-15-MUSCLE	AQM11-LKWH-14-MUSCLE	AQM11-LKWH-13-MUSCLE	AQM37-LKWH-05-MUSCLE	AQM37-LKWH-06-MUSCLE	AQM37-LKWH-09-MUSCLE
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 19, 2016	Jul 19, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 17, 2016	Jul 17, 2016
Laboratory Sample ID	Units	L1808034-168	L1808034-171	L1808034-174	L1808034-177	L1808034-180	L1808034-243	L1808034-246	L1808034-249	L1808034-252	L1808034-255	L1808034-258
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	1.01	0.64	0.72	14.1	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.043	0.066	0.023	<0.01	0.012	<0.01	<0.01	0.01	0.021	0.033	0.017
Barium	mg/kg ww	<0.04	0.041	0.052	0.137	0.062	0.115	0.337	0.07	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	0.007	0.0059	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	0.024	0.02	<0.02	0.021	0.048	<0.02	<0.02	0.037	<0.02
Copper	mg/kg ww	0.141	0.202	0.185	0.411	0.31	0.224	0.309	0.254	0.277	0.22	0.192
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.14	0.428	0.268	0.326	0.327	0.346	0.759	0.383	0.181	0.238	0.201
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/kg ww	<0.1	<0.1	<0.1	0.18	0.12	0.12	0.21	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.19	0.15	0.34	0.23	0.24	0.23	0.25	0.27	0.32	0.22	0.32
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.055	0.807	0.925	1.63	0.84	1.31	0.525	1.13	0.12	0.239	0.264
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	3.6	5.66	4.16	7	5.16	5.22	5.08	6.02	3.81	5.33	4.13
Moisture Content	%	74.4	71.3	77.9	79.9	79.5	80.7	80.1	78.1	73.4	73.1	76.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Muscle

Sample Name		AQM37-LKWH-07-MUSCLE	AQM37-LKWH-08-MUSCLE	AQM37-LKWH-11-MUSCLE	AQM9-LKWH-03-MUSCLE	AQF16A-LKWH-005-MUSCLE
Sample Type						
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Swede Lake
DateSampled		Jul 17, 2016	Jul 17, 2016	Jul 17, 2016	Jul 15, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1808034-261	L1808034-264	L1808034-267	L1808034-270	L1808034-273
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.02	0.013	0.019	0.022	0.047
Barium	mg/kg ww	<0.04	<0.04	<0.04	0.045	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.053	0.046	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.29	0.448	0.142	0.153	0.149
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.281	0.307	0.114	0.235	0.125
Mercury	mg/kg ww	---	---	---	---	---
Molybdenum	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.28	0.34	0.27	0.3	0.23
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	0.381	0.553	0.115	0.659	0.176
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	9.76	6.11	3.09	3.41	3.4
Moisture Content	%	71.7	74.9	75	77	72.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX D.9
BASELINE DATA FOR FISH CARCASS

Baseline Data for Fish Carcass

Sample Name		COCKERAM LAKE WALLEYE - WHOLE BODY	AQM - COCKERAM LAKE NORTHERN LAKE - WHOLE	AQM - COCKERAM LAKE NORTHERN LAKE - WHOLE	AQM - COCKERAM LAKE NORTHERN LAKE - WHOLE	AQM - COCKERAM LAKE NORTHERN LAKE - WHOLE	AQM - COCKERAM LAKE NORTHERN LAKE - WHOLE	FARLEY LAKE - NORTHERN PIKE - WHOLE BODY 1	FARLEY LAKE - NORTHERN PIKE - WHOLE BODY 2	FARLEY LAKE - NORTHERN PIKE - WHOLE BODY 3	SWEDE LAKE - NORTHERN PIKE - WHOLE BODY 1	SWEDE LAKE - NORTHERN PIKE - WHOLE BODY 2
Sample Type												
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 29, 2015	Jun 29, 2015	Jun 29, 2015	Jul 1, 2015	Jul 1, 2015
Laboratory Sample ID	Units	L1635153-73	L1635153-74	L1635153-75	L1635153-76	L1635153-77	L1635153-78	L1636528-7	L1636528-8	L1636528-9	L1636528-44	L1636528-45
Aluminum	mg/kg ww	7.01	0.68	1.7	0.94	<0.6	<0.6	<0.6	1.3	0.63	0.75	1.59
Arsenic	mg/kg ww	0.018	0.01	0.013	0.011	0.012	<0.01	0.07	0.074	0.048	0.016	0.019
Barium	mg/kg ww	1.66	0.407	0.62	0.325	0.669	0.292	1.42	2.52	2.42	0.435	1.36
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.009	0.0116	0.0142	0.01	0.0126	0.0088	<0.004	<0.004	<0.004	<0.004	0.0066
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.105	0.023	<0.02	0.037	0.022	0.038	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.439	0.296	0.257	0.337	0.25	0.264	0.348	0.351	0.348	0.212	0.351
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	27.7	2.68	4.17	2.4	3.56	2.11	6.42	6.14	5.28	3.67	8.27
Mercury	mg/kg ww	0.221	0.124	0.202	0.139	0.247	0.126	0.151	0.13	0.147	0.238	0.324
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	0.68	0.12	0.12	0.17	0.11	0.13	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.28	0.27	0.23	0.32	0.24	0.26	0.14	0.14	0.14	0.14	0.14
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	6.72	4.02	6.74	3.24	5.19	3.4	4.1	6.52	5.45	3.41	5.4
Thallium	mg/kg ww	0.0068	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	11.6	45.7	40.8	85.9	48.7	37.1	35.2	51.5	95.9	32.8	57.8
Moisture Content	%	75.9	75.7	79.1	70.3	73.4	81.3	74.6	76.1	76.8	75.9	75.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		SWEDE LAKE - NORTHERN PIKE - WHOLE BODY 3	SWEDE LAKE - NORTHERN PIKE - WHOLE BODY 4	SWEDE LAKE - NORTHERN PIKE - WHOLE BODY 5	SWEDE LAKE - WALLEYE - WHOLE BODY 1	SWEDE LAKE - WALLEYE - WHOLE BODY 1	SWEDE LAKE - WALLEYE - WHOLE BODY 2	SWEDE LAKE - WALLEYE - WHOLE BODY 3	AQF11 PIKE 1 - CARCASS	AQF11 PIKE 1 - CARCASS	AQF11 PIKE 2 - CARCASS	AQF11 PIKE 3 - CARCASS
Sample Type						Lab Dup				Lab Dup		
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake
DateSampled		Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015
Laboratory Sample ID	Units	L1636528-46	L1636528-47	L1636528-48	L1636528-55	L1636528-55	L1636528-56	L1636528-57	L1651767-3	L1651767-3	L1651767-6	L1651767-9
Aluminum	mg/kg ww	<0.6	<0.6	2.83	1.86	1.86	2.89	1.22	0.82	0.82	<0.6	<0.6
Arsenic	mg/kg ww	0.014	0.019	0.021	0.021	0.021	0.026	0.027	0.018	0.018	0.015	0.013
Barium	mg/kg ww	0.549	0.501	0.563	0.469	0.469	0.554	0.983	0.302	0.302	0.969	0.522
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0067	0.0082	0.0068	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0043	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.258	0.281	0.328	0.197	0.197	0.219	0.213	0.25	0.25	0.241	0.227
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	5.62	4.55	6.16	0.775	0.775	1.24	1.09	3.93	3.93	5.71	3.46
Mercury	mg/kg ww	0.243	0.383	0.099	0.509	0.509	0.342	0.469	0.128	0.128	0.151	0.15
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.292	0.292	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.13	0.16	0.15	0.16	0.16	0.17	0.17	0.14	0.14	0.13	0.12
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	3.49	4.22	2.8	3.06	3.06	4.74	6.05	2.89	2.89	2.98	3.25
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	0.0048	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	115	54	70.3	9.85	9.85	9.08	10.9	39.5	39.5	40.4	27.5
Moisture Content	%	77.9	72	70.5	76.5	76.5	67.1	74.5	74.3	74.3	79.3	78

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQF11 PIKE 4 - CARCASS	AQF11 PIKE 5 - CARCASS	AQF8 PIKE 1 - CARCASS	AQF8 PIKE 2 - CARCASS	AQM16-NRPK-19-CARCASS	AQM16-NRPK-19-CARCASS	AQM16-NRPK-18-CARCASS	AQM16-NRPK-18-CARCASS	AQM16-NRPK-14-CARCASS	AQM16-NRPK-15-CARCASS	AQM16-NRPK-15-CARCASS
Sample Type							Lab Dup		Lab Dup			Lab Dup
Sampling Area		Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake
DateSampled		Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016
Laboratory Sample ID	Units	L1651767-12	L1651767-15	L1651767-18	L1651767-21	L1807581-3	L1807581-3	L1807581-6	L1807581-6	L1807581-9	L1807581-12	L1807581-12
Aluminum	mg/kg ww	<0.6	<0.6	0.68	2.51	0.62	0.62	<0.6	<0.6	1.2	<0.6	<0.6
Arsenic	mg/kg ww	0.017	0.021	0.059	0.053	0.027	0.027	0.023	0.023	0.044	0.042	0.042
Barium	mg/kg ww	0.41	0.49	0.905	1.62	0.375	0.375	0.26	0.26	1.35	1.09	1.09
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	0.0089	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0042	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.245	0.279	0.278	0.338	0.272	0.272	0.218	0.218	0.251	0.27	0.27
Lead	mg/kg ww	<0.04	5.35	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	3.62	6.46	4.62	5.02	2.54	2.54	1.08	1.08	2.39	2.48	2.48
Mercury	mg/kg ww	0.125	0.117	0.11	0.218	0.046	0.046	0.045	0.045	0.066	0.068	0.068
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.14	0.15	0.13	0.15	0.16	0.16	0.14	0.14	0.14	0.14	0.14
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	2.34	3.63	2.88	4.8	2.75	2.75	1.85	1.85	4.81	4.52	4.52
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.0074	0.0062	0.0062
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	29.2	54.3	46.7	46.4	34.8	34.8	22.6	22.6	40.5	39.5	39.5
Moisture Content	%	74.1	75.3	77.1	73	82.3	82.3	78.1	78.1	78.6	80.9	80.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQM16-NRPK-04-CARCASS	AQM16-NRPK-04-CARCASS	AQM16-NRPK-08-CARCASS	AQM16-NRPK-12-CARCASS	AQM16-NRPK-06-CARCASS	AQM16-NRPK-02-CARCASS	AQM16-NRPK-01-CARCASS	AQM13-NRPK-07-CARCASS	AQM13-NRPK-20-CARCASS	AQM13-NRPK-18-CARCASS	AQM13-NRPK-16-CARCASS
Sample Type			Lab Dup									
Sampling Area		MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake
DateSampled		Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-15	L1807581-15	L1807581-18	L1807581-21	L1807581-24	L1807581-27	L1807581-30	L1807581-33	L1807581-36	L1807581-39	L1807581-42
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.035	0.035	0.035	0.032	0.033	0.035	0.035	<0.01	<0.01	<0.01	<0.01
Barium	mg/kg ww	0.708	0.708	0.598	0.896	0.676	0.711	0.49	0.39	0.428	0.505	1.02
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.252	0.252	0.269	0.294	0.232	0.266	0.234	0.246	0.212	0.252	0.237
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	2.22	2.22	1.8	2.47	2.18	1.81	1.42	1.16	1.86	2.18	4.91
Mercury	mg/kg ww	0.064	0.064	0.069	0.064	0.05	0.063	0.058	0.037	0.026	0.026	0.025
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.17	0.17	0.18	0.16	0.14	0.17	0.15	0.13	0.14	0.15	0.14
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	3.78	3.78	2.71	4.87	4.43	5.66	2.67	3.24	3.75	5.49	10.7
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	48.1	48.1	39.8	42.2	46.8	44.7	31	36	29.8	26.9	38.2
Moisture Content	%	74.3	74.3	74.8	75.3	75.4	69	75.1	76.5	74.8	74	75.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQM13-NRPK-13-CARCASS	AQM13-NRPK-04-CARCASS	AQM13-NRPK-05-CARCASS	AQM13-NRPK-11-CARCASS	AQM13-NRPK-01-CARCASS	AQM13-NRPK-12-CARCASS	AQF8-NRPK-16-CARCASS	AQF8-NRPK-10-CARCASS	AQF8-NRPK-17-CARCASS	AQF8-NRPK-18-CARCASS	AQF8-NRPK-18-CARCASS
Sample Type												Lab Dup
Sampling Area		MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake
DateSampled		Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016
Laboratory Sample ID	Units	L1807581-45	L1807581-48	L1807581-51	L1807581-54	L1807581-57	L1807581-60	L1807581-63	L1807581-66	L1807581-69	L1807581-72	L1807581-72
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	1.05	<0.6	<0.6	0.91	<0.6	0.71	0.69	0.69
Arsenic	mg/kg ww	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	0.048	0.053	0.038	0.044	0.044
Barium	mg/kg ww	0.302	0.399	0.242	0.613	0.488	0.807	0.58	1.33	1.93	0.618	0.618
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.211	0.232	0.185	0.233	0.338	0.275	0.273	0.273	0.372	0.374	0.374
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.47	1.89	0.822	2.61	3.07	3.85	7.19	9.41	12.9	3.83	3.83
Mercury	mg/kg ww	0.031	0.029	0.029	0.025	0.026	0.027	0.079	0.086	0.118	0.09	0.09
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.12	0.15	0.12	0.14	0.15	0.14	0.12	0.15	0.13	0.12	0.12
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	2.96	3.55	2.01	5.65	4.16	8.14	4.52	6.5	8.43	2.53	2.53
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	27.6	31.3	17	43.3	47.5	42.6	39.4	66	62.7	53.5	53.5
Moisture Content	%	64.3	74.7	78.4	77.4	73	73.6	78.6	77.3	78.6	78.9	78.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQF8-NRPK-19-CARCASS	AQF8-NRPK-19-CARCASS	AQF8-NRPK-11-CARCASS	AQF8-NRPK-11-CARCASS	AQF8-NRPK-13-CARCASS	AQF8-NRPK-14-CARCASS	AQF8-NRPK-12-CARCASS	AQF8-NRPK-12-CARCASS	AQF33-NRPK-25-CARCASS	AQF33-NRPK-25-CARCASS	AQF16A-NRPK-003-CARCASS
Sample Type			Lab Dup		Lab Dup				Lab Dup		Lab Dup	
Sampling Area		Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Swede Lake
DateSampled		Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1807581-75	L1807581-75	L1807581-78	L1807581-78	L1807581-81	L1807581-84	L1807581-87	L1807581-87	L1807581-90	L1807581-90	L1807581-93
Aluminum	mg/kg ww	0.74	0.74	0.7	0.7	0.95	1.96	<0.6	<0.6	<0.6	<0.6	2.28
Arsenic	mg/kg ww	0.046	0.046	0.059	0.059	0.052	0.05	0.05	0.05	0.049	0.049	0.022
Barium	mg/kg ww	0.884	0.884	3.83	3.83	2.57	6.69	4.57	4.57	2.17	2.17	0.557
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.308	0.308	0.341	0.341	0.296	0.316	0.26	0.26	0.294	0.294	0.221
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	5.51	5.51	12.5	12.5	7.48	19.2	12.4	12.4	5.14	5.14	4.15
Mercury	mg/kg ww	0.087	0.087	0.109	0.109	0.225	0.244	0.201	0.201	0.267	0.267	0.144
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	0.013	<0.01	0.017	0.017	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.13	0.13	0.14	0.14	0.12	0.13	0.12	0.12	0.13	0.13	0.13
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	4.53	4.53	19.2	19.2	7.3	18.3	13.8	13.8	5.31	5.31	5.22
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	0.0036	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	45.7	45.7	45.3	45.3	50.4	58	39.9	39.9	53	53	33.1
Moisture Content	%	75.3	75.3	75	75	80.4	78.8	78.5	78.5	78.8	78.8	76.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQF16A-NRPK-011-CARCASS	AQF16A-NRPK-013-CARCASS	AQF16A-NRPK-007-CARCASS	AQF16A-NRPK-008-CARCASS	AQF16A-NRPK-017-CARCASS	AQF16A-NRPK-016-CARCASS	AQF16A-NRPK-015-CARCASS	AQF16A-NRPK-014-CARCASS	AQF16A-NRPK-009-CARCASS	AQF11-NRPK-024-CARCASS	AQF11-NRPK-025-CARCASS
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake
DateSampled		Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 22, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-96	L1807581-99	L1807581-102	L1807581-105	L1807581-108	L1807581-111	L1807581-114	L1807581-117	L1807581-120	L1807581-123	L1807581-126
Aluminum	mg/kg ww	2.48	0.63	2.13	1.23	6.34	1.27	0.96	<0.6	1.28	<0.6	0.75
Arsenic	mg/kg ww	0.025	0.016	0.019	0.017	0.02	0.017	0.022	0.02	0.01	0.027	0.025
Barium	mg/kg ww	1.77	0.874	1.25	1.49	3.03	0.61	0.483	2.56	1.71	1.07	1.25
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0059	0.0041	<0.004	0.0044	<0.004	<0.004	0.0042	0.0067	0.0082	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.31	0.234	0.218	0.281	0.253	0.236	0.255	0.284	0.249	0.287	0.267
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	7.25	3.65	5.5	7.57	10.4	6.05	3.78	8.71	7.75	9.32	8.45
Mercury	mg/kg ww	0.167	0.283	0.236	0.333	0.259	0.164	0.192	0.313	0.612	0.084	0.075
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.16	0.14	0.13	0.13	0.13	0.14	0.14	0.14	0.13	0.14	0.14
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	5.87	4.82	6.2	6.83	9.87	6.15	3.57	6.07	8.06	6.54	7.8
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	56.3	43.8	43.6	69	52.3	54.5	49.5	56.7	71.7	73.9	29.6
Moisture Content	%	76.2	77.7	77.6	77.6	79	73.3	77.6	77.7	79.6	77.7	78.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQF11-NRPK-027-CARCASS	AQF11-NRPK-028-CARCASS	AQF11-NRPK-028-CARCASS	AQF11-NRPK-014-CARCASS	AQF11-NRPK-015-CARCASS	AQF11-NRPK-016-CARCASS	AQF11-NRPK-017-CARCASS	AQF11-NRPK-012-CARCASS	AQF11-NRPK-020-CARCASS	AQF11-NRPK-020-CARCASS	AQM9-NRPK-015-CARCASS
Sample Type				Lab Dup							Lab Dup	
Sampling Area		Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 15, 2016
Laboratory Sample ID	Units	L1807581-129	L1807581-132	L1807581-132	L1807581-135	L1807581-138	L1807581-141	L1807581-144	L1807581-147	L1807581-150	L1807581-150	L1807581-153
Aluminum	mg/kg ww	<0.6	11.2	11.2	<0.6	1.35	43.9	0.65	1.2	1.71	1.71	1.84
Arsenic	mg/kg ww	0.023	0.029	0.029	0.038	0.03	0.034	0.029	0.025	0.03	0.03	0.01
Barium	mg/kg ww	0.706	0.605	0.605	2.06	1.33	1.99	1.23	1.53	1.82	1.82	0.887
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	<0.004	0.0044	<0.004	<0.004	<0.004	<0.004	0.0333
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.032
Copper	mg/kg ww	0.23	0.323	0.323	0.323	0.316	0.344	0.292	0.243	0.279	0.279	0.393
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	6.63	3.8	3.8	6.1	7.87	8.61	6.31	4.85	4.96	4.96	5.19
Mercury	mg/kg ww	0.135	0.142	0.142	0.153	0.13	0.131	0.201	0.213	0.261	0.261	0.081
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.22
Selenium	mg/kg ww	0.14	0.15	0.15	0.16	0.15	0.15	0.16	0.13	0.14	0.14	0.24
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	3.93	2.85	2.85	5.38	5.3	5.4	4.09	4.36	5.16	5.16	9.06
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	0.002	0.002	<0.002	<0.002	0.0078	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	34.9	35.7	35.7	50.2	49.1	80.4	61.1	41.7	38.8	38.8	52.8
Moisture Content	%	80.1	78.8	78.8	76.6	75.2	78.4	77.6	78.3	76.1	76.1	76.3

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQM9-NRPK-014-CARCASS	AQM9-NRPK-012-CARCASS	AQM9-NRPK-012-CARCASS	AQM9-NRPK-011-CARCASS	AQM9-NRPK-09-CARCASS	AQM9-NRPK-06-CARCASS	AQM9-NRPK-05-CARCASS	AQM9-NRPK-04-CARCASS	AQM9-NRPK-01-CARCASS	AQM9-NRPK-01-CARCASS	AQM9-NRPK-02-CARCASS
Sample Type				Lab Dup							Lab Dup	
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016
Laboratory Sample ID	Units	L1807581-156	L1807581-159	L1807581-159	L1807581-162	L1807581-165	L1807581-168	L1807581-171	L1807581-174	L1807581-177	L1807581-177	L1807581-180
Aluminum	mg/kg ww	1.59	1.08	1.08	1.48	1.55	0.76	<0.6	2.26	0.63	0.63	2.23
Arsenic	mg/kg ww	<0.01	0.016	0.016	0.011	0.012	0.012	<0.01	<0.01	0.035	0.035	<0.01
Barium	mg/kg ww	0.552	1.04	1.04	0.733	0.566	0.392	0.397	1.52	0.662	0.662	0.844
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0084	0.0058	0.0058	0.0114	0.009	0.0058	0.0047	0.0153	0.0103	0.0103	0.011
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.045	<0.02	<0.02	0.033	0.043	<0.02	<0.02	0.027	0.042	0.042	0.025
Copper	mg/kg ww	0.283	0.318	0.318	0.317	0.261	0.214	0.228	0.275	0.245	0.245	0.262
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	3.65	2.63	2.63	3.34	4.34	2.51	3.4	6.8	4.78	4.78	3.25
Mercury	mg/kg ww	0.085	0.159	0.159	0.16	0.156	0.23	0.15	0.503	0.216	0.216	0.505
Molybdenum	mg/kg ww	<0.01	<0.01	<0.01	0.01	0.016	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	mg/kg ww	0.25	<0.1	<0.1	0.21	0.22	0.14	<0.1	0.22	0.16	0.16	0.21
Selenium	mg/kg ww	0.26	0.18	0.18	0.26	0.24	0.25	0.23	0.26	0.22	0.22	0.25
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	5.93	4.44	4.44	7.38	7.31	4.08	4.75	11.7	7.29	7.29	5.95
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	42	54.4	54.4	46.3	38.4	22.9	19.8	72.2	29.3	29.3	39.9
Moisture Content	%	78.9	75.6	75.6	77.5	77.5	79.2	78.3	78.9	77.3	77.3	77.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQF16B-LKWH-018-CARCASS	AQF16B-LKWH-018-CARCASS	AQF16B-LKWH-019-CARCASS	AQF16B-LKWH-020-CARCASS	AQF16B-LKWH-021-CARCASS	AQF16B-LKWH-022-CARCASS	AQF16B-LKWH-023-CARCASS	AQF16A-LKWH-009-CARCASS	AQF16A-LKWH-009-CARCASS	AQF16A-LKWH-008-CARCASS	AQF16A-LKWH-010-CARCASS
Sample Type			Lab Dup							Lab Dup		
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1808034-118	L1808034-118	L1808034-121	L1808034-124	L1808034-127	L1808034-130	L1808034-133	L1808034-151	L1808034-151	L1808034-154	L1808034-157
Aluminum	mg/kg ww	0.61	0.61	<0.6	0.92	0.77	8.08	2.22	1.81	1.81	1.06	2.15
Arsenic	mg/kg ww	0.042	0.042	0.061	0.066	0.048	0.065	0.083	0.058	0.058	0.076	0.059
Barium	mg/kg ww	0.427	0.427	0.174	0.31	0.228	0.378	0.277	0.247	0.247	0.184	0.322
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	<0.004	0.006	<0.004	<0.004	<0.004	<0.004	<0.004	0.0043
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.348	0.348	0.313	0.362	0.382	0.455	0.331	0.347	0.347	0.297	0.444
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	2.04	2.04	0.63	1.99	1.26	1.43	0.991	0.838	0.838	0.623	1.67
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.24	0.24	0.16	0.27	0.24	0.15	0.16	0.16	0.16	0.14	0.21
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	7.88	7.88	5.92	5.84	4.47	6.07	7.2	5.74	5.74	4.59	5.97
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	39.1	39.1	13.7	65.1	51.3	12.4	17.7	12.4	12.4	13.3	30.3
Moisture Content	%	67.7	67.7	67.4	65.2	69.7	73.1	72.4	67.9	67.9	65.9	69.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQF16A-LKWH-011-CARCASS	AQF16A-LKWH-012-CARCASS	AQF16A-LKWH-006-CARCASS	AQF16A-LKWH-004-CARCASS	AQF16A-LKWH-007-CARCASS	AQF16A-LKWH-007-CARCASS	AQM11-LKWH-12-CARCASS	AQM11-LKWH-17-CARCASS	AQM11-LKWH-16-CARCASS	AQM11-LKWH-15-CARCASS	AQM11-LKWH-14-CARCASS
Sample Type							Lab Dup					
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016
Laboratory Sample ID	Units	L1808034-160	L1808034-163	L1808034-166	L1808034-169	L1808034-172	L1808034-172	L1808034-175	L1808034-178	L1808034-181	L1808034-244	L1808034-247
Aluminum	mg/kg ww	1.94	<0.6	0.81	<0.6	<0.6	<0.6	3.39	7.57	1.1	7.79	16.5
Arsenic	mg/kg ww	0.059	0.048	0.033	0.045	0.063	0.063	0.024	<0.01	0.012	0.011	0.017
Barium	mg/kg ww	0.294	0.32	0.192	0.396	0.246	0.246	0.671	0.648	0.538	0.509	0.5
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	0.004	<0.004	<0.004	0.0086	0.0111	0.0048	0.01	0.0139
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.055	0.036	0.023	0.051	0.088
Copper	mg/kg ww	0.363	0.261	0.312	0.368	0.344	0.344	0.447	0.602	0.313	0.546	0.881
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.55	1.43	1.37	2.56	1.37	1.37	1.41	1.46	1.09	2.03	2.87
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.21	0.31	0.12	0.32	0.64
Selenium	mg/kg ww	0.19	0.22	0.27	0.25	0.19	0.19	0.34	0.25	0.23	0.26	0.27
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	6.67	5.45	4.13	9.82	5.05	5.05	11.5	7.61	7.93	6.48	5.55
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.0062	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0021
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	20	29.5	26.1	27.2	28.4	28.4	13.9	17.3	13.8	20.9	15.4
Moisture Content	%	67	70.1	68.9	67.3	64.3	64.3	71.1	77.7	79.5	78.9	79.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Carcass

Sample Name		AQM11-LKWH-13-CARCASS	AQM37-LKWH-05-CARCASS	AQM37-LKWH-05-CARCASS	AQM37-LKWH-06-CARCASS	AQM37-LKWH-09-CARCASS	AQM37-LKWH-07-CARCASS	AQM37-LKWH-08-CARCASS	AQM37-LKWH-11-CARCASS	AQM9-LKWH-03-CARCASS	AQM9-LKWH-03-CARCASS	AQF16A-LKWH-005-CARCASS
Sample Type				Lab Dup							Lab Dup	
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Swede Lake
DateSampled		Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 17, 2016	Jul 17, 2016	Jul 17, 2016	Jul 17, 2016	Jul 17, 2016	Jul 15, 2016	Jul 15, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1808034-250	L1808034-253	L1808034-253	L1808034-256	L1808034-259	L1808034-262	L1808034-265	L1808034-268	L1808034-271	L1808034-271	L1808034-274
Aluminum	mg/kg ww	6.39	<0.6	<0.6	<0.6	<0.6	1.34	0.65	0.67	7.3	7.3	2.27
Arsenic	mg/kg ww	0.014	0.02	0.02	0.033	0.016	0.014	<0.01	0.025	0.019	0.019	0.034
Barium	mg/kg ww	0.643	0.336	0.336	0.576	0.635	0.396	0.585	0.299	0.631	0.631	0.655
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0098	0.0142	0.0142	0.0122	0.007	0.0096	0.0101	0.0063	0.0123	0.0123	0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.058	0.025	0.025	0.091	0.039	0.081	0.096	0.061	0.045	0.045	<0.02
Copper	mg/kg ww	0.457	0.373	0.373	0.303	0.308	0.377	0.305	0.312	0.435	0.435	0.379
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	2.25	2.72	2.72	3.25	1.36	2.36	2.38	1.11	1.55	1.55	2.59
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/kg ww	0.28	0.13	0.13	0.13	0.12	0.15	0.11	<0.1	0.3	0.3	<0.1
Selenium	mg/kg ww	0.29	0.39	0.39	0.25	0.33	0.29	0.33	0.26	0.31	0.31	0.25
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	10.2	5.56	5.56	10.3	10.4	8.72	11.5	5.65	9.23	9.23	8.73
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	0.0027	0.0027	0.0031	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	26.4	17.3	17.3	23.4	14	14.6	15.9	13.2	14.7	14.7	23.1
Moisture Content	%	74.2	68.6	68.6	69.3	73.6	68.9	72.9	71.9	74.9	74.9	70

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX D.10
BASELINE DATA FOR FISH LIVER

Baseline Data for Fish Liver

Sample Name		COCKERAM LAKE NORTHERN PIKE - LIVER 1	COCKERAM LAKE NORTHERN PIKE - LIVER 2	COCKERAM LAKE NORTHERN PIKE - LIVER 3	COCKERAM LAKE NORTHERN PIKE - LIVER 4	COCKERAM LAKE NORTHERN PIKE - LIVER 5	COCKERAM LAKE WALLEYE - LIVER	FARLEY LAKE - NORTHERN PIKE - LIVER 1	FARLEY LAKE - NORTHERN PIKE - LIVER 1	FARLEY LAKE - NORTHERN PIKE - LIVER 2	FARLEY LAKE - NORTHERN PIKE - LIVER 3	SWEDE LAKE - NORTHERN PIKE - LIVER 1
Sample Type									Lab Dup			
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Swede Lake
DateSampled		Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 27, 2015	Jun 29, 2015	Jun 29, 2015	Jun 29, 2015	Jun 29, 2015	Jul 1, 2015
Laboratory Sample ID	Units	L1635153-61	L1635153-62	L1635153-63	L1635153-64	L1635153-65	L1635153-71	L1636528-1	L1636528-1	L1636528-2	L1636528-3	L1636528-34
Aluminum	mg/kg ww	0.94	1.99	1.1	3.27	1.14	1.69	0.98	0.98	1.5	1.95	1.45
Arsenic	mg/kg ww	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.056	0.056	0.064	0.036	<0.01
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0552	0.0868	0.092	0.156	0.129	0.292	0.0088	0.0088	0.01	0.0166	0.0398
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.071	0.051	0.06	0.088	0.086	0.157	0.024	0.024	0.033	0.032	0.027
Copper	mg/kg ww	9.06	8.73	12.4	15.7	13.4	2.11	11.2	11.2	17.1	9.76	15.6
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.13	0.946	1.18	0.925	0.727	1.8	0.957	0.957	1.33	1.73	1.24
Mercury	mg/kg ww	0.095	0.129	0.063	0.162	0.069	0.096	0.035	0.035	0.055	0.061	0.171
Molybdenum	mg/kg ww	0.138	0.129	0.093	0.142	0.121	0.134	0.122	0.122	0.148	0.152	0.152
Nickel	mg/kg ww	0.25	0.2	0.19	0.3	0.3	0.4	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	1.28	1.62	1.2	1.63	1.28	1.02	0.98	0.98	1.13	1.18	1.01
Silver	mg/kg ww	0.031	0.031	0.034	0.047	0.045	<0.02	0.09	0.09	0.172	0.076	0.199
Strontium	mg/kg ww	0.029	0.026	0.035	0.031	0.039	0.089	0.027	0.027	0.045	0.03	0.023
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	0.0143	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	0.15	<0.1	<0.1	0.11	0.11	0.25	0.35	0.17
Zinc	mg/kg ww	39.4	25.7	24.5	31.8	28.7	17	22.2	22.2	33.4	28.2	37.4
Moisture Content	%	---	---	---	---	---	---	63.9	63.9	66.6	71.7	70.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		SWEDE LAKE - NORTHERN PIKE - LIVER 2	SWEDE LAKE - NORTHERN PIKE - LIVER 3	SWEDE LAKE - NORTHERN PIKE - LIVER 4	SWEDE LAKE - NORTHERN PIKE - LIVER 5	SWEDE LAKE - WALLEYE - LIVER 1	SWEDE LAKE - WALLEYE - LIVER 2	SWEDE LAKE - WALLEYE - LIVER 3	AQF11 PIKE 1 - LIVER	AQF11 PIKE 2 - LIVER	AQF11 PIKE 3 - LIVER	AQF11 PIKE 4 - LIVER
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake
DateSampled		Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 1, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 31, 2015
Laboratory Sample ID	Units	L1636528-35	L1636528-36	L1636528-37	L1636528-38	L1636528-49	L1636528-50	L1636528-51	L1651767-1	L1651767-4	L1651767-7	L1651767-10
Aluminum	mg/kg ww	1.79	2.45	1.04	1.25	5.23	1.55	2.23	1.13	2.17	1.78	0.74
Arsenic	mg/kg ww	0.018	0.02	0.014	0.022	0.051	0.058	0.068	0.013	0.012	0.01	0.013
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	0.123	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0673	0.108	0.0775	0.0284	0.144	0.0743	0.108	0.0113	0.0268	0.0229	0.0115
Chromium	mg/kg ww	<0.1	0.27	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.028	0.042	<0.02	0.035	0.09	0.729	0.744	0.027	0.034	0.038	0.028
Copper	mg/kg ww	14.2	16.1	12.3	11.3	1.89	1.87	2.35	16.2	26.3	55.4	13.9
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	0.134	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.13	1.97	0.913	1.77	1.77	1.31	1.65	1.17	1.09	1.22	1.2
Mercury	mg/kg ww	0.246	0.246	0.247	0.093	0.338	0.195	0.359	0.071	0.12	0.107	0.062
Molybdenum	mg/kg ww	0.143	0.302	0.109	0.269	0.118	0.121	0.202	0.18	0.233	0.26	0.188
Nickel	mg/kg ww	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	1.04	1.02	1.06	1.07	0.8	0.74	0.94	1.07	1.17	1.12	1.11
Silver	mg/kg ww	0.209	0.409	0.1	0.157	<0.02	<0.02	<0.02	0.174	0.371	0.468	0.14
Strontium	mg/kg ww	0.031	0.038	0.02	0.038	0.967	0.035	0.068	0.021	0.029	0.025	0.024
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	0.0091	0.0081	0.0099	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	0.24	0.4	0.21	0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.13	<0.1
Zinc	mg/kg ww	24.2	65.4	30.2	49.4	21.2	17.7	21.6	37.6	41.7	54	31
Moisture Content	%	67	73.3	66.2	61.4	75.4	76.4	67.9	64.4	71.6	75.5	65.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQF11 PIKE 5 - LIVER	AQF8 PIKE 1 - LIVER	AQF8 PIKE 2 - LIVER	AQM16-NRPK-19-LIVER	AQM16-NRPK-18-LIVER	AQM16-NRPK-14-LIVER	AQM16-NRPK-15-LIVER	AQM16-NRPK-04-LIVER	AQM16-NRPK-08-LIVER	AQM16-NRPK-12-LIVER	AQM16-NRPK-06-LIVER
Sample Type												
Sampling Area		Gordon Region - Susan Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake
DateSampled		Jul 31, 2015	Jul 31, 2015	Jul 31, 2015	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016
Laboratory Sample ID	Units	L1651767-13	L1651767-16	L1651767-19	L1807581-1	L1807581-4	L1807581-7	L1807581-10	L1807581-13	L1807581-16	L1807581-19	L1807581-22
Aluminum	mg/kg ww	1	1.52	2.82	<0.6	<0.6	0.82	1.33	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.016	0.021	0.033	0.024	0.015	0.026	0.029	0.015	0.019	0.019	0.02
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.055	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.012	0.0076	0.011	<0.004	0.0053	0.0466	0.0378	0.0079	0.0221	0.0172	0.0081
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.026	0.03	0.03	0.021	0.02	0.029	0.041	0.021	0.023	<0.02	0.021
Copper	mg/kg ww	17.3	24.4	34.4	5.85	6.86	23.8	21.3	4.26	15.4	10.8	12.1
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.1	0.987	1.05	1.02	1.22	1.23	1.44	0.793	0.74	0.648	0.678
Mercury	mg/kg ww	0.074	0.042	0.101	0.035	0.042	0.055	0.063	0.034	0.054	0.028	0.042
Molybdenum	mg/kg ww	0.171	0.162	0.166	0.179	0.208	0.258	0.312	0.163	0.157	0.135	0.15
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	1.36	1.43	1.46	0.65	0.84	0.86	1.27	1.21	1.57	1.1	1.3
Silver	mg/kg ww	0.11	0.134	0.151	<0.02	0.022	0.117	0.086	<0.02	0.045	0.045	0.041
Strontium	mg/kg ww	0.03	0.037	0.044	0.04	0.085	0.043	0.103	0.032	0.025	0.023	0.035
Thallium	mg/kg ww	<0.006	<0.006	<0.006	0.0085	0.0077	0.0146	0.0196	0.006	0.0096	<0.006	0.0092
Uranium	mg/kg ww	<0.002	<0.002	0.0027	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	0.21	0.34	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	33.7	34.5	33.9	37.1	40.2	50.4	69.1	29	46.1	28.9	34.8
Moisture Content	%	64	67.6	73.1	74.1	100	74.7	82.1	64.6	66.6	67.3	66.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQM16-NRPK-02-LIVER	AQM16-NRPK-01-LIVER	AQM13-NRPK-07-LIVER	AQM13-NRPK-20-LIVER	AQM13-NRPK-18-LIVER	AQM13-NRPK-16-LIVER	AQM13-NRPK-13-LIVER	AQM13-NRPK-04-LIVER	AQM13-NRPK-05-LIVER	AQM13-NRPK-11-LIVER	AQM13-NRPK-01-LIVER
Sample Type												
Sampling Area		MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake
DateSampled		Jul 21, 2016	Jul 21, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-25	L1807581-28	L1807581-31	L1807581-34	L1807581-37	L1807581-40	L1807581-43	L1807581-46	L1807581-49	L1807581-52	L1807581-55
Aluminum	mg/kg ww	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Arsenic	mg/kg ww	0.014	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.042	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0179	0.0077	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0049	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.023	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	0.021	<0.02	<0.02
Copper	mg/kg ww	14.7	7.06	3.94	4.8	8.1	5.64	5.26	7.1	8.03	5.7	5.95
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.747	0.59	0.872	0.695	0.589	0.747	0.583	0.668	0.774	0.679	0.924
Mercury	mg/kg ww	0.049	0.039	0.025	0.022	0.036	0.024	0.024	0.019	0.032	0.023	0.02
Molybdenum	mg/kg ww	0.178	0.146	0.131	0.13	0.136	0.142	0.156	0.091	0.173	0.113	0.106
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	1.51	1.23	0.92	0.96	1.24	1.01	1.17	1.12	1.23	0.98	0.95
Silver	mg/kg ww	0.044	<0.02	<0.02	0.022	0.041	0.034	0.024	0.035	0.035	0.031	0.025
Strontium	mg/kg ww	0.032	0.028	0.027	0.021	0.027	0.027	0.025	0.022	0.053	0.029	0.03
Thallium	mg/kg ww	0.0066	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	44.4	28.1	28.8	34.6	25.2	32.6	27.3	23.4	34.4	26.2	29.1
Moisture Content	%	68.2	63.7	68.9	71.5	64.7	74.4	61.8	70	71.8	70.8	70.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQM13-NRPK-12-LIVER	AQF8-NRPK-16-LIVER	AQF8-NRPK-10-LIVER	AQF8-NRPK-17-LIVER	AQF8-NRPK-18-LIVER	AQF8-NRPK-19-LIVER	AQF8-NRPK-11-LIVER	AQF8-NRPK-13-LIVER	AQF8-NRPK-14-LIVER	AQF8-NRPK-12-LIVER	AQF33-NRPK-25-LIVER
Sample Type												
Sampling Area		MacLellan Region - Lobster Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake	Gordon Region - Farley Lake
DateSampled		Jul 22, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016	Jul 16, 2016
Laboratory Sample ID	Units	L1807581-58	L1807581-61	L1807581-64	L1807581-67	L1807581-70	L1807581-73	L1807581-76	L1807581-79	L1807581-82	L1807581-85	L1807581-88
Aluminum	mg/kg ww	5.94	0.71	<0.6	1.08	1.23	1.13	0.83	2.77	2.94	3.27	2.42
Arsenic	mg/kg ww	<0.01	0.04	0.046	0.024	0.039	0.035	0.037	0.043	0.028	0.028	0.028
Barium	mg/kg ww	0.06	<0.04	<0.04	<0.04	<0.04	0.043	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	<0.004	<0.004	0.0097	0.0147	0.0099	0.0065	0.0201	0.0229	0.0231	0.0188
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.02	0.03	<0.02	0.033	0.032	0.026	0.029	0.035	0.028	0.033	0.038
Copper	mg/kg ww	8.22	7.3	6.87	16.5	26.8	13.6	28.4	12.7	45.7	22.8	51.9
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.81	1.65	0.775	1.96	1.43	1.13	0.783	1.77	1.17	0.847	1.08
Mercury	mg/kg ww	0.025	0.067	0.029	0.068	0.057	0.059	0.063	0.15	0.414	0.172	0.198
Molybdenum	mg/kg ww	0.143	0.239	0.13	0.249	0.188	0.155	0.15	0.232	0.147	0.156	0.194
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	1.03	0.8	0.84	0.95	1.19	1.11	1.32	0.95	1.12	1.12	1.34
Silver	mg/kg ww	0.043	0.099	0.053	0.142	0.193	0.176	0.245	0.185	0.287	0.329	0.389
Strontium	mg/kg ww	0.06	0.061	0.027	0.034	0.042	0.209	0.06	0.055	0.037	0.046	0.036
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	0.0037	0.0027	0.0037
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	0.15	0.36	0.32	0.14	0.5	0.41	0.45	0.39
Zinc	mg/kg ww	23.7	48.4	31.2	47.4	59.7	31.2	28.7	45.9	31.4	32.8	42.3
Moisture Content	%	70	65.5	65.7	72.5	71.5	67.2	71.8	78.7	77.8	69.6	74

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQF16A-NRPK-003-LIVER	AQF16A-NRPK-011-LIVER	AQF16A-NRPK-013-LIVER	AQF16A-NRPK-007-LIVER	AQF16A-NRPK-008-LIVER	AQF16A-NRPK-017-LIVER	AQF16A-NRPK-016-LIVER	AQF16A-NRPK-015-LIVER	AQF16A-NRPK-014-LIVER	AQF16A-NRPK-009-LIVER	AQF11-NRPK-024-LIVER
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Susan Lake
DateSampled		Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-91	L1807581-94	L1807581-97	L1807581-100	L1807581-103	L1807581-106	L1807581-109	L1807581-112	L1807581-115	L1807581-118	L1807581-121
Aluminum	mg/kg ww	<0.6	1.22	2.06	2.08	<0.6	2.55	5.57	0.89	2.16	8.77	<0.6
Arsenic	mg/kg ww	0.019	0.018	0.014	0.014	0.013	0.016	0.011	0.016	0.011	0.018	0.018
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0107	0.072	0.0621	0.0289	0.0088	0.063	0.115	0.0309	0.0831	0.24	0.0121
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.026	<0.02	0.03	0.028	<0.02	0.044	0.03	<0.02	0.024	0.052	0.022
Copper	mg/kg ww	15.7	46.2	15.5	38.4	10.9	21.3	18.3	13.3	15.9	55.1	21.9
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.902	0.773	0.865	1.09	0.641	1.34	1.19	0.782	0.878	1.2	0.997
Mercury	mg/kg ww	0.067	0.057	0.196	0.123	0.081	0.179	0.32	0.098	0.167	1.11	0.045
Molybdenum	mg/kg ww	0.18	0.103	0.17	0.169	0.118	0.242	0.199	0.119	0.121	0.262	0.152
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.82	1.22	1.2	1.05	0.81	1.4	0.96	0.85	0.79	1.41	0.97
Silver	mg/kg ww	0.072	0.43	0.131	0.373	0.043	0.211	0.29	0.091	0.174	0.358	0.223
Strontium	mg/kg ww	0.032	0.023	0.032	0.03	0.018	0.032	0.029	0.023	0.029	0.043	0.04
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0038	<0.002
Vanadium	mg/kg ww	<0.1	0.29	0.22	0.26	<0.1	0.36	0.53	0.12	0.27	0.77	<0.1
Zinc	mg/kg ww	43.6	21.5	32.7	53.6	38.9	41.3	38.3	31.4	31.4	54.6	47
Moisture Content	%	69	73.5	78.9	77.6	68.7	78.4	75.4	69.6	66.3	76.2	74.7

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQF11-NRPK-025-LIVER	AQF11-NRPK-027-LIVER	AQF11-NRPK-028-LIVER	AQF11-NRPK-014-LIVER	AQF11-NRPK-015-LIVER	AQF11-NRPK-016-LIVER	AQF11-NRPK-017-LIVER	AQF11-NRPK-012-LIVER	AQF11-NRPK-020-LIVER	AQM9-NRPK-015-LIVER	AQM9-NRPK-014-LIVER
Sample Type												
Sampling Area		Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 15, 2016	Jul 15, 2016
Laboratory Sample ID	Units	L1807581-124	L1807581-127	L1807581-130	L1807581-133	L1807581-136	L1807581-139	L1807581-142	L1807581-145	L1807581-148	L1807581-151	L1807581-154
Aluminum	mg/kg ww	<0.6	0.87	<0.6	1.2	1.08	0.98	1.59	2.05	3.04	1.39	1.1
Arsenic	mg/kg ww	0.017	0.013	<0.01	0.023	0.019	0.019	0.016	0.016	0.025	<0.01	<0.01
Barium	mg/kg ww	<0.04	0.452	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0099	0.017	0.0072	0.017	0.0178	0.0104	0.0172	0.0371	0.0455	0.14	0.0904
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.022	0.024	<0.02	0.024	0.028	<0.02	<0.02	0.03	0.032	0.097	0.114
Copper	mg/kg ww	19.9	20.6	9.33	31.4	23.7	14.4	22.2	60	47.2	23.8	21.5
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.877	0.945	0.463	0.657	1.03	0.697	0.59	0.812	0.946	1.29	1.18
Mercury	mg/kg ww	0.035	0.068	0.085	0.067	0.077	0.077	0.093	0.134	0.192	0.059	0.071
Molybdenum	mg/kg ww	0.159	0.136	0.086	0.124	0.15	0.121	0.102	0.151	0.177	0.253	0.191
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.45	0.39
Selenium	mg/kg ww	1.07	0.91	0.58	1.05	1.16	1.02	0.73	1.35	1.32	1.66	1.38
Silver	mg/kg ww	0.165	0.239	0.117	0.504	0.447	0.218	0.246	0.485	0.605	0.105	0.074
Strontium	mg/kg ww	0.022	0.034	0.016	0.044	0.032	0.02	0.02	0.03	0.033	0.086	0.029
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.0072	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	0.13	0.11	<0.1	0.28	0.2	0.23	<0.1	<0.1
Zinc	mg/kg ww	27.8	27.5	12.9	23.9	26.5	18.8	17.7	32.8	28.2	109	37.9
Moisture Content	%	71.7	78	74.6	71.6	72.8	66.9	76.4	66.2	68.9	77.1	67.4

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQM9-NRPK-012-LIVER	AQM9-NRPK-011-LIVER	AQM9-NRPK-09-LIVER	AQM9-NRPK-06-LIVER	AQM9-NRPK-05-LIVER	AQM9-NRPK-04-LIVER	AQM9-NRPK-01-LIVER	AQM9-NRPK-02-LIVER	AQF16B-LKWH-018-LIVER	AQF16B-LKWH-019-LIVER	AQF16B-LKWH-020-LIVER
Sample Type												
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 15, 2016	Jul 20, 2016	Jul 20, 2016	Jul 20, 2016
Laboratory Sample ID	Units	L1807581-157	L1807581-160	L1807581-163	L1807581-166	L1807581-169	L1807581-172	L1807581-175	L1807581-178	L1808034-116	L1808034-119	L1808034-122
Aluminum	mg/kg ww	0.88	2.4	1.73	1.81	1.26	8.19	1.68	6.02	0.61	<0.6	<0.6
Arsenic	mg/kg ww	0.012	<0.01	<0.01	<0.01	<0.01	0.014	0.029	0.011	0.055	0.048	0.104
Barium	mg/kg ww	1.14	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0197	0.268	0.304	0.211	0.214	0.454	0.183	0.422	0.099	0.0055	0.0271
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	<0.1	0.14	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.025	0.133	0.222	0.098	0.115	0.133	0.1	0.154	0.026	<0.02	0.023
Copper	mg/kg ww	18.5	33	27.1	24.7	50.3	47.6	26.1	40	5.12	5.11	2.72
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	0.845	1.23	0.691	0.657	0.734	0.945	0.823	1.58	2.91	0.996	3.21
Mercury	mg/kg ww	0.067	0.154	0.087	0.122	0.108	0.933	0.113	0.748	---	---	---
Molybdenum	mg/kg ww	0.133	0.198	0.119	0.125	0.162	0.229	0.076	0.232	0.234	0.095	0.138
Nickel	mg/kg ww	<0.1	0.55	0.72	0.44	0.46	1.04	0.32	0.89	<0.1	<0.1	<0.1
Selenium	mg/kg ww	1.06	1.77	1.36	1.37	1.47	1.94	1.17	2.48	1.27	1.02	1.08
Silver	mg/kg ww	0.086	0.107	0.069	0.071	0.1	0.175	0.058	0.13	0.041	<0.02	<0.02
Strontium	mg/kg ww	0.053	0.052	0.041	0.027	0.062	0.089	0.032	0.042	0.058	0.085	0.106
Thallium	mg/kg ww	0.006	0.0064	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.0266	0.0191	0.0312
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	0.13	0.19	0.17	<0.1	0.35	0.1	0.43	<0.1	<0.1	<0.1
Zinc	mg/kg ww	28.3	51.5	38.7	32.7	43.2	43.8	27	49.2	676	22.7	733
Moisture Content	%	74	71.4	74.4	71.3	74.5	76.8	74.9	72.7	73.1	61.7	71.7

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQF16B-LKWH-021-LIVER	AQF16B-LKWH-022-LIVER	AQF16B-LKWH-023-LIVER	AQF16A-LKWH-009-LIVER	AQF16A-LKWH-008-LIVER	AQF16A-LKWH-010-LIVER	AQF16A-LKWH-011-LIVER	AQF16A-LKWH-012-LIVER	AQF16A-LKWH-006-LIVER	AQF16A-LKWH-004-LIVER	AQF16A-LKWH-007-LIVER
Sample Type												
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jul 20, 2016	Jul 20, 2016	Jul 20, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1808034-125	L1808034-128	L1808034-131	L1808034-149	L1808034-152	L1808034-155	L1808034-158	L1808034-161	L1808034-164	L1808034-167	L1808034-170
Aluminum	mg/kg ww	0.83	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	1.11	1.06	0.7	<0.6
Arsenic	mg/kg ww	0.041	0.048	0.042	0.044	0.052	0.079	0.053	0.036	0.042	0.036	0.092
Barium	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.457	<0.04	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0974	0.0064	0.0067	0.0099	0.0079	0.0268	0.0397	0.0781	0.107	0.115	0.0261
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.021	<0.02	<0.02	0.02	<0.02	0.023	0.024	0.032	<0.02	0.023	0.033
Copper	mg/kg ww	4.06	3.75	3.14	3.13	4.83	8.32	4.8	6.94	3.06	7.88	4.25
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.64	1.64	1.31	1.05	1.07	2.27	2.8	2.36	1.75	2.11	2.54
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	0.127	0.121	0.105	0.088	0.119	0.128	0.17	0.224	0.136	0.169	0.191
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.98	1.18	1.01	0.82	0.94	0.92	1.03	1.16	0.99	0.92	0.97
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	0.025	<0.02	<0.02	<0.02	<0.02	0.021
Strontium	mg/kg ww	0.063	0.101	0.077	0.131	0.148	0.114	0.108	0.073	0.294	0.103	0.059
Thallium	mg/kg ww	0.0178	0.0321	0.0268	0.0163	0.0167	0.0325	0.0236	0.0179	0.0131	0.0184	0.05
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	670	25.9	23.5	20.4	23.6	676	257	634	510	693	345
Moisture Content	%	74.1	---	71	67.1	59.3	70	72.8	72.3	76.6	76.4	69.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQM11-LKWH-12-LIVER	AQM11-LKWH-17-LIVER	AQM11-LKWH-16-LIVER	AQM11-LKWH-15-LIVER	AQM11-LKWH-14-LIVER	AQM11-LKWH-13-LIVER	AQM37-LKWH-05-LIVER	AQM37-LKWH-06-LIVER	AQM37-LKWH-09-LIVER	AQM37-LKWH-07-LIVER	AQM37-LKWH-08-LIVER
Sample Type												
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 17, 2016	Jul 17, 2016	Jul 17, 2016	Jul 17, 2016
Laboratory Sample ID	Units	L1808034-173	L1808034-176	L1808034-179	L1808034-242	L1808034-245	L1808034-248	L1808034-251	L1808034-254	L1808034-257	L1808034-260	L1808034-263
Aluminum	mg/kg ww	0.91	2.55	2.16	3.89	1.6	1.55	1.24	1.72	0.7	1.47	1.22
Arsenic	mg/kg ww	0.03	0.011	0.029	<0.01	0.022	0.021	0.016	0.028	0.041	0.018	<0.01
Barium	mg/kg ww	0.094	1.99	0.508	0.217	<0.04	<0.04	<0.04	<0.04	0.689	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.17	0.0619	0.036	0.0466	0.134	0.114	0.187	0.228	0.08	0.156	0.16
Chromium	mg/kg ww	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.167	0.109	0.101	0.098	0.258	0.119	0.112	0.316	0.142	0.365	0.281
Copper	mg/kg ww	6.64	3.85	2.62	2.77	3.87	4.2	6.1	17.3	4.79	13.1	2.53
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	2.1	1.93	3.14	2.05	2.39	2.58	1.41	1.89	1.89	1.46	1.48
Mercury	mg/kg ww	---	---	---	---	---	---	---	---	---	---	---
Molybdenum	mg/kg ww	0.124	0.094	0.075	0.087	0.149	0.172	0.095	0.149	0.131	0.156	0.115
Nickel	mg/kg ww	0.26	0.35	0.58	0.45	0.54	0.35	0.2	0.34	0.19	0.37	0.18
Selenium	mg/kg ww	1.41	1.22	0.92	1.17	1.64	1.83	1.04	1.29	1.11	1.13	1.29
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.023	<0.02	0.025	<0.02
Strontium	mg/kg ww	0.833	0.269	8.33	0.285	0.216	0.201	0.273	0.263	3.89	0.184	0.173
Thallium	mg/kg ww	0.0136	0.0418	0.0661	0.0227	0.0294	0.0231	0.0137	0.0205	0.0136	<0.006	0.0105
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	27.6	31.3	28.3	23.3	37.8	31.7	26.9	33.4	30.5	25.5	23.2
Moisture Content	%	78.2	---	---	---	---	---	77.1	75.4	---	76.8	---

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Fish Liver

Sample Name		AQM37-LKWH-11-LIVER	AQM9-LKWH-03-LIVER	AQF16A-LKWH-005-LIVER
Sample Type				
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Swede Lake
DateSampled		Jul 17, 2016	Jul 15, 2016	Jul 19, 2016
Laboratory Sample ID	Units	L1808034-266	L1808034-269	L1808034-272
Aluminum	mg/kg ww	1.07	1.13	0.64
Arsenic	mg/kg ww	0.011	0.013	0.025
Barium	mg/kg ww	<0.04	<0.04	<0.04
Beryllium	mg/kg ww	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0404	0.166	0.0752
Chromium	mg/kg ww	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.186	0.164	0.024
Copper	mg/kg ww	6.78	4.41	6.02
Lead	mg/kg ww	<0.04	<0.04	<0.04
Manganese	mg/kg ww	1.38	1.87	1.39
Mercury	mg/kg ww	---	---	---
Molybdenum	mg/kg ww	0.12	0.114	0.16
Nickel	mg/kg ww	0.18	0.33	<0.1
Selenium	mg/kg ww	1.14	1.09	0.94
Silver	mg/kg ww	<0.02	<0.02	0.031
Strontium	mg/kg ww	0.149	0.158	0.079
Thallium	mg/kg ww	0.0076	0.0108	0.0254
Uranium	mg/kg ww	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1
Zinc	mg/kg ww	21.6	36.1	276
Moisture Content	%	77.6	---	76.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX D.11
BASELINE DATA FOR WHOLE BODY FISH

Baseline Data for Whole Body Fish

Sample Name		SWEDE LAKE - YELLOW PERCH - WHOLE BODY 1	SWEDE LAKE - YELLOW PERCH - WHOLE BODY 2	GORDON LAKE - BROOK STICKLEBAC K #1-4	GORDON LAKE - BROOK STICKLEBAC K #1-4	GORDON LAKE - BROOK STICKLEBAC K #5-6	COCKERAM - SPOTTAIL SHINER #1-5	DOT LAKE - BROOK STICKLEBAC K #1-5	AQM31-BRST-13-COMPOSITE	AQM31-BRST-12-COMPOSITE	AQM31-BRST-07-COMPOSITE	AQM31-BRST-02-COMPOSITE
Sample Type					Lab Dup							
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Dot Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake
DateSampled		Jul 1, 2015	Jul 1, 2015	Sep 11, 2015	Sep 11, 2015	Sep 12, 2015	Sep 15, 2015	Sep 15, 2015	Jul 25, 2016	Jul 25, 2016	Jul 25, 2016	Jul 25, 2016
Laboratory Sample ID	Units	L1636528-58	L1636528-59	L1692108-1	L1692108-1	L1692108-2	L1692108-7	L1692108-8	L1807581-181	L1807581-182	L1807581-183	L1807581-184
Aluminum	mg/kg ww	5.21	3.81	17.5	17.5	17.3	2.2	10.7	1.02	1.4	1.91	1.38
Arsenic	mg/kg ww	<0.01	0.017	0.053	0.053	0.045	0.07	0.038	0.014	0.015	0.018	0.029
Barium	mg/kg ww	0.801	1.09	1.54	1.54	1.04	1.34	2.64	1.83	1.42	1.83	1.59
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	0.0083	0.0044	0.0044	0.0051	0.0243	0.0116	0.004	<0.004	<0.004	0.0048
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	0.025	0.025	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.325	0.592	1.34	1.34	1	0.563	1.63	1.11	0.944	1.02	1.38
Lead	mg/kg ww	<0.04	<0.04	0.043	0.043	<0.04	<0.04	<0.04	<0.04	<0.04	0.085	<0.04
Manganese	mg/kg ww	4.99	5.73	18.7	18.7	19.3	2.65	5.82	3.26	2.52	3.01	3.78
Mercury	mg/kg ww	0.063	0.035	0.044	0.044	0.03	0.026	0.045	0.022	0.021	0.014	0.018
Molybdenum	mg/kg ww	0.022	0.026	0.024	0.024	0.025	0.018	0.023	0.022	0.024	0.023	0.024
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	0.33	0.28	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.15	0.2	0.14	0.14	0.12	0.38	0.19	0.19	0.17	0.18	0.18
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	4.75	6.59	5.28	5.28	4.87	9.07	10.3	8.82	5.98	8.14	7.31
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	0.0021	0.0022	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	19.3	16.2	35.1	35.1	31.9	35.5	39.3	42.4	24.5	33.3	40.2
Moisture Content	%	68.7	69.7	---	---	---	---	---	78.1	75.7	76	76.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Whole Body Fish

Sample Name		AQM31-BRST-11-COMPOSITE	AQM31-BRST-03-COMPOSITE	AQM31-BRST-01-COMPOSITE	AQM31-BRST-01-COMPOSITE	AQM31-BRST-05-COMPOSITE	AQM31-BRST-05-COMPOSITE	AQF2-BRST-02-COMPOSITE	AQF2-BRST-11-COMPOSITE	AQF2-BRST-08-COMPOSITE	AQF2-BRST-12-COMPOSITE	AQF2-BRST-13-COMPOSITE
Sample Type					Lab Dup		Lab Dup					
Sampling Area		MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	MacLellan Region - Payne Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake
DateSampled		Jul 25, 2016	Jul 25, 2016	Jul 25, 2016	Jul 25, 2016	Jul 25, 2016	Jul 25, 2016	Jul 17, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 18, 2016
Laboratory Sample ID	Units	L1807581-185	L1807581-186	L1807581-187	L1807581-187	L1807581-188	L1807581-188	L1807581-189	L1807581-190	L1807581-191	L1807581-192	L1807581-193
Aluminum	mg/kg ww	1.32	1.84	1.5	1.5	1.03	1.03	3.91	3.76	11	5.65	8.55
Arsenic	mg/kg ww	0.017	0.019	0.015	0.015	0.014	0.014	0.04	0.038	0.045	0.052	0.044
Barium	mg/kg ww	1.97	2.06	2.01	2.01	1.66	1.66	0.974	0.976	1.02	0.889	0.676
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	<0.004	0.0056	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	1.44	1.14	0.89	0.89	1.12	1.12	1.14	1.01	0.966	1.01	1.11
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	3.22	3.63	3.69	3.69	2.61	2.61	13.8	12.3	13.4	11.4	11.1
Mercury	mg/kg ww	0.021	0.022	0.021	0.021	0.018	0.018	0.026	0.021	0.019	0.04	0.023
Molybdenum	mg/kg ww	0.023	0.026	0.019	0.019	0.022	0.022	0.024	0.027	0.028	0.028	0.025
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.2	0.18	0.16	0.16	0.16	0.16	0.12	0.11	0.12	0.13	0.13
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	8.57	9.71	10.5	10.5	8.31	8.31	4.66	4.7	3.51	3.69	2.83
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	47.6	56.9	34.7	34.7	30.5	30.5	31.9	30.5	25.6	21.2	22.9
Moisture Content	%	76.5	76.1	78.3	78.3	72.7	72.7	72.7	75.6	72.9	75.3	73.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Whole Body Fish

Sample Name		AQF2-BRST-04-COMPOSITE	AQF2-BRST-10-COMPOSITE	AQF2-BRST-07-COMPOSITE	AQM16-BRST-01-COMPOSITE	AQM16-BRST-02-COMPOSITE	AQM16-BRST-03-COMPOSITE	AQM16-BRST-04-COMPOSITE	AQM13-BRST-01-COMPOSITE	AQM13-BRST-02-COMPOSITE	AQM13-BRST-03-COMPOSITE	AQM13-BRST-04-COMPOSITE
Sample Type												
Sampling Area		Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	Gordon Region - Gordon Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake
DateSampled		Jul 18, 2016	Jul 18, 2016	Jul 18, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 21, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016
Laboratory Sample ID	Units	L1807581-194	L1807581-195	L1807581-196	L1807581-197	L1807581-198	L1807581-199	L1807581-200	L1807581-201	L1807581-202	L1807581-203	L1807581-204
Aluminum	mg/kg ww	13.7	3.87	2.03	2.89	1.25	3.6	2.18	2.9	4.11	1.57	3.96
Arsenic	mg/kg ww	0.067	0.046	0.04	0.063	0.07	0.055	0.06	0.015	0.014	0.015	0.016
Barium	mg/kg ww	1.14	0.761	0.691	1.86	1.62	1.18	1.25	2.68	2.12	2.01	2.78
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0052	<0.004	<0.004	0.0146	0.0183	0.0158	0.0161	0.0043	0.0046	0.0055	0.0073
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	1.13	1.23	0.966	1.63	1.69	1.52	1.31	1.52	1.1	1.07	1.2
Lead	mg/kg ww	<0.04	<0.04	<0.04	0.176	0.088	0.469	0.509	0.052	<0.04	<0.04	0.046
Manganese	mg/kg ww	18.6	13.6	10.1	6.18	6.62	6.94	6.51	7.06	5.85	5.17	6.72
Mercury	mg/kg ww	0.037	0.025	0.02	0.05	0.07	0.045	0.045	0.017	0.019	0.016	0.023
Molybdenum	mg/kg ww	0.029	0.028	0.023	0.049	0.052	0.047	0.056	0.023	0.032	0.03	0.042
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.13	0.13	0.11	0.23	0.25	0.24	0.22	0.19	0.19	0.2	0.16
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	3.98	3.76	3.28	7.88	8.2	5.79	6.27	11.4	9.17	8.11	10.2
Thallium	mg/kg ww	<0.006	<0.006	<0.006	0.0063	0.0085	<0.006	0.0065	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	27.3	28.1	24.1	31.9	25.5	36.6	36.4	55.3	40.4	39.4	46.7
Moisture Content	%	72.8	74.2	72.2	76.6	75	75.5	73.3	77.6	79.2	76.8	76

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Whole Body Fish

Sample Name		AQM13-BRST-05-COMPOSITE	AQM13-BRST-06-COMPOSITE	AQF11-BRST-01-COMPOSITE	AQF11-BRST-02-COMPOSITE	AQF11-BRST-03-COMPOSITE	AQF11-BRST-04-COMPOSITE	AQF11-BRST-05-COMPOSITE	AQF11-BRST-06-COMPOSITE	AQF11-BRST-07-COMPOSITE	AQF11-BRST-07-COMPOSITE	AQM35-BRST-8-COMPOSITE
Sample Type											Lab Dup	
Sampling Area		MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	Gordon Region - Susan Lake	MacLellan Region - Dot Lake
DateSampled		Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 22, 2016	Jul 24, 2016
Laboratory Sample ID	Units	L1807581-205	L1807581-206	L1807581-207	L1807581-208	L1807581-209	L1807581-210	L1807581-211	L1807581-212	L1807581-213	L1807581-213	L1807581-214
Aluminum	mg/kg ww	1.88	1.51	5.49	5.93	6.56	4.98	3.54	4.93	5.66	5.66	9.44
Arsenic	mg/kg ww	0.014	0.013	0.032	0.035	0.04	0.034	0.029	0.032	0.033	0.033	0.031
Barium	mg/kg ww	2.32	2.04	1.43	1.29	1.6	1.73	1.72	1.52	1.59	1.59	3.86
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.005	0.0048	0.0075	0.0075	0.0087	0.0052	0.0067	0.0062	0.0068	0.0068	0.0096
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.021
Copper	mg/kg ww	0.96	0.839	1.27	1.41	1.53	1.53	1.94	1.27	1.61	1.61	1.21
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	6.03	5.39	7.91	8.49	8.32	8.24	7.36	6.9	8.21	8.21	6.14
Mercury	mg/kg ww	0.017	0.014	0.018	0.017	0.018	0.017	0.024	0.019	0.019	0.019	0.042
Molybdenum	mg/kg ww	0.036	0.035	0.047	0.048	0.053	0.043	0.051	0.042	0.047	0.047	0.021
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.17	0.15	0.2	0.19	0.19	0.19	0.18	0.19	0.19	0.19	0.17
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	9.19	8.1	6.82	6.5	6.78	7.3	7.01	6.76	6.49	6.49	13.4
Thallium	mg/kg ww	0.007	0.0067	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	0.003	0.0033	0.0034	0.0026	0.0032	0.0027	0.0051	0.0051	0.0021
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	41.2	34.5	35.4	35.2	32.9	42	40.7	33.8	37.6	37.6	53.4
Moisture Content	%	77.7	79.1	77.7	77.5	78.6	76.5	79.6	77.8	79	79	77.9

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Whole Body Fish

Sample Name		AQM35-BRST-7-COMPOSITE	AQM35-BRST-6-COMPOSITE	AQM35-BRST-11-COMPOSITE	AQM35-BRST-12-COMPOSITE	AQM35-BRST-02-COMPOSITE	AQM35-BRST-02-COMPOSITE	AQM35-BRST-13-COMPOSITE	AQM35-BRST-03-COMPOSITE	AQM30-SPSH-18-COMPOSITE	AQM30-SPSH-14-COMPOSITE	AQM30-SPSH-03-COMPOSITE
Sample Type							Lab Dup					
Sampling Area		MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Dot Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake
DateSampled		Jul 21, 2016	Jul 20, 2016	Jul 24, 2016	Jul 22, 2016	Jul 20, 2016	Jul 20, 2016	Jul 24, 2016	Jul 20, 2016	Jul 24, 2016	Jul 24, 2016	Jul 24, 2016
Laboratory Sample ID	Units	L1807581-215	L1807581-216	L1807581-217	L1807581-218	L1807581-219	L1807581-219	L1807581-220	L1807581-221	L1807581-222	L1807581-223	L1807581-224
Aluminum	mg/kg ww	7.46	4.45	13	7.85	3.19	3.19	12.4	3.36	1.2	2.17	2.84
Arsenic	mg/kg ww	0.04	0.051	0.057	0.051	0.031	0.031	0.058	0.037	0.052	0.049	0.054
Barium	mg/kg ww	4.95	6.69	4.29	4.34	4.11	4.11	4.47	3.49	1.26	1.68	1.75
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0093	0.0102	0.0095	0.0102	0.0084	0.0084	0.0112	0.0123	0.0221	0.017	0.0255
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	0.026	0.024	0.025	0.021	0.021	0.028	0.025	<0.02	<0.02	<0.02
Copper	mg/kg ww	1.48	1.34	1.53	1.9	1.51	1.51	1.25	1.99	0.604	0.584	0.681
Lead	mg/kg ww	0.054	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	7.48	8.43	7.29	7.69	6.92	6.92	8.02	8.24	2.84	3	3.91
Mercury	mg/kg ww	0.035	0.046	0.04	0.046	0.043	0.043	0.037	0.056	0.03	0.03	0.031
Molybdenum	mg/kg ww	0.021	0.023	0.023	0.022	0.026	0.026	0.025	0.03	0.016	0.015	0.016
Nickel	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.22	0.27
Selenium	mg/kg ww	0.18	0.2	0.18	0.21	0.18	0.18	0.19	0.18	0.3	0.29	0.32
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	15.9	20.2	13.8	15	13.9	13.9	14.3	13.3	7.63	9.39	10
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	0.0023	0.0022	0.0024	<0.002	0.0021	0.0021	0.0024	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	54.5	56.7	51.6	53.9	48.5	48.5	46.7	63.1	33.2	38	39.6
Moisture Content	%	76.8	76.2	75.9	74.7	76.7	76.7	76.6	76.6	79.2	81.3	79.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Whole Body Fish

Sample Name		AQM30-SPSH-02-COMPOSITE	AQM30-SPSH-01-COMPOSITE	AQM30-SPSH-19-COMPOSITE	AQM30-SPSH-10-COMPOSITE	AQM30-SPSH-16-COMPOSITE	AQF11-BRST-11-COMPOSITE	AQF16A-SPSH-10-COMPOSITE	AQF16A-SPSH-10-COMPOSITE	AQF16A-SPSH-02-COMPOSITE	AQF16A-SPSH-07-COMPOSITE	AQF16A-SPSH-08-COMPOSITE
Sample Type									Lab Dup			
Sampling Area		MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	MacLellan Region - Cockeram Lake	Gordon Region - Susan Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake
DateSampled		Jul 24, 2016	Jul 24, 2016	Jul 24, 2016	Jul 24, 2016	Jul 24, 2016	Jul 30, 2016	Jul 30, 2016	Jul 30, 2016	Jul 30, 2016	Jul 30, 2016	Jul 30, 2016
Laboratory Sample ID	Units	L1807581-225	L1807581-226	L1807581-227	L1807581-228	L1807581-256	L1807581-257	L1807581-258	L1807581-258	L1807581-259	L1807581-260	L1807581-261
Aluminum	mg/kg ww	3.22	2.07	3.99	1.03	2	6.14	3.63	3.63	4.49	5.32	6.37
Arsenic	mg/kg ww	0.051	0.046	0.057	0.051	0.048	0.03	0.1	0.1	0.096	0.093	0.112
Barium	mg/kg ww	1.85	1.57	1.86	1.72	1.75	1.99	1.33	1.33	1.07	1.52	1.85
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.0263	0.0199	0.0212	0.0256	0.0184	0.0065	0.0046	0.0046	0.0058	0.0053	0.0065
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	0.022	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.661	0.577	0.662	0.647	0.571	1.37	0.58	0.58	0.563	0.558	0.623
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	4.04	3.19	4.31	3.62	3.4	11.8	3.37	3.37	2.95	4.18	5.1
Mercury	mg/kg ww	0.031	0.028	0.032	0.029	0.03	0.023	0.015	0.015	0.039	0.016	0.017
Molybdenum	mg/kg ww	0.018	0.016	0.017	0.015	0.015	0.042	0.022	0.022	0.021	0.022	0.026
Nickel	mg/kg ww	0.31	0.21	0.24	0.26	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.32	0.27	0.3	0.31	0.31	0.2	0.23	0.23	0.24	0.24	0.28
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	9.47	8.5	10.1	10.7	9.63	9.03	6.22	6.22	5.81	7.62	9.07
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	0.0055	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	42.4	36	40.8	38.8	39.4	38.4	29	29	37.7	32.9	39.2
Moisture Content	%	79	78.3	77.8	77.7	78.1	78.6	77.5	77.5	76.9	77.5	78

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Whole Body Fish

Sample Name		AQF16A-SPSH-06-COMPOSITE	AQF16A-SPSH-04-COMPOSITE	AQF16A-SPSH-09-COMPOSITE	AQF16A-SPSH-05-COMPOSITE	AQM13-BRST-07-COMPOSITE	AQM13-BRST-08-COMPOSITE	AQM16-BRST-05-COMPOSITE	AQM16-BRST-05-COMPOSITE
Sample Type									Lab Dup
Sampling Area		Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	Gordon Region - Swede Lake	MacLellan Region - Lobster Lake	MacLellan Region - Lobster Lake	MacLellan Region - Minton Lake	MacLellan Region - Minton Lake
DateSampled		Jul 30, 2016	Jul 30, 2016	Jul 30, 2016	Jul 30, 2016	Aug 1, 2016	Aug 1, 2016	Aug 1, 2016	Aug 1, 2016
Laboratory Sample ID	Units	L1807581-262	L1807581-263	L1807581-264	L1807581-265	L1807581-266	L1807581-267	L1807581-268	L1807581-268
Aluminum	mg/kg ww	4.36	5.54	5.6	7.7	1.95	1.29	1.42	1.42
Arsenic	mg/kg ww	0.087	0.109	0.109	0.108	0.023	0.018	0.051	0.051
Barium	mg/kg ww	2.25	1.94	1.51	1.68	2.67	2.42	1.29	1.29
Beryllium	mg/kg ww	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/kg ww	0.006	0.0059	0.0055	0.0054	0.0057	0.0049	0.0087	0.0087
Chromium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/kg ww	0.594	0.593	0.585	0.559	1.7	1.15	1.37	1.37
Lead	mg/kg ww	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Manganese	mg/kg ww	4.57	4.78	4.62	4.21	5.79	5.39	5.65	5.65
Mercury	mg/kg ww	0.017	0.017	0.016	0.015	0.014	0.013	0.056	0.056
Molybdenum	mg/kg ww	0.023	0.024	0.024	0.027	0.04	0.038	0.036	0.036
Nickel	mg/kg ww	0.42	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenium	mg/kg ww	0.24	0.26	0.24	0.24	0.17	0.17	0.19	0.19
Silver	mg/kg ww	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Strontium	mg/kg ww	8.41	7.16	8.09	7.82	11.4	9.62	7.07	7.07
Thallium	mg/kg ww	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Uranium	mg/kg ww	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium	mg/kg ww	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	mg/kg ww	38.1	37.6	33	34.6	37	36.4	25.8	25.8
Moisture Content	%	79.4	76.9	76.8	75.7	81	78.1	78.7	78.7

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

APPENDIX D.12
BASELINE DATA FOR SEDIMENT

Baseline Data for Sediment

Sample Name		AQF2 - GORDON LAKE - B	AQF2 - GORDON LAKE - C	AQF2 - GORDON LAKE - D	AQF8 - FARLEY LAKE - B	AQF8 - FARLEY LAKE - C	AQF8 - FARLEY LAKE - D	AQF16 - SWEDE LAKE - B	AQF16 - SWEDE LAKE - B	AQF16 - SWEDE LAKE - C	AQF16 - SWEDE LAKE - D	AQF16 - SWEDE LAKE - D
Sample Type									Lab Dup			Lab Dup
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Sep 11, 2015	Sep 11, 2015	Sep 11, 2015	Sep 12, 2015	Sep 12, 2015	Sep 12, 2015	Sep 13, 2015	Sep 13, 2015	Sep 13, 2015	Sep 13, 2015	Sep 13, 2015
Laboratory Sample ID	Units	L1675938-1	L1675938-2	L1675938-3	L1675938-4	L1675938-5	L1675938-6	L1675938-7	L1675938-7	L1675938-8	L1675938-9	L1675938-9
Aluminum	mg/kg	16800	19600	18800	16900	17100	18900	2120	2120	2050	2300	2300
Arsenic	mg/kg	5.56	5.87	5.85	6.54	6.89	7.18	0.97	0.97	0.85	0.91	0.91
Barium	mg/kg	127	131	128	144	140	173	16.8	16.8	15.6	17	17
Beryllium	mg/kg	0.6	0.55	0.63	0.78	0.59	0.68	<0.1	<0.1	<0.1	0.11	0.11
Cadmium	mg/kg	0.313	0.313	0.298	0.476	0.417	0.433	0.079	0.079	0.091	0.055	0.055
Chromium	mg/kg	36.5	53.8	36.3	33.2	33.4	37.5	3.8	3.8	3.5	4	4
Cobalt	mg/kg	10.2	10.6	9.83	10.8	11.1	13	2.74	2.74	2.27	2.9	2.9
Copper	mg/kg	21	21.1	19.9	22.9	24.8	26.1	2.5	2.5	2.3	2.4	2.4
Lead	mg/kg	6.6	5.79	6.79	15	9.69	11.9	1.89	1.89	1.62	2.01	2.01
Manganese	mg/kg	520	522	543	790	682	804	112	112	118	123	123
Mercury	mg/kg	0.065	0.062	0.073	0.12	0.115	0.121	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum	mg/kg	1.43	1.37	1.23	2.26	1.78	2.04	0.503	0.503	0.466	0.42	0.42
Nickel	mg/kg	30	39.4	29.7	25	26.3	27.7	2.81	2.81	2.68	2.98	2.98
Selenium	mg/kg	<0.5	0.72	0.65	0.67	0.72	0.81	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	35	29.1	34.7	42.7	35	41.3	4.56	4.56	4.18	5.54	5.54
Thallium	mg/kg	0.22	0.19	0.21	0.29	0.23	0.27	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	mg/kg	1.77	1.53	1.59	3.35	4.52	3.36	0.574	0.574	0.407	0.57	0.57
Vanadium	mg/kg	34.4	35.1	35.3	38.2	39.8	44.5	5.57	5.57	5.45	5.67	5.67
Zinc	mg/kg	88	89	86	98	98	104	11	11	10	<10	<10
Moisture Content	%	---	---	---	---	---	---	---	---	---	---	---

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQM9 - KEEWATIN RIVER NEAR FAR DS - B	AQM9 - KEEWATIN RIVER NEAR FAR DS - C	AQM9 - KEEWATIN RIVER NEAR FAR DS - D	AQM10 - COCKERAM LAKE - B	AQM10 - COCKERAM LAKE - C	AQM10 - COCKERAM LAKE - D	AQF11 - SUSAN LAKE - B	AQF11 - SUSAN LAKE - C	AQF11 - SUSAN LAKE - D	AQF33-A	AQF33-B
Sample Type												
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Sep 15, 2015	Sep 15, 2015	Sep 15, 2015	Sep 16, 2015	Sep 16, 2015	Sep 16, 2015	Sep 17, 2015	Sep 17, 2015	Sep 17, 2015	Sep 18, 2016	Sep 18, 2016
Laboratory Sample ID	Units	L1675938-19	L1675938-20	L1675938-21	L1675938-22	L1675938-23	L1675938-24	L1675938-25	L1675938-26	L1675938-27	L1831350-1	L1831350-2
Aluminum	mg/kg	8420	13400	7930	1480	1540	2240	22200	14600	17600	11900	19200
Arsenic	mg/kg	1.3	1.75	1.32	0.88	0.88	0.96	3.59	2.53	3.55	10.7	6.3
Barium	mg/kg	48.4	86.3	40.7	13.3	18.3	23.3	190	118	142	97.9	171
Beryllium	mg/kg	0.19	0.25	0.17	<0.1	<0.1	<0.1	0.9	0.48	0.59	0.62	0.81
Cadmium	mg/kg	0.406	0.644	0.371	0.078	0.081	0.086	0.323	0.191	0.276	0.289	0.384
Chromium	mg/kg	42.1	72.3	43	3.2	3.2	4.6	43.5	30.4	36	26.6	40.1
Cobalt	mg/kg	42.8	64.2	45.5	3.26	3.12	3.95	12.3	8.32	10.8	19.2	14.3
Copper	mg/kg	63.9	112	69.3	5.9	4.5	5.1	30	16.7	24.2	20.2	22.7
Lead	mg/kg	3.08	4.27	2.81	1.78	4.5	2.12	9.43	6.15	7.76	6.6	9.27
Manganese	mg/kg	266	405	258	132	381	628	600	379	517	697	836
Mercury	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.075	0.054	0.084	0.054	0.104
Molybdenum	mg/kg	0.291	0.379	0.258	0.138	0.142	0.2	5.8	4.32	5.83	2.85	1.58
Nickel	mg/kg	264	405	282	34.1	36.7	42.9	31.9	20.3	26.6	26.9	29.2
Selenium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.69	<0.5	0.59	1.23	1.03
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.091	0.095
Strontium	mg/kg	15	21.7	14.7	3.4	2.53	4.13	32.5	22	27.1	26.6	30.9
Thallium	mg/kg	<0.1	0.11	<0.1	<0.1	<0.1	<0.1	0.36	0.22	0.28	0.303	0.328
Uranium	mg/kg	0.897	0.95	0.719	0.709	0.372	0.604	6.7	3.68	4.54	3.02	2.62
Vanadium	mg/kg	14.8	20.5	12.9	3.83	4.44	5.3	45.4	31.4	38	39.6	46.9
Zinc	mg/kg	170	270	156	28	26	29	102	65	82	75.1	107
Moisture Content	%	---	---	---	---	---	---	---	---	---	82.8	89.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQF33-C	AQM9A-A	AQM9A-A	AQM9A-A	AQM9A-B	AQM9A-B	AQM9A-C	AQM9A-C	AQM9A-C	AQM37-A	AQM37-B
Sample Type				Field Duplicate	Duplicate Lab		Field Duplicate		Lab Dup	Field Duplicate		
Sampling Area		Gordon Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Sep 18, 2016	Sep 19, 2016	Sep 19, 2016	Sep 19, 2016	Sep 19, 2016	Sep 19, 2016	Sep 19, 2016	Sep 19, 2016	Sep 19, 2016	Sep 18, 2016	Sep 18, 2016
Laboratory Sample ID	Units	L1831350-3	L1831350-4	L1831350-4	L1831350-4	L1831350-5	L1831350-5	L1831350-6	L1831350-6	L1831350-6	L1831350-7	L1831350-8
Aluminum	mg/kg	16800	14800	14800	14800	11700	11700	17400	17400	17400	22700	22800
Arsenic	mg/kg	7.62	1.91	1.91	1.91	1.74	1.74	2.14	2.14	2.14	2.69	2.87
Barium	mg/kg	153	71.7	71.7	71.7	60	60	76.8	76.8	76.8	92.7	92.9
Beryllium	mg/kg	0.81	0.31	0.31	0.31	0.28	0.28	0.38	0.38	0.38	0.49	0.5
Cadmium	mg/kg	0.28	0.631	0.631	0.631	0.394	0.394	0.709	0.709	0.709	0.436	0.438
Chromium	mg/kg	36.2	87.7	87.7	87.7	67.9	67.9	101	101	101	150	151
Cobalt	mg/kg	15	54.7	54.7	54.7	31.1	31.1	63.5	63.5	63.5	38.6	42.2
Copper	mg/kg	21.8	111	111	111	89.5	89.5	129	129	129	185	176
Lead	mg/kg	7.22	5.91	5.91	5.91	5.63	5.63	6.66	6.66	6.66	9.67	9.11
Manganese	mg/kg	647	372	372	372	321	321	464	464	464	428	517
Mercury	mg/kg	0.0615	0.049	0.049	0.049	0.032	0.032	0.0529	0.0529	0.0529	0.0789	0.0702
Molybdenum	mg/kg	3.08	0.44	0.44	0.44	0.34	0.34	0.53	0.53	0.53	0.7	0.67
Nickel	mg/kg	29.7	374	374	374	262	262	452	452	452	406	413
Selenium	mg/kg	1.28	0.4	0.4	0.4	0.29	0.29	0.46	0.46	0.46	0.59	0.6
Silver	mg/kg	0.093	0.134	0.134	0.134	0.114	0.114	0.155	0.155	0.155	0.288	0.276
Strontium	mg/kg	31.3	31.5	31.5	31.5	24.7	24.7	35.3	35.3	35.3	37.3	38.2
Thallium	mg/kg	0.349	0.12	0.12	0.12	0.101	0.101	0.136	0.136	0.136	0.207	0.197
Uranium	mg/kg	2.71	1.43	1.43	1.43	1.71	1.71	1.66	1.66	1.66	1.45	1.54
Vanadium	mg/kg	43.6	21	21	21	18.4	18.4	25.2	25.2	25.2	36.8	36.7
Zinc	mg/kg	84.7	221	221	221	135	135	274	274	274	185	189
Moisture Content	%	89.3	76.6	76.6	76.6	63.9	63.9	74.1	74.1	74.1	80.4	79.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQM37-C	AQM61 - A	AQM61 - A	AQM61 - B	AQM61 - B	AQM61 - C	AQM61 - C	AQM14 - A	AQM14 - A	AQM14 - B	AQM14 - C
Sample Type				Field Duplicate		Field Duplicate		Field Duplicate		Lab Dup		
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Sep 18, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 12, 2016
Laboratory Sample ID	Units	L1831350-9	L1831350-13	L1831350-13	L1831350-14	L1831350-14	L1831350-15	L1831350-15	L1831350-28	L1831350-28	L1831350-29	L1831350-30
Aluminum	mg/kg	21500	32400	32400	32200	32200	29700	29700	16500	16500	16100	15000
Arsenic	mg/kg	2.61	2.77	2.77	2.26	2.26	1.93	1.93	2.68	2.68	2.34	2.65
Barium	mg/kg	85.2	51.1	51.1	40.4	40.4	32.4	32.4	143	143	167	138
Beryllium	mg/kg	0.43	0.25	0.25	0.23	0.23	0.16	0.16	0.56	0.56	0.55	0.51
Cadmium	mg/kg	0.463	0.953	0.953	0.689	0.689	0.419	0.419	0.493	0.493	0.322	0.35
Chromium	mg/kg	145	224	224	205	205	181	181	30.4	30.4	29.4	27.7
Cobalt	mg/kg	46.5	139	139	84.8	84.8	81.6	81.6	10.9	10.9	14.3	9.65
Copper	mg/kg	186	379	379	376	376	339	339	52.2	52.2	15.6	18
Lead	mg/kg	8.45	4.2	4.2	3.93	3.93	3.14	3.14	9.17	9.17	8.14	8.35
Manganese	mg/kg	483	960	960	467	467	395	395	798	798	1360	729
Mercury	mg/kg	0.0713	0.0418	0.0418	0.0396	0.0396	0.0256	0.0256	0.0731	0.0731	0.0655	0.0617
Molybdenum	mg/kg	0.65	0.74	0.74	0.67	0.67	0.48	0.48	0.78	0.78	0.67	0.76
Nickel	mg/kg	430	1070	1070	918	918	774	774	20.1	20.1	18.4	17.3
Selenium	mg/kg	0.54	1.01	1.01	1.1	1.1	1.45	1.45	0.39	0.39	0.34	0.34
Silver	mg/kg	0.271	0.37	0.37	0.36	0.36	0.39	0.39	0.089	0.089	0.061	0.06
Strontium	mg/kg	38	70.1	70.1	71.5	71.5	84.6	84.6	22.3	22.3	20.8	19.9
Thallium	mg/kg	0.177	0.062	0.062	0.052	0.052	<0.05	<0.05	0.262	0.262	0.276	0.242
Uranium	mg/kg	1.43	0.491	0.491	0.528	0.528	0.358	0.358	2.37	2.37	2.18	2.17
Vanadium	mg/kg	33.4	26.8	26.8	24.2	24.2	22.1	22.1	31.1	31.1	30.9	29
Zinc	mg/kg	189	511	511	431	431	248	248	127	127	79.7	80.5
Moisture Content	%	77.7	76.3	76.3	69.1	69.1	57.9	57.9	72.3	72.3	78.8	72.5

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQM35 - A	AQM35 - B	AQM35 - C	AQM16 - A	AQM16 - B	AQM16 - C	AQM13 - A	AQM13 - B	AQM13 - C	AQM31 - A	AQM31 - B
Sample Type												
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Sep 12, 2016	Sep 12, 2016	Sep 12, 2016	Sep 13, 2016	Sep 13, 2016	Sep 13, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016
Laboratory Sample ID	Units	L1831350-31	L1831350-32	L1831350-33	L1831350-34	L1831350-35	L1831350-36	L1831350-43	L1831350-44	L1831350-45	L1831350-46	L1831350-47
Aluminum	mg/kg	12200	9660	8640	14000	12100	13800	9040	13400	6940	4960	6520
Arsenic	mg/kg	2.09	1.77	1.96	6.49	5.63	6.14	3.5	3.49	1.61	2.66	1.83
Barium	mg/kg	101	82.4	66.9	113	98.6	106	80.5	111	64.5	96.5	97.7
Beryllium	mg/kg	0.49	0.37	0.34	0.57	0.48	0.5	0.29	0.6	0.21	0.17	0.23
Cadmium	mg/kg	0.355	0.281	0.273	0.571	0.561	0.444	0.75	0.595	0.45	0.726	0.829
Chromium	mg/kg	20.3	15.2	15	26.6	23.4	25.8	15.5	26.4	12.5	10.4	13.1
Cobalt	mg/kg	7.08	4.93	3.78	8.79	7.5	8.44	7.52	11.4	6.31	5.76	7.55
Copper	mg/kg	27.9	18.9	26.5	16.5	14.7	16	12.2	14.1	7.09	19.9	13.2
Lead	mg/kg	7.03	4.17	7.95	9.72	10.7	9.77	11.1	7.51	4.27	8.93	3.92
Manganese	mg/kg	145	133	113	356	283	297	267	358	181	198	264
Mercury	mg/kg	0.0646	0.0771	0.0685	0.0853	0.0875	0.0717	0.111	0.0483	0.0804	0.127	0.098
Molybdenum	mg/kg	1.41	1.14	0.72	0.98	0.88	0.79	1.29	2.37	1.18	1.02	1.49
Nickel	mg/kg	25	18.7	19.2	22.2	21	23.2	17.8	20.1	13	18.1	12.8
Selenium	mg/kg	0.61	0.63	0.32	0.61	0.65	0.54	0.68	0.64	0.59	1.09	1.27
Silver	mg/kg	0.074	0.05	<0.05	0.074	0.072	0.068	0.053	0.067	<0.05	0.058	1.48
Strontium	mg/kg	24.5	25.4	16.6	23.5	23.3	20.3	15.4	20.6	14.5	22.5	25.1
Thallium	mg/kg	0.183	0.107	0.114	0.235	0.179	0.214	0.181	0.431	0.115	0.119	0.215
Uranium	mg/kg	1.91	1.44	1.74	2.11	1.84	1.76	0.971	2.39	0.848	0.972	1.32
Vanadium	mg/kg	22	17	16.5	30.1	25.2	27.9	24.1	33	18	14.4	19.1
Zinc	mg/kg	70	46.7	47.9	93.3	82.8	86.1	102	117	74.4	114	149
Moisture Content	%	84.4	87	76.1	85.3	86.2	92	90.3	85	86.1	92.6	94.2

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQM31 - B	AQM31 - C	AQM38 - A	AQM38 - B	AQM38 - C	AQM32 - A	AQM32 - B	AQM32 - C	AQM20 - A	AQM20 - B	AQM20 - C
Sample Type		Lab Dup										
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 14, 2016	Sep 15, 2016	Sep 15, 2016	Sep 15, 2016	Sep 15, 2016	Sep 15, 2016	Sep 15, 2016
Laboratory Sample ID	Units	L1831350-47	L1831350-48	L1831350-49	L1831350-50	L1831350-51	L1831350-52	L1831350-53	L1831350-54	L1831350-55	L1831350-56	L1831350-57
Aluminum	mg/kg	6520	6150	14800	14300	12000	14900	13500	13900	5810	6900	6820
Arsenic	mg/kg	1.83	2.16	1.84	1.72	1.51	2.24	2.43	2.71	1.76	2.21	1.36
Barium	mg/kg	97.7	79	111	113	98.9	131	116	120	54.9	92.2	50.5
Beryllium	mg/kg	0.23	0.21	0.41	0.44	0.4	0.5	0.39	0.42	0.27	0.32	0.27
Cadmium	mg/kg	0.829	0.566	0.263	0.212	0.197	0.181	0.147	0.153	0.189	0.195	0.249
Chromium	mg/kg	13.1	12.2	28.1	28.2	24.2	26.5	23.7	24	12	14.8	13.6
Cobalt	mg/kg	7.55	7.44	6.19	6.1	5.48	11	12.3	12.6	3.2	5.89	3.33
Copper	mg/kg	13.2	12.5	10.5	9.66	8.13	7.42	6.37	6.64	13.2	7.22	15.2
Lead	mg/kg	3.92	4.31	7.45	7.21	7.02	7.92	6.54	6.99	6.33	6.65	5.14
Manganese	mg/kg	264	189	362	330	307	625	866	1030	487	1900	150
Mercury	mg/kg	0.098	0.088	0.0572	0.0398	0.0468	0.0391	0.0354	0.0348	0.0294	0.0262	0.038
Molybdenum	mg/kg	1.49	1.32	0.44	0.43	0.35	0.41	0.31	0.33	0.46	0.68	0.33
Nickel	mg/kg	12.8	13.5	14.4	13.8	12.2	13.2	12.1	12.2	9.62	11.2	10.9
Selenium	mg/kg	1.27	1.02	0.29	0.21	0.26	0.23	0.17	0.2	0.27	0.26	0.29
Silver	mg/kg	1.48	0.057	0.052	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Strontium	mg/kg	25.1	21.9	25.2	24.1	22.5	19.1	15.4	16.5	15	14.4	13.4
Thallium	mg/kg	0.215	0.154	0.21	0.192	0.191	0.265	0.211	0.217	0.093	0.116	0.102
Uranium	mg/kg	1.32	0.871	1.87	2.18	1.89	2.03	1.85	2.12	2.31	2.12	1.7
Vanadium	mg/kg	19.1	20.7	25.6	25.7	21.5	28.1	25.4	25.7	14.2	17.6	13.5
Zinc	mg/kg	149	102	60.8	54.6	53.5	58.7	50	51.3	30.6	35.4	43.2
Moisture Content	%	94.2	91.9	82	74.1	85.7	64.1	69.5	62.7	56	57.8	86

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQF7-A	AQF7-B	AQF7-C	AQF38-A	AQF38-B	AQF38-C	AQF41-A	AQF41-B	AQF41-C	AQF51-A	AQF51-B
Sample Type												
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016	Sep 16, 2016
Laboratory Sample ID	Units	L1831350-61	L1831350-62	L1831350-63	L1831350-64	L1831350-65	L1831350-66	L1831350-67	L1831350-68	L1831350-69	L1831350-70	L1831350-71
Aluminum	mg/kg	18800	28000	22000	12900	11600	15700	21500	21800	20700	4100	3940
Arsenic	mg/kg	4.13	13.8	5.13	2.54	2.62	4.89	3.67	4.14	4.83	1.44	1.69
Barium	mg/kg	153	246	214	137	114	120	179	204	209	90.8	91.9
Beryllium	mg/kg	0.79	2.52	1.02	0.47	0.45	0.49	0.72	0.78	0.78	0.2	0.19
Cadmium	mg/kg	0.56	1.19	0.828	0.483	0.517	0.748	0.217	0.205	0.202	0.313	0.35
Chromium	mg/kg	26	27.4	33.8	23.8	20.7	25.4	41.1	42.1	39.7	5.05	4.51
Cobalt	mg/kg	9.88	14.6	12.6	10.1	8.45	10.1	10.5	11.4	11.3	1.4	1.32
Copper	mg/kg	20.3	14.5	25.2	21.5	18.8	24.5	19.6	20.5	20.2	14.4	15.3
Lead	mg/kg	7.75	10.9	5.65	7.11	9.63	14.9	8.24	8.44	8.62	3.39	3.96
Manganese	mg/kg	674	3420	1150	399	348	384	835	1500	2270	174	149
Mercury	mg/kg	0.1	0.0661	0.0705	0.0846	0.088	0.141	0.075	0.0805	0.0845	0.117	0.12
Molybdenum	mg/kg	5.27	23.7	6.9	20.8	19.2	21.8	1.81	1.67	1.94	9.15	9.39
Nickel	mg/kg	19.2	11.8	23.6	21.4	18.3	21.8	23.3	23.7	22.8	5.88	6.02
Selenium	mg/kg	1.15	0.89	1.4	1.14	0.99	1.29	0.49	0.56	0.61	0.94	1.02
Silver	mg/kg	0.074	0.055	0.101	0.074	0.068	0.071	0.071	0.075	0.083	<0.05	<0.05
Strontium	mg/kg	23.9	18.3	28.1	29.6	25.9	25.2	32.8	38.5	42.1	49.1	49.2
Thallium	mg/kg	0.181	0.317	0.331	0.156	0.151	0.17	0.262	0.266	0.258	<0.05	<0.05
Uranium	mg/kg	1.85	2.07	3.01	2.14	1.93	1.87	3.37	3.68	4.08	0.822	0.783
Vanadium	mg/kg	51.4	109	59.7	26.8	24.4	33.2	40.5	41.1	40.9	7.15	6.93
Zinc	mg/kg	97.5	321	140	84.1	82.5	88.9	73.3	70.3	65.3	27.1	28.7
Moisture Content	%	96.4	53	96.3	96.3	96.4	95.7	80.3	77.7	72.2	92.4	91.8

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQF51-C	AQF51-C	AQF9-A	AQF9-B	AQF9-C	AQF16-A	AQF16-A	AQF16-A	AQF16-B	AQF16-B	AQF16-C
Sample Type			Lab Dup					Lab Dup	Field Duplicate		Field Duplicate	
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Sep 16, 2016	Sep 16, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016
Laboratory Sample ID	Units	L1831350-72	L1831350-72	L1831350-73	L1831350-74	L1831350-75	L1831350-16	L1831350-16	L1831350-16	L1831350-17	L1831350-17	L1831350-18
Aluminum	mg/kg	3820	3820	11500	10500	10700	5190	5190	5190	4390	4390	8790
Arsenic	mg/kg	1.31	1.31	2.88	2.72	2.71	1.51	1.51	1.51	1.24	1.24	2.06
Barium	mg/kg	114	114	85.9	74	77.9	38.2	38.2	38.2	31.5	31.5	60
Beryllium	mg/kg	0.19	0.19	0.44	0.39	0.4	0.21	0.21	0.21	0.18	0.18	0.36
Cadmium	mg/kg	0.343	0.343	0.171	0.153	0.146	0.111	0.111	0.111	0.103	0.103	0.15
Chromium	mg/kg	4.81	4.81	26.5	23.5	24.1	11.7	11.7	11.7	9.08	9.08	19.3
Cobalt	mg/kg	1.37	1.37	6.57	5.87	6.09	4.7	4.7	4.7	5.27	5.27	7.67
Copper	mg/kg	12.7	12.7	14.3	11.9	12.9	5.49	5.49	5.49	4.19	4.19	8.82
Lead	mg/kg	3.36	3.36	6.11	5.56	5.58	3.64	3.64	3.64	3.38	3.38	5.62
Manganese	mg/kg	179	179	288	249	257	245	245	245	217	217	297
Mercury	mg/kg	0.101	0.101	0.0347	0.0303	0.0341	0.0238	0.0238	0.0238	0.0206	0.0206	0.0309
Molybdenum	mg/kg	9.68	9.68	0.95	0.8	1.01	0.6	0.6	0.6	0.4	0.4	0.68
Nickel	mg/kg	5.55	5.55	15.5	13.6	13.5	8.32	8.32	8.32	6.83	6.83	14
Selenium	mg/kg	1.05	1.05	0.29	0.23	0.26	<0.2	<0.2	<0.2	<0.2	<0.2	0.21
Silver	mg/kg	<0.05	<0.05	0.063	0.053	0.055	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium	mg/kg	50.4	50.4	20.6	18.4	18.3	9.46	9.46	9.46	7.84	7.84	13.6
Thallium	mg/kg	<0.05	<0.05	0.2	0.17	0.173	0.102	0.102	0.102	0.118	0.118	0.172
Uranium	mg/kg	0.75	0.75	3.03	2.83	2.76	1.01	1.01	1.01	0.942	0.942	1.52
Vanadium	mg/kg	6.41	6.41	31.1	28.4	29.9	11.8	11.8	11.8	10	10	19.8
Zinc	mg/kg	33.1	33.1	56.7	49.9	52.6	25.1	25.1	25.1	20.1	20.1	37.4
Moisture Content	%	93	93	72.2	76.2	73.2	57.1	57.1	57.1	50.4	50.4	64.6

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQF16-C	AQF16-C	AQF15-A	AQF15-B	AQF15-C (AQF-15A ON CONTAINER)	AQF18-A	AQF18-B	AQF18-C	AQF11-A	AQF11-B	AQF11-C
Sample Type		Field Duplicate	Duplicate Lab									
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 17, 2016
Laboratory Sample ID	Units	L1831350-18	L1831350-18	L1831350-79	L1831350-80	L1831350-81	L1831350-82	L1831350-83	L1831350-84	L1831350-85	L1831350-86	L1831350-87
Aluminum	mg/kg	8790	8790	19000	11000	14700	11300	13700	20200	21000	25900	24600
Arsenic	mg/kg	2.06	2.06	4.14	2.73	3.73	3.24	3.41	3.7	3.31	3.91	3.14
Barium	mg/kg	60	60	120	68.1	96.2	76.4	88.9	149	147	175	167
Beryllium	mg/kg	0.36	0.36	0.76	0.44	0.61	0.48	0.59	0.81	0.77	0.88	0.87
Cadmium	mg/kg	0.15	0.15	0.253	0.143	0.218	0.155	0.159	0.276	0.383	0.505	0.322
Chromium	mg/kg	19.3	19.3	40.3	22.7	32.3	25.3	29.6	41.8	43.4	50.3	52.8
Cobalt	mg/kg	7.67	7.67	10.7	6.09	8.86	6.5	7.88	11.1	10.4	12.4	11.9
Copper	mg/kg	8.82	8.82	18.3	10.4	14.4	12	13.8	19	26.7	30.2	28.2
Lead	mg/kg	5.62	5.62	13.2	7.33	10.8	8.95	10.1	13	9.33	10.7	8.04
Manganese	mg/kg	297	297	413	251	410	244	330	469	674	671	757
Mercury	mg/kg	0.0309	0.0309	0.0715	0.0412	0.0645	0.0386	0.0419	0.0741	0.0975	0.112	0.0816
Molybdenum	mg/kg	0.68	0.68	1.37	1.2	1.17	1.55	0.86	2.09	5.72	4.07	3.25
Nickel	mg/kg	14	14	27.3	15.1	22.2	17	19.3	27.6	30.6	35.6	36
Selenium	mg/kg	0.21	0.21	0.37	0.25	0.33	0.21	0.21	0.34	0.75	0.99	0.9
Silver	mg/kg	<0.1	<0.1	0.084	<0.05	0.063	<0.05	0.061	0.072	0.085	0.105	0.101
Strontium	mg/kg	13.6	13.6	25	16.5	21	17.8	20.1	26.4	29.7	36.3	32.7
Thallium	mg/kg	0.172	0.172	0.283	0.162	0.234	0.168	0.212	0.293	0.263	0.283	0.295
Uranium	mg/kg	1.52	1.52	2.56	2.22	3.06	2.54	2.61	2.38	6.05	6.64	7.25
Vanadium	mg/kg	19.8	19.8	42.2	24.1	32.8	25.1	30.9	44	40.8	48.3	45.6
Zinc	mg/kg	37.4	37.4	71.7	42.7	58.9	44	48.8	76.3	86.6	106	95.3
Moisture Content	%	64.6	64.6	78.2	77.2	79.5	73.1	68.7	60.7	91.1	90.1	90.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQF8-A	AQF8-B	AQF8-C	AQM11-A	AQM11-B	AQM11-C	AQM30-A	AQM30-B	AQM30-C	AQM10-A	AQM10-A
Sample Type												Field Duplicate
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region
DateSampled		Sep 17, 2016	Sep 17, 2016	Sep 17, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016
Laboratory Sample ID	Units	L1831350-88	L1831350-89	L1831350-90	L1831350-91	L1831350-92	L1831350-93	L1831350-94	L1831350-95	L1831350-96	L1831350-19	L1831350-19
Aluminum	mg/kg	21100	18300	17900	21700	20800	25100	25300	22100	19900	7840	7840
Arsenic	mg/kg	7.26	5.56	8.03	3.17	2.76	3.69	2.64	2.47	2.39	1.79	1.79
Barium	mg/kg	172	173	154	118	117	148	78.1	81.2	76.8	51.7	51.7
Beryllium	mg/kg	0.78	0.87	0.76	0.55	0.66	0.79	0.37	0.46	0.42	0.27	0.27
Cadmium	mg/kg	0.54	0.539	0.527	0.45	0.368	0.471	0.434	0.35	0.321	0.294	0.294
Chromium	mg/kg	42.6	41.3	126	105	79.1	96.1	229	184	158	27.4	27.4
Cobalt	mg/kg	12.8	15.8	13.8	34.8	26.1	35.2	47.8	39.1	34	14	14
Copper	mg/kg	29.8	25.8	31.3	143	89.2	112	261	203	175	43.6	43.6
Lead	mg/kg	10.1	8.02	12.4	9.71	9.52	11.9	7.82	8.2	6.91	5.62	5.62
Manganese	mg/kg	965	985	726	487	467	628	399	421	394	254	254
Mercury	mg/kg	0.118	0.101	0.113	0.0911	0.0803	0.0761	0.0713	0.057	0.0499	0.0463	0.0463
Molybdenum	mg/kg	2.68	1.78	3.39	0.67	0.73	0.86	0.66	0.71	0.66	0.36	0.36
Nickel	mg/kg	31.1	31.6	86.1	337	246	320	489	385	335	152	152
Selenium	mg/kg	1.2	1.38	1.03	0.64	0.53	0.47	0.7	0.66	0.55	0.23	0.23
Silver	mg/kg	0.092	0.108	0.115	0.221	0.179	0.219	0.353	0.318	0.27	<0.1	<0.1
Strontium	mg/kg	40.2	41.5	42.8	24.3	24.4	30.6	41.4	40.8	35	11.1	11.1
Thallium	mg/kg	0.333	0.393	0.288	0.244	0.285	0.349	0.142	0.187	0.184	0.124	0.124
Uranium	mg/kg	3.17	3.46	4.11	1.59	1.83	2.25	1.07	1.51	1.39	1.18	1.18
Vanadium	mg/kg	48.2	43.3	42.7	39.8	37.8	47.2	38.2	34.9	32.5	16	16
Zinc	mg/kg	117	109	102	184	153	199	185	142	121	114	114
Moisture Content	%	88.9	87.4	89.1	84.5	85	83.9	77.5	80.2	77.9	63.7	63.7

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQM10-B	AQM10-B	AQM10-B	AQM10-C	AQM10-C	AQM10-C	AQM36-A	AQM36-B	AQM36-C	AQF2-A	AQF2-A
Sample Type			Field Duplicate	Duplicate Lab		Lab Dup	Field Duplicate					Field Duplicate
Sampling Area		Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Maclellan Region	Gordon Region	Gordon Region
DateSampled		Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016
Laboratory Sample ID	Units	L1831350-20	L1831350-20	L1831350-20	L1831350-21	L1831350-21	L1831350-21	L1831350-100	L1831350-101	L1831350-102	L1831350-58	L1831350-58
Aluminum	mg/kg	10100	10100	10100	7840	7840	7840	17000	14500	14300	12800	12800
Arsenic	mg/kg	2.01	2.01	2.01	1.63	1.63	1.63	2.79	2.97	2.83	3.54	3.54
Barium	mg/kg	64.1	64.1	64.1	50.1	50.1	50.1	102	92	90.3	91	91
Beryllium	mg/kg	0.32	0.32	0.32	0.24	0.24	0.24	0.56	0.5	0.5	0.45	0.45
Cadmium	mg/kg	0.321	0.321	0.321	0.25	0.25	0.25	0.353	0.326	0.347	0.296	0.296
Chromium	mg/kg	35.7	35.7	35.7	26.6	26.6	26.6	43.6	37	37.4	23.2	23.2
Cobalt	mg/kg	15.4	15.4	15.4	11.6	11.6	11.6	18.1	16.6	17.4	6.71	6.71
Copper	mg/kg	49.3	49.3	49.3	37.2	37.2	37.2	53.6	47.8	51	17.8	17.8
Lead	mg/kg	5.98	5.98	5.98	4.96	4.96	4.96	8.26	7.7	7.95	7.01	7.01
Manganese	mg/kg	289	289	289	230	230	230	403	442	403	285	285
Mercury	mg/kg	0.0513	0.0513	0.0513	0.0427	0.0427	0.0427	0.0667	0.061	0.0616	0.0822	0.0822
Molybdenum	mg/kg	0.55	0.55	0.55	0.38	0.38	0.38	0.49	0.43	0.45	1.02	1.02
Nickel	mg/kg	159	159	159	117	117	117	211	191	207	25.3	25.3
Selenium	mg/kg	0.25	0.25	0.25	<0.2	<0.2	<0.2	0.4	0.33	0.37	0.79	0.79
Silver	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.114	0.103	0.104	0.069	0.069
Strontium	mg/kg	13.5	13.5	13.5	10.8	10.8	10.8	20	18.2	17.4	26.3	26.3
Thallium	mg/kg	0.151	0.151	0.151	0.128	0.128	0.128	0.244	0.224	0.22	0.158	0.158
Uranium	mg/kg	1.33	1.33	1.33	1.1	1.1	1.1	1.86	1.82	1.81	1.38	1.38
Vanadium	mg/kg	20	20	20	15.6	15.6	15.6	33.6	29.9	28.8	22.5	22.5
Zinc	mg/kg	120	120	120	93.6	93.6	93.6	149	140	147	59.2	59.2
Moisture Content	%	67.5	67.5	67.5	61.7	61.7	61.7	60	76.6	82.1	82.3	82.3

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Baseline Data for Sediment

Sample Name		AQF2-B	AQF2-B	AQF2-C	AQF2-C
Sample Type			Field Duplicate		Field Duplicate
Sampling Area		Gordon Region	Gordon Region	Gordon Region	Gordon Region
DateSampled		Sep 18, 2016	Sep 18, 2016	Sep 18, 2016	Sep 18, 2016
Laboratory Sample ID	Units	L1831350-59	L1831350-59	L1831350-60	L1831350-60
Aluminum	mg/kg	16400	16400	16800	16800
Arsenic	mg/kg	4.4	4.4	5.11	5.11
Barium	mg/kg	112	112	119	119
Beryllium	mg/kg	0.57	0.57	0.61	0.61
Cadmium	mg/kg	0.29	0.29	0.29	0.29
Chromium	mg/kg	31.1	31.1	32	32
Cobalt	mg/kg	8.92	8.92	9.53	9.53
Copper	mg/kg	16.9	16.9	18.7	18.7
Lead	mg/kg	7.26	7.26	6.29	6.29
Manganese	mg/kg	428	428	495	495
Mercury	mg/kg	0.0766	0.0766	0.0647	0.0647
Molybdenum	mg/kg	1.07	1.07	1.04	1.04
Nickel	mg/kg	24.8	24.8	26.7	26.7
Selenium	mg/kg	0.74	0.74	0.76	0.76
Silver	mg/kg	0.079	0.079	0.097	0.097
Strontium	mg/kg	28.9	28.9	31.1	31.1
Thallium	mg/kg	0.205	0.205	0.222	0.222
Uranium	mg/kg	1.61	1.61	1.59	1.59
Vanadium	mg/kg	30	30	30.3	30.3
Zinc	mg/kg	70.6	70.6	77.7	77.7
Moisture Content	%	80.2	80.2	79.1	79.1

Notes:
12.3 Concentration was detected.
<0.03 The analyte was not detected above the laboratory reportable detection limit.
--- Parameter not analyzed / not available.

Appendix C PROUCL OUTPUTS

APPENDIX C
PROUCL OUTPUTS

APPENDIX C.1
PROUCL OUTPUTS
DEPOSITION
GORDON REGION

UCL Statistics for Uncensored Full Data Sets			
User Selected Options			
Date/Time of Computation	ProUCL 5.13/10/2020 4:02:25 PM		
From File	Gordon dep input_a.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Silver			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.3768E-6	Mean	5.7482E-6
Maximum	1.1202E-5	Median	5.8599E-6
SD	1.4648E-6	Std. Error of Mean	2.1836E-7
Coefficient of Variation	N/A	Skewness	0.465
Normal GOF Test			
Shapiro Wilk Test Statistic	0.888	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.179	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.1151E-6	95% Adjusted-CLT UCL (Chen-1995)	6.1236E-6
		95% Modified-t UCL (Johnson-1978)	6.1176E-6
Gamma GOF Test			
A-D Test Statistic	2.531	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	14.23	k star (bias corrected MLE)	13.3
Theta hat (MLE)	4.0384E-7	Theta star (bias corrected MLE)	4.3221E-7
nu hat (MLE)	1281	nu star (bias corrected)	1197
MLE Mean (bias corrected)	5.7482E-6	MLE Sd (bias corrected)	1.5762E-6
		Approximate Chi Square Value (0.05)	1118
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	1115
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.1562E-6	95% Adjusted Gamma UCL (use when n<50)	6.1701E-6

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.85	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.227	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-12.95	Mean of logged Data	-12.1
Maximum of Logged Data	-11.4	SD of logged Data	0.283
Assuming Lognormal Distribution			
95% H-UCL	6.2241E-6	90% Chebyshev (MVUE) UCL	6.5112E-6
95% Chebyshev (MVUE) UCL	6.8475E-6	97.5% Chebyshev (MVUE) UCL	7.3141E-6
99% Chebyshev (MVUE) UCL	8.2308E-6		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.1074E-6	95% Jackknife UCL	6.1151E-6
95% Standard Bootstrap UCL	6.0981E-6	95% Bootstrap-t UCL	6.1218E-6
95% Hall's Bootstrap UCL	6.1632E-6	95% Percentile Bootstrap UCL	6.0992E-6
95% BCA Bootstrap UCL	6.1230E-6		
90% Chebyshev(Mean, Sd) UCL	6.4033E-6	95% Chebyshev(Mean, Sd) UCL	6.7000E-6
97.5% Chebyshev(Mean, Sd) UCL	7.1119E-6	99% Chebyshev(Mean, Sd) UCL	7.9209E-6
Suggested UCL to Use			
95% Student's-t UCL	6.1151E-6	or 95% Modified-t UCL	6.1176E-6
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Aluminum			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.0504	Mean	0.165
Maximum	0.646	Median	0.11
SD	0.131	Std. Error of Mean	0.0195
Coefficient of Variation	0.795	Skewness	2.394
Normal GOF Test			
Shapiro Wilk Test Statistic	0.629	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.381	Lilliefors GOF Test	

5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.198	95% Adjusted-CLT UCL (Chen-1995)	0.204
		95% Modified-t UCL (Johnson-1978)	0.199
Gamma GOF Test			
A-D Test Statistic	5.571	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.358	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.763	k star (bias corrected MLE)	2.593
Theta hat (MLE)	0.0596	Theta star (bias corrected MLE)	0.0635
nu hat (MLE)	248.6	nu star (bias corrected)	233.4
MLE Mean (bias corrected)	0.165	MLE Sd (bias corrected)	0.102
		Approximate Chi Square Value (0.05)	199
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	198
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.193	95% Adjusted Gamma UCL (use when n<50)	0.194
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.789	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.328	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.988	Mean of logged Data	-1.995
Maximum of Logged Data	-0.437	SD of logged Data	0.563
Assuming Lognormal Distribution			
95% H-UCL	0.188	90% Chebyshev (MVUE) UCL	0.201
95% Chebyshev (MVUE) UCL	0.22	97.5% Chebyshev (MVUE) UCL	0.247
99% Chebyshev (MVUE) UCL	0.3		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.197	95% Jackknife UCL	0.198
95% Standard Bootstrap UCL	0.197	95% Bootstrap-t UCL	0.209
95% Hall's Bootstrap UCL	0.211	95% Percentile Bootstrap UCL	0.199
95% BCA Bootstrap UCL	0.204		

90% Chebyshev(Mean, Sd) UCL	0.223	95% Chebyshev(Mean, Sd) UCL	0.25
97.5% Chebyshev(Mean, Sd) UCL	0.287	99% Chebyshev(Mean, Sd) UCL	0.359
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.25		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Arsenic			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	4.3635E-4	Mean	0.00116
Maximum	0.00243	Median	0.00113
SD	3.2489E-4	Std. Error of Mean	4.8432E-5
Coefficient of Variation	0.281	Skewness	1.308
Normal GOF Test			
Shapiro Wilk Test Statistic	0.814	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.246	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00124	95% Adjusted-CLT UCL (Chen-1995)	0.00125
		95% Modified-t UCL (Johnson-1978)	0.00124
Gamma GOF Test			
A-D Test Statistic	3.352	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.213	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	12.99	k star (bias corrected MLE)	12.14
Theta hat (MLE)	8.9023E-5	Theta star (bias corrected MLE)	9.5265E-5
nu hat (MLE)	1169	nu star (bias corrected)	1093
MLE Mean (bias corrected)	0.00116	MLE Sd (bias corrected)	3.3196E-4
		Approximate Chi Square Value (0.05)	1017
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	1015
Assuming Gamma Distribution			

95% Approximate Gamma UCL (use when n>=50))	0.00124	95% Adjusted Gamma UCL (use when n<50)	0.00125
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.82	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.228	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-7.737	Mean of logged Data	-6.801
Maximum of Logged Data	-6.02	SD of logged Data	0.292
Assuming Lognormal Distribution			
95% H-UCL	0.00126	90% Chebyshev (MVUE) UCL	0.00131
95% Chebyshev (MVUE) UCL	0.00138	97.5% Chebyshev (MVUE) UCL	0.00148
99% Chebyshev (MVUE) UCL	0.00167		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00124	95% Jackknife UCL	0.00124
95% Standard Bootstrap UCL	0.00124	95% Bootstrap-t UCL	0.00125
95% Hall's Bootstrap UCL	0.00128	95% Percentile Bootstrap UCL	0.00124
95% BCA Bootstrap UCL	0.00124		
90% Chebyshev(Mean, Sd) UCL	0.0013	95% Chebyshev(Mean, Sd) UCL	0.00137
97.5% Chebyshev(Mean, Sd) UCL	0.00146	99% Chebyshev(Mean, Sd) UCL	0.00164
Suggested UCL to Use			
95% Student's-t UCL	0.00124	or 95% Modified-t UCL	0.00124
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Beryllium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	8.2248E-7	Mean	3.1715E-6
Maximum	1.5307E-5	Median	1.7393E-6
SD	3.2988E-6	Std. Error of Mean	4.9176E-7
Coefficient of Variation	N/A	Skewness	2.434
Normal GOF Test			
Shapiro Wilk Test Statistic	0.613	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.376	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.9977E-6	95% Adjusted-CLT UCL (Chen-1995)	4.1710E-6
		95% Modified-t UCL (Johnson-1978)	4.0275E-6
Gamma GOF Test			
A-D Test Statistic	5.411	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.764	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.352	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.134	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.741	k star (bias corrected MLE)	1.64
Theta hat (MLE)	1.8216E-6	Theta star (bias corrected MLE)	1.9341E-6
nu hat (MLE)	156.7	nu star (bias corrected)	147.6
MLE Mean (bias corrected)	3.1715E-6	MLE Sd (bias corrected)	2.4767E-6
		Approximate Chi Square Value (0.05)	120.5
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	119.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	3.8841E-6	95% Adjusted Gamma UCL (use when n<50)	3.9104E-6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.316	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-14.01	Mean of logged Data	-12.98
Maximum of Logged Data	-11.09	SD of logged Data	0.708
Assuming Lognormal Distribution			
95% H-UCL	3.7190E-6	90% Chebyshev (MVUE) UCL	3.9827E-6
95% Chebyshev (MVUE) UCL	4.4471E-6	97.5% Chebyshev (MVUE) UCL	5.0917E-6
99% Chebyshev (MVUE) UCL	6.3577E-6		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	3.9804E-6	95% Jackknife UCL	3.9977E-6
95% Standard Bootstrap UCL	3.9243E-6	95% Bootstrap-t UCL	4.3472E-6

95% Hall's Bootstrap UCL	4.3502E-6	95% Percentile Bootstrap UCL	4.0410E-6
95% BCA Bootstrap UCL	4.2177E-6		
90% Chebyshev(Mean, Sd) UCL	4.6468E-6	95% Chebyshev(Mean, Sd) UCL	5.3150E-6
97.5% Chebyshev(Mean, Sd) UCL	6.2425E-6	99% Chebyshev(Mean, Sd) UCL	8.0645E-6
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	5.3150E-6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Cadmium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	3.3381E-6	Mean	9.3421E-6
Maximum	1.9004E-5	Median	1.0288E-5
SD	3.0079E-6	Std. Error of Mean	4.4839E-7
Coefficient of Variation	N/A	Skewness	0.0717
Normal GOF Test			
Shapiro Wilk Test Statistic	0.865	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.248	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.0095E-5	95% Adjusted-CLT UCL (Chen-1995)	1.0085E-5
		95% Modified-t UCL (Johnson-1978)	1.0096E-5
Gamma GOF Test			
A-D Test Statistic	3.631	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.286	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	8.476	k star (bias corrected MLE)	7.926
Theta hat (MLE)	1.1022E-6	Theta star (bias corrected MLE)	1.1787E-6
nu hat (MLE)	762.9	nu star (bias corrected)	713.3
MLE Mean (bias corrected)	9.3421E-6	MLE Sd (bias corrected)	3.3183E-6
		Approximate Chi Square Value (0.05)	652.4
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	650.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.0215E-5	95% Adjusted Gamma UCL (use when n<50)	1.0245E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.832	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.298	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-12.61	Mean of logged Data	-11.64
Maximum of Logged Data	-10.87	SD of logged Data	0.371
Assuming Lognormal Distribution			
95% H-UCL	1.0433E-5	90% Chebyshev (MVUE) UCL	1.1010E-5
95% Chebyshev (MVUE) UCL	1.1736E-5	97.5% Chebyshev (MVUE) UCL	1.2743E-5
99% Chebyshev (MVUE) UCL	1.4722E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.0080E-5	95% Jackknife UCL	1.0095E-5
95% Standard Bootstrap UCL	1.0078E-5	95% Bootstrap-t UCL	1.0080E-5
95% Hall's Bootstrap UCL	1.0078E-5	95% Percentile Bootstrap UCL	1.0018E-5
95% BCA Bootstrap UCL	1.0077E-5		
90% Chebyshev(Mean, Sd) UCL	1.0687E-5	95% Chebyshev(Mean, Sd) UCL	1.1297E-5
97.5% Chebyshev(Mean, Sd) UCL	1.2142E-5	99% Chebyshev(Mean, Sd) UCL	1.3803E-5
Suggested UCL to Use			
95% Student's-t UCL	1.0095E-5	or 95% Modified-t UCL	1.0096E-5
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Cobalt			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	5.3061E-5	Mean	1.5081E-4
Maximum	4.8445E-4	Median	1.1556E-4
SD	9.1259E-5	Std. Error of Mean	1.3604E-5
Coefficient of Variation	0.605	Skewness	2.342

Normal GOF Test			
Shapiro Wilk Test Statistic	0.646	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.398	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.7367E-4	95% Adjusted-CLT UCL (Chen-1995)	1.7826E-4
		95% Modified-t UCL (Johnson-1978)	1.7446E-4
Gamma GOF Test			
A-D Test Statistic	5.599	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.377	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.346	k star (bias corrected MLE)	4.072
Theta hat (MLE)	3.4698E-5	Theta star (bias corrected MLE)	3.7041E-5
nu hat (MLE)	391.2	nu star (bias corrected)	366.4
MLE Mean (bias corrected)	1.5081E-4	MLE Sd (bias corrected)	7.4741E-5
		Approximate Chi Square Value (0.05)	323.1
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	321.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.7105E-4	95% Adjusted Gamma UCL (use when n<50)	1.7177E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.786	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.353	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-9.844	Mean of logged Data	-8.919
Maximum of Logged Data	-7.632	SD of logged Data	0.455
Assuming Lognormal Distribution			
95% H-UCL	1.6878E-4	90% Chebyshev (MVUE) UCL	1.7941E-4
95% Chebyshev (MVUE) UCL	1.9361E-4	97.5% Chebyshev (MVUE) UCL	2.1333E-4
99% Chebyshev (MVUE) UCL	2.5206E-4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			

95% CLT UCL	1.7319E-4	95% Jackknife UCL	1.7367E-4
95% Standard Bootstrap UCL	1.7283E-4	95% Bootstrap-t UCL	1.8487E-4
95% Hall's Bootstrap UCL	1.7950E-4	95% Percentile Bootstrap UCL	1.7438E-4
95% BCA Bootstrap UCL	1.7782E-4		
90% Chebyshev(Mean, Sd) UCL	1.9162E-4	95% Chebyshev(Mean, Sd) UCL	2.1011E-4
97.5% Chebyshev(Mean, Sd) UCL	2.3577E-4	99% Chebyshev(Mean, Sd) UCL	2.8617E-4
Suggested UCL to Use			
95% Student's-t UCL	1.7367E-4	or 95% Modified-t UCL	1.7446E-4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Chromium 3			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.7592E-4	Mean	7.2717E-4
Maximum	0.00188	Median	6.2683E-4
SD	3.2078E-4	Std. Error of Mean	4.7819E-5
Coefficient of Variation	0.441	Skewness	2.206
Normal GOF Test			
Shapiro Wilk Test Statistic	0.689	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.347	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	8.0752E-4	95% Adjusted-CLT UCL (Chen-1995)	8.2263E-4
		95% Modified-t UCL (Johnson-1978)	8.1014E-4
Gamma GOF Test			
A-D Test Statistic	4.829	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.318	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	7.179	k star (bias corrected MLE)	6.715
Theta hat (MLE)	1.0130E-4	Theta star (bias corrected MLE)	1.0829E-4
nu hat (MLE)	646.1	nu star (bias corrected)	604.3
MLE Mean (bias corrected)	7.2717E-4	MLE Sd (bias corrected)	2.8062E-4

		Approximate Chi Square Value (0.05)	548.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	546.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.0147E-4	95% Adjusted Gamma UCL (use when n<50)	8.0405E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.809	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.295	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-8.195	Mean of logged Data	-7.298
Maximum of Logged Data	-6.278	SD of logged Data	0.364
Assuming Lognormal Distribution			
95% H-UCL	7.9945E-4	90% Chebyshev (MVUE) UCL	8.4309E-4
95% Chebyshev (MVUE) UCL	8.9776E-4	97.5% Chebyshev (MVUE) UCL	9.7365E-4
99% Chebyshev (MVUE) UCL	0.00112		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.0583E-4	95% Jackknife UCL	8.0752E-4
95% Standard Bootstrap UCL	8.0393E-4	95% Bootstrap-t UCL	8.3792E-4
95% Hall's Bootstrap UCL	8.2843E-4	95% Percentile Bootstrap UCL	8.0852E-4
95% BCA Bootstrap UCL	8.2704E-4		
90% Chebyshev(Mean, Sd) UCL	8.7063E-4	95% Chebyshev(Mean, Sd) UCL	9.3561E-4
97.5% Chebyshev(Mean, Sd) UCL	0.00103	99% Chebyshev(Mean, Sd) UCL	0.0012
Suggested UCL to Use			
95% Student's-t UCL	8.0752E-4	or 95% Modified-t UCL	8.1014E-4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Chromium 6+			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	3.393E-11	Mean	1.025E-10
Maximum	9.454E-10	Median	7.677E-11
SD	1.314E-10	Std. Error of Mean	1.959E-11

Coefficient of Variation	N/A	Skewness	6.263
Normal GOF Test			
Shapiro Wilk Test Statistic	0.306	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.387	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.354E-10	95% Adjusted-CLT UCL (Chen-1995)	1.543E-10
		95% Modified-t UCL (Johnson-1978)	1.385E-10
Gamma GOF Test			
A-D Test Statistic	5.829	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.302	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.637	k star (bias corrected MLE)	2.476
Theta hat (MLE)	3.887E-11	Theta star (bias corrected MLE)	4.140E-11
nu hat (MLE)	237.3	nu star (bias corrected)	222.8
MLE Mean (bias corrected)	1.025E-10	MLE Sd (bias corrected)	6.513E-11
		Approximate Chi Square Value (0.05)	189.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	188.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.207E-10	95% Adjusted Gamma UCL (use when n<50)	1.213E-10
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.745	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.222	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-24.11	Mean of logged Data	-23.2
Maximum of Logged Data	-20.78	SD of logged Data	0.485
Assuming Lognormal Distribution			
95% H-UCL	1.082E-10	90% Chebyshev (MVUE) UCL	1.153E-10
95% Chebyshev (MVUE) UCL	1.250E-10	97.5% Chebyshev (MVUE) UCL	1.384E-10
99% Chebyshev (MVUE) UCL	1.647E-10		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			

Nonparametric Distribution Free UCLs			
95% CLT UCL	1.347E-10	95% Jackknife UCL	1.354E-10
95% Standard Bootstrap UCL	1.336E-10	95% Bootstrap-t UCL	2.412E-10
95% Hall's Bootstrap UCL	2.582E-10	95% Percentile Bootstrap UCL	1.386E-10
95% BCA Bootstrap UCL	1.624E-10		
90% Chebyshev(Mean, Sd) UCL	1.613E-10	95% Chebyshev(Mean, Sd) UCL	1.879E-10
97.5% Chebyshev(Mean, Sd) UCL	2.249E-10	99% Chebyshev(Mean, Sd) UCL	2.974E-10
Suggested UCL to Use			
95% Student's-t UCL	1.354E-10	or 95% Modified-t UCL	1.385E-10
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Total Chromium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.7592E-4	Mean	7.2717E-4
Maximum	0.00188	Median	6.2683E-4
SD	3.2078E-4	Std. Error of Mean	4.7819E-5
Coefficient of Variation	0.441	Skewness	2.206
Normal GOF Test			
Shapiro Wilk Test Statistic	0.689	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.347	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	8.0752E-4	95% Adjusted-CLT UCL (Chen-1995)	8.2263E-4
		95% Modified-t UCL (Johnson-1978)	8.1014E-4
Gamma GOF Test			
A-D Test Statistic	4.829	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.318	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	7.179	k star (bias corrected MLE)	6.715
Theta hat (MLE)	1.0130E-4	Theta star (bias corrected MLE)	1.0829E-4

nu hat (MLE)	646.1	nu star (bias corrected)	604.3
MLE Mean (bias corrected)	7.2717E-4	MLE Sd (bias corrected)	2.8062E-4
		Approximate Chi Square Value (0.05)	548.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	546.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.0147E-4	95% Adjusted Gamma UCL (use when n<50)	8.0405E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.809	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.295	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-8.195	Mean of logged Data	-7.298
Maximum of Logged Data	-6.278	SD of logged Data	0.364
Assuming Lognormal Distribution			
95% H-UCL	7.9945E-4	90% Chebyshev (MVUE) UCL	8.4309E-4
95% Chebyshev (MVUE) UCL	8.9776E-4	97.5% Chebyshev (MVUE) UCL	9.7365E-4
99% Chebyshev (MVUE) UCL	0.00112		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.0583E-4	95% Jackknife UCL	8.0752E-4
95% Standard Bootstrap UCL	8.0756E-4	95% Bootstrap-t UCL	8.3708E-4
95% Hall's Bootstrap UCL	8.3178E-4	95% Percentile Bootstrap UCL	8.0923E-4
95% BCA Bootstrap UCL	8.1945E-4		
90% Chebyshev(Mean, Sd) UCL	8.7063E-4	95% Chebyshev(Mean, Sd) UCL	9.3561E-4
97.5% Chebyshev(Mean, Sd) UCL	0.00103	99% Chebyshev(Mean, Sd) UCL	0.0012
Suggested UCL to Use			
95% Student's-t UCL	8.0752E-4	or 95% Modified-t UCL	8.1014E-4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Copper			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	1.9350E-4	Mean	5.4490E-4

Maximum	0.00188	Median	4.0955E-4
SD	3.5186E-4	Std. Error of Mean	5.2453E-5
Coefficient of Variation	0.646	Skewness	2.634
Normal GOF Test			
Shapiro Wilk Test Statistic	0.614	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.355	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.3303E-4	95% Adjusted-CLT UCL (Chen-1995)	6.5318E-4
		95% Modified-t UCL (Johnson-1978)	6.3646E-4
Gamma GOF Test			
A-D Test Statistic	5.49	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.319	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.133	k star (bias corrected MLE)	3.873
Theta hat (MLE)	1.3183E-4	Theta star (bias corrected MLE)	1.4070E-4
nu hat (MLE)	372	nu star (bias corrected)	348.5
MLE Mean (bias corrected)	5.4490E-4	MLE Sd (bias corrected)	2.7689E-4
		Approximate Chi Square Value (0.05)	306.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	305
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.2008E-4	95% Adjusted Gamma UCL (use when n<50)	6.2274E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.784	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.293	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-8.55	Mean of logged Data	-7.641
Maximum of Logged Data	-6.275	SD of logged Data	0.458
Assuming Lognormal Distribution			
95% H-UCL	6.0753E-4	90% Chebyshev (MVUE) UCL	6.4597E-4
95% Chebyshev (MVUE) UCL	6.9745E-4	97.5% Chebyshev (MVUE) UCL	7.6890E-4
99% Chebyshev (MVUE) UCL	9.0925E-4		

Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.3117E-4	95% Jackknife UCL	6.3303E-4
95% Standard Bootstrap UCL	6.2943E-4	95% Bootstrap-t UCL	6.8947E-4
95% Hall's Bootstrap UCL	6.6746E-4	95% Percentile Bootstrap UCL	6.3558E-4
95% BCA Bootstrap UCL	6.6083E-4		
90% Chebyshev(Mean, Sd) UCL	7.0225E-4	95% Chebyshev(Mean, Sd) UCL	7.7353E-4
97.5% Chebyshev(Mean, Sd) UCL	8.7246E-4	99% Chebyshev(Mean, Sd) UCL	0.00107
Suggested UCL to Use			
95% Student's-t UCL	6.3303E-4	or 95% Modified-t UCL	6.3646E-4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Iron			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.139	Mean	0.554
Maximum	2.827	Median	0.286
SD	0.616	Std. Error of Mean	0.0918
Coefficient of Variation	1.112	Skewness	2.467
Normal GOF Test			
Shapiro Wilk Test Statistic	0.606	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.377	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.708	95% Adjusted-CLT UCL (Chen-1995)	0.741
		95% Modified-t UCL (Johnson-1978)	0.714
Gamma GOF Test			
A-D Test Statistic	5.425	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.767	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.35	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.134	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			

k hat (MLE)	1.557	k star (bias corrected MLE)	1.468
Theta hat (MLE)	0.356	Theta star (bias corrected MLE)	0.377
nu hat (MLE)	140.1	nu star (bias corrected)	132.1
MLE Mean (bias corrected)	0.554	MLE Sd (bias corrected)	0.457
		Approximate Chi Square Value (0.05)	106.6
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	105.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.687	95% Adjusted Gamma UCL (use when n<50)	0.692
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.794	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.31	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.973	Mean of logged Data	-0.945
Maximum of Logged Data	1.039	SD of logged Data	0.749
Assuming Lognormal Distribution			
95% H-UCL	0.654	90% Chebyshev (MVUE) UCL	0.7
95% Chebyshev (MVUE) UCL	0.785	97.5% Chebyshev (MVUE) UCL	0.904
99% Chebyshev (MVUE) UCL	1.138		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.705	95% Jackknife UCL	0.708
95% Standard Bootstrap UCL	0.706	95% Bootstrap-t UCL	0.782
95% Hall's Bootstrap UCL	0.749	95% Percentile Bootstrap UCL	0.709
95% BCA Bootstrap UCL	0.736		
90% Chebyshev(Mean, Sd) UCL	0.829	95% Chebyshev(Mean, Sd) UCL	0.954
97.5% Chebyshev(Mean, Sd) UCL	1.127	99% Chebyshev(Mean, Sd) UCL	1.468
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.954		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Mercury			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45

		Number of Missing Observations	0
Minimum	4.8350E-8	Mean	1.1858E-7
Maximum	2.3773E-7	Median	1.1353E-7
SD	3.6532E-8	Std. Error of Mean	5.4459E-9
Coefficient of Variation	N/A	Skewness	1.661
Normal GOF Test			
Shapiro Wilk Test Statistic	0.731	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.324	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.2773E-7	95% Adjusted-CLT UCL (Chen-1995)	1.2898E-7
		95% Modified-t UCL (Johnson-1978)	1.2795E-7
Gamma GOF Test			
A-D Test Statistic	4.725	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.285	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	12.08	k star (bias corrected MLE)	11.29
Theta hat (MLE)	9.8134E-9	Theta star (bias corrected MLE)	1.0501E-8
nu hat (MLE)	1087	nu star (bias corrected)	1016
MLE Mean (bias corrected)	1.1858E-7	MLE Sd (bias corrected)	3.5286E-8
		Approximate Chi Square Value (0.05)	943.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	941
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.2775E-7	95% Adjusted Gamma UCL (use when n<50)	1.2807E-7
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.785	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.273	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-16.84	Mean of logged Data	-15.99
Maximum of Logged Data	-15.25	SD of logged Data	0.294
Assuming Lognormal Distribution			
95% H-UCL	1.2839E-7	90% Chebyshev (MVUE) UCL	1.3444E-7
95% Chebyshev (MVUE) UCL	1.4162E-7	97.5% Chebyshev (MVUE) UCL	1.5158E-7

99% Chebyshev (MVUE) UCL	1.7115E-7		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.2753E-7	95% Jackknife UCL	1.2773E-7
95% Standard Bootstrap UCL	1.2733E-7	95% Bootstrap-t UCL	1.2967E-7
95% Hall's Bootstrap UCL	1.3117E-7	95% Percentile Bootstrap UCL	1.2753E-7
95% BCA Bootstrap UCL	1.2946E-7		
90% Chebyshev(Mean, Sd) UCL	1.3491E-7	95% Chebyshev(Mean, Sd) UCL	1.4232E-7
97.5% Chebyshev(Mean, Sd) UCL	1.5259E-7	99% Chebyshev(Mean, Sd) UCL	1.7276E-7
Suggested UCL to Use			
95% Student's-t UCL	1.2773E-7	or 95% Modified-t UCL	1.2795E-7
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Molybdenum			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.4308E-6	Mean	8.5739E-6
Maximum	4.1885E-5	Median	4.7581E-6
SD	8.8827E-6	Std. Error of Mean	1.3242E-6
Coefficient of Variation	N/A	Skewness	2.591
Normal GOF Test			
Shapiro Wilk Test Statistic	0.59	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.386	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.0799E-5	95% Adjusted-CLT UCL (Chen-1995)	1.1298E-5
		95% Modified-t UCL (Johnson-1978)	1.0884E-5
Gamma GOF Test			
A-D Test Statistic	5.748	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.366	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.134	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.839	k star (bias corrected MLE)	1.731
Theta hat (MLE)	4.6618E-6	Theta star (bias corrected MLE)	4.9521E-6
nu hat (MLE)	165.5	nu star (bias corrected)	155.8
MLE Mean (bias corrected)	8.5739E-6	MLE Sd (bias corrected)	6.5160E-6
		Approximate Chi Square Value (0.05)	128
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	127.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.0440E-5	95% Adjusted Gamma UCL (use when n<50)	1.0509E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.774	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.33	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-12.93	Mean of logged Data	-11.96
Maximum of Logged Data	-10.08	SD of logged Data	0.68
Assuming Lognormal Distribution			
95% H-UCL	9.9212E-6	90% Chebyshev (MVUE) UCL	1.0629E-5
95% Chebyshev (MVUE) UCL	1.1825E-5	97.5% Chebyshev (MVUE) UCL	1.3486E-5
99% Chebyshev (MVUE) UCL	1.6748E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.0752E-5	95% Jackknife UCL	1.0799E-5
95% Standard Bootstrap UCL	1.0679E-5	95% Bootstrap-t UCL	1.1919E-5
95% Hall's Bootstrap UCL	1.1407E-5	95% Percentile Bootstrap UCL	1.0947E-5
95% BCA Bootstrap UCL	1.1420E-5		
90% Chebyshev(Mean, Sd) UCL	1.2546E-5	95% Chebyshev(Mean, Sd) UCL	1.4346E-5
97.5% Chebyshev(Mean, Sd) UCL	1.6843E-5	99% Chebyshev(Mean, Sd) UCL	2.1749E-5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1.4346E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Nickel			

General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.8545E-4	Mean	6.9023E-4
Maximum	0.00137	Median	6.6399E-4
SD	1.9617E-4	Std. Error of Mean	2.9243E-5
Coefficient of Variation	0.284	Skewness	1.492
Normal GOF Test			
Shapiro Wilk Test Statistic	0.749	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.317	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	7.3936E-4	95% Adjusted-CLT UCL (Chen-1995)	7.4528E-4
		95% Modified-t UCL (Johnson-1978)	7.4045E-4
Gamma GOF Test			
A-D Test Statistic	4.796	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.281	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	13.61	k star (bias corrected MLE)	12.72
Theta hat (MLE)	5.0721E-5	Theta star (bias corrected MLE)	5.4281E-5
nu hat (MLE)	1225	nu star (bias corrected)	1144
MLE Mean (bias corrected)	6.9023E-4	MLE Sd (bias corrected)	1.9356E-4
		Approximate Chi Square Value (0.05)	1067
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	1064
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.4039E-4	95% Adjusted Gamma UCL (use when n<50)	7.4211E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.782	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.293	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-8.161	Mean of logged Data	-7.316
Maximum of Logged Data	-6.59	SD of logged Data	0.279
Assuming Lognormal Distribution			

95% H-UCL	7.4431E-4	90% Chebyshev (MVUE) UCL	7.7835E-4
95% Chebyshev (MVUE) UCL	8.1801E-4	97.5% Chebyshev (MVUE) UCL	8.7305E-4
99% Chebyshev (MVUE) UCL	9.8117E-4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.3833E-4	95% Jackknife UCL	7.3936E-4
95% Standard Bootstrap UCL	7.3899E-4	95% Bootstrap-t UCL	7.4906E-4
95% Hall's Bootstrap UCL	7.5626E-4	95% Percentile Bootstrap UCL	7.3862E-4
95% BCA Bootstrap UCL	7.4417E-4		
90% Chebyshev(Mean, Sd) UCL	7.7796E-4	95% Chebyshev(Mean, Sd) UCL	8.1770E-4
97.5% Chebyshev(Mean, Sd) UCL	8.7285E-4	99% Chebyshev(Mean, Sd) UCL	9.8119E-4
Suggested UCL to Use			
95% Student's-t UCL	7.3936E-4	or 95% Modified-t UCL	7.4045E-4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Lead			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	1.1005E-4	Mean	3.0101E-4
Maximum	6.2435E-4	Median	3.2990E-4
SD	9.4064E-5	Std. Error of Mean	1.4022E-5
Coefficient of Variation	0.312	Skewness	0.242
Normal GOF Test			
Shapiro Wilk Test Statistic	0.886	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	3.2457E-4	95% Adjusted-CLT UCL (Chen-1995)	3.2462E-4
		95% Modified-t UCL (Johnson-1978)	3.2466E-4
Gamma GOF Test			
A-D Test Statistic	2.803	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.239	Kolmogorov-Smirnov Gamma GOF Test	

5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	9.209	k star (bias corrected MLE)	8.61
Theta hat (MLE)	3.2685E-5	Theta star (bias corrected MLE)	3.4959E-5
nu hat (MLE)	828.9	nu star (bias corrected)	774.9
MLE Mean (bias corrected)	3.0101E-4	MLE Sd (bias corrected)	1.0258E-4
		Approximate Chi Square Value (0.05)	711.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	709.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	3.2792E-4	95% Adjusted Gamma UCL (use when n<50)	3.2885E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.861	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.248	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-9.115	Mean of logged Data	-8.164
Maximum of Logged Data	-7.379	SD of logged Data	0.354
Assuming Lognormal Distribution			
95% H-UCL	3.3409E-4	90% Chebyshev (MVUE) UCL	3.5198E-4
95% Chebyshev (MVUE) UCL	3.7425E-4	97.5% Chebyshev (MVUE) UCL	4.0517E-4
99% Chebyshev (MVUE) UCL	4.6589E-4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	3.2408E-4	95% Jackknife UCL	3.2457E-4
95% Standard Bootstrap UCL	3.2351E-4	95% Bootstrap-t UCL	3.2417E-4
95% Hall's Bootstrap UCL	3.2660E-4	95% Percentile Bootstrap UCL	3.2344E-4
95% BCA Bootstrap UCL	3.2484E-4		
90% Chebyshev(Mean, Sd) UCL	3.4308E-4	95% Chebyshev(Mean, Sd) UCL	3.6213E-4
97.5% Chebyshev(Mean, Sd) UCL	3.8858E-4	99% Chebyshev(Mean, Sd) UCL	4.4053E-4
Suggested UCL to Use			
95% Student's-t UCL	3.2457E-4	or 95% Modified-t UCL	3.2466E-4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Selenium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.6298E-6	Mean	6.7230E-6
Maximum	1.6033E-5	Median	5.9061E-6
SD	2.6441E-6	Std. Error of Mean	3.9415E-7
Coefficient of Variation	N/A	Skewness	2.105
Normal GOF Test			
Shapiro Wilk Test Statistic	0.71	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.305	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.3853E-6	95% Adjusted-CLT UCL (Chen-1995)	7.5035E-6
		95% Modified-t UCL (Johnson-1978)	7.4059E-6
Gamma GOF Test			
A-D Test Statistic	4.421	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.272	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	8.571	k star (bias corrected MLE)	8.015
Theta hat (MLE)	7.8436E-7	Theta star (bias corrected MLE)	8.3883E-7
nu hat (MLE)	771.4	nu star (bias corrected)	721.3
MLE Mean (bias corrected)	6.7230E-6	MLE Sd (bias corrected)	2.3748E-6
		Approximate Chi Square Value (0.05)	660
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	658.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.3476E-6	95% Adjusted Gamma UCL (use when n<50)	7.3692E-6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.258	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-12.85	Mean of logged Data	-11.97
Maximum of Logged Data	-11.04	SD of logged Data	0.337

Assuming Lognormal Distribution			
95% H-UCL	7.3476E-6	90% Chebyshev (MVUE) UCL	7.7275E-6
95% Chebyshev (MVUE) UCL	8.1948E-6	97.5% Chebyshev (MVUE) UCL	8.8435E-6
99% Chebyshev (MVUE) UCL	1.0118E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.3714E-6	95% Jackknife UCL	7.3853E-6
95% Standard Bootstrap UCL	7.3509E-6	95% Bootstrap-t UCL	7.5681E-6
95% Hall's Bootstrap UCL	7.5768E-6	95% Percentile Bootstrap UCL	7.3642E-6
95% BCA Bootstrap UCL	7.5435E-6		
90% Chebyshev(Mean, Sd) UCL	7.9055E-6	95% Chebyshev(Mean, Sd) UCL	8.4411E-6
97.5% Chebyshev(Mean, Sd) UCL	9.1845E-6	99% Chebyshev(Mean, Sd) UCL	1.0645E-5
Suggested UCL to Use			
95% Student's-t UCL	7.3853E-6	or 95% Modified-t UCL	7.4059E-6
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Thallium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.0333E-6	Mean	4.5606E-6
Maximum	9.2591E-6	Median	4.7222E-6
SD	1.1464E-6	Std. Error of Mean	1.7090E-7
Coefficient of Variation	N/A	Skewness	0.877
Normal GOF Test			
Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.8478E-6	95% Adjusted-CLT UCL (Chen-1995)	4.8656E-6
		95% Modified-t UCL (Johnson-1978)	4.8515E-6
Gamma GOF Test			
A-D Test Statistic	4.538	**Anderson-Darling Gamma GOF Test**	

5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.285	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	15.2	k star (bias corrected MLE)	14.2
Theta hat (MLE)	2.9997E-7	Theta star (bias corrected MLE)	3.2106E-7
nu hat (MLE)	1368	nu star (bias corrected)	1278
MLE Mean (bias corrected)	4.5606E-6	MLE Sd (bias corrected)	1.2101E-6
		Approximate Chi Square Value (0.05)	1196
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	1194
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.8733E-6	95% Adjusted Gamma UCL (use when n<50)	4.8840E-6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.772	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-13.11	Mean of logged Data	-12.33
Maximum of Logged Data	-11.59	SD of logged Data	0.272
Assuming Lognormal Distribution			
95% H-UCL	4.9176E-6	90% Chebyshev (MVUE) UCL	5.1390E-6
95% Chebyshev (MVUE) UCL	5.3949E-6	97.5% Chebyshev (MVUE) UCL	5.7501E-6
99% Chebyshev (MVUE) UCL	6.4478E-6		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.8417E-6	95% Jackknife UCL	4.8478E-6
95% Standard Bootstrap UCL	4.8384E-6	95% Bootstrap-t UCL	4.8649E-6
95% Hall's Bootstrap UCL	4.9317E-6	95% Percentile Bootstrap UCL	4.8375E-6
95% BCA Bootstrap UCL	4.8485E-6		
90% Chebyshev(Mean, Sd) UCL	5.0733E-6	95% Chebyshev(Mean, Sd) UCL	5.3056E-6
97.5% Chebyshev(Mean, Sd) UCL	5.6279E-6	99% Chebyshev(Mean, Sd) UCL	6.2610E-6
Suggested UCL to Use			
95% Student's-t UCL	4.8478E-6	or 95% Modified-t UCL	4.8515E-6
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
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Uranium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	3.3416E-6	Mean	9.8875E-6
Maximum	3.5171E-5	Median	7.3226E-6
SD	6.7727E-6	Std. Error of Mean	1.0096E-6
Coefficient of Variation	N/A	Skewness	2.493
Normal GOF Test			
Shapiro Wilk Test Statistic	0.631	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.374	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.1584E-5	95% Adjusted-CLT UCL (Chen-1995)	1.1949E-5
		95% Modified-t UCL (Johnson-1978)	1.1646E-5
Gamma GOF Test			
A-D Test Statistic	5.316	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.352	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.628	k star (bias corrected MLE)	3.401
Theta hat (MLE)	2.7256E-6	Theta star (bias corrected MLE)	2.9076E-6
nu hat (MLE)	326.5	nu star (bias corrected)	306.1
MLE Mean (bias corrected)	9.8875E-6	MLE Sd (bias corrected)	5.3618E-6
		Approximate Chi Square Value (0.05)	266.5
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	265.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.1354E-5	95% Adjusted Gamma UCL (use when n<50)	1.1406E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.796	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.326	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			

Minimum of Logged Data	-12.61	Mean of logged Data	-11.67
Maximum of Logged Data	-10.26	SD of logged Data	0.492
Assuming Lognormal Distribution			
95% H-UCL	1.1127E-5	90% Chebyshev (MVUE) UCL	1.1857E-5
95% Chebyshev (MVUE) UCL	1.2864E-5	97.5% Chebyshev (MVUE) UCL	1.4261E-5
99% Chebyshev (MVUE) UCL	1.7006E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.1548E-5	95% Jackknife UCL	1.1584E-5
95% Standard Bootstrap UCL	1.1553E-5	95% Bootstrap-t UCL	1.2375E-5
95% Hall's Bootstrap UCL	1.2095E-5	95% Percentile Bootstrap UCL	1.1712E-5
95% BCA Bootstrap UCL	1.1950E-5		
90% Chebyshev(Mean, Sd) UCL	1.2916E-5	95% Chebyshev(Mean, Sd) UCL	1.4288E-5
97.5% Chebyshev(Mean, Sd) UCL	1.6193E-5	99% Chebyshev(Mean, Sd) UCL	1.9933E-5
Suggested UCL to Use			
95% Student's-t UCL	1.1584E-5	or 95% Modified-t UCL	1.1646E-5
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Vanadium			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	1.6519E-4	Mean	5.4011E-4
Maximum	0.00214	Median	3.5570E-4
SD	4.3576E-4	Std. Error of Mean	6.4959E-5
Coefficient of Variation	0.807	Skewness	2.401
Normal GOF Test			
Shapiro Wilk Test Statistic	0.627	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.381	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.4926E-4	95% Adjusted-CLT UCL (Chen-1995)	6.7180E-4
		95% Modified-t UCL (Johnson-1978)	6.5313E-4

Gamma GOF Test			
A-D Test Statistic	5.571	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.357	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.701	k star (bias corrected MLE)	2.535
Theta hat (MLE)	2.0000E-4	Theta star (bias corrected MLE)	2.1303E-4
nu hat (MLE)	243	nu star (bias corrected)	228.2
MLE Mean (bias corrected)	5.4011E-4	MLE Sd (bias corrected)	3.3921E-4
		Approximate Chi Square Value (0.05)	194.2
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	193.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.3457E-4	95% Adjusted Gamma UCL (use when n<50)	6.3797E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.788	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.33	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-8.708	Mean of logged Data	-7.72
Maximum of Logged Data	-6.146	SD of logged Data	0.569
Assuming Lognormal Distribution			
95% H-UCL	6.1729E-4	90% Chebyshev (MVUE) UCL	6.6028E-4
95% Chebyshev (MVUE) UCL	7.2397E-4	97.5% Chebyshev (MVUE) UCL	8.1237E-4
99% Chebyshev (MVUE) UCL	9.8601E-4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.4696E-4	95% Jackknife UCL	6.4926E-4
95% Standard Bootstrap UCL	6.4406E-4	95% Bootstrap-t UCL	6.9626E-4
95% Hall's Bootstrap UCL	6.8103E-4	95% Percentile Bootstrap UCL	6.6043E-4
95% BCA Bootstrap UCL	6.8294E-4		
90% Chebyshev(Mean, Sd) UCL	7.3499E-4	95% Chebyshev(Mean, Sd) UCL	8.2326E-4
97.5% Chebyshev(Mean, Sd) UCL	9.4578E-4	99% Chebyshev(Mean, Sd) UCL	0.00119
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	8.2326E-4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Zinc			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	8.2470E-4	Mean	0.00187
Maximum	0.00373	Median	0.00191
SD	4.4797E-4	Std. Error of Mean	6.6780E-5
Coefficient of Variation	0.24	Skewness	0.863
Normal GOF Test			
Shapiro Wilk Test Statistic	0.783	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.27	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00198	95% Adjusted-CLT UCL (Chen-1995)	0.00198
		95% Modified-t UCL (Johnson-1978)	0.00198
Gamma GOF Test			
A-D Test Statistic	4.437	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.303	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	16.55	k star (bias corrected MLE)	15.46
Theta hat (MLE)	1.1268E-4	Theta star (bias corrected MLE)	1.2061E-4
nu hat (MLE)	1490	nu star (bias corrected)	1392
MLE Mean (bias corrected)	0.00187	MLE Sd (bias corrected)	4.7431E-4
		Approximate Chi Square Value (0.05)	1306
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	1303
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00199	95% Adjusted Gamma UCL (use when n<50)	0.00199
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.769	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.317	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	-7.1	Mean of logged Data	-6.315
Maximum of Logged Data	-5.59	SD of logged Data	0.261
Assuming Lognormal Distribution			
95% H-UCL	0.002	90% Chebyshev (MVUE) UCL	0.00209
95% Chebyshev (MVUE) UCL	0.00219	97.5% Chebyshev (MVUE) UCL	0.00233
99% Chebyshev (MVUE) UCL	0.0026		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00198	95% Jackknife UCL	0.00198
95% Standard Bootstrap UCL	0.00197	95% Bootstrap-t UCL	0.00198
95% Hall's Bootstrap UCL	0.00202	95% Percentile Bootstrap UCL	0.00198
95% BCA Bootstrap UCL	0.00199		
90% Chebyshev(Mean, Sd) UCL	0.00207	95% Chebyshev(Mean, Sd) UCL	0.00216
97.5% Chebyshev(Mean, Sd) UCL	0.00228	99% Chebyshev(Mean, Sd) UCL	0.00253
Suggested UCL to Use			
95% Student's-t UCL	0.00198	or 95% Modified-t UCL	0.00198
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Manganese Compounds			
General Statistics			
Total Number of Observations	45	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	2.9580E-9	Mean	8.9337E-9
Maximum	8.2411E-8	Median	6.6923E-9
SD	1.1458E-8	Std. Error of Mean	1.7080E-9
Coefficient of Variation	N/A	Skewness	6.263
Normal GOF Test			
Shapiro Wilk Test Statistic	0.306	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.387	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.1804E-8	95% Adjusted-CLT UCL (Chen-1995)	1.3447E-8

		95% Modified-t UCL (Johnson-1978)	1.2069E-8
Gamma GOF Test			
A-D Test Statistic	5.829	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.302	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.637	k star (bias corrected MLE)	2.476
Theta hat (MLE)	3.3882E-9	Theta star (bias corrected MLE)	3.6085E-9
nu hat (MLE)	237.3	nu star (bias corrected)	222.8
MLE Mean (bias corrected)	8.9337E-9	MLE Sd (bias corrected)	5.6778E-9
		Approximate Chi Square Value (0.05)	189.3
Adjusted Level of Significance	0.0447	Adjusted Chi Square Value	188.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.0517E-8	95% Adjusted Gamma UCL (use when n<50)	1.0574E-8
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.745	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.222	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.131	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-19.64	Mean of logged Data	-18.73
Maximum of Logged Data	-16.31	SD of logged Data	0.485
Assuming Lognormal Distribution			
95% H-UCL	9.4360E-9	90% Chebyshev (MVUE) UCL	1.0051E-8
95% Chebyshev (MVUE) UCL	1.0893E-8	97.5% Chebyshev (MVUE) UCL	1.2062E-8
99% Chebyshev (MVUE) UCL	1.4358E-8		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.1743E-8	95% Jackknife UCL	1.1804E-8
95% Standard Bootstrap UCL	1.1757E-8	95% Bootstrap-t UCL	2.1063E-8
95% Hall's Bootstrap UCL	2.2438E-8	95% Percentile Bootstrap UCL	1.2235E-8
95% BCA Bootstrap UCL	1.5204E-8		
90% Chebyshev(Mean, Sd) UCL	1.4058E-8	95% Chebyshev(Mean, Sd) UCL	1.6379E-8
97.5% Chebyshev(Mean, Sd) UCL	1.9600E-8	99% Chebyshev(Mean, Sd) UCL	2.5928E-8
Suggested UCL to Use			
95% Student's-t UCL	1.1804E-8	or 95% Modified-t UCL	1.2069E-8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

APPENDIX C.2
PROUCL OUTPUTS
DEPOSITION
MACLELLAN REGION

UCL Statistics for Uncensored Full Data Sets			
User Selected Options			
Date/Time of Computation	ProUCL 5.13/12/2020 1:00:38 PM		
From File	MacLellan dep input.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Silver			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	8.4367E-6	Mean	3.9456E-5
Maximum	2.9572E-4	Median	3.0875E-5
SD	3.7912E-5	Std. Error of Mean	3.5508E-6
Coefficient of Variation	N/A	Skewness	4.964
Normal GOF Test			
Shapiro Wilk Test Statistic	0.467	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.318	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	4.5345E-5	95% Adjusted-CLT UCL (Chen-1995)	4.7061E-5
		95% Modified-t UCL (Johnson-1978)	4.5620E-5
Gamma GOF Test			
A-D Test Statistic	8.869	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.922	k star (bias corrected MLE)	2.851
Theta hat (MLE)	1.3501E-5	Theta star (bias corrected MLE)	1.3838E-5
nu hat (MLE)	666.3	nu star (bias corrected)	650.1
MLE Mean (bias corrected)	3.9456E-5	MLE Sd (bias corrected)	2.3366E-5
		Approximate Chi Square Value (0.05)	592
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	591.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.3332E-5	95% Adjusted Gamma UCL (use when n<50)	4.3384E-5

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.863	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	6.661E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-11.68	Mean of logged Data	-10.32
Maximum of Logged Data	-8.126	SD of logged Data	0.519
Assuming Lognormal Distribution			
95% H-UCL	4.1231E-5	90% Chebyshev (MVUE) UCL	4.3443E-5
95% Chebyshev (MVUE) UCL	4.6077E-5	97.5% Chebyshev (MVUE) UCL	4.9733E-5
99% Chebyshev (MVUE) UCL	5.6915E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.5296E-5	95% Jackknife UCL	4.5345E-5
95% Standard Bootstrap UCL	4.5182E-5	95% Bootstrap-t UCL	4.9679E-5
95% Hall's Bootstrap UCL	4.9799E-5	95% Percentile Bootstrap UCL	4.5770E-5
95% BCA Bootstrap UCL	4.8150E-5		
90% Chebyshev(Mean, Sd) UCL	5.0108E-5	95% Chebyshev(Mean, Sd) UCL	5.4933E-5
97.5% Chebyshev(Mean, Sd) UCL	6.1631E-5	99% Chebyshev(Mean, Sd) UCL	7.4786E-5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	5.4933E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Aluminum			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	0.0886	Mean	0.452
Maximum	3.463	Median	0.358
SD	0.447	Std. Error of Mean	0.0419
Coefficient of Variation	0.99	Skewness	4.924
Normal GOF Test			
Shapiro Wilk Test Statistic	0.457	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.333	Lilliefors GOF Test	

5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.522	95% Adjusted-CLT UCL (Chen-1995)	0.542
		95% Modified-t UCL (Johnson-1978)	0.525
Gamma GOF Test			
A-D Test Statistic	8.616	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.817	k star (bias corrected MLE)	2.749
Theta hat (MLE)	0.16	Theta star (bias corrected MLE)	0.164
nu hat (MLE)	642.4	nu star (bias corrected)	626.8
MLE Mean (bias corrected)	0.452	MLE Sd (bias corrected)	0.273
		Approximate Chi Square Value (0.05)	569.7
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	569
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.497	95% Adjusted Gamma UCL (use when n<50)	0.498
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	2.109E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.165	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.423	Mean of logged Data	-0.982
Maximum of Logged Data	1.242	SD of logged Data	0.527
Assuming Lognormal Distribution			
95% H-UCL	0.472	90% Chebyshev (MVUE) UCL	0.498
95% Chebyshev (MVUE) UCL	0.528	97.5% Chebyshev (MVUE) UCL	0.571
99% Chebyshev (MVUE) UCL	0.654		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.521	95% Jackknife UCL	0.522
95% Standard Bootstrap UCL	0.521	95% Bootstrap-t UCL	0.575
95% Hall's Bootstrap UCL	0.542	95% Percentile Bootstrap UCL	0.524
95% BCA Bootstrap UCL	0.542		

90% Chebyshev(Mean, Sd) UCL	0.578	95% Chebyshev(Mean, Sd) UCL	0.635
97.5% Chebyshev(Mean, Sd) UCL	0.714	99% Chebyshev(Mean, Sd) UCL	0.869
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.635		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Arsenic			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	0.00145	Mean	0.00677
Maximum	0.0483	Median	0.00532
SD	0.00648	Std. Error of Mean	6.0667E-4
Coefficient of Variation	0.957	Skewness	4.883
Normal GOF Test			
Shapiro Wilk Test Statistic	0.465	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.306	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00777	95% Adjusted-CLT UCL (Chen-1995)	0.00806
		95% Modified-t UCL (Johnson-1978)	0.00782
Gamma GOF Test			
A-D Test Statistic	8.64	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.21	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.919	k star (bias corrected MLE)	2.848
Theta hat (MLE)	0.00232	Theta star (bias corrected MLE)	0.00238
nu hat (MLE)	665.5	nu star (bias corrected)	649.3
MLE Mean (bias corrected)	0.00677	MLE Sd (bias corrected)	0.00401
		Approximate Chi Square Value (0.05)	591.2
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	590.5
Assuming Gamma Distribution			

95% Approximate Gamma UCL (use when n>=50))	0.00743	95% Adjusted Gamma UCL (use when n<50)	0.00744
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	9.992E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-6.537	Mean of logged Data	-5.177
Maximum of Logged Data	-3.03	SD of logged Data	0.52
Assuming Lognormal Distribution			
95% H-UCL	0.00708	90% Chebyshev (MVUE) UCL	0.00746
95% Chebyshev (MVUE) UCL	0.00791	97.5% Chebyshev (MVUE) UCL	0.00854
99% Chebyshev (MVUE) UCL	0.00977		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00776	95% Jackknife UCL	0.00777
95% Standard Bootstrap UCL	0.00776	95% Bootstrap-t UCL	0.00843
95% Hall's Bootstrap UCL	0.00835	95% Percentile Bootstrap UCL	0.00784
95% BCA Bootstrap UCL	0.00805		
90% Chebyshev(Mean, Sd) UCL	0.00859	95% Chebyshev(Mean, Sd) UCL	0.00941
97.5% Chebyshev(Mean, Sd) UCL	0.0106	99% Chebyshev(Mean, Sd) UCL	0.0128
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.00941		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Beryllium			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	1.0130E-6	Mean	4.7075E-6
Maximum	3.2311E-5	Median	3.6820E-6
SD	4.5413E-6	Std. Error of Mean	4.2533E-7
Coefficient of Variation	N/A	Skewness	4.777
Normal GOF Test			
Shapiro Wilk Test Statistic	0.459	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.4129E-6	95% Adjusted-CLT UCL (Chen-1995)	5.6105E-6
		95% Modified-t UCL (Johnson-1978)	5.4447E-6
Gamma GOF Test			
A-D Test Statistic	9.134	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.229	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.904	k star (bias corrected MLE)	2.833
Theta hat (MLE)	1.6212E-6	Theta star (bias corrected MLE)	1.6616E-6
nu hat (MLE)	662	nu star (bias corrected)	645.9
MLE Mean (bias corrected)	4.7075E-6	MLE Sd (bias corrected)	2.7968E-6
		Approximate Chi Square Value (0.05)	588
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	587.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.1716E-6	95% Adjusted Gamma UCL (use when n<50)	5.1778E-6
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.110E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-13.8	Mean of logged Data	-12.45
Maximum of Logged Data	-10.34	SD of logged Data	0.516
Assuming Lognormal Distribution			
95% H-UCL	4.9046E-6	90% Chebyshev (MVUE) UCL	5.1667E-6
95% Chebyshev (MVUE) UCL	5.4786E-6	97.5% Chebyshev (MVUE) UCL	5.9115E-6
99% Chebyshev (MVUE) UCL	6.7618E-6		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.4072E-6	95% Jackknife UCL	5.4129E-6
95% Standard Bootstrap UCL	5.4044E-6	95% Bootstrap-t UCL	5.9434E-6

95% Hall's Bootstrap UCL	5.7135E-6	95% Percentile Bootstrap UCL	5.4803E-6
95% BCA Bootstrap UCL	5.6826E-6		
90% Chebyshev(Mean, Sd) UCL	5.9835E-6	95% Chebyshev(Mean, Sd) UCL	6.5615E-6
97.5% Chebyshev(Mean, Sd) UCL	7.3637E-6	99% Chebyshev(Mean, Sd) UCL	8.9395E-6
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	6.5615E-6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Cadmium			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	1.6276E-5	Mean	7.7696E-5
Maximum	5.4716E-4	Median	6.0926E-5
SD	7.5646E-5	Std. Error of Mean	7.0849E-6
Coefficient of Variation	N/A	Skewness	4.852
Normal GOF Test			
Shapiro Wilk Test Statistic	0.457	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.323	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	8.9446E-5	95% Adjusted-CLT UCL (Chen-1995)	9.2790E-5
		95% Modified-t UCL (Johnson-1978)	8.9983E-5
Gamma GOF Test			
A-D Test Statistic	8.957	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.226	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.864	k star (bias corrected MLE)	2.795
Theta hat (MLE)	2.7125E-5	Theta star (bias corrected MLE)	2.7800E-5
nu hat (MLE)	653.1	nu star (bias corrected)	637.2
MLE Mean (bias corrected)	7.7696E-5	MLE Sd (bias corrected)	4.6475E-5
		Approximate Chi Square Value (0.05)	579.7
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	579

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.5411E-5	95% Adjusted Gamma UCL (use when n<50)	8.5514E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.859	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	1.110E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.169	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-11.03	Mean of logged Data	-9.647
Maximum of Logged Data	-7.511	SD of logged Data	0.523
Assuming Lognormal Distribution			
95% H-UCL	8.1121E-5	90% Chebyshev (MVUE) UCL	8.5501E-5
95% Chebyshev (MVUE) UCL	9.0725E-5	97.5% Chebyshev (MVUE) UCL	9.7976E-5
99% Chebyshev (MVUE) UCL	1.1222E-4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.9350E-5	95% Jackknife UCL	8.9446E-5
95% Standard Bootstrap UCL	8.9309E-5	95% Bootstrap-t UCL	9.6521E-5
95% Hall's Bootstrap UCL	9.5160E-5	95% Percentile Bootstrap UCL	9.0425E-5
95% BCA Bootstrap UCL	9.2336E-5		
90% Chebyshev(Mean, Sd) UCL	9.8951E-5	95% Chebyshev(Mean, Sd) UCL	1.0858E-4
97.5% Chebyshev(Mean, Sd) UCL	1.2194E-4	99% Chebyshev(Mean, Sd) UCL	1.4819E-4
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1.0858E-4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Cobalt			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	1.1680E-4	Mean	6.0330E-4
Maximum	0.00465	Median	4.7695E-4
SD	6.0164E-4	Std. Error of Mean	5.6349E-5
Coefficient of Variation	0.997	Skewness	4.933

Normal GOF Test			
Shapiro Wilk Test Statistic	0.454	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.332	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.9675E-4	95% Adjusted-CLT UCL (Chen-1995)	7.2380E-4
		95% Modified-t UCL (Johnson-1978)	7.0109E-4
Gamma GOF Test			
A-D Test Statistic	8.71	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.228	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.792	k star (bias corrected MLE)	2.725
Theta hat (MLE)	2.1606E-4	Theta star (bias corrected MLE)	2.2142E-4
nu hat (MLE)	636.6	nu star (bias corrected)	621.2
MLE Mean (bias corrected)	6.0330E-4	MLE Sd (bias corrected)	3.6549E-4
		Approximate Chi Square Value (0.05)	564.4
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	563.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.6403E-4	95% Adjusted Gamma UCL (use when n<50)	6.6484E-4
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.110E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-9.055	Mean of logged Data	-7.603
Maximum of Logged Data	-5.371	SD of logged Data	0.529
Assuming Lognormal Distribution			
95% H-UCL	6.2957E-4	90% Chebyshev (MVUE) UCL	6.6387E-4
95% Chebyshev (MVUE) UCL	7.0489E-4	97.5% Chebyshev (MVUE) UCL	7.6183E-4
99% Chebyshev (MVUE) UCL	8.7368E-4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			

95% CLT UCL	6.9598E-4	95% Jackknife UCL	6.9675E-4
95% Standard Bootstrap UCL	6.9383E-4	95% Bootstrap-t UCL	7.5251E-4
95% Hall's Bootstrap UCL	7.1962E-4	95% Percentile Bootstrap UCL	7.0011E-4
95% BCA Bootstrap UCL	7.4057E-4		
90% Chebyshev(Mean, Sd) UCL	7.7234E-4	95% Chebyshev(Mean, Sd) UCL	8.4892E-4
97.5% Chebyshev(Mean, Sd) UCL	9.5520E-4	99% Chebyshev(Mean, Sd) UCL	0.00116
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	8.4892E-4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Chromium 3			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	6.9787E-4	Mean	0.00362
Maximum	0.028	Median	0.00287
SD	0.00361	Std. Error of Mean	3.3811E-4
Coefficient of Variation	0.996	Skewness	4.947
Normal GOF Test			
Shapiro Wilk Test Statistic	0.455	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.334	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00418	95% Adjusted-CLT UCL (Chen-1995)	0.00435
		95% Modified-t UCL (Johnson-1978)	0.00421
Gamma GOF Test			
A-D Test Statistic	8.602	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.794	k star (bias corrected MLE)	2.726
Theta hat (MLE)	0.0013	Theta star (bias corrected MLE)	0.00133
nu hat (MLE)	637	nu star (bias corrected)	621.5
MLE Mean (bias corrected)	0.00362	MLE Sd (bias corrected)	0.00219

		Approximate Chi Square Value (0.05)	564.7
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	564
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00399	95% Adjusted Gamma UCL (use when n<50)	0.00399
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.887E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-7.267	Mean of logged Data	-5.81
Maximum of Logged Data	-3.575	SD of logged Data	0.53
Assuming Lognormal Distribution			
95% H-UCL	0.00378	90% Chebyshev (MVUE) UCL	0.00399
95% Chebyshev (MVUE) UCL	0.00424	97.5% Chebyshev (MVUE) UCL	0.00458
99% Chebyshev (MVUE) UCL	0.00525		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00418	95% Jackknife UCL	0.00418
95% Standard Bootstrap UCL	0.00416	95% Bootstrap-t UCL	0.00464
95% Hall's Bootstrap UCL	0.00432	95% Percentile Bootstrap UCL	0.00419
95% BCA Bootstrap UCL	0.00432		
90% Chebyshev(Mean, Sd) UCL	0.00464	95% Chebyshev(Mean, Sd) UCL	0.0051
97.5% Chebyshev(Mean, Sd) UCL	0.00574	99% Chebyshev(Mean, Sd) UCL	0.00699
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0051		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Chromium 6+			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	5.121E-11	Mean	1.487E-10
Maximum	7.086E-10	Median	1.272E-10
SD	9.645E-11	Std. Error of Mean	9.034E-12

Coefficient of Variation	N/A	Skewness	4.272
Normal GOF Test			
Shapiro Wilk Test Statistic	0.519	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.326	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.637E-10	95% Adjusted-CLT UCL (Chen-1995)	1.675E-10
		95% Modified-t UCL (Johnson-1978)	1.643E-10
Gamma GOF Test			
A-D Test Statistic	9.776	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.243	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.086	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.057	k star (bias corrected MLE)	4.93
Theta hat (MLE)	2.941E-11	Theta star (bias corrected MLE)	3.017E-11
nu hat (MLE)	1153	nu star (bias corrected)	1124
MLE Mean (bias corrected)	1.487E-10	MLE Sd (bias corrected)	6.699E-11
		Approximate Chi Square Value (0.05)	1047
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	1046
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.597E-10	95% Adjusted Gamma UCL (use when n<50)	1.598E-10
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.824	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.195	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-23.7	Mean of logged Data	-22.73
Maximum of Logged Data	-21.07	SD of logged Data	0.397
Assuming Lognormal Distribution			
95% H-UCL	1.553E-10	90% Chebyshev (MVUE) UCL	1.620E-10
95% Chebyshev (MVUE) UCL	1.696E-10	97.5% Chebyshev (MVUE) UCL	1.802E-10
99% Chebyshev (MVUE) UCL	2.009E-10		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			

Nonparametric Distribution Free UCLs			
95% CLT UCL	1.636E-10	95% Jackknife UCL	1.637E-10
95% Standard Bootstrap UCL	1.634E-10	95% Bootstrap-t UCL	1.706E-10
95% Hall's Bootstrap UCL	1.730E-10	95% Percentile Bootstrap UCL	1.638E-10
95% BCA Bootstrap UCL	1.668E-10		
90% Chebyshev(Mean, Sd) UCL	1.758E-10	95% Chebyshev(Mean, Sd) UCL	1.881E-10
97.5% Chebyshev(Mean, Sd) UCL	2.052E-10	99% Chebyshev(Mean, Sd) UCL	2.386E-10
Suggested UCL to Use			
95% Student's-t UCL	1.637E-10	or 95% Modified-t UCL	1.643E-10

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Total Chromium

General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	6.9787E-4	Mean	0.00362
Maximum	0.028	Median	0.00287
SD	0.00361	Std. Error of Mean	3.3811E-4
Coefficient of Variation	0.996	Skewness	4.947
Normal GOF Test			
Shapiro Wilk Test Statistic	0.455	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.00418	95% Adjusted-CLT UCL (Chen-1995)	0.00435
		95% Modified-t UCL (Johnson-1978)	0.00421
Gamma GOF Test			
A-D Test Statistic	8.602	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.794	k star (bias corrected MLE)	2.726
Theta hat (MLE)	0.0013	Theta star (bias corrected MLE)	0.00133

nu hat (MLE)	637	nu star (bias corrected)	621.5
MLE Mean (bias corrected)	0.00362	MLE Sd (bias corrected)	0.00219
		Approximate Chi Square Value (0.05)	564.7
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	564
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00399	95% Adjusted Gamma UCL (use when n<50)	0.00399
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.867	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	1.887E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-7.267	Mean of logged Data	-5.81
Maximum of Logged Data	-3.575	SD of logged Data	0.53
Assuming Lognormal Distribution			
95% H-UCL	0.00378	90% Chebyshev (MVUE) UCL	0.00399
95% Chebyshev (MVUE) UCL	0.00424	97.5% Chebyshev (MVUE) UCL	0.00458
99% Chebyshev (MVUE) UCL	0.00525		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00418	95% Jackknife UCL	0.00418
95% Standard Bootstrap UCL	0.00418	95% Bootstrap-t UCL	0.00462
95% Hall's Bootstrap UCL	0.00438	95% Percentile Bootstrap UCL	0.00421
95% BCA Bootstrap UCL	0.00443		
90% Chebyshev(Mean, Sd) UCL	0.00464	95% Chebyshev(Mean, Sd) UCL	0.0051
97.5% Chebyshev(Mean, Sd) UCL	0.00574	99% Chebyshev(Mean, Sd) UCL	0.00699
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0051		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Copper			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	4.5649E-4	Mean	0.00237

Maximum	0.0184	Median	0.00187
SD	0.00237	Std. Error of Mean	2.2237E-4
Coefficient of Variation	1.001	Skewness	4.941
Normal GOF Test			
Shapiro Wilk Test Statistic	0.452	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.00274	95% Adjusted-CLT UCL (Chen-1995)	0.00285
		95% Modified-t UCL (Johnson-1978)	0.00276
Gamma GOF Test			
A-D Test Statistic	8.761	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.228	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.781	k star (bias corrected MLE)	2.713
Theta hat (MLE)	8.5260E-4	Theta star (bias corrected MLE)	8.7376E-4
nu hat (MLE)	634	nu star (bias corrected)	618.6
MLE Mean (bias corrected)	0.00237	MLE Sd (bias corrected)	0.00144
		Approximate Chi Square Value (0.05)	561.9
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	561.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00261	95% Adjusted Gamma UCL (use when n<50)	0.00261
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	8.882E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-7.692	Mean of logged Data	-6.235
Maximum of Logged Data	-3.997	SD of logged Data	0.53
Assuming Lognormal Distribution			
95% H-UCL	0.00247	90% Chebyshev (MVUE) UCL	0.00261
95% Chebyshev (MVUE) UCL	0.00277	97.5% Chebyshev (MVUE) UCL	0.00299
99% Chebyshev (MVUE) UCL	0.00343		

Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00274	95% Jackknife UCL	0.00274
95% Standard Bootstrap UCL	0.00273	95% Bootstrap-t UCL	0.00297
95% Hall's Bootstrap UCL	0.00298	95% Percentile Bootstrap UCL	0.00274
95% BCA Bootstrap UCL	0.00289		
90% Chebyshev(Mean, Sd) UCL	0.00304	95% Chebyshev(Mean, Sd) UCL	0.00334
97.5% Chebyshev(Mean, Sd) UCL	0.00376	99% Chebyshev(Mean, Sd) UCL	0.00458
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.00334		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Iron			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	0.129	Mean	0.631
Maximum	4.75	Median	0.497
SD	0.617	Std. Error of Mean	0.0578
Coefficient of Variation	0.978	Skewness	4.862
Normal GOF Test			
Shapiro Wilk Test Statistic	0.461	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.336	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.727	95% Adjusted-CLT UCL (Chen-1995)	0.754
		95% Modified-t UCL (Johnson-1978)	0.732
Gamma GOF Test			
A-D Test Statistic	8.835	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.229	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			

k hat (MLE)	2.868	k star (bias corrected MLE)	2.798
Theta hat (MLE)	0.22	Theta star (bias corrected MLE)	0.226
nu hat (MLE)	653.8	nu star (bias corrected)	638
MLE Mean (bias corrected)	0.631	MLE Sd (bias corrected)	0.377
		Approximate Chi Square Value (0.05)	580.4
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	579.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.694	95% Adjusted Gamma UCL (use when n<50)	0.695
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.864	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	7.772E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.165	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.045	Mean of logged Data	-0.644
Maximum of Logged Data	1.558	SD of logged Data	0.52
Assuming Lognormal Distribution			
95% H-UCL	0.658	90% Chebyshev (MVUE) UCL	0.693
95% Chebyshev (MVUE) UCL	0.735	97.5% Chebyshev (MVUE) UCL	0.793
99% Chebyshev (MVUE) UCL	0.908		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.726	95% Jackknife UCL	0.727
95% Standard Bootstrap UCL	0.726	95% Bootstrap-t UCL	0.801
95% Hall's Bootstrap UCL	0.758	95% Percentile Bootstrap UCL	0.731
95% BCA Bootstrap UCL	0.756		
90% Chebyshev(Mean, Sd) UCL	0.805	95% Chebyshev(Mean, Sd) UCL	0.883
97.5% Chebyshev(Mean, Sd) UCL	0.992	99% Chebyshev(Mean, Sd) UCL	1.206
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.883		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Mercury			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114

		Number of Missing Observations	0
Minimum	1.6217E-7	Mean	7.7014E-7
Maximum	6.2765E-6	Median	5.9040E-7
SD	7.4946E-7	Std. Error of Mean	7.0194E-8
Coefficient of Variation	N/A	Skewness	5.205
Normal GOF Test			
Shapiro Wilk Test Statistic	0.465	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.8655E-7	95% Adjusted-CLT UCL (Chen-1995)	9.2216E-7
		95% Modified-t UCL (Johnson-1978)	8.9225E-7
Gamma GOF Test			
A-D Test Statistic	9.49	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.234	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.921	k star (bias corrected MLE)	2.85
Theta hat (MLE)	2.6363E-7	Theta star (bias corrected MLE)	2.7020E-7
nu hat (MLE)	666.1	nu star (bias corrected)	649.9
MLE Mean (bias corrected)	7.7014E-7	MLE Sd (bias corrected)	4.5617E-7
		Approximate Chi Square Value (0.05)	591.7
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	591
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.4581E-7	95% Adjusted Gamma UCL (use when n<50)	8.4681E-7
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.859	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.110E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-15.63	Mean of logged Data	-14.26
Maximum of Logged Data	-11.98	SD of logged Data	0.516
Assuming Lognormal Distribution			
95% H-UCL	8.0295E-7	90% Chebyshev (MVUE) UCL	8.4583E-7
95% Chebyshev (MVUE) UCL	8.9683E-7	97.5% Chebyshev (MVUE) UCL	9.6761E-7

99% Chebyshev (MVUE) UCL	1.1067E-6		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.8559E-7	95% Jackknife UCL	8.8655E-7
95% Standard Bootstrap UCL	8.8519E-7	95% Bootstrap-t UCL	9.5355E-7
95% Hall's Bootstrap UCL	1.0100E-6	95% Percentile Bootstrap UCL	8.8741E-7
95% BCA Bootstrap UCL	9.3085E-7		
90% Chebyshev(Mean, Sd) UCL	9.8072E-7	95% Chebyshev(Mean, Sd) UCL	1.0761E-6
97.5% Chebyshev(Mean, Sd) UCL	1.2085E-6	99% Chebyshev(Mean, Sd) UCL	1.4686E-6
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1.0761E-6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Molybdenum			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	3.4921E-6	Mean	1.6733E-5
Maximum	1.1872E-4	Median	1.3130E-5
SD	1.6295E-5	Std. Error of Mean	1.5261E-6
Coefficient of Variation	N/A	Skewness	4.809
Normal GOF Test			
Shapiro Wilk Test Statistic	0.458	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.331	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.9264E-5	95% Adjusted-CLT UCL (Chen-1995)	1.9978E-5
		95% Modified-t UCL (Johnson-1978)	1.9378E-5
Gamma GOF Test			
A-D Test Statistic	8.981	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.226	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.871	k star (bias corrected MLE)	2.801
Theta hat (MLE)	5.8287E-6	Theta star (bias corrected MLE)	5.9737E-6
nu hat (MLE)	654.5	nu star (bias corrected)	638.6
MLE Mean (bias corrected)	1.6733E-5	MLE Sd (bias corrected)	9.9979E-6
		Approximate Chi Square Value (0.05)	581
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	580.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.8392E-5	95% Adjusted Gamma UCL (use when n<50)	1.8415E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.110E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.165	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-12.57	Mean of logged Data	-11.18
Maximum of Logged Data	-9.039	SD of logged Data	0.52
Assuming Lognormal Distribution			
95% H-UCL	1.7442E-5	90% Chebyshev (MVUE) UCL	1.8380E-5
95% Chebyshev (MVUE) UCL	1.9497E-5	97.5% Chebyshev (MVUE) UCL	2.1048E-5
99% Chebyshev (MVUE) UCL	2.4094E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.9243E-5	95% Jackknife UCL	1.9264E-5
95% Standard Bootstrap UCL	1.9180E-5	95% Bootstrap-t UCL	2.1020E-5
95% Hall's Bootstrap UCL	2.0702E-5	95% Percentile Bootstrap UCL	1.9412E-5
95% BCA Bootstrap UCL	2.0089E-5		
90% Chebyshev(Mean, Sd) UCL	2.1311E-5	95% Chebyshev(Mean, Sd) UCL	2.3385E-5
97.5% Chebyshev(Mean, Sd) UCL	2.6264E-5	99% Chebyshev(Mean, Sd) UCL	3.1918E-5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	2.3385E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Nickel			

General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	8.3619E-4	Mean	0.00433
Maximum	0.0332	Median	0.00342
SD	0.00431	Std. Error of Mean	4.0370E-4
Coefficient of Variation	0.996	Skewness	4.925
Normal GOF Test			
Shapiro Wilk Test Statistic	0.454	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.005	95% Adjusted-CLT UCL (Chen-1995)	0.00519
		95% Modified-t UCL (Johnson-1978)	0.00503
Gamma GOF Test			
A-D Test Statistic	8.679	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.228	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.792	k star (bias corrected MLE)	2.724
Theta hat (MLE)	0.00155	Theta star (bias corrected MLE)	0.00159
nu hat (MLE)	636.5	nu star (bias corrected)	621.1
MLE Mean (bias corrected)	0.00433	MLE Sd (bias corrected)	0.00262
		Approximate Chi Square Value (0.05)	564.2
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	563.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00476	95% Adjusted Gamma UCL (use when n<50)	0.00477
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.110E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-7.087	Mean of logged Data	-5.633
Maximum of Logged Data	-3.406	SD of logged Data	0.53
Assuming Lognormal Distribution			

95% H-UCL	0.00452	90% Chebyshev (MVUE) UCL	0.00476
95% Chebyshev (MVUE) UCL	0.00506	97.5% Chebyshev (MVUE) UCL	0.00547
99% Chebyshev (MVUE) UCL	0.00627		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00499	95% Jackknife UCL	0.005
95% Standard Bootstrap UCL	0.00499	95% Bootstrap-t UCL	0.00547
95% Hall's Bootstrap UCL	0.00521	95% Percentile Bootstrap UCL	0.00503
95% BCA Bootstrap UCL	0.00524		
90% Chebyshev(Mean, Sd) UCL	0.00554	95% Chebyshev(Mean, Sd) UCL	0.00609
97.5% Chebyshev(Mean, Sd) UCL	0.00685	99% Chebyshev(Mean, Sd) UCL	0.00834
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.00609		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Lead			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	5.0432E-4	Mean	0.00234
Maximum	0.0173	Median	0.00183
SD	0.00225	Std. Error of Mean	2.1084E-4
Coefficient of Variation	0.964	Skewness	4.929
Normal GOF Test			
Shapiro Wilk Test Statistic	0.465	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.323	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00269	95% Adjusted-CLT UCL (Chen-1995)	0.00279
		95% Modified-t UCL (Johnson-1978)	0.0027
Gamma GOF Test			
A-D Test Statistic	8.889	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.218	Kolmogorov-Smirnov Gamma GOF Test	

5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.907	k star (bias corrected MLE)	2.837
Theta hat (MLE)	8.0339E-4	Theta star (bias corrected MLE)	8.2341E-4
nu hat (MLE)	662.9	nu star (bias corrected)	646.8
MLE Mean (bias corrected)	0.00234	MLE Sd (bias corrected)	0.00139
		Approximate Chi Square Value (0.05)	588.8
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	588.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00257	95% Adjusted Gamma UCL (use when n<50)	0.00257
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.862	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	3.331E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-7.592	Mean of logged Data	-6.241
Maximum of Logged Data	-4.059	SD of logged Data	0.52
Assuming Lognormal Distribution			
95% H-UCL	0.00244	90% Chebyshev (MVUE) UCL	0.00257
95% Chebyshev (MVUE) UCL	0.00273	97.5% Chebyshev (MVUE) UCL	0.00294
99% Chebyshev (MVUE) UCL	0.00337		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00268	95% Jackknife UCL	0.00269
95% Standard Bootstrap UCL	0.00268	95% Bootstrap-t UCL	0.00292
95% Hall's Bootstrap UCL	0.00299	95% Percentile Bootstrap UCL	0.0027
95% BCA Bootstrap UCL	0.00283		
90% Chebyshev(Mean, Sd) UCL	0.00297	95% Chebyshev(Mean, Sd) UCL	0.00325
97.5% Chebyshev(Mean, Sd) UCL	0.00365	99% Chebyshev(Mean, Sd) UCL	0.00443
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.00325		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Selenium			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	8.6538E-6	Mean	3.9316E-5
Maximum	3.0558E-4	Median	3.0552E-5
SD	3.8391E-5	Std. Error of Mean	3.5957E-6
Coefficient of Variation	N/A	Skewness	5.009
Normal GOF Test			
Shapiro Wilk Test Statistic	0.463	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.327	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	4.5279E-5	95% Adjusted-CLT UCL (Chen-1995)	4.7033E-5
		95% Modified-t UCL (Johnson-1978)	4.5561E-5
Gamma GOF Test			
A-D Test Statistic	9.462	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.231	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.884	k star (bias corrected MLE)	2.814
Theta hat (MLE)	1.3632E-5	Theta star (bias corrected MLE)	1.3971E-5
nu hat (MLE)	657.6	nu star (bias corrected)	641.6
MLE Mean (bias corrected)	3.9316E-5	MLE Sd (bias corrected)	2.3437E-5
		Approximate Chi Square Value (0.05)	583.8
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	583.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.3206E-5	95% Adjusted Gamma UCL (use when n<50)	4.3258E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.855	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-11.66	Mean of logged Data	-10.33
Maximum of Logged Data	-8.093	SD of logged Data	0.519

Assuming Lognormal Distribution			
95% H-UCL	4.0974E-5	90% Chebyshev (MVUE) UCL	4.3171E-5
95% Chebyshev (MVUE) UCL	4.5788E-5	97.5% Chebyshev (MVUE) UCL	4.9419E-5
99% Chebyshev (MVUE) UCL	5.6553E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.5231E-5	95% Jackknife UCL	4.5279E-5
95% Standard Bootstrap UCL	4.5327E-5	95% Bootstrap-t UCL	4.8807E-5
95% Hall's Bootstrap UCL	5.0423E-5	95% Percentile Bootstrap UCL	4.5877E-5
95% BCA Bootstrap UCL	4.7817E-5		
90% Chebyshev(Mean, Sd) UCL	5.0103E-5	95% Chebyshev(Mean, Sd) UCL	5.4989E-5
97.5% Chebyshev(Mean, Sd) UCL	6.1771E-5	99% Chebyshev(Mean, Sd) UCL	7.5093E-5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	5.4989E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Thallium			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	7.7249E-6	Mean	3.6794E-5
Maximum	3.0580E-4	Median	2.8129E-5
SD	3.6138E-5	Std. Error of Mean	3.3847E-6
Coefficient of Variation	N/A	Skewness	5.26
Normal GOF Test			
Shapiro Wilk Test Statistic	0.462	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.33	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	4.2408E-5	95% Adjusted-CLT UCL (Chen-1995)	4.4143E-5
		95% Modified-t UCL (Johnson-1978)	4.2686E-5
Gamma GOF Test			
A-D Test Statistic	9.723	Anderson-Darling Gamma GOF Test	

5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.235	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.898	k star (bias corrected MLE)	2.827
Theta hat (MLE)	1.2698E-5	Theta star (bias corrected MLE)	1.3015E-5
nu hat (MLE)	660.6	nu star (bias corrected)	644.6
MLE Mean (bias corrected)	3.6794E-5	MLE Sd (bias corrected)	2.1883E-5
		Approximate Chi Square Value (0.05)	586.7
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	586
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.0426E-5	95% Adjusted Gamma UCL (use when n<50)	4.0474E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.856	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.18	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-11.77	Mean of logged Data	-10.39
Maximum of Logged Data	-8.093	SD of logged Data	0.517
Assuming Lognormal Distribution			
95% H-UCL	3.8328E-5	90% Chebyshev (MVUE) UCL	4.0377E-5
95% Chebyshev (MVUE) UCL	4.2816E-5	97.5% Chebyshev (MVUE) UCL	4.6201E-5
99% Chebyshev (MVUE) UCL	5.2850E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.2362E-5	95% Jackknife UCL	4.2408E-5
95% Standard Bootstrap UCL	4.2558E-5	95% Bootstrap-t UCL	4.6017E-5
95% Hall's Bootstrap UCL	4.7922E-5	95% Percentile Bootstrap UCL	4.2867E-5
95% BCA Bootstrap UCL	4.4709E-5		
90% Chebyshev(Mean, Sd) UCL	4.6948E-5	95% Chebyshev(Mean, Sd) UCL	5.1548E-5
97.5% Chebyshev(Mean, Sd) UCL	5.7932E-5	99% Chebyshev(Mean, Sd) UCL	7.0471E-5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	5.1548E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Uranium			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	8.5510E-6	Mean	3.9158E-5
Maximum	3.1794E-4	Median	2.9960E-5
SD	3.8226E-5	Std. Error of Mean	3.5802E-6
Coefficient of Variation	N/A	Skewness	5.166
Normal GOF Test			
Shapiro Wilk Test Statistic	0.464	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.5095E-5	95% Adjusted-CLT UCL (Chen-1995)	4.6898E-5
		95% Modified-t UCL (Johnson-1978)	4.5384E-5
Gamma GOF Test			
A-D Test Statistic	9.658	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.235	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.91	k star (bias corrected MLE)	2.839
Theta hat (MLE)	1.3457E-5	Theta star (bias corrected MLE)	1.3793E-5
nu hat (MLE)	663.4	nu star (bias corrected)	647.3
MLE Mean (bias corrected)	3.9158E-5	MLE Sd (bias corrected)	2.3240E-5
		Approximate Chi Square Value (0.05)	589.3
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	588.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.3014E-5	95% Adjusted Gamma UCL (use when n<50)	4.3065E-5
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			

Minimum of Logged Data	-11.67	Mean of logged Data	-10.33
Maximum of Logged Data	-8.054	SD of logged Data	0.515
Assuming Lognormal Distribution			
95% H-UCL	4.0784E-5	90% Chebyshev (MVUE) UCL	4.2961E-5
95% Chebyshev (MVUE) UCL	4.5549E-5	97.5% Chebyshev (MVUE) UCL	4.9142E-5
99% Chebyshev (MVUE) UCL	5.6199E-5		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.5047E-5	95% Jackknife UCL	4.5095E-5
95% Standard Bootstrap UCL	4.4997E-5	95% Bootstrap-t UCL	4.9716E-5
95% Hall's Bootstrap UCL	5.1915E-5	95% Percentile Bootstrap UCL	4.5584E-5
95% BCA Bootstrap UCL	4.7070E-5		
90% Chebyshev(Mean, Sd) UCL	4.9899E-5	95% Chebyshev(Mean, Sd) UCL	5.4764E-5
97.5% Chebyshev(Mean, Sd) UCL	6.1516E-5	99% Chebyshev(Mean, Sd) UCL	7.4781E-5
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	5.4764E-5		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Vanadium			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	2.8909E-4	Mean	0.00147
Maximum	0.0112	Median	0.00116
SD	0.00145	Std. Error of Mean	1.3608E-4
Coefficient of Variation	0.989	Skewness	4.91
Normal GOF Test			
Shapiro Wilk Test Statistic	0.457	Shapiro Wilk GOF Test	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.33	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.00169	95% Adjusted-CLT UCL (Chen-1995)	0.00176
		95% Modified-t UCL (Johnson-1978)	0.0017

Gamma GOF Test			
A-D Test Statistic	8.67	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.221	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.818	k star (bias corrected MLE)	2.75
Theta hat (MLE)	5.2116E-4	Theta star (bias corrected MLE)	5.3411E-4
nu hat (MLE)	642.6	nu star (bias corrected)	627
MLE Mean (bias corrected)	0.00147	MLE Sd (bias corrected)	8.8571E-4
		Approximate Chi Square Value (0.05)	569.9
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	569.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.00162	95% Adjusted Gamma UCL (use when n<50)	0.00162
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.866	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	1.443E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-8.149	Mean of logged Data	-6.711
Maximum of Logged Data	-4.493	SD of logged Data	0.527
Assuming Lognormal Distribution			
95% H-UCL	0.00153	90% Chebyshev (MVUE) UCL	0.00162
95% Chebyshev (MVUE) UCL	0.00172	97.5% Chebyshev (MVUE) UCL	0.00185
99% Chebyshev (MVUE) UCL	0.00212		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.00169	95% Jackknife UCL	0.00169
95% Standard Bootstrap UCL	0.00169	95% Bootstrap-t UCL	0.00182
95% Hall's Bootstrap UCL	0.0018	95% Percentile Bootstrap UCL	0.0017
95% BCA Bootstrap UCL	0.00177		
90% Chebyshev(Mean, Sd) UCL	0.00188	95% Chebyshev(Mean, Sd) UCL	0.00206
97.5% Chebyshev(Mean, Sd) UCL	0.00232	99% Chebyshev(Mean, Sd) UCL	0.00282
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.00206		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Zinc

General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	0.0028	Mean	0.0139
Maximum	0.101	Median	0.0109
SD	0.0137	Std. Error of Mean	0.00128
Coefficient of Variation	0.985	Skewness	4.842
Normal GOF Test			
Shapiro Wilk Test Statistic	0.455	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.016	95% Adjusted-CLT UCL (Chen-1995)	0.0166
		95% Modified-t UCL (Johnson-1978)	0.0161
Gamma GOF Test			
A-D Test Statistic	8.877	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0865	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.823	k star (bias corrected MLE)	2.754
Theta hat (MLE)	0.00492	Theta star (bias corrected MLE)	0.00505
nu hat (MLE)	643.5	nu star (bias corrected)	627.9
MLE Mean (bias corrected)	0.0139	MLE Sd (bias corrected)	0.00838
		Approximate Chi Square Value (0.05)	570.8
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	570.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0153	95% Adjusted Gamma UCL (use when n<50)	0.0153
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.861	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	2.220E-16	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	-5.879	Mean of logged Data	-4.463
Maximum of Logged Data	-2.296	SD of logged Data	0.527
Assuming Lognormal Distribution			
95% H-UCL	0.0145	90% Chebyshev (MVUE) UCL	0.0153
95% Chebyshev (MVUE) UCL	0.0162	97.5% Chebyshev (MVUE) UCL	0.0175
99% Chebyshev (MVUE) UCL	0.0201		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.016	95% Jackknife UCL	0.016
95% Standard Bootstrap UCL	0.016	95% Bootstrap-t UCL	0.0176
95% Hall's Bootstrap UCL	0.0169	95% Percentile Bootstrap UCL	0.0163
95% BCA Bootstrap UCL	0.0168		
90% Chebyshev(Mean, Sd) UCL	0.0177	95% Chebyshev(Mean, Sd) UCL	0.0195
97.5% Chebyshev(Mean, Sd) UCL	0.0219	99% Chebyshev(Mean, Sd) UCL	0.0267
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0195		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Manganese Compounds			
General Statistics			
Total Number of Observations	114	Number of Distinct Observations	114
		Number of Missing Observations	0
Minimum	4.4640E-9	Mean	1.2966E-8
Maximum	6.1767E-8	Median	1.1091E-8
SD	8.4080E-9	Std. Error of Mean	7.875E-10
Coefficient of Variation	N/A	Skewness	4.272
Normal GOF Test			
Shapiro Wilk Test Statistic	0.519	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.326	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0833	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.4272E-8	95% Adjusted-CLT UCL (Chen-1995)	1.4598E-8

		95% Modified-t UCL (Johnson-1978)	1.4325E-8
Gamma GOF Test			
A-D Test Statistic	9.776	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.243	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.086	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.057	k star (bias corrected MLE)	4.93
Theta hat (MLE)	2.5641E-9	Theta star (bias corrected MLE)	2.6302E-9
nu hat (MLE)	1153	nu star (bias corrected)	1124
MLE Mean (bias corrected)	1.2966E-8	MLE Sd (bias corrected)	5.8398E-9
		Approximate Chi Square Value (0.05)	1047
Adjusted Level of Significance	0.0479	Adjusted Chi Square Value	1046
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.3917E-8	95% Adjusted Gamma UCL (use when n<50)	1.3930E-8
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.824	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.195	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.0833	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-19.23	Mean of logged Data	-18.26
Maximum of Logged Data	-16.6	SD of logged Data	0.397
Assuming Lognormal Distribution			
95% H-UCL	1.3540E-8	90% Chebyshev (MVUE) UCL	1.4123E-8
95% Chebyshev (MVUE) UCL	1.4786E-8	97.5% Chebyshev (MVUE) UCL	1.5706E-8
99% Chebyshev (MVUE) UCL	1.7514E-8		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.4261E-8	95% Jackknife UCL	1.4272E-8
95% Standard Bootstrap UCL	1.4252E-8	95% Bootstrap-t UCL	1.4953E-8
95% Hall's Bootstrap UCL	1.4906E-8	95% Percentile Bootstrap UCL	1.4303E-8
95% BCA Bootstrap UCL	1.4587E-8		
90% Chebyshev(Mean, Sd) UCL	1.5329E-8	95% Chebyshev(Mean, Sd) UCL	1.6399E-8
97.5% Chebyshev(Mean, Sd) UCL	1.7884E-8	99% Chebyshev(Mean, Sd) UCL	2.0801E-8
Suggested UCL to Use			
95% Student's-t UCL	1.4272E-8	or 95% Modified-t UCL	1.4325E-8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

APPENDIX C.3
PROUCL OUTPUTS
SURFACE SOIL
GORDON REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:12:16 AM		
From File	Gordon Region, Soil - Surface, Antimony (Sb), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Antimony (Sb), mg/kg			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	4
Number of Detects	8	Number of Non-Detects	20
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.18	Maximum Non-Detect	0.1
Variance Detects	6.4107E-4	Percent Non-Detects	71.43%
Mean Detects	0.121	SD Detects	0.0253
Median Detects	0.12	CV Detects	0.209
Skewness Detects	2.138	Kurtosis Detects	5.392
Mean of Logged Detects	-2.126	SD of Logged Detects	0.184
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.711	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.395	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.106	KM Standard Error of Mean	0.00321
KM SD	0.0159	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.112	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.111	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.116	95% KM Chebyshev UCL	0.12
97.5% KM Chebyshev UCL	0.126	99% KM Chebyshev UCL	0.138
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.936	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.716	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.374	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.294	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	31.15	k star (bias corrected MLE)	19.55
Theta hat (MLE)	0.00389	Theta star (bias corrected MLE)	0.0062
nu hat (MLE)	498.4	nu star (bias corrected)	312.8

Mean (detects)	0.121		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0668
Maximum	0.18	Median	0.0619
SD	0.0429	CV	0.642
k hat (MLE)	2.031	k star (bias corrected MLE)	1.837
Theta hat (MLE)	0.0329	Theta star (bias corrected MLE)	0.0364
nu hat (MLE)	113.7	nu star (bias corrected)	102.9
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (102.87, α)	80.47	Adjusted Chi Square Value (102.87, β)	79.24
95% Gamma Approximate UCL (use when n>=50)	0.0854	95% Gamma Adjusted UCL (use when n<50)	0.0867
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.106	SD (KM)	0.0159
Variance (KM)	2.5242E-4	SE of Mean (KM)	0.00321
k hat (KM)	44.57	k star (KM)	39.82
nu hat (KM)	2496	nu star (KM)	2230
theta hat (KM)	0.00238	theta star (KM)	0.00266
80% gamma percentile (KM)	0.12	90% gamma percentile (KM)	0.128
95% gamma percentile (KM)	0.135	99% gamma percentile (KM)	0.149
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	2121	Adjusted Chi Square Value (N/A, β)	2115
95% Gamma Approximate KM-UCL (use when n>=50)	0.112	95% Gamma Adjusted KM-UCL (use when n<50)	0.112
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.771	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.363	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0806	Mean in Log Scale	-2.59
SD in Original Scale	0.0321	SD in Log Scale	0.383
95% t UCL (assumes normality of ROS data)	0.0909	95% Percentile Bootstrap UCL	0.0903
95% BCA Bootstrap UCL	0.0914	95% Bootstrap t UCL	0.093
95% H-UCL (Log ROS)	0.0926		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.252	KM Geo Mean	0.105
KM SD (logged)	0.122	95% Critical H Value (KM-Log)	1.715
KM Standard Error of Mean (logged)	0.0246	95% H-UCL (KM -Log)	0.11

KM SD (logged)	0.122	95% Critical H Value (KM-Log)	1.715
KM Standard Error of Mean (logged)	0.0246		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0704	Mean in Log Scale	-2.747
SD in Original Scale	0.0352	SD in Log Scale	0.411
95% t UCL (Assumes normality)	0.0817	95% H-Stat UCL	0.0809
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.112	KM H-UCL	0.11
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:12:55 AM
From File	Gordon Region, Soil - Surface, Arsenic (As), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Arsenic (As), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.2	Mean	0.925
Maximum	2.77	Median	0.855
SD	0.505	Std. Error of Mean	0.0954
Coefficient of Variation	0.545	Skewness	1.847

Normal GOF Test			
Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.088	95% Adjusted-CLT UCL (Chen-1995)	1.118
		95% Modified-t UCL (Johnson-1978)	1.093

Gamma GOF Test			
A-D Test Statistic	0.274	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.166	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.989	k star (bias corrected MLE)	3.586
Theta hat (MLE)	0.232	Theta star (bias corrected MLE)	0.258
nu hat (MLE)	223.4	nu star (bias corrected)	200.8
MLE Mean (bias corrected)	0.925	MLE Sd (bias corrected)	0.489
		Approximate Chi Square Value (0.05)	169
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	167.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.099	95% Adjusted Gamma UCL (use when n<50)	1.111

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.609	Mean of logged Data	-0.208
Maximum of Logged Data	1.019	SD of logged Data	0.532
Assuming Lognormal Distribution			
95% H-UCL	1.144	90% Chebyshev (MVUE) UCL	1.224
95% Chebyshev (MVUE) UCL	1.357	97.5% Chebyshev (MVUE) UCL	1.542
99% Chebyshev (MVUE) UCL	1.905		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.082	95% Jackknife UCL	1.088
95% Standard Bootstrap UCL	1.077	95% Bootstrap-t UCL	1.133
95% Hall's Bootstrap UCL	1.246	95% Percentile Bootstrap UCL	1.082
95% BCA Bootstrap UCL	1.124		
90% Chebyshev(Mean, Sd) UCL	1.211	95% Chebyshev(Mean, Sd) UCL	1.341
97.5% Chebyshev(Mean, Sd) UCL	1.521	99% Chebyshev(Mean, Sd) UCL	1.874
Suggested UCL to Use			
95% Student's-t UCL	1.088		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:13:34 AM		
From File	Gordon Region, Soil - Surface, Barium (Ba), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Barium (Ba), mg/kg			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	7.36	Mean	36.73
Maximum	155	Median	22.65
SD	32.36	Std. Error of Mean	6.115
Coefficient of Variation	0.881	Skewness	2.094
Normal GOF Test			
Shapiro Wilk Test Statistic	0.785	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	47.15	95% Adjusted-CLT UCL (Chen-1995)	49.38
		95% Modified-t UCL (Johnson-1978)	47.55
Gamma GOF Test			
A-D Test Statistic	0.603	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.162	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.797	k star (bias corrected MLE)	1.628
Theta hat (MLE)	20.44	Theta star (bias corrected MLE)	22.56
nu hat (MLE)	100.6	nu star (bias corrected)	91.19
MLE Mean (bias corrected)	36.73	MLE Sd (bias corrected)	28.78
		Approximate Chi Square Value (0.05)	70.17
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	69.03
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	47.73	95% Adjusted Gamma UCL (use when n<50)	48.52

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.119	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.996	Mean of logged Data	3.3
Maximum of Logged Data	5.043	SD of logged Data	0.781
Assuming Lognormal Distribution			
95% H-UCL	51.25	90% Chebyshev (MVUE) UCL	53.9
95% Chebyshev (MVUE) UCL	61.88	97.5% Chebyshev (MVUE) UCL	72.96
99% Chebyshev (MVUE) UCL	94.71		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	46.79	95% Jackknife UCL	47.15
95% Standard Bootstrap UCL	46.75	95% Bootstrap-t UCL	52.27
95% Hall's Bootstrap UCL	55.02	95% Percentile Bootstrap UCL	46.94
95% BCA Bootstrap UCL	49.59		
90% Chebyshev(Mean, Sd) UCL	55.08	95% Chebyshev(Mean, Sd) UCL	63.39
97.5% Chebyshev(Mean, Sd) UCL	74.92	99% Chebyshev(Mean, Sd) UCL	97.58
Suggested UCL to Use			
95% Adjusted Gamma UCL	48.52		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:14:13 AM
From File	Gordon Region, Soil - Surface, Beryllium (Be), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Beryllium (Be), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	22
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.78	Maximum Non-Detect	0.1
Variance Detects	0.0614	Percent Non-Detects	78.57%
Mean Detects	0.299	SD Detects	0.248
Median Detects	0.238	CV Detects	0.828
Skewness Detects	1.934	Kurtosis Detects	4.103
Mean of Logged Detects	-1.438	SD of Logged Detects	0.714

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.77	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.316	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.143	KM Standard Error of Mean	0.0275
KM SD	0.133	95% KM (BCA) UCL	0.183
95% KM (t) UCL	0.19	95% KM (Percentile Bootstrap) UCL	0.189
95% KM (z) UCL	0.188	95% KM Bootstrap t UCL	0.231
90% KM Chebyshev UCL	0.225	95% KM Chebyshev UCL	0.263
97.5% KM Chebyshev UCL	0.314	99% KM Chebyshev UCL	0.416

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.404	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.703	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.225	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.335	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.32	k star (bias corrected MLE)	1.271
Theta hat (MLE)	0.129	Theta star (bias corrected MLE)	0.235
nu hat (MLE)	27.84	nu star (bias corrected)	15.25

Mean (detects)	0.299		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.072
Maximum	0.78	Median	0.01
SD	0.161	CV	2.24
k hat (MLE)	0.492	k star (bias corrected MLE)	0.463
Theta hat (MLE)	0.146	Theta star (bias corrected MLE)	0.155
nu hat (MLE)	27.54	nu star (bias corrected)	25.92
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (25.92, α)	15.32	Adjusted Chi Square Value (25.92, β)	14.82
95% Gamma Approximate UCL (use when n>=50)	0.122	95% Gamma Adjusted UCL (use when n<50)	0.126
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.143	SD (KM)	0.133
Variance (KM)	0.0176	SE of Mean (KM)	0.0275
k hat (KM)	1.154	k star (KM)	1.054
nu hat (KM)	64.6	nu star (KM)	59.01
theta hat (KM)	0.124	theta star (KM)	0.135
80% gamma percentile (KM)	0.229	90% gamma percentile (KM)	0.324
95% gamma percentile (KM)	0.42	99% gamma percentile (KM)	0.64
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (59.01, α)	42.35	Adjusted Chi Square Value (59.01, β)	41.48
95% Gamma Approximate KM-UCL (use when n>=50)	0.199	95% Gamma Adjusted KM-UCL (use when n<50)	0.203
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0787	Mean in Log Scale	-3.968
SD in Original Scale	0.159	SD in Log Scale	1.821
95% t UCL (assumes normality of ROS data)	0.13	95% Percentile Bootstrap UCL	0.133
95% BCA Bootstrap UCL	0.155	95% Bootstrap t UCL	0.194
95% H-UCL (Log ROS)	0.351		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.117	KM Geo Mean	0.12
KM SD (logged)	0.466	95% Critical H Value (KM-Log)	1.915
KM Standard Error of Mean (logged)	0.0964	95% H-UCL (KM -Log)	0.159

KM SD (logged)	0.466	95% Critical H Value (KM-Log)	1.915
KM Standard Error of Mean (logged)	0.0964		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.103	Mean in Log Scale	-2.662
SD in Original Scale	0.149	SD in Log Scale	0.72
95% t UCL (Assumes normality)	0.151	95% H-Stat UCL	0.122
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.19		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:14:52 AM
From File	Gordon Region, Soil - Surface, Cadmium (Cd), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Cadmium (Cd), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	27
Number of Detects	27	Number of Non-Detects	1
Number of Distinct Detects	26	Number of Distinct Non-Detects	1
Minimum Detect	0.025	Minimum Non-Detect	0.02
Maximum Detect	1.17	Maximum Non-Detect	0.02
Variance Detects	0.0819	Percent Non-Detects	3.571%
Mean Detects	0.232	SD Detects	0.286
Median Detects	0.138	CV Detects	1.236
Skewness Detects	2.385	Kurtosis Detects	5.308
Mean of Logged Detects	-1.976	SD of Logged Detects	0.999

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.659	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.224	KM Standard Error of Mean	0.0536
KM SD	0.279	95% KM (BCA) UCL	0.329
95% KM (t) UCL	0.315	95% KM (Percentile Bootstrap) UCL	0.315
95% KM (z) UCL	0.312	95% KM Bootstrap t UCL	0.394
90% KM Chebyshev UCL	0.385	95% KM Chebyshev UCL	0.458
97.5% KM Chebyshev UCL	0.559	99% KM Chebyshev UCL	0.758

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.953	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.771	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.181	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.173	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.111	k star (bias corrected MLE)	1.013
Theta hat (MLE)	0.208	Theta star (bias corrected MLE)	0.229
nu hat (MLE)	60.02	nu star (bias corrected)	54.68

Mean (detects)	0.232		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.224
Maximum	1.17	Median	0.137
SD	0.284	CV	1.269
k hat (MLE)	1.008	k star (bias corrected MLE)	0.924
Theta hat (MLE)	0.222	Theta star (bias corrected MLE)	0.242
nu hat (MLE)	56.43	nu star (bias corrected)	51.72
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (51.72, α)	36.2	Adjusted Chi Square Value (51.72, β)	35.4
95% Gamma Approximate UCL (use when n>=50)	0.32	95% Gamma Adjusted UCL (use when n<50)	0.327
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.224	SD (KM)	0.279
Variance (KM)	0.0776	SE of Mean (KM)	0.0536
k hat (KM)	0.647	k star (KM)	0.601
nu hat (KM)	36.23	nu star (KM)	33.68
theta hat (KM)	0.346	theta star (KM)	0.373
80% gamma percentile (KM)	0.369	90% gamma percentile (KM)	0.582
95% gamma percentile (KM)	0.805	99% gamma percentile (KM)	1.345
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (33.68, α)	21.41	Adjusted Chi Square Value (33.68, β)	20.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.352	95% Gamma Adjusted KM-UCL (use when n<50)	0.363
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.108	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.224	Mean in Log Scale	-2.065
SD in Original Scale	0.284	SD in Log Scale	1.088
95% t UCL (assumes normality of ROS data)	0.315	95% Percentile Bootstrap UCL	0.314
95% BCA Bootstrap UCL	0.327	95% Bootstrap t UCL	0.375
95% H-UCL (Log ROS)	0.392		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.045	KM Geo Mean	0.129
KM SD (logged)	1.028	95% Critical H Value (KM-Log)	2.49
KM Standard Error of Mean (logged)	0.198	95% H-UCL (KM -Log)	0.359

KM SD (logged)	1.028	95% Critical H Value (KM-Log)	2.49
KM Standard Error of Mean (logged)	0.198		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.224	Mean in Log Scale	-2.07
SD in Original Scale	0.284	SD in Log Scale	1.099
95% t UCL (Assumes normality)	0.315	95% H-Stat UCL	0.398
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.359		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:15:30 AM
From File	Gordon Region, Soil - Surface, Chromium (Cr), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Chromium (Cr), mg/kg

General Statistics

Total Number of Observations	28	Number of Distinct Observations	19
Number of Detects	18	Number of Non-Detects	10
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	1.2	Minimum Non-Detect	1
Maximum Detect	40.9	Maximum Non-Detect	1
Variance Detects	90.49	Percent Non-Detects	35.71%
Mean Detects	7.592	SD Detects	9.513
Median Detects	4.7	CV Detects	1.253
Skewness Detects	2.936	Kurtosis Detects	9.348
Mean of Logged Detects	1.6	SD of Logged Detects	0.871

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.605	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.366	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.202	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	5.238	KM Standard Error of Mean	1.567
KM SD	8.057	95% KM (BCA) UCL	8.177
95% KM (t) UCL	7.906	95% KM (Percentile Bootstrap) UCL	7.977
95% KM (z) UCL	7.815	95% KM Bootstrap t UCL	12.49
90% KM Chebyshev UCL	9.938	95% KM Chebyshev UCL	12.07
97.5% KM Chebyshev UCL	15.02	99% KM Chebyshev UCL	20.83

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.99	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.76	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.208	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.313	k star (bias corrected MLE)	1.131
Theta hat (MLE)	5.783	Theta star (bias corrected MLE)	6.712
nu hat (MLE)	47.26	nu star (bias corrected)	40.72

Mean (detects)	7.592		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	4.884
Maximum	40.9	Median	2.75
SD	8.406	CV	1.721
k hat (MLE)	0.311	k star (bias corrected MLE)	0.302
Theta hat (MLE)	15.69	Theta star (bias corrected MLE)	16.19
nu hat (MLE)	17.43	nu star (bias corrected)	16.9
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (16.90, α)	8.599	Adjusted Chi Square Value (16.90, β)	8.233
95% Gamma Approximate UCL (use when n>=50)	9.597	95% Gamma Adjusted UCL (use when n<50)	10.02
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	5.238	SD (KM)	8.057
Variance (KM)	64.92	SE of Mean (KM)	1.567
k hat (KM)	0.423	k star (KM)	0.401
nu hat (KM)	23.66	nu star (KM)	22.46
theta hat (KM)	12.39	theta star (KM)	13.06
80% gamma percentile (KM)	8.456	90% gamma percentile (KM)	14.79
95% gamma percentile (KM)	21.74	99% gamma percentile (KM)	39.22
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (22.46, α)	12.69	Adjusted Chi Square Value (22.46, β)	12.23
95% Gamma Approximate KM-UCL (use when n>=50)	9.274	95% Gamma Adjusted KM-UCL (use when n<50)	9.619
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	5.111	Mean in Log Scale	0.818
SD in Original Scale	8.276	SD in Log Scale	1.324
95% t UCL (assumes normality of ROS data)	7.776	95% Percentile Bootstrap UCL	7.92
95% BCA Bootstrap UCL	8.955	95% Bootstrap t UCL	11.4
95% H-UCL (Log ROS)	11.34		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	1.029	KM Geo Mean	2.797
KM SD (logged)	1.024	95% Critical H Value (KM-Log)	2.485
KM Standard Error of Mean (logged)	0.199	95% H-UCL (KM -Log)	7.711

KM SD (logged)	1.024	95% Critical H Value (KM-Log)	2.485
KM Standard Error of Mean (logged)	0.199		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.059	Mean in Log Scale	0.781
SD in Original Scale	8.304	SD in Log Scale	1.315
95% t UCL (Assumes normality)	7.732	95% H-Stat UCL	10.72
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	7.711		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:16:09 AM		
From File	Gordon Region, Soil - Surface, Cobalt (Co), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Cobalt (Co), mg/kg			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.085	Mean	1.46
Maximum	7.49	Median	0.692
SD	2.008	Std. Error of Mean	0.38
Coefficient of Variation	1.376	Skewness	2.33
Normal GOF Test			
Shapiro Wilk Test Statistic	0.622	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.303	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.106	95% Adjusted-CLT UCL (Chen-1995)	2.263
		95% Modified-t UCL (Johnson-1978)	2.134
Gamma GOF Test			
A-D Test Statistic	1.527	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.776	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.207	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.171	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.941	k star (bias corrected MLE)	0.864
Theta hat (MLE)	1.552	Theta star (bias corrected MLE)	1.691
nu hat (MLE)	52.67	nu star (bias corrected)	48.36
MLE Mean (bias corrected)	1.46	MLE Sd (bias corrected)	1.571
		Approximate Chi Square Value (0.05)	33.4
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	32.63
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	2.114	95% Adjusted Gamma UCL (use when n<50)	2.164

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.465	Mean of logged Data	-0.24
Maximum of Logged Data	2.014	SD of logged Data	1.075
Assuming Lognormal Distribution			
95% H-UCL	2.374	90% Chebyshev (MVUE) UCL	2.32
95% Chebyshev (MVUE) UCL	2.756	97.5% Chebyshev (MVUE) UCL	3.36
99% Chebyshev (MVUE) UCL	4.547		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.084	95% Jackknife UCL	2.106
95% Standard Bootstrap UCL	2.068	95% Bootstrap-t UCL	2.624
95% Hall's Bootstrap UCL	2.254	95% Percentile Bootstrap UCL	2.13
95% BCA Bootstrap UCL	2.339		
90% Chebyshev(Mean, Sd) UCL	2.599	95% Chebyshev(Mean, Sd) UCL	3.114
97.5% Chebyshev(Mean, Sd) UCL	3.83	99% Chebyshev(Mean, Sd) UCL	5.236
Suggested UCL to Use			
95% H-UCL	2.374		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:16:48 AM		
From File	Gordon Region, Soil - Surface, Copper (Cu), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Copper (Cu), mg/kg			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	26
Number of Detects	27	Number of Non-Detects	1
Number of Distinct Detects	25	Number of Distinct Non-Detects	1
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	248	Maximum Non-Detect	1
Variance Detects	2559	Percent Non-Detects	3.571%
Mean Detects	21.61	SD Detects	50.59
Median Detects	5.2	CV Detects	2.341
Skewness Detects	3.874	Kurtosis Detects	16.39
Mean of Logged Detects	1.755	SD of Logged Detects	1.485
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.449	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.363	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	20.88	KM Standard Error of Mean	9.417
KM SD	48.9	95% KM (BCA) UCL	36.27
95% KM (t) UCL	36.92	95% KM (Percentile Bootstrap) UCL	38.7
95% KM (z) UCL	36.37	95% KM Bootstrap t UCL	63.69
90% KM Chebyshev UCL	49.13	95% KM Chebyshev UCL	61.92
97.5% KM Chebyshev UCL	79.68	99% KM Chebyshev UCL	114.6
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.25	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.811	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.26	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.178	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.484	k star (bias corrected MLE)	0.455
Theta hat (MLE)	44.64	Theta star (bias corrected MLE)	47.49
nu hat (MLE)	26.15	nu star (bias corrected)	24.57

Mean (detects)	21.61		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	20.84
Maximum	248	Median	4.95
SD	49.81	CV	2.39
k hat (MLE)	0.431	k star (bias corrected MLE)	0.408
Theta hat (MLE)	48.37	Theta star (bias corrected MLE)	51.02
nu hat (MLE)	24.13	nu star (bias corrected)	22.88
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (22.88, α)	13	Adjusted Chi Square Value (22.88, β)	12.54
95% Gamma Approximate UCL (use when n>=50)	36.68	95% Gamma Adjusted UCL (use when n<50)	38.03
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	20.88	SD (KM)	48.9
Variance (KM)	2391	SE of Mean (KM)	9.417
k hat (KM)	0.182	k star (KM)	0.187
nu hat (KM)	10.21	nu star (KM)	10.45
theta hat (KM)	114.5	theta star (KM)	111.9
80% gamma percentile (KM)	26.47	90% gamma percentile (KM)	63.06
95% gamma percentile (KM)	109.5	99% gamma percentile (KM)	238.8
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (10.45, α)	4.224	Adjusted Chi Square Value (10.45, β)	3.981
95% Gamma Approximate KM-UCL (use when n>=50)	51.64	95% Gamma Adjusted KM-UCL (use when n<50)	54.79
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	20.85	Mean in Log Scale	1.625
SD in Original Scale	49.81	SD in Log Scale	1.612
95% t UCL (assumes normality of ROS data)	36.88	95% Percentile Bootstrap UCL	37.67
95% BCA Bootstrap UCL	45.7	95% Bootstrap t UCL	69.39
95% H-UCL (Log ROS)	51.68		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	1.692	KM Geo Mean	5.431
KM SD (logged)	1.468	95% Critical H Value (KM-Log)	3.083
KM Standard Error of Mean (logged)	0.283	95% H-UCL (KM -Log)	38.1

KM SD (logged)	1.468	95% Critical H Value (KM-Log)	3.083
KM Standard Error of Mean (logged)	0.283		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	20.86	Mean in Log Scale	1.667
SD in Original Scale	49.8	SD in Log Scale	1.529
95% t UCL (Assumes normality)	36.89	95% H-Stat UCL	43.38
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	38.1		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:18:43 AM		
From File	Gordon Region, Soil - Surface, Lead (Pb), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Soil - Surface, Lead (Pb), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.71	Mean	4.444
Maximum	21.4	Median	2.96
SD	4.509	Std. Error of Mean	0.852
Coefficient of Variation	1.015	Skewness	2.536

Normal GOF Test			
Shapiro Wilk Test Statistic	0.697	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.895	95% Adjusted-CLT UCL (Chen-1995)	6.282
		95% Modified-t UCL (Johnson-1978)	5.964

Gamma GOF Test			
A-D Test Statistic	0.925	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.761	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.168	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.65	k star (bias corrected MLE)	1.497
Theta hat (MLE)	2.694	Theta star (bias corrected MLE)	2.969
nu hat (MLE)	92.38	nu star (bias corrected)	83.81
MLE Mean (bias corrected)	4.444	MLE Sd (bias corrected)	3.633
		Approximate Chi Square Value (0.05)	63.71
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	62.63

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.846	95% Adjusted Gamma UCL (use when n<50)	5.947

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.119	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.342	Mean of logged Data	1.159
Maximum of Logged Data	3.063	SD of logged Data	0.788
Assuming Lognormal Distribution			
95% H-UCL	6.079	90% Chebyshev (MVUE) UCL	6.387
95% Chebyshev (MVUE) UCL	7.339	97.5% Chebyshev (MVUE) UCL	8.66
99% Chebyshev (MVUE) UCL	11.26		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.846	95% Jackknife UCL	5.895
95% Standard Bootstrap UCL	5.839	95% Bootstrap-t UCL	6.94
95% Hall's Bootstrap UCL	7.801	95% Percentile Bootstrap UCL	5.896
95% BCA Bootstrap UCL	6.434		
90% Chebyshev(Mean, Sd) UCL	7	95% Chebyshev(Mean, Sd) UCL	8.158
97.5% Chebyshev(Mean, Sd) UCL	9.765	99% Chebyshev(Mean, Sd) UCL	12.92
Suggested UCL to Use			
95% H-UCL	6.079		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:19:22 AM
From File	Gordon Region, Soil - Surface, Manganese (Mn), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Manganese (Mn), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	2.4	Mean	54.57
Maximum	370	Median	25.8
SD	74.16	Std. Error of Mean	14.01
Coefficient of Variation	1.359	Skewness	3.21
Normal GOF Test			
Shapiro Wilk Test Statistic	0.62	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.262	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	78.44	95% Adjusted-CLT UCL (Chen-1995)	86.7
		95% Modified-t UCL (Johnson-1978)	79.86
Gamma GOF Test			
A-D Test Statistic	0.772	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.774	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.156	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.17	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.012	k star (bias corrected MLE)	0.927
Theta hat (MLE)	53.93	Theta star (bias corrected MLE)	58.85
nu hat (MLE)	56.66	nu star (bias corrected)	51.92
MLE Mean (bias corrected)	54.57	MLE Sd (bias corrected)	56.67
		Approximate Chi Square Value (0.05)	36.37
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	35.57
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	77.9	95% Adjusted Gamma UCL (use when n<50)	79.66

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0947	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.875	Mean of logged Data	3.43
Maximum of Logged Data	5.914	SD of logged Data	1.08
Assuming Lognormal Distribution			
95% H-UCL	94.08	90% Chebyshev (MVUE) UCL	91.77
95% Chebyshev (MVUE) UCL	109.1	97.5% Chebyshev (MVUE) UCL	133
99% Chebyshev (MVUE) UCL	180.2		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	77.62	95% Jackknife UCL	78.44
95% Standard Bootstrap UCL	76.95	95% Bootstrap-t UCL	98.51
95% Hall's Bootstrap UCL	166.8	95% Percentile Bootstrap UCL	80.92
95% BCA Bootstrap UCL	92.93		
90% Chebyshev(Mean, Sd) UCL	96.61	95% Chebyshev(Mean, Sd) UCL	115.7
97.5% Chebyshev(Mean, Sd) UCL	142.1	99% Chebyshev(Mean, Sd) UCL	194
Suggested UCL to Use			
95% Adjusted Gamma UCL	79.66		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:20:01 AM		
From File	Gordon Region, Soil - Surface, Mercury (Hg), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Mercury (Hg), mg/kg			
General Statistics			
Total Number of Observations	22	Number of Distinct Observations	14
Number of Detects	13	Number of Non-Detects	9
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.054	Minimum Non-Detect	0.05
Maximum Detect	0.203	Maximum Non-Detect	0.05
Variance Detects	0.00303	Percent Non-Detects	40.91%
Mean Detects	0.109	SD Detects	0.055
Median Detects	0.099	CV Detects	0.503
Skewness Detects	1.018	Kurtosis Detects	-0.477
Mean of Logged Detects	-2.318	SD of Logged Detects	0.465
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.802	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0851	KM Standard Error of Mean	0.0111
KM SD	0.05	95% KM (BCA) UCL	0.104
95% KM (t) UCL	0.104	95% KM (Percentile Bootstrap) UCL	0.103
95% KM (z) UCL	0.103	95% KM Bootstrap t UCL	0.111
90% KM Chebyshev UCL	0.118	95% KM Chebyshev UCL	0.133
97.5% KM Chebyshev UCL	0.154	99% KM Chebyshev UCL	0.196
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.757	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.736	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.201	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.237	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.924	k star (bias corrected MLE)	3.839
Theta hat (MLE)	0.0222	Theta star (bias corrected MLE)	0.0285
nu hat (MLE)	128	nu star (bias corrected)	99.82

Mean (detects)	0.109		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0706
Maximum	0.203	Median	0.0625
SD	0.0634	CV	0.898
k hat (MLE)	1.162	k star (bias corrected MLE)	1.034
Theta hat (MLE)	0.0608	Theta star (bias corrected MLE)	0.0683
nu hat (MLE)	51.14	nu star (bias corrected)	45.5
Adjusted Level of Significance (β)	0.0386		
Approximate Chi Square Value (45.50, α)	31.03	Adjusted Chi Square Value (45.50, β)	30.14
95% Gamma Approximate UCL (use when n>=50)	0.104	95% Gamma Adjusted UCL (use when n<50)	0.107
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0851	SD (KM)	0.05
Variance (KM)	0.0025	SE of Mean (KM)	0.0111
k hat (KM)	2.892	k star (KM)	2.528
nu hat (KM)	127.2	nu star (KM)	111.2
theta hat (KM)	0.0294	theta star (KM)	0.0337
80% gamma percentile (KM)	0.124	90% gamma percentile (KM)	0.157
95% gamma percentile (KM)	0.188	99% gamma percentile (KM)	0.256
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (111.23, α)	87.88	Adjusted Chi Square Value (111.23, β)	86.33
95% Gamma Approximate KM-UCL (use when n>=50)	0.108	95% Gamma Adjusted KM-UCL (use when n<50)	0.11
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0772	Mean in Log Scale	-2.819
SD in Original Scale	0.0578	SD in Log Scale	0.745
95% t UCL (assumes normality of ROS data)	0.0984	95% Percentile Bootstrap UCL	0.0971
95% BCA Bootstrap UCL	0.101	95% Bootstrap t UCL	0.106
95% H-UCL (Log ROS)	0.114		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.595	KM Geo Mean	0.0746
KM SD (logged)	0.479	95% Critical H Value (KM-Log)	1.978
KM Standard Error of Mean (logged)	0.106	95% H-UCL (KM -Log)	0.103

KM SD (logged)	0.479	95% Critical H Value (KM-Log)	1.978
KM Standard Error of Mean (logged)	0.106		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0749	Mean in Log Scale	-2.879
SD in Original Scale	0.0594	SD in Log Scale	0.774
95% t UCL (Assumes normality)	0.0967	95% H-Stat UCL	0.112
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.11	95% GROS Adjusted Gamma UCL	0.107
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:20:40 AM		
From File	Gordon Region, Soil - Surface, Molybdenum (Mo), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Molybdenum (Mo), mg/kg			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.031	Mean	1.149
Maximum	19.3	Median	0.284
SD	3.612	Std. Error of Mean	0.683
Coefficient of Variation	3.143	Skewness	5.051
Normal GOF Test			
Shapiro Wilk Test Statistic	0.298	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.418	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.312	95% Adjusted-CLT UCL (Chen-1995)	2.968
		95% Modified-t UCL (Johnson-1978)	2.421
Gamma GOF Test			
A-D Test Statistic	3.253	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.81	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.303	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.175	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.504	k star (bias corrected MLE)	0.474
Theta hat (MLE)	2.281	Theta star (bias corrected MLE)	2.427
nu hat (MLE)	28.21	nu star (bias corrected)	26.52
MLE Mean (bias corrected)	1.149	MLE Sd (bias corrected)	1.67
		Approximate Chi Square Value (0.05)	15.78
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	15.27
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.931	95% Adjusted Gamma UCL (use when n<50)	1.996

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.474	Mean of logged Data	-1.12
Maximum of Logged Data	2.96	SD of logged Data	1.271
Assuming Lognormal Distribution			
95% H-UCL	1.453	90% Chebyshev (MVUE) UCL	1.302
95% Chebyshev (MVUE) UCL	1.576	97.5% Chebyshev (MVUE) UCL	1.956
99% Chebyshev (MVUE) UCL	2.703		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.272	95% Jackknife UCL	2.312
95% Standard Bootstrap UCL	2.234	95% Bootstrap-t UCL	8.195
95% Hall's Bootstrap UCL	6.568	95% Percentile Bootstrap UCL	2.434
95% BCA Bootstrap UCL	3.68		
90% Chebyshev(Mean, Sd) UCL	3.197	95% Chebyshev(Mean, Sd) UCL	4.125
97.5% Chebyshev(Mean, Sd) UCL	5.412	99% Chebyshev(Mean, Sd) UCL	7.942
Suggested UCL to Use			
95% H-UCL	1.453		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:21:18 AM		
From File	Gordon Region, Soil - Surface, Nickel (Ni), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Soil - Surface, Nickel (Ni), mg/kg			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
Number of Detects	27	Number of Non-Detects	1
Number of Distinct Detects	27	Number of Distinct Non-Detects	1
Minimum Detect	0.51	Minimum Non-Detect	0.5
Maximum Detect	21.3	Maximum Non-Detect	0.5
Variance Detects	17.89	Percent Non-Detects	3.571%
Mean Detects	3.219	SD Detects	4.229
Median Detects	1.75	CV Detects	1.314
Skewness Detects	3.45	Kurtosis Detects	13.45
Mean of Logged Detects	0.735	SD of Logged Detects	0.861
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.572	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.291	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	3.122	KM Standard Error of Mean	0.791
KM SD	4.107	95% KM (BCA) UCL	4.638
95% KM (t) UCL	4.469	95% KM (Percentile Bootstrap) UCL	4.516
95% KM (z) UCL	4.423	95% KM Bootstrap t UCL	6.494
90% KM Chebyshev UCL	5.495	95% KM Chebyshev UCL	6.57
97.5% KM Chebyshev UCL	8.061	99% KM Chebyshev UCL	10.99
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.269	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.767	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.166	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.293	k star (bias corrected MLE)	1.174
Theta hat (MLE)	2.491	Theta star (bias corrected MLE)	2.743
nu hat (MLE)	69.8	nu star (bias corrected)	63.38

Mean (detects)	3.219		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	3.105
Maximum	21.3	Median	1.695
SD	4.194	CV	1.351
k hat (MLE)	0.983	k star (bias corrected MLE)	0.901
Theta hat (MLE)	3.16	Theta star (bias corrected MLE)	3.446
nu hat (MLE)	55.02	nu star (bias corrected)	50.46
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (50.46, α)	35.15	Adjusted Chi Square Value (50.46, β)	34.36
95% Gamma Approximate UCL (use when n>=50)	4.457	95% Gamma Adjusted UCL (use when n<50)	4.56
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	3.122	SD (KM)	4.107
Variance (KM)	16.86	SE of Mean (KM)	0.791
k hat (KM)	0.578	k star (KM)	0.54
nu hat (KM)	32.37	nu star (KM)	30.24
theta hat (KM)	5.401	theta star (KM)	5.783
80% gamma percentile (KM)	5.141	90% gamma percentile (KM)	8.311
95% gamma percentile (KM)	11.67	99% gamma percentile (KM)	19.87
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (30.24, α)	18.68	Adjusted Chi Square Value (30.24, β)	18.12
95% Gamma Approximate KM-UCL (use when n>=50)	5.054	95% Gamma Adjusted KM-UCL (use when n<50)	5.211
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	3.113	Mean in Log Scale	0.659
SD in Original Scale	4.188	SD in Log Scale	0.935
95% t UCL (assumes normality of ROS data)	4.461	95% Percentile Bootstrap UCL	4.502
95% BCA Bootstrap UCL	5.119	95% Bootstrap t UCL	6.408
95% H-UCL (Log ROS)	4.591		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	0.684	KM Geo Mean	1.982
KM SD (logged)	0.871	95% Critical H Value (KM-Log)	2.303
KM Standard Error of Mean (logged)	0.168	95% H-UCL (KM -Log)	4.258

KM SD (logged)	0.871	95% Critical H Value (KM-Log)	2.303
KM Standard Error of Mean (logged)	0.168		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	3.113	Mean in Log Scale	0.659
SD in Original Scale	4.188	SD in Log Scale	0.935
95% t UCL (Assumes normality)	4.461	95% H-Stat UCL	4.59
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	5.211	95% GROS Adjusted Gamma UCL	4.56
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:21:57 AM
From File	Gordon Region, Soil - Surface, Silver (Ag), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Silver (Ag), mg/kg

General Statistics

Total Number of Observations	28	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	26
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.14	Minimum Non-Detect	0.1
Maximum Detect	0.175	Maximum Non-Detect	0.1
Variance Detects	6.1250E-4	Percent Non-Detects	92.86%
Mean Detects	0.158	SD Detects	0.0247
Median Detects	0.158	CV Detects	0.157
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.855	SD of Logged Detects	0.158

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.104	KM Standard Error of Mean	0.00415
KM SD	0.0155	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.111	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.111	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.117	95% KM Chebyshev UCL	0.122
97.5% KM Chebyshev UCL	0.13	99% KM Chebyshev UCL	0.145

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	80.67	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00195	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	322.7	nu star (bias corrected)	N/A
Mean (detects)	0.158		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.104	SD (KM)	0.0155

Variance (KM)	2.4117E-4	SE of Mean (KM)	0.00415
k hat (KM)	44.94	k star (KM)	40.15
nu hat (KM)	2517	nu star (KM)	2248
theta hat (KM)	0.00232	theta star (KM)	0.00259
80% gamma percentile (KM)	0.118	90% gamma percentile (KM)	0.126
95% gamma percentile (KM)	0.133	99% gamma percentile (KM)	0.146
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0404
Approximate Chi Square Value (N/A, α)	2139	Adjusted Chi Square Value (N/A, β)	2133
95% Gamma Approximate KM-UCL (use when n>=50)	0.109	95% Gamma Adjusted KM-UCL (use when n<50)	0.11
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0531	Mean in Log Scale	-3.152
SD in Original Scale	0.0382	SD in Log Scale	0.668
95% t UCL (assumes normality of ROS data)	0.0654	95% Percentile Bootstrap UCL	0.0657
95% BCA Bootstrap UCL	0.0668	95% Bootstrap t UCL	0.0705
95% H-UCL (Log ROS)	0.07		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.271	KM Geo Mean	0.103
KM SD (logged)	0.119	95% Critical H Value (KM-Log)	1.713
KM Standard Error of Mean (logged)	0.0319	95% H-UCL (KM -Log)	0.108
KM SD (logged)	0.119	95% Critical H Value (KM-Log)	1.713
KM Standard Error of Mean (logged)	0.0319		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0577	Mean in Log Scale	-2.914
SD in Original Scale	0.0286	SD in Log Scale	0.301
95% t UCL (Assumes normality)	0.0669	95% H-Stat UCL	0.063
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.111	KM H-UCL	0.108
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:22:36 AM
From File	Gordon Region, Soil - Surface, Strontium (Sr), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Strontium (Sr), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	1.95	Mean	15.13
Maximum	61.05	Median	10.5
SD	13.9	Std. Error of Mean	2.628
Coefficient of Variation	0.919	Skewness	1.711
Normal GOF Test			
Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	19.6	95% Adjusted-CLT UCL (Chen-1995)	20.36
		95% Modified-t UCL (Johnson-1978)	19.75
Gamma GOF Test			
A-D Test Statistic	0.426	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.106	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.466	k star (bias corrected MLE)	1.333
Theta hat (MLE)	10.32	Theta star (bias corrected MLE)	11.35
nu hat (MLE)	82.1	nu star (bias corrected)	74.63
MLE Mean (bias corrected)	15.13	MLE Sd (bias corrected)	13.11
		Approximate Chi Square Value (0.05)	55.74
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	54.73
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	20.26	95% Adjusted Gamma UCL (use when n<50)	20.63

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.094	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.668	Mean of logged Data	2.338
Maximum of Logged Data	4.112	SD of logged Data	0.905
Assuming Lognormal Distribution			
95% H-UCL	23.47	90% Chebyshev (MVUE) UCL	24.11
95% Chebyshev (MVUE) UCL	28.11	97.5% Chebyshev (MVUE) UCL	33.65
99% Chebyshev (MVUE) UCL	44.53		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	19.45	95% Jackknife UCL	19.6
95% Standard Bootstrap UCL	19.39	95% Bootstrap-t UCL	21.11
95% Hall's Bootstrap UCL	20.81	95% Percentile Bootstrap UCL	19.57
95% BCA Bootstrap UCL	20.48		
90% Chebyshev(Mean, Sd) UCL	23.01	95% Chebyshev(Mean, Sd) UCL	26.58
97.5% Chebyshev(Mean, Sd) UCL	31.54	99% Chebyshev(Mean, Sd) UCL	41.27
Suggested UCL to Use			
95% Adjusted Gamma UCL	20.63		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:23:15 AM
From File	Gordon Region, Soil - Surface, Thallium (Tl), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Thallium (Tl), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	25
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.29	Maximum Non-Detect	0.1
Variance Detects	0.00911	Percent Non-Detects	89.29%
Mean Detects	0.182	SD Detects	0.0954
Median Detects	0.145	CV Detects	0.525
Skewness Detects	1.474	Kurtosis Detects	N/A
Mean of Logged Detects	-1.792	SD of Logged Detects	0.499

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.316	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.109	KM Standard Error of Mean	0.00831
KM SD	0.0359	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.123	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.122	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.134	95% KM Chebyshev UCL	0.145
97.5% KM Chebyshev UCL	0.161	99% KM Chebyshev UCL	0.191

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	5.944	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0306	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	35.66	nu star (bias corrected)	N/A

Mean (detects)	0.182		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0284
Maximum	0.29	Median	0.01
SD	0.06	CV	2.113
k hat (MLE)	0.8	k star (bias corrected MLE)	0.738
Theta hat (MLE)	0.0355	Theta star (bias corrected MLE)	0.0385
nu hat (MLE)	44.78	nu star (bias corrected)	41.32
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (41.32, α)	27.59	Adjusted Chi Square Value (41.32, β)	26.89
95% Gamma Approximate UCL (use when n>=50)	0.0425	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.109	SD (KM)	0.0359
Variance (KM)	0.00129	SE of Mean (KM)	0.00831
k hat (KM)	9.178	k star (KM)	8.218
nu hat (KM)	514	nu star (KM)	460.2
theta hat (KM)	0.0118	theta star (KM)	0.0132
80% gamma percentile (KM)	0.139	90% gamma percentile (KM)	0.159
95% gamma percentile (KM)	0.178	99% gamma percentile (KM)	0.216
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (460.22, α)	411.5	Adjusted Chi Square Value (460.22, β)	408.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.122	95% Gamma Adjusted KM-UCL (use when n<50)	0.122
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0303	Mean in Log Scale	-4.85
SD in Original Scale	0.061	SD in Log Scale	1.745
95% t UCL (assumes normality of ROS data)	0.0499	95% Percentile Bootstrap UCL	0.0505
95% BCA Bootstrap UCL	0.0579	95% Bootstrap t UCL	0.0781
95% H-UCL (Log ROS)	0.116		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.248	KM Geo Mean	0.106
KM SD (logged)	0.207	95% Critical H Value (KM-Log)	1.752
KM Standard Error of Mean (logged)	0.0479	95% H-UCL (KM -Log)	0.116

KM SD (logged)	0.207	95% Critical H Value (KM-Log)	1.752
KM Standard Error of Mean (logged)	0.0479		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0641	Mean in Log Scale	-2.867
SD in Original Scale	0.0489	SD in Log Scale	0.403
95% t UCL (Assumes normality)	0.0799	95% H-Stat UCL	0.0713
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.123		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:25:50 AM
From File	Gordon Region, Soil - Surface, Uranium (U), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Uranium (U), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	27
Number of Detects	27	Number of Non-Detects	1
Number of Distinct Detects	26	Number of Distinct Non-Detects	1
Minimum Detect	0.021	Minimum Non-Detect	0.02
Maximum Detect	1.17	Maximum Non-Detect	0.02
Variance Detects	0.0822	Percent Non-Detects	3.571%
Mean Detects	0.371	SD Detects	0.287
Median Detects	0.359	CV Detects	0.774
Skewness Detects	1.029	Kurtosis Detects	1.369
Mean of Logged Detects	-1.418	SD of Logged Detects	1.102

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.167	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.358	KM Standard Error of Mean	0.0547
KM SD	0.284	95% KM (BCA) UCL	0.45
95% KM (t) UCL	0.451	95% KM (Percentile Bootstrap) UCL	0.446
95% KM (z) UCL	0.448	95% KM Bootstrap t UCL	0.471
90% KM Chebyshev UCL	0.522	95% KM Chebyshev UCL	0.596
97.5% KM Chebyshev UCL	0.699	99% KM Chebyshev UCL	0.902

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.632	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.767	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.143	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.319	k star (bias corrected MLE)	1.197
Theta hat (MLE)	0.281	Theta star (bias corrected MLE)	0.309
nu hat (MLE)	71.23	nu star (bias corrected)	64.65

Mean (detects)	0.371		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0117	Mean	0.358
Maximum	1.17	Median	0.339
SD	0.289	CV	0.809
k hat (MLE)	1.142	k star (bias corrected MLE)	1.044
Theta hat (MLE)	0.313	Theta star (bias corrected MLE)	0.343
nu hat (MLE)	63.97	nu star (bias corrected)	58.45
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (58.45, α)	41.88	Adjusted Chi Square Value (58.45, β)	41.01
95% Gamma Approximate UCL (use when n>=50)	0.499	95% Gamma Adjusted UCL (use when n<50)	0.51
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.358	SD (KM)	0.284
Variance (KM)	0.0806	SE of Mean (KM)	0.0547
k hat (KM)	1.59	k star (KM)	1.444
nu hat (KM)	89.06	nu star (KM)	80.85
theta hat (KM)	0.225	theta star (KM)	0.248
80% gamma percentile (KM)	0.556	90% gamma percentile (KM)	0.753
95% gamma percentile (KM)	0.945	99% gamma percentile (KM)	1.378
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (80.85, α)	61.13	Adjusted Chi Square Value (80.85, β)	60.07
95% Gamma Approximate KM-UCL (use when n>=50)	0.473	95% Gamma Adjusted KM-UCL (use when n<50)	0.482
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.358	Mean in Log Scale	-1.512
SD in Original Scale	0.289	SD in Log Scale	1.191
95% t UCL (assumes normality of ROS data)	0.451	95% Percentile Bootstrap UCL	0.448
95% BCA Bootstrap UCL	0.455	95% Bootstrap t UCL	0.464
95% H-UCL (Log ROS)	0.831		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.507	KM Geo Mean	0.222
KM SD (logged)	1.158	95% Critical H Value (KM-Log)	2.657
KM Standard Error of Mean (logged)	0.223	95% H-UCL (KM -Log)	0.784

KM SD (logged)	1.158	95% Critical H Value (KM-Log)	2.657
KM Standard Error of Mean (logged)	0.223		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.358	Mean in Log Scale	-1.531
SD in Original Scale	0.29	SD in Log Scale	1.238
95% t UCL (Assumes normality)	0.451	95% H-Stat UCL	0.899
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.451		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:26:29 AM
From File	Gordon Region, Soil - Surface, Vanadium (V), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Vanadium (V), mg/kg

General Statistics

Total Number of Observations	28	Number of Distinct Observations	24
Number of Detects	24	Number of Non-Detects	4
Number of Distinct Detects	23	Number of Distinct Non-Detects	1
Minimum Detect	0.565	Minimum Non-Detect	0.5
Maximum Detect	38.1	Maximum Non-Detect	0.5
Variance Detects	90.77	Percent Non-Detects	14.29%
Mean Detects	8.901	SD Detects	9.527
Median Detects	6.06	CV Detects	1.07
Skewness Detects	1.675	Kurtosis Detects	2.974
Mean of Logged Detects	1.55	SD of Logged Detects	1.265

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	7.701	KM Standard Error of Mean	1.761
KM SD	9.122	95% KM (BCA) UCL	10.72
95% KM (t) UCL	10.7	95% KM (Percentile Bootstrap) UCL	10.7
95% KM (z) UCL	10.6	95% KM Bootstrap t UCL	11.81
90% KM Chebyshev UCL	12.98	95% KM Chebyshev UCL	15.38
97.5% KM Chebyshev UCL	18.7	99% KM Chebyshev UCL	25.22

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.419	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.775	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.122	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.184	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.917	k star (bias corrected MLE)	0.83
Theta hat (MLE)	9.706	Theta star (bias corrected MLE)	10.72
nu hat (MLE)	44.02	nu star (bias corrected)	39.85

Mean (detects)	8.901		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	7.631
Maximum	38.1	Median	3.953
SD	9.347	CV	1.225
k hat (MLE)	0.471	k star (bias corrected MLE)	0.444
Theta hat (MLE)	16.2	Theta star (bias corrected MLE)	17.17
nu hat (MLE)	26.37	nu star (bias corrected)	24.88
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (24.88, α)	14.52	Adjusted Chi Square Value (24.88, β)	14.03
95% Gamma Approximate UCL (use when n>=50)	13.08	95% Gamma Adjusted UCL (use when n<50)	13.53
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	7.701	SD (KM)	9.122
Variance (KM)	83.2	SE of Mean (KM)	1.761
k hat (KM)	0.713	k star (KM)	0.66
nu hat (KM)	39.92	nu star (KM)	36.97
theta hat (KM)	10.8	theta star (KM)	11.66
80% gamma percentile (KM)	12.68	90% gamma percentile (KM)	19.6
95% gamma percentile (KM)	26.77	99% gamma percentile (KM)	43.98
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (36.97, α)	24.05	Adjusted Chi Square Value (36.97, β)	23.41
95% Gamma Approximate KM-UCL (use when n>=50)	11.84	95% Gamma Adjusted KM-UCL (use when n<50)	12.16
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	7.67	Mean in Log Scale	1.136
SD in Original Scale	9.314	SD in Log Scale	1.568
95% t UCL (assumes normality of ROS data)	10.67	95% Percentile Bootstrap UCL	10.72
95% BCA Bootstrap UCL	11.19	95% Bootstrap t UCL	11.61
95% H-UCL (Log ROS)	28.23		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	1.23	KM Geo Mean	3.42
KM SD (logged)	1.389	95% Critical H Value (KM-Log)	2.971
KM Standard Error of Mean (logged)	0.268	95% H-UCL (KM -Log)	19.87

KM SD (logged)	1.389	95% Critical H Value (KM-Log)	2.971
KM Standard Error of Mean (logged)	0.268		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.665	Mean in Log Scale	1.131
SD in Original Scale	9.318	SD in Log Scale	1.568
95% t UCL (Assumes normality)	10.66	95% H-Stat UCL	28.04
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	12.16		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:27:08 AM
From File	Gordon Region, Soil - Surface, Zinc (Zn), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Soil - Surface, Zinc (Zn), mg/kg

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	13
Number of Detects	15	Number of Non-Detects	13
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	10	Minimum Non-Detect	10
Maximum Detect	163	Maximum Non-Detect	10
Variance Detects	1713	Percent Non-Detects	46.43%
Mean Detects	36.03	SD Detects	41.39
Median Detects	19	CV Detects	1.149
Skewness Detects	2.385	Kurtosis Detects	6.217
Mean of Logged Detects	3.171	SD of Logged Detects	0.864

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.669	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.306	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.22	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	23.95	KM Standard Error of Mean	6.263
KM SD	32.02	95% KM (BCA) UCL	35.41
95% KM (t) UCL	34.61	95% KM (Percentile Bootstrap) UCL	34.73
95% KM (z) UCL	34.25	95% KM Bootstrap t UCL	46.6
90% KM Chebyshev UCL	42.73	95% KM Chebyshev UCL	51.25
97.5% KM Chebyshev UCL	63.06	99% KM Chebyshev UCL	86.26

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.084	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.757	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.224	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.226	Detected data appear Gamma Distributed at 5% Significance Level
Detected data follow Appr. Gamma Distribution at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.351	k star (bias corrected MLE)	1.126
Theta hat (MLE)	26.66	Theta star (bias corrected MLE)	32.01
nu hat (MLE)	40.54	nu star (bias corrected)	33.77

Mean (detects)	36.03		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	19.31
Maximum	163	Median	10
SD	34.97	CV	1.811
k hat (MLE)	0.214	k star (bias corrected MLE)	0.215
Theta hat (MLE)	90.17	Theta star (bias corrected MLE)	89.8
nu hat (MLE)	11.99	nu star (bias corrected)	12.04
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (12.04, α)	5.254	Adjusted Chi Square Value (12.04, β)	4.978
95% Gamma Approximate UCL (use when n>=50)	44.25	95% Gamma Adjusted UCL (use when n<50)	46.7
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	23.95	SD (KM)	32.02
Variance (KM)	1025	SE of Mean (KM)	6.263
k hat (KM)	0.559	k star (KM)	0.523
nu hat (KM)	31.33	nu star (KM)	29.31
theta hat (KM)	42.8	theta star (KM)	45.76
80% gamma percentile (KM)	39.4	90% gamma percentile (KM)	64.17
95% gamma percentile (KM)	90.51	99% gamma percentile (KM)	155
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (29.31, α)	17.95	Adjusted Chi Square Value (29.31, β)	17.4
95% Gamma Approximate KM-UCL (use when n>=50)	39.1	95% Gamma Adjusted KM-UCL (use when n<50)	40.34
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	20.59	Mean in Log Scale	2.061
SD in Original Scale	34.28	SD in Log Scale	1.462
95% t UCL (assumes normality of ROS data)	31.63	95% Percentile Bootstrap UCL	32.26
95% BCA Bootstrap UCL	35.23	95% Bootstrap t UCL	41.99
95% H-UCL (Log ROS)	54.35		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	2.768	KM Geo Mean	15.92
KM SD (logged)	0.749	95% Critical H Value (KM-Log)	2.171
KM Standard Error of Mean (logged)	0.146	95% H-UCL (KM -Log)	28.81

KM SD (logged)	0.749	95% Critical H Value (KM-Log)	2.171
KM Standard Error of Mean (logged)	0.146		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	21.63	Mean in Log Scale	2.446
SD in Original Scale	33.71	SD in Log Scale	1.008
95% t UCL (Assumes normality)	32.48	95% H-Stat UCL	30.94
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	40.34	95% GROS Adjusted Gamma UCL	46.7
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.4
PROUCL OUTPUTS
SURFACE SOIL
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:29:34 AM
From File	MacLellan Region, Soil - Surface, Antimony (Sb), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Antimony (Sb), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	7
Number of Detects	9	Number of Non-Detects	16
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.21	Maximum Non-Detect	0.1
Variance Detects	0.00136	Percent Non-Detects	64%
Mean Detects	0.141	SD Detects	0.0369
Median Detects	0.15	CV Detects	0.261
Skewness Detects	0.578	Kurtosis Detects	-0.204
Mean of Logged Detects	-1.988	SD of Logged Detects	0.258

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.161	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.115	KM Standard Error of Mean	0.00609
KM SD	0.0287	95% KM (BCA) UCL	0.127
95% KM (t) UCL	0.125	95% KM (Percentile Bootstrap) UCL	0.125
95% KM (z) UCL	0.125	95% KM Bootstrap t UCL	0.13
90% KM Chebyshev UCL	0.133	95% KM Chebyshev UCL	0.141
97.5% KM Chebyshev UCL	0.153	99% KM Chebyshev UCL	0.175

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.342	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	16.94	k star (bias corrected MLE)	11.37
Theta hat (MLE)	0.00833	Theta star (bias corrected MLE)	0.0124
nu hat (MLE)	304.9	nu star (bias corrected)	204.6

Mean (detects)	0.141		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0753
Maximum	0.21	Median	0.0642
SD	0.0586	CV	0.778
k hat (MLE)	1.383	k star (bias corrected MLE)	1.244
Theta hat (MLE)	0.0545	Theta star (bias corrected MLE)	0.0605
nu hat (MLE)	69.16	nu star (bias corrected)	62.19
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (62.19, α)	45.05	Adjusted Chi Square Value (62.19, β)	44.06
95% Gamma Approximate UCL (use when n>=50)	0.104	95% Gamma Adjusted UCL (use when n<50)	0.106
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.115	SD (KM)	0.0287
Variance (KM)	8.2496E-4	SE of Mean (KM)	0.00609
k hat (KM)	15.98	k star (KM)	14.08
nu hat (KM)	798.8	nu star (KM)	704.2
theta hat (KM)	0.00719	theta star (KM)	0.00815
80% gamma percentile (KM)	0.139	90% gamma percentile (KM)	0.155
95% gamma percentile (KM)	0.169	99% gamma percentile (KM)	0.198
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (704.25, α)	643.7	Adjusted Chi Square Value (704.25, β)	639.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.126	95% Gamma Adjusted KM-UCL (use when n<50)	0.126
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0891	Mean in Log Scale	-2.55
SD in Original Scale	0.0475	SD in Log Scale	0.527
95% t UCL (assumes normality of ROS data)	0.105	95% Percentile Bootstrap UCL	0.105
95% BCA Bootstrap UCL	0.107	95% Bootstrap t UCL	0.108
95% H-UCL (Log ROS)	0.111		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.189	KM Geo Mean	0.112
KM SD (logged)	0.21	95% Critical H Value (KM-Log)	1.761
KM Standard Error of Mean (logged)	0.0446	95% H-UCL (KM -Log)	0.123

KM SD (logged)	0.21	95% Critical H Value (KM-Log)	1.761
KM Standard Error of Mean (logged)	0.0446		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0828	Mean in Log Scale	-2.633
SD in Original Scale	0.0495	SD in Log Scale	0.516
95% t UCL (Assumes normality)	0.0997	95% H-Stat UCL	0.101
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.125		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:30:14 AM
From File	MacLellan Region, Soil - Surface, Arsenic (As), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Arsenic (As), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	22
		Number of Missing Observations	0
Minimum	0.4	Mean	0.924
Maximum	3.68	Median	0.73
SD	0.756	Std. Error of Mean	0.151
Coefficient of Variation	0.819	Skewness	2.629

Normal GOF Test			
Shapiro Wilk Test Statistic	0.643	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.182	95% Adjusted-CLT UCL (Chen-1995)	1.257
		95% Modified-t UCL (Johnson-1978)	1.196

Gamma GOF Test			
A-D Test Statistic	1.918	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.241	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.176	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.768	k star (bias corrected MLE)	2.463
Theta hat (MLE)	0.334	Theta star (bias corrected MLE)	0.375
nu hat (MLE)	138.4	nu star (bias corrected)	123.1
MLE Mean (bias corrected)	0.924	MLE Sd (bias corrected)	0.589
		Approximate Chi Square Value (0.05)	98.5
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	97

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.155	95% Adjusted Gamma UCL (use when n<50)	1.172

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.916	Mean of logged Data	-0.271
Maximum of Logged Data	1.303	SD of logged Data	0.562
Assuming Lognormal Distribution			
95% H-UCL	1.126	90% Chebyshev (MVUE) UCL	1.202
95% Chebyshev (MVUE) UCL	1.344	97.5% Chebyshev (MVUE) UCL	1.542
99% Chebyshev (MVUE) UCL	1.93		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.172	95% Jackknife UCL	1.182
95% Standard Bootstrap UCL	1.168	95% Bootstrap-t UCL	1.435
95% Hall's Bootstrap UCL	1.429	95% Percentile Bootstrap UCL	1.191
95% BCA Bootstrap UCL	1.262		
90% Chebyshev(Mean, Sd) UCL	1.377	95% Chebyshev(Mean, Sd) UCL	1.583
97.5% Chebyshev(Mean, Sd) UCL	1.868	99% Chebyshev(Mean, Sd) UCL	2.428
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1.583		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:30:53 AM
From File	MacLellan Region, Soil - Surface, Barium (Ba), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Barium (Ba), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	4.76	Mean	27.62
Maximum	85.5	Median	18.5
SD	22.62	Std. Error of Mean	4.525
Coefficient of Variation	0.819	Skewness	1.389
Normal GOF Test			
Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	35.36	95% Adjusted-CLT UCL (Chen-1995)	36.4
		95% Modified-t UCL (Johnson-1978)	35.57
Gamma GOF Test			
A-D Test Statistic	0.433	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.149	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.177	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.816	k star (bias corrected MLE)	1.625
Theta hat (MLE)	15.21	Theta star (bias corrected MLE)	17
nu hat (MLE)	90.79	nu star (bias corrected)	81.23
MLE Mean (bias corrected)	27.62	MLE Sd (bias corrected)	21.67
		Approximate Chi Square Value (0.05)	61.46
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	60.29
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	36.5	95% Adjusted Gamma UCL (use when n<50)	37.21

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.56	Mean of logged Data	3.019
Maximum of Logged Data	4.449	SD of logged Data	0.796
Assuming Lognormal Distribution			
95% H-UCL	40.51	90% Chebyshev (MVUE) UCL	42.1
95% Chebyshev (MVUE) UCL	48.65	97.5% Chebyshev (MVUE) UCL	57.74
99% Chebyshev (MVUE) UCL	75.59		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	35.06	95% Jackknife UCL	35.36
95% Standard Bootstrap UCL	34.82	95% Bootstrap-t UCL	37.74
95% Hall's Bootstrap UCL	36.26	95% Percentile Bootstrap UCL	35.06
95% BCA Bootstrap UCL	36.21		
90% Chebyshev(Mean, Sd) UCL	41.19	95% Chebyshev(Mean, Sd) UCL	47.34
97.5% Chebyshev(Mean, Sd) UCL	55.88	99% Chebyshev(Mean, Sd) UCL	72.64
Suggested UCL to Use			
95% Adjusted Gamma UCL	37.21		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:31:32 AM
From File	MacLellan Region, Soil - Surface, Beryllium (Be), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Beryllium (Be), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	4
Number of Detects	5	Number of Non-Detects	20
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.18	Maximum Non-Detect	0.1
Variance Detects	0.00107	Percent Non-Detects	80%
Mean Detects	0.128	SD Detects	0.0327
Median Detects	0.11	CV Detects	0.256
Skewness Detects	1.294	Kurtosis Detects	0.906
Mean of Logged Detects	-2.08	SD of Logged Detects	0.239

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.106	KM Standard Error of Mean	0.00385
KM SD	0.0172	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.112	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.112	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.117	95% KM Chebyshev UCL	0.122
97.5% KM Chebyshev UCL	0.13	99% KM Chebyshev UCL	0.144

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.454	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.328	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	21.1	k star (bias corrected MLE)	8.573
Theta hat (MLE)	0.00607	Theta star (bias corrected MLE)	0.0149
nu hat (MLE)	211	nu star (bias corrected)	85.73

Mean (detects)	0.128		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0435
Maximum	0.18	Median	0.0132
SD	0.0485	CV	1.114
k hat (MLE)	1.035	k star (bias corrected MLE)	0.937
Theta hat (MLE)	0.0421	Theta star (bias corrected MLE)	0.0464
nu hat (MLE)	51.73	nu star (bias corrected)	46.86
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (46.86, α)	32.15	Adjusted Chi Square Value (46.86, β)	31.32
95% Gamma Approximate UCL (use when n>=50)	0.0634	95% Gamma Adjusted UCL (use when n<50)	0.0651
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.106	SD (KM)	0.0172
Variance (KM)	2.9664E-4	SE of Mean (KM)	0.00385
k hat (KM)	37.59	k star (KM)	33.11
nu hat (KM)	1880	nu star (KM)	1655
theta hat (KM)	0.00281	theta star (KM)	0.00319
80% gamma percentile (KM)	0.121	90% gamma percentile (KM)	0.13
95% gamma percentile (KM)	0.137	99% gamma percentile (KM)	0.153
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	1562	Adjusted Chi Square Value (N/A, β)	1556
95% Gamma Approximate KM-UCL (use when n>=50)	0.112	95% Gamma Adjusted KM-UCL (use when n<50)	0.112
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.303	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.061	Mean in Log Scale	-2.992
SD in Original Scale	0.0405	SD in Log Scale	0.637
95% t UCL (assumes normality of ROS data)	0.0748	95% Percentile Bootstrap UCL	0.0746
95% BCA Bootstrap UCL	0.0763	95% Bootstrap t UCL	0.0787
95% H-UCL (Log ROS)	0.0807		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.258	KM Geo Mean	0.105
KM SD (logged)	0.131	95% Critical H Value (KM-Log)	1.724
KM Standard Error of Mean (logged)	0.0292	95% H-UCL (KM -Log)	0.11

KM SD (logged)	0.131	95% Critical H Value (KM-Log)	1.724
KM Standard Error of Mean (logged)	0.0292		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0656	Mean in Log Scale	-2.813
SD in Original Scale	0.0345	SD in Log Scale	0.387
95% t UCL (Assumes normality)	0.0774	95% H-Stat UCL	0.075
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.112		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:32:11 AM		
From File	MacLellan Region, Soil - Surface, Cadmium (Cd), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Surface, Cadmium (Cd), mg/kg			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	22
Number of Detects	21	Number of Non-Detects	4
Number of Distinct Detects	21	Number of Distinct Non-Detects	1
Minimum Detect	0.021	Minimum Non-Detect	0.02
Maximum Detect	1.32	Maximum Non-Detect	0.02
Variance Detects	0.0855	Percent Non-Detects	16%
Mean Detects	0.297	SD Detects	0.292
Median Detects	0.208	CV Detects	0.984
Skewness Detects	2.208	Kurtosis Detects	6.926
Mean of Logged Detects	-1.723	SD of Logged Detects	1.169
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.777	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.253	KM Standard Error of Mean	0.0575
KM SD	0.281	95% KM (BCA) UCL	0.347
95% KM (t) UCL	0.351	95% KM (Percentile Bootstrap) UCL	0.351
95% KM (z) UCL	0.347	95% KM Bootstrap t UCL	0.409
90% KM Chebyshev UCL	0.425	95% KM Chebyshev UCL	0.503
97.5% KM Chebyshev UCL	0.612	99% KM Chebyshev UCL	0.825
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.422	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.767	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.122	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.118	k star (bias corrected MLE)	0.99
Theta hat (MLE)	0.266	Theta star (bias corrected MLE)	0.3
nu hat (MLE)	46.97	nu star (bias corrected)	41.59

Mean (detects)	0.297		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.251
Maximum	1.32	Median	0.168
SD	0.288	CV	1.145
k hat (MLE)	0.746	k star (bias corrected MLE)	0.683
Theta hat (MLE)	0.337	Theta star (bias corrected MLE)	0.368
nu hat (MLE)	37.31	nu star (bias corrected)	34.16
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (34.16, α)	21.8	Adjusted Chi Square Value (34.16, β)	21.12
95% Gamma Approximate UCL (use when n>=50)	0.394	95% Gamma Adjusted UCL (use when n<50)	0.406
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.253	SD (KM)	0.281
Variance (KM)	0.0787	SE of Mean (KM)	0.0575
k hat (KM)	0.812	k star (KM)	0.741
nu hat (KM)	40.61	nu star (KM)	37.07
theta hat (KM)	0.311	theta star (KM)	0.341
80% gamma percentile (KM)	0.415	90% gamma percentile (KM)	0.626
95% gamma percentile (KM)	0.843	99% gamma percentile (KM)	1.358
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (37.07, α)	24.13	Adjusted Chi Square Value (37.07, β)	23.42
95% Gamma Approximate KM-UCL (use when n>=50)	0.388	95% Gamma Adjusted KM-UCL (use when n<50)	0.4
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.252	Mean in Log Scale	-2.139
SD in Original Scale	0.287	SD in Log Scale	1.454
95% t UCL (assumes normality of ROS data)	0.35	95% Percentile Bootstrap UCL	0.352
95% BCA Bootstrap UCL	0.369	95% Bootstrap t UCL	0.392
95% H-UCL (Log ROS)	0.856		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.073	KM Geo Mean	0.126
KM SD (logged)	1.318	95% Critical H Value (KM-Log)	2.926
KM Standard Error of Mean (logged)	0.27	95% H-UCL (KM -Log)	0.659

KM SD (logged)	1.318	95% Critical H Value (KM-Log)	2.926
KM Standard Error of Mean (logged)	0.27		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.251	Mean in Log Scale	-2.184
SD in Original Scale	0.288	SD in Log Scale	1.517
95% t UCL (Assumes normality)	0.35	95% H-Stat UCL	0.965
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.351		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:32:50 AM		
From File	MacLellan Region, Soil - Surface, Chromium (Cr), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Surface, Chromium (Cr), mg/kg			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	19
Number of Detects	19	Number of Non-Detects	6
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	26.6	Maximum Non-Detect	1
Variance Detects	31.59	Percent Non-Detects	24%
Mean Detects	4.539	SD Detects	5.621
Median Detects	3.4	CV Detects	1.238
Skewness Detects	3.706	Kurtosis Detects	14.9
Mean of Logged Detects	1.179	SD of Logged Detects	0.734
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.515	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.352	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.197	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	3.69	KM Standard Error of Mean	1.028
KM SD	5.003	95% KM (BCA) UCL	5.704
95% KM (t) UCL	5.449	95% KM (Percentile Bootstrap) UCL	5.534
95% KM (z) UCL	5.381	95% KM Bootstrap t UCL	8.552
90% KM Chebyshev UCL	6.774	95% KM Chebyshev UCL	8.171
97.5% KM Chebyshev UCL	10.11	99% KM Chebyshev UCL	13.92
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.163	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.254	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.202	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.644	k star (bias corrected MLE)	1.42
Theta hat (MLE)	2.761	Theta star (bias corrected MLE)	3.197
nu hat (MLE)	62.49	nu star (bias corrected)	53.95

Mean (detects)	4.539		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	3.452
Maximum	26.6	Median	2
SD	5.253	CV	1.521
k hat (MLE)	0.446	k star (bias corrected MLE)	0.42
Theta hat (MLE)	7.733	Theta star (bias corrected MLE)	8.229
nu hat (MLE)	22.32	nu star (bias corrected)	20.98
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (20.98, α)	11.57	Adjusted Chi Square Value (20.98, β)	11.1
95% Gamma Approximate UCL (use when n>=50)	6.257	95% Gamma Adjusted UCL (use when n<50)	6.525
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	3.69	SD (KM)	5.003
Variance (KM)	25.03	SE of Mean (KM)	1.028
k hat (KM)	0.544	k star (KM)	0.505
nu hat (KM)	27.2	nu star (KM)	25.27
theta hat (KM)	6.783	theta star (KM)	7.301
80% gamma percentile (KM)	6.063	90% gamma percentile (KM)	9.961
95% gamma percentile (KM)	14.12	99% gamma percentile (KM)	24.34
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (25.27, α)	14.82	Adjusted Chi Square Value (25.27, β)	14.27
95% Gamma Approximate KM-UCL (use when n>=50)	6.293	95% Gamma Adjusted KM-UCL (use when n<50)	6.533
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.197	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	3.601	Mean in Log Scale	0.77
SD in Original Scale	5.159	SD in Log Scale	0.993
95% t UCL (assumes normality of ROS data)	5.366	95% Percentile Bootstrap UCL	5.475
95% BCA Bootstrap UCL	6.931	95% Bootstrap t UCL	7.948
95% H-UCL (Log ROS)	5.854		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	0.896	KM Geo Mean	2.45
KM SD (logged)	0.801	95% Critical H Value (KM-Log)	2.256
KM Standard Error of Mean (logged)	0.165	95% H-UCL (KM -Log)	4.88

KM SD (logged)	0.801	95% Critical H Value (KM-Log)	2.256
KM Standard Error of Mean (logged)	0.165		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.57	Mean in Log Scale	0.73
SD in Original Scale	5.176	SD in Log Scale	1.034
95% t UCL (Assumes normality)	5.341	95% H-Stat UCL	6.051
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	4.88		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:33:30 AM		
From File	MacLellan Region, Soil - Surface, Cobalt (Co), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Surface, Cobalt (Co), mg/kg			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.154	Mean	1.409
Maximum	8.02	Median	0.854
SD	1.758	Std. Error of Mean	0.352
Coefficient of Variation	1.248	Skewness	2.673
Normal GOF Test			
Shapiro Wilk Test Statistic	0.672	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.011	95% Adjusted-CLT UCL (Chen-1995)	2.188
		95% Modified-t UCL (Johnson-1978)	2.042
Gamma GOF Test			
A-D Test Statistic	0.703	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.771	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.149	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.179	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.097	k star (bias corrected MLE)	0.992
Theta hat (MLE)	1.285	Theta star (bias corrected MLE)	1.421
nu hat (MLE)	54.85	nu star (bias corrected)	49.6
MLE Mean (bias corrected)	1.409	MLE Sd (bias corrected)	1.415
		Approximate Chi Square Value (0.05)	34.43
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	33.57
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	2.03	95% Adjusted Gamma UCL (use when n<50)	2.082

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0809	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.871	Mean of logged Data	-0.178
Maximum of Logged Data	2.082	SD of logged Data	1.012
Assuming Lognormal Distribution			
95% H-UCL	2.345	90% Chebyshev (MVUE) UCL	2.294
95% Chebyshev (MVUE) UCL	2.718	97.5% Chebyshev (MVUE) UCL	3.308
99% Chebyshev (MVUE) UCL	4.466		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.987	95% Jackknife UCL	2.011
95% Standard Bootstrap UCL	1.972	95% Bootstrap-t UCL	2.512
95% Hall's Bootstrap UCL	4.498	95% Percentile Bootstrap UCL	2.043
95% BCA Bootstrap UCL	2.16		
90% Chebyshev(Mean, Sd) UCL	2.464	95% Chebyshev(Mean, Sd) UCL	2.942
97.5% Chebyshev(Mean, Sd) UCL	3.605	99% Chebyshev(Mean, Sd) UCL	4.907
Suggested UCL to Use			
95% Adjusted Gamma UCL	2.082		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:34:09 AM		
From File	MacLellan Region, Soil - Surface, Copper (Cu), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Surface, Copper (Cu), mg/kg			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	23
Number of Detects	22	Number of Non-Detects	3
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	1.1	Minimum Non-Detect	1
Maximum Detect	307	Maximum Non-Detect	1
Variance Detects	4822	Percent Non-Detects	12%
Mean Detects	40.35	SD Detects	69.44
Median Detects	13.7	CV Detects	1.721
Skewness Detects	3.054	Kurtosis Detects	10.64
Mean of Logged Detects	2.597	SD of Logged Detects	1.565
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.594	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	35.62	KM Standard Error of Mean	13.29
KM SD	64.91	95% KM (BCA) UCL	59.44
95% KM (t) UCL	58.36	95% KM (Percentile Bootstrap) UCL	58.49
95% KM (z) UCL	57.48	95% KM Bootstrap t UCL	86.06
90% KM Chebyshev UCL	75.49	95% KM Chebyshev UCL	93.54
97.5% KM Chebyshev UCL	118.6	99% KM Chebyshev UCL	167.8
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.721	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.799	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.168	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.566	k star (bias corrected MLE)	0.519
Theta hat (MLE)	71.25	Theta star (bias corrected MLE)	77.69
nu hat (MLE)	24.91	nu star (bias corrected)	22.85

Mean (detects)	40.35		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	35.51
Maximum	307	Median	8.5
SD	66.32	CV	1.868
k hat (MLE)	0.364	k star (bias corrected MLE)	0.347
Theta hat (MLE)	97.61	Theta star (bias corrected MLE)	102.4
nu hat (MLE)	18.19	nu star (bias corrected)	17.34
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (17.34, α)	8.914	Adjusted Chi Square Value (17.34, β)	8.503
95% Gamma Approximate UCL (use when n>=50)	69.06	95% Gamma Adjusted UCL (use when n<50)	72.39
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	35.62	SD (KM)	64.91
Variance (KM)	4214	SE of Mean (KM)	13.29
k hat (KM)	0.301	k star (KM)	0.292
nu hat (KM)	15.06	nu star (KM)	14.59
theta hat (KM)	118.3	theta star (KM)	122.1
80% gamma percentile (KM)	54.25	90% gamma percentile (KM)	105.4
95% gamma percentile (KM)	164.4	99% gamma percentile (KM)	318.3
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (14.59, α)	6.974	Adjusted Chi Square Value (14.59, β)	6.617
95% Gamma Approximate KM-UCL (use when n>=50)	74.5	95% Gamma Adjusted KM-UCL (use when n<50)	78.53
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0985	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	35.55	Mean in Log Scale	2.154
SD in Original Scale	66.29	SD in Log Scale	1.914
95% t UCL (assumes normality of ROS data)	58.23	95% Percentile Bootstrap UCL	58.91
95% BCA Bootstrap UCL	68.5	95% Bootstrap t UCL	84.64
95% H-UCL (Log ROS)	241.5		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	2.285	KM Geo Mean	9.828
KM SD (logged)	1.664	95% Critical H Value (KM-Log)	3.445
KM Standard Error of Mean (logged)	0.341	95% H-UCL (KM -Log)	126.4

KM SD (logged)	1.664	95% Critical H Value (KM-Log)	3.445
KM Standard Error of Mean (logged)	0.341		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	35.56	Mean in Log Scale	2.202
SD in Original Scale	66.28	SD in Log Scale	1.826
95% t UCL (Assumes normality)	58.24	95% H-Stat UCL	190
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	78.53		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:36:06 AM
From File	MacLellan Region, Soil - Surface, Lead (Pb), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Lead (Pb), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	1.43	Mean	4.882
Maximum	13.4	Median	3.245
SD	3.553	Std. Error of Mean	0.711
Coefficient of Variation	0.728	Skewness	0.973

Normal GOF Test			
Shapiro Wilk Test Statistic	0.845	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.235	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.098	95% Adjusted-CLT UCL (Chen-1995)	6.198
		95% Modified-t UCL (Johnson-1978)	6.121

Gamma GOF Test			
A-D Test Statistic	1.042	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.185	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.177	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.164	k star (bias corrected MLE)	1.931
Theta hat (MLE)	2.256	Theta star (bias corrected MLE)	2.528
nu hat (MLE)	108.2	nu star (bias corrected)	96.55
MLE Mean (bias corrected)	4.882	MLE Sd (bias corrected)	3.513
		Approximate Chi Square Value (0.05)	74.89
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	73.58

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.294	95% Adjusted Gamma UCL (use when n<50)	6.405

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.358	Mean of logged Data	1.337
Maximum of Logged Data	2.595	SD of logged Data	0.717
Assuming Lognormal Distribution			
95% H-UCL	6.76	90% Chebyshev (MVUE) UCL	7.122
95% Chebyshev (MVUE) UCL	8.145	97.5% Chebyshev (MVUE) UCL	9.565
99% Chebyshev (MVUE) UCL	12.35		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.051	95% Jackknife UCL	6.098
95% Standard Bootstrap UCL	6.053	95% Bootstrap-t UCL	6.314
95% Hall's Bootstrap UCL	6.148	95% Percentile Bootstrap UCL	6.062
95% BCA Bootstrap UCL	6.16		
90% Chebyshev(Mean, Sd) UCL	7.014	95% Chebyshev(Mean, Sd) UCL	7.979
97.5% Chebyshev(Mean, Sd) UCL	9.32	99% Chebyshev(Mean, Sd) UCL	11.95
Suggested UCL to Use			
95% H-UCL	6.76		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:36:45 AM		
From File	MacLellan Region, Soil - Surface, Manganese (Mn), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Surface, Manganese (Mn), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	5.38	Mean	37.4
Maximum	158	Median	25
SD	35.19	Std. Error of Mean	7.038
Coefficient of Variation	0.941	Skewness	2.049

Normal GOF Test			
Shapiro Wilk Test Statistic	0.767	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	49.44	95% Adjusted-CLT UCL (Chen-1995)	52.06
		95% Modified-t UCL (Johnson-1978)	49.92

Gamma GOF Test			
A-D Test Statistic	0.685	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.155	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.177	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.624	k star (bias corrected MLE)	1.456
Theta hat (MLE)	23.02	Theta star (bias corrected MLE)	25.68
nu hat (MLE)	81.22	nu star (bias corrected)	72.81
MLE Mean (bias corrected)	37.4	MLE Sd (bias corrected)	30.99
		Approximate Chi Square Value (0.05)	54.16
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	53.07

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	50.28	95% Adjusted Gamma UCL (use when n<50)	51.32

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.683	Mean of logged Data	3.283
Maximum of Logged Data	5.063	SD of logged Data	0.823
Assuming Lognormal Distribution			
95% H-UCL	54.84	90% Chebyshev (MVUE) UCL	56.69
95% Chebyshev (MVUE) UCL	65.73	97.5% Chebyshev (MVUE) UCL	78.27
99% Chebyshev (MVUE) UCL	102.9		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	48.98	95% Jackknife UCL	49.44
95% Standard Bootstrap UCL	48.52	95% Bootstrap-t UCL	55.56
95% Hall's Bootstrap UCL	56.49	95% Percentile Bootstrap UCL	49.58
95% BCA Bootstrap UCL	51.24		
90% Chebyshev(Mean, Sd) UCL	58.51	95% Chebyshev(Mean, Sd) UCL	68.08
97.5% Chebyshev(Mean, Sd) UCL	81.35	99% Chebyshev(Mean, Sd) UCL	107.4
Suggested UCL to Use			
95% Adjusted Gamma UCL	51.32		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:37:24 AM
From File	MacLellan Region, Soil - Surface, Mercury (Hg), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Mercury (Hg), mg/kg

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	3
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	0.06	Minimum Non-Detect	0.05
Maximum Detect	0.339	Maximum Non-Detect	0.05
Variance Detects	0.00552	Percent Non-Detects	23.08%
Mean Detects	0.151	SD Detects	0.0743
Median Detects	0.138	CV Detects	0.492
Skewness Detects	1.918	Kurtosis Detects	5.138
Mean of Logged Detects	-1.981	SD of Logged Detects	0.444

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.807	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.128	KM Standard Error of Mean	0.022
KM SD	0.0751	95% KM (BCA) UCL	0.167
95% KM (t) UCL	0.167	95% KM (Percentile Bootstrap) UCL	0.165
95% KM (z) UCL	0.164	95% KM Bootstrap t UCL	0.183
90% KM Chebyshev UCL	0.194	95% KM Chebyshev UCL	0.224
97.5% KM Chebyshev UCL	0.265	99% KM Chebyshev UCL	0.346

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.473	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.2	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	5.618	k star (bias corrected MLE)	4
Theta hat (MLE)	0.0269	Theta star (bias corrected MLE)	0.0378
nu hat (MLE)	112.4	nu star (bias corrected)	79.99

Mean (detects)	0.151		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.121
Maximum	0.339	Median	0.133
SD	0.0862	CV	0.711
k hat (MLE)	1.646	k star (bias corrected MLE)	1.318
Theta hat (MLE)	0.0736	Theta star (bias corrected MLE)	0.0919
nu hat (MLE)	42.8	nu star (bias corrected)	34.26
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (34.26, α)	21.87	Adjusted Chi Square Value (34.26, β)	20.47
95% Gamma Approximate UCL (use when n>=50)	0.19	95% Gamma Adjusted UCL (use when n<50)	0.203
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.128	SD (KM)	0.0751
Variance (KM)	0.00564	SE of Mean (KM)	0.022
k hat (KM)	2.896	k star (KM)	2.279
nu hat (KM)	75.3	nu star (KM)	59.25
theta hat (KM)	0.0441	theta star (KM)	0.0561
80% gamma percentile (KM)	0.188	90% gamma percentile (KM)	0.241
95% gamma percentile (KM)	0.291	99% gamma percentile (KM)	0.401
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (59.25, α)	42.55	Adjusted Chi Square Value (59.25, β)	40.54
95% Gamma Approximate KM-UCL (use when n>=50)	0.178	95% Gamma Adjusted KM-UCL (use when n<50)	0.187
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.128	Mean in Log Scale	-2.22
SD in Original Scale	0.0784	SD in Log Scale	0.601
95% t UCL (assumes normality of ROS data)	0.166	95% Percentile Bootstrap UCL	0.163
95% BCA Bootstrap UCL	0.174	95% Bootstrap t UCL	0.182
95% H-UCL (Log ROS)	0.192		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.215	KM Geo Mean	0.109
KM SD (logged)	0.565	95% Critical H Value (KM-Log)	2.19
KM Standard Error of Mean (logged)	0.165	95% H-UCL (KM -Log)	0.183

KM SD (logged)	0.565	95% Critical H Value (KM-Log)	2.19
KM Standard Error of Mean (logged)	0.165		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.122	Mean in Log Scale	-2.375
SD in Original Scale	0.0849	SD in Log Scale	0.842
95% t UCL (Assumes normality)	0.164	95% H-Stat UCL	0.248
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.187	95% GROS Adjusted Gamma UCL	0.203
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:38:03 AM
From File	MacLellan Region, Soil - Surface, Molybdenum (Mo), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Molybdenum (Mo), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.057	Mean	0.239
Maximum	1.67	Median	0.151
SD	0.319	Std. Error of Mean	0.0638
Coefficient of Variation	1.332	Skewness	4.071

Normal GOF Test		
Shapiro Wilk Test Statistic	0.499	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.324	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.349	95% Adjusted-CLT UCL (Chen-1995)	0.4
		95% Modified-t UCL (Johnson-1978)	0.357

Gamma GOF Test		
A-D Test Statistic	1.274	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.761	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.208	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.178	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.503	k star (bias corrected MLE)	1.349
Theta hat (MLE)	0.159	Theta star (bias corrected MLE)	0.178
nu hat (MLE)	75.13	nu star (bias corrected)	67.45
MLE Mean (bias corrected)	0.239	MLE Sd (bias corrected)	0.206
		Approximate Chi Square Value (0.05)	49.55
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	48.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.326	95% Adjusted Gamma UCL (use when n<50)	0.333

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.132	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.865	Mean of logged Data	-1.798
Maximum of Logged Data	0.513	SD of logged Data	0.766
Assuming Lognormal Distribution			
95% H-UCL	0.314	90% Chebyshev (MVUE) UCL	0.328
95% Chebyshev (MVUE) UCL	0.378	97.5% Chebyshev (MVUE) UCL	0.447
99% Chebyshev (MVUE) UCL	0.582		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.344	95% Jackknife UCL	0.349
95% Standard Bootstrap UCL	0.342	95% Bootstrap-t UCL	0.53
95% Hall's Bootstrap UCL	0.729	95% Percentile Bootstrap UCL	0.362
95% BCA Bootstrap UCL	0.432		
90% Chebyshev(Mean, Sd) UCL	0.431	95% Chebyshev(Mean, Sd) UCL	0.518
97.5% Chebyshev(Mean, Sd) UCL	0.638	99% Chebyshev(Mean, Sd) UCL	0.874
Suggested UCL to Use			
95% H-UCL	0.314		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:38:42 AM
From File	MacLellan Region, Soil - Surface, Nickel (Ni), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Nickel (Ni), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	23
Number of Detects	23	Number of Non-Detects	2
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.88	Minimum Non-Detect	0.5
Maximum Detect	383	Maximum Non-Detect	0.5
Variance Detects	6195	Percent Non-Detects	8%
Mean Detects	24.42	SD Detects	78.71
Median Detects	4.29	CV Detects	3.223
Skewness Detects	4.691	Kurtosis Detects	22.28
Mean of Logged Detects	1.748	SD of Logged Detects	1.381

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.297	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.413	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	22.51	KM Standard Error of Mean	15.16
KM SD	74.12	95% KM (BCA) UCL	53.27
95% KM (t) UCL	48.44	95% KM (Percentile Bootstrap) UCL	52.59
95% KM (z) UCL	47.44	95% KM Bootstrap t UCL	226.7
90% KM Chebyshev UCL	67.98	95% KM Chebyshev UCL	88.58
97.5% KM Chebyshev UCL	117.2	99% KM Chebyshev UCL	173.3

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.746	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.817	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.278	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.193	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.447	k star (bias corrected MLE)	0.417
Theta hat (MLE)	54.68	Theta star (bias corrected MLE)	58.51
nu hat (MLE)	20.55	nu star (bias corrected)	19.2

Mean (detects)	24.42		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	22.47
Maximum	383	Median	3.89
SD	75.66	CV	3.367
k hat (MLE)	0.358	k star (bias corrected MLE)	0.342
Theta hat (MLE)	62.79	Theta star (bias corrected MLE)	65.78
nu hat (MLE)	17.89	nu star (bias corrected)	17.08
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (17.08, α)	8.728	Adjusted Chi Square Value (17.08, β)	8.322
95% Gamma Approximate UCL (use when n>=50)	43.97	95% Gamma Adjusted UCL (use when n<50)	46.11
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	22.51	SD (KM)	74.12
Variance (KM)	5494	SE of Mean (KM)	15.16
k hat (KM)	0.0922	k star (KM)	0.108
nu hat (KM)	4.611	nu star (KM)	5.391
theta hat (KM)	244.1	theta star (KM)	208.8
80% gamma percentile (KM)	17.33	90% gamma percentile (KM)	61.66
95% gamma percentile (KM)	129.9	99% gamma percentile (KM)	344.2
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (5.39, α)	1.337	Adjusted Chi Square Value (5.39, β)	1.206
95% Gamma Approximate KM-UCL (use when n>=50)	90.76	95% Gamma Adjusted KM-UCL (use when n<50)	100.6
95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	22.49	Mean in Log Scale	1.494
SD in Original Scale	75.66	SD in Log Scale	1.589
95% t UCL (assumes normality of ROS data)	48.38	95% Percentile Bootstrap UCL	52.45
95% BCA Bootstrap UCL	68.78	95% Bootstrap t UCL	222.3
95% H-UCL (Log ROS)	46.37		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	1.553	KM Geo Mean	4.724
KM SD (logged)	1.455	95% Critical H Value (KM-Log)	3.127

KM Standard Error of Mean (logged)	0.298	95% H-UCL (KM -Log)	34.47
KM SD (logged)	1.455	95% Critical H Value (KM-Log)	3.127
KM Standard Error of Mean (logged)	0.298		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	22.49	Mean in Log Scale	1.497
SD in Original Scale	75.66	SD in Log Scale	1.582
95% t UCL (Assumes normality)	48.38	95% H-Stat UCL	45.58
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	34.47		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:39:21 AM
From File	MacLellan Region, Soil - Surface, Selenium (Se), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Selenium (Se), mg/kg

General Statistics

Total Number of Observations	25	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	24
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Soil - Surface, Selenium (Se), mg/kg was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:40:00 AM		
From File	MacLellan Region, Soil - Surface, Silver (Ag), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Surface, Silver (Ag), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	24
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Soil - Surface, Silver (Ag), mg/kg was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:40:39 AM		
From File	MacLellan Region, Soil - Surface, Strontium (Sr), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Surface, Strontium (Sr), mg/kg			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	1.12	Mean	11.4
Maximum	40.8	Median	9.65
SD	10.29	Std. Error of Mean	2.058
Coefficient of Variation	0.903	Skewness	1.118
Normal GOF Test			
Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	14.92	95% Adjusted-CLT UCL (Chen-1995)	15.27
		95% Modified-t UCL (Johnson-1978)	14.99
Gamma GOF Test			
A-D Test Statistic	0.773	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.771	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.167	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.179	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.081	k star (bias corrected MLE)	0.978
Theta hat (MLE)	10.55	Theta star (bias corrected MLE)	11.66
nu hat (MLE)	54.03	nu star (bias corrected)	48.88
MLE Mean (bias corrected)	11.4	MLE Sd (bias corrected)	11.53
		Approximate Chi Square Value (0.05)	33.83
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	32.98
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	16.47	95% Adjusted Gamma UCL (use when n<50)	16.89

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.113	Mean of logged Data	1.904
Maximum of Logged Data	3.709	SD of logged Data	1.172
Assuming Lognormal Distribution			
95% H-UCL	25.56	90% Chebyshev (MVUE) UCL	23.29
95% Chebyshev (MVUE) UCL	28.05	97.5% Chebyshev (MVUE) UCL	34.67
99% Chebyshev (MVUE) UCL	47.66		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	14.78	95% Jackknife UCL	14.92
95% Standard Bootstrap UCL	14.77	95% Bootstrap-t UCL	15.47
95% Hall's Bootstrap UCL	15.47	95% Percentile Bootstrap UCL	14.85
95% BCA Bootstrap UCL	15.12		
90% Chebyshev(Mean, Sd) UCL	17.57	95% Chebyshev(Mean, Sd) UCL	20.37
97.5% Chebyshev(Mean, Sd) UCL	24.25	99% Chebyshev(Mean, Sd) UCL	31.87
Suggested UCL to Use			
95% Student's-t UCL	14.92		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:41:19 AM
From File	MacLellan Region, Soil - Surface, Thallium (Tl), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Thallium (Tl), mg/kg

General Statistics

Total Number of Observations	25	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	24
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Soil - Surface, Thallium (Tl), mg/kg was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:44:34 AM		
From File	MacLellan Region, Soil - Surface, Uranium (U), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Surface, Uranium (U), mg/kg

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.032	Mean	0.318
Maximum	0.84	Median	0.294
SD	0.239	Std. Error of Mean	0.0478
Coefficient of Variation	0.751	Skewness	0.485

Normal GOF Test			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.4	95% Adjusted-CLT UCL (Chen-1995)	0.401
		95% Modified-t UCL (Johnson-1978)	0.4

Gamma GOF Test			
A-D Test Statistic	0.652	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.765	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.16	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.359	k star (bias corrected MLE)	1.223
Theta hat (MLE)	0.234	Theta star (bias corrected MLE)	0.26
nu hat (MLE)	67.95	nu star (bias corrected)	61.13
MLE Mean (bias corrected)	0.318	MLE Sd (bias corrected)	0.287
		Approximate Chi Square Value (0.05)	44.15
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	43.16

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.44	95% Adjusted Gamma UCL (use when n<50)	0.45

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.207	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.442	Mean of logged Data	-1.557
Maximum of Logged Data	-0.174	SD of logged Data	1.055
Assuming Lognormal Distribution			
95% H-UCL	0.639	90% Chebyshev (MVUE) UCL	0.615
95% Chebyshev (MVUE) UCL	0.732	97.5% Chebyshev (MVUE) UCL	0.895
99% Chebyshev (MVUE) UCL	1.214		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.396	95% Jackknife UCL	0.4
95% Standard Bootstrap UCL	0.396	95% Bootstrap-t UCL	0.406
95% Hall's Bootstrap UCL	0.404	95% Percentile Bootstrap UCL	0.395
95% BCA Bootstrap UCL	0.395		
90% Chebyshev(Mean, Sd) UCL	0.461	95% Chebyshev(Mean, Sd) UCL	0.526
97.5% Chebyshev(Mean, Sd) UCL	0.616	99% Chebyshev(Mean, Sd) UCL	0.793
Suggested UCL to Use			
95% Student's-t UCL	0.4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:45:13 AM
From File	MacLellan Region, Soil - Surface, Vanadium (V), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Surface, Vanadium (V), mg/kg

General Statistics

Total Number of Observations	25	Number of Distinct Observations	24
Number of Detects	23	Number of Non-Detects	2
Number of Distinct Detects	23	Number of Distinct Non-Detects	1
Minimum Detect	0.54	Minimum Non-Detect	0.5
Maximum Detect	13.6	Maximum Non-Detect	0.5
Variance Detects	11.3	Percent Non-Detects	8%
Mean Detects	4.733	SD Detects	3.362
Median Detects	4.17	CV Detects	0.71
Skewness Detects	0.842	Kurtosis Detects	0.524
Mean of Logged Detects	1.246	SD of Logged Detects	0.89

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.914	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.116	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.18	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.395	KM Standard Error of Mean	0.686
KM SD	3.356	95% KM (BCA) UCL	5.527
95% KM (t) UCL	5.569	95% KM (Percentile Bootstrap) UCL	5.519
95% KM (z) UCL	5.524	95% KM Bootstrap t UCL	5.701
90% KM Chebyshev UCL	6.454	95% KM Chebyshev UCL	7.386
97.5% KM Chebyshev UCL	8.681	99% KM Chebyshev UCL	11.22

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.228	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.757	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0874	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.184	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.767	k star (bias corrected MLE)	1.565
Theta hat (MLE)	2.679	Theta star (bias corrected MLE)	3.024
nu hat (MLE)	81.27	nu star (bias corrected)	72

Mean (detects)	4.733		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	4.359
Maximum	13.6	Median	3.88
SD	3.47	CV	0.796
k hat (MLE)	0.953	k star (bias corrected MLE)	0.866
Theta hat (MLE)	4.572	Theta star (bias corrected MLE)	5.036
nu hat (MLE)	47.66	nu star (bias corrected)	43.28
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (43.28, α)	29.19	Adjusted Chi Square Value (43.28, β)	28.4
95% Gamma Approximate UCL (use when n>=50)	6.461	95% Gamma Adjusted UCL (use when n<50)	6.641
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	4.395	SD (KM)	3.356
Variance (KM)	11.26	SE of Mean (KM)	0.686
k hat (KM)	1.715	k star (KM)	1.536
nu hat (KM)	85.74	nu star (KM)	76.79
theta hat (KM)	2.563	theta star (KM)	2.862
80% gamma percentile (KM)	6.782	90% gamma percentile (KM)	9.106
95% gamma percentile (KM)	11.36	99% gamma percentile (KM)	16.44
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (76.79, α)	57.6	Adjusted Chi Square Value (76.79, β)	56.47
95% Gamma Approximate KM-UCL (use when n>=50)	5.859	95% Gamma Adjusted KM-UCL (use when n<50)	5.976
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	4.391	Mean in Log Scale	1.081
SD in Original Scale	3.43	SD in Log Scale	1.026
95% t UCL (assumes normality of ROS data)	5.565	95% Percentile Bootstrap UCL	5.543
95% BCA Bootstrap UCL	5.573	95% Bootstrap t UCL	5.778
95% H-UCL (Log ROS)	8.471		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	1.091	KM Geo Mean	2.976
KM SD (logged)	0.986	95% Critical H Value (KM-Log)	2.478
KM Standard Error of Mean (logged)	0.202	95% H-UCL (KM -Log)	7.974

KM SD (logged)	0.986	95% Critical H Value (KM-Log)	2.478
KM Standard Error of Mean (logged)	0.202		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.375	Mean in Log Scale	1.035
SD in Original Scale	3.45	SD in Log Scale	1.121
95% t UCL (Assumes normality)	5.555	95% H-Stat UCL	9.684
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	5.569		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:45:53 AM		
From File	MacLellan Region, Soil - Surface, Zinc (Zn), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Surface, Zinc (Zn), mg/kg			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	15
Number of Detects	16	Number of Non-Detects	9
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	11	Minimum Non-Detect	10
Maximum Detect	208	Maximum Non-Detect	10
Variance Detects	2811	Percent Non-Detects	36%
Mean Detects	53.63	SD Detects	53.02
Median Detects	39	CV Detects	0.989
Skewness Detects	1.945	Kurtosis Detects	4.059
Mean of Logged Detects	3.597	SD of Logged Detects	0.896
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.766	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.287	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	37.92	KM Standard Error of Mean	9.522
KM SD	46.1	95% KM (BCA) UCL	54.6
95% KM (t) UCL	54.21	95% KM (Percentile Bootstrap) UCL	53.84
95% KM (z) UCL	53.58	95% KM Bootstrap t UCL	65.96
90% KM Chebyshev UCL	66.49	95% KM Chebyshev UCL	79.43
97.5% KM Chebyshev UCL	97.39	99% KM Chebyshev UCL	132.7
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.495	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.174	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.219	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.443	k star (bias corrected MLE)	1.214
Theta hat (MLE)	37.16	Theta star (bias corrected MLE)	44.17
nu hat (MLE)	46.18	nu star (bias corrected)	38.85

Mean (detects)	53.63		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	34.32
Maximum	208	Median	16
SD	49.47	CV	1.441
k hat (MLE)	0.246	k star (bias corrected MLE)	0.243
Theta hat (MLE)	139.4	Theta star (bias corrected MLE)	141
nu hat (MLE)	12.31	nu star (bias corrected)	12.17
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (12.17, α)	5.338	Adjusted Chi Square Value (12.17, β)	5.031
95% Gamma Approximate UCL (use when n>=50)	78.24	95% Gamma Adjusted UCL (use when n<50)	83.01
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	37.92	SD (KM)	46.1
Variance (KM)	2125	SE of Mean (KM)	9.522
k hat (KM)	0.677	k star (KM)	0.622
nu hat (KM)	33.83	nu star (KM)	31.11
theta hat (KM)	56.04	theta star (KM)	60.95
80% gamma percentile (KM)	62.49	90% gamma percentile (KM)	97.82
95% gamma percentile (KM)	134.7	99% gamma percentile (KM)	223.6
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (31.11, α)	19.36	Adjusted Chi Square Value (31.11, β)	18.73
95% Gamma Approximate KM-UCL (use when n>=50)	60.91	95% Gamma Adjusted KM-UCL (use when n<50)	62.97
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	35.88	Mean in Log Scale	2.77
SD in Original Scale	48.39	SD in Log Scale	1.383
95% t UCL (assumes normality of ROS data)	52.44	95% Percentile Bootstrap UCL	51.99
95% BCA Bootstrap UCL	58.11	95% Bootstrap t UCL	62.31
95% H-UCL (Log ROS)	97.46		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	3.131	KM Geo Mean	22.9
KM SD (logged)	0.932	95% Critical H Value (KM-Log)	2.41
KM Standard Error of Mean (logged)	0.192	95% H-UCL (KM -Log)	55.9

KM SD (logged)	0.932	95% Critical H Value (KM-Log)	2.41
KM Standard Error of Mean (logged)	0.192		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	36.12	Mean in Log Scale	2.882
SD in Original Scale	48.21	SD in Log Scale	1.204
95% t UCL (Assumes normality)	52.62	95% H-Stat UCL	72.73
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	62.97	95% GROS Adjusted Gamma UCL	83.01
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.5
PROUCL OUTPUTS
GARDEN SOIL
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:14:36 AM
From File	MacLellan Region, Soil - Garden, Antimony (Sb), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Antimony (Sb), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	2
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.16	Minimum Non-Detect	0.1
Maximum Detect	0.41	Maximum Non-Detect	0.1
Variance Detects	0.00714	Percent Non-Detects	20%
Mean Detects	0.24	SD Detects	0.0845
Median Detects	0.22	CV Detects	0.352
Skewness Detects	1.397	Kurtosis Detects	1.469
Mean of Logged Detects	-1.474	SD of Logged Detects	0.318

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	Detected Data Not Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.212	KM Standard Error of Mean	0.0305
KM SD	0.0902	95% KM (BCA) UCL	0.258
95% KM (t) UCL	0.268	95% KM (Percentile Bootstrap) UCL	0.257
95% KM (z) UCL	0.262	95% KM Bootstrap t UCL	0.287
90% KM Chebyshev UCL	0.303	95% KM Chebyshev UCL	0.345
97.5% KM Chebyshev UCL	0.402	99% KM Chebyshev UCL	0.515

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.463	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	10.77	k star (bias corrected MLE)	6.812
Theta hat (MLE)	0.0223	Theta star (bias corrected MLE)	0.0352
nu hat (MLE)	172.2	nu star (bias corrected)	109

Mean (detects)	0.24		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0501	Mean	0.205
Maximum	0.41	Median	0.205
SD	0.105	CV	0.509
k hat (MLE)	3.635	k star (bias corrected MLE)	2.611
Theta hat (MLE)	0.0565	Theta star (bias corrected MLE)	0.0787
nu hat (MLE)	72.69	nu star (bias corrected)	52.22
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (52.22, α)	36.62	Adjusted Chi Square Value (52.22, β)	34.36
95% Gamma Approximate UCL (use when n>=50)	0.293	95% Gamma Adjusted UCL (use when n<50)	0.312
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.212	SD (KM)	0.0902
Variance (KM)	0.00814	SE of Mean (KM)	0.0305
k hat (KM)	5.524	k star (KM)	3.934
nu hat (KM)	110.5	nu star (KM)	78.67
theta hat (KM)	0.0384	theta star (KM)	0.0539
80% gamma percentile (KM)	0.293	90% gamma percentile (KM)	0.355
95% gamma percentile (KM)	0.413	99% gamma percentile (KM)	0.536
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (78.67, α)	59.24	Adjusted Chi Square Value (78.67, β)	56.31
95% Gamma Approximate KM-UCL (use when n>=50)	0.282	95% Gamma Adjusted KM-UCL (use when n<50)	0.296
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.213	Mean in Log Scale	-1.63
SD in Original Scale	0.0937	SD in Log Scale	0.433
95% t UCL (assumes normality of ROS data)	0.267	95% Percentile Bootstrap UCL	0.264
95% BCA Bootstrap UCL	0.267	95% Bootstrap t UCL	0.292
95% H-UCL (Log ROS)	0.293		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.64	KM Geo Mean	0.194
KM SD (logged)	0.425	95% Critical H Value (KM-Log)	2.12
KM Standard Error of Mean (logged)	0.144	95% H-UCL (KM -Log)	0.287

KM SD (logged)	0.425	95% Critical H Value (KM-Log)	2.12
KM Standard Error of Mean (logged)	0.144		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.202	Mean in Log Scale	-1.779
SD in Original Scale	0.109	SD in Log Scale	0.7
95% t UCL (Assumes normality)	0.265	95% H-Stat UCL	0.39
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.268		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:15:16 AM		
From File	MacLellan Region, Soil - Garden, Arsenic (As), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Garden, Arsenic (As), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	1.26	Mean	3.143
Maximum	4.85	Median	3.355
SD	1.209	Std. Error of Mean	0.382
Coefficient of Variation	0.385	Skewness	-0.281

Normal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.844	95% Adjusted-CLT UCL (Chen-1995)	3.736
		95% Modified-t UCL (Johnson-1978)	3.838

Gamma GOF Test			
A-D Test Statistic	0.358	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.728	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.174	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.288	k star (bias corrected MLE)	4.468
Theta hat (MLE)	0.5	Theta star (bias corrected MLE)	0.703
nu hat (MLE)	125.8	nu star (bias corrected)	89.36
MLE Mean (bias corrected)	3.143	MLE Sd (bias corrected)	1.487
		Approximate Chi Square Value (0.05)	68.56
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	65.41

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.096	95% Adjusted Gamma UCL (use when n<50)	4.294

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.231	Mean of logged Data	1.064
Maximum of Logged Data	1.579	SD of logged Data	0.45
Assuming Lognormal Distribution			
95% H-UCL	4.426	90% Chebyshev (MVUE) UCL	4.544
95% Chebyshev (MVUE) UCL	5.166	97.5% Chebyshev (MVUE) UCL	6.03
99% Chebyshev (MVUE) UCL	7.726		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	3.772	95% Jackknife UCL	3.844
95% Standard Bootstrap UCL	3.729	95% Bootstrap-t UCL	3.845
95% Hall's Bootstrap UCL	3.703	95% Percentile Bootstrap UCL	3.721
95% BCA Bootstrap UCL	3.704		
90% Chebyshev(Mean, Sd) UCL	4.29	95% Chebyshev(Mean, Sd) UCL	4.81
97.5% Chebyshev(Mean, Sd) UCL	5.531	99% Chebyshev(Mean, Sd) UCL	6.948
Suggested UCL to Use			
95% Student's-t UCL	3.844		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:15:55 AM
From File	MacLellan Region, Soil - Garden, Barium (Ba), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Barium (Ba), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	46.3	Mean	84.53
Maximum	132	Median	80.05
SD	31.3	Std. Error of Mean	9.898
Coefficient of Variation	0.37	Skewness	0.127

Normal GOF Test			
Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	102.7	95% Adjusted-CLT UCL (Chen-1995)	101.2
		95% Modified-t UCL (Johnson-1978)	102.7

Gamma GOF Test			
A-D Test Statistic	0.43	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.195	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	7.644	k star (bias corrected MLE)	5.417
Theta hat (MLE)	11.06	Theta star (bias corrected MLE)	15.6
nu hat (MLE)	152.9	nu star (bias corrected)	108.3
MLE Mean (bias corrected)	84.53	MLE Sd (bias corrected)	36.32
		Approximate Chi Square Value (0.05)	85.33
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	81.78

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	107.3	95% Adjusted Gamma UCL (use when n<50)	112

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.835	Mean of logged Data	4.37
Maximum of Logged Data	4.883	SD of logged Data	0.394
Assuming Lognormal Distribution			
95% H-UCL	112.3	90% Chebyshev (MVUE) UCL	116.8
95% Chebyshev (MVUE) UCL	131.3	97.5% Chebyshev (MVUE) UCL	151.4
99% Chebyshev (MVUE) UCL	190.9		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	100.8	95% Jackknife UCL	102.7
95% Standard Bootstrap UCL	99.97	95% Bootstrap-t UCL	102.6
95% Hall's Bootstrap UCL	100.4	95% Percentile Bootstrap UCL	99.82
95% BCA Bootstrap UCL	99.37		
90% Chebyshev(Mean, Sd) UCL	114.2	95% Chebyshev(Mean, Sd) UCL	127.7
97.5% Chebyshev(Mean, Sd) UCL	146.3	99% Chebyshev(Mean, Sd) UCL	183
Suggested UCL to Use			
95% Student's-t UCL	102.7		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:16:34 AM
From File	MacLellan Region, Soil - Garden, Beryllium (Be), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Beryllium (Be), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.13	Mean	0.203
Maximum	0.4	Median	0.155
SD	0.105	Std. Error of Mean	0.0332
Coefficient of Variation	0.517	Skewness	1.504

Normal GOF Test		
Shapiro Wilk Test Statistic	0.708	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.287	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.264	95% Adjusted-CLT UCL (Chen-1995)	0.274
		95% Modified-t UCL (Johnson-1978)	0.266

Gamma GOF Test		
A-D Test Statistic	1.097	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.729	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.251	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level
Detected data follow Appr. Gamma Distribution at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	5.381	k star (bias corrected MLE)	3.834
Theta hat (MLE)	0.0377	Theta star (bias corrected MLE)	0.053
nu hat (MLE)	107.6	nu star (bias corrected)	76.67
MLE Mean (bias corrected)	0.203	MLE Sd (bias corrected)	0.104
		Approximate Chi Square Value (0.05)	57.5
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	54.63

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.271	95% Adjusted Gamma UCL (use when n<50)	0.285

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.228	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.04	Mean of logged Data	-1.69
Maximum of Logged Data	-0.916	SD of logged Data	0.434
Assuming Lognormal Distribution			
95% H-UCL	0.276	90% Chebyshev (MVUE) UCL	0.285
95% Chebyshev (MVUE) UCL	0.322	97.5% Chebyshev (MVUE) UCL	0.375
99% Chebyshev (MVUE) UCL	0.479		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.258	95% Jackknife UCL	0.264
95% Standard Bootstrap UCL	0.254	95% Bootstrap-t UCL	0.39
95% Hall's Bootstrap UCL	0.532	95% Percentile Bootstrap UCL	0.257
95% BCA Bootstrap UCL	0.273		
90% Chebyshev(Mean, Sd) UCL	0.303	95% Chebyshev(Mean, Sd) UCL	0.348
97.5% Chebyshev(Mean, Sd) UCL	0.41	99% Chebyshev(Mean, Sd) UCL	0.533
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.285		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:17:52 AM
From File	MacLellan Region, Soil - Garden, Cadmium (Cd), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Cadmium (Cd), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	0.068	Mean	0.327
Maximum	0.56	Median	0.322
SD	0.156	Std. Error of Mean	0.0493
Coefficient of Variation	0.477	Skewness	-0.329

Normal GOF Test			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.262	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.417	95% Adjusted-CLT UCL (Chen-1995)	0.402
		95% Modified-t UCL (Johnson-1978)	0.416

Gamma GOF Test			
A-D Test Statistic	0.859	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.732	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.342	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.268	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.232	k star (bias corrected MLE)	2.329
Theta hat (MLE)	0.101	Theta star (bias corrected MLE)	0.14
nu hat (MLE)	64.65	nu star (bias corrected)	46.59
MLE Mean (bias corrected)	0.327	MLE Sd (bias corrected)	0.214
		Approximate Chi Square Value (0.05)	31.92
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	29.83

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.477	95% Adjusted Gamma UCL (use when n<50)	0.51

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.789	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.367	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.688	Mean of logged Data	-1.281
Maximum of Logged Data	-0.58	SD of logged Data	0.688
Assuming Lognormal Distribution			
95% H-UCL	0.626	90% Chebyshev (MVUE) UCL	0.572
95% Chebyshev (MVUE) UCL	0.676	97.5% Chebyshev (MVUE) UCL	0.821
99% Chebyshev (MVUE) UCL	1.105		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.408	95% Jackknife UCL	0.417
95% Standard Bootstrap UCL	0.405	95% Bootstrap-t UCL	0.413
95% Hall's Bootstrap UCL	0.41	95% Percentile Bootstrap UCL	0.4
95% BCA Bootstrap UCL	0.401		
90% Chebyshev(Mean, Sd) UCL	0.475	95% Chebyshev(Mean, Sd) UCL	0.542
97.5% Chebyshev(Mean, Sd) UCL	0.635	99% Chebyshev(Mean, Sd) UCL	0.817
Suggested UCL to Use			
95% Student's-t UCL	0.417		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:18:31 AM
From File	MacLellan Region, Soil - Garden, Chromium (Cr), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Chromium (Cr), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	8.1	Mean	12.35
Maximum	17.9	Median	11.75
SD	3.363	Std. Error of Mean	1.063
Coefficient of Variation	0.272	Skewness	0.538

Normal GOF Test			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	14.3	95% Adjusted-CLT UCL (Chen-1995)	14.29
		95% Modified-t UCL (Johnson-1978)	14.33

Gamma GOF Test			
A-D Test Statistic	0.259	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.152	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	15.47	k star (bias corrected MLE)	10.9
Theta hat (MLE)	0.798	Theta star (bias corrected MLE)	1.133
nu hat (MLE)	309.5	nu star (bias corrected)	218
MLE Mean (bias corrected)	12.35	MLE Sd (bias corrected)	3.741
		Approximate Chi Square Value (0.05)	184.8
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	179.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	14.57	95% Adjusted Gamma UCL (use when n<50)	15

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.135	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.092	Mean of logged Data	2.481
Maximum of Logged Data	2.885	SD of logged Data	0.268
Assuming Lognormal Distribution			
95% H-UCL	14.74	90% Chebyshev (MVUE) UCL	15.51
95% Chebyshev (MVUE) UCL	16.94	97.5% Chebyshev (MVUE) UCL	18.92
99% Chebyshev (MVUE) UCL	22.83		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	14.1	95% Jackknife UCL	14.3
95% Standard Bootstrap UCL	14.05	95% Bootstrap-t UCL	14.65
95% Hall's Bootstrap UCL	14.19	95% Percentile Bootstrap UCL	14.07
95% BCA Bootstrap UCL	14.25		
90% Chebyshev(Mean, Sd) UCL	15.54	95% Chebyshev(Mean, Sd) UCL	16.99
97.5% Chebyshev(Mean, Sd) UCL	18.99	99% Chebyshev(Mean, Sd) UCL	22.93
Suggested UCL to Use			
95% Student's-t UCL	14.3		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:19:10 AM
From File	MacLellan Region, Soil - Garden, Cobalt (Co), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Cobalt (Co), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	1.36	Mean	3.315
Maximum	5.8	Median	2.905
SD	1.485	Std. Error of Mean	0.47
Coefficient of Variation	0.448	Skewness	0.651
Normal GOF Test			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.176	95% Adjusted-CLT UCL (Chen-1995)	4.191
		95% Modified-t UCL (Johnson-1978)	4.192
Gamma GOF Test			
A-D Test Statistic	0.22	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.553	k star (bias corrected MLE)	3.954
Theta hat (MLE)	0.597	Theta star (bias corrected MLE)	0.838
nu hat (MLE)	111.1	nu star (bias corrected)	79.08
MLE Mean (bias corrected)	3.315	MLE Sd (bias corrected)	1.667
		Approximate Chi Square Value (0.05)	59.59
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	56.66
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.399	95% Adjusted Gamma UCL (use when n<50)	4.627

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.141	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.307	Mean of logged Data	1.106
Maximum of Logged Data	1.758	SD of logged Data	0.461
Assuming Lognormal Distribution			
95% H-UCL	4.689	90% Chebyshev (MVUE) UCL	4.799
95% Chebyshev (MVUE) UCL	5.468	97.5% Chebyshev (MVUE) UCL	6.396
99% Chebyshev (MVUE) UCL	8.219		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.088	95% Jackknife UCL	4.176
95% Standard Bootstrap UCL	4.042	95% Bootstrap-t UCL	4.401
95% Hall's Bootstrap UCL	4.665	95% Percentile Bootstrap UCL	4.064
95% BCA Bootstrap UCL	4.141		
90% Chebyshev(Mean, Sd) UCL	4.724	95% Chebyshev(Mean, Sd) UCL	5.362
97.5% Chebyshev(Mean, Sd) UCL	6.248	99% Chebyshev(Mean, Sd) UCL	7.989
Suggested UCL to Use			
95% Student's-t UCL	4.176		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:19:49 AM
From File	MacLellan Region, Soil - Garden, Copper (Cu), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Copper (Cu), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	25.7	Mean	94.65
Maximum	221	Median	79.75
SD	64.34	Std. Error of Mean	20.35
Coefficient of Variation	0.68	Skewness	1.381
Normal GOF Test			
Shapiro Wilk Test Statistic	0.802	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	131.9	95% Adjusted-CLT UCL (Chen-1995)	137.6
		95% Modified-t UCL (Johnson-1978)	133.4
Gamma GOF Test			
A-D Test Statistic	0.519	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.733	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.255	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.269	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.85	k star (bias corrected MLE)	2.061
Theta hat (MLE)	33.22	Theta star (bias corrected MLE)	45.92
nu hat (MLE)	56.99	nu star (bias corrected)	41.23
MLE Mean (bias corrected)	94.65	MLE Sd (bias corrected)	65.92
		Approximate Chi Square Value (0.05)	27.51
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	25.58
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	141.8	95% Adjusted Gamma UCL (use when n<50)	152.6

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.217	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.246	Mean of logged Data	4.365
Maximum of Logged Data	5.398	SD of logged Data	0.637
Assuming Lognormal Distribution			
95% H-UCL	161.3	90% Chebyshev (MVUE) UCL	152.5
95% Chebyshev (MVUE) UCL	179	97.5% Chebyshev (MVUE) UCL	215.8
99% Chebyshev (MVUE) UCL	287.9		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	128.1	95% Jackknife UCL	131.9
95% Standard Bootstrap UCL	126.3	95% Bootstrap-t UCL	188
95% Hall's Bootstrap UCL	391	95% Percentile Bootstrap UCL	127.4
95% BCA Bootstrap UCL	135.4		
90% Chebyshev(Mean, Sd) UCL	155.7	95% Chebyshev(Mean, Sd) UCL	183.3
97.5% Chebyshev(Mean, Sd) UCL	221.7	99% Chebyshev(Mean, Sd) UCL	297.1
Suggested UCL to Use			
95% Adjusted Gamma UCL	152.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:20:28 AM		
From File	MacLellan Region, Soil - Garden, Lead (Pb), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Garden, Lead (Pb), mg/kg			
General Statistics			
Total Number of Observations	10	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	3.64	Mean	21.58
Maximum	123	Median	10.6
SD	35.85	Std. Error of Mean	11.34
Coefficient of Variation	1.662	Skewness	3.091
Normal GOF Test			
Shapiro Wilk Test Statistic	0.467	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.462	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	42.36	95% Adjusted-CLT UCL (Chen-1995)	52.06
		95% Modified-t UCL (Johnson-1978)	44.21
Gamma GOF Test			
A-D Test Statistic	1.549	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.376	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.274	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.001	k star (bias corrected MLE)	0.767
Theta hat (MLE)	21.56	Theta star (bias corrected MLE)	28.12
nu hat (MLE)	20.02	nu star (bias corrected)	15.35
MLE Mean (bias corrected)	21.58	MLE Sd (bias corrected)	24.63
		Approximate Chi Square Value (0.05)	7.503
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	6.572
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	44.13	95% Adjusted Gamma UCL (use when n<50)	50.38

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.798	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.284	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.292	Mean of logged Data	2.495
Maximum of Logged Data	4.812	SD of logged Data	0.941
Assuming Lognormal Distribution			
95% H-UCL	48.08	90% Chebyshev (MVUE) UCL	34.43
95% Chebyshev (MVUE) UCL	41.96	97.5% Chebyshev (MVUE) UCL	52.41
99% Chebyshev (MVUE) UCL	72.94		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	40.22	95% Jackknife UCL	42.36
95% Standard Bootstrap UCL	38.86	95% Bootstrap-t UCL	159
95% Hall's Bootstrap UCL	143	95% Percentile Bootstrap UCL	43.56
95% BCA Bootstrap UCL	54.92		
90% Chebyshev(Mean, Sd) UCL	55.59	95% Chebyshev(Mean, Sd) UCL	71
97.5% Chebyshev(Mean, Sd) UCL	92.38	99% Chebyshev(Mean, Sd) UCL	134.4
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	71		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:21:07 AM
From File	MacLellan Region, Soil - Garden, Manganese (Mn), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Manganese (Mn), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	41.1	Mean	258.4
Maximum	498	Median	187
SD	180	Std. Error of Mean	56.91
Coefficient of Variation	0.696	Skewness	0.293

Normal GOF Test			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.25	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	362.7	95% Adjusted-CLT UCL (Chen-1995)	357.6
		95% Modified-t UCL (Johnson-1978)	363.6

Gamma GOF Test			
A-D Test Statistic	0.532	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.255	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.912	k star (bias corrected MLE)	1.405
Theta hat (MLE)	135.1	Theta star (bias corrected MLE)	183.9
nu hat (MLE)	38.24	nu star (bias corrected)	28.1
MLE Mean (bias corrected)	258.4	MLE Sd (bias corrected)	218
		Approximate Chi Square Value (0.05)	17.01
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	15.52

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	426.9	95% Adjusted Gamma UCL (use when n<50)	467.7

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.233	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.716	Mean of logged Data	5.271
Maximum of Logged Data	6.211	SD of logged Data	0.857
Assuming Lognormal Distribution			
95% H-UCL	628	90% Chebyshev (MVUE) UCL	495.1
95% Chebyshev (MVUE) UCL	597.9	97.5% Chebyshev (MVUE) UCL	740.6
99% Chebyshev (MVUE) UCL	1021		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	352	95% Jackknife UCL	362.7
95% Standard Bootstrap UCL	347.8	95% Bootstrap-t UCL	373.6
95% Hall's Bootstrap UCL	333.4	95% Percentile Bootstrap UCL	348.3
95% BCA Bootstrap UCL	355.7		
90% Chebyshev(Mean, Sd) UCL	429.1	95% Chebyshev(Mean, Sd) UCL	506.4
97.5% Chebyshev(Mean, Sd) UCL	613.8	99% Chebyshev(Mean, Sd) UCL	824.6
Suggested UCL to Use			
95% Student's-t UCL	362.7		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:21:46 AM
From File	MacLellan Region, Soil - Garden, Mercury (Hg), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Mercury (Hg), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	4
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.0604	Minimum Non-Detect	0.05
Maximum Detect	0.0807	Maximum Non-Detect	0.05
Variance Detects	5.7352E-5	Percent Non-Detects	40%
Mean Detects	0.0669	SD Detects	0.00757
Median Detects	0.0642	CV Detects	0.113
Skewness Detects	1.5	Kurtosis Detects	2.075
Mean of Logged Detects	-2.71	SD of Logged Detects	0.108

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0601	KM Standard Error of Mean	0.00342
KM SD	0.00986	95% KM (BCA) UCL	0.0656
95% KM (t) UCL	0.0664	95% KM (Percentile Bootstrap) UCL	0.065
95% KM (z) UCL	0.0658	95% KM Bootstrap t UCL	0.0654
90% KM Chebyshev UCL	0.0704	95% KM Chebyshev UCL	0.075
97.5% KM Chebyshev UCL	0.0815	99% KM Chebyshev UCL	0.0941

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.468	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.244	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	100	k star (bias corrected MLE)	50.12
Theta hat (MLE)	6.6891E-4	Theta star (bias corrected MLE)	0.00133
nu hat (MLE)	1200	nu star (bias corrected)	601.4

Mean (detects)	0.0669		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0407	Mean	0.059
Maximum	0.0807	Median	0.0612
SD	0.012	CV	0.204
k hat (MLE)	26.3	k star (bias corrected MLE)	18.48
Theta hat (MLE)	0.00224	Theta star (bias corrected MLE)	0.00319
nu hat (MLE)	526	nu star (bias corrected)	369.5
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (369.51, α)	326	Adjusted Chi Square Value (369.51, β)	318.8
95% Gamma Approximate UCL (use when n>=50)	0.0669	95% Gamma Adjusted UCL (use when n<50)	0.0684
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0601	SD (KM)	0.00986
Variance (KM)	9.7222E-5	SE of Mean (KM)	0.00342
k hat (KM)	37.2	k star (KM)	26.11
nu hat (KM)	744	nu star (KM)	522.2
theta hat (KM)	0.00162	theta star (KM)	0.0023
80% gamma percentile (KM)	0.0698	90% gamma percentile (KM)	0.0756
95% gamma percentile (KM)	0.0807	99% gamma percentile (KM)	0.0909
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (522.15, α)	470.2	Adjusted Chi Square Value (522.15, β)	461.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.0668	95% Gamma Adjusted KM-UCL (use when n<50)	0.068
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0599	Mean in Log Scale	-2.829
SD in Original Scale	0.0109	SD in Log Scale	0.18
95% t UCL (assumes normality of ROS data)	0.0662	95% Percentile Bootstrap UCL	0.065
95% BCA Bootstrap UCL	0.0663	95% Bootstrap t UCL	0.0669
95% H-UCL (Log ROS)	0.0671		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.824	KM Geo Mean	0.0594
KM SD (logged)	0.16	95% Critical H Value (KM-Log)	1.847
KM Standard Error of Mean (logged)	0.0553	95% H-UCL (KM -Log)	0.0663

KM SD (logged)	0.16	95% Critical H Value (KM-Log)	1.847
KM Standard Error of Mean (logged)	0.0553		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0501	Mean in Log Scale	-3.101
SD in Original Scale	0.0224	SD in Log Scale	0.512
95% t UCL (Assumes normality)	0.0631	95% H-Stat UCL	0.0751
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0664		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:22:25 AM		
From File	MacLellan Region, Soil - Garden, Molybdenum (Mo), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Garden, Molybdenum (Mo), mg/kg			
General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	0.319	Mean	0.475
Maximum	0.753	Median	0.461
SD	0.137	Std. Error of Mean	0.0433
Coefficient of Variation	0.289	Skewness	0.773
Normal GOF Test			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.554	95% Adjusted-CLT UCL (Chen-1995)	0.557
		95% Modified-t UCL (Johnson-1978)	0.556
Gamma GOF Test			
A-D Test Statistic	0.286	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.156	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	14.04	k star (bias corrected MLE)	9.894
Theta hat (MLE)	0.0338	Theta star (bias corrected MLE)	0.048
nu hat (MLE)	280.8	nu star (bias corrected)	197.9
MLE Mean (bias corrected)	0.475	MLE Sd (bias corrected)	0.151
		Approximate Chi Square Value (0.05)	166.3
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	161.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.565	95% Adjusted Gamma UCL (use when n<50)	0.582

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.143	Mean of logged Data	-0.781
Maximum of Logged Data	-0.284	SD of logged Data	0.281
Assuming Lognormal Distribution			
95% H-UCL	0.572	90% Chebyshev (MVUE) UCL	0.602
95% Chebyshev (MVUE) UCL	0.659	97.5% Chebyshev (MVUE) UCL	0.739
99% Chebyshev (MVUE) UCL	0.897		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.546	95% Jackknife UCL	0.554
95% Standard Bootstrap UCL	0.542	95% Bootstrap-t UCL	0.566
95% Hall's Bootstrap UCL	0.566	95% Percentile Bootstrap UCL	0.543
95% BCA Bootstrap UCL	0.552		
90% Chebyshev(Mean, Sd) UCL	0.605	95% Chebyshev(Mean, Sd) UCL	0.664
97.5% Chebyshev(Mean, Sd) UCL	0.745	99% Chebyshev(Mean, Sd) UCL	0.906
Suggested UCL to Use			
95% Student's-t UCL	0.554		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:23:04 AM		
From File	MacLellan Region, Soil - Garden, Nickel (Ni), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Garden, Nickel (Ni), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	7.29	Mean	19.3
Maximum	35.1	Median	20.15
SD	9.941	Std. Error of Mean	3.144
Coefficient of Variation	0.515	Skewness	0.528

Normal GOF Test			
Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	25.06	95% Adjusted-CLT UCL (Chen-1995)	25.03
		95% Modified-t UCL (Johnson-1978)	25.15

Gamma GOF Test			
A-D Test Statistic	0.354	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.179	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.268	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.005	k star (bias corrected MLE)	2.87
Theta hat (MLE)	4.819	Theta star (bias corrected MLE)	6.724
nu hat (MLE)	80.09	nu star (bias corrected)	57.4
MLE Mean (bias corrected)	19.3	MLE Sd (bias corrected)	11.39
		Approximate Chi Square Value (0.05)	40.98
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	38.58

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	27.03	95% Adjusted Gamma UCL (use when n<50)	28.71

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.987	Mean of logged Data	2.83
Maximum of Logged Data	3.558	SD of logged Data	0.553
Assuming Lognormal Distribution			
95% H-UCL	30.17	90% Chebyshev (MVUE) UCL	29.83
95% Chebyshev (MVUE) UCL	34.54	97.5% Chebyshev (MVUE) UCL	41.09
99% Chebyshev (MVUE) UCL	53.94		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	24.47	95% Jackknife UCL	25.06
95% Standard Bootstrap UCL	24.17	95% Bootstrap-t UCL	26.02
95% Hall's Bootstrap UCL	26.87	95% Percentile Bootstrap UCL	24.53
95% BCA Bootstrap UCL	24.45		
90% Chebyshev(Mean, Sd) UCL	28.73	95% Chebyshev(Mean, Sd) UCL	33
97.5% Chebyshev(Mean, Sd) UCL	38.93	99% Chebyshev(Mean, Sd) UCL	50.58
Suggested UCL to Use			
95% Student's-t UCL	25.06		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:23:43 AM		
From File	MacLellan Region, Soil - Garden, Selenium (Se), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Garden, Selenium (Se), mg/kg			
General Statistics			
Total Number of Observations	10	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	6
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.54	Minimum Non-Detect	0.5
Maximum Detect	0.64	Maximum Non-Detect	0.5
Variance Detects	0.00189	Percent Non-Detects	60%
Mean Detects	0.578	SD Detects	0.0435
Median Detects	0.565	CV Detects	0.0753
Skewness Detects	1.504	Kurtosis Detects	2.646
Mean of Logged Detects	-0.551	SD of Logged Detects	0.0734
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.318	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.531	KM Standard Error of Mean	0.0164
KM SD	0.0448	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.561	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.558	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.58	95% KM Chebyshev UCL	0.602
97.5% KM Chebyshev UCL	0.633	99% KM Chebyshev UCL	0.694
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.417	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.322	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	243.4	k star (bias corrected MLE)	61.01
Theta hat (MLE)	0.00237	Theta star (bias corrected MLE)	0.00947
nu hat (MLE)	1947	nu star (bias corrected)	488.1

Mean (detects)	0.578		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.355	Mean	0.489
Maximum	0.64	Median	0.48
SD	0.0886	CV	0.181
k hat (MLE)	33.54	k star (bias corrected MLE)	23.55
Theta hat (MLE)	0.0146	Theta star (bias corrected MLE)	0.0208
nu hat (MLE)	670.9	nu star (bias corrected)	470.9
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (470.95, α)	421.6	Adjusted Chi Square Value (470.95, β)	413.5
95% Gamma Approximate UCL (use when n>=50)	0.546	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.531	SD (KM)	0.0448
Variance (KM)	0.00201	SE of Mean (KM)	0.0164
k hat (KM)	140.3	k star (KM)	98.31
nu hat (KM)	2807	nu star (KM)	1966
theta hat (KM)	0.00378	theta star (KM)	0.0054
80% gamma percentile (KM)	0.575	90% gamma percentile (KM)	0.601
95% gamma percentile (KM)	0.622	99% gamma percentile (KM)	0.663
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	1864	Adjusted Chi Square Value (N/A, β)	1847
95% Gamma Approximate KM-UCL (use when n>=50)	0.56	95% Gamma Adjusted KM-UCL (use when n<50)	0.565
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.499	Mean in Log Scale	-0.707
SD in Original Scale	0.0782	SD in Log Scale	0.156
95% t UCL (assumes normality of ROS data)	0.544	95% Percentile Bootstrap UCL	0.538
95% BCA Bootstrap UCL	0.54	95% Bootstrap t UCL	0.546
95% H-UCL (Log ROS)	0.549		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.636	KM Geo Mean	0.529
KM SD (logged)	0.0804	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0293	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0804	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0293		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.381	Mean in Log Scale	-1.052
SD in Original Scale	0.171	SD in Log Scale	0.433
95% t UCL (Assumes normality)	0.48	95% H-Stat UCL	0.522
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.561		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:24:22 AM		
From File	MacLellan Region, Soil - Garden, Silver (Ag), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Soil - Garden, Silver (Ag), mg/kg			
General Statistics			
Total Number of Observations	10	Number of Distinct Observations	7
Number of Detects	8	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.12	Minimum Non-Detect	0.1
Maximum Detect	0.32	Maximum Non-Detect	0.1
Variance Detects	0.00608	Percent Non-Detects	20%
Mean Detects	0.198	SD Detects	0.078
Median Detects	0.19	CV Detects	0.395
Skewness Detects	0.547	Kurtosis Detects	-1.246
Mean of Logged Detects	-1.69	SD of Logged Detects	0.393
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.178	KM Standard Error of Mean	0.0257
KM SD	0.076	95% KM (BCA) UCL	0.216
95% KM (t) UCL	0.225	95% KM (Percentile Bootstrap) UCL	0.22
95% KM (z) UCL	0.22	95% KM Bootstrap t UCL	0.237
90% KM Chebyshev UCL	0.255	95% KM Chebyshev UCL	0.29
97.5% KM Chebyshev UCL	0.338	99% KM Chebyshev UCL	0.434
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.436	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.203	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	7.533	k star (bias corrected MLE)	4.791
Theta hat (MLE)	0.0262	Theta star (bias corrected MLE)	0.0412
nu hat (MLE)	120.5	nu star (bias corrected)	76.66

Mean (detects)	0.198		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.025	Mean	0.166
Maximum	0.32	Median	0.145
SD	0.0959	CV	0.578
k hat (MLE)	2.47	k star (bias corrected MLE)	1.796
Theta hat (MLE)	0.0672	Theta star (bias corrected MLE)	0.0924
nu hat (MLE)	49.4	nu star (bias corrected)	35.91
Adjusted Level of Significance (β)	0.0267		
Approximate Chi Square Value (35.91, α)	23.2	Adjusted Chi Square Value (35.91, β)	21.44
95% Gamma Approximate UCL (use when n>=50)	0.257	95% Gamma Adjusted UCL (use when n<50)	0.278
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.178	SD (KM)	0.076
Variance (KM)	0.00578	SE of Mean (KM)	0.0257
k hat (KM)	5.485	k star (KM)	3.906
nu hat (KM)	109.7	nu star (KM)	78.13
theta hat (KM)	0.0324	theta star (KM)	0.0456
80% gamma percentile (KM)	0.246	90% gamma percentile (KM)	0.299
95% gamma percentile (KM)	0.347	99% gamma percentile (KM)	0.451
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (78.13, α)	58.77	Adjusted Chi Square Value (78.13, β)	55.86
95% Gamma Approximate KM-UCL (use when n>=50)	0.237	95% Gamma Adjusted KM-UCL (use when n<50)	0.249
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.172	Mean in Log Scale	-1.882
SD in Original Scale	0.0871	SD in Log Scale	0.537
95% t UCL (assumes normality of ROS data)	0.223	95% Percentile Bootstrap UCL	0.213
95% BCA Bootstrap UCL	0.218	95% Bootstrap t UCL	0.237
95% H-UCL (Log ROS)	0.264		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.812	KM Geo Mean	0.163
KM SD (logged)	0.41	95% Critical H Value (KM-Log)	2.102
KM Standard Error of Mean (logged)	0.139	95% H-UCL (KM -Log)	0.237

KM SD (logged)	0.41	95% Critical H Value (KM-Log)	2.102
KM Standard Error of Mean (logged)	0.139		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.168	Mean in Log Scale	-1.951
SD in Original Scale	0.0927	SD in Log Scale	0.651
95% t UCL (Assumes normality)	0.222	95% H-Stat UCL	0.299
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.225		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:25:01 AM
From File	MacLellan Region, Soil - Garden, Strontium (Sr), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Strontium (Sr), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	16.3	Mean	34.76
Maximum	63.4	Median	33.95
SD	13.11	Std. Error of Mean	4.145
Coefficient of Variation	0.377	Skewness	0.867

Normal GOF Test			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	42.36	95% Adjusted-CLT UCL (Chen-1995)	42.79
		95% Modified-t UCL (Johnson-1978)	42.55

Gamma GOF Test			
A-D Test Statistic	0.298	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.16	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	7.873	k star (bias corrected MLE)	5.578
Theta hat (MLE)	4.415	Theta star (bias corrected MLE)	6.232
nu hat (MLE)	157.5	nu star (bias corrected)	111.6
MLE Mean (bias corrected)	34.76	MLE Sd (bias corrected)	14.72
		Approximate Chi Square Value (0.05)	88.18
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	84.57

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	43.98	95% Adjusted Gamma UCL (use when n<50)	45.85

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.791	Mean of logged Data	3.484
Maximum of Logged Data	4.149	SD of logged Data	0.387
Assuming Lognormal Distribution			
95% H-UCL	45.85	90% Chebyshev (MVUE) UCL	47.75
95% Chebyshev (MVUE) UCL	53.6	97.5% Chebyshev (MVUE) UCL	61.72
99% Chebyshev (MVUE) UCL	77.67		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	41.58	95% Jackknife UCL	42.36
95% Standard Bootstrap UCL	41.12	95% Bootstrap-t UCL	43.74
95% Hall's Bootstrap UCL	47.59	95% Percentile Bootstrap UCL	41.65
95% BCA Bootstrap UCL	42.89		
90% Chebyshev(Mean, Sd) UCL	47.19	95% Chebyshev(Mean, Sd) UCL	52.83
97.5% Chebyshev(Mean, Sd) UCL	60.64	99% Chebyshev(Mean, Sd) UCL	76
Suggested UCL to Use			
95% Student's-t UCL	42.36		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:25:40 AM
From File	MacLellan Region, Soil - Garden, Thallium (Tl), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Thallium (Tl), mg/kg

General Statistics

Total Number of Observations	10	Number of Distinct Observations	2
Number of Detects	2	Number of Non-Detects	8
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Soil - Garden, Thallium (Tl), mg/kg was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:26:58 AM
From File	MacLellan Region, Soil - Garden, Uranium (U), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Soil - Garden, Uranium (U), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	0.585	Mean	1.246
Maximum	2.1	Median	1.22
SD	0.503	Std. Error of Mean	0.159
Coefficient of Variation	0.403	Skewness	0.493

Normal GOF Test			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.538	95% Adjusted-CLT UCL (Chen-1995)	1.534
		95% Modified-t UCL (Johnson-1978)	1.542

Gamma GOF Test			
A-D Test Statistic	0.224	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.728	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.14	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.756	k star (bias corrected MLE)	4.796
Theta hat (MLE)	0.184	Theta star (bias corrected MLE)	0.26
nu hat (MLE)	135.1	nu star (bias corrected)	95.92
MLE Mean (bias corrected)	1.246	MLE Sd (bias corrected)	0.569
		Approximate Chi Square Value (0.05)	74.33
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	71.03

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.608	95% Adjusted Gamma UCL (use when n<50)	1.683

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.536	Mean of logged Data	0.144
Maximum of Logged Data	0.742	SD of logged Data	0.416
Assuming Lognormal Distribution			
95% H-UCL	1.688	90% Chebyshev (MVUE) UCL	1.748
95% Chebyshev (MVUE) UCL	1.974	97.5% Chebyshev (MVUE) UCL	2.288
99% Chebyshev (MVUE) UCL	2.905		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.508	95% Jackknife UCL	1.538
95% Standard Bootstrap UCL	1.497	95% Bootstrap-t UCL	1.572
95% Hall's Bootstrap UCL	1.606	95% Percentile Bootstrap UCL	1.51
95% BCA Bootstrap UCL	1.499		
90% Chebyshev(Mean, Sd) UCL	1.723	95% Chebyshev(Mean, Sd) UCL	1.939
97.5% Chebyshev(Mean, Sd) UCL	2.239	99% Chebyshev(Mean, Sd) UCL	2.828
Suggested UCL to Use			
95% Student's-t UCL	1.538		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:27:37 AM		
From File	MacLellan Region, Soil - Garden, Vanadium (V), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Garden, Vanadium (V), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	8.69	Mean	13.94
Maximum	26.1	Median	10.85
SD	6.482	Std. Error of Mean	2.05
Coefficient of Variation	0.465	Skewness	1.433

Normal GOF Test			
Shapiro Wilk Test Statistic	0.743	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	17.69	95% Adjusted-CLT UCL (Chen-1995)	18.3
		95% Modified-t UCL (Johnson-1978)	17.85

Gamma GOF Test			
A-D Test Statistic	0.972	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.728	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.271	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.445	k star (bias corrected MLE)	4.579
Theta hat (MLE)	2.162	Theta star (bias corrected MLE)	3.044
nu hat (MLE)	128.9	nu star (bias corrected)	91.57
MLE Mean (bias corrected)	13.94	MLE Sd (bias corrected)	6.513
		Approximate Chi Square Value (0.05)	70.5
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	67.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	18.1	95% Adjusted Gamma UCL (use when n<50)	18.96

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.82	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.162	Mean of logged Data	2.555
Maximum of Logged Data	3.262	SD of logged Data	0.399
Assuming Lognormal Distribution			
95% H-UCL	18.4	90% Chebyshev (MVUE) UCL	19.11
95% Chebyshev (MVUE) UCL	21.51	97.5% Chebyshev (MVUE) UCL	24.84
99% Chebyshev (MVUE) UCL	31.38		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	17.31	95% Jackknife UCL	17.69
95% Standard Bootstrap UCL	17.03	95% Bootstrap-t UCL	23.27
95% Hall's Bootstrap UCL	30.72	95% Percentile Bootstrap UCL	17.11
95% BCA Bootstrap UCL	18.17		
90% Chebyshev(Mean, Sd) UCL	20.09	95% Chebyshev(Mean, Sd) UCL	22.87
97.5% Chebyshev(Mean, Sd) UCL	26.74	99% Chebyshev(Mean, Sd) UCL	34.33
Suggested UCL to Use			
95% Student's-t UCL	17.69	or 95% Modified-t UCL	17.85
or 95% H-UCL	18.4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:28:16 AM		
From File	MacLellan Region, Soil - Garden, Zinc (Zn), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Soil - Garden, Zinc (Zn), mg/kg

General Statistics			
Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	22	Mean	98.3
Maximum	159	Median	105.5
SD	44.22	Std. Error of Mean	13.98
Coefficient of Variation	0.45	Skewness	-0.613

Normal GOF Test			
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	123.9	95% Adjusted-CLT UCL (Chen-1995)	118.4
		95% Modified-t UCL (Johnson-1978)	123.5

Gamma GOF Test			
A-D Test Statistic	0.709	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.268	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.578	k star (bias corrected MLE)	2.571
Theta hat (MLE)	27.47	Theta star (bias corrected MLE)	38.23
nu hat (MLE)	71.56	nu star (bias corrected)	51.42
MLE Mean (bias corrected)	98.3	MLE Sd (bias corrected)	61.3
		Approximate Chi Square Value (0.05)	35.95
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	33.72

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	140.6	95% Adjusted Gamma UCL (use when n<50)	149.9

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.808	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.091	Mean of logged Data	4.442
Maximum of Logged Data	5.069	SD of logged Data	0.65
Assuming Lognormal Distribution			
95% H-UCL	178.3	90% Chebyshev (MVUE) UCL	167.3
95% Chebyshev (MVUE) UCL	196.7	97.5% Chebyshev (MVUE) UCL	237.5
99% Chebyshev (MVUE) UCL	317.6		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	121.3	95% Jackknife UCL	123.9
95% Standard Bootstrap UCL	120.6	95% Bootstrap-t UCL	120.6
95% Hall's Bootstrap UCL	120.4	95% Percentile Bootstrap UCL	119.6
95% BCA Bootstrap UCL	118.1		
90% Chebyshev(Mean, Sd) UCL	140.2	95% Chebyshev(Mean, Sd) UCL	159.2
97.5% Chebyshev(Mean, Sd) UCL	185.6	99% Chebyshev(Mean, Sd) UCL	237.4
Suggested UCL to Use			
95% Student's-t UCL	123.9		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

APPENDIX C.6
PROUCL OUTPUTS
BERRIES TISSUE
GORDON REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:29:04 AM
From File	Gordon Region, Tissue - Berries, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Berries, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	34	Number of Distinct Observations	31
Number of Detects	1	Number of Non-Detects	33
Number of Distinct Detects	1	Number of Distinct Non-Detects	30

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Berries, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:29:43 AM
From File	Gordon Region, Tissue - Berries, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Berries, Barium (Ba), mg/kg ww

General Statistics

Total Number of Observations	34	Number of Distinct Observations	34
Number of Detects	30	Number of Non-Detects	4
Number of Distinct Detects	30	Number of Distinct Non-Detects	4
Minimum Detect	0.0413	Minimum Non-Detect	0.0304
Maximum Detect	13.62	Maximum Non-Detect	0.0472
Variance Detects	5.815	Percent Non-Detects	11.76%
Mean Detects	2.145	SD Detects	2.411
Median Detects	1.732	CV Detects	1.124
Skewness Detects	3.891	Kurtosis Detects	18.57
Mean of Logged Detects	0.241	SD of Logged Detects	1.271

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.602	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.896	KM Standard Error of Mean	0.406
KM SD	2.329	95% KM (BCA) UCL	2.595
95% KM (t) UCL	2.583	95% KM (Percentile Bootstrap) UCL	2.619
95% KM (z) UCL	2.564	95% KM Bootstrap t UCL	3.199
90% KM Chebyshev UCL	3.115	95% KM Chebyshev UCL	3.667
97.5% KM Chebyshev UCL	4.433	99% KM Chebyshev UCL	5.938

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.073	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.773	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.152	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.164	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.095	k star (bias corrected MLE)	1.008
Theta hat (MLE)	1.959	Theta star (bias corrected MLE)	2.128
nu hat (MLE)	65.7	nu star (bias corrected)	60.46

Mean (detects)	2.145		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.893
Maximum	13.62	Median	1.591
SD	2.366	CV	1.25
k hat (MLE)	0.634	k star (bias corrected MLE)	0.597
Theta hat (MLE)	2.988	Theta star (bias corrected MLE)	3.17
nu hat (MLE)	43.09	nu star (bias corrected)	40.62
Adjusted Level of Significance (β)	0.0422		
Approximate Chi Square Value (40.62, α)	27.02	Adjusted Chi Square Value (40.62, β)	26.47
95% Gamma Approximate UCL (use when n>=50)	2.847	95% Gamma Adjusted UCL (use when n<50)	2.906
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.896	SD (KM)	2.329
Variance (KM)	5.423	SE of Mean (KM)	0.406
k hat (KM)	0.663	k star (KM)	0.624
nu hat (KM)	45.08	nu star (KM)	42.44
theta hat (KM)	2.86	theta star (KM)	3.038
80% gamma percentile (KM)	3.124	90% gamma percentile (KM)	4.888
95% gamma percentile (KM)	6.727	99% gamma percentile (KM)	11.16
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (42.44, α)	28.5	Adjusted Chi Square Value (42.44, β)	27.94
95% Gamma Approximate KM-UCL (use when n>=50)	2.823	95% Gamma Adjusted KM-UCL (use when n<50)	2.88
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.836	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.905	Mean in Log Scale	-0.0507
SD in Original Scale	2.357	SD in Log Scale	1.442
95% t UCL (assumes normality of ROS data)	2.589	95% Percentile Bootstrap UCL	2.623
95% BCA Bootstrap UCL	2.995	95% Bootstrap t UCL	3.171
95% H-UCL (Log ROS)	5.763		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.192	KM Geo Mean	0.825
KM SD (logged)	1.669	95% Critical H Value (KM-Log)	3.366
KM Standard Error of Mean (logged)	0.291	95% H-UCL (KM -Log)	8.842

KM SD (logged)	1.669	95% Critical H Value (KM-Log)	3.366
KM Standard Error of Mean (logged)	0.291		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.894	Mean in Log Scale	-0.255
SD in Original Scale	2.365	SD in Log Scale	1.824
95% t UCL (Assumes normality)	2.581	95% H-Stat UCL	12.81
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	2.88	95% GROS Adjusted Gamma UCL	2.906
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:31:01 AM
From File	Gordon Region, Tissue - Berries, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Berries, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	34	Number of Distinct Observations	32
Number of Detects	21	Number of Non-Detects	13
Number of Distinct Detects	21	Number of Distinct Non-Detects	12
Minimum Detect	0.00235	Minimum Non-Detect	0.0024
Maximum Detect	0.0851	Maximum Non-Detect	0.0036
Variance Detects	5.3026E-4	Percent Non-Detects	38.24%
Mean Detects	0.0307	SD Detects	0.023
Median Detects	0.029	CV Detects	0.75
Skewness Detects	0.434	Kurtosis Detects	-0.141
Mean of Logged Detects	-3.994	SD of Logged Detects	1.255

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0199	KM Standard Error of Mean	0.00393
KM SD	0.0223	95% KM (BCA) UCL	0.0265
95% KM (t) UCL	0.0266	95% KM (Percentile Bootstrap) UCL	0.0264
95% KM (z) UCL	0.0264	95% KM Bootstrap t UCL	0.0276
90% KM Chebyshev UCL	0.0317	95% KM Chebyshev UCL	0.037
97.5% KM Chebyshev UCL	0.0444	99% KM Chebyshev UCL	0.059

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.345	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.767	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.194	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.117	k star (bias corrected MLE)	0.989
Theta hat (MLE)	0.0275	Theta star (bias corrected MLE)	0.031
nu hat (MLE)	46.93	nu star (bias corrected)	41.56

Mean (detects)	0.0307		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00235	Mean	0.0228
Maximum	0.0851	Median	0.01
SD	0.0206	CV	0.906
k hat (MLE)	1.262	k star (bias corrected MLE)	1.171
Theta hat (MLE)	0.018	Theta star (bias corrected MLE)	0.0195
nu hat (MLE)	85.85	nu star (bias corrected)	79.61
Adjusted Level of Significance (β)	0.0422		
Approximate Chi Square Value (79.61, α)	60.05	Adjusted Chi Square Value (79.61, β)	59.21
95% Gamma Approximate UCL (use when n>=50)	0.0302	95% Gamma Adjusted UCL (use when n<50)	0.0306
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0199	SD (KM)	0.0223
Variance (KM)	4.9910E-4	SE of Mean (KM)	0.00393
k hat (KM)	0.795	k star (KM)	0.744
nu hat (KM)	54.06	nu star (KM)	50.63
theta hat (KM)	0.0251	theta star (KM)	0.0268
80% gamma percentile (KM)	0.0327	90% gamma percentile (KM)	0.0493
95% gamma percentile (KM)	0.0663	99% gamma percentile (KM)	0.107
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (50.63, α)	35.29	Adjusted Chi Square Value (50.63, β)	34.65
95% Gamma Approximate KM-UCL (use when n>=50)	0.0286	95% Gamma Adjusted KM-UCL (use when n<50)	0.0291
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.802	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.02	Mean in Log Scale	-4.748
SD in Original Scale	0.0226	SD in Log Scale	1.395
95% t UCL (assumes normality of ROS data)	0.0266	95% Percentile Bootstrap UCL	0.0266
95% BCA Bootstrap UCL	0.0271	95% Bootstrap t UCL	0.0272
95% H-UCL (Log ROS)	0.0472		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.755	KM Geo Mean	0.00861
KM SD (logged)	1.366	95% Critical H Value (KM-Log)	2.929
KM Standard Error of Mean (logged)	0.241	95% H-UCL (KM -Log)	0.0439

KM SD (logged)	1.366	95% Critical H Value (KM-Log)	2.929
KM Standard Error of Mean (logged)	0.241		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0195	Mean in Log Scale	-4.943
SD in Original Scale	0.023	SD in Log Scale	1.568
95% t UCL (Assumes normality)	0.0262	95% H-Stat UCL	0.0587
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0266		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:31:41 AM
From File	Gordon Region, Tissue - Berries, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Berries, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	34	Number of Distinct Observations	31
Number of Detects	2	Number of Non-Detects	32
Number of Distinct Detects	2	Number of Distinct Non-Detects	29
Minimum Detect	0.0149	Minimum Non-Detect	0.0088
Maximum Detect	0.0607	Maximum Non-Detect	0.0384
Variance Detects	0.00105	Percent Non-Detects	94.12%
Mean Detects	0.0378	SD Detects	0.0324
Median Detects	0.0378	CV Detects	0.857
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.504	SD of Logged Detects	0.993

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0107	KM Standard Error of Mean	0.00216
KM SD	0.00882	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0143	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0142	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0171	95% KM Chebyshev UCL	0.0201
97.5% KM Chebyshev UCL	0.0241	99% KM Chebyshev UCL	0.0321

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.341	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0161	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	9.363	nu star (bias corrected)	N/A
Mean (detects)	0.0378		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0107	SD (KM)	0.00882

Variance (KM)	7.7729E-5	SE of Mean (KM)	0.00216
k hat (KM)	1.461	k star (KM)	1.351
nu hat (KM)	99.32	nu star (KM)	91.89
theta hat (KM)	0.0073	theta star (KM)	0.00789
80% gamma percentile (KM)	0.0167	90% gamma percentile (KM)	0.0228
95% gamma percentile (KM)	0.0288	99% gamma percentile (KM)	0.0423
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0422
Approximate Chi Square Value (91.89, α)	70.78	Adjusted Chi Square Value (91.89, β)	69.87
95% Gamma Approximate KM-UCL (use when n>=50)	0.0138	95% Gamma Adjusted KM-UCL (use when n<50)	0.014
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00253	Mean in Log Scale	-7.872
SD in Original Scale	0.0106	SD in Log Scale	1.206
95% t UCL (assumes normality of ROS data)	0.0056	95% Percentile Bootstrap UCL	0.00572
95% BCA Bootstrap UCL	0.00828	95% Bootstrap t UCL	0.138
95% H-UCL (Log ROS)	0.00139		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.648	KM Geo Mean	0.00958
KM SD (logged)	0.343	95% Critical H Value (KM-Log)	1.825
KM Standard Error of Mean (logged)	0.0872	95% H-UCL (KM -Log)	0.0113
KM SD (logged)	0.343	95% Critical H Value (KM-Log)	1.825
KM Standard Error of Mean (logged)	0.0872		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00942	Mean in Log Scale	-4.832
SD in Original Scale	0.00949	SD in Log Scale	0.464
95% t UCL (Assumes normality)	0.0122	95% H-Stat UCL	0.0104
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0201		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:32:19 AM		
From File	Gordon Region, Tissue - Berries, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Berries, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	34	Number of Distinct Observations	34
		Number of Missing Observations	0
Minimum	0.0551	Mean	0.576
Maximum	1.417	Median	0.524
SD	0.248	Std. Error of Mean	0.0426
Coefficient of Variation	0.431	Skewness	1.43

Normal GOF Test			
Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.648	95% Adjusted-CLT UCL (Chen-1995)	0.658
		95% Modified-t UCL (Johnson-1978)	0.65

Gamma GOF Test			
A-D Test Statistic	1.297	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.163	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.151	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	5.117	k star (bias corrected MLE)	4.685
Theta hat (MLE)	0.113	Theta star (bias corrected MLE)	0.123
nu hat (MLE)	348	nu star (bias corrected)	318.6
MLE Mean (bias corrected)	0.576	MLE Sd (bias corrected)	0.266
		Approximate Chi Square Value (0.05)	278.3
Adjusted Level of Significance	0.0422	Adjusted Chi Square Value	276.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.66	95% Adjusted Gamma UCL (use when n<50)	0.664

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.793	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.202	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.15	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.899	Mean of logged Data	-0.652
Maximum of Logged Data	0.349	SD of logged Data	0.516
Assuming Lognormal Distribution			
95% H-UCL	0.71	90% Chebyshev (MVUE) UCL	0.758
95% Chebyshev (MVUE) UCL	0.833	97.5% Chebyshev (MVUE) UCL	0.937
99% Chebyshev (MVUE) UCL	1.141		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.646	95% Jackknife UCL	0.648
95% Standard Bootstrap UCL	0.644	95% Bootstrap-t UCL	0.668
95% Hall's Bootstrap UCL	0.676	95% Percentile Bootstrap UCL	0.645
95% BCA Bootstrap UCL	0.661		
90% Chebyshev(Mean, Sd) UCL	0.704	95% Chebyshev(Mean, Sd) UCL	0.762
97.5% Chebyshev(Mean, Sd) UCL	0.842	99% Chebyshev(Mean, Sd) UCL	1
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.762		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:32:58 AM		
From File	Gordon Region, Tissue - Berries, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Berries, Manganese (Mn), mg/kg ww			
General Statistics			
Total Number of Observations	34	Number of Distinct Observations	34
		Number of Missing Observations	0
Minimum	0.87	Mean	33.28
Maximum	247.4	Median	17.5
SD	42.8	Std. Error of Mean	7.339
Coefficient of Variation	1.286	Skewness	3.996
Normal GOF Test			
Shapiro Wilk Test Statistic	0.577	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.236	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	45.7	95% Adjusted-CLT UCL (Chen-1995)	50.73
		95% Modified-t UCL (Johnson-1978)	46.54
Gamma GOF Test			
A-D Test Statistic	0.909	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.772	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.14	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.155	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.172	k star (bias corrected MLE)	1.088
Theta hat (MLE)	28.4	Theta star (bias corrected MLE)	30.58
nu hat (MLE)	79.7	nu star (bias corrected)	74
MLE Mean (bias corrected)	33.28	MLE Sd (bias corrected)	31.91
		Approximate Chi Square Value (0.05)	55.19
Adjusted Level of Significance	0.0422	Adjusted Chi Square Value	54.39
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	44.63	95% Adjusted Gamma UCL (use when n<50)	45.29

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.108	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.15	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.139	Mean of logged Data	3.021
Maximum of Logged Data	5.511	SD of logged Data	1.023
Assuming Lognormal Distribution			
95% H-UCL	53.79	90% Chebyshev (MVUE) UCL	54.56
95% Chebyshev (MVUE) UCL	63.94	97.5% Chebyshev (MVUE) UCL	76.96
99% Chebyshev (MVUE) UCL	102.5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	45.36	95% Jackknife UCL	45.7
95% Standard Bootstrap UCL	45.51	95% Bootstrap-t UCL	58.28
95% Hall's Bootstrap UCL	96.17	95% Percentile Bootstrap UCL	46.52
95% BCA Bootstrap UCL	52.72		
90% Chebyshev(Mean, Sd) UCL	55.3	95% Chebyshev(Mean, Sd) UCL	65.28
97.5% Chebyshev(Mean, Sd) UCL	79.12	99% Chebyshev(Mean, Sd) UCL	106.3
Suggested UCL to Use			
95% Adjusted Gamma UCL	45.29		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:33:38 AM		
From File	Gordon Region, Tissue - Berries, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Berries, Molybdenum (Mo), mg/kg ww			
General Statistics			
Total Number of Observations	34	Number of Distinct Observations	34
Number of Detects	24	Number of Non-Detects	10
Number of Distinct Detects	24	Number of Distinct Non-Detects	10
Minimum Detect	0.00627	Minimum Non-Detect	0.00545
Maximum Detect	0.326	Maximum Non-Detect	0.0082
Variance Detects	0.00652	Percent Non-Detects	29.41%
Mean Detects	0.0597	SD Detects	0.0808
Median Detects	0.02	CV Detects	1.354
Skewness Detects	2.308	Kurtosis Detects	5.304
Mean of Logged Detects	-3.484	SD of Logged Detects	1.131
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.668	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0438	KM Standard Error of Mean	0.0124
KM SD	0.0708	95% KM (BCA) UCL	0.0673
95% KM (t) UCL	0.0648	95% KM (Percentile Bootstrap) UCL	0.0658
95% KM (z) UCL	0.0642	95% KM Bootstrap t UCL	0.0812
90% KM Chebyshev UCL	0.081	95% KM Chebyshev UCL	0.0979
97.5% KM Chebyshev UCL	0.121	99% KM Chebyshev UCL	0.167
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.259	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.777	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.248	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.184	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.882	k star (bias corrected MLE)	0.799
Theta hat (MLE)	0.0677	Theta star (bias corrected MLE)	0.0747
nu hat (MLE)	42.31	nu star (bias corrected)	38.36

Mean (detects)	0.0597		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00627	Mean	0.0451
Maximum	0.326	Median	0.0134
SD	0.0712	CV	1.581
k hat (MLE)	0.828	k star (bias corrected MLE)	0.774
Theta hat (MLE)	0.0544	Theta star (bias corrected MLE)	0.0582
nu hat (MLE)	56.28	nu star (bias corrected)	52.65
Adjusted Level of Significance (β)	0.0422		
Approximate Chi Square Value (52.65, α)	36.98	Adjusted Chi Square Value (52.65, β)	36.33
95% Gamma Approximate UCL (use when n>=50)	0.0641	95% Gamma Adjusted UCL (use when n<50)	0.0653
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0438	SD (KM)	0.0708
Variance (KM)	0.00502	SE of Mean (KM)	0.0124
k hat (KM)	0.382	k star (KM)	0.368
nu hat (KM)	26	nu star (KM)	25.04
theta hat (KM)	0.115	theta star (KM)	0.119
80% gamma percentile (KM)	0.0699	90% gamma percentile (KM)	0.125
95% gamma percentile (KM)	0.187	99% gamma percentile (KM)	0.344
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (25.04, α)	14.64	Adjusted Chi Square Value (25.04, β)	14.25
95% Gamma Approximate KM-UCL (use when n>=50)	0.0749	95% Gamma Adjusted KM-UCL (use when n<50)	0.077
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0429	Mean in Log Scale	-4.224
SD in Original Scale	0.0724	SD in Log Scale	1.504
95% t UCL (assumes normality of ROS data)	0.0639	95% Percentile Bootstrap UCL	0.0635
95% BCA Bootstrap UCL	0.0685	95% Bootstrap t UCL	0.0805
95% H-UCL (Log ROS)	0.103		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.979	KM Geo Mean	0.0187
KM SD (logged)	1.207	95% Critical H Value (KM-Log)	2.711
KM Standard Error of Mean (logged)	0.212	95% H-UCL (KM -Log)	0.0685

KM SD (logged)	1.207	95% Critical H Value (KM-Log)	2.711
KM Standard Error of Mean (logged)	0.212		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0432	Mean in Log Scale	-4.12
SD in Original Scale	0.0722	SD in Log Scale	1.379
95% t UCL (Assumes normality)	0.0641	95% H-Stat UCL	0.0852
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.0685		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:34:17 AM		
From File	Gordon Region, Tissue - Berries, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Berries, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	34	Number of Distinct Observations	32
Number of Detects	24	Number of Non-Detects	10
Number of Distinct Detects	24	Number of Distinct Non-Detects	8
Minimum Detect	0.0752	Minimum Non-Detect	0.0545
Maximum Detect	0.434	Maximum Non-Detect	0.09
Variance Detects	0.0129	Percent Non-Detects	29.41%
Mean Detects	0.171	SD Detects	0.114
Median Detects	0.134	CV Detects	0.664
Skewness Detects	1.577	Kurtosis Detects	1.203
Mean of Logged Detects	-1.926	SD of Logged Detects	0.545
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.732	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.279	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.137	KM Standard Error of Mean	0.0188
KM SD	0.107	95% KM (BCA) UCL	0.172
95% KM (t) UCL	0.169	95% KM (Percentile Bootstrap) UCL	0.168
95% KM (z) UCL	0.168	95% KM Bootstrap t UCL	0.181
90% KM Chebyshev UCL	0.194	95% KM Chebyshev UCL	0.219
97.5% KM Chebyshev UCL	0.255	99% KM Chebyshev UCL	0.325
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.481	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.75	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.179	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.255	k star (bias corrected MLE)	2.876
Theta hat (MLE)	0.0526	Theta star (bias corrected MLE)	0.0596
nu hat (MLE)	156.2	nu star (bias corrected)	138

Mean (detects)	0.171		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.124
Maximum	0.434	Median	0.0994
SD	0.121	CV	0.974
k hat (MLE)	0.935	k star (bias corrected MLE)	0.873
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.142
nu hat (MLE)	63.61	nu star (bias corrected)	59.33
Adjusted Level of Significance (β)	0.0422		
Approximate Chi Square Value (59.33, α)	42.62	Adjusted Chi Square Value (59.33, β)	41.92
95% Gamma Approximate UCL (use when n>=50)	0.173	95% Gamma Adjusted UCL (use when n<50)	0.175
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.137	SD (KM)	0.107
Variance (KM)	0.0115	SE of Mean (KM)	0.0188
k hat (KM)	1.633	k star (KM)	1.508
nu hat (KM)	111	nu star (KM)	102.6
theta hat (KM)	0.0841	theta star (KM)	0.091
80% gamma percentile (KM)	0.212	90% gamma percentile (KM)	0.286
95% gamma percentile (KM)	0.357	99% gamma percentile (KM)	0.518
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (102.56, α)	80.19	Adjusted Chi Square Value (102.56, β)	79.21
95% Gamma Approximate KM-UCL (use when n>=50)	0.176	95% Gamma Adjusted KM-UCL (use when n<50)	0.178
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.134	Mean in Log Scale	-2.284
SD in Original Scale	0.112	SD in Log Scale	0.729
95% t UCL (assumes normality of ROS data)	0.166	95% Percentile Bootstrap UCL	0.166
95% BCA Bootstrap UCL	0.173	95% Bootstrap t UCL	0.177
95% H-UCL (Log ROS)	0.174		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.211	KM Geo Mean	0.11
KM SD (logged)	0.631	95% Critical H Value (KM-Log)	2.051
KM Standard Error of Mean (logged)	0.111	95% H-UCL (KM -Log)	0.168

KM SD (logged)	0.631	95% Critical H Value (KM-Log)	2.051
KM Standard Error of Mean (logged)	0.111		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.13	Mean in Log Scale	-2.381
SD in Original Scale	0.115	SD in Log Scale	0.852
95% t UCL (Assumes normality)	0.164	95% H-Stat UCL	0.186
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.168		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:34:56 AM
From File	Gordon Region, Tissue - Berries, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Berries, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	34	Number of Distinct Observations	34
		Number of Missing Observations	0
Minimum	0.0189	Mean	0.286
Maximum	2.641	Median	0.162
SD	0.487	Std. Error of Mean	0.0835
Coefficient of Variation	1.705	Skewness	4.098

Normal GOF Test			
Shapiro Wilk Test Statistic	0.457	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.427	95% Adjusted-CLT UCL (Chen-1995)	0.486
		95% Modified-t UCL (Johnson-1978)	0.437

Gamma GOF Test			
A-D Test Statistic	2.313	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.775	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.239	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.155	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.03	k star (bias corrected MLE)	0.959
Theta hat (MLE)	0.277	Theta star (bias corrected MLE)	0.298
nu hat (MLE)	70.05	nu star (bias corrected)	65.21
MLE Mean (bias corrected)	0.286	MLE Sd (bias corrected)	0.292
		Approximate Chi Square Value (0.05)	47.63
Adjusted Level of Significance	0.0422	Adjusted Chi Square Value	46.88

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.391	95% Adjusted Gamma UCL (use when n<50)	0.397

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.15	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.971	Mean of logged Data	-1.811
Maximum of Logged Data	0.971	SD of logged Data	0.945
Assuming Lognormal Distribution			
95% H-UCL	0.378	90% Chebyshev (MVUE) UCL	0.39
95% Chebyshev (MVUE) UCL	0.454	97.5% Chebyshev (MVUE) UCL	0.541
99% Chebyshev (MVUE) UCL	0.714		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.423	95% Jackknife UCL	0.427
95% Standard Bootstrap UCL	0.419	95% Bootstrap-t UCL	0.795
95% Hall's Bootstrap UCL	1.044	95% Percentile Bootstrap UCL	0.438
95% BCA Bootstrap UCL	0.51		
90% Chebyshev(Mean, Sd) UCL	0.536	95% Chebyshev(Mean, Sd) UCL	0.65
97.5% Chebyshev(Mean, Sd) UCL	0.807	99% Chebyshev(Mean, Sd) UCL	1.117
Suggested UCL to Use			
95% H-UCL	0.378		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:36:53 AM
From File	Gordon Region, Tissue - Berries, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Berries, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	34	Number of Distinct Observations	34
Number of Detects	33	Number of Non-Detects	1
Number of Distinct Detects	33	Number of Distinct Non-Detects	1
Minimum Detect	0.823	Minimum Non-Detect	0.145
Maximum Detect	6.033	Maximum Non-Detect	0.145
Variance Detects	2.427	Percent Non-Detects	2.941%
Mean Detects	2.237	SD Detects	1.558
Median Detects	1.389	CV Detects	0.696
Skewness Detects	1.194	Kurtosis Detects	0.152
Mean of Logged Detects	0.603	SD of Logged Detects	0.623

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.796	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	2.175	KM Standard Error of Mean	0.27
KM SD	1.552	95% KM (BCA) UCL	2.628
95% KM (t) UCL	2.633	95% KM (Percentile Bootstrap) UCL	2.648
95% KM (z) UCL	2.62	95% KM Bootstrap t UCL	2.699
90% KM Chebyshev UCL	2.986	95% KM Chebyshev UCL	3.354
97.5% KM Chebyshev UCL	3.863	99% KM Chebyshev UCL	4.865

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.709	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.155	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.624	k star (bias corrected MLE)	2.406
Theta hat (MLE)	0.852	Theta star (bias corrected MLE)	0.93
nu hat (MLE)	173.2	nu star (bias corrected)	158.8

Mean (detects)	2.237		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	2.171
Maximum	6.033	Median	1.367
SD	1.581	CV	0.728
k hat (MLE)	1.682	k star (bias corrected MLE)	1.553
Theta hat (MLE)	1.291	Theta star (bias corrected MLE)	1.398
nu hat (MLE)	114.3	nu star (bias corrected)	105.6
Adjusted Level of Significance (β)	0.0422		
Approximate Chi Square Value (105.59, α)	82.88	Adjusted Chi Square Value (105.59, β)	81.88
95% Gamma Approximate UCL (use when n>=50)	2.766	95% Gamma Adjusted UCL (use when n<50)	2.8
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	2.175	SD (KM)	1.552
Variance (KM)	2.409	SE of Mean (KM)	0.27
k hat (KM)	1.964	k star (KM)	1.811
nu hat (KM)	133.6	nu star (KM)	123.1
theta hat (KM)	1.107	theta star (KM)	1.201
80% gamma percentile (KM)	3.295	90% gamma percentile (KM)	4.332
95% gamma percentile (KM)	5.326	99% gamma percentile (KM)	7.546
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (123.12, α)	98.5	Adjusted Chi Square Value (123.12, β)	97.41
95% Gamma Approximate KM-UCL (use when n>=50)	2.719	95% Gamma Adjusted KM-UCL (use when n<50)	2.75
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2.183	Mean in Log Scale	0.557
SD in Original Scale	1.566	SD in Log Scale	0.668
95% t UCL (assumes normality of ROS data)	2.637	95% Percentile Bootstrap UCL	2.622
95% BCA Bootstrap UCL	2.682	95% Bootstrap t UCL	2.71
95% H-UCL (Log ROS)	2.782		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	0.528	KM Geo Mean	1.696
KM SD (logged)	0.741	95% Critical H Value (KM-Log)	2.159
KM Standard Error of Mean (logged)	0.129	95% H-UCL (KM -Log)	2.947

KM SD (logged)	0.741	95% Critical H Value (KM-Log)	2.159
KM Standard Error of Mean (logged)	0.129		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	2.173	Mean in Log Scale	0.508
SD in Original Scale	1.578	SD in Log Scale	0.826
95% t UCL (Assumes normality)	2.631	95% H-Stat UCL	3.23
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	3.354		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.7
PROUCL OUTPUTS
BERRIES TISSUE
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:47:50 AM
From File	MacLellan Region, Tissue - Berries, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
Number of Detects	23	Number of Non-Detects	5
Number of Distinct Detects	23	Number of Distinct Non-Detects	5
Minimum Detect	0.0331	Minimum Non-Detect	0.0268
Maximum Detect	4.18	Maximum Non-Detect	0.0472
Variance Detects	1.111	Percent Non-Detects	17.86%
Mean Detects	2.004	SD Detects	1.054
Median Detects	2.295	CV Detects	0.526
Skewness Detects	-0.152	Kurtosis Detects	-0.405
Mean of Logged Detects	0.346	SD of Logged Detects	1.234

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	1.651	KM Standard Error of Mean	0.232
KM SD	1.203	95% KM (BCA) UCL	2.019
95% KM (t) UCL	2.047	95% KM (Percentile Bootstrap) UCL	2.023
95% KM (z) UCL	2.033	95% KM Bootstrap t UCL	2.054
90% KM Chebyshev UCL	2.348	95% KM Chebyshev UCL	2.664
97.5% KM Chebyshev UCL	3.102	99% KM Chebyshev UCL	3.963

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.765	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.759	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.219	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.185	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.576	k star (bias corrected MLE)	1.4
Theta hat (MLE)	1.271	Theta star (bias corrected MLE)	1.432
nu hat (MLE)	72.51	nu star (bias corrected)	64.38

Mean (detects)	2.004		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0331	Mean	1.755
Maximum	4.18	Median	1.437
SD	1.096	CV	0.624
k hat (MLE)	1.507	k star (bias corrected MLE)	1.369
Theta hat (MLE)	1.165	Theta star (bias corrected MLE)	1.282
nu hat (MLE)	84.4	nu star (bias corrected)	76.69
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (76.69, α)	57.52	Adjusted Chi Square Value (76.69, β)	56.49
95% Gamma Approximate UCL (use when n>=50)	2.341	95% Gamma Adjusted UCL (use when n<50)	2.383
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.651	SD (KM)	1.203
Variance (KM)	1.446	SE of Mean (KM)	0.232
k hat (KM)	1.885	k star (KM)	1.707
nu hat (KM)	105.6	nu star (KM)	95.6
theta hat (KM)	0.876	theta star (KM)	0.967
80% gamma percentile (KM)	2.518	90% gamma percentile (KM)	3.335
95% gamma percentile (KM)	4.121	99% gamma percentile (KM)	5.883
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (95.60, α)	74.05	Adjusted Chi Square Value (95.60, β)	72.88
95% Gamma Approximate KM-UCL (use when n>=50)	2.132	95% Gamma Adjusted KM-UCL (use when n<50)	2.166
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.645	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.679	Mean in Log Scale	-0.0188
SD in Original Scale	1.187	SD in Log Scale	1.371
95% t UCL (assumes normality of ROS data)	2.061	95% Percentile Bootstrap UCL	2.047
95% BCA Bootstrap UCL	2.063	95% Bootstrap t UCL	2.076
95% H-UCL (Log ROS)	5.459		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.357	KM Geo Mean	0.7
KM SD (logged)	1.862	95% Critical H Value (KM-Log)	3.672
KM Standard Error of Mean (logged)	0.36	95% H-UCL (KM -Log)	14.77

KM SD (logged)	1.862	95% Critical H Value (KM-Log)	3.672
KM Standard Error of Mean (logged)	0.36		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.649	Mean in Log Scale	-0.443
SD in Original Scale	1.227	SD in Log Scale	2.053
95% t UCL (Assumes normality)	2.044	95% H-Stat UCL	25.35
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	2.047		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:49:09 AM
From File	MacLellan Region, Tissue - Berries, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
Number of Detects	13	Number of Non-Detects	15
Number of Distinct Detects	13	Number of Distinct Non-Detects	15
Minimum Detect	0.00305	Minimum Non-Detect	0.00216
Maximum Detect	0.0994	Maximum Non-Detect	0.00358
Variance Detects	0.00104	Percent Non-Detects	53.57%
Mean Detects	0.0403	SD Detects	0.0323
Median Detects	0.034	CV Detects	0.801
Skewness Detects	0.487	Kurtosis Detects	-1.001
Mean of Logged Detects	-3.671	SD of Logged Detects	1.146

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0199	KM Standard Error of Mean	0.00559
KM SD	0.0284	95% KM (BCA) UCL	0.0298
95% KM (t) UCL	0.0294	95% KM (Percentile Bootstrap) UCL	0.0292
95% KM (z) UCL	0.0291	95% KM Bootstrap t UCL	0.0312
90% KM Chebyshev UCL	0.0367	95% KM Chebyshev UCL	0.0443
97.5% KM Chebyshev UCL	0.0548	99% KM Chebyshev UCL	0.0756

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.374	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.242	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.226	k star (bias corrected MLE)	0.995
Theta hat (MLE)	0.0329	Theta star (bias corrected MLE)	0.0406
nu hat (MLE)	31.88	nu star (bias corrected)	25.86

Mean (detects)	0.0403		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00305	Mean	0.0241
Maximum	0.0994	Median	0.01
SD	0.0265	CV	1.099
k hat (MLE)	1.264	k star (bias corrected MLE)	1.152
Theta hat (MLE)	0.0191	Theta star (bias corrected MLE)	0.0209
nu hat (MLE)	70.78	nu star (bias corrected)	64.53
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (64.53, α)	47.05	Adjusted Chi Square Value (64.53, β)	46.13
95% Gamma Approximate UCL (use when n>=50)	0.033	95% Gamma Adjusted UCL (use when n<50)	0.0337
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0199	SD (KM)	0.0284
Variance (KM)	8.0858E-4	SE of Mean (KM)	0.00559
k hat (KM)	0.49	k star (KM)	0.461
nu hat (KM)	27.43	nu star (KM)	25.82
theta hat (KM)	0.0406	theta star (KM)	0.0432
80% gamma percentile (KM)	0.0325	90% gamma percentile (KM)	0.0547
95% gamma percentile (KM)	0.0787	99% gamma percentile (KM)	0.138
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (25.82, α)	15.24	Adjusted Chi Square Value (25.82, β)	14.74
95% Gamma Approximate KM-UCL (use when n>=50)	0.0337	95% Gamma Adjusted KM-UCL (use when n<50)	0.0349
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0194	Mean in Log Scale	-5.251
SD in Original Scale	0.0293	SD in Log Scale	1.683
95% t UCL (assumes normality of ROS data)	0.0289	95% Percentile Bootstrap UCL	0.0286
95% BCA Bootstrap UCL	0.0309	95% Bootstrap t UCL	0.0316
95% H-UCL (Log ROS)	0.065		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.985	KM Geo Mean	0.00684
KM SD (logged)	1.436	95% Critical H Value (KM-Log)	3.037
KM Standard Error of Mean (logged)	0.283	95% H-UCL (KM -Log)	0.0444

KM SD (logged)	1.436	95% Critical H Value (KM-Log)	3.037
KM Standard Error of Mean (logged)	0.283		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0195	Mean in Log Scale	-5.206
SD in Original Scale	0.0292	SD in Log Scale	1.647
95% t UCL (Assumes normality)	0.0289	95% H-Stat UCL	0.0616
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0294		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:49:49 AM
From File	MacLellan Region, Tissue - Berries, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	28	Number of Distinct Observations	26
Number of Detects	1	Number of Non-Detects	27
Number of Distinct Detects	1	Number of Distinct Non-Detects	25

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Berries, Cobalt (Co), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:50:28 AM
From File	MacLellan Region, Tissue - Berries, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.356	Mean	0.684
Maximum	1.514	Median	0.593
SD	0.27	Std. Error of Mean	0.0509
Coefficient of Variation	0.394	Skewness	1.937

Normal GOF Test		
Shapiro Wilk Test Statistic	0.778	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.771	95% Adjusted-CLT UCL (Chen-1995)	0.788
		95% Modified-t UCL (Johnson-1978)	0.774

Gamma GOF Test		
A-D Test Statistic	1.399	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.203	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	8.821	k star (bias corrected MLE)	7.9
Theta hat (MLE)	0.0776	Theta star (bias corrected MLE)	0.0866
nu hat (MLE)	494	nu star (bias corrected)	442.4
MLE Mean (bias corrected)	0.684	MLE Sd (bias corrected)	0.243
		Approximate Chi Square Value (0.05)	394.6
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	391.8

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.767	95% Adjusted Gamma UCL (use when n<50)	0.773

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.032	Mean of logged Data	-0.437
Maximum of Logged Data	0.415	SD of logged Data	0.327
Assuming Lognormal Distribution			
95% H-UCL	0.764	90% Chebyshev (MVUE) UCL	0.809
95% Chebyshev (MVUE) UCL	0.867	97.5% Chebyshev (MVUE) UCL	0.948
99% Chebyshev (MVUE) UCL	1.107		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.768	95% Jackknife UCL	0.771
95% Standard Bootstrap UCL	0.768	95% Bootstrap-t UCL	0.811
95% Hall's Bootstrap UCL	0.818	95% Percentile Bootstrap UCL	0.77
95% BCA Bootstrap UCL	0.789		
90% Chebyshev(Mean, Sd) UCL	0.837	95% Chebyshev(Mean, Sd) UCL	0.906
97.5% Chebyshev(Mean, Sd) UCL	1.002	99% Chebyshev(Mean, Sd) UCL	1.191
Suggested UCL to Use			
95% Student's-t UCL	0.771	or 95% Modified-t UCL	0.774
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:51:08 AM
From File	MacLellan Region, Tissue - Berries, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	4.221	Mean	34.9
Maximum	106.1	Median	28.54
SD	24.62	Std. Error of Mean	4.652
Coefficient of Variation	0.705	Skewness	0.906
Normal GOF Test			
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	42.82	95% Adjusted-CLT UCL (Chen-1995)	43.4
		95% Modified-t UCL (Johnson-1978)	42.95
Gamma GOF Test			
A-D Test Statistic	0.374	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.126	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.878	k star (bias corrected MLE)	1.7
Theta hat (MLE)	18.59	Theta star (bias corrected MLE)	20.53
nu hat (MLE)	105.1	nu star (bias corrected)	95.21
MLE Mean (bias corrected)	34.9	MLE Sd (bias corrected)	26.76
		Approximate Chi Square Value (0.05)	73.71
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	72.54
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	45.08	95% Adjusted Gamma UCL (use when n<50)	45.81

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.126	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.44	Mean of logged Data	3.263
Maximum of Logged Data	4.664	SD of logged Data	0.84
Assuming Lognormal Distribution			
95% H-UCL	53.63	90% Chebyshev (MVUE) UCL	55.86
95% Chebyshev (MVUE) UCL	64.6	97.5% Chebyshev (MVUE) UCL	76.73
99% Chebyshev (MVUE) UCL	100.6		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	42.55	95% Jackknife UCL	42.82
95% Standard Bootstrap UCL	42.5	95% Bootstrap-t UCL	43.63
95% Hall's Bootstrap UCL	44.27	95% Percentile Bootstrap UCL	42.25
95% BCA Bootstrap UCL	42.94		
90% Chebyshev(Mean, Sd) UCL	48.85	95% Chebyshev(Mean, Sd) UCL	55.18
97.5% Chebyshev(Mean, Sd) UCL	63.95	99% Chebyshev(Mean, Sd) UCL	81.19
Suggested UCL to Use			
95% Student's-t UCL	42.82		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:51:47 AM
From File	MacLellan Region, Tissue - Berries, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
Number of Detects	15	Number of Non-Detects	13
Number of Distinct Detects	15	Number of Distinct Non-Detects	13
Minimum Detect	0.0103	Minimum Non-Detect	0.00545
Maximum Detect	0.0729	Maximum Non-Detect	0.00885
Variance Detects	2.6004E-4	Percent Non-Detects	46.43%
Mean Detects	0.0251	SD Detects	0.0161
Median Detects	0.0207	CV Detects	0.643
Skewness Detects	2	Kurtosis Detects	5.085
Mean of Logged Detects	-3.838	SD of Logged Detects	0.548

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.798	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.016	KM Standard Error of Mean	0.00294
KM SD	0.015	95% KM (BCA) UCL	0.0213
95% KM (t) UCL	0.021	95% KM (Percentile Bootstrap) UCL	0.0211
95% KM (z) UCL	0.0208	95% KM Bootstrap t UCL	0.023
90% KM Chebyshev UCL	0.0248	95% KM Chebyshev UCL	0.0288
97.5% KM Chebyshev UCL	0.0343	99% KM Chebyshev UCL	0.0452

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.407	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.15	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.223	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.455	k star (bias corrected MLE)	2.808
Theta hat (MLE)	0.00726	Theta star (bias corrected MLE)	0.00893
nu hat (MLE)	103.6	nu star (bias corrected)	84.25

Mean (detects)	0.0251		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0181
Maximum	0.0729	Median	0.011
SD	0.0139	CV	0.769
k hat (MLE)	2.922	k star (bias corrected MLE)	2.633
Theta hat (MLE)	0.00619	Theta star (bias corrected MLE)	0.00687
nu hat (MLE)	163.6	nu star (bias corrected)	147.4
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (147.43, α)	120.4	Adjusted Chi Square Value (147.43, β)	118.9
95% Gamma Approximate UCL (use when n>=50)	0.0221	95% Gamma Adjusted UCL (use when n<50)	0.0224
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.016	SD (KM)	0.015
Variance (KM)	2.2582E-4	SE of Mean (KM)	0.00294
k hat (KM)	1.129	k star (KM)	1.031
nu hat (KM)	63.2	nu star (KM)	57.76
theta hat (KM)	0.0141	theta star (KM)	0.0155
80% gamma percentile (KM)	0.0256	90% gamma percentile (KM)	0.0365
95% gamma percentile (KM)	0.0473	99% gamma percentile (KM)	0.0724
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (57.76, α)	41.29	Adjusted Chi Square Value (57.76, β)	40.43
95% Gamma Approximate KM-UCL (use when n>=50)	0.0223	95% Gamma Adjusted KM-UCL (use when n<50)	0.0228
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0158	Mean in Log Scale	-4.505
SD in Original Scale	0.0154	SD in Log Scale	0.83
95% t UCL (assumes normality of ROS data)	0.0208	95% Percentile Bootstrap UCL	0.0208
95% BCA Bootstrap UCL	0.022	95% Bootstrap t UCL	0.0227
95% H-UCL (Log ROS)	0.0224		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.476	KM Geo Mean	0.0114
KM SD (logged)	0.788	95% Critical H Value (KM-Log)	2.212
KM Standard Error of Mean (logged)	0.154	95% H-UCL (KM -Log)	0.0217

KM SD (logged)	0.788	95% Critical H Value (KM-Log)	2.212
KM Standard Error of Mean (logged)	0.154		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0151	Mean in Log Scale	-4.678
SD in Original Scale	0.0159	SD in Log Scale	1.007
95% t UCL (Assumes normality)	0.0202	95% H-Stat UCL	0.0249
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.021		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:52:27 AM		
From File	MacLellan Region, Tissue - Berries, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Berries, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.0676	Mean	0.422
Maximum	1.384	Median	0.287
SD	0.369	Std. Error of Mean	0.0697
Coefficient of Variation	0.873	Skewness	1.247
Normal GOF Test			
Shapiro Wilk Test Statistic	0.839	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.541	95% Adjusted-CLT UCL (Chen-1995)	0.554
		95% Modified-t UCL (Johnson-1978)	0.544
Gamma GOF Test			
A-D Test Statistic	0.631	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.169	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.491	k star (bias corrected MLE)	1.355
Theta hat (MLE)	0.283	Theta star (bias corrected MLE)	0.312
nu hat (MLE)	83.49	nu star (bias corrected)	75.88
MLE Mean (bias corrected)	0.422	MLE Sd (bias corrected)	0.363
		Approximate Chi Square Value (0.05)	56.82
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	55.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.564	95% Adjusted Gamma UCL (use when n<50)	0.574

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.694	Mean of logged Data	-1.234
Maximum of Logged Data	0.325	SD of logged Data	0.898
Assuming Lognormal Distribution			
95% H-UCL	0.653	90% Chebyshev (MVUE) UCL	0.672
95% Chebyshev (MVUE) UCL	0.783	97.5% Chebyshev (MVUE) UCL	0.936
99% Chebyshev (MVUE) UCL	1.238		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.537	95% Jackknife UCL	0.541
95% Standard Bootstrap UCL	0.536	95% Bootstrap-t UCL	0.565
95% Hall's Bootstrap UCL	0.55	95% Percentile Bootstrap UCL	0.544
95% BCA Bootstrap UCL	0.557		
90% Chebyshev(Mean, Sd) UCL	0.631	95% Chebyshev(Mean, Sd) UCL	0.726
97.5% Chebyshev(Mean, Sd) UCL	0.857	99% Chebyshev(Mean, Sd) UCL	1.116
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.574		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:53:06 AM
From File	MacLellan Region, Tissue - Berries, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Berries, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.0555	Mean	0.28
Maximum	0.986	Median	0.203
SD	0.233	Std. Error of Mean	0.0441
Coefficient of Variation	0.835	Skewness	1.475

Normal GOF Test		
Shapiro Wilk Test Statistic	0.832	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.355	95% Adjusted-CLT UCL (Chen-1995)	0.365
		95% Modified-t UCL (Johnson-1978)	0.357

Gamma GOF Test		
A-D Test Statistic	0.591	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.148	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.789	k star (bias corrected MLE)	1.621
Theta hat (MLE)	0.156	Theta star (bias corrected MLE)	0.173
nu hat (MLE)	100.2	nu star (bias corrected)	90.77
MLE Mean (bias corrected)	0.28	MLE Sd (bias corrected)	0.22
		Approximate Chi Square Value (0.05)	69.8
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	68.67

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.364	95% Adjusted Gamma UCL (use when n<50)	0.37

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.891	Mean of logged Data	-1.579
Maximum of Logged Data	-0.0145	SD of logged Data	0.792
Assuming Lognormal Distribution			
95% H-UCL	0.396	90% Chebyshev (MVUE) UCL	0.416
95% Chebyshev (MVUE) UCL	0.478	97.5% Chebyshev (MVUE) UCL	0.564
99% Chebyshev (MVUE) UCL	0.734		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.352	95% Jackknife UCL	0.355
95% Standard Bootstrap UCL	0.352	95% Bootstrap-t UCL	0.375
95% Hall's Bootstrap UCL	0.373	95% Percentile Bootstrap UCL	0.35
95% BCA Bootstrap UCL	0.364		
90% Chebyshev(Mean, Sd) UCL	0.412	95% Chebyshev(Mean, Sd) UCL	0.472
97.5% Chebyshev(Mean, Sd) UCL	0.555	99% Chebyshev(Mean, Sd) UCL	0.719
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.37		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:55:05 AM		
From File	MacLellan Region, Tissue - Berries, Zinc (Zn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Berries, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.78	Mean	2.179
Maximum	6.254	Median	1.407
SD	1.562	Std. Error of Mean	0.295
Coefficient of Variation	0.717	Skewness	1.296

Normal GOF Test			
Shapiro Wilk Test Statistic	0.79	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.682	95% Adjusted-CLT UCL (Chen-1995)	2.742
		95% Modified-t UCL (Johnson-1978)	2.694

Gamma GOF Test			
A-D Test Statistic	1.67	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.212	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.167	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.553	k star (bias corrected MLE)	2.303
Theta hat (MLE)	0.854	Theta star (bias corrected MLE)	0.946
nu hat (MLE)	143	nu star (bias corrected)	129
MLE Mean (bias corrected)	2.179	MLE Sd (bias corrected)	1.436
		Approximate Chi Square Value (0.05)	103.8
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	102.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	2.709	95% Adjusted Gamma UCL (use when n<50)	2.746

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.188	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.248	Mean of logged Data	0.571
Maximum of Logged Data	1.833	SD of logged Data	0.63
Assuming Lognormal Distribution			
95% H-UCL	2.769	90% Chebyshev (MVUE) UCL	2.955
95% Chebyshev (MVUE) UCL	3.324	97.5% Chebyshev (MVUE) UCL	3.836
99% Chebyshev (MVUE) UCL	4.843		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.665	95% Jackknife UCL	2.682
95% Standard Bootstrap UCL	2.651	95% Bootstrap-t UCL	2.788
95% Hall's Bootstrap UCL	2.695	95% Percentile Bootstrap UCL	2.671
95% BCA Bootstrap UCL	2.762		
90% Chebyshev(Mean, Sd) UCL	3.065	95% Chebyshev(Mean, Sd) UCL	3.466
97.5% Chebyshev(Mean, Sd) UCL	4.022	99% Chebyshev(Mean, Sd) UCL	5.116
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	3.466		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.8
PROUCL OUTPUTS
LABRADOR TEA TISSUE
GORDON REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:01:18 AM		
From File	Gordon Region, Tissue - Labrador tea, Antimony (Sb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Labrador tea, Antimony (Sb), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	23
Number of Detects	2	Number of Non-Detects	25
Number of Distinct Detects	2	Number of Distinct Non-Detects	21
Minimum Detect	0.025	Minimum Non-Detect	0.00755
Maximum Detect	0.0422	Maximum Non-Detect	0.0276
Variance Detects	1.4837E-4	Percent Non-Detects	92.59%
Mean Detects	0.0336	SD Detects	0.0122
Median Detects	0.0336	CV Detects	0.363
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.428	SD of Logged Detects	0.371

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00995	KM Standard Error of Mean	0.0023
KM SD	0.00762	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0139	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0137	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0169	95% KM Chebyshev UCL	0.02
97.5% KM Chebyshev UCL	0.0243	99% KM Chebyshev UCL	0.0328

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	14.85	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00226	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	59.41	nu star (bias corrected)	N/A
Mean (detects)	0.0336		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00995	SD (KM)	0.00762

Variance (KM)	5.8128E-5	SE of Mean (KM)	0.0023
k hat (KM)	1.703	k star (KM)	1.539
nu hat (KM)	91.98	nu star (KM)	83.09
theta hat (KM)	0.00584	theta star (KM)	0.00647
80% gamma percentile (KM)	0.0154	90% gamma percentile (KM)	0.0206
95% gamma percentile (KM)	0.0257	99% gamma percentile (KM)	0.0372
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0401
Approximate Chi Square Value (83.09, α)	63.09	Adjusted Chi Square Value (83.09, β)	61.97
95% Gamma Approximate KM-UCL (use when n>=50)	0.0131	95% Gamma Adjusted KM-UCL (use when n<50)	0.0133
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0085	Mean in Log Scale	-4.94
SD in Original Scale	0.00776	SD in Log Scale	0.491
95% t UCL (assumes normality of ROS data)	0.011	95% Percentile Bootstrap UCL	0.0113
95% BCA Bootstrap UCL	0.0128	95% Bootstrap t UCL	0.0202
95% H-UCL (Log ROS)	0.00974		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.746	KM Geo Mean	0.00869
KM SD (logged)	0.426	95% Critical H Value (KM-Log)	1.91
KM Standard Error of Mean (logged)	0.135	95% H-UCL (KM -Log)	0.0112
KM SD (logged)	0.426	95% Critical H Value (KM-Log)	1.91
KM Standard Error of Mean (logged)	0.135		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0134	Mean in Log Scale	-4.388
SD in Original Scale	0.00655	SD in Log Scale	0.371
95% t UCL (Assumes normality)	0.0155	95% H-Stat UCL	0.0152
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0139	KM H-UCL	0.0112
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:01:58 AM
From File	Gordon Region, Tissue - Labrador tea, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Labrador tea, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.0317	Mean	34.57
Maximum	53.41	Median	35.14
SD	10.29	Std. Error of Mean	1.98
Coefficient of Variation	0.298	Skewness	-1.21
Normal GOF Test			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.94	95% Adjusted-CLT UCL (Chen-1995)	37.33
		95% Modified-t UCL (Johnson-1978)	37.87
Gamma GOF Test			
A-D Test Statistic	4.656	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.344	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.17	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.195	k star (bias corrected MLE)	1.976
Theta hat (MLE)	15.75	Theta star (bias corrected MLE)	17.5
nu hat (MLE)	118.5	nu star (bias corrected)	106.7
MLE Mean (bias corrected)	34.57	MLE Sd (bias corrected)	24.59
		Approximate Chi Square Value (0.05)	83.84
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	82.55
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	43.98	95% Adjusted Gamma UCL (use when n<50)	44.67

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.335	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.422	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.167	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.451	Mean of logged Data	3.298
Maximum of Logged Data	3.978	SD of logged Data	1.366
Assuming Lognormal Distribution			
95% H-UCL	155.1	90% Chebyshev (MVUE) UCL	127
95% Chebyshev (MVUE) UCL	155.2	97.5% Chebyshev (MVUE) UCL	194.3
99% Chebyshev (MVUE) UCL	271.2		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	37.82	95% Jackknife UCL	37.94
95% Standard Bootstrap UCL	37.68	95% Bootstrap-t UCL	37.56
95% Hall's Bootstrap UCL	37.59	95% Percentile Bootstrap UCL	37.45
95% BCA Bootstrap UCL	37.27		
90% Chebyshev(Mean, Sd) UCL	40.5	95% Chebyshev(Mean, Sd) UCL	43.19
97.5% Chebyshev(Mean, Sd) UCL	46.93	99% Chebyshev(Mean, Sd) UCL	54.26
Suggested UCL to Use			
95% Student's-t UCL	37.94		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:03:16 AM		
From File	Gordon Region, Tissue - Labrador tea, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Labrador tea, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	22
Number of Detects	1	Number of Non-Detects	26
Number of Distinct Detects	1	Number of Distinct Non-Detects	21

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Labrador tea, Cadmium (Cd), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:03:55 AM		
From File	Gordon Region, Tissue - Labrador tea, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Labrador tea, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	23
Number of Detects	2	Number of Non-Detects	25
Number of Distinct Detects	2	Number of Distinct Non-Detects	21
Minimum Detect	0.0196	Minimum Non-Detect	0.0393
Maximum Detect	0.0606	Maximum Non-Detect	0.0552
Variance Detects	8.3927E-4	Percent Non-Detects	92.59%
Mean Detects	0.0401	SD Detects	0.029
Median Detects	0.0401	CV Detects	0.722
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.367	SD of Logged Detects	0.797

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0211	KM Standard Error of Mean	0.00211
KM SD	0.00774	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0247	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0246	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0275	95% KM Chebyshev UCL	0.0303
97.5% KM Chebyshev UCL	0.0343	99% KM Chebyshev UCL	0.0421

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.467	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0116	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	13.87	nu star (bias corrected)	N/A
Mean (detects)	0.0401		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0211	SD (KM)	0.00774

Variance (KM)	5.9866E-5	SE of Mean (KM)	0.00211
k hat (KM)	7.47	k star (KM)	6.665
nu hat (KM)	403.4	nu star (KM)	359.9
theta hat (KM)	0.00283	theta star (KM)	0.00317
80% gamma percentile (KM)	0.0276	90% gamma percentile (KM)	0.0321
95% gamma percentile (KM)	0.0362	99% gamma percentile (KM)	0.0447
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0401
Approximate Chi Square Value (359.91, α)	316.9	Adjusted Chi Square Value (359.91, β)	314.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.024	95% Gamma Adjusted KM-UCL (use when n<50)	0.0242
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0213	Mean in Log Scale	-3.89
SD in Original Scale	0.00822	SD in Log Scale	0.249
95% t UCL (assumes normality of ROS data)	0.024	95% Percentile Bootstrap UCL	0.0242
95% BCA Bootstrap UCL	0.0261	95% Bootstrap t UCL	0.0291
95% H-UCL (Log ROS)	0.023		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.889	KM Geo Mean	0.0205
KM SD (logged)	0.213	95% Critical H Value (KM-Log)	1.768
KM Standard Error of Mean (logged)	0.0579	95% H-UCL (KM -Log)	0.0225
KM SD (logged)	0.213	95% Critical H Value (KM-Log)	1.768
KM Standard Error of Mean (logged)	0.0579		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0252	Mean in Log Scale	-3.706
SD in Original Scale	0.00737	SD in Log Scale	0.201
95% t UCL (Assumes normality)	0.0276	95% H-Stat UCL	0.0269
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0303		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:04:34 AM		
From File	Gordon Region, Tissue - Labrador tea, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Labrador tea, Copper (Cu), mg/kg ww			
General Statistics			
Total Number of Observations	27	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.847	Mean	1.591
Maximum	2.579	Median	1.654
SD	0.366	Std. Error of Mean	0.0704
Coefficient of Variation	0.23	Skewness	0.407
Normal GOF Test			
Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.711	95% Adjusted-CLT UCL (Chen-1995)	1.713
		95% Modified-t UCL (Johnson-1978)	1.712
Gamma GOF Test			
A-D Test Statistic	0.366	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.117	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	19.34	k star (bias corrected MLE)	17.22
Theta hat (MLE)	0.0823	Theta star (bias corrected MLE)	0.0924
nu hat (MLE)	1044	nu star (bias corrected)	929.7
MLE Mean (bias corrected)	1.591	MLE Sd (bias corrected)	0.383
		Approximate Chi Square Value (0.05)	859.9
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	855.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.72	95% Adjusted Gamma UCL (use when n<50)	1.729

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.167	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.166	Mean of logged Data	0.438
Maximum of Logged Data	0.947	SD of logged Data	0.236
Assuming Lognormal Distribution			
95% H-UCL	1.73	90% Chebyshev (MVUE) UCL	1.811
95% Chebyshev (MVUE) UCL	1.91	97.5% Chebyshev (MVUE) UCL	2.048
99% Chebyshev (MVUE) UCL	2.318		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.707	95% Jackknife UCL	1.711
95% Standard Bootstrap UCL	1.703	95% Bootstrap-t UCL	1.718
95% Hall's Bootstrap UCL	1.719	95% Percentile Bootstrap UCL	1.701
95% BCA Bootstrap UCL	1.707		
90% Chebyshev(Mean, Sd) UCL	1.802	95% Chebyshev(Mean, Sd) UCL	1.898
97.5% Chebyshev(Mean, Sd) UCL	2.031	99% Chebyshev(Mean, Sd) UCL	2.292
Suggested UCL to Use			
95% Student's-t UCL	1.711		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:05:14 AM		
From File	Gordon Region, Tissue - Labrador tea, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Labrador tea, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	25.97	Mean	272.3
Maximum	591.4	Median	229.9
SD	150.1	Std. Error of Mean	28.89
Coefficient of Variation	0.551	Skewness	0.575

Normal GOF Test			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	321.6	95% Adjusted-CLT UCL (Chen-1995)	323.2
		95% Modified-t UCL (Johnson-1978)	322.1

Gamma GOF Test			
A-D Test Statistic	0.299	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.107	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.17	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.86	k star (bias corrected MLE)	2.567
Theta hat (MLE)	95.22	Theta star (bias corrected MLE)	106.1
nu hat (MLE)	154.4	nu star (bias corrected)	138.6
MLE Mean (bias corrected)	272.3	MLE Sd (bias corrected)	170
		Approximate Chi Square Value (0.05)	112.4
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	110.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	335.8	95% Adjusted Gamma UCL (use when n<50)	340.3

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.167	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.257	Mean of logged Data	5.422
Maximum of Logged Data	6.383	SD of logged Data	0.692
Assuming Lognormal Distribution			
95% H-UCL	385	90% Chebyshev (MVUE) UCL	406.7
95% Chebyshev (MVUE) UCL	462.1	97.5% Chebyshev (MVUE) UCL	539
99% Chebyshev (MVUE) UCL	690.1		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	319.8	95% Jackknife UCL	321.6
95% Standard Bootstrap UCL	319.3	95% Bootstrap-t UCL	327.3
95% Hall's Bootstrap UCL	323.4	95% Percentile Bootstrap UCL	319.7
95% BCA Bootstrap UCL	321.5		
90% Chebyshev(Mean, Sd) UCL	359	95% Chebyshev(Mean, Sd) UCL	398.2
97.5% Chebyshev(Mean, Sd) UCL	452.7	99% Chebyshev(Mean, Sd) UCL	559.8
Suggested UCL to Use			
95% Student's-t UCL	321.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:05:53 AM
From File	Gordon Region, Tissue - Labrador tea, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Labrador tea, Molybdenum (Mo), mg/kg ww

General Statistics

Total Number of Observations	27	Number of Distinct Observations	23
Number of Detects	5	Number of Non-Detects	22
Number of Distinct Detects	5	Number of Distinct Non-Detects	18
Minimum Detect	0.0239	Minimum Non-Detect	0.0197
Maximum Detect	0.188	Maximum Non-Detect	0.0276
Variance Detects	0.00587	Percent Non-Detects	81.48%
Mean Detects	0.0861	SD Detects	0.0766
Median Detects	0.0454	CV Detects	0.89
Skewness Detects	0.709	Kurtosis Detects	-2.386
Mean of Logged Detects	-2.818	SD of Logged Detects	0.974

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.302	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0324	KM Standard Error of Mean	0.00842
KM SD	0.0391	95% KM (BCA) UCL	0.0506
95% KM (t) UCL	0.0467	95% KM (Percentile Bootstrap) UCL	0.0463
95% KM (z) UCL	0.0462	95% KM Bootstrap t UCL	0.0838
90% KM Chebyshev UCL	0.0576	95% KM Chebyshev UCL	0.0691
97.5% KM Chebyshev UCL	0.0849	99% KM Chebyshev UCL	0.116

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.502	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.686	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.362	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.512	k star (bias corrected MLE)	0.738
Theta hat (MLE)	0.0569	Theta star (bias corrected MLE)	0.117
nu hat (MLE)	15.12	nu star (bias corrected)	7.383

Mean (detects)	0.0861		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0241
Maximum	0.188	Median	0.01
SD	0.0425	CV	1.766
k hat (MLE)	1.047	k star (bias corrected MLE)	0.955
Theta hat (MLE)	0.023	Theta star (bias corrected MLE)	0.0252
nu hat (MLE)	56.54	nu star (bias corrected)	51.59
Adjusted Level of Significance (β)	0.0401		
Approximate Chi Square Value (51.59, α)	36.1	Adjusted Chi Square Value (51.59, β)	35.27
95% Gamma Approximate UCL (use when n>=50)	0.0344	95% Gamma Adjusted UCL (use when n<50)	0.0352
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0324	SD (KM)	0.0391
Variance (KM)	0.00153	SE of Mean (KM)	0.00842
k hat (KM)	0.686	k star (KM)	0.634
nu hat (KM)	37.02	nu star (KM)	34.24
theta hat (KM)	0.0472	theta star (KM)	0.051
80% gamma percentile (KM)	0.0533	90% gamma percentile (KM)	0.0831
95% gamma percentile (KM)	0.114	99% gamma percentile (KM)	0.189
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (34.24, α)	21.86	Adjusted Chi Square Value (34.24, β)	21.22
95% Gamma Approximate KM-UCL (use when n>=50)	0.0507	95% Gamma Adjusted KM-UCL (use when n<50)	0.0522
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0183	Mean in Log Scale	-5.412
SD in Original Scale	0.0446	SD in Log Scale	1.403
95% t UCL (assumes normality of ROS data)	0.0329	95% Percentile Bootstrap UCL	0.0344
95% BCA Bootstrap UCL	0.0365	95% Bootstrap t UCL	0.0791
95% H-UCL (Log ROS)	0.028		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.705	KM Geo Mean	0.0246
KM SD (logged)	0.569	95% Critical H Value (KM-Log)	2.032
KM Standard Error of Mean (logged)	0.124	95% H-UCL (KM -Log)	0.0363

KM SD (logged)	0.569	95% Critical H Value (KM-Log)	2.032
KM Standard Error of Mean (logged)	0.124		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0258	Mean in Log Scale	-4.122
SD in Original Scale	0.042	SD in Log Scale	0.744
95% t UCL (Assumes normality)	0.0396	95% H-Stat UCL	0.0295
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0467		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:06:32 AM
From File	Gordon Region, Tissue - Labrador tea, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Labrador tea, Nickel (Ni), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	26
Number of Detects	21	Number of Non-Detects	6
Number of Distinct Detects	21	Number of Distinct Non-Detects	5
Minimum Detect	0.228	Minimum Non-Detect	0.237
Maximum Detect	0.583	Maximum Non-Detect	0.276
Variance Detects	0.0115	Percent Non-Detects	22.22%
Mean Detects	0.385	SD Detects	0.107
Median Detects	0.364	CV Detects	0.279
Skewness Detects	0.448	Kurtosis Detects	-0.727
Mean of Logged Detects	-0.991	SD of Logged Detects	0.28

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.351	KM Standard Error of Mean	0.0221
KM SD	0.112	95% KM (BCA) UCL	0.387
95% KM (t) UCL	0.389	95% KM (Percentile Bootstrap) UCL	0.388
95% KM (z) UCL	0.388	95% KM Bootstrap t UCL	0.392
90% KM Chebyshev UCL	0.418	95% KM Chebyshev UCL	0.448
97.5% KM Chebyshev UCL	0.489	99% KM Chebyshev UCL	0.571

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.415	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.125	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.189	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	13.69	k star (bias corrected MLE)	11.77
Theta hat (MLE)	0.0281	Theta star (bias corrected MLE)	0.0327
nu hat (MLE)	575.2	nu star (bias corrected)	494.3

Mean (detects)	0.385		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.189	Mean	0.348
Maximum	0.583	Median	0.358
SD	0.118	CV	0.34
k hat (MLE)	9.299	k star (bias corrected MLE)	8.291
Theta hat (MLE)	0.0374	Theta star (bias corrected MLE)	0.042
nu hat (MLE)	502.2	nu star (bias corrected)	447.7
Adjusted Level of Significance (β)	0.0401		
Approximate Chi Square Value (447.70, α)	399.6	Adjusted Chi Square Value (447.70, β)	396.7
95% Gamma Approximate UCL (use when n>=50)	0.39	95% Gamma Adjusted UCL (use when n<50)	0.393
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.351	SD (KM)	0.112
Variance (KM)	0.0125	SE of Mean (KM)	0.0221
k hat (KM)	9.842	k star (KM)	8.773
nu hat (KM)	531.5	nu star (KM)	473.8
theta hat (KM)	0.0357	theta star (KM)	0.0401
80% gamma percentile (KM)	0.445	90% gamma percentile (KM)	0.509
95% gamma percentile (KM)	0.567	99% gamma percentile (KM)	0.684
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (473.76, α)	424.3	Adjusted Chi Square Value (473.76, β)	421.3
95% Gamma Approximate KM-UCL (use when n>=50)	0.392	95% Gamma Adjusted KM-UCL (use when n<50)	0.395
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.117	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.351	Mean in Log Scale	-1.097
SD in Original Scale	0.115	SD in Log Scale	0.319
95% t UCL (assumes normality of ROS data)	0.389	95% Percentile Bootstrap UCL	0.387
95% BCA Bootstrap UCL	0.388	95% Bootstrap t UCL	0.392
95% H-UCL (Log ROS)	0.394		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.095	KM Geo Mean	0.335
KM SD (logged)	0.309	95% Critical H Value (KM-Log)	1.827
KM Standard Error of Mean (logged)	0.0612	95% H-UCL (KM -Log)	0.392

KM SD (logged)	0.309	95% Critical H Value (KM-Log)	1.827
KM Standard Error of Mean (logged)	0.0612		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.328	Mean in Log Scale	-1.232
SD in Original Scale	0.145	SD in Log Scale	0.522
95% t UCL (Assumes normality)	0.375	95% H-Stat UCL	0.41
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.389		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:07:12 AM		
From File	Gordon Region, Tissue - Labrador tea, Strontium (Sr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Labrador tea, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.18	Mean	4.491
Maximum	17.83	Median	3.82
SD	3.455	Std. Error of Mean	0.665
Coefficient of Variation	0.769	Skewness	2.493

Normal GOF Test			
Shapiro Wilk Test Statistic	0.764	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.625	95% Adjusted-CLT UCL (Chen-1995)	5.925
		95% Modified-t UCL (Johnson-1978)	5.678

Gamma GOF Test			
A-D Test Statistic	0.667	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.138	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.17	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.141	k star (bias corrected MLE)	1.928
Theta hat (MLE)	2.097	Theta star (bias corrected MLE)	2.329
nu hat (MLE)	115.6	nu star (bias corrected)	104.1
MLE Mean (bias corrected)	4.491	MLE Sd (bias corrected)	3.234
		Approximate Chi Square Value (0.05)	81.56
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	80.29

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	5.732	95% Adjusted Gamma UCL (use when n<50)	5.823

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.167	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.717	Mean of logged Data	1.251
Maximum of Logged Data	2.881	SD of logged Data	0.809
Assuming Lognormal Distribution			
95% H-UCL	6.967	90% Chebyshev (MVUE) UCL	7.225
95% Chebyshev (MVUE) UCL	8.337	97.5% Chebyshev (MVUE) UCL	9.88
99% Chebyshev (MVUE) UCL	12.91		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.584	95% Jackknife UCL	5.625
95% Standard Bootstrap UCL	5.575	95% Bootstrap-t UCL	6.231
95% Hall's Bootstrap UCL	10.89	95% Percentile Bootstrap UCL	5.667
95% BCA Bootstrap UCL	6.006		
90% Chebyshev(Mean, Sd) UCL	6.485	95% Chebyshev(Mean, Sd) UCL	7.389
97.5% Chebyshev(Mean, Sd) UCL	8.643	99% Chebyshev(Mean, Sd) UCL	11.11
Suggested UCL to Use			
95% Adjusted Gamma UCL	5.823		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:07:51 AM		
From File	Gordon Region, Tissue - Labrador tea, Thallium (Tl), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Labrador tea, Thallium (Tl), mg/kg ww			
General Statistics			
Total Number of Observations	27	Number of Distinct Observations	26
Number of Detects	12	Number of Non-Detects	15
Number of Distinct Detects	12	Number of Distinct Non-Detects	14
Minimum Detect	0.0188	Minimum Non-Detect	0.00453
Maximum Detect	0.121	Maximum Non-Detect	0.0166
Variance Detects	8.1445E-4	Percent Non-Detects	55.56%
Mean Detects	0.0371	SD Detects	0.0285
Median Detects	0.0298	CV Detects	0.769
Skewness Detects	2.704	Kurtosis Detects	7.959
Mean of Logged Detects	-3.459	SD of Logged Detects	0.538
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.64	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.32	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.019	KM Standard Error of Mean	0.0049
KM SD	0.0244	95% KM (BCA) UCL	0.0323
95% KM (t) UCL	0.0274	95% KM (Percentile Bootstrap) UCL	0.0292
95% KM (z) UCL	0.0271	95% KM Bootstrap t UCL	0.0317
90% KM Chebyshev UCL	0.0337	95% KM Chebyshev UCL	0.0404
97.5% KM Chebyshev UCL	0.0496	99% KM Chebyshev UCL	0.0677
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.955	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.738	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.242	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.247	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.181	k star (bias corrected MLE)	2.441
Theta hat (MLE)	0.0117	Theta star (bias corrected MLE)	0.0152
nu hat (MLE)	76.34	nu star (bias corrected)	58.58

Mean (detects)	0.0371		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.022
Maximum	0.121	Median	0.01
SD	0.0231	CV	1.047
k hat (MLE)	1.927	k star (bias corrected MLE)	1.738
Theta hat (MLE)	0.0114	Theta star (bias corrected MLE)	0.0127
nu hat (MLE)	104.1	nu star (bias corrected)	93.85
Adjusted Level of Significance (β)	0.0401		
Approximate Chi Square Value (93.85, α)	72.51	Adjusted Chi Square Value (93.85, β)	71.31
95% Gamma Approximate UCL (use when n>=50)	0.0285	95% Gamma Adjusted UCL (use when n<50)	0.029
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.019	SD (KM)	0.0244
Variance (KM)	5.9378E-4	SE of Mean (KM)	0.0049
k hat (KM)	0.608	k star (KM)	0.565
nu hat (KM)	32.85	nu star (KM)	30.54
theta hat (KM)	0.0312	theta star (KM)	0.0336
80% gamma percentile (KM)	0.0313	90% gamma percentile (KM)	0.0501
95% gamma percentile (KM)	0.0699	99% gamma percentile (KM)	0.118
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (30.54, α)	18.91	Adjusted Chi Square Value (30.54, β)	18.33
95% Gamma Approximate KM-UCL (use when n>=50)	0.0307	95% Gamma Adjusted KM-UCL (use when n<50)	0.0317
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0204	Mean in Log Scale	-4.301
SD in Original Scale	0.024	SD in Log Scale	0.847
95% t UCL (assumes normality of ROS data)	0.0282	95% Percentile Bootstrap UCL	0.0285
95% BCA Bootstrap UCL	0.0324	95% Bootstrap t UCL	0.0345
95% H-UCL (Log ROS)	0.0286		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.536	KM Geo Mean	0.0107
KM SD (logged)	1.022	95% Critical H Value (KM-Log)	2.55
KM Standard Error of Mean (logged)	0.205	95% H-UCL (KM -Log)	0.0301

KM SD (logged)	1.022	95% Critical H Value (KM-Log)	2.55
KM Standard Error of Mean (logged)	0.205		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0202	Mean in Log Scale	-4.338
SD in Original Scale	0.0241	SD in Log Scale	0.902
95% t UCL (Assumes normality)	0.0281	95% H-Stat UCL	0.03
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.0317	95% GROS Adjusted Gamma UCL	0.029
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:09:49 AM
From File	Gordon Region, Tissue - Labrador tea, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Labrador tea, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	27	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	3.986	Mean	9.284
Maximum	14.6	Median	8.566
SD	2.245	Std. Error of Mean	0.432
Coefficient of Variation	0.242	Skewness	0.608

Normal GOF Test			
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.02	95% Adjusted-CLT UCL (Chen-1995)	10.05
		95% Modified-t UCL (Johnson-1978)	10.03

Gamma GOF Test			
A-D Test Statistic	0.875	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.179	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.168	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	17.43	k star (bias corrected MLE)	15.51
Theta hat (MLE)	0.533	Theta star (bias corrected MLE)	0.598
nu hat (MLE)	941	nu star (bias corrected)	837.8
MLE Mean (bias corrected)	9.284	MLE Sd (bias corrected)	2.357
		Approximate Chi Square Value (0.05)	771.6
Adjusted Level of Significance	0.0401	Adjusted Chi Square Value	767.6

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	10.08	95% Adjusted Gamma UCL (use when n<50)	10.13

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.167	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.383	Mean of logged Data	2.199
Maximum of Logged Data	2.681	SD of logged Data	0.251
Assuming Lognormal Distribution			
95% H-UCL	10.16	90% Chebyshev (MVUE) UCL	10.66
95% Chebyshev (MVUE) UCL	11.28	97.5% Chebyshev (MVUE) UCL	12.13
99% Chebyshev (MVUE) UCL	13.81		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	9.994	95% Jackknife UCL	10.02
95% Standard Bootstrap UCL	9.978	95% Bootstrap-t UCL	10.15
95% Hall's Bootstrap UCL	10.17	95% Percentile Bootstrap UCL	9.994
95% BCA Bootstrap UCL	9.991		
90% Chebyshev(Mean, Sd) UCL	10.58	95% Chebyshev(Mean, Sd) UCL	11.17
97.5% Chebyshev(Mean, Sd) UCL	11.98	99% Chebyshev(Mean, Sd) UCL	13.58
Suggested UCL to Use			
95% Student's-t UCL	10.02	or 95% Modified-t UCL	10.03
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.9
PROUCL OUTPUTS
LABRADOR TEA TISSUE
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:29:48 AM
From File	MacLellan Region, Tissue - Labrador tea, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Labrador tea, Antimony (Sb), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	23
Number of Detects	1	Number of Non-Detects	24
Number of Distinct Detects	1	Number of Distinct Non-Detects	22

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Labrador tea, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:30:28 AM		
From File	MacLellan Region, Tissue - Labrador tea, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Labrador tea, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	3.264	Mean	31.46
Maximum	53.9	Median	29.59
SD	12.18	Std. Error of Mean	2.436
Coefficient of Variation	0.387	Skewness	0.106
Normal GOF Test			
Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0835	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	35.63	95% Adjusted-CLT UCL (Chen-1995)	35.53
		95% Modified-t UCL (Johnson-1978)	35.64
Gamma GOF Test			
A-D Test Statistic	0.571	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.126	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.175	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.897	k star (bias corrected MLE)	4.336
Theta hat (MLE)	6.426	Theta star (bias corrected MLE)	7.257
nu hat (MLE)	244.8	nu star (bias corrected)	216.8
MLE Mean (bias corrected)	31.46	MLE Sd (bias corrected)	15.11
		Approximate Chi Square Value (0.05)	183.7
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	181.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	37.13	95% Adjusted Gamma UCL (use when n<50)	37.55

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.777	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.183	Mean of logged Data	3.343
Maximum of Logged Data	3.987	SD of logged Data	0.554
Assuming Lognormal Distribution			
95% H-UCL	41.4	90% Chebyshev (MVUE) UCL	44.21
95% Chebyshev (MVUE) UCL	49.39	97.5% Chebyshev (MVUE) UCL	56.57
99% Chebyshev (MVUE) UCL	70.69		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	35.47	95% Jackknife UCL	35.63
95% Standard Bootstrap UCL	35.45	95% Bootstrap-t UCL	35.63
95% Hall's Bootstrap UCL	35.91	95% Percentile Bootstrap UCL	35.47
95% BCA Bootstrap UCL	35.37		
90% Chebyshev(Mean, Sd) UCL	38.77	95% Chebyshev(Mean, Sd) UCL	42.08
97.5% Chebyshev(Mean, Sd) UCL	46.68	99% Chebyshev(Mean, Sd) UCL	55.7
Suggested UCL to Use			
95% Student's-t UCL	35.63		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:31:47 AM
From File	MacLellan Region, Tissue - Labrador tea, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Labrador tea, Cadmium (Cd), mg/kg ww

General Statistics

Total Number of Observations	25	Number of Distinct Observations	23
Number of Detects	1	Number of Non-Detects	24
Number of Distinct Detects	1	Number of Distinct Non-Detects	22

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Labrador tea, Cadmium (Cd), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:32:27 AM
From File	MacLellan Region, Tissue - Labrador tea, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Labrador tea, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	23
Number of Detects	1	Number of Non-Detects	24
Number of Distinct Detects	1	Number of Distinct Non-Detects	22

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Labrador tea, Cobalt (Co), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:33:06 AM		
From File	MacLellan Region, Tissue - Labrador tea, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Labrador tea, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	1.154	Mean	1.599
Maximum	2.463	Median	1.541
SD	0.328	Std. Error of Mean	0.0656
Coefficient of Variation	0.205	Skewness	1.154

Normal GOF Test		
Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.711	95% Adjusted-CLT UCL (Chen-1995)	1.723
		95% Modified-t UCL (Johnson-1978)	1.714

Gamma GOF Test		
A-D Test Statistic	0.693	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.161	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	27.18	k star (bias corrected MLE)	23.95
Theta hat (MLE)	0.0588	Theta star (bias corrected MLE)	0.0668
nu hat (MLE)	1359	nu star (bias corrected)	1197
MLE Mean (bias corrected)	1.599	MLE Sd (bias corrected)	0.327
		Approximate Chi Square Value (0.05)	1118
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	1113

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	1.712	95% Adjusted Gamma UCL (use when n<50)	1.72

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.143	Mean of logged Data	0.451
Maximum of Logged Data	0.901	SD of logged Data	0.193
Assuming Lognormal Distribution			
95% H-UCL	1.713	90% Chebyshev (MVUE) UCL	1.784
95% Chebyshev (MVUE) UCL	1.868	97.5% Chebyshev (MVUE) UCL	1.985
99% Chebyshev (MVUE) UCL	2.215		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.707	95% Jackknife UCL	1.711
95% Standard Bootstrap UCL	1.706	95% Bootstrap-t UCL	1.738
95% Hall's Bootstrap UCL	1.747	95% Percentile Bootstrap UCL	1.708
95% BCA Bootstrap UCL	1.712		
90% Chebyshev(Mean, Sd) UCL	1.796	95% Chebyshev(Mean, Sd) UCL	1.885
97.5% Chebyshev(Mean, Sd) UCL	2.008	99% Chebyshev(Mean, Sd) UCL	2.251
Suggested UCL to Use			
95% Adjusted Gamma UCL	1.72		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:33:46 AM		
From File	MacLellan Region, Tissue - Labrador tea, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Labrador tea, Manganese (Mn), mg/kg ww			
General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	60.52	Mean	311.4
Maximum	661.9	Median	317.2
SD	167.6	Std. Error of Mean	33.52
Coefficient of Variation	0.538	Skewness	0.578
Normal GOF Test			
Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	368.8	95% Adjusted-CLT UCL (Chen-1995)	370.7
		95% Modified-t UCL (Johnson-1978)	369.4
Gamma GOF Test			
A-D Test Statistic	0.321	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.106	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.176	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.338	k star (bias corrected MLE)	2.964
Theta hat (MLE)	93.31	Theta star (bias corrected MLE)	105.1
nu hat (MLE)	166.9	nu star (bias corrected)	148.2
MLE Mean (bias corrected)	311.4	MLE Sd (bias corrected)	180.9
		Approximate Chi Square Value (0.05)	121.1
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	119.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	381.3	95% Adjusted Gamma UCL (use when n<50)	386.6

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.135	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	4.103	Mean of logged Data	5.584
Maximum of Logged Data	6.495	SD of logged Data	0.602
Assuming Lognormal Distribution			
95% H-UCL	410.6	90% Chebyshev (MVUE) UCL	437.4
95% Chebyshev (MVUE) UCL	492.2	97.5% Chebyshev (MVUE) UCL	568.3
99% Chebyshev (MVUE) UCL	717.7		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	366.6	95% Jackknife UCL	368.8
95% Standard Bootstrap UCL	365.8	95% Bootstrap-t UCL	372.6
95% Hall's Bootstrap UCL	373.5	95% Percentile Bootstrap UCL	366.6
95% BCA Bootstrap UCL	369.1		
90% Chebyshev(Mean, Sd) UCL	412	95% Chebyshev(Mean, Sd) UCL	457.6
97.5% Chebyshev(Mean, Sd) UCL	520.8	99% Chebyshev(Mean, Sd) UCL	645
Suggested UCL to Use			
95% Student's-t UCL	368.8		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:34:26 AM		
From File	MacLellan Region, Tissue - Labrador tea, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Labrador tea, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	23
Number of Detects	2	Number of Non-Detects	23
Number of Distinct Detects	2	Number of Distinct Non-Detects	21
Minimum Detect	0.0298	Minimum Non-Detect	0.0194
Maximum Detect	0.0307	Maximum Non-Detect	0.0301
Variance Detects	4.3245E-7	Percent Non-Detects	92%
Mean Detects	0.0302	SD Detects	6.5761E-4
Median Detects	0.0302	CV Detects	0.0218
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.499	SD of Logged Detects	0.0218

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0203	KM Standard Error of Mean	8.4774E-4
KM SD	0.00297	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0217	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0217	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0228	95% KM Chebyshev UCL	0.024
97.5% KM Chebyshev UCL	0.0256	99% KM Chebyshev UCL	0.0287

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	4225	k star (bias corrected MLE)	N/A
Theta hat (MLE)	7.1544E-6	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	16899	nu star (bias corrected)	N/A
Mean (detects)	0.0302		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0203	SD (KM)	0.00297

Variance (KM)	8.7969E-6	SE of Mean (KM)	8.4774E-4
k hat (KM)	46.77	k star (KM)	41.19
nu hat (KM)	2339	nu star (KM)	2059
theta hat (KM)	4.3369E-4	theta star (KM)	4.9251E-4
80% gamma percentile (KM)	0.0229	90% gamma percentile (KM)	0.0244
95% gamma percentile (KM)	0.0257	99% gamma percentile (KM)	0.0284
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0395
Approximate Chi Square Value (N/A, α)	1955	Adjusted Chi Square Value (N/A, β)	1948
95% Gamma Approximate KM-UCL (use when n>=50)	0.0214	95% Gamma Adjusted KM-UCL (use when n<50)	0.0214
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0272	Mean in Log Scale	-3.606
SD in Original Scale	9.6147E-4	SD in Log Scale	0.0338
95% t UCL (assumes normality of ROS data)	0.0275	95% Percentile Bootstrap UCL	0.0275
95% BCA Bootstrap UCL	0.0277	95% Bootstrap t UCL	0.0282
95% H-UCL (Log ROS)	N/A		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.906	KM Geo Mean	0.0201
KM SD (logged)	0.121	95% Critical H Value (KM-Log)	1.72
KM Standard Error of Mean (logged)	0.0347	95% H-UCL (KM -Log)	0.0211
KM SD (logged)	0.121	95% Critical H Value (KM-Log)	1.72
KM Standard Error of Mean (logged)	0.0347		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0138	Mean in Log Scale	-4.327
SD in Original Scale	0.00507	SD in Log Scale	0.264
95% t UCL (Assumes normality)	0.0155	95% H-Stat UCL	0.0151
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0217	KM H-UCL	0.0211
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:35:06 AM		
From File	MacLellan Region, Tissue - Labrador tea, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Labrador tea, Nickel (Ni), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.307	Mean	1.668
Maximum	8.58	Median	0.975
SD	1.818	Std. Error of Mean	0.364
Coefficient of Variation	1.09	Skewness	2.577

Normal GOF Test			
Shapiro Wilk Test Statistic	0.71	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.29	95% Adjusted-CLT UCL (Chen-1995)	2.466
		95% Modified-t UCL (Johnson-1978)	2.321

Gamma GOF Test			
A-D Test Statistic	0.634	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.765	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.146	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.345	k star (bias corrected MLE)	1.21
Theta hat (MLE)	1.24	Theta star (bias corrected MLE)	1.378
nu hat (MLE)	67.24	nu star (bias corrected)	60.51
MLE Mean (bias corrected)	1.668	MLE Sd (bias corrected)	1.516
		Approximate Chi Square Value (0.05)	43.62
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	42.64

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	2.313	95% Adjusted Gamma UCL (use when n<50)	2.367

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0924	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.182	Mean of logged Data	0.0957
Maximum of Logged Data	2.149	SD of logged Data	0.903
Assuming Lognormal Distribution			
95% H-UCL	2.562	90% Chebyshev (MVUE) UCL	2.596
95% Chebyshev (MVUE) UCL	3.039	97.5% Chebyshev (MVUE) UCL	3.655
99% Chebyshev (MVUE) UCL	4.863		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.266	95% Jackknife UCL	2.29
95% Standard Bootstrap UCL	2.252	95% Bootstrap-t UCL	2.648
95% Hall's Bootstrap UCL	4.662	95% Percentile Bootstrap UCL	2.327
95% BCA Bootstrap UCL	2.48		
90% Chebyshev(Mean, Sd) UCL	2.759	95% Chebyshev(Mean, Sd) UCL	3.253
97.5% Chebyshev(Mean, Sd) UCL	3.939	99% Chebyshev(Mean, Sd) UCL	5.286
Suggested UCL to Use			
95% Adjusted Gamma UCL	2.367		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:35:46 AM
From File	MacLellan Region, Tissue - Labrador tea, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Labrador tea, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.805	Mean	5.625
Maximum	27.2	Median	3.773
SD	5.452	Std. Error of Mean	1.09
Coefficient of Variation	0.969	Skewness	2.837

Normal GOF Test		
Shapiro Wilk Test Statistic	0.695	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.49	95% Adjusted-CLT UCL (Chen-1995)	8.079
		95% Modified-t UCL (Johnson-1978)	7.593

Gamma GOF Test		
A-D Test Statistic	0.688	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.129	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.177	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.777	k star (bias corrected MLE)	1.59
Theta hat (MLE)	3.166	Theta star (bias corrected MLE)	3.537
nu hat (MLE)	88.83	nu star (bias corrected)	79.51
MLE Mean (bias corrected)	5.625	MLE Sd (bias corrected)	4.46
		Approximate Chi Square Value (0.05)	59.96
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	58.8

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	7.458	95% Adjusted Gamma UCL (use when n<50)	7.605

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.117	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.217	Mean of logged Data	1.42
Maximum of Logged Data	3.303	SD of logged Data	0.772
Assuming Lognormal Distribution			
95% H-UCL	7.909	90% Chebyshev (MVUE) UCL	8.259
95% Chebyshev (MVUE) UCL	9.514	97.5% Chebyshev (MVUE) UCL	11.26
99% Chebyshev (MVUE) UCL	14.68		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.418	95% Jackknife UCL	7.49
95% Standard Bootstrap UCL	7.451	95% Bootstrap-t UCL	8.914
95% Hall's Bootstrap UCL	15.41	95% Percentile Bootstrap UCL	7.49
95% BCA Bootstrap UCL	8.243		
90% Chebyshev(Mean, Sd) UCL	8.896	95% Chebyshev(Mean, Sd) UCL	10.38
97.5% Chebyshev(Mean, Sd) UCL	12.43	99% Chebyshev(Mean, Sd) UCL	16.47
Suggested UCL to Use			
95% Adjusted Gamma UCL	7.605		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:36:26 AM
From File	MacLellan Region, Tissue - Labrador tea, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Labrador tea, Thallium (Tl), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	25
Number of Detects	14	Number of Non-Detects	11
Number of Distinct Detects	14	Number of Distinct Non-Detects	11
Minimum Detect	0.0136	Minimum Non-Detect	0.0116
Maximum Detect	0.169	Maximum Non-Detect	0.0163
Variance Detects	0.00223	Percent Non-Detects	44%
Mean Detects	0.0461	SD Detects	0.0472
Median Detects	0.0279	CV Detects	1.024
Skewness Detects	1.998	Kurtosis Detects	3.306
Mean of Logged Detects	-3.422	SD of Logged Detects	0.798

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.693	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0314	KM Standard Error of Mean	0.00788
KM SD	0.0379	95% KM (BCA) UCL	0.0455
95% KM (t) UCL	0.0448	95% KM (Percentile Bootstrap) UCL	0.0458
95% KM (z) UCL	0.0443	95% KM Bootstrap t UCL	0.0637
90% KM Chebyshev UCL	0.055	95% KM Chebyshev UCL	0.0657
97.5% KM Chebyshev UCL	0.0806	99% KM Chebyshev UCL	0.11

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.971	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.75	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.208	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.233	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.593	k star (bias corrected MLE)	1.299
Theta hat (MLE)	0.029	Theta star (bias corrected MLE)	0.0355
nu hat (MLE)	44.59	nu star (bias corrected)	36.37

Mean (detects)	0.0461		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0302
Maximum	0.169	Median	0.0152
SD	0.0393	CV	1.3
k hat (MLE)	1.268	k star (bias corrected MLE)	1.142
Theta hat (MLE)	0.0239	Theta star (bias corrected MLE)	0.0265
nu hat (MLE)	63.38	nu star (bias corrected)	57.1
Adjusted Level of Significance (β)	0.0395		
Approximate Chi Square Value (57.10, α)	40.73	Adjusted Chi Square Value (57.10, β)	39.79
95% Gamma Approximate UCL (use when n>=50)	0.0424	95% Gamma Adjusted UCL (use when n<50)	0.0434
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0314	SD (KM)	0.0379
Variance (KM)	0.00144	SE of Mean (KM)	0.00788
k hat (KM)	0.684	k star (KM)	0.629
nu hat (KM)	34.2	nu star (KM)	31.43
theta hat (KM)	0.0459	theta star (KM)	0.0499
80% gamma percentile (KM)	0.0517	90% gamma percentile (KM)	0.0807
95% gamma percentile (KM)	0.111	99% gamma percentile (KM)	0.184
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (31.43, α)	19.62	Adjusted Chi Square Value (31.43, β)	18.98
95% Gamma Approximate KM-UCL (use when n>=50)	0.0502	95% Gamma Adjusted KM-UCL (use when n<50)	0.0519
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0282	Mean in Log Scale	-4.221
SD in Original Scale	0.0404	SD in Log Scale	1.099
95% t UCL (assumes normality of ROS data)	0.042	95% Percentile Bootstrap UCL	0.043
95% BCA Bootstrap UCL	0.0456	95% Bootstrap t UCL	0.0575
95% H-UCL (Log ROS)	0.0483		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.843	KM Geo Mean	0.0214
KM SD (logged)	0.748	95% Critical H Value (KM-Log)	2.197
KM Standard Error of Mean (logged)	0.157	95% H-UCL (KM -Log)	0.0396

KM SD (logged)	0.748	95% Critical H Value (KM-Log)	2.197
KM Standard Error of Mean (logged)	0.157		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0291	Mean in Log Scale	-4.079
SD in Original Scale	0.0399	SD in Log Scale	0.96
95% t UCL (Assumes normality)	0.0427	95% H-Stat UCL	0.0433
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.0519	95% GROS Adjusted Gamma UCL	0.0434
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:38:25 AM
From File	MacLellan Region, Tissue - Labrador tea, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Labrador tea, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	6.578	Mean	9.071
Maximum	14.26	Median	8.663
SD	1.818	Std. Error of Mean	0.364
Coefficient of Variation	0.2	Skewness	1.429

Normal GOF Test			
Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	9.692	95% Adjusted-CLT UCL (Chen-1995)	9.779
		95% Modified-t UCL (Johnson-1978)	9.71

Gamma GOF Test			
A-D Test Statistic	0.721	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.153	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	29.29	k star (bias corrected MLE)	25.81
Theta hat (MLE)	0.31	Theta star (bias corrected MLE)	0.351
nu hat (MLE)	1465	nu star (bias corrected)	1290
MLE Mean (bias corrected)	9.071	MLE Sd (bias corrected)	1.786
		Approximate Chi Square Value (0.05)	1208
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	1202

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	9.689	95% Adjusted Gamma UCL (use when n<50)	9.733

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.884	Mean of logged Data	2.188
Maximum of Logged Data	2.657	SD of logged Data	0.184
Assuming Lognormal Distribution			
95% H-UCL	9.686	90% Chebyshev (MVUE) UCL	10.07
95% Chebyshev (MVUE) UCL	10.53	97.5% Chebyshev (MVUE) UCL	11.16
99% Chebyshev (MVUE) UCL	12.41		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	9.668	95% Jackknife UCL	9.692
95% Standard Bootstrap UCL	9.668	95% Bootstrap-t UCL	9.882
95% Hall's Bootstrap UCL	9.952	95% Percentile Bootstrap UCL	9.685
95% BCA Bootstrap UCL	9.772		
90% Chebyshev(Mean, Sd) UCL	10.16	95% Chebyshev(Mean, Sd) UCL	10.66
97.5% Chebyshev(Mean, Sd) UCL	11.34	99% Chebyshev(Mean, Sd) UCL	12.69
Suggested UCL to Use			
95% Adjusted Gamma UCL	9.733		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.10
PROUCL OUTPUTS
CONIFEROUS
AND DECIDUOUS
VEGETATION
TISSUE GORDON
REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:44:19 PM
From File	Gordon Region, Tissue - Browse, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	3	Number of Non-Detects	37
Number of Distinct Detects	3	Number of Distinct Non-Detects	36
Minimum Detect	0.021	Minimum Non-Detect	0.017
Maximum Detect	0.0355	Maximum Non-Detect	0.0347
Variance Detects	5.5944E-5	Percent Non-Detects	92.5%
Mean Detects	0.0293	SD Detects	0.00748
Median Detects	0.0315	CV Detects	0.255
Skewness Detects	-1.185	Kurtosis Detects	N/A
Mean of Logged Detects	-3.554	SD of Logged Detects	0.275

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0183	KM Standard Error of Mean	8.9259E-4
KM SD	0.0038	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0198	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0198	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.021	95% KM Chebyshev UCL	0.0222
97.5% KM Chebyshev UCL	0.0239	99% KM Chebyshev UCL	0.0272

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	21	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0014	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	126	nu star (bias corrected)	N/A

Mean (detects)	0.0293		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0115
Maximum	0.0355	Median	0.01
SD	0.00542	CV	0.473
k hat (MLE)	9.052	k star (bias corrected MLE)	8.39
Theta hat (MLE)	0.00127	Theta star (bias corrected MLE)	0.00137
nu hat (MLE)	724.2	nu star (bias corrected)	671.2
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (671.20, α)	612.1	Adjusted Chi Square Value (671.20, β)	610
95% Gamma Approximate UCL (use when n>=50)	0.0126	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0183	SD (KM)	0.0038
Variance (KM)	1.4456E-5	SE of Mean (KM)	8.9259E-4
k hat (KM)	23.13	k star (KM)	21.41
nu hat (KM)	1851	nu star (KM)	1713
theta hat (KM)	7.9053E-4	theta star (KM)	8.5396E-4
80% gamma percentile (KM)	0.0215	90% gamma percentile (KM)	0.0235
95% gamma percentile (KM)	0.0252	99% gamma percentile (KM)	0.0287
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	1618	Adjusted Chi Square Value (N/A, β)	1615
95% Gamma Approximate KM-UCL (use when n>=50)	0.0194	95% Gamma Adjusted KM-UCL (use when n<50)	0.0194
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0124	Mean in Log Scale	-4.435
SD in Original Scale	0.0052	SD in Log Scale	0.268
95% t UCL (assumes normality of ROS data)	0.0138	95% Percentile Bootstrap UCL	0.0139
95% BCA Bootstrap UCL	0.0145	95% Bootstrap t UCL	0.0162
95% H-UCL (Log ROS)	0.0133		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.017	KM Geo Mean	0.018
KM SD (logged)	0.161	95% Critical H Value (KM-Log)	1.722
KM Standard Error of Mean (logged)	0.0408	95% H-UCL (KM -Log)	0.0191

KM SD (logged)	0.161	95% Critical H Value (KM-Log)	1.722
KM Standard Error of Mean (logged)	0.0408		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0136	Mean in Log Scale	-4.344
SD in Original Scale	0.00528	SD in Log Scale	0.291
95% t UCL (Assumes normality)	0.015	95% H-Stat UCL	0.0147
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0198		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:45:36 PM		
From File	Gordon Region, Tissue - Browse, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Browse, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	2.383	Mean	14.64
Maximum	44.5	Median	12.25
SD	10.54	Std. Error of Mean	1.666
Coefficient of Variation	0.719	Skewness	0.967
Normal GOF Test			
Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.139	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	17.45	95% Adjusted-CLT UCL (Chen-1995)	17.66
		95% Modified-t UCL (Johnson-1978)	17.49
Gamma GOF Test			
A-D Test Statistic	0.549	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.976	k star (bias corrected MLE)	1.845
Theta hat (MLE)	7.411	Theta star (bias corrected MLE)	7.939
nu hat (MLE)	158.1	nu star (bias corrected)	147.6
MLE Mean (bias corrected)	14.64	MLE Sd (bias corrected)	10.78
		Approximate Chi Square Value (0.05)	120.5
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	119.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	17.94	95% Adjusted Gamma UCL (use when n<50)	18.07

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.139	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.868	Mean of logged Data	2.41
Maximum of Logged Data	3.795	SD of logged Data	0.784
Assuming Lognormal Distribution			
95% H-UCL	19.88	90% Chebyshev (MVUE) UCL	21.17
95% Chebyshev (MVUE) UCL	23.97	97.5% Chebyshev (MVUE) UCL	27.85
99% Chebyshev (MVUE) UCL	35.49		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	17.38	95% Jackknife UCL	17.45
95% Standard Bootstrap UCL	17.31	95% Bootstrap-t UCL	17.68
95% Hall's Bootstrap UCL	17.73	95% Percentile Bootstrap UCL	17.52
95% BCA Bootstrap UCL	17.59		
90% Chebyshev(Mean, Sd) UCL	19.64	95% Chebyshev(Mean, Sd) UCL	21.91
97.5% Chebyshev(Mean, Sd) UCL	25.05	99% Chebyshev(Mean, Sd) UCL	31.22
Suggested UCL to Use			
95% Adjusted Gamma UCL	18.07		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:46:54 PM
From File	Gordon Region, Tissue - Browse, Beryllium (Be), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Beryllium (Be), mg/kg ww

General Statistics

Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	1	Number of Non-Detects	39
Number of Distinct Detects	1	Number of Distinct Non-Detects	38

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Browse, Beryllium (Be), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:49:29 PM
From File	Gordon Region, Tissue - Browse, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	8	Number of Non-Detects	32
Number of Distinct Detects	8	Number of Distinct Non-Detects	31
Minimum Detect	0.0155	Minimum Non-Detect	0.00678
Maximum Detect	0.316	Maximum Non-Detect	0.0139
Variance Detects	0.0083	Percent Non-Detects	80%
Mean Detects	0.128	SD Detects	0.0911
Median Detects	0.113	CV Detects	0.715
Skewness Detects	1.261	Kurtosis Detects	2.251
Mean of Logged Detects	-2.333	SD of Logged Detects	0.891

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0309	KM Standard Error of Mean	0.0104
KM SD	0.0615	95% KM (BCA) UCL	0.0491
95% KM (t) UCL	0.0484	95% KM (Percentile Bootstrap) UCL	0.0477
95% KM (z) UCL	0.048	95% KM Bootstrap t UCL	0.0537
90% KM Chebyshev UCL	0.0621	95% KM Chebyshev UCL	0.0763
97.5% KM Chebyshev UCL	0.0959	99% KM Chebyshev UCL	0.134

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.227	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.176	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.298	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.978	k star (bias corrected MLE)	1.319
Theta hat (MLE)	0.0645	Theta star (bias corrected MLE)	0.0967
nu hat (MLE)	31.64	nu star (bias corrected)	21.11

Mean (detects)	0.128		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0335
Maximum	0.316	Median	0.01
SD	0.0613	CV	1.829
k hat (MLE)	0.788	k star (bias corrected MLE)	0.746
Theta hat (MLE)	0.0425	Theta star (bias corrected MLE)	0.0449
nu hat (MLE)	63.04	nu star (bias corrected)	59.65
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (59.65, α)	42.89	Adjusted Chi Square Value (59.65, β)	42.36
95% Gamma Approximate UCL (use when n>=50)	0.0466	95% Gamma Adjusted UCL (use when n<50)	0.0472
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0309	SD (KM)	0.0615
Variance (KM)	0.00379	SE of Mean (KM)	0.0104
k hat (KM)	0.253	k star (KM)	0.25
nu hat (KM)	20.21	nu star (KM)	20.03
theta hat (KM)	0.122	theta star (KM)	0.124
80% gamma percentile (KM)	0.0449	90% gamma percentile (KM)	0.0928
95% gamma percentile (KM)	0.15	99% gamma percentile (KM)	0.301
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (20.03, α)	10.87	Adjusted Chi Square Value (20.03, β)	10.62
95% Gamma Approximate KM-UCL (use when n>=50)	0.057	95% Gamma Adjusted KM-UCL (use when n<50)	0.0583
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0281	Mean in Log Scale	-5.059
SD in Original Scale	0.0634	SD in Log Scale	1.441
95% t UCL (assumes normality of ROS data)	0.045	95% Percentile Bootstrap UCL	0.0456
95% BCA Bootstrap UCL	0.0499	95% Bootstrap t UCL	0.056
95% H-UCL (Log ROS)	0.0356		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.462	KM Geo Mean	0.0115
KM SD (logged)	1.128	95% Critical H Value (KM-Log)	2.56
KM Standard Error of Mean (logged)	0.191	95% H-UCL (KM -Log)	0.0346

KM SD (logged)	1.128	95% Critical H Value (KM-Log)	2.56
KM Standard Error of Mean (logged)	0.191		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0293	Mean in Log Scale	-4.756
SD in Original Scale	0.063	SD in Log Scale	1.293
95% t UCL (Assumes normality)	0.0461	95% H-Stat UCL	0.0352
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0484		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:50:47 PM
From File	Gordon Region, Tissue - Browse, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	17	Number of Non-Detects	23
Number of Distinct Detects	17	Number of Distinct Non-Detects	22
Minimum Detect	0.0567	Minimum Non-Detect	0.0395
Maximum Detect	0.7	Maximum Non-Detect	0.0693
Variance Detects	0.0344	Percent Non-Detects	57.5%
Mean Detects	0.259	SD Detects	0.185
Median Detects	0.22	CV Detects	0.717
Skewness Detects	1.193	Kurtosis Detects	0.854
Mean of Logged Detects	-1.594	SD of Logged Detects	0.735

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.183	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.207	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.133	KM Standard Error of Mean	0.026
KM SD	0.16	95% KM (BCA) UCL	0.18
95% KM (t) UCL	0.177	95% KM (Percentile Bootstrap) UCL	0.177
95% KM (z) UCL	0.176	95% KM Bootstrap t UCL	0.188
90% KM Chebyshev UCL	0.211	95% KM Chebyshev UCL	0.246
97.5% KM Chebyshev UCL	0.295	99% KM Chebyshev UCL	0.392

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.202	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0967	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.211	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.221	k star (bias corrected MLE)	1.869
Theta hat (MLE)	0.116	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	75.53	nu star (bias corrected)	63.53

Mean (detects)	0.259		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.116
Maximum	0.7	Median	0.01
SD	0.172	CV	1.487
k hat (MLE)	0.538	k star (bias corrected MLE)	0.514
Theta hat (MLE)	0.215	Theta star (bias corrected MLE)	0.225
nu hat (MLE)	43	nu star (bias corrected)	41.11
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (41.11, α)	27.42	Adjusted Chi Square Value (41.11, β)	27
95% Gamma Approximate UCL (use when n>=50)	0.173	95% Gamma Adjusted UCL (use when n<50)	0.176
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.133	SD (KM)	0.16
Variance (KM)	0.0255	SE of Mean (KM)	0.026
k hat (KM)	0.691	k star (KM)	0.656
nu hat (KM)	55.28	nu star (KM)	52.47
theta hat (KM)	0.192	theta star (KM)	0.202
80% gamma percentile (KM)	0.219	90% gamma percentile (KM)	0.338
95% gamma percentile (KM)	0.463	99% gamma percentile (KM)	0.761
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (52.47, α)	36.83	Adjusted Chi Square Value (52.47, β)	36.34
95% Gamma Approximate KM-UCL (use when n>=50)	0.189	95% Gamma Adjusted KM-UCL (use when n<50)	0.192
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0931	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.207	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.125	Mean in Log Scale	-2.779
SD in Original Scale	0.166	SD in Log Scale	1.138
95% t UCL (assumes normality of ROS data)	0.169	95% Percentile Bootstrap UCL	0.17
95% BCA Bootstrap UCL	0.175	95% Bootstrap t UCL	0.185
95% H-UCL (Log ROS)	0.19		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.534	KM Geo Mean	0.0793
KM SD (logged)	0.933	95% Critical H Value (KM-Log)	2.331
KM Standard Error of Mean (logged)	0.152	95% H-UCL (KM -Log)	0.174

KM SD (logged)	0.933	95% Critical H Value (KM-Log)	2.331
KM Standard Error of Mean (logged)	0.152		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.124	Mean in Log Scale	-2.804
SD in Original Scale	0.167	SD in Log Scale	1.159
95% t UCL (Assumes normality)	0.169	95% H-Stat UCL	0.192
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.177		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:52:05 PM
From File	Gordon Region, Tissue - Browse, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Copper (Cu), mg/kg ww

General Statistics

Total Number of Observations	40	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	0.639	Mean	1.665
Maximum	4.67	Median	1.295
SD	0.976	Std. Error of Mean	0.154
Coefficient of Variation	0.586	Skewness	1.419

Normal GOF Test

Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.94	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.183	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.139	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.925	95% Adjusted-CLT UCL (Chen-1995)	1.956
		95% Modified-t UCL (Johnson-1978)	1.931

Gamma GOF Test

A-D Test Statistic	0.824	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.134	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.14	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.68	k star (bias corrected MLE)	3.421
Theta hat (MLE)	0.453	Theta star (bias corrected MLE)	0.487
nu hat (MLE)	294.4	nu star (bias corrected)	273.7
MLE Mean (bias corrected)	1.665	MLE Sd (bias corrected)	0.9
		Approximate Chi Square Value (0.05)	236.3
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	235

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.928	95% Adjusted Gamma UCL (use when n<50)	1.939

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.139	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.448	Mean of logged Data	0.368
Maximum of Logged Data	1.541	SD of logged Data	0.524
Assuming Lognormal Distribution			
95% H-UCL	1.951	90% Chebyshev (MVUE) UCL	2.083
95% Chebyshev (MVUE) UCL	2.279	97.5% Chebyshev (MVUE) UCL	2.551
99% Chebyshev (MVUE) UCL	3.085		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.919	95% Jackknife UCL	1.925
95% Standard Bootstrap UCL	1.917	95% Bootstrap-t UCL	1.98
95% Hall's Bootstrap UCL	1.946	95% Percentile Bootstrap UCL	1.914
95% BCA Bootstrap UCL	1.939		
90% Chebyshev(Mean, Sd) UCL	2.128	95% Chebyshev(Mean, Sd) UCL	2.338
97.5% Chebyshev(Mean, Sd) UCL	2.629	99% Chebyshev(Mean, Sd) UCL	3.201
Suggested UCL to Use			
95% Adjusted Gamma UCL	1.939		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:53:23 PM
From File	Gordon Region, Tissue - Browse, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	1	Number of Non-Detects	39
Number of Distinct Detects	1	Number of Distinct Non-Detects	38

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Browse, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:54:40 PM
From File	Gordon Region, Tissue - Browse, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	17.78	Mean	305.8
Maximum	1858	Median	246.2
SD	325.2	Std. Error of Mean	51.42
Coefficient of Variation	1.064	Skewness	3.002

Normal GOF Test		
Shapiro Wilk Test Statistic	0.729	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.94	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.139	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	392.4	95% Adjusted-CLT UCL (Chen-1995)	416.4
		95% Modified-t UCL (Johnson-1978)	396.5

Gamma GOF Test		
A-D Test Statistic	0.516	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.776	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.113	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.143	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.121	k star (bias corrected MLE)	1.053
Theta hat (MLE)	272.8	Theta star (bias corrected MLE)	290.3
nu hat (MLE)	89.65	nu star (bias corrected)	84.26
MLE Mean (bias corrected)	305.8	MLE Sd (bias corrected)	297.9
		Approximate Chi Square Value (0.05)	64.11
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	63.45

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	401.9	95% Adjusted Gamma UCL (use when n<50)	406.1

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.139	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.878	Mean of logged Data	5.214
Maximum of Logged Data	7.527	SD of logged Data	1.126
Assuming Lognormal Distribution			
95% H-UCL	550.2	90% Chebyshev (MVUE) UCL	555.3
95% Chebyshev (MVUE) UCL	653.5	97.5% Chebyshev (MVUE) UCL	789.9
99% Chebyshev (MVUE) UCL	1058		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	390.3	95% Jackknife UCL	392.4
95% Standard Bootstrap UCL	388.3	95% Bootstrap-t UCL	443.9
95% Hall's Bootstrap UCL	794.3	95% Percentile Bootstrap UCL	394.2
95% BCA Bootstrap UCL	427.1		
90% Chebyshev(Mean, Sd) UCL	460	95% Chebyshev(Mean, Sd) UCL	529.9
97.5% Chebyshev(Mean, Sd) UCL	626.9	99% Chebyshev(Mean, Sd) UCL	817.4
Suggested UCL to Use			
95% Adjusted Gamma UCL	406.1		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:55:58 PM		
From File	Gordon Region, Tissue - Browse, Mercury (Hg), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Browse, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	1	Number of Non-Detects	39
Number of Distinct Detects	1	Number of Distinct Non-Detects	38

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Browse, Mercury (Hg), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:57:16 PM		
From File	Gordon Region, Tissue - Browse, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Browse, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	39
Number of Detects	15	Number of Non-Detects	25
Number of Distinct Detects	15	Number of Distinct Non-Detects	24
Minimum Detect	0.0176	Minimum Non-Detect	0.0198
Maximum Detect	7.298	Maximum Non-Detect	0.0347
Variance Detects	3.469	Percent Non-Detects	62.5%
Mean Detects	0.642	SD Detects	1.862
Median Detects	0.105	CV Detects	2.9
Skewness Detects	3.734	Kurtosis Detects	14.16
Mean of Logged Detects	-2.232	SD of Logged Detects	1.606

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.37	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.442	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.252	KM Standard Error of Mean	0.187
KM SD	1.142	95% KM (BCA) UCL	0.6
95% KM (t) UCL	0.567	95% KM (Percentile Bootstrap) UCL	0.608
95% KM (z) UCL	0.56	95% KM Bootstrap t UCL	4.843
90% KM Chebyshev UCL	0.813	95% KM Chebyshev UCL	1.067
97.5% KM Chebyshev UCL	1.42	99% KM Chebyshev UCL	2.113

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.095	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.82	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.329	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.238	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.372	k star (bias corrected MLE)	0.342
Theta hat (MLE)	1.725	Theta star (bias corrected MLE)	1.877
nu hat (MLE)	11.16	nu star (bias corrected)	10.26

Mean (detects)	0.642		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.247
Maximum	7.298	Median	0.01
SD	1.158	CV	4.688
k hat (MLE)	0.298	k star (bias corrected MLE)	0.292
Theta hat (MLE)	0.829	Theta star (bias corrected MLE)	0.845
nu hat (MLE)	23.84	nu star (bias corrected)	23.38
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (23.38, α)	13.38	Adjusted Chi Square Value (23.38, β)	13.09
95% Gamma Approximate UCL (use when n>=50)	0.432	95% Gamma Adjusted UCL (use when n<50)	0.441
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.252	SD (KM)	1.142
Variance (KM)	1.305	SE of Mean (KM)	0.187
k hat (KM)	0.0488	k star (KM)	0.0618
nu hat (KM)	3.904	nu star (KM)	4.945
theta hat (KM)	5.171	theta star (KM)	4.083
80% gamma percentile (KM)	0.0662	90% gamma percentile (KM)	0.489
95% gamma percentile (KM)	1.423	99% gamma percentile (KM)	5.027
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.94, α)	1.127	Adjusted Chi Square Value (4.94, β)	1.061
95% Gamma Approximate KM-UCL (use when n>=50)	1.108	95% Gamma Adjusted KM-UCL (use when n<50)	1.176
95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.245	Mean in Log Scale	-4.041
SD in Original Scale	1.159	SD in Log Scale	1.728
95% t UCL (assumes normality of ROS data)	0.553	95% Percentile Bootstrap UCL	0.598
95% BCA Bootstrap UCL	0.822	95% Bootstrap t UCL	4.643
95% H-UCL (Log ROS)	0.199		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.332	KM Geo Mean	0.0357
KM SD (logged)	1.278	95% Critical H Value (KM-Log)	2.751

KM Standard Error of Mean (logged)	0.211	95% H-UCL (KM -Log)	0.142
KM SD (logged)	1.278	95% Critical H Value (KM-Log)	2.751
KM Standard Error of Mean (logged)	0.211		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.249	Mean in Log Scale	-3.577
SD in Original Scale	1.158	SD in Log Scale	1.433
95% t UCL (Assumes normality)	0.557	95% H-Stat UCL	0.154
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	1.067		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:58:34 PM		
From File	Gordon Region, Tissue - Browse, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Browse, Nickel (Ni), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	40
Number of Detects	31	Number of Non-Detects	9
Number of Distinct Detects	31	Number of Distinct Non-Detects	9
Minimum Detect	0.224	Minimum Non-Detect	0.198
Maximum Detect	1.563	Maximum Non-Detect	0.347
Variance Detects	0.182	Percent Non-Detects	22.5%
Mean Detects	0.675	SD Detects	0.427
Median Detects	0.51	CV Detects	0.632
Skewness Detects	0.747	Kurtosis Detects	-0.74
Mean of Logged Detects	-0.591	SD of Logged Detects	0.649

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.573	KM Standard Error of Mean	0.0669
KM SD	0.416	95% KM (BCA) UCL	0.681
95% KM (t) UCL	0.685	95% KM (Percentile Bootstrap) UCL	0.688
95% KM (z) UCL	0.683	95% KM Bootstrap t UCL	0.698
90% KM Chebyshev UCL	0.773	95% KM Chebyshev UCL	0.864
97.5% KM Chebyshev UCL	0.99	99% KM Chebyshev UCL	1.238

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.856	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.161	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.159	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.671	k star (bias corrected MLE)	2.434
Theta hat (MLE)	0.253	Theta star (bias corrected MLE)	0.277
nu hat (MLE)	165.6	nu star (bias corrected)	150.9

Mean (detects)	0.675		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.545
Maximum	1.563	Median	0.432
SD	0.448	CV	0.821
k hat (MLE)	1.21	k star (bias corrected MLE)	1.136
Theta hat (MLE)	0.451	Theta star (bias corrected MLE)	0.48
nu hat (MLE)	96.78	nu star (bias corrected)	90.86
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (90.86, α)	69.88	Adjusted Chi Square Value (90.86, β)	69.19
95% Gamma Approximate UCL (use when n>=50)	0.709	95% Gamma Adjusted UCL (use when n<50)	0.716
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.573	SD (KM)	0.416
Variance (KM)	0.173	SE of Mean (KM)	0.0669
k hat (KM)	1.896	k star (KM)	1.771
nu hat (KM)	151.7	nu star (KM)	141.6
theta hat (KM)	0.302	theta star (KM)	0.323
80% gamma percentile (KM)	0.87	90% gamma percentile (KM)	1.146
95% gamma percentile (KM)	1.412	99% gamma percentile (KM)	2.006
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (141.64, α)	115.1	Adjusted Chi Square Value (141.64, β)	114.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.704	95% Gamma Adjusted KM-UCL (use when n<50)	0.71
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.564	Mean in Log Scale	-0.853
SD in Original Scale	0.429	SD in Log Scale	0.763
95% t UCL (assumes normality of ROS data)	0.678	95% Percentile Bootstrap UCL	0.676
95% BCA Bootstrap UCL	0.688	95% Bootstrap t UCL	0.694
95% H-UCL (Log ROS)	0.742		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.801	KM Geo Mean	0.449
KM SD (logged)	0.685	95% Critical H Value (KM-Log)	2.077
KM Standard Error of Mean (logged)	0.11	95% H-UCL (KM -Log)	0.713

KM SD (logged)	0.685	95% Critical H Value (KM-Log)	2.077
KM Standard Error of Mean (logged)	0.11		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.553	Mean in Log Scale	-0.918
SD in Original Scale	0.439	SD in Log Scale	0.842
95% t UCL (Assumes normality)	0.67	95% H-Stat UCL	0.769
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.713		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:59:52 PM
From File	Gordon Region, Tissue - Browse, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	40	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	0.866	Mean	6.799
Maximum	24.78	Median	5.289
SD	5.164	Std. Error of Mean	0.816
Coefficient of Variation	0.759	Skewness	1.432
Normal GOF Test			
Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.139	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.174	95% Adjusted-CLT UCL (Chen-1995)	8.339
		95% Modified-t UCL (Johnson-1978)	8.205
Gamma GOF Test			
A-D Test Statistic	0.205	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.761	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0757	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.142	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.819	k star (bias corrected MLE)	1.699
Theta hat (MLE)	3.738	Theta star (bias corrected MLE)	4.002
nu hat (MLE)	145.5	nu star (bias corrected)	135.9
MLE Mean (bias corrected)	6.799	MLE Sd (bias corrected)	5.216
		Approximate Chi Square Value (0.05)	110
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	109.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	8.402	95% Adjusted Gamma UCL (use when n<50)	8.469

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0948	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.139	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.143	Mean of logged Data	1.617
Maximum of Logged Data	3.21	SD of logged Data	0.836
Assuming Lognormal Distribution			
95% H-UCL	9.636	90% Chebyshev (MVUE) UCL	10.22
95% Chebyshev (MVUE) UCL	11.64	97.5% Chebyshev (MVUE) UCL	13.62
99% Chebyshev (MVUE) UCL	17.51		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.142	95% Jackknife UCL	8.174
95% Standard Bootstrap UCL	8.106	95% Bootstrap-t UCL	8.47
95% Hall's Bootstrap UCL	8.445	95% Percentile Bootstrap UCL	8.139
95% BCA Bootstrap UCL	8.296		
90% Chebyshev(Mean, Sd) UCL	9.248	95% Chebyshev(Mean, Sd) UCL	10.36
97.5% Chebyshev(Mean, Sd) UCL	11.9	99% Chebyshev(Mean, Sd) UCL	14.92
Suggested UCL to Use			
95% Adjusted Gamma UCL	8.469		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:01:10 PM
From File	Gordon Region, Tissue - Browse, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Browse, Thallium (Tl), mg/kg ww

General Statistics

Total Number of Observations	40	Number of Distinct Observations	40
Number of Detects	4	Number of Non-Detects	36
Number of Distinct Detects	4	Number of Distinct Non-Detects	36
Minimum Detect	0.0164	Minimum Non-Detect	0.0102
Maximum Detect	0.0252	Maximum Non-Detect	0.0208
Variance Detects	1.3135E-5	Percent Non-Detects	90%
Mean Detects	0.0205	SD Detects	0.00362
Median Detects	0.0203	CV Detects	0.177
Skewness Detects	0.433	Kurtosis Detects	1.401
Mean of Logged Detects	-3.898	SD of Logged Detects	0.176

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0113	KM Standard Error of Mean	6.2886E-4
KM SD	0.00334	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0123	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0123	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0132	95% KM Chebyshev UCL	0.014
97.5% KM Chebyshev UCL	0.0152	99% KM Chebyshev UCL	0.0175

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.254	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.217	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	43.03	k star (bias corrected MLE)	10.92
Theta hat (MLE)	4.7692E-4	Theta star (bias corrected MLE)	0.00188
nu hat (MLE)	344.2	nu star (bias corrected)	87.38

Mean (detects)	0.0205		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0111
Maximum	0.0252	Median	0.01
SD	0.00335	CV	0.303
k hat (MLE)	17.22	k star (bias corrected MLE)	15.95
Theta hat (MLE)	6.4164E-4	Theta star (bias corrected MLE)	6.9294E-4
nu hat (MLE)	1378	nu star (bias corrected)	1276
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (N/A, α)	1194	Adjusted Chi Square Value (N/A, β)	1191
95% Gamma Approximate UCL (use when n>=50)	0.0118	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0113	SD (KM)	0.00334
Variance (KM)	1.1129E-5	SE of Mean (KM)	6.2886E-4
k hat (KM)	11.45	k star (KM)	10.61
nu hat (KM)	916.1	nu star (KM)	848.7
theta hat (KM)	9.8583E-4	theta star (KM)	0.00106
80% gamma percentile (KM)	0.0141	90% gamma percentile (KM)	0.0159
95% gamma percentile (KM)	0.0175	99% gamma percentile (KM)	0.0209
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (848.72, α)	782.1	Adjusted Chi Square Value (848.72, β)	779.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.0123	95% Gamma Adjusted KM-UCL (use when n<50)	0.0123
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0103	Mean in Log Scale	-4.614
SD in Original Scale	0.0036	SD in Log Scale	0.247
95% t UCL (assumes normality of ROS data)	0.0113	95% Percentile Bootstrap UCL	0.0113
95% BCA Bootstrap UCL	0.0116	95% Bootstrap t UCL	0.012
95% H-UCL (Log ROS)	0.011		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.513	KM Geo Mean	0.011
KM SD (logged)	0.219	95% Critical H Value (KM-Log)	1.748
KM Standard Error of Mean (logged)	0.0415	95% H-UCL (KM -Log)	0.0119

KM SD (logged)	0.219	95% Critical H Value (KM-Log)	1.748
KM Standard Error of Mean (logged)	0.0415		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00872	Mean in Log Scale	-4.819
SD in Original Scale	0.0043	SD in Log Scale	0.358
95% t UCL (Assumes normality)	0.00986	95% H-Stat UCL	0.00956
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0123		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:05:03 PM		
From File	Gordon Region, Tissue - Browse, Zinc (Zn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Browse, Zinc (Zn), mg/kg ww			
General Statistics			
Total Number of Observations	40	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	3.414	Mean	28.09
Maximum	111.7	Median	19.04
SD	25.31	Std. Error of Mean	4.002
Coefficient of Variation	0.901	Skewness	2.064
Normal GOF Test			
Shapiro Wilk Test Statistic	0.732	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.139	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34.83	95% Adjusted-CLT UCL (Chen-1995)	36.06
		95% Modified-t UCL (Johnson-1978)	35.05
Gamma GOF Test			
A-D Test Statistic	1.182	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.761	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.138	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.834	k star (bias corrected MLE)	1.713
Theta hat (MLE)	15.31	Theta star (bias corrected MLE)	16.39
nu hat (MLE)	146.8	nu star (bias corrected)	137.1
MLE Mean (bias corrected)	28.09	MLE Sd (bias corrected)	21.46
		Approximate Chi Square Value (0.05)	111
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	110.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	34.68	95% Adjusted Gamma UCL (use when n<50)	34.95

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0861	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.139	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.228	Mean of logged Data	3.039
Maximum of Logged Data	4.716	SD of logged Data	0.763
Assuming Lognormal Distribution			
95% H-UCL	36.35	90% Chebyshev (MVUE) UCL	38.75
95% Chebyshev (MVUE) UCL	43.76	97.5% Chebyshev (MVUE) UCL	50.72
99% Chebyshev (MVUE) UCL	64.39		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	34.67	95% Jackknife UCL	34.83
95% Standard Bootstrap UCL	34.43	95% Bootstrap-t UCL	37.13
95% Hall's Bootstrap UCL	36.26	95% Percentile Bootstrap UCL	34.98
95% BCA Bootstrap UCL	36.66		
90% Chebyshev(Mean, Sd) UCL	40.09	95% Chebyshev(Mean, Sd) UCL	45.53
97.5% Chebyshev(Mean, Sd) UCL	53.08	99% Chebyshev(Mean, Sd) UCL	67.9
Suggested UCL to Use			
95% Adjusted Gamma UCL	34.95		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.11
PROUCL OUTPUTS
CONIFEROUS AND
DECIDUOUS TISSUE
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:43:40 PM
From File	MacLellan Region, Tissue - Browse, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	37	Number of Distinct Observations	31
Number of Detects	1	Number of Non-Detects	36
Number of Distinct Detects	1	Number of Distinct Non-Detects	30

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Browse, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:44:58 PM		
From File	MacLellan Region, Tissue - Browse, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Browse, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	36
		Number of Missing Observations	0
Minimum	2.237	Mean	14.92
Maximum	58.36	Median	11.31
SD	11.73	Std. Error of Mean	1.928
Coefficient of Variation	0.786	Skewness	1.664
Normal GOF Test			
Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18.17	95% Adjusted-CLT UCL (Chen-1995)	18.65
		95% Modified-t UCL (Johnson-1978)	18.26
Gamma GOF Test			
A-D Test Statistic	0.396	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0996	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.147	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.932	k star (bias corrected MLE)	1.794
Theta hat (MLE)	7.722	Theta star (bias corrected MLE)	8.319
nu hat (MLE)	143	nu star (bias corrected)	132.7
MLE Mean (bias corrected)	14.92	MLE Sd (bias corrected)	11.14
		Approximate Chi Square Value (0.05)	107.1
Adjusted Level of Significance	0.0431	Adjusted Chi Square Value	106.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	18.49	95% Adjusted Gamma UCL (use when n<50)	18.66

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0733	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.144	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.805	Mean of logged Data	2.422
Maximum of Logged Data	4.067	SD of logged Data	0.775
Assuming Lognormal Distribution			
95% H-UCL	20.09	90% Chebyshev (MVUE) UCL	21.42
95% Chebyshev (MVUE) UCL	24.3	97.5% Chebyshev (MVUE) UCL	28.29
99% Chebyshev (MVUE) UCL	36.14		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	18.09	95% Jackknife UCL	18.17
95% Standard Bootstrap UCL	18.01	95% Bootstrap-t UCL	18.92
95% Hall's Bootstrap UCL	19.36	95% Percentile Bootstrap UCL	18.34
95% BCA Bootstrap UCL	18.63		
90% Chebyshev(Mean, Sd) UCL	20.7	95% Chebyshev(Mean, Sd) UCL	23.32
97.5% Chebyshev(Mean, Sd) UCL	26.96	99% Chebyshev(Mean, Sd) UCL	34.1
Suggested UCL to Use			
95% Adjusted Gamma UCL	18.66		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:46:15 PM
From File	MacLellan Region, Tissue - Browse, Beryllium (Be), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Beryllium (Be), mg/kg ww

General Statistics

Total Number of Observations	37	Number of Distinct Observations	32
Number of Detects	2	Number of Non-Detects	35
Number of Distinct Detects	2	Number of Distinct Non-Detects	30
Minimum Detect	0.0316	Minimum Non-Detect	0.019
Maximum Detect	0.0462	Maximum Non-Detect	0.0311
Variance Detects	1.0693E-4	Percent Non-Detects	94.59%
Mean Detects	0.0389	SD Detects	0.0103
Median Detects	0.0389	CV Detects	0.266
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.264	SD of Logged Detects	0.269

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0201	KM Standard Error of Mean	0.00112
KM SD	0.00481	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.022	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0219	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0234	95% KM Chebyshev UCL	0.025
97.5% KM Chebyshev UCL	0.0271	99% KM Chebyshev UCL	0.0312

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	27.98	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00139	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	111.9	nu star (bias corrected)	N/A
Mean (detects)	0.0389		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0201	SD (KM)	0.00481

Variance (KM)	2.3163E-5	SE of Mean (KM)	0.00112
k hat (KM)	17.4	k star (KM)	16.01
nu hat (KM)	1288	nu star (KM)	1185
theta hat (KM)	0.00115	theta star (KM)	0.00125
80% gamma percentile (KM)	0.0241	90% gamma percentile (KM)	0.0267
95% gamma percentile (KM)	0.029	99% gamma percentile (KM)	0.0336
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0431
Approximate Chi Square Value (N/A, α)	1106	Adjusted Chi Square Value (N/A, β)	1102
95% Gamma Approximate KM-UCL (use when n>=50)	0.0215	95% Gamma Adjusted KM-UCL (use when n<50)	0.0216
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00496	Mean in Log Scale	-5.701
SD in Original Scale	0.00845	SD in Log Scale	0.652
95% t UCL (assumes normality of ROS data)	0.00731	95% Percentile Bootstrap UCL	0.00741
95% BCA Bootstrap UCL	0.00861	95% Bootstrap t UCL	0.0258
95% H-UCL (Log ROS)	0.00516		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.926	KM Geo Mean	0.0197
KM SD (logged)	0.164	95% Critical H Value (KM-Log)	1.72
KM Standard Error of Mean (logged)	0.0382	95% H-UCL (KM -Log)	0.021
KM SD (logged)	0.164	95% Critical H Value (KM-Log)	1.72
KM Standard Error of Mean (logged)	0.0382		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0136	Mean in Log Scale	-4.356
SD in Original Scale	0.00651	SD in Log Scale	0.289
95% t UCL (Assumes normality)	0.0154	95% H-Stat UCL	0.0146
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.022	KM H-UCL	0.021
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:48:50 PM		
From File	MacLellan Region, Tissue - Browse, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Browse, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	37	Number of Distinct Observations	33
Number of Detects	11	Number of Non-Detects	26
Number of Distinct Detects	11	Number of Distinct Non-Detects	22
Minimum Detect	0.0383	Minimum Non-Detect	0.0079
Maximum Detect	0.582	Maximum Non-Detect	0.0124
Variance Detects	0.0242	Percent Non-Detects	70.27%
Mean Detects	0.129	SD Detects	0.156
Median Detects	0.0795	CV Detects	1.21
Skewness Detects	2.944	Kurtosis Detects	9.078
Mean of Logged Detects	-2.401	SD of Logged Detects	0.76

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.564	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.382	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0438	KM Standard Error of Mean	0.0169
KM SD	0.098	95% KM (BCA) UCL	0.0783
95% KM (t) UCL	0.0724	95% KM (Percentile Bootstrap) UCL	0.0741
95% KM (z) UCL	0.0716	95% KM Bootstrap t UCL	0.113
90% KM Chebyshev UCL	0.0945	95% KM Chebyshev UCL	0.117
97.5% KM Chebyshev UCL	0.149	99% KM Chebyshev UCL	0.212

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.044	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.742	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.313	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.26	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.572	k star (bias corrected MLE)	1.204
Theta hat (MLE)	0.0819	Theta star (bias corrected MLE)	0.107
nu hat (MLE)	34.58	nu star (bias corrected)	26.48

Mean (detects)	0.129		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0453
Maximum	0.582	Median	0.01
SD	0.0988	CV	2.181
k hat (MLE)	0.706	k star (bias corrected MLE)	0.667
Theta hat (MLE)	0.0642	Theta star (bias corrected MLE)	0.068
nu hat (MLE)	52.23	nu star (bias corrected)	49.33
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (49.33, α)	34.2	Adjusted Chi Square Value (49.33, β)	33.65
95% Gamma Approximate UCL (use when n>=50)	0.0653	95% Gamma Adjusted UCL (use when n<50)	0.0664
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0438	SD (KM)	0.098
Variance (KM)	0.0096	SE of Mean (KM)	0.0169
k hat (KM)	0.2	k star (KM)	0.202
nu hat (KM)	14.8	nu star (KM)	14.93
theta hat (KM)	0.219	theta star (KM)	0.217
80% gamma percentile (KM)	0.058	90% gamma percentile (KM)	0.133
95% gamma percentile (KM)	0.225	99% gamma percentile (KM)	0.48
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (14.93, α)	7.214	Adjusted Chi Square Value (14.93, β)	6.981
95% Gamma Approximate KM-UCL (use when n>=50)	0.0907	95% Gamma Adjusted KM-UCL (use when n<50)	0.0937
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.248	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0433	Mean in Log Scale	-4.218
SD in Original Scale	0.0996	SD in Log Scale	1.29
95% t UCL (assumes normality of ROS data)	0.0709	95% Percentile Bootstrap UCL	0.0732
95% BCA Bootstrap UCL	0.0888	95% Bootstrap t UCL	0.118
95% H-UCL (Log ROS)	0.061		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.115	KM Geo Mean	0.0163
KM SD (logged)	1.183	95% Critical H Value (KM-Log)	2.607
KM Standard Error of Mean (logged)	0.204	95% H-UCL (KM -Log)	0.055

KM SD (logged)	1.183	95% Critical H Value (KM-Log)	2.607
KM Standard Error of Mean (logged)	0.204		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0417	Mean in Log Scale	-4.459
SD in Original Scale	0.1	SD in Log Scale	1.418
95% t UCL (Assumes normality)	0.0695	95% H-Stat UCL	0.0629
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.055		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:50:08 PM
From File	MacLellan Region, Tissue - Browse, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	37	Number of Distinct Observations	33
Number of Detects	15	Number of Non-Detects	22
Number of Distinct Detects	15	Number of Distinct Non-Detects	18
Minimum Detect	0.0407	Minimum Non-Detect	0.0422
Maximum Detect	0.433	Maximum Non-Detect	0.0622
Variance Detects	0.0169	Percent Non-Detects	59.46%
Mean Detects	0.222	SD Detects	0.13
Median Detects	0.241	CV Detects	0.586
Skewness Detects	-0.0351	Kurtosis Detects	-1.288
Mean of Logged Detects	-1.742	SD of Logged Detects	0.789

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.141	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.22	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.114	KM Standard Error of Mean	0.0203
KM SD	0.119	95% KM (BCA) UCL	0.151
95% KM (t) UCL	0.148	95% KM (Percentile Bootstrap) UCL	0.147
95% KM (z) UCL	0.148	95% KM Bootstrap t UCL	0.156
90% KM Chebyshev UCL	0.175	95% KM Chebyshev UCL	0.203
97.5% KM Chebyshev UCL	0.241	99% KM Chebyshev UCL	0.316

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.649	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.224	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.276	k star (bias corrected MLE)	1.865
Theta hat (MLE)	0.0974	Theta star (bias corrected MLE)	0.119
nu hat (MLE)	68.29	nu star (bias corrected)	55.96

Mean (detects)	0.222		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0976
Maximum	0.433	Median	0.0262
SD	0.132	CV	1.351
k hat (MLE)	0.609	k star (bias corrected MLE)	0.577
Theta hat (MLE)	0.16	Theta star (bias corrected MLE)	0.169
nu hat (MLE)	45.04	nu star (bias corrected)	42.72
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (42.72, α)	28.73	Adjusted Chi Square Value (42.72, β)	28.24
95% Gamma Approximate UCL (use when n>=50)	0.145	95% Gamma Adjusted UCL (use when n<50)	0.148
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.114	SD (KM)	0.119
Variance (KM)	0.0143	SE of Mean (KM)	0.0203
k hat (KM)	0.913	k star (KM)	0.857
nu hat (KM)	67.57	nu star (KM)	63.42
theta hat (KM)	0.125	theta star (KM)	0.133
80% gamma percentile (KM)	0.186	90% gamma percentile (KM)	0.273
95% gamma percentile (KM)	0.361	99% gamma percentile (KM)	0.569
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (63.42, α)	46.1	Adjusted Chi Square Value (63.42, β)	45.46
95% Gamma Approximate KM-UCL (use when n>=50)	0.157	95% Gamma Adjusted KM-UCL (use when n<50)	0.159
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.11	Mean in Log Scale	-2.721
SD in Original Scale	0.124	SD in Log Scale	0.971
95% t UCL (assumes normality of ROS data)	0.145	95% Percentile Bootstrap UCL	0.144
95% BCA Bootstrap UCL	0.149	95% Bootstrap t UCL	0.154
95% H-UCL (Log ROS)	0.154		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.608	KM Geo Mean	0.0737
KM SD (logged)	0.865	95% Critical H Value (KM-Log)	2.242
KM Standard Error of Mean (logged)	0.147	95% H-UCL (KM -Log)	0.148

KM SD (logged)	0.865	95% Critical H Value (KM-Log)	2.242
KM Standard Error of Mean (logged)	0.147		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.105	Mean in Log Scale	-2.904
SD in Original Scale	0.127	SD in Log Scale	1.092
95% t UCL (Assumes normality)	0.14	95% H-Stat UCL	0.157
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.148		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:51:26 PM		
From File	MacLellan Region, Tissue - Browse, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Browse, Copper (Cu), mg/kg ww			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	0.822	Mean	1.447
Maximum	3.622	Median	1.324
SD	0.61	Std. Error of Mean	0.1
Coefficient of Variation	0.421	Skewness	1.599
Normal GOF Test			
Shapiro Wilk Test Statistic	0.859	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.152	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.616	95% Adjusted-CLT UCL (Chen-1995)	1.64
		95% Modified-t UCL (Johnson-1978)	1.621
Gamma GOF Test			
A-D Test Statistic	0.655	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.112	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.145	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	7.073	k star (bias corrected MLE)	6.518
Theta hat (MLE)	0.205	Theta star (bias corrected MLE)	0.222
nu hat (MLE)	523.4	nu star (bias corrected)	482.3
MLE Mean (bias corrected)	1.447	MLE Sd (bias corrected)	0.567
		Approximate Chi Square Value (0.05)	432.4
Adjusted Level of Significance	0.0431	Adjusted Chi Square Value	430.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	1.614	95% Adjusted Gamma UCL (use when n<50)	1.622

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0958	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.144	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.197	Mean of logged Data	0.297
Maximum of Logged Data	1.287	SD of logged Data	0.373
Assuming Lognormal Distribution			
95% H-UCL	1.617	90% Chebyshev (MVUE) UCL	1.713
95% Chebyshev (MVUE) UCL	1.836	97.5% Chebyshev (MVUE) UCL	2.007
99% Chebyshev (MVUE) UCL	2.343		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.612	95% Jackknife UCL	1.616
95% Standard Bootstrap UCL	1.607	95% Bootstrap-t UCL	1.645
95% Hall's Bootstrap UCL	1.675	95% Percentile Bootstrap UCL	1.615
95% BCA Bootstrap UCL	1.639		
90% Chebyshev(Mean, Sd) UCL	1.748	95% Chebyshev(Mean, Sd) UCL	1.884
97.5% Chebyshev(Mean, Sd) UCL	2.073	99% Chebyshev(Mean, Sd) UCL	2.445
Suggested UCL to Use			
95% Adjusted Gamma UCL	1.622		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:52:44 PM
From File	MacLellan Region, Tissue - Browse, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	37	Number of Distinct Observations	31
Number of Detects	1	Number of Non-Detects	36
Number of Distinct Detects	1	Number of Distinct Non-Detects	30

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Browse, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:54:01 PM		
From File	MacLellan Region, Tissue - Browse, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Browse, Manganese (Mn), mg/kg ww			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	9.415	Mean	259.3
Maximum	759.5	Median	214.4
SD	193.1	Std. Error of Mean	31.75
Coefficient of Variation	0.745	Skewness	1.308
Normal GOF Test			
Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	312.9	95% Adjusted-CLT UCL (Chen-1995)	318.8
		95% Modified-t UCL (Johnson-1978)	314
Gamma GOF Test			
A-D Test Statistic	0.474	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.764	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0959	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.147	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.641	k star (bias corrected MLE)	1.526
Theta hat (MLE)	158	Theta star (bias corrected MLE)	169.9
nu hat (MLE)	121.4	nu star (bias corrected)	112.9
MLE Mean (bias corrected)	259.3	MLE Sd (bias corrected)	209.9
		Approximate Chi Square Value (0.05)	89.38
Adjusted Level of Significance	0.0431	Adjusted Chi Square Value	88.47
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	327.6	95% Adjusted Gamma UCL (use when n<50)	330.9

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.144	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.242	Mean of logged Data	5.223
Maximum of Logged Data	6.633	SD of logged Data	0.98
Assuming Lognormal Distribution			
95% H-UCL	441.4	90% Chebyshev (MVUE) UCL	458.9
95% Chebyshev (MVUE) UCL	533.5	97.5% Chebyshev (MVUE) UCL	636.9
99% Chebyshev (MVUE) UCL	840.1		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	311.5	95% Jackknife UCL	312.9
95% Standard Bootstrap UCL	312.2	95% Bootstrap-t UCL	322.1
95% Hall's Bootstrap UCL	320.3	95% Percentile Bootstrap UCL	311.5
95% BCA Bootstrap UCL	316.2		
90% Chebyshev(Mean, Sd) UCL	354.5	95% Chebyshev(Mean, Sd) UCL	397.7
97.5% Chebyshev(Mean, Sd) UCL	457.6	99% Chebyshev(Mean, Sd) UCL	575.2
Suggested UCL to Use			
95% Adjusted Gamma UCL	330.9		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:55:19 PM
From File	MacLellan Region, Tissue - Browse, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	37	Number of Distinct Observations	32
Number of Detects	2	Number of Non-Detects	35
Number of Distinct Detects	2	Number of Distinct Non-Detects	30
Minimum Detect	0.00435	Minimum Non-Detect	0.00428
Maximum Detect	0.00887	Maximum Non-Detect	0.0311
Variance Detects	1.0256E-5	Percent Non-Detects	94.59%
Mean Detects	0.00661	SD Detects	0.0032
Median Detects	0.00661	CV Detects	0.485
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.082	SD of Logged Detects	0.505

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00545	KM Standard Error of Mean	0.0014
KM SD	0.00198	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00781	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00775	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00964	95% KM Chebyshev UCL	0.0115
97.5% KM Chebyshev UCL	0.0142	99% KM Chebyshev UCL	0.0194

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.172	k star (bias corrected MLE)	N/A
Theta hat (MLE)	8.0882E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	32.69	nu star (bias corrected)	N/A
Mean (detects)	0.00661		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00545	SD (KM)	0.00198

Variance (KM)	3.9022E-6	SE of Mean (KM)	0.0014
k hat (KM)	7.62	k star (KM)	7.02
nu hat (KM)	563.9	nu star (KM)	519.5
theta hat (KM)	7.1561E-4	theta star (KM)	7.7676E-4
80% gamma percentile (KM)	0.00707	90% gamma percentile (KM)	0.0082
95% gamma percentile (KM)	0.00922	99% gamma percentile (KM)	0.0113
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0431
Approximate Chi Square Value (519.48, α)	467.6	Adjusted Chi Square Value (519.48, β)	465.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.00606	95% Gamma Adjusted KM-UCL (use when n<50)	0.00609
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00401	Mean in Log Scale	-5.55
SD in Original Scale	0.0011	SD in Log Scale	0.242
95% t UCL (assumes normality of ROS data)	0.00431	95% Percentile Bootstrap UCL	0.00431
95% BCA Bootstrap UCL	0.00438	95% Bootstrap t UCL	0.0044
95% H-UCL (Log ROS)	0.0043		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.266	KM Geo Mean	0.00516
KM SD (logged)	0.313	95% Critical H Value (KM-Log)	1.792
KM Standard Error of Mean (logged)	0.221	95% H-UCL (KM -Log)	0.00595
KM SD (logged)	0.313	95% Critical H Value (KM-Log)	1.792
KM Standard Error of Mean (logged)	0.221		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0113	Mean in Log Scale	-4.547
SD in Original Scale	0.0029	SD in Log Scale	0.429
95% t UCL (Assumes normality)	0.0121	95% H-Stat UCL	0.0133
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0115		
Warning: Recommended UCL exceeds the maximum observation			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:56:37 PM		
From File	MacLellan Region, Tissue - Browse, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Browse, Molybdenum (Mo), mg/kg ww			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	31
Number of Detects	7	Number of Non-Detects	30
Number of Distinct Detects	7	Number of Distinct Non-Detects	24
Minimum Detect	0.0232	Minimum Non-Detect	0.019
Maximum Detect	0.151	Maximum Non-Detect	0.0311
Variance Detects	0.00205	Percent Non-Detects	81.08%
Mean Detects	0.0563	SD Detects	0.0453
Median Detects	0.0379	CV Detects	0.804
Skewness Detects	1.973	Kurtosis Detects	3.941
Mean of Logged Detects	-3.086	SD of Logged Detects	0.652
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.753	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0263	KM Standard Error of Mean	0.00415
KM SD	0.0233	95% KM (BCA) UCL	0.0355
95% KM (t) UCL	0.0333	95% KM (Percentile Bootstrap) UCL	0.0337
95% KM (z) UCL	0.0331	95% KM Bootstrap t UCL	0.0423
90% KM Chebyshev UCL	0.0388	95% KM Chebyshev UCL	0.0444
97.5% KM Chebyshev UCL	0.0522	99% KM Chebyshev UCL	0.0676
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.5	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.713	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.314	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.552	k star (bias corrected MLE)	1.554
Theta hat (MLE)	0.022	Theta star (bias corrected MLE)	0.0362
nu hat (MLE)	35.73	nu star (bias corrected)	21.75

Mean (detects)	0.0563		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0188
Maximum	0.151	Median	0.01
SD	0.0261	CV	1.389
k hat (MLE)	1.611	k star (bias corrected MLE)	1.498
Theta hat (MLE)	0.0116	Theta star (bias corrected MLE)	0.0125
nu hat (MLE)	119.2	nu star (bias corrected)	110.9
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (110.88, α)	87.58	Adjusted Chi Square Value (110.88, β)	86.68
95% Gamma Approximate UCL (use when n>=50)	0.0237	95% Gamma Adjusted UCL (use when n<50)	0.024
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0263	SD (KM)	0.0233
Variance (KM)	5.4260E-4	SE of Mean (KM)	0.00415
k hat (KM)	1.277	k star (KM)	1.191
nu hat (KM)	94.47	nu star (KM)	88.15
theta hat (KM)	0.0206	theta star (KM)	0.0221
80% gamma percentile (KM)	0.0417	90% gamma percentile (KM)	0.058
95% gamma percentile (KM)	0.0742	99% gamma percentile (KM)	0.111
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (88.15, α)	67.5	Adjusted Chi Square Value (88.15, β)	66.72
95% Gamma Approximate KM-UCL (use when n>=50)	0.0344	95% Gamma Adjusted KM-UCL (use when n<50)	0.0348
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0138	Mean in Log Scale	-5.148
SD in Original Scale	0.0279	SD in Log Scale	1.097
95% t UCL (assumes normality of ROS data)	0.0215	95% Percentile Bootstrap UCL	0.0219
95% BCA Bootstrap UCL	0.0252	95% Bootstrap t UCL	0.0316
95% H-UCL (Log ROS)	0.0168		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.785	KM Geo Mean	0.0227
KM SD (logged)	0.43	95% Critical H Value (KM-Log)	1.863
KM Standard Error of Mean (logged)	0.0778	95% H-UCL (KM -Log)	0.0285

KM SD (logged)	0.43	95% Critical H Value (KM-Log)	1.863
KM Standard Error of Mean (logged)	0.0778		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0206	Mean in Log Scale	-4.159
SD in Original Scale	0.0255	SD in Log Scale	0.597
95% t UCL (Assumes normality)	0.0276	95% H-Stat UCL	0.0228
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0333		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:57:55 PM		
From File	MacLellan Region, Tissue - Browse, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Browse, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	37
Number of Detects	35	Number of Non-Detects	2
Number of Distinct Detects	35	Number of Distinct Non-Detects	2
Minimum Detect	0.234	Minimum Non-Detect	0.248
Maximum Detect	21.72	Maximum Non-Detect	0.256
Variance Detects	15.95	Percent Non-Detects	5.405%
Mean Detects	2.847	SD Detects	3.993
Median Detects	1.537	CV Detects	1.403
Skewness Detects	3.453	Kurtosis Detects	14.68
Mean of Logged Detects	0.447	SD of Logged Detects	1.081
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.616	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.148	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	2.706	KM Standard Error of Mean	0.646
KM SD	3.873	95% KM (BCA) UCL	3.907
95% KM (t) UCL	3.797	95% KM (Percentile Bootstrap) UCL	3.896
95% KM (z) UCL	3.769	95% KM Bootstrap t UCL	4.698
90% KM Chebyshev UCL	4.644	95% KM Chebyshev UCL	5.522
97.5% KM Chebyshev UCL	6.741	99% KM Chebyshev UCL	9.134
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.866	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.777	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.135	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.968	k star (bias corrected MLE)	0.904
Theta hat (MLE)	2.943	Theta star (bias corrected MLE)	3.151
nu hat (MLE)	67.73	nu star (bias corrected)	63.26

Mean (detects)	2.847		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	2.694
Maximum	21.72	Median	1.392
SD	3.935	CV	1.461
k hat (MLE)	0.735	k star (bias corrected MLE)	0.693
Theta hat (MLE)	3.665	Theta star (bias corrected MLE)	3.885
nu hat (MLE)	54.39	nu star (bias corrected)	51.32
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (51.32, α)	35.87	Adjusted Chi Square Value (51.32, β)	35.3
95% Gamma Approximate UCL (use when n>=50)	3.854	95% Gamma Adjusted UCL (use when n<50)	3.916
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	2.706	SD (KM)	3.873
Variance (KM)	15	SE of Mean (KM)	0.646
k hat (KM)	0.488	k star (KM)	0.466
nu hat (KM)	36.11	nu star (KM)	34.52
theta hat (KM)	5.544	theta star (KM)	5.801
80% gamma percentile (KM)	4.428	90% gamma percentile (KM)	7.425
95% gamma percentile (KM)	10.65	99% gamma percentile (KM)	18.65
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (34.52, α)	22.08	Adjusted Chi Square Value (34.52, β)	21.65
95% Gamma Approximate KM-UCL (use when n>=50)	4.23	95% Gamma Adjusted KM-UCL (use when n<50)	4.315
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0915	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.148	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2.702	Mean in Log Scale	0.324
SD in Original Scale	3.929	SD in Log Scale	1.174
95% t UCL (assumes normality of ROS data)	3.792	95% Percentile Bootstrap UCL	3.848
95% BCA Bootstrap UCL	4.143	95% Bootstrap t UCL	4.725
95% H-UCL (Log ROS)	4.577		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	0.345	KM Geo Mean	1.412
KM SD (logged)	1.122	95% Critical H Value (KM-Log)	2.532
KM Standard Error of Mean (logged)	0.187	95% H-UCL (KM -Log)	4.251

KM SD (logged)	1.122	95% Critical H Value (KM-Log)	2.532
KM Standard Error of Mean (logged)	0.187		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.7	Mean in Log Scale	0.311
SD in Original Scale	3.931	SD in Log Scale	1.199
95% t UCL (Assumes normality)	3.791	95% H-Stat UCL	4.732
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	4.315		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:59:13 PM		
From File	MacLellan Region, Tissue - Browse, Strontium (Sr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Browse, Strontium (Sr), mg/kg ww			
General Statistics			
Total Number of Observations	37	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	1.009	Mean	8.903
Maximum	85.63	Median	4.861
SD	14.3	Std. Error of Mean	2.351
Coefficient of Variation	1.606	Skewness	4.568
Normal GOF Test			
Shapiro Wilk Test Statistic	0.494	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	12.87	95% Adjusted-CLT UCL (Chen-1995)	14.66
		95% Modified-t UCL (Johnson-1978)	13.17
Gamma GOF Test			
A-D Test Statistic	1.332	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.776	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.149	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.05	k star (bias corrected MLE)	0.983
Theta hat (MLE)	8.482	Theta star (bias corrected MLE)	9.061
nu hat (MLE)	77.68	nu star (bias corrected)	72.71
MLE Mean (bias corrected)	8.903	MLE Sd (bias corrected)	8.982
		Approximate Chi Square Value (0.05)	54.08
Adjusted Level of Significance	0.0431	Adjusted Chi Square Value	53.38
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	11.97	95% Adjusted Gamma UCL (use when n<50)	12.13

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.073	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.144	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.00868	Mean of logged Data	1.64
Maximum of Logged Data	4.45	SD of logged Data	0.966
Assuming Lognormal Distribution			
95% H-UCL	12	90% Chebyshev (MVUE) UCL	12.51
95% Chebyshev (MVUE) UCL	14.52	97.5% Chebyshev (MVUE) UCL	17.31
99% Chebyshev (MVUE) UCL	22.78		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	12.77	95% Jackknife UCL	12.87
95% Standard Bootstrap UCL	12.84	95% Bootstrap-t UCL	17.81
95% Hall's Bootstrap UCL	27.49	95% Percentile Bootstrap UCL	13.02
95% BCA Bootstrap UCL	15.47		
90% Chebyshev(Mean, Sd) UCL	15.96	95% Chebyshev(Mean, Sd) UCL	19.15
97.5% Chebyshev(Mean, Sd) UCL	23.59	99% Chebyshev(Mean, Sd) UCL	32.3
Suggested UCL to Use			
95% H-UCL	12		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:00:31 PM
From File	MacLellan Region, Tissue - Browse, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Thallium (Tl), mg/kg ww

General Statistics

Total Number of Observations	37	Number of Distinct Observations	32
Number of Detects	5	Number of Non-Detects	32
Number of Distinct Detects	5	Number of Distinct Non-Detects	27
Minimum Detect	0.0143	Minimum Non-Detect	0.0114
Maximum Detect	0.0454	Maximum Non-Detect	0.0187
Variance Detects	1.6189E-4	Percent Non-Detects	86.49%
Mean Detects	0.0229	SD Detects	0.0127
Median Detects	0.0176	CV Detects	0.554
Skewness Detects	2.106	Kurtosis Detects	4.56
Mean of Logged Detects	-3.868	SD of Logged Detects	0.449

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.694	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.399	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0131	KM Standard Error of Mean	0.00107
KM SD	0.00575	95% KM (BCA) UCL	0.0158
95% KM (t) UCL	0.0149	95% KM (Percentile Bootstrap) UCL	0.0151
95% KM (z) UCL	0.0148	95% KM Bootstrap t UCL	0.0153
90% KM Chebyshev UCL	0.0163	95% KM Chebyshev UCL	0.0177
97.5% KM Chebyshev UCL	0.0197	99% KM Chebyshev UCL	0.0237

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.765	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.681	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.378	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.358	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.51	k star (bias corrected MLE)	2.338
Theta hat (MLE)	0.00416	Theta star (bias corrected MLE)	0.00982
nu hat (MLE)	55.1	nu star (bias corrected)	23.38

Mean (detects)	0.0229		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0117
Maximum	0.0454	Median	0.01
SD	0.00617	CV	0.526
k hat (MLE)	8.277	k star (bias corrected MLE)	7.624
Theta hat (MLE)	0.00142	Theta star (bias corrected MLE)	0.00154
nu hat (MLE)	612.5	nu star (bias corrected)	564.2
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (564.17, α)	510.1	Adjusted Chi Square Value (564.17, β)	507.9
95% Gamma Approximate UCL (use when n>=50)	0.013	95% Gamma Adjusted UCL (use when n<50)	0.0131
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0131	SD (KM)	0.00575
Variance (KM)	3.3093E-5	SE of Mean (KM)	0.00107
k hat (KM)	5.15	k star (KM)	4.75
nu hat (KM)	381.1	nu star (KM)	351.5
theta hat (KM)	0.00253	theta star (KM)	0.00275
80% gamma percentile (KM)	0.0176	90% gamma percentile (KM)	0.0211
95% gamma percentile (KM)	0.0242	99% gamma percentile (KM)	0.0308
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (351.53, α)	309.1	Adjusted Chi Square Value (351.53, β)	307.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.0148	95% Gamma Adjusted KM-UCL (use when n<50)	0.0149
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.783	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.35	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0063	Mean in Log Scale	-5.388
SD in Original Scale	0.00795	SD in Log Scale	0.661
95% t UCL (assumes normality of ROS data)	0.0085	95% Percentile Bootstrap UCL	0.0086
95% BCA Bootstrap UCL	0.0097	95% Bootstrap t UCL	0.0109
95% H-UCL (Log ROS)	0.00712		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.385	KM Geo Mean	0.0125
KM SD (logged)	0.256	95% Critical H Value (KM-Log)	1.762
KM Standard Error of Mean (logged)	0.0481	95% H-UCL (KM -Log)	0.0139

KM SD (logged)	0.256	95% Critical H Value (KM-Log)	1.762
KM Standard Error of Mean (logged)	0.0481		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00931	Mean in Log Scale	-4.798
SD in Original Scale	0.00696	SD in Log Scale	0.415
95% t UCL (Assumes normality)	0.0112	95% H-Stat UCL	0.0102
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM Student's t	0.0143	KM H-UCL	0.0139
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:04:24 PM
From File	MacLellan Region, Tissue - Browse, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Browse, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	37	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	5.864	Mean	30.76
Maximum	94.83	Median	19.26
SD	25.85	Std. Error of Mean	4.249
Coefficient of Variation	0.84	Skewness	1.481
Normal GOF Test			
Shapiro Wilk Test Statistic	0.738	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.286	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.144	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.93	95% Adjusted-CLT UCL (Chen-1995)	38.85
		95% Modified-t UCL (Johnson-1978)	38.11
Gamma GOF Test			
A-D Test Statistic	2.196	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.147	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.962	k star (bias corrected MLE)	1.821
Theta hat (MLE)	15.68	Theta star (bias corrected MLE)	16.9
nu hat (MLE)	145.2	nu star (bias corrected)	134.7
MLE Mean (bias corrected)	30.76	MLE Sd (bias corrected)	22.8
		Approximate Chi Square Value (0.05)	108.9
Adjusted Level of Significance	0.0431	Adjusted Chi Square Value	107.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	38.05	95% Adjusted Gamma UCL (use when n<50)	38.41

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.936	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.144	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.769	Mean of logged Data	3.15
Maximum of Logged Data	4.552	SD of logged Data	0.724
Assuming Lognormal Distribution			
95% H-UCL	39.07	90% Chebyshev (MVUE) UCL	41.79
95% Chebyshev (MVUE) UCL	47.1	97.5% Chebyshev (MVUE) UCL	54.47
99% Chebyshev (MVUE) UCL	68.95		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	37.75	95% Jackknife UCL	37.93
95% Standard Bootstrap UCL	37.49	95% Bootstrap-t UCL	39.57
95% Hall's Bootstrap UCL	38.6	95% Percentile Bootstrap UCL	38.08
95% BCA Bootstrap UCL	38.52		
90% Chebyshev(Mean, Sd) UCL	43.51	95% Chebyshev(Mean, Sd) UCL	49.28
97.5% Chebyshev(Mean, Sd) UCL	57.3	99% Chebyshev(Mean, Sd) UCL	73.04
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	49.28		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.12
PROUCL OUTPUTS
GARDEN PRODUCE TISSUE
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:19:10 AM
From File	MacLellan Region, Tissue - Garden Produce, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Arsenic (As), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	0.00595	Minimum Non-Detect	0.0035
Maximum Detect	0.00655	Maximum Non-Detect	0.0167
Variance Detects	1.8000E-7	Percent Non-Detects	77.78%
Mean Detects	0.00625	SD Detects	4.2426E-4
Median Detects	0.00625	CV Detects	0.0679
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.076	SD of Logged Detects	0.0679

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00488	KM Standard Error of Mean	9.8447E-4
KM SD	0.00139	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00671	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0065	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00783	95% KM Chebyshev UCL	0.00917
97.5% KM Chebyshev UCL	0.011	99% KM Chebyshev UCL	0.0147

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	434	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.4406E-5	Theta star (bias corrected MLE)	N/A

nu hat (MLE)	1736	nu star (bias corrected)	N/A
Mean (detects)	0.00625		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00488	SD (KM)	0.00139
Variance (KM)	1.9384E-6	SE of Mean (KM)	9.8447E-4
k hat (KM)	12.27	k star (KM)	8.251
nu hat (KM)	220.8	nu star (KM)	148.5
theta hat (KM)	3.9753E-4	theta star (KM)	5.9095E-4
80% gamma percentile (KM)	0.00622	90% gamma percentile (KM)	0.00714
95% gamma percentile (KM)	0.00796	99% gamma percentile (KM)	0.00966
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0231
Approximate Chi Square Value (148.52, α)	121.4	Adjusted Chi Square Value (148.52, β)	116.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.00597	95% Gamma Adjusted KM-UCL (use when n<50)	0.00623
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00554	Mean in Log Scale	-5.2
SD in Original Scale	5.0732E-4	SD in Log Scale	0.0902
95% t UCL (assumes normality of ROS data)	0.00585	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	N/A		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.365	KM Geo Mean	0.00468
KM SD (logged)	0.291	95% Critical H Value (KM-Log)	2.002
KM Standard Error of Mean (logged)	0.206	95% H-UCL (KM -Log)	0.006
KM SD (logged)	0.291	95% Critical H Value (KM-Log)	2.002
KM Standard Error of Mean (logged)	0.206		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00543	Mean in Log Scale	-5.332
SD in Original Scale	0.00237	SD in Log Scale	0.558
95% t UCL (Assumes normality)	0.0069	95% H-Stat UCL	0.00895
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00671	KM H-UCL	0.006
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Warning: Recommended UCL exceeds the maximum observation			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:19:50 AM
From File	MacLellan Region, Tissue - Garden Produce, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Barium (Ba), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	8	Number of Non-Detects	1
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.164	Minimum Non-Detect	0.0642
Maximum Detect	3.493	Maximum Non-Detect	0.0642
Variance Detects	1.443	Percent Non-Detects	11.11%
Mean Detects	1.268	SD Detects	1.201
Median Detects	0.972	CV Detects	0.948
Skewness Detects	0.874	Kurtosis Detects	-0.0651
Mean of Logged Detects	-0.297	SD of Logged Detects	1.197

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.134	KM Standard Error of Mean	0.401
KM SD	1.125	95% KM (BCA) UCL	1.728
95% KM (t) UCL	1.879	95% KM (Percentile Bootstrap) UCL	1.754
95% KM (z) UCL	1.793	95% KM Bootstrap t UCL	2.137
90% KM Chebyshev UCL	2.336	95% KM Chebyshev UCL	2.881
97.5% KM Chebyshev UCL	3.637	99% KM Chebyshev UCL	5.122

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.45	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.301	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.073	k star (bias corrected MLE)	0.754
Theta hat (MLE)	1.182	Theta star (bias corrected MLE)	1.682
nu hat (MLE)	17.16	nu star (bias corrected)	12.06
Mean (detects)	1.268		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.128
Maximum	3.493	Median	0.52
SD	1.199	CV	1.063
k hat (MLE)	0.678	k star (bias corrected MLE)	0.526
Theta hat (MLE)	1.664	Theta star (bias corrected MLE)	2.144
nu hat (MLE)	12.2	nu star (bias corrected)	9.467
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (9.47, α)	3.612	Adjusted Chi Square Value (9.47, β)	2.891
95% Gamma Approximate UCL (use when n>=50)	2.957	95% Gamma Adjusted UCL (use when n<50)	3.694
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.134	SD (KM)	1.125
Variance (KM)	1.265	SE of Mean (KM)	0.401
k hat (KM)	1.016	k star (KM)	0.752
nu hat (KM)	18.29	nu star (KM)	13.53
theta hat (KM)	1.116	theta star (KM)	1.509
80% gamma percentile (KM)	1.859	90% gamma percentile (KM)	2.799
95% gamma percentile (KM)	3.762	99% gamma percentile (KM)	6.048
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.53, α)	6.249	Adjusted Chi Square Value (13.53, β)	5.243
95% Gamma Approximate KM-UCL (use when n>=50)	2.455	95% Gamma Adjusted KM-UCL (use when n<50)	2.926
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.131	Mean in Log Scale	-0.62
SD in Original Scale	1.196	SD in Log Scale	1.481
95% t UCL (assumes normality of ROS data)	1.872	95% Percentile Bootstrap UCL	1.766
95% BCA Bootstrap UCL	1.878	95% Bootstrap t UCL	2.136
95% H-UCL (Log ROS)	16.07		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.569	KM Geo Mean	0.566
KM SD (logged)	1.306	95% Critical H Value (KM-Log)	3.957
KM Standard Error of Mean (logged)	0.466	95% H-UCL (KM -Log)	8.267
KM SD (logged)	1.306	95% Critical H Value (KM-Log)	3.957
KM Standard Error of Mean (logged)	0.466		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.13	Mean in Log Scale	-0.646
SD in Original Scale	1.197	SD in Log Scale	1.533
95% t UCL (Assumes normality)	1.872	95% H-Stat UCL	19.74
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.879		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:21:10 AM		
From File	MacLellan Region, Tissue - Garden Produce, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Tissue - Garden Produce, Cadmium (Cd), mg/kg ww			
General Statistics			
Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	7	Number of Non-Detects	2
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	0.00334	Minimum Non-Detect	0.00482
Maximum Detect	0.0143	Maximum Non-Detect	0.00668
Variance Detects	1.4846E-5	Percent Non-Detects	22.22%
Mean Detects	0.00931	SD Detects	0.00385
Median Detects	0.00899	CV Detects	0.414
Skewness Detects	-0.204	Kurtosis Detects	-0.829
Mean of Logged Detects	-4.77	SD of Logged Detects	0.498
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1			
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00798	KM Standard Error of Mean	0.00144
KM SD	0.00401	95% KM (BCA) UCL	0.0107
95% KM (t) UCL	0.0107	95% KM (Percentile Bootstrap) UCL	0.0103
95% KM (z) UCL	0.0104	95% KM Bootstrap t UCL	0.0106
90% KM Chebyshev UCL	0.0123	95% KM Chebyshev UCL	0.0143
97.5% KM Chebyshev UCL	0.017	99% KM Chebyshev UCL	0.0223
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.272	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.167	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	5.565	k star (bias corrected MLE)	3.275
Theta hat (MLE)	0.00167	Theta star (bias corrected MLE)	0.00284
nu hat (MLE)	77.91	nu star (bias corrected)	45.85
Mean (detects)	0.00931		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00334	Mean	0.00946
Maximum	0.0143	Median	0.01
SD	0.00335	CV	0.354
k hat (MLE)	7.067	k star (bias corrected MLE)	4.785
Theta hat (MLE)	0.00134	Theta star (bias corrected MLE)	0.00198
nu hat (MLE)	127.2	nu star (bias corrected)	86.13
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (86.13, α)	65.74	Adjusted Chi Square Value (86.13, β)	61.99
95% Gamma Approximate UCL (use when n>=50)	0.0124	95% Gamma Adjusted UCL (use when n<50)	0.0131
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00798	SD (KM)	0.00401
Variance (KM)	1.6050E-5	SE of Mean (KM)	0.00144
k hat (KM)	3.967	k star (KM)	2.719
nu hat (KM)	71.41	nu star (KM)	48.94
theta hat (KM)	0.00201	theta star (KM)	0.00293
80% gamma percentile (KM)	0.0115	90% gamma percentile (KM)	0.0145
95% gamma percentile (KM)	0.0172	99% gamma percentile (KM)	0.0233
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (48.94, α)	33.88	Adjusted Chi Square Value (48.94, β)	31.26
95% Gamma Approximate KM-UCL (use when n>=50)	0.0115	95% Gamma Adjusted KM-UCL (use when n<50)	0.0125
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00807	Mean in Log Scale	-4.952
SD in Original Scale	0.00414	SD in Log Scale	0.562
95% t UCL (assumes normality of ROS data)	0.0106	95% Percentile Bootstrap UCL	0.0104
95% BCA Bootstrap UCL	0.0103	95% Bootstrap t UCL	0.011
95% H-UCL (Log ROS)	0.0132		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.977	KM Geo Mean	0.0069
KM SD (logged)	0.562	95% Critical H Value (KM-Log)	2.343
KM Standard Error of Mean (logged)	0.202	95% H-UCL (KM -Log)	0.0129
KM SD (logged)	0.562	95% Critical H Value (KM-Log)	2.343
KM Standard Error of Mean (logged)	0.202		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00788	Mean in Log Scale	-5.013
SD in Original Scale	0.00438	SD in Log Scale	0.652
95% t UCL (Assumes normality)	0.0106	95% H-Stat UCL	0.0148
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0107		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:21:50 AM		
From File	MacLellan Region, Tissue - Garden Produce, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Garden Produce, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	1	Number of Non-Detects	8
Number of Distinct Detects	1	Number of Distinct Non-Detects	8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Garden Produce, Cobalt (Co), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:22:30 AM
From File	MacLellan Region, Tissue - Garden Produce, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.292	Mean	0.675
Maximum	1.665	Median	0.521
SD	0.452	Std. Error of Mean	0.151
Coefficient of Variation	0.669	Skewness	1.615

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.803	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.955	95% Adjusted-CLT UCL (Chen-1995)	1.01
		95% Modified-t UCL (Johnson-1978)	0.969

Gamma GOF Test			
A-D Test Statistic	0.513	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.234	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.281	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.265	k star (bias corrected MLE)	2.25
Theta hat (MLE)	0.207	Theta star (bias corrected MLE)	0.3
nu hat (MLE)	58.76	nu star (bias corrected)	40.51
MLE Mean (bias corrected)	0.675	MLE Sd (bias corrected)	0.45

		Approximate Chi Square Value (0.05)	26.92
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	24.61
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	1.016	95% Adjusted Gamma UCL (use when n<50)	1.112
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.231	Mean of logged Data	-0.553
Maximum of Logged Data	0.51	SD of logged Data	0.573
Assuming Lognormal Distribution			
95% H-UCL	1.095	90% Chebyshev (MVUE) UCL	1.051
95% Chebyshev (MVUE) UCL	1.227	97.5% Chebyshev (MVUE) UCL	1.47
99% Chebyshev (MVUE) UCL	1.949		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.923	95% Jackknife UCL	0.955
95% Standard Bootstrap UCL	0.906	95% Bootstrap-t UCL	1.338
95% Hall's Bootstrap UCL	2.053	95% Percentile Bootstrap UCL	0.922
95% BCA Bootstrap UCL	1.039		
90% Chebyshev(Mean, Sd) UCL	1.127	95% Chebyshev(Mean, Sd) UCL	1.332
97.5% Chebyshev(Mean, Sd) UCL	1.616	99% Chebyshev(Mean, Sd) UCL	2.173
Suggested UCL to Use			
95% Adjusted Gamma UCL	1.112		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:23:10 AM
From File	MacLellan Region, Tissue - Garden Produce, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	0.0132	Minimum Non-Detect	0.014
Maximum Detect	0.0195	Maximum Non-Detect	0.0668
Variance Detects	1.9845E-5	Percent Non-Detects	77.78%
Mean Detects	0.0164	SD Detects	0.00445
Median Detects	0.0164	CV Detects	0.272
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-4.131	SD of Logged Detects	0.275

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0148	KM Standard Error of Mean	0.00193
KM SD	0.00273	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0184	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.018	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0206	95% KM Chebyshev UCL	0.0232
97.5% KM Chebyshev UCL	0.0269	99% KM Chebyshev UCL	0.034

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	26.7	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.1343E-4	Theta star (bias corrected MLE)	N/A

nu hat (MLE)	106.8	nu star (bias corrected)	N/A
Mean (detects)	0.0164		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0148	SD (KM)	0.00273
Variance (KM)	7.4419E-6	SE of Mean (KM)	0.00193
k hat (KM)	29.45	k star (KM)	19.71
nu hat (KM)	530.2	nu star (KM)	354.8
theta hat (KM)	5.0266E-4	theta star (KM)	7.5116E-4
80% gamma percentile (KM)	0.0175	90% gamma percentile (KM)	0.0192
95% gamma percentile (KM)	0.0207	99% gamma percentile (KM)	0.0236
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0231
Approximate Chi Square Value (354.77, α)	312.1	Adjusted Chi Square Value (354.77, β)	303.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.0168	95% Gamma Adjusted KM-UCL (use when n<50)	0.0173
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0146	Mean in Log Scale	-4.235
SD in Original Scale	0.00194	SD in Log Scale	0.119
95% t UCL (assumes normality of ROS data)	0.0158	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.0158		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.228	KM Geo Mean	0.0146
KM SD (logged)	0.169	95% Critical H Value (KM-Log)	1.879
KM Standard Error of Mean (logged)	0.119	95% H-UCL (KM -Log)	0.0165
KM SD (logged)	0.169	95% Critical H Value (KM-Log)	1.879
KM Standard Error of Mean (logged)	0.119		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0199	Mean in Log Scale	-4.04
SD in Original Scale	0.00957	SD in Log Scale	0.544
95% t UCL (Assumes normality)	0.0258	95% H-Stat UCL	0.0318
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0184	KM H-UCL	0.0165
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:23:50 AM
From File	MacLellan Region, Tissue - Garden Produce, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Manganese (Mn), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.628	Mean	1.065
Maximum	1.861	Median	1.071
SD	0.431	Std. Error of Mean	0.144
Coefficient of Variation	0.405	Skewness	0.695

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.274	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.332	95% Adjusted-CLT UCL (Chen-1995)	1.337
		95% Modified-t UCL (Johnson-1978)	1.338

Gamma GOF Test

A-D Test Statistic	0.389	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.209	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.28	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.163	k star (bias corrected MLE)	4.85
Theta hat (MLE)	0.149	Theta star (bias corrected MLE)	0.22
nu hat (MLE)	128.9	nu star (bias corrected)	87.29
MLE Mean (bias corrected)	1.065	MLE Sd (bias corrected)	0.484

		Approximate Chi Square Value (0.05)	66.75
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	62.98
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.393	95% Adjusted Gamma UCL (use when n<50)	1.476
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.465	Mean of logged Data	-0.0085
Maximum of Logged Data	0.621	SD of logged Data	0.399
Assuming Lognormal Distribution			
95% H-UCL	1.452	90% Chebyshev (MVUE) UCL	1.493
95% Chebyshev (MVUE) UCL	1.687	97.5% Chebyshev (MVUE) UCL	1.957
99% Chebyshev (MVUE) UCL	2.487		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.301	95% Jackknife UCL	1.332
95% Standard Bootstrap UCL	1.298	95% Bootstrap-t UCL	1.399
95% Hall's Bootstrap UCL	1.339	95% Percentile Bootstrap UCL	1.292
95% BCA Bootstrap UCL	1.341		
90% Chebyshev(Mean, Sd) UCL	1.496	95% Chebyshev(Mean, Sd) UCL	1.692
97.5% Chebyshev(Mean, Sd) UCL	1.963	99% Chebyshev(Mean, Sd) UCL	2.496
Suggested UCL to Use			
95% Student's-t UCL	1.332		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:24:30 AM
From File	MacLellan Region, Tissue - Garden Produce, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.0125	Mean	0.0765
Maximum	0.243	Median	0.0392
SD	0.0786	Std. Error of Mean	0.0262
Coefficient of Variation	1.028	Skewness	1.318

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test		
Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.274	Data appear Normal at 5% Significance Level
Data appear Approximate Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.125	95% Adjusted-CLT UCL (Chen-1995)	0.132
		95% Modified-t UCL (Johnson-1978)	0.127

Gamma GOF Test		
A-D Test Statistic	0.524	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.234	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.286	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.083	k star (bias corrected MLE)	0.796
Theta hat (MLE)	0.0706	Theta star (bias corrected MLE)	0.0961
nu hat (MLE)	19.5	nu star (bias corrected)	14.33
MLE Mean (bias corrected)	0.0765	MLE Sd (bias corrected)	0.0857

		Approximate Chi Square Value (0.05)	6.801
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	5.743
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.161	95% Adjusted Gamma UCL (use when n<50)	0.191
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.212	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.38	Mean of logged Data	-3.098
Maximum of Logged Data	-1.413	SD of logged Data	1.129
Assuming Lognormal Distribution			
95% H-UCL	0.349	90% Chebyshev (MVUE) UCL	0.168
95% Chebyshev (MVUE) UCL	0.209	97.5% Chebyshev (MVUE) UCL	0.266
99% Chebyshev (MVUE) UCL	0.378		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.12	95% Jackknife UCL	0.125
95% Standard Bootstrap UCL	0.118	95% Bootstrap-t UCL	0.159
95% Hall's Bootstrap UCL	0.147	95% Percentile Bootstrap UCL	0.117
95% BCA Bootstrap UCL	0.132		
90% Chebyshev(Mean, Sd) UCL	0.155	95% Chebyshev(Mean, Sd) UCL	0.191
97.5% Chebyshev(Mean, Sd) UCL	0.24	99% Chebyshev(Mean, Sd) UCL	0.337
Suggested UCL to Use			
95% Student's-t UCL	0.125		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:25:10 AM
From File	MacLellan Region, Tissue - Garden Produce, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Nickel (Ni), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	2	Number of Non-Detects	7
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	0.103	Minimum Non-Detect	0.0315
Maximum Detect	0.369	Maximum Non-Detect	0.167
Variance Detects	0.0354	Percent Non-Detects	77.78%
Mean Detects	0.236	SD Detects	0.188
Median Detects	0.236	CV Detects	0.796
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.633	SD of Logged Detects	0.902

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.085	KM Standard Error of Mean	0.0513
KM SD	0.105	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.18	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.169	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.239	95% KM Chebyshev UCL	0.308
97.5% KM Chebyshev UCL	0.405	99% KM Chebyshev UCL	0.595

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.776	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0851	Theta star (bias corrected MLE)	N/A

nu hat (MLE)	11.11	nu star (bias corrected)	N/A
Mean (detects)	0.236		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.085	SD (KM)	0.105
Variance (KM)	0.011	SE of Mean (KM)	0.0513
k hat (KM)	0.658	k star (KM)	0.513
nu hat (KM)	11.85	nu star (KM)	9.234
theta hat (KM)	0.129	theta star (KM)	0.166
80% gamma percentile (KM)	0.14	90% gamma percentile (KM)	0.229
95% gamma percentile (KM)	0.323	99% gamma percentile (KM)	0.556
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0231
Approximate Chi Square Value (9.23, α)	3.469	Adjusted Chi Square Value (9.23, β)	2.766
95% Gamma Approximate KM-UCL (use when n>=50)	0.226	95% Gamma Adjusted KM-UCL (use when n<50)	0.284
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0694	Mean in Log Scale	-3.361
SD in Original Scale	0.116	SD in Log Scale	1.051
95% t UCL (assumes normality of ROS data)	0.141	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.209		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.92	KM Geo Mean	0.0539
KM SD (logged)	0.835	95% Critical H Value (KM-Log)	2.885
KM Standard Error of Mean (logged)	0.455	95% H-UCL (KM -Log)	0.179
KM SD (logged)	0.835	95% Critical H Value (KM-Log)	2.885
KM Standard Error of Mean (logged)	0.455		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0909	Mean in Log Scale	-2.862
SD in Original Scale	0.109	SD in Log Scale	0.995
95% t UCL (Assumes normality)	0.158	95% H-Stat UCL	0.292
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.308		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:25:50 AM
From File	MacLellan Region, Tissue - Garden Produce, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Strontium (Sr), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	0.19	Mean	1.018
Maximum	1.764	Median	1.197
SD	0.658	Std. Error of Mean	0.219
Coefficient of Variation	0.646	Skewness	-0.13

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.24	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.274	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.426	95% Adjusted-CLT UCL (Chen-1995)	1.368
		95% Modified-t UCL (Johnson-1978)	1.424

Gamma GOF Test

A-D Test Statistic	0.658	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.237	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.283	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.979	k star (bias corrected MLE)	1.393
Theta hat (MLE)	0.514	Theta star (bias corrected MLE)	0.73
nu hat (MLE)	35.62	nu star (bias corrected)	25.08
MLE Mean (bias corrected)	1.018	MLE Sd (bias corrected)	0.862

		Approximate Chi Square Value (0.05)	14.68
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	13.03
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.74	95% Adjusted Gamma UCL (use when n<50)	1.96
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.249	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.659	Mean of logged Data	-0.256
Maximum of Logged Data	0.568	SD of logged Data	0.863
Assuming Lognormal Distribution			
95% H-UCL	2.757	90% Chebyshev (MVUE) UCL	2.017
95% Chebyshev (MVUE) UCL	2.447	97.5% Chebyshev (MVUE) UCL	3.044
99% Chebyshev (MVUE) UCL	4.217		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.378	95% Jackknife UCL	1.426
95% Standard Bootstrap UCL	1.364	95% Bootstrap-t UCL	1.395
95% Hall's Bootstrap UCL	1.297	95% Percentile Bootstrap UCL	1.347
95% BCA Bootstrap UCL	1.354		
90% Chebyshev(Mean, Sd) UCL	1.676	95% Chebyshev(Mean, Sd) UCL	1.973
97.5% Chebyshev(Mean, Sd) UCL	2.387	99% Chebyshev(Mean, Sd) UCL	3.199
Suggested UCL to Use			
95% Student's-t UCL	1.426		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:27:09 AM
From File	MacLellan Region, Tissue - Garden Produce, Uranium (U), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Uranium (U), mg/kg ww

General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	4	Number of Non-Detects	5
Number of Distinct Detects	4	Number of Distinct Non-Detects	5
Minimum Detect	0.00115	Minimum Non-Detect	7.0000E-4
Maximum Detect	0.00279	Maximum Non-Detect	0.00334
Variance Detects	5.9580E-7	Percent Non-Detects	55.56%
Mean Detects	0.00183	SD Detects	7.7188E-4
Median Detects	0.00169	CV Detects	0.422
Skewness Detects	0.602	Kurtosis Detects	-2.475
Mean of Logged Detects	-6.371	SD of Logged Detects	0.422

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00152	KM Standard Error of Mean	3.3978E-4
KM SD	7.0276E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00215	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00208	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00254	95% KM Chebyshev UCL	0.003
97.5% KM Chebyshev UCL	0.00364	99% KM Chebyshev UCL	0.0049

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.367	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.658	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.301	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	7.628	k star (bias corrected MLE)	2.074
Theta hat (MLE)	2.3981E-4	Theta star (bias corrected MLE)	8.8215E-4
nu hat (MLE)	61.02	nu star (bias corrected)	16.59
Mean (detects)	0.00183		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.00115	Mean	0.00637
Maximum	0.01	Median	0.01
SD	0.00433	CV	0.68
k hat (MLE)	1.646	k star (bias corrected MLE)	1.171
Theta hat (MLE)	0.00387	Theta star (bias corrected MLE)	0.00544
nu hat (MLE)	29.63	nu star (bias corrected)	21.09
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (21.09, α)	11.66	Adjusted Chi Square Value (21.09, β)	10.21
95% Gamma Approximate UCL (use when n>=50)	0.0115	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00152	SD (KM)	7.0276E-4
Variance (KM)	4.9387E-7	SE of Mean (KM)	3.3978E-4
k hat (KM)	4.67	k star (KM)	3.187
nu hat (KM)	84.06	nu star (KM)	57.37
theta hat (KM)	3.2520E-4	theta star (KM)	4.7647E-4
80% gamma percentile (KM)	0.00215	90% gamma percentile (KM)	0.00266
95% gamma percentile (KM)	0.00313	99% gamma percentile (KM)	0.00416
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (57.37, α)	40.96	Adjusted Chi Square Value (57.37, β)	38.05
95% Gamma Approximate KM-UCL (use when n>=50)	0.00213	95% Gamma Adjusted KM-UCL (use when n<50)	0.00229
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00147	Mean in Log Scale	-6.593
SD in Original Scale	6.1456E-4	SD in Log Scale	0.386
95% t UCL (assumes normality of ROS data)	0.00185	95% Percentile Bootstrap UCL	0.00179
95% BCA Bootstrap UCL	0.00187	95% Bootstrap t UCL	0.00231
95% H-UCL (Log ROS)	0.00197		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.597	KM Geo Mean	0.00136
KM SD (logged)	0.466	95% Critical H Value (KM-Log)	2.199
KM Standard Error of Mean (logged)	0.232	95% H-UCL (KM -Log)	0.00218
KM SD (logged)	0.466	95% Critical H Value (KM-Log)	2.199
KM Standard Error of Mean (logged)	0.232		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00149	Mean in Log Scale	-6.628
SD in Original Scale	6.8175E-4	SD in Log Scale	0.577
95% t UCL (Assumes normality)	0.00191	95% H-Stat UCL	0.00254
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00215		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:27:49 AM
From File	MacLellan Region, Tissue - Garden Produce, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Garden Produce, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	1.474	Mean	2.67
Maximum	4.583	Median	2.699
SD	0.974	Std. Error of Mean	0.325
Coefficient of Variation	0.365	Skewness	0.778

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.273	95% Adjusted-CLT UCL (Chen-1995)	3.293
		95% Modified-t UCL (Johnson-1978)	3.287

Gamma GOF Test			
A-D Test Statistic	0.179	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.131	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	8.794	k star (bias corrected MLE)	5.937
Theta hat (MLE)	0.304	Theta star (bias corrected MLE)	0.45
nu hat (MLE)	158.3	nu star (bias corrected)	106.9
MLE Mean (bias corrected)	2.67	MLE Sd (bias corrected)	1.096

		Approximate Chi Square Value (0.05)	84
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	79.74
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	3.396	95% Adjusted Gamma UCL (use when n<50)	3.578
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.388	Mean of logged Data	0.924
Maximum of Logged Data	1.522	SD of logged Data	0.361
Assuming Lognormal Distribution			
95% H-UCL	3.509	90% Chebyshev (MVUE) UCL	3.641
95% Chebyshev (MVUE) UCL	4.081	97.5% Chebyshev (MVUE) UCL	4.692
99% Chebyshev (MVUE) UCL	5.892		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	3.203	95% Jackknife UCL	3.273
95% Standard Bootstrap UCL	3.193	95% Bootstrap-t UCL	3.44
95% Hall's Bootstrap UCL	3.429	95% Percentile Bootstrap UCL	3.152
95% BCA Bootstrap UCL	3.249		
90% Chebyshev(Mean, Sd) UCL	3.643	95% Chebyshev(Mean, Sd) UCL	4.084
97.5% Chebyshev(Mean, Sd) UCL	4.697	99% Chebyshev(Mean, Sd) UCL	5.899
Suggested UCL to Use			
95% Student's-t UCL	3.273		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.13
PROUCL OUTPUTS
SMALL MAMMAL TISSUE
GORDON REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:11:08 AM		
From File	Gordon Region, Tissue - Small Mammal, Antimony (Sb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Small Mammal, Antimony (Sb), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Small Mammal, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:11:47 AM
From File	Gordon Region, Tissue - Small Mammal, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.02	Mean	0.0848
Maximum	0.189	Median	0.065
SD	0.0699	Std. Error of Mean	0.0285
Coefficient of Variation	0.824	Skewness	0.734

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.142	95% Adjusted-CLT UCL (Chen-1995)	0.141
		95% Modified-t UCL (Johnson-1978)	0.144

Gamma GOF Test			
A-D Test Statistic	0.339	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.216	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.337	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.595	k star (bias corrected MLE)	0.909
Theta hat (MLE)	0.0532	Theta star (bias corrected MLE)	0.0934
nu hat (MLE)	19.14	nu star (bias corrected)	10.9
MLE Mean (bias corrected)	0.0848	MLE Sd (bias corrected)	0.089

		Approximate Chi Square Value (0.05)	4.514
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	3.154
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.205	95% Adjusted Gamma UCL (use when n<50)	0.293
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.207	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.912	Mean of logged Data	-2.812
Maximum of Logged Data	-1.666	SD of logged Data	0.961
Assuming Lognormal Distribution			
95% H-UCL	0.527	90% Chebyshev (MVUE) UCL	0.187
95% Chebyshev (MVUE) UCL	0.233	97.5% Chebyshev (MVUE) UCL	0.296
99% Chebyshev (MVUE) UCL	0.42		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.132	95% Jackknife UCL	0.142
95% Standard Bootstrap UCL	0.128	95% Bootstrap-t UCL	0.202
95% Hall's Bootstrap UCL	0.403	95% Percentile Bootstrap UCL	0.129
95% BCA Bootstrap UCL	0.135		
90% Chebyshev(Mean, Sd) UCL	0.17	95% Chebyshev(Mean, Sd) UCL	0.209
97.5% Chebyshev(Mean, Sd) UCL	0.263	99% Chebyshev(Mean, Sd) UCL	0.369
Suggested UCL to Use			
95% Student's-t UCL	0.142		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:12:26 AM
From File	Gordon Region, Tissue - Small Mammal, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	3.44	Mean	8.047
Maximum	24	Median	5.455
SD	7.874	Std. Error of Mean	3.214
Coefficient of Variation	0.979	Skewness	2.368

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.613	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.443	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	14.52	95% Adjusted-CLT UCL (Chen-1995)	16.65
		95% Modified-t UCL (Johnson-1978)	15.04

Gamma GOF Test			
A-D Test Statistic	0.943	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.704	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.413	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.336	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.104	k star (bias corrected MLE)	1.163
Theta hat (MLE)	3.825	Theta star (bias corrected MLE)	6.919
nu hat (MLE)	25.25	nu star (bias corrected)	13.96
MLE Mean (bias corrected)	8.047	MLE Sd (bias corrected)	7.462

		Approximate Chi Square Value (0.05)	6.541
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	4.828
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	17.17	95% Adjusted Gamma UCL (use when n<50)	23.26
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.773	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.369	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.235	Mean of logged Data	1.829
Maximum of Logged Data	3.178	SD of logged Data	0.693
Assuming Lognormal Distribution			
95% H-UCL	21.02	90% Chebyshev (MVUE) UCL	13.96
95% Chebyshev (MVUE) UCL	16.85	97.5% Chebyshev (MVUE) UCL	20.87
99% Chebyshev (MVUE) UCL	28.76		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	13.33	95% Jackknife UCL	14.52
95% Standard Bootstrap UCL	12.93	95% Bootstrap-t UCL	43.14
95% Hall's Bootstrap UCL	48.9	95% Percentile Bootstrap UCL	14.22
95% BCA Bootstrap UCL	14.79		
90% Chebyshev(Mean, Sd) UCL	17.69	95% Chebyshev(Mean, Sd) UCL	22.06
97.5% Chebyshev(Mean, Sd) UCL	28.12	99% Chebyshev(Mean, Sd) UCL	40.03
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	22.06		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:13:45 AM
From File	Gordon Region, Tissue - Small Mammal, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Cadmium (Cd), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	1
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.0051	Minimum Non-Detect	0.004
Maximum Detect	0.1	Maximum Non-Detect	0.004
Variance Detects	0.00153	Percent Non-Detects	16.67%
Mean Detects	0.0427	SD Detects	0.0391
Median Detects	0.0395	CV Detects	0.915
Skewness Detects	0.716	Kurtosis Detects	-0.44
Mean of Logged Detects	-3.662	SD of Logged Detects	1.264

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0363	KM Standard Error of Mean	0.016
KM SD	0.035	95% KM (BCA) UCL	0.0638
95% KM (t) UCL	0.0685	95% KM (Percentile Bootstrap) UCL	0.0606
95% KM (z) UCL	0.0625	95% KM Bootstrap t UCL	0.078
90% KM Chebyshev UCL	0.0842	95% KM Chebyshev UCL	0.106
97.5% KM Chebyshev UCL	0.136	99% KM Chebyshev UCL	0.195

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.282	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.69	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.228	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.364	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.121	k star (bias corrected MLE)	0.582
Theta hat (MLE)	0.0381	Theta star (bias corrected MLE)	0.0734
nu hat (MLE)	11.21	nu star (bias corrected)	5.815
Mean (detects)	0.0427		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0051	Mean	0.0373
Maximum	0.1	Median	0.0248
SD	0.0374	CV	1.004
k hat (MLE)	1.081	k star (bias corrected MLE)	0.652
Theta hat (MLE)	0.0345	Theta star (bias corrected MLE)	0.0572
nu hat (MLE)	12.97	nu star (bias corrected)	7.82
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (7.82, α)	2.631	Adjusted Chi Square Value (7.82, β)	1.675
95% Gamma Approximate UCL (use when n>=50)	0.111	95% Gamma Adjusted UCL (use when n<50)	0.174
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0363	SD (KM)	0.035
Variance (KM)	0.00123	SE of Mean (KM)	0.016
k hat (KM)	1.072	k star (KM)	0.647
nu hat (KM)	12.86	nu star (KM)	7.764
theta hat (KM)	0.0338	theta star (KM)	0.056
80% gamma percentile (KM)	0.0597	90% gamma percentile (KM)	0.0927
95% gamma percentile (KM)	0.127	99% gamma percentile (KM)	0.209
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (7.76, α)	2.599	Adjusted Chi Square Value (7.76, β)	1.651
95% Gamma Approximate KM-UCL (use when n>=50)	0.108	95% Gamma Adjusted KM-UCL (use when n<50)	0.17
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0358	Mean in Log Scale	-4.195
SD in Original Scale	0.0389	SD in Log Scale	1.728
95% t UCL (assumes normality of ROS data)	0.0677	95% Percentile Bootstrap UCL	0.0613
95% BCA Bootstrap UCL	0.0664	95% Bootstrap t UCL	0.102
95% H-UCL (Log ROS)	11.9		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.972	KM Geo Mean	0.0188
KM SD (logged)	1.243	95% Critical H Value (KM-Log)	4.966
KM Standard Error of Mean (logged)	0.567	95% H-UCL (KM -Log)	0.644
KM SD (logged)	1.243	95% Critical H Value (KM-Log)	4.966
KM Standard Error of Mean (logged)	0.567		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0359	Mean in Log Scale	-4.088
SD in Original Scale	0.0387	SD in Log Scale	1.537
95% t UCL (Assumes normality)	0.0678	95% H-Stat UCL	3.418
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0685		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:14:24 AM		
From File	Gordon Region, Tissue - Small Mammal, Chromium (Cr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Tissue - Small Mammal, Chromium (Cr), mg/kg ww			
General Statistics			
Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!			
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).			
The data set for variable Gordon Site, Tissue - Small Mammal, Chromium (Cr), mg/kg ww was not processed!			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:15:03 AM		
From File	Gordon Region, Tissue - Small Mammal, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Small Mammal, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.024	Mean	0.0447
Maximum	0.064	Median	0.0455
SD	0.0169	Std. Error of Mean	0.00691
Coefficient of Variation	0.379	Skewness	-0.0694

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0586	95% Adjusted-CLT UCL (Chen-1995)	0.0558
		95% Modified-t UCL (Johnson-1978)	0.0586

Gamma GOF Test			
A-D Test Statistic	0.491	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.296	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	7.766	k star (bias corrected MLE)	3.994
Theta hat (MLE)	0.00575	Theta star (bias corrected MLE)	0.0112
nu hat (MLE)	93.19	nu star (bias corrected)	47.93
MLE Mean (bias corrected)	0.0447	MLE Sd (bias corrected)	0.0224

		Approximate Chi Square Value (0.05)	33.04
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	28.65
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0648	95% Adjusted Gamma UCL (use when n<50)	0.0747
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.277	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.73	Mean of logged Data	-3.174
Maximum of Logged Data	-2.749	SD of logged Data	0.406
Assuming Lognormal Distribution			
95% H-UCL	0.0706	90% Chebyshev (MVUE) UCL	0.067
95% Chebyshev (MVUE) UCL	0.0771	97.5% Chebyshev (MVUE) UCL	0.0911
99% Chebyshev (MVUE) UCL	0.119		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.056	95% Jackknife UCL	0.0586
95% Standard Bootstrap UCL	0.0551	95% Bootstrap-t UCL	0.0589
95% Hall's Bootstrap UCL	0.0518	95% Percentile Bootstrap UCL	0.055
95% BCA Bootstrap UCL	0.0547		
90% Chebyshev(Mean, Sd) UCL	0.0654	95% Chebyshev(Mean, Sd) UCL	0.0748
97.5% Chebyshev(Mean, Sd) UCL	0.0878	99% Chebyshev(Mean, Sd) UCL	0.113
Suggested UCL to Use			
95% Student's-t UCL	0.0586		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:15:43 AM
From File	Gordon Region, Tissue - Small Mammal, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.76	Mean	4.093
Maximum	5.49	Median	4.105
SD	0.916	Std. Error of Mean	0.374
Coefficient of Variation	0.224	Skewness	0.124

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test		
Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.847	95% Adjusted-CLT UCL (Chen-1995)	4.728
		95% Modified-t UCL (Johnson-1978)	4.85

Gamma GOF Test		
A-D Test Statistic	0.216	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.152	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	23.22	k star (bias corrected MLE)	11.72
Theta hat (MLE)	0.176	Theta star (bias corrected MLE)	0.349
nu hat (MLE)	278.6	nu star (bias corrected)	140.6
MLE Mean (bias corrected)	4.093	MLE Sd (bias corrected)	1.196

		Approximate Chi Square Value (0.05)	114.2
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	105.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.039	95% Adjusted Gamma UCL (use when n<50)	5.45
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.015	Mean of logged Data	1.388
Maximum of Logged Data	1.703	SD of logged Data	0.231
Assuming Lognormal Distribution			
95% H-UCL	5.119	90% Chebyshev (MVUE) UCL	5.255
95% Chebyshev (MVUE) UCL	5.78	97.5% Chebyshev (MVUE) UCL	6.509
99% Chebyshev (MVUE) UCL	7.941		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.708	95% Jackknife UCL	4.847
95% Standard Bootstrap UCL	4.645	95% Bootstrap-t UCL	4.823
95% Hall's Bootstrap UCL	4.937	95% Percentile Bootstrap UCL	4.663
95% BCA Bootstrap UCL	4.655		
90% Chebyshev(Mean, Sd) UCL	5.215	95% Chebyshev(Mean, Sd) UCL	5.723
97.5% Chebyshev(Mean, Sd) UCL	6.428	99% Chebyshev(Mean, Sd) UCL	7.813
Suggested UCL to Use			
95% Student's-t UCL	4.847		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:16:22 AM
From File	Gordon Region, Tissue - Small Mammal, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Small Mammal, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:17:01 AM		
From File	Gordon Region, Tissue - Small Mammal, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Small Mammal, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.55	Mean	4.852
Maximum	8.75	Median	4.415
SD	2.217	Std. Error of Mean	0.905
Coefficient of Variation	0.457	Skewness	1.186

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.675	95% Adjusted-CLT UCL (Chen-1995)	6.808
		95% Modified-t UCL (Johnson-1978)	6.748

Gamma GOF Test			
A-D Test Statistic	0.198	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.337	k star (bias corrected MLE)	3.28
Theta hat (MLE)	0.766	Theta star (bias corrected MLE)	1.479
nu hat (MLE)	76.05	nu star (bias corrected)	39.36
MLE Mean (bias corrected)	4.852	MLE Sd (bias corrected)	2.679

		Approximate Chi Square Value (0.05)	25.99
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	22.14
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.348	95% Adjusted Gamma UCL (use when n<50)	8.623
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.936	Mean of logged Data	1.498
Maximum of Logged Data	2.169	SD of logged Data	0.436
Assuming Lognormal Distribution			
95% H-UCL	7.994	90% Chebyshev (MVUE) UCL	7.419
95% Chebyshev (MVUE) UCL	8.588	97.5% Chebyshev (MVUE) UCL	10.21
99% Chebyshev (MVUE) UCL	13.4		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.34	95% Jackknife UCL	6.675
95% Standard Bootstrap UCL	6.179	95% Bootstrap-t UCL	8.018
95% Hall's Bootstrap UCL	15.37	95% Percentile Bootstrap UCL	6.297
95% BCA Bootstrap UCL	6.62		
90% Chebyshev(Mean, Sd) UCL	7.566	95% Chebyshev(Mean, Sd) UCL	8.796
97.5% Chebyshev(Mean, Sd) UCL	10.5	99% Chebyshev(Mean, Sd) UCL	13.86
Suggested UCL to Use			
95% Student's-t UCL	6.675		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:17:40 AM		
From File	Gordon Region, Tissue - Small Mammal, Mercury (Hg), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Small Mammal, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	3
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.019	Minimum Non-Detect	0.01
Maximum Detect	0.029	Maximum Non-Detect	0.01
Variance Detects	3.0333E-5	Percent Non-Detects	50%
Mean Detects	0.0227	SD Detects	0.00551
Median Detects	0.02	CV Detects	0.243
Skewness Detects	1.668	Kurtosis Detects	N/A
Mean of Logged Detects	-3.805	SD of Logged Detects	0.231

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.824	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0163	KM Standard Error of Mean	0.00354
KM SD	0.00709	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0235	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0222	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.027	95% KM Chebyshev UCL	0.0318
97.5% KM Chebyshev UCL	0.0385	99% KM Chebyshev UCL	0.0516

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	27.33	k star (bias corrected MLE)	N/A
Theta hat (MLE)	8.2937E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	164	nu star (bias corrected)	N/A
Mean (detects)	0.0227		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0164
Maximum	0.029	Median	0.0148
SD	0.00768	CV	0.467
k hat (MLE)	5.884	k star (bias corrected MLE)	3.053
Theta hat (MLE)	0.00279	Theta star (bias corrected MLE)	0.00538
nu hat (MLE)	70.61	nu star (bias corrected)	36.64
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (36.64, α)	23.78	Adjusted Chi Square Value (36.64, β)	20.13
95% Gamma Approximate UCL (use when n>=50)	0.0253	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0163	SD (KM)	0.00709
Variance (KM)	5.0222E-5	SE of Mean (KM)	0.00354
k hat (KM)	5.312	k star (KM)	2.767
nu hat (KM)	63.74	nu star (KM)	33.21
theta hat (KM)	0.00307	theta star (KM)	0.0059
80% gamma percentile (KM)	0.0235	90% gamma percentile (KM)	0.0295
95% gamma percentile (KM)	0.0351	99% gamma percentile (KM)	0.0473
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (33.21, α)	21.03	Adjusted Chi Square Value (33.21, β)	17.62
95% Gamma Approximate KM-UCL (use when n>=50)	0.0258	95% Gamma Adjusted KM-UCL (use when n<50)	0.0308
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.839	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.345	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0167	Mean in Log Scale	-4.179
SD in Original Scale	0.00756	SD in Log Scale	0.456
95% t UCL (assumes normality of ROS data)	0.0229	95% Percentile Bootstrap UCL	0.0213
95% BCA Bootstrap UCL	0.0218	95% Bootstrap t UCL	0.0251
95% H-UCL (Log ROS)	0.0285		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.205	KM Geo Mean	0.0149
KM SD (logged)	0.422	95% Critical H Value (KM-Log)	2.46
KM Standard Error of Mean (logged)	0.211	95% H-UCL (KM -Log)	0.0259
KM SD (logged)	0.422	95% Critical H Value (KM-Log)	2.46
KM Standard Error of Mean (logged)	0.211		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0138	Mean in Log Scale	-4.552
SD in Original Scale	0.0103	SD in Log Scale	0.831
95% t UCL (Assumes normality)	0.0223	95% H-Stat UCL	0.0561
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0235		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 1:18:20 AM		
From File	Gordon Region, Tissue - Small Mammal, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Tissue - Small Mammal, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.106	Mean	0.211
Maximum	0.3	Median	0.21
SD	0.0757	Std. Error of Mean	0.0309
Coefficient of Variation	0.359	Skewness	-0.137

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.273	95% Adjusted-CLT UCL (Chen-1995)	0.26
		95% Modified-t UCL (Johnson-1978)	0.273

Gamma GOF Test			
A-D Test Statistic	0.255	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.189	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	8.347	k star (bias corrected MLE)	4.285
Theta hat (MLE)	0.0253	Theta star (bias corrected MLE)	0.0492
nu hat (MLE)	100.2	nu star (bias corrected)	51.42
MLE Mean (bias corrected)	0.211	MLE Sd (bias corrected)	0.102

		Approximate Chi Square Value (0.05)	35.95
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	31.34
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.302	95% Adjusted Gamma UCL (use when n<50)	0.346
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.18	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.244	Mean of logged Data	-1.618
Maximum of Logged Data	-1.204	SD of logged Data	0.397
Assuming Lognormal Distribution			
95% H-UCL	0.329	90% Chebyshev (MVUE) UCL	0.314
95% Chebyshev (MVUE) UCL	0.361	97.5% Chebyshev (MVUE) UCL	0.426
99% Chebyshev (MVUE) UCL	0.553		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.262	95% Jackknife UCL	0.273
95% Standard Bootstrap UCL	0.257	95% Bootstrap-t UCL	0.281
95% Hall's Bootstrap UCL	0.275	95% Percentile Bootstrap UCL	0.256
95% BCA Bootstrap UCL	0.256		
90% Chebyshev(Mean, Sd) UCL	0.304	95% Chebyshev(Mean, Sd) UCL	0.346
97.5% Chebyshev(Mean, Sd) UCL	0.404	99% Chebyshev(Mean, Sd) UCL	0.518
Suggested UCL to Use			
95% Student's-t UCL	0.273		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:18:59 AM
From File	Gordon Region, Tissue - Small Mammal, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Nickel (Ni), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	3
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.12	Minimum Non-Detect	0.1
Maximum Detect	0.15	Maximum Non-Detect	0.1
Variance Detects	3.0000E-4	Percent Non-Detects	50%
Mean Detects	0.13	SD Detects	0.0173
Median Detects	0.12	CV Detects	0.133
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-2.046	SD of Logged Detects	0.129

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.115	KM Standard Error of Mean	0.00901
KM SD	0.018	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.133	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.13	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.142	95% KM Chebyshev UCL	0.154
97.5% KM Chebyshev UCL	0.171	99% KM Chebyshev UCL	0.205

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	88.48	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00147	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	530.9	nu star (bias corrected)	N/A
Mean (detects)	0.13		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0641	Mean	0.104
Maximum	0.15	Median	0.106
SD	0.0314	CV	0.3
k hat (MLE)	12.9	k star (bias corrected MLE)	6.559
Theta hat (MLE)	0.0081	Theta star (bias corrected MLE)	0.0159
nu hat (MLE)	154.8	nu star (bias corrected)	78.71
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (78.71, α)	59.27	Adjusted Chi Square Value (78.71, β)	53.22
95% Gamma Approximate UCL (use when n>=50)	0.139	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.115	SD (KM)	0.018
Variance (KM)	3.2500E-4	SE of Mean (KM)	0.00901
k hat (KM)	40.69	k star (KM)	20.46
nu hat (KM)	488.3	nu star (KM)	245.5
theta hat (KM)	0.00283	theta star (KM)	0.00562
80% gamma percentile (KM)	0.136	90% gamma percentile (KM)	0.149
95% gamma percentile (KM)	0.16	99% gamma percentile (KM)	0.182
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (245.49, α)	210.2	Adjusted Chi Square Value (245.49, β)	198.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.134	95% Gamma Adjusted KM-UCL (use when n<50)	0.142
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.109	Mean in Log Scale	-2.245
SD in Original Scale	0.0267	SD in Log Scale	0.245
95% t UCL (assumes normality of ROS data)	0.131	95% Percentile Bootstrap UCL	0.125
95% BCA Bootstrap UCL	0.126	95% Bootstrap t UCL	0.135
95% H-UCL (Log ROS)	0.138		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.174	KM Geo Mean	0.114
KM SD (logged)	0.148	95% Critical H Value (KM-Log)	2
KM Standard Error of Mean (logged)	0.0742	95% H-UCL (KM -Log)	0.131
KM SD (logged)	0.148	95% Critical H Value (KM-Log)	2
KM Standard Error of Mean (logged)	0.0742		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.09	Mean in Log Scale	-2.521
SD in Original Scale	0.0452	SD in Log Scale	0.527
95% t UCL (Assumes normality)	0.127	95% H-Stat UCL	0.175
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.133		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:19:39 AM
From File	Gordon Region, Tissue - Small Mammal, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.12	Mean	0.265
Maximum	0.48	Median	0.245
SD	0.144	Std. Error of Mean	0.0589
Coefficient of Variation	0.544	Skewness	0.511

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.384	95% Adjusted-CLT UCL (Chen-1995)	0.375
		95% Modified-t UCL (Johnson-1978)	0.386

Gamma GOF Test			
A-D Test Statistic	0.374	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.7	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.243	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.98	k star (bias corrected MLE)	2.101
Theta hat (MLE)	0.0666	Theta star (bias corrected MLE)	0.126
nu hat (MLE)	47.75	nu star (bias corrected)	25.21
MLE Mean (bias corrected)	0.265	MLE Sd (bias corrected)	0.183

		Approximate Chi Square Value (0.05)	14.77
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	11.99
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.452	95% Adjusted Gamma UCL (use when n<50)	0.557
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.12	Mean of logged Data	-1.459
Maximum of Logged Data	-0.734	SD of logged Data	0.568
Assuming Lognormal Distribution			
95% H-UCL	0.557	90% Chebyshev (MVUE) UCL	0.449
95% Chebyshev (MVUE) UCL	0.533	97.5% Chebyshev (MVUE) UCL	0.648
99% Chebyshev (MVUE) UCL	0.876		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.362	95% Jackknife UCL	0.384
95% Standard Bootstrap UCL	0.355	95% Bootstrap-t UCL	0.41
95% Hall's Bootstrap UCL	0.339	95% Percentile Bootstrap UCL	0.357
95% BCA Bootstrap UCL	0.362		
90% Chebyshev(Mean, Sd) UCL	0.442	95% Chebyshev(Mean, Sd) UCL	0.522
97.5% Chebyshev(Mean, Sd) UCL	0.633	99% Chebyshev(Mean, Sd) UCL	0.851
Suggested UCL to Use			
95% Student's-t UCL	0.384		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:20:18 AM
From File	Gordon Region, Tissue - Small Mammal, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Strontium (Sr), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.31	Mean	4.138
Maximum	6.24	Median	4.13
SD	1.312	Std. Error of Mean	0.536
Coefficient of Variation	0.317	Skewness	0.38

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.184	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.218	95% Adjusted-CLT UCL (Chen-1995)	5.108
		95% Modified-t UCL (Johnson-1978)	5.232

Gamma GOF Test

A-D Test Statistic	0.207	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.167	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.48	k star (bias corrected MLE)	5.852
Theta hat (MLE)	0.36	Theta star (bias corrected MLE)	0.707
nu hat (MLE)	137.8	nu star (bias corrected)	70.22
MLE Mean (bias corrected)	4.138	MLE Sd (bias corrected)	1.711

		Approximate Chi Square Value (0.05)	51.93
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	46.29
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.596	95% Adjusted Gamma UCL (use when n<50)	6.277
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.837	Mean of logged Data	1.376
Maximum of Logged Data	1.831	SD of logged Data	0.332
Assuming Lognormal Distribution			
95% H-UCL	5.876	90% Chebyshev (MVUE) UCL	5.832
95% Chebyshev (MVUE) UCL	6.596	97.5% Chebyshev (MVUE) UCL	7.656
99% Chebyshev (MVUE) UCL	9.739		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.02	95% Jackknife UCL	5.218
95% Standard Bootstrap UCL	4.936	95% Bootstrap-t UCL	5.273
95% Hall's Bootstrap UCL	5.584	95% Percentile Bootstrap UCL	4.917
95% BCA Bootstrap UCL	4.985		
90% Chebyshev(Mean, Sd) UCL	5.746	95% Chebyshev(Mean, Sd) UCL	6.474
97.5% Chebyshev(Mean, Sd) UCL	7.484	99% Chebyshev(Mean, Sd) UCL	9.469
Suggested UCL to Use			
95% Student's-t UCL	5.218		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:20:58 AM
From File	Gordon Region, Tissue - Small Mammal, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Thallium (Tl), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	3
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0236	Minimum Non-Detect	0.006
Maximum Detect	0.0611	Maximum Non-Detect	0.006
Variance Detects	4.1097E-4	Percent Non-Detects	50%
Mean Detects	0.0379	SD Detects	0.0203
Median Detects	0.029	CV Detects	0.535
Skewness Detects	1.595	Kurtosis Detects	N/A
Mean of Logged Detects	-3.361	SD of Logged Detects	0.5

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.022	KM Standard Error of Mean	0.00989
KM SD	0.0198	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0419	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0382	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0516	95% KM Chebyshev UCL	0.0651
97.5% KM Chebyshev UCL	0.0837	99% KM Chebyshev UCL	0.12

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	5.848	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00648	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	35.09	nu star (bias corrected)	N/A
Mean (detects)	0.0379		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.024
Maximum	0.0611	Median	0.0168
SD	0.0199	CV	0.833
k hat (MLE)	2.142	k star (bias corrected MLE)	1.182
Theta hat (MLE)	0.0112	Theta star (bias corrected MLE)	0.0203
nu hat (MLE)	25.71	nu star (bias corrected)	14.19
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (14.19, α)	6.7	Adjusted Chi Square Value (14.19, β)	4.961
95% Gamma Approximate UCL (use when n>=50)	0.0507	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.022	SD (KM)	0.0198
Variance (KM)	3.9139E-4	SE of Mean (KM)	0.00989
k hat (KM)	1.231	k star (KM)	0.727
nu hat (KM)	14.77	nu star (KM)	8.719
theta hat (KM)	0.0178	theta star (KM)	0.0302
80% gamma percentile (KM)	0.036	90% gamma percentile (KM)	0.0546
95% gamma percentile (KM)	0.0737	99% gamma percentile (KM)	0.119
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (8.72, α)	3.158	Adjusted Chi Square Value (8.72, β)	2.079
95% Gamma Approximate KM-UCL (use when n>=50)	0.0606	95% Gamma Adjusted KM-UCL (use when n<50)	0.0921
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0225	Mean in Log Scale	-4.194
SD in Original Scale	0.0213	SD in Log Scale	1.014
95% t UCL (assumes normality of ROS data)	0.04	95% Percentile Bootstrap UCL	0.0363
95% BCA Bootstrap UCL	0.0409	95% Bootstrap t UCL	0.0511
95% H-UCL (Log ROS)	0.168		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.238	KM Geo Mean	0.0144
KM SD (logged)	0.924	95% Critical H Value (KM-Log)	3.849
KM Standard Error of Mean (logged)	0.462	95% H-UCL (KM -Log)	0.108
KM SD (logged)	0.924	95% Critical H Value (KM-Log)	3.849
KM Standard Error of Mean (logged)	0.462		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0205	Mean in Log Scale	-4.585
SD in Original Scale	0.023	SD in Log Scale	1.378
95% t UCL (Assumes normality)	0.0394	95% H-Stat UCL	0.754
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0419		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:22:16 AM
From File	Gordon Region, Tissue - Small Mammal, Uranium (U), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Uranium (U), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	3
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0027	Minimum Non-Detect	0.002
Maximum Detect	0.0054	Maximum Non-Detect	0.002
Variance Detects	2.2633E-6	Percent Non-Detects	50%
Mean Detects	0.00367	SD Detects	0.0015
Median Detects	0.0029	CV Detects	0.41
Skewness Detects	1.698	Kurtosis Detects	N/A
Mean of Logged Detects	-5.66	SD of Logged Detects	0.381

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00283	KM Standard Error of Mean	6.0185E-4
KM SD	0.0012	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00405	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00382	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00464	95% KM Chebyshev UCL	0.00546
97.5% KM Chebyshev UCL	0.00659	99% KM Chebyshev UCL	0.00882

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	9.937	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3.6901E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	59.62	nu star (bias corrected)	N/A
Mean (detects)	0.00367		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0027	Mean	0.00683
Maximum	0.01	Median	0.0077
SD	0.0036	CV	0.526
k hat (MLE)	3.572	k star (bias corrected MLE)	1.897
Theta hat (MLE)	0.00191	Theta star (bias corrected MLE)	0.0036
nu hat (MLE)	42.86	nu star (bias corrected)	22.77
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (22.77, α)	12.91	Adjusted Chi Square Value (22.77, β)	10.34
95% Gamma Approximate UCL (use when n>=50)	0.012	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00283	SD (KM)	0.0012
Variance (KM)	1.4489E-6	SE of Mean (KM)	6.0185E-4
k hat (KM)	5.541	k star (KM)	2.881
nu hat (KM)	66.49	nu star (KM)	34.58
theta hat (KM)	5.1137E-4	theta star (KM)	9.8331E-4
80% gamma percentile (KM)	0.00406	90% gamma percentile (KM)	0.00507
95% gamma percentile (KM)	0.00602	99% gamma percentile (KM)	0.00807
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (34.58, α)	22.13	Adjusted Chi Square Value (34.58, β)	18.62
95% Gamma Approximate KM-UCL (use when n>=50)	0.00443	95% Gamma Adjusted KM-UCL (use when n<50)	0.00526
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.826	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.351	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00237	Mean in Log Scale	-6.274
SD in Original Scale	0.00173	SD in Log Scale	0.75
95% t UCL (assumes normality of ROS data)	0.00379	95% Percentile Bootstrap UCL	0.00351
95% BCA Bootstrap UCL	0.00375	95% Bootstrap t UCL	0.00469
95% H-UCL (Log ROS)	0.0076		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.937	KM Geo Mean	0.00264
KM SD (logged)	0.354	95% Critical H Value (KM-Log)	2.324
KM Standard Error of Mean (logged)	0.177	95% H-UCL (KM -Log)	0.00406
KM SD (logged)	0.354	95% Critical H Value (KM-Log)	2.324
KM Standard Error of Mean (logged)	0.177		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00233	Mean in Log Scale	-6.284
SD in Original Scale	0.00174	SD in Log Scale	0.725
95% t UCL (Assumes normality)	0.00377	95% H-Stat UCL	0.00695
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00405		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:22:56 AM
From File	Gordon Region, Tissue - Small Mammal, Vanadium (V), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Vanadium (V), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Tissue - Small Mammal, Vanadium (V), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 1:23:35 AM
From File	Gordon Region, Tissue - Small Mammal, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Tissue - Small Mammal, Zinc (Zn), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	23.5	Mean	26.68
Maximum	30.4	Median	26.3
SD	2.393	Std. Error of Mean	0.977
Coefficient of Variation	0.0897	Skewness	0.417

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	28.65	95% Adjusted-CLT UCL (Chen-1995)	28.47
		95% Modified-t UCL (Johnson-1978)	28.68

Gamma GOF Test

A-D Test Statistic	0.198	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.184	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	150.8	k star (bias corrected MLE)	75.52
Theta hat (MLE)	0.177	Theta star (bias corrected MLE)	0.353
nu hat (MLE)	1810	nu star (bias corrected)	906.2
MLE Mean (bias corrected)	26.68	MLE Sd (bias corrected)	3.071

		Approximate Chi Square Value (0.05)	837.3
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	813.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	28.88	95% Adjusted Gamma UCL (use when n<50)	29.74
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.157	Mean of logged Data	3.281
Maximum of Logged Data	3.414	SD of logged Data	0.0891
Assuming Lognormal Distribution			
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	29.59
95% Chebyshev (MVUE) UCL	30.91	97.5% Chebyshev (MVUE) UCL	32.74
99% Chebyshev (MVUE) UCL	36.34		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	28.29	95% Jackknife UCL	28.65
95% Standard Bootstrap UCL	28.14	95% Bootstrap-t UCL	29.28
95% Hall's Bootstrap UCL	29.3	95% Percentile Bootstrap UCL	28.27
95% BCA Bootstrap UCL	28.27		
90% Chebyshev(Mean, Sd) UCL	29.61	95% Chebyshev(Mean, Sd) UCL	30.94
97.5% Chebyshev(Mean, Sd) UCL	32.78	99% Chebyshev(Mean, Sd) UCL	36.4
Suggested UCL to Use			
95% Student's-t UCL	28.65		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.14
PROUCL OUTPUTS
SMALL MAMMAL TISSUE
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:39:44 AM
From File	MacLellan Region, Tissue - Small Mammal, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.013	Mean	0.0265
Maximum	0.046	Median	0.0225
SD	0.0143	Std. Error of Mean	0.00582
Coefficient of Variation	0.538	Skewness	0.629

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0382	95% Adjusted-CLT UCL (Chen-1995)	0.0377
		95% Modified-t UCL (Johnson-1978)	0.0385

Gamma GOF Test			
A-D Test Statistic	0.441	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.7	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.214	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.213	k star (bias corrected MLE)	2.218
Theta hat (MLE)	0.00629	Theta star (bias corrected MLE)	0.012
nu hat (MLE)	50.55	nu star (bias corrected)	26.61
MLE Mean (bias corrected)	0.0265	MLE Sd (bias corrected)	0.0178

		Approximate Chi Square Value (0.05)	15.85
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	12.95
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0445	95% Adjusted Gamma UCL (use when n<50)	0.0545
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.343	Mean of logged Data	-3.754
Maximum of Logged Data	-3.079	SD of logged Data	0.547
Assuming Lognormal Distribution			
95% H-UCL	0.0533	90% Chebyshev (MVUE) UCL	0.0442
95% Chebyshev (MVUE) UCL	0.0522	97.5% Chebyshev (MVUE) UCL	0.0633
99% Chebyshev (MVUE) UCL	0.0851		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0361	95% Jackknife UCL	0.0382
95% Standard Bootstrap UCL	0.0351	95% Bootstrap-t UCL	0.0498
95% Hall's Bootstrap UCL	0.115	95% Percentile Bootstrap UCL	0.0358
95% BCA Bootstrap UCL	0.036		
90% Chebyshev(Mean, Sd) UCL	0.044	95% Chebyshev(Mean, Sd) UCL	0.0519
97.5% Chebyshev(Mean, Sd) UCL	0.0629	99% Chebyshev(Mean, Sd) UCL	0.0844
Suggested UCL to Use			
95% Student's-t UCL	0.0382		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:40:24 AM
From File	MacLellan Region, Tissue - Small Mammal, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	18.6	Mean	25.25
Maximum	48.7	Median	21
SD	11.56	Std. Error of Mean	4.719
Coefficient of Variation	0.458	Skewness	2.383

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.602	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.441	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34.76	95% Adjusted-CLT UCL (Chen-1995)	37.92
		95% Modified-t UCL (Johnson-1978)	35.52

Gamma GOF Test			
A-D Test Statistic	1.172	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.698	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.432	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	8.053	k star (bias corrected MLE)	4.138
Theta hat (MLE)	3.135	Theta star (bias corrected MLE)	6.102
nu hat (MLE)	96.64	nu star (bias corrected)	49.65
MLE Mean (bias corrected)	25.25	MLE Sd (bias corrected)	12.41

		Approximate Chi Square Value (0.05)	34.47
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	29.98
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	36.37	95% Adjusted Gamma UCL (use when n<50)	41.82
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.663	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.411	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.923	Mean of logged Data	3.165
Maximum of Logged Data	3.886	SD of logged Data	0.358
Assuming Lognormal Distribution			
95% H-UCL	36.72	90% Chebyshev (MVUE) UCL	35.96
95% Chebyshev (MVUE) UCL	40.92	97.5% Chebyshev (MVUE) UCL	47.81
99% Chebyshev (MVUE) UCL	61.35		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	33.01	95% Jackknife UCL	34.76
95% Standard Bootstrap UCL	32.3	95% Bootstrap-t UCL	81.43
95% Hall's Bootstrap UCL	81.59	95% Percentile Bootstrap UCL	34.18
95% BCA Bootstrap UCL	35.07		
90% Chebyshev(Mean, Sd) UCL	39.41	95% Chebyshev(Mean, Sd) UCL	45.82
97.5% Chebyshev(Mean, Sd) UCL	54.72	99% Chebyshev(Mean, Sd) UCL	72.2
Suggested UCL to Use			
95% Student's-t UCL	34.76	or 95% Modified-t UCL	35.52
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:41:44 AM
From File	MacLellan Region, Tissue - Small Mammal, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Cadmium (Cd), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.0549	Mean	0.142
Maximum	0.353	Median	0.101
SD	0.107	Std. Error of Mean	0.0439
Coefficient of Variation	0.755	Skewness	2.033

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.744	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.313	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.231	95% Adjusted-CLT UCL (Chen-1995)	0.254
		95% Modified-t UCL (Johnson-1978)	0.237

Gamma GOF Test

A-D Test Statistic	0.546	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.702	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.299	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.335	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.909	k star (bias corrected MLE)	1.566
Theta hat (MLE)	0.049	Theta star (bias corrected MLE)	0.091
nu hat (MLE)	34.91	nu star (bias corrected)	18.79
MLE Mean (bias corrected)	0.142	MLE Sd (bias corrected)	0.114

		Approximate Chi Square Value (0.05)	9.963
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	7.753
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.269	95% Adjusted Gamma UCL (use when n<50)	0.345
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.902	Mean of logged Data	-2.13
Maximum of Logged Data	-1.041	SD of logged Data	0.623
Assuming Lognormal Distribution			
95% H-UCL	0.328	90% Chebyshev (MVUE) UCL	0.245
95% Chebyshev (MVUE) UCL	0.293	97.5% Chebyshev (MVUE) UCL	0.359
99% Chebyshev (MVUE) UCL	0.49		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.215	95% Jackknife UCL	0.231
95% Standard Bootstrap UCL	0.208	95% Bootstrap-t UCL	0.435
95% Hall's Bootstrap UCL	0.641	95% Percentile Bootstrap UCL	0.219
95% BCA Bootstrap UCL	0.234		
90% Chebyshev(Mean, Sd) UCL	0.274	95% Chebyshev(Mean, Sd) UCL	0.334
97.5% Chebyshev(Mean, Sd) UCL	0.416	99% Chebyshev(Mean, Sd) UCL	0.579
Suggested UCL to Use			
95% Student's-t UCL	0.231		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:42:24 AM
From File	MacLellan Region, Tissue - Small Mammal, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.032	Mean	0.0405
Maximum	0.061	Median	0.0355
SD	0.0113	Std. Error of Mean	0.0046
Coefficient of Variation	0.278	Skewness	1.563

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.803	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.289	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0498	95% Adjusted-CLT UCL (Chen-1995)	0.0512
		95% Modified-t UCL (Johnson-1978)	0.0502

Gamma GOF Test			
A-D Test Statistic	0.566	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.284	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	17.94	k star (bias corrected MLE)	9.081
Theta hat (MLE)	0.00226	Theta star (bias corrected MLE)	0.00446
nu hat (MLE)	215.3	nu star (bias corrected)	109
MLE Mean (bias corrected)	0.0405	MLE Sd (bias corrected)	0.0134

		Approximate Chi Square Value (0.05)	85.88
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	78.49
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0514	95% Adjusted Gamma UCL (use when n<50)	0.0562
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.442	Mean of logged Data	-3.235
Maximum of Logged Data	-2.797	SD of logged Data	0.251
Assuming Lognormal Distribution			
95% H-UCL	0.0517	90% Chebyshev (MVUE) UCL	0.0529
95% Chebyshev (MVUE) UCL	0.0585	97.5% Chebyshev (MVUE) UCL	0.0663
99% Chebyshev (MVUE) UCL	0.0817		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0481	95% Jackknife UCL	0.0498
95% Standard Bootstrap UCL	0.0474	95% Bootstrap-t UCL	0.0758
95% Hall's Bootstrap UCL	0.0868	95% Percentile Bootstrap UCL	0.0477
95% BCA Bootstrap UCL	0.0498		
90% Chebyshev(Mean, Sd) UCL	0.0543	95% Chebyshev(Mean, Sd) UCL	0.0605
97.5% Chebyshev(Mean, Sd) UCL	0.0692	99% Chebyshev(Mean, Sd) UCL	0.0862
Suggested UCL to Use			
95% Student's-t UCL	0.0498		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:43:03 AM		
From File	MacLellan Region, Tissue - Small Mammal, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Small Mammal, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.99	Mean	3.202
Maximum	3.34	Median	3.255
SD	0.14	Std. Error of Mean	0.0571
Coefficient of Variation	0.0437	Skewness	-0.839

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test		
Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.317	95% Adjusted-CLT UCL (Chen-1995)	3.275
		95% Modified-t UCL (Johnson-1978)	3.314

Gamma GOF Test		
A-D Test Statistic	0.462	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.259	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	617.5	k star (bias corrected MLE)	308.9
Theta hat (MLE)	0.00518	Theta star (bias corrected MLE)	0.0104
nu hat (MLE)	7411	nu star (bias corrected)	3707
MLE Mean (bias corrected)	3.202	MLE Sd (bias corrected)	0.182

		Approximate Chi Square Value (0.05)	3566
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	3516
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	3.328	95% Adjusted Gamma UCL (use when n<50)	3.376
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.095	Mean of logged Data	1.163
Maximum of Logged Data	1.206	SD of logged Data	0.0443
Assuming Lognormal Distribution			
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	3.375
95% Chebyshev (MVUE) UCL	3.454	97.5% Chebyshev (MVUE) UCL	3.563
99% Chebyshev (MVUE) UCL	3.778		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	3.296	95% Jackknife UCL	3.317
95% Standard Bootstrap UCL	3.288	95% Bootstrap-t UCL	3.295
95% Hall's Bootstrap UCL	3.26	95% Percentile Bootstrap UCL	3.282
95% BCA Bootstrap UCL	3.27		
90% Chebyshev(Mean, Sd) UCL	3.373	95% Chebyshev(Mean, Sd) UCL	3.451
97.5% Chebyshev(Mean, Sd) UCL	3.558	99% Chebyshev(Mean, Sd) UCL	3.77
Suggested UCL to Use			
95% Student's-t UCL	3.317		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:43:43 AM
From File	MacLellan Region, Tissue - Small Mammal, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	1
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.048	Minimum Non-Detect	0.04
Maximum Detect	0.088	Maximum Non-Detect	0.04
Variance Detects	3.5050E-4	Percent Non-Detects	16.67%
Mean Detects	0.068	SD Detects	0.0187
Median Detects	0.077	CV Detects	0.275
Skewness Detects	-0.377	Kurtosis Detects	-2.9
Mean of Logged Detects	-2.721	SD of Logged Detects	0.292

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0633	KM Standard Error of Mean	0.00845
KM SD	0.0185	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0804	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0772	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0887	95% KM Chebyshev UCL	0.1
97.5% KM Chebyshev UCL	0.116	99% KM Chebyshev UCL	0.147

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.617	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.32	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	15.36	k star (bias corrected MLE)	6.277
Theta hat (MLE)	0.00443	Theta star (bias corrected MLE)	0.0108
nu hat (MLE)	153.6	nu star (bias corrected)	62.77
Mean (detects)	0.068		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0284	Mean	0.0614
Maximum	0.088	Median	0.0625
SD	0.0233	CV	0.379
k hat (MLE)	7.215	k star (bias corrected MLE)	3.719
Theta hat (MLE)	0.00851	Theta star (bias corrected MLE)	0.0165
nu hat (MLE)	86.58	nu star (bias corrected)	44.62
Adjusted Level of Significance (β)	0.0122		
Approximate Chi Square Value (44.62, α)	30.3	Adjusted Chi Square Value (44.62, β)	26.11
95% Gamma Approximate UCL (use when n>=50)	0.0904	95% Gamma Adjusted UCL (use when n<50)	0.105
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0633	SD (KM)	0.0185
Variance (KM)	3.4256E-4	SE of Mean (KM)	0.00845
k hat (KM)	11.71	k star (KM)	5.966
nu hat (KM)	140.5	nu star (KM)	71.59
theta hat (KM)	0.00541	theta star (KM)	0.0106
80% gamma percentile (KM)	0.0835	90% gamma percentile (KM)	0.098
95% gamma percentile (KM)	0.111	99% gamma percentile (KM)	0.139
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (71.59, α)	53.11	Adjusted Chi Square Value (71.59, β)	47.41
95% Gamma Approximate KM-UCL (use when n>=50)	0.0854	95% Gamma Adjusted KM-UCL (use when n<50)	0.0956
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.801	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.305	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0621	Mean in Log Scale	-2.838
SD in Original Scale	0.0221	SD in Log Scale	0.387
95% t UCL (assumes normality of ROS data)	0.0803	95% Percentile Bootstrap UCL	0.0758
95% BCA Bootstrap UCL	0.0753	95% Bootstrap t UCL	0.0802
95% H-UCL (Log ROS)	0.0954		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.804	KM Geo Mean	0.0606
KM SD (logged)	0.302	95% Critical H Value (KM-Log)	2.23
KM Standard Error of Mean (logged)	0.138	95% H-UCL (KM -Log)	0.0857
KM SD (logged)	0.302	95% Critical H Value (KM-Log)	2.23
KM Standard Error of Mean (logged)	0.138		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.06	Mean in Log Scale	-2.92
SD in Original Scale	0.0258	SD in Log Scale	0.552
95% t UCL (Assumes normality)	0.0812	95% H-Stat UCL	0.124
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0804		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:44:23 AM
From File	MacLellan Region, Tissue - Small Mammal, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.65	Mean	5.06
Maximum	8.48	Median	4.75
SD	2.323	Std. Error of Mean	0.948
Coefficient of Variation	0.459	Skewness	0.486

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.971	95% Adjusted-CLT UCL (Chen-1995)	6.821
		95% Modified-t UCL (Johnson-1978)	7.002

Gamma GOF Test			
A-D Test Statistic	0.269	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.204	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	5.624	k star (bias corrected MLE)	2.923
Theta hat (MLE)	0.9	Theta star (bias corrected MLE)	1.731
nu hat (MLE)	67.49	nu star (bias corrected)	35.08
MLE Mean (bias corrected)	5.06	MLE Sd (bias corrected)	2.96

		Approximate Chi Square Value (0.05)	22.53
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	18.98
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.879	95% Adjusted Gamma UCL (use when n<50)	9.351
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.188	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.975	Mean of logged Data	1.53
Maximum of Logged Data	2.138	SD of logged Data	0.474
Assuming Lognormal Distribution			
95% H-UCL	8.923	90% Chebyshev (MVUE) UCL	8.002
95% Chebyshev (MVUE) UCL	9.333	97.5% Chebyshev (MVUE) UCL	11.18
99% Chebyshev (MVUE) UCL	14.81		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.62	95% Jackknife UCL	6.971
95% Standard Bootstrap UCL	6.502	95% Bootstrap-t UCL	7.589
95% Hall's Bootstrap UCL	7.044	95% Percentile Bootstrap UCL	6.467
95% BCA Bootstrap UCL	6.532		
90% Chebyshev(Mean, Sd) UCL	7.905	95% Chebyshev(Mean, Sd) UCL	9.193
97.5% Chebyshev(Mean, Sd) UCL	10.98	99% Chebyshev(Mean, Sd) UCL	14.49
Suggested UCL to Use			
95% Student's-t UCL	6.971		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:45:03 AM
From File	MacLellan Region, Tissue - Small Mammal, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.018	Mean	0.0303
Maximum	0.044	Median	0.03
SD	0.00975	Std. Error of Mean	0.00398
Coefficient of Variation	0.321	Skewness	0.175

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0384	95% Adjusted-CLT UCL (Chen-1995)	0.0372
		95% Modified-t UCL (Johnson-1978)	0.0384

Gamma GOF Test

A-D Test Statistic	0.176	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.154	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.18	k star (bias corrected MLE)	5.701
Theta hat (MLE)	0.00271	Theta star (bias corrected MLE)	0.00532
nu hat (MLE)	134.2	nu star (bias corrected)	68.41
MLE Mean (bias corrected)	0.0303	MLE Sd (bias corrected)	0.0127

		Approximate Chi Square Value (0.05)	50.37
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	44.83
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0412	95% Adjusted Gamma UCL (use when n<50)	0.0463
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.017	Mean of logged Data	-3.541
Maximum of Logged Data	-3.124	SD of logged Data	0.335
Assuming Lognormal Distribution			
95% H-UCL	0.0432	90% Chebyshev (MVUE) UCL	0.0428
95% Chebyshev (MVUE) UCL	0.0485	97.5% Chebyshev (MVUE) UCL	0.0563
99% Chebyshev (MVUE) UCL	0.0717		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0369	95% Jackknife UCL	0.0384
95% Standard Bootstrap UCL	0.0362	95% Bootstrap-t UCL	0.0398
95% Hall's Bootstrap UCL	0.0387	95% Percentile Bootstrap UCL	0.0363
95% BCA Bootstrap UCL	0.0363		
90% Chebyshev(Mean, Sd) UCL	0.0423	95% Chebyshev(Mean, Sd) UCL	0.0477
97.5% Chebyshev(Mean, Sd) UCL	0.0552	99% Chebyshev(Mean, Sd) UCL	0.0699
Suggested UCL to Use			
95% Student's-t UCL	0.0384		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:45:43 AM
From File	MacLellan Region, Tissue - Small Mammal, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Molybdenum (Mo), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.069	Mean	0.128
Maximum	0.176	Median	0.123
SD	0.0382	Std. Error of Mean	0.0156
Coefficient of Variation	0.298	Skewness	-0.278

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.196	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.159	95% Adjusted-CLT UCL (Chen-1995)	0.152
		95% Modified-t UCL (Johnson-1978)	0.159

Gamma GOF Test

A-D Test Statistic	0.33	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.219	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.97	k star (bias corrected MLE)	6.098
Theta hat (MLE)	0.0107	Theta star (bias corrected MLE)	0.021
nu hat (MLE)	143.7	nu star (bias corrected)	73.18
MLE Mean (bias corrected)	0.128	MLE Sd (bias corrected)	0.0518

		Approximate Chi Square Value (0.05)	54.48
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	48.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.172	95% Adjusted Gamma UCL (use when n<50)	0.192
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.247	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.674	Mean of logged Data	-2.099
Maximum of Logged Data	-1.737	SD of logged Data	0.331
Assuming Lognormal Distribution			
95% H-UCL	0.181	90% Chebyshev (MVUE) UCL	0.18
95% Chebyshev (MVUE) UCL	0.204	97.5% Chebyshev (MVUE) UCL	0.236
99% Chebyshev (MVUE) UCL	0.301		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.153	95% Jackknife UCL	0.159
95% Standard Bootstrap UCL	0.152	95% Bootstrap-t UCL	0.164
95% Hall's Bootstrap UCL	0.174	95% Percentile Bootstrap UCL	0.152
95% BCA Bootstrap UCL	0.147		
90% Chebyshev(Mean, Sd) UCL	0.175	95% Chebyshev(Mean, Sd) UCL	0.196
97.5% Chebyshev(Mean, Sd) UCL	0.225	99% Chebyshev(Mean, Sd) UCL	0.283
Suggested UCL to Use			
95% Student's-t UCL	0.159		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 4:46:23 AM		
From File	MacLellan Region, Tissue - Small Mammal, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Tissue - Small Mammal, Nickel (Ni), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	5
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Tissue - Small Mammal, Nickel (Ni), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:47:02 AM
From File	MacLellan Region, Tissue - Small Mammal, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.3	Mean	0.368
Maximum	0.52	Median	0.36
SD	0.0808	Std. Error of Mean	0.033
Coefficient of Variation	0.22	Skewness	1.615

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.325	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data Not Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.435	95% Adjusted-CLT UCL (Chen-1995)	0.446
		95% Modified-t UCL (Johnson-1978)	0.438

Gamma GOF Test			
A-D Test Statistic	0.523	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.299	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	28.05	k star (bias corrected MLE)	14.13
Theta hat (MLE)	0.0131	Theta star (bias corrected MLE)	0.0261
nu hat (MLE)	336.6	nu star (bias corrected)	169.6
MLE Mean (bias corrected)	0.368	MLE Sd (bias corrected)	0.098

		Approximate Chi Square Value (0.05)	140.5
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	130.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.445	95% Adjusted Gamma UCL (use when n<50)	0.477
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.289	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.204	Mean of logged Data	-1.017
Maximum of Logged Data	-0.654	SD of logged Data	0.202
Assuming Lognormal Distribution			
95% H-UCL	0.445	90% Chebyshev (MVUE) UCL	0.459
95% Chebyshev (MVUE) UCL	0.5	97.5% Chebyshev (MVUE) UCL	0.557
99% Chebyshev (MVUE) UCL	0.67		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.423	95% Jackknife UCL	0.435
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	0.467	95% Chebyshev(Mean, Sd) UCL	0.512
97.5% Chebyshev(Mean, Sd) UCL	0.574	99% Chebyshev(Mean, Sd) UCL	0.697
Suggested UCL to Use			
95% Student's-t UCL	0.435		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:47:42 AM
From File	MacLellan Region, Tissue - Small Mammal, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2.63	Mean	5.435
Maximum	9.3	Median	5.22
SD	2.425	Std. Error of Mean	0.99
Coefficient of Variation	0.446	Skewness	0.641

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test			
Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.43	95% Adjusted-CLT UCL (Chen-1995)	7.34
		95% Modified-t UCL (Johnson-1978)	7.473

Gamma GOF Test			
A-D Test Statistic	0.285	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.214	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.034	k star (bias corrected MLE)	3.128
Theta hat (MLE)	0.901	Theta star (bias corrected MLE)	1.737
nu hat (MLE)	72.41	nu star (bias corrected)	37.54
MLE Mean (bias corrected)	5.435	MLE Sd (bias corrected)	3.073

		Approximate Chi Square Value (0.05)	24.51
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	20.79
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.324	95% Adjusted Gamma UCL (use when n<50)	9.812
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.967	Mean of logged Data	1.608
Maximum of Logged Data	2.23	SD of logged Data	0.457
Assuming Lognormal Distribution			
95% H-UCL	9.311	90% Chebyshev (MVUE) UCL	8.483
95% Chebyshev (MVUE) UCL	9.861	97.5% Chebyshev (MVUE) UCL	11.77
99% Chebyshev (MVUE) UCL	15.53		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.064	95% Jackknife UCL	7.43
95% Standard Bootstrap UCL	6.952	95% Bootstrap-t UCL	8.073
95% Hall's Bootstrap UCL	7.142	95% Percentile Bootstrap UCL	6.948
95% BCA Bootstrap UCL	7.027		
90% Chebyshev(Mean, Sd) UCL	8.405	95% Chebyshev(Mean, Sd) UCL	9.751
97.5% Chebyshev(Mean, Sd) UCL	11.62	99% Chebyshev(Mean, Sd) UCL	15.29
Suggested UCL to Use			
95% Student's-t UCL	7.43		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 4:49:02 AM
From File	MacLellan Region, Tissue - Small Mammal, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Tissue - Small Mammal, Zinc (Zn), mg/kg ww

General Statistics

Total Number of Observations	6	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	28.8	Mean	29.27
Maximum	30.6	Median	29
SD	0.677	Std. Error of Mean	0.276
Coefficient of Variation	0.0231	Skewness	2.091

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.723	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.314	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	29.82	95% Adjusted-CLT UCL (Chen-1995)	29.97
		95% Modified-t UCL (Johnson-1978)	29.86

Gamma GOF Test

A-D Test Statistic	0.871	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.696	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.309	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	2289	k star (bias corrected MLE)	1144
Theta hat (MLE)	0.0128	Theta star (bias corrected MLE)	0.0256
nu hat (MLE)	27462	nu star (bias corrected)	13732
MLE Mean (bias corrected)	29.27	MLE Sd (bias corrected)	0.865

		Approximate Chi Square Value (0.05)	13461
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	13362
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	29.86	95% Adjusted Gamma UCL (use when n<50)	30.08
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.728	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.31	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.325	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.36	Mean of logged Data	3.376
Maximum of Logged Data	3.421	SD of logged Data	0.0228
Assuming Lognormal Distribution			
95% H-UCL	N/A	90% Chebyshev (MVUE) UCL	30.08
95% Chebyshev (MVUE) UCL	30.45	97.5% Chebyshev (MVUE) UCL	30.97
99% Chebyshev (MVUE) UCL	31.97		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	29.72	95% Jackknife UCL	29.82
95% Standard Bootstrap UCL	29.69	95% Bootstrap-t UCL	31.02
95% Hall's Bootstrap UCL	31.53	95% Percentile Bootstrap UCL	29.75
95% BCA Bootstrap UCL	29.85		
90% Chebyshev(Mean, Sd) UCL	30.1	95% Chebyshev(Mean, Sd) UCL	30.47
97.5% Chebyshev(Mean, Sd) UCL	30.99	99% Chebyshev(Mean, Sd) UCL	32.02
Suggested UCL to Use			
95% Student's-t UCL	29.82		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.15
PROUCL OUTPUTS
FISH MUSCLE TISSUE (ALL LAKES)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:33:37 PM		
From File	Gordon Region (All Lakes), Fish - Muscle, Antimony (Sb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Muscle, Antimony (Sb), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Muscle, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:34:16 PM
From File	Gordon Region (All Lakes), Fish - Muscle, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Muscle, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	42
		Number of Missing Observations	0
Minimum	0.011	Mean	0.0411
Maximum	0.108	Median	0.033
SD	0.0234	Std. Error of Mean	0.00295
Coefficient of Variation	0.569	Skewness	0.916
Normal GOF Test			
Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	6.2295E-6	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.046	95% Adjusted-CLT UCL (Chen-1995)	0.0463
		95% Modified-t UCL (Johnson-1978)	0.046
Gamma GOF Test			
A-D Test Statistic	1.192	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.131	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.113	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.365	k star (bias corrected MLE)	3.215
Theta hat (MLE)	0.0122	Theta star (bias corrected MLE)	0.0128
nu hat (MLE)	423.9	nu star (bias corrected)	405.1
MLE Mean (bias corrected)	0.0411	MLE Sd (bias corrected)	0.0229
		Approximate Chi Square Value (0.05)	359.4
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	358.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0463	95% Adjusted Gamma UCL (use when n<50)	0.0464

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0122	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.51	Mean of logged Data	-3.349
Maximum of Logged Data	-2.226	SD of logged Data	0.565
Assuming Lognormal Distribution			
95% H-UCL	0.0473	90% Chebyshev (MVUE) UCL	0.0505
95% Chebyshev (MVUE) UCL	0.0547	97.5% Chebyshev (MVUE) UCL	0.0606
99% Chebyshev (MVUE) UCL	0.0722		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0459	95% Jackknife UCL	0.046
95% Standard Bootstrap UCL	0.0459	95% Bootstrap-t UCL	0.0466
95% Hall's Bootstrap UCL	0.0463	95% Percentile Bootstrap UCL	0.046
95% BCA Bootstrap UCL	0.0459		
90% Chebyshev(Mean, Sd) UCL	0.0499	95% Chebyshev(Mean, Sd) UCL	0.0539
97.5% Chebyshev(Mean, Sd) UCL	0.0595	99% Chebyshev(Mean, Sd) UCL	0.0704
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0539		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:34:55 PM		
From File	Gordon Region (All Lakes), Fish - Muscle, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Muscle, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	42
Number of Detects	46	Number of Non-Detects	17
Number of Distinct Detects	41	Number of Distinct Non-Detects	1
Minimum Detect	0.041	Minimum Non-Detect	0.04
Maximum Detect	0.643	Maximum Non-Detect	0.04
Variance Detects	0.0131	Percent Non-Detects	26.98%
Mean Detects	0.148	SD Detects	0.114
Median Detects	0.113	CV Detects	0.775
Skewness Detects	2.255	Kurtosis Detects	6.941
Mean of Logged Detects	-2.142	SD of Logged Detects	0.667
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.788	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.129	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.118	KM Standard Error of Mean	0.0137
KM SD	0.108	95% KM (BCA) UCL	0.142
95% KM (t) UCL	0.141	95% KM (Percentile Bootstrap) UCL	0.142
95% KM (z) UCL	0.141	95% KM Bootstrap t UCL	0.149
90% KM Chebyshev UCL	0.16	95% KM Chebyshev UCL	0.178
97.5% KM Chebyshev UCL	0.204	99% KM Chebyshev UCL	0.255
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.671	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.105	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.132	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.35	k star (bias corrected MLE)	2.211
Theta hat (MLE)	0.0628	Theta star (bias corrected MLE)	0.0667
nu hat (MLE)	216.2	nu star (bias corrected)	203.4

Mean (detects)	0.148		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.11
Maximum	0.643	Median	0.087
SD	0.115	CV	1.043
k hat (MLE)	0.962	k star (bias corrected MLE)	0.927
Theta hat (MLE)	0.115	Theta star (bias corrected MLE)	0.119
nu hat (MLE)	121.2	nu star (bias corrected)	116.8
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (116.80, α)	92.84	Adjusted Chi Square Value (116.80, β)	92.34
95% Gamma Approximate UCL (use when n>=50)	0.139	95% Gamma Adjusted UCL (use when n<50)	0.14
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.118	SD (KM)	0.108
Variance (KM)	0.0116	SE of Mean (KM)	0.0137
k hat (KM)	1.21	k star (KM)	1.163
nu hat (KM)	152.5	nu star (KM)	146.5
theta hat (KM)	0.0979	theta star (KM)	0.102
80% gamma percentile (KM)	0.188	90% gamma percentile (KM)	0.263
95% gamma percentile (KM)	0.337	99% gamma percentile (KM)	0.506
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (146.53, α)	119.6	Adjusted Chi Square Value (146.53, β)	119
95% Gamma Approximate KM-UCL (use when n>=50)	0.145	95% Gamma Adjusted KM-UCL (use when n<50)	0.146
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.063	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.129	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.115	Mean in Log Scale	-2.568
SD in Original Scale	0.112	SD in Log Scale	0.932
95% t UCL (assumes normality of ROS data)	0.138	95% Percentile Bootstrap UCL	0.139
95% BCA Bootstrap UCL	0.142	95% Bootstrap t UCL	0.143
95% H-UCL (Log ROS)	0.154		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.432	KM Geo Mean	0.0878
KM SD (logged)	0.739	95% Critical H Value (KM-Log)	2.04
KM Standard Error of Mean (logged)	0.0942	95% H-UCL (KM -Log)	0.14

KM SD (logged)	0.739	95% Critical H Value (KM-Log)	2.04
KM Standard Error of Mean (logged)	0.0942		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.113	Mean in Log Scale	-2.619
SD in Original Scale	0.113	SD in Log Scale	0.975
95% t UCL (Assumes normality)	0.137	95% H-Stat UCL	0.155
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Approximate Gamma UCL	0.145	95% GROS Approximate Gamma UCL	0.139
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:35:34 PM
From File	Gordon Region (All Lakes), Fish - Muscle, Chromium (Cr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Muscle, Chromium (Cr), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Muscle, Chromium (Cr), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:36:12 PM
From File	Gordon Region (All Lakes), Fish - Muscle, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Muscle, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	0.061	Mean	0.158
Maximum	0.364	Median	0.149
SD	0.0463	Std. Error of Mean	0.00584
Coefficient of Variation	0.294	Skewness	1.455

Normal GOF Test			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	4.9669E-4	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.167	95% Adjusted-CLT UCL (Chen-1995)	0.168
		95% Modified-t UCL (Johnson-1978)	0.168

Gamma GOF Test			
A-D Test Statistic	0.547	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.125	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	12.9	k star (bias corrected MLE)	12.3
Theta hat (MLE)	0.0122	Theta star (bias corrected MLE)	0.0128
nu hat (MLE)	1626	nu star (bias corrected)	1550
MLE Mean (bias corrected)	0.158	MLE Sd (bias corrected)	0.045
		Approximate Chi Square Value (0.05)	1459
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	1457

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.168	95% Adjusted Gamma UCL (use when n<50)	0.168

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.85	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.797	Mean of logged Data	-1.886
Maximum of Logged Data	-1.011	SD of logged Data	0.282
Assuming Lognormal Distribution			
95% H-UCL	0.168	90% Chebyshev (MVUE) UCL	0.175
95% Chebyshev (MVUE) UCL	0.183	97.5% Chebyshev (MVUE) UCL	0.193
99% Chebyshev (MVUE) UCL	0.214		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.167	95% Jackknife UCL	0.167
95% Standard Bootstrap UCL	0.167	95% Bootstrap-t UCL	0.169
95% Hall's Bootstrap UCL	0.17	95% Percentile Bootstrap UCL	0.168
95% BCA Bootstrap UCL	0.169		
90% Chebyshev(Mean, Sd) UCL	0.175	95% Chebyshev(Mean, Sd) UCL	0.183
97.5% Chebyshev(Mean, Sd) UCL	0.194	99% Chebyshev(Mean, Sd) UCL	0.216
Suggested UCL to Use			
95% Approximate Gamma UCL	0.168		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:36:51 PM
From File	Gordon Region (All Lakes), Fish - Muscle, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Muscle, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Muscle, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:37:29 PM		
From File	Gordon Region (All Lakes), Fish - Muscle, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Muscle, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	60
		Number of Missing Observations	0
Minimum	0.115	Mean	0.7
Maximum	3.38	Median	0.617
SD	0.555	Std. Error of Mean	0.07
Coefficient of Variation	0.793	Skewness	2.132

Normal GOF Test			
Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.4043E-9	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.817	95% Adjusted-CLT UCL (Chen-1995)	0.836
		95% Modified-t UCL (Johnson-1978)	0.82

Gamma GOF Test			
A-D Test Statistic	0.798	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.765	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.107	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.114	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.815	k star (bias corrected MLE)	1.739
Theta hat (MLE)	0.386	Theta star (bias corrected MLE)	0.403
nu hat (MLE)	228.7	nu star (bias corrected)	219.2
MLE Mean (bias corrected)	0.7	MLE Sd (bias corrected)	0.531
		Approximate Chi Square Value (0.05)	185.9
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	185.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.826	95% Adjusted Gamma UCL (use when n<50)	0.829

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0049	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.163	Mean of logged Data	-0.656
Maximum of Logged Data	1.218	SD of logged Data	0.822
Assuming Lognormal Distribution			
95% H-UCL	0.906	90% Chebyshev (MVUE) UCL	0.976
95% Chebyshev (MVUE) UCL	1.091	97.5% Chebyshev (MVUE) UCL	1.25
99% Chebyshev (MVUE) UCL	1.564		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.816	95% Jackknife UCL	0.817
95% Standard Bootstrap UCL	0.812	95% Bootstrap-t UCL	0.843
95% Hall's Bootstrap UCL	0.868	95% Percentile Bootstrap UCL	0.813
95% BCA Bootstrap UCL	0.843		
90% Chebyshev(Mean, Sd) UCL	0.91	95% Chebyshev(Mean, Sd) UCL	1.005
97.5% Chebyshev(Mean, Sd) UCL	1.137	99% Chebyshev(Mean, Sd) UCL	1.397
Suggested UCL to Use			
95% Approximate Gamma UCL	0.826		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:38:08 PM
From File	Gordon Region (All Lakes), Fish - Muscle, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Muscle, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	0.09	Mean	0.282
Maximum	0.88	Median	0.22
SD	0.177	Std. Error of Mean	0.0256
Coefficient of Variation	0.629	Skewness	1.761

Normal GOF Test		
Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.325	95% Adjusted-CLT UCL (Chen-1995)	0.331
		95% Modified-t UCL (Johnson-1978)	0.326

Gamma GOF Test		
A-D Test Statistic	0.87	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.118	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level
Detected data follow Appr. Gamma Distribution at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.399	k star (bias corrected MLE)	3.2
Theta hat (MLE)	0.083	Theta star (bias corrected MLE)	0.0881
nu hat (MLE)	326.3	nu star (bias corrected)	307.2
MLE Mean (bias corrected)	0.282	MLE Sd (bias corrected)	0.158
		Approximate Chi Square Value (0.05)	267.6
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	266.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.324	95% Adjusted Gamma UCL (use when n<50)	0.325

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0862	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.408	Mean of logged Data	-1.42
Maximum of Logged Data	-0.128	SD of logged Data	0.542
Assuming Lognormal Distribution			
95% H-UCL	0.326	90% Chebyshev (MVUE) UCL	0.348
95% Chebyshev (MVUE) UCL	0.38	97.5% Chebyshev (MVUE) UCL	0.423
99% Chebyshev (MVUE) UCL	0.509		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.324	95% Jackknife UCL	0.325
95% Standard Bootstrap UCL	0.324	95% Bootstrap-t UCL	0.336
95% Hall's Bootstrap UCL	0.331	95% Percentile Bootstrap UCL	0.328
95% BCA Bootstrap UCL	0.334		
90% Chebyshev(Mean, Sd) UCL	0.359	95% Chebyshev(Mean, Sd) UCL	0.393
97.5% Chebyshev(Mean, Sd) UCL	0.442	99% Chebyshev(Mean, Sd) UCL	0.537
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.325		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:38:47 PM		
From File	Gordon Region (All Lakes), Fish - Muscle, Selenium (Se), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Muscle, Selenium (Se), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	11
Number of Detects	52	Number of Non-Detects	11
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.23	Maximum Non-Detect	0.1
Variance Detects	0.00105	Percent Non-Detects	17.46%
Mean Detects	0.133	SD Detects	0.0325
Median Detects	0.12	CV Detects	0.244
Skewness Detects	1.564	Kurtosis Detects	1.856
Mean of Logged Detects	-2.042	SD of Logged Detects	0.216
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.793	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	2.1499E-9	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.122	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.127	KM Standard Error of Mean	0.00404
KM SD	0.0318	95% KM (BCA) UCL	0.134
95% KM (t) UCL	0.134	95% KM (Percentile Bootstrap) UCL	0.134
95% KM (z) UCL	0.134	95% KM Bootstrap t UCL	0.135
90% KM Chebyshev UCL	0.139	95% KM Chebyshev UCL	0.145
97.5% KM Chebyshev UCL	0.153	99% KM Chebyshev UCL	0.168
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	3.118	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.123	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	20.42	k star (bias corrected MLE)	19.26
Theta hat (MLE)	0.00652	Theta star (bias corrected MLE)	0.00691
nu hat (MLE)	2124	nu star (bias corrected)	2003

Mean (detects)	0.133		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0486	Mean	0.122
Maximum	0.23	Median	0.12
SD	0.0382	CV	0.313
k hat (MLE)	10.58	k star (bias corrected MLE)	10.09
Theta hat (MLE)	0.0115	Theta star (bias corrected MLE)	0.0121
nu hat (MLE)	1333	nu star (bias corrected)	1271
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (N/A, α)	1189	Adjusted Chi Square Value (N/A, β)	1188
95% Gamma Approximate UCL (use when n>=50)	0.131	95% Gamma Adjusted UCL (use when n<50)	0.131
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.127	SD (KM)	0.0318
Variance (KM)	0.00101	SE of Mean (KM)	0.00404
k hat (KM)	16.04	k star (KM)	15.29
nu hat (KM)	2021	nu star (KM)	1926
theta hat (KM)	0.00794	theta star (KM)	0.00833
80% gamma percentile (KM)	0.154	90% gamma percentile (KM)	0.17
95% gamma percentile (KM)	0.185	99% gamma percentile (KM)	0.215
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	1825	Adjusted Chi Square Value (N/A, β)	1823
95% Gamma Approximate KM-UCL (use when n>=50)	0.134	95% Gamma Adjusted KM-UCL (use when n<50)	0.135
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.85	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	7.6356E-7	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.122	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.124	Mean in Log Scale	-2.126
SD in Original Scale	0.0358	SD in Log Scale	0.272
95% t UCL (assumes normality of ROS data)	0.131	95% Percentile Bootstrap UCL	0.131
95% BCA Bootstrap UCL	0.132	95% Bootstrap t UCL	0.132
95% H-UCL (Log ROS)	0.132		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.087	KM Geo Mean	0.124
KM SD (logged)	0.218	95% Critical H Value (KM-Log)	1.719
KM Standard Error of Mean (logged)	0.0277	95% H-UCL (KM -Log)	0.133

KM SD (logged)	0.218	95% Critical H Value (KM-Log)	1.719
KM Standard Error of Mean (logged)	0.0277		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.119	Mean in Log Scale	-2.208
SD in Original Scale	0.0433	SD in Log Scale	0.414
95% t UCL (Assumes normality)	0.128	95% H-Stat UCL	0.132
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.134	KM H-UCL	0.133
95% KM (BCA) UCL	0.134		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:39:26 PM
From File	Gordon Region (All Lakes), Fish - Muscle, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Muscle, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	61
		Number of Missing Observations	0
Minimum	0.012	Mean	0.407
Maximum	2.04	Median	0.338
SD	0.325	Std. Error of Mean	0.041
Coefficient of Variation	0.798	Skewness	2.29

Normal GOF Test			
Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	4.7059E-9	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.124	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.476	95% Adjusted-CLT UCL (Chen-1995)	0.487
		95% Modified-t UCL (Johnson-1978)	0.478

Gamma GOF Test			
A-D Test Statistic	0.519	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.114	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.587	k star (bias corrected MLE)	1.522
Theta hat (MLE)	0.257	Theta star (bias corrected MLE)	0.268
nu hat (MLE)	199.9	nu star (bias corrected)	191.7
MLE Mean (bias corrected)	0.407	MLE Sd (bias corrected)	0.33
		Approximate Chi Square Value (0.05)	160.7
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	160

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.486	95% Adjusted Gamma UCL (use when n<50)	0.488

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	4.9174E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.165	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.423	Mean of logged Data	-1.246
Maximum of Logged Data	0.713	SD of logged Data	0.971
Assuming Lognormal Distribution			
95% H-UCL	0.607	90% Chebyshev (MVUE) UCL	0.653
95% Chebyshev (MVUE) UCL	0.742	97.5% Chebyshev (MVUE) UCL	0.865
99% Chebyshev (MVUE) UCL	1.108		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.475	95% Jackknife UCL	0.476
95% Standard Bootstrap UCL	0.473	95% Bootstrap-t UCL	0.494
95% Hall's Bootstrap UCL	0.508	95% Percentile Bootstrap UCL	0.478
95% BCA Bootstrap UCL	0.494		
90% Chebyshev(Mean, Sd) UCL	0.53	95% Chebyshev(Mean, Sd) UCL	0.586
97.5% Chebyshev(Mean, Sd) UCL	0.663	99% Chebyshev(Mean, Sd) UCL	0.815
Suggested UCL to Use			
95% Approximate Gamma UCL	0.486		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:41:23 PM		
From File	Gordon Region (All Lakes), Fish - Muscle, Zinc (Zn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Muscle, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	58
		Number of Missing Observations	0
Minimum	1.94	Mean	5.08
Maximum	9.55	Median	4.83
SD	1.598	Std. Error of Mean	0.201
Coefficient of Variation	0.315	Skewness	0.702
Normal GOF Test			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00706	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.416	95% Adjusted-CLT UCL (Chen-1995)	5.43
		95% Modified-t UCL (Johnson-1978)	5.419
Gamma GOF Test			
A-D Test Statistic	0.744	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0937	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	10.71	k star (bias corrected MLE)	10.21
Theta hat (MLE)	0.474	Theta star (bias corrected MLE)	0.498
nu hat (MLE)	1349	nu star (bias corrected)	1286
MLE Mean (bias corrected)	5.08	MLE Sd (bias corrected)	1.59
		Approximate Chi Square Value (0.05)	1204
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	1202
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	5.427	95% Adjusted Gamma UCL (use when n<50)	5.435

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.32	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0805	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.663	Mean of logged Data	1.578
Maximum of Logged Data	2.257	SD of logged Data	0.311
Assuming Lognormal Distribution			
95% H-UCL	5.45	90% Chebyshev (MVUE) UCL	5.69
95% Chebyshev (MVUE) UCL	5.966	97.5% Chebyshev (MVUE) UCL	6.35
99% Chebyshev (MVUE) UCL	7.102		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.411	95% Jackknife UCL	5.416
95% Standard Bootstrap UCL	5.406	95% Bootstrap-t UCL	5.46
95% Hall's Bootstrap UCL	5.448	95% Percentile Bootstrap UCL	5.412
95% BCA Bootstrap UCL	5.459		
90% Chebyshev(Mean, Sd) UCL	5.684	95% Chebyshev(Mean, Sd) UCL	5.957
97.5% Chebyshev(Mean, Sd) UCL	6.337	99% Chebyshev(Mean, Sd) UCL	7.082
Suggested UCL to Use			
95% Approximate Gamma UCL	5.427		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.16
PROUCL OUTPUTS
FISH MUSCLE TISSUE (ALL LAKES)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:33:32 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	47
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.013	Minimum Non-Detect	0.01
Maximum Detect	0.029	Maximum Non-Detect	0.03
Variance Detects	1.2800E-4	Percent Non-Detects	95.92%
Mean Detects	0.021	SD Detects	0.0113
Median Detects	0.021	CV Detects	0.539
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.942	SD of Logged Detects	0.567

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0106	KM Standard Error of Mean	7.4178E-4
KM SD	0.00315	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0119	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0118	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0128	95% KM Chebyshev UCL	0.0138
97.5% KM Chebyshev UCL	0.0152	99% KM Chebyshev UCL	0.018

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	6.54	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00321	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	26.16	nu star (bias corrected)	N/A
Mean (detects)	0.021		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0106	SD (KM)	0.00315

Variance (KM)	9.9043E-6	SE of Mean (KM)	7.4178E-4
k hat (KM)	11.37	k star (KM)	10.69
nu hat (KM)	1114	nu star (KM)	1047
theta hat (KM)	9.3339E-4	theta star (KM)	9.9300E-4
80% gamma percentile (KM)	0.0132	90% gamma percentile (KM)	0.0149
95% gamma percentile (KM)	0.0165	99% gamma percentile (KM)	0.0196
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (N/A, α)	973.1	Adjusted Chi Square Value (N/A, β)	970.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.0114	95% Gamma Adjusted KM-UCL (use when n<50)	0.0114
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00139	Mean in Log Scale	-9.119
SD in Original Scale	0.00454	SD in Log Scale	2.45
95% t UCL (assumes normality of ROS data)	0.00248	95% Percentile Bootstrap UCL	0.0025
95% BCA Bootstrap UCL	0.00317	95% Bootstrap t UCL	0.00535
95% H-UCL (Log ROS)	0.00991		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.568	KM Geo Mean	0.0104
KM SD (logged)	0.179	95% Critical H Value (KM-Log)	1.79
KM Standard Error of Mean (logged)	0.0422	95% H-UCL (KM -Log)	0.011
KM SD (logged)	0.179	95% Critical H Value (KM-Log)	1.79
KM Standard Error of Mean (logged)	0.0422		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00831	Mean in Log Scale	-4.951
SD in Original Scale	0.00541	SD in Log Scale	0.536
95% t UCL (Assumes normality)	0.0096	95% H-Stat UCL	0.00947
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0138		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:34:11 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	24
Number of Detects	34	Number of Non-Detects	15
Number of Distinct Detects	24	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.054	Maximum Non-Detect	0.01
Variance Detects	1.4904E-4	Percent Non-Detects	30.61%
Mean Detects	0.0229	SD Detects	0.0122
Median Detects	0.0185	CV Detects	0.534
Skewness Detects	0.993	Kurtosis Detects	-0.0676
Mean of Logged Detects	-3.905	SD of Logged Detects	0.499

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.183	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0189	KM Standard Error of Mean	0.00169
KM SD	0.0116	95% KM (BCA) UCL	0.0219
95% KM (t) UCL	0.0217	95% KM (Percentile Bootstrap) UCL	0.0218
95% KM (z) UCL	0.0217	95% KM Bootstrap t UCL	0.0221
90% KM Chebyshev UCL	0.024	95% KM Chebyshev UCL	0.0263
97.5% KM Chebyshev UCL	0.0295	99% KM Chebyshev UCL	0.0357

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.194	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.752	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.156	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.152	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	4.127	k star (bias corrected MLE)	3.782
Theta hat (MLE)	0.00554	Theta star (bias corrected MLE)	0.00604
nu hat (MLE)	280.6	nu star (bias corrected)	257.2

Mean (detects)	0.0229		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0189
Maximum	0.054	Median	0.014
SD	0.0118	CV	0.622
k hat (MLE)	3.458	k star (bias corrected MLE)	3.26
Theta hat (MLE)	0.00547	Theta star (bias corrected MLE)	0.0058
nu hat (MLE)	338.9	nu star (bias corrected)	319.5
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (319.46, α)	279.1	Adjusted Chi Square Value (319.46, β)	277.9
95% Gamma Approximate UCL (use when n>=50)	0.0217	95% Gamma Adjusted UCL (use when n<50)	0.0217
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0189	SD (KM)	0.0116
Variance (KM)	1.3546E-4	SE of Mean (KM)	0.00169
k hat (KM)	2.642	k star (KM)	2.494
nu hat (KM)	258.9	nu star (KM)	244.4
theta hat (KM)	0.00716	theta star (KM)	0.00759
80% gamma percentile (KM)	0.0276	90% gamma percentile (KM)	0.035
95% gamma percentile (KM)	0.0419	99% gamma percentile (KM)	0.0571
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (244.41, α)	209.2	Adjusted Chi Square Value (244.41, β)	208.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.0221	95% Gamma Adjusted KM-UCL (use when n<50)	0.0222
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0178	Mean in Log Scale	-4.274
SD in Original Scale	0.0128	SD in Log Scale	0.721
95% t UCL (assumes normality of ROS data)	0.0208	95% Percentile Bootstrap UCL	0.0207
95% BCA Bootstrap UCL	0.021	95% Bootstrap t UCL	0.0212
95% H-UCL (Log ROS)	0.0224		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.119	KM Geo Mean	0.0163
KM SD (logged)	0.522	95% Critical H Value (KM-Log)	1.904
KM Standard Error of Mean (logged)	0.0757	95% H-UCL (KM -Log)	0.0215

KM SD (logged)	0.522	95% Critical H Value (KM-Log)	1.904
KM Standard Error of Mean (logged)	0.0757		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0174	Mean in Log Scale	-4.331
SD in Original Scale	0.0131	SD in Log Scale	0.77
95% t UCL (Assumes normality)	0.0205	95% H-Stat UCL	0.0223
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM Student's t	0.0193	KM H-UCL	0.0215
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:34:50 AM		
From File	MacLellan Region (All Lakes), Fish - Muscle, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Muscle, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	29
Number of Detects	34	Number of Non-Detects	15
Number of Distinct Detects	29	Number of Distinct Non-Detects	1
Minimum Detect	0.04	Minimum Non-Detect	0.04
Maximum Detect	0.337	Maximum Non-Detect	0.04
Variance Detects	0.00333	Percent Non-Detects	30.61%
Mean Detects	0.0856	SD Detects	0.0577
Median Detects	0.0645	CV Detects	0.674
Skewness Detects	2.775	Kurtosis Detects	10.29
Mean of Logged Detects	-2.604	SD of Logged Detects	0.509
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.717	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0717	KM Standard Error of Mean	0.00752
KM SD	0.0518	95% KM (BCA) UCL	0.0863
95% KM (t) UCL	0.0843	95% KM (Percentile Bootstrap) UCL	0.085
95% KM (z) UCL	0.084	95% KM Bootstrap t UCL	0.0893
90% KM Chebyshev UCL	0.0942	95% KM Chebyshev UCL	0.104
97.5% KM Chebyshev UCL	0.119	99% KM Chebyshev UCL	0.146
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.25	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.193	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.152	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.581	k star (bias corrected MLE)	3.284
Theta hat (MLE)	0.0239	Theta star (bias corrected MLE)	0.0261
nu hat (MLE)	243.5	nu star (bias corrected)	223.3

Mean (detects)	0.0856		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0626
Maximum	0.337	Median	0.05
SD	0.0593	CV	0.948
k hat (MLE)	1.285	k star (bias corrected MLE)	1.22
Theta hat (MLE)	0.0487	Theta star (bias corrected MLE)	0.0513
nu hat (MLE)	125.9	nu star (bias corrected)	119.6
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (119.57, α)	95.32	Adjusted Chi Square Value (119.57, β)	94.67
95% Gamma Approximate UCL (use when n>=50)	0.0785	95% Gamma Adjusted UCL (use when n<50)	0.079
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0717	SD (KM)	0.0518
Variance (KM)	0.00269	SE of Mean (KM)	0.00752
k hat (KM)	1.912	k star (KM)	1.809
nu hat (KM)	187.4	nu star (KM)	177.3
theta hat (KM)	0.0375	theta star (KM)	0.0396
80% gamma percentile (KM)	0.109	90% gamma percentile (KM)	0.143
95% gamma percentile (KM)	0.176	99% gamma percentile (KM)	0.249
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (177.26, α)	147.5	Adjusted Chi Square Value (177.26, β)	146.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.0862	95% Gamma Adjusted KM-UCL (use when n<50)	0.0866
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.161	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0664	Mean in Log Scale	-2.981
SD in Original Scale	0.0563	SD in Log Scale	0.736
95% t UCL (assumes normality of ROS data)	0.0798	95% Percentile Bootstrap UCL	0.0804
95% BCA Bootstrap UCL	0.0829	95% Bootstrap t UCL	0.0858
95% H-UCL (Log ROS)	0.0829		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.792	KM Geo Mean	0.0613
KM SD (logged)	0.505	95% Critical H Value (KM-Log)	1.892
KM Standard Error of Mean (logged)	0.0732	95% H-UCL (KM -Log)	0.0799

KM SD (logged)	0.505	95% Critical H Value (KM-Log)	1.892
KM Standard Error of Mean (logged)	0.0732		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0656	Mean in Log Scale	-3.004
SD in Original Scale	0.0568	SD in Log Scale	0.741
95% t UCL (Assumes normality)	0.0792	95% H-Stat UCL	0.0815
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.104		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:35:30 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Cadmium (Cd), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	47
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.0059	Minimum Non-Detect	0.004
Maximum Detect	0.007	Maximum Non-Detect	0.004
Variance Detects	6.0500E-7	Percent Non-Detects	95.92%
Mean Detects	0.00645	SD Detects	7.7782E-4
Median Detects	0.00645	CV Detects	0.121
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.047	SD of Logged Detects	0.121

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0041	KM Standard Error of Mean	1.0048E-4
KM SD	4.9734E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00427	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00427	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0044	95% KM Chebyshev UCL	0.00454
97.5% KM Chebyshev UCL	0.00473	99% KM Chebyshev UCL	0.0051

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	137.2	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.7013E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	548.8	nu star (bias corrected)	N/A
Mean (detects)	0.00645		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0041	SD (KM)	4.9734E-4

Variance (KM)	2.4735E-7	SE of Mean (KM)	1.0048E-4
k hat (KM)	67.96	k star (KM)	63.81
nu hat (KM)	6660	nu star (KM)	6254
theta hat (KM)	6.0329E-5	theta star (KM)	6.4249E-5
80% gamma percentile (KM)	0.00452	90% gamma percentile (KM)	0.00477
95% gamma percentile (KM)	0.00498	99% gamma percentile (KM)	0.00539
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (N/A, α)	6071	Adjusted Chi Square Value (N/A, β)	6066
95% Gamma Approximate KM-UCL (use when n>=50)	0.00422	95% Gamma Adjusted KM-UCL (use when n<50)	0.00423
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00219	Mean in Log Scale	-6.283
SD in Original Scale	0.00134	SD in Log Scale	0.573
95% t UCL (assumes normality of ROS data)	0.00251	95% Percentile Bootstrap UCL	0.0025
95% BCA Bootstrap UCL	0.00256	95% Bootstrap t UCL	0.0026
95% H-UCL (Log ROS)	0.00258		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.502	KM Geo Mean	0.00408
KM SD (logged)	0.0954	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0193	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0954	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0193		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00218	Mean in Log Scale	-6.167
SD in Original Scale	8.9668E-4	SD in Log Scale	0.234
95% t UCL (Assumes normality)	0.0024	95% H-Stat UCL	0.00229
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00427	KM H-UCL	N/A
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:36:09 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	7
Number of Detects	7	Number of Non-Detects	42
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.053	Maximum Non-Detect	0.02
Variance Detects	1.9295E-4	Percent Non-Detects	85.71%
Mean Detects	0.0356	SD Detects	0.0139
Median Detects	0.037	CV Detects	0.391
Skewness Detects	-0.00592	Kurtosis Detects	-2.269
Mean of Logged Detects	-3.408	SD of Logged Detects	0.417

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0222	KM Standard Error of Mean	0.00113
KM SD	0.0073	95% KM (BCA) UCL	0.0243
95% KM (t) UCL	0.0241	95% KM (Percentile Bootstrap) UCL	0.0241
95% KM (z) UCL	0.0241	95% KM Bootstrap t UCL	0.0248
90% KM Chebyshev UCL	0.0256	95% KM Chebyshev UCL	0.0271
97.5% KM Chebyshev UCL	0.0293	99% KM Chebyshev UCL	0.0334

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.514	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.233	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.142	k star (bias corrected MLE)	4.177
Theta hat (MLE)	0.00498	Theta star (bias corrected MLE)	0.00852
nu hat (MLE)	99.99	nu star (bias corrected)	58.47

Mean (detects)	0.0356		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0138
Maximum	0.053	Median	0.01
SD	0.0103	CV	0.742
k hat (MLE)	3.769	k star (bias corrected MLE)	3.552
Theta hat (MLE)	0.00367	Theta star (bias corrected MLE)	0.00389
nu hat (MLE)	369.4	nu star (bias corrected)	348.1
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (348.12, α)	305.9	Adjusted Chi Square Value (348.12, β)	304.7
95% Gamma Approximate UCL (use when n>=50)	0.0157	95% Gamma Adjusted UCL (use when n<50)	0.0158
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0222	SD (KM)	0.0073
Variance (KM)	5.3317E-5	SE of Mean (KM)	0.00113
k hat (KM)	9.264	k star (KM)	8.71
nu hat (KM)	907.9	nu star (KM)	853.6
theta hat (KM)	0.0024	theta star (KM)	0.00255
80% gamma percentile (KM)	0.0282	90% gamma percentile (KM)	0.0323
95% gamma percentile (KM)	0.0359	99% gamma percentile (KM)	0.0434
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (853.62, α)	786.8	Adjusted Chi Square Value (853.62, β)	784.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.0241	95% Gamma Adjusted KM-UCL (use when n<50)	0.0242
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0102	Mean in Log Scale	-5.16
SD in Original Scale	0.0123	SD in Log Scale	1.097
95% t UCL (assumes normality of ROS data)	0.0131	95% Percentile Bootstrap UCL	0.0132
95% BCA Bootstrap UCL	0.0137	95% Bootstrap t UCL	0.0139
95% H-UCL (Log ROS)	0.0154		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.84	KM Geo Mean	0.0215
KM SD (logged)	0.229	95% Critical H Value (KM-Log)	1.815
KM Standard Error of Mean (logged)	0.0353	95% H-UCL (KM -Log)	0.0234

KM SD (logged)	0.229	95% Critical H Value (KM-Log)	1.815
KM Standard Error of Mean (logged)	0.0353		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0137	Mean in Log Scale	-4.434
SD in Original Scale	0.0103	SD in Log Scale	0.448
95% t UCL (Assumes normality)	0.0161	95% H-Stat UCL	0.0148
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0241		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:36:48 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	0.124	Mean	0.192
Maximum	0.448	Median	0.172
SD	0.0675	Std. Error of Mean	0.00964
Coefficient of Variation	0.352	Skewness	2.131
Normal GOF Test			
Shapiro Wilk Test Statistic	0.775	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.208	95% Adjusted-CLT UCL (Chen-1995)	0.211
		95% Modified-t UCL (Johnson-1978)	0.208
Gamma GOF Test			
A-D Test Statistic	1.986	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.172	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.126	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	10.94	k star (bias corrected MLE)	10.28
Theta hat (MLE)	0.0175	Theta star (bias corrected MLE)	0.0186
nu hat (MLE)	1072	nu star (bias corrected)	1008
MLE Mean (bias corrected)	0.192	MLE Sd (bias corrected)	0.0597
		Approximate Chi Square Value (0.05)	935.1
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	933
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.206	95% Adjusted Gamma UCL (use when n<50)	0.207

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.087	Mean of logged Data	-1.699
Maximum of Logged Data	-0.803	SD of logged Data	0.29
Assuming Lognormal Distribution			
95% H-UCL	0.206	90% Chebyshev (MVUE) UCL	0.215
95% Chebyshev (MVUE) UCL	0.226	97.5% Chebyshev (MVUE) UCL	0.241
99% Chebyshev (MVUE) UCL	0.271		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.207	95% Jackknife UCL	0.208
95% Standard Bootstrap UCL	0.207	95% Bootstrap-t UCL	0.213
95% Hall's Bootstrap UCL	0.214	95% Percentile Bootstrap UCL	0.208
95% BCA Bootstrap UCL	0.211		
90% Chebyshev(Mean, Sd) UCL	0.22	95% Chebyshev(Mean, Sd) UCL	0.234
97.5% Chebyshev(Mean, Sd) UCL	0.252	99% Chebyshev(Mean, Sd) UCL	0.287
Suggested UCL to Use			
95% Student's-t UCL	0.208	or 95% Modified-t UCL	0.208
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:37:27 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Manganese (Mn), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	44
		Number of Missing Observations	0
Minimum	0.114	Mean	0.368
Maximum	1.07	Median	0.307
SD	0.209	Std. Error of Mean	0.0299
Coefficient of Variation	0.568	Skewness	1.911

Normal GOF Test

Shapiro Wilk Test Statistic	0.787	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.418	95% Adjusted-CLT UCL (Chen-1995)	0.426
		95% Modified-t UCL (Johnson-1978)	0.419

Gamma GOF Test

A-D Test Statistic	1.463	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.15	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.314	k star (bias corrected MLE)	4.063
Theta hat (MLE)	0.0853	Theta star (bias corrected MLE)	0.0906
nu hat (MLE)	422.7	nu star (bias corrected)	398.2
MLE Mean (bias corrected)	0.368	MLE Sd (bias corrected)	0.183
		Approximate Chi Square Value (0.05)	352.9
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	351.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.415	95% Adjusted Gamma UCL (use when n<50)	0.417

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.172	Mean of logged Data	-1.12
Maximum of Logged Data	0.0677	SD of logged Data	0.473
Assuming Lognormal Distribution			
95% H-UCL	0.415	90% Chebyshev (MVUE) UCL	0.441
95% Chebyshev (MVUE) UCL	0.476	97.5% Chebyshev (MVUE) UCL	0.525
99% Chebyshev (MVUE) UCL	0.62		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.417	95% Jackknife UCL	0.418
95% Standard Bootstrap UCL	0.416	95% Bootstrap-t UCL	0.431
95% Hall's Bootstrap UCL	0.428	95% Percentile Bootstrap UCL	0.416
95% BCA Bootstrap UCL	0.428		
90% Chebyshev(Mean, Sd) UCL	0.458	95% Chebyshev(Mean, Sd) UCL	0.498
97.5% Chebyshev(Mean, Sd) UCL	0.555	99% Chebyshev(Mean, Sd) UCL	0.665
Suggested UCL to Use			
95% Student's-t UCL	0.418	or 95% Modified-t UCL	0.419
or 95% H-UCL	0.415		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:38:07 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	36	Number of Distinct Observations	33
Number of Detects	35	Number of Non-Detects	1
Number of Distinct Detects	32	Number of Distinct Non-Detects	1
Minimum Detect	0.036	Minimum Non-Detect	1
Maximum Detect	0.675	Maximum Non-Detect	1
Variance Detects	0.0197	Percent Non-Detects	2.778%
Mean Detects	0.151	SD Detects	0.14
Median Detects	0.087	CV Detects	0.928
Skewness Detects	1.871	Kurtosis Detects	4.368
Mean of Logged Detects	-2.243	SD of Logged Detects	0.838

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.781	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.148	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.151	KM Standard Error of Mean	0.0237
KM SD	0.138	95% KM (BCA) UCL	0.191
95% KM (t) UCL	0.191	95% KM (Percentile Bootstrap) UCL	0.191
95% KM (z) UCL	0.19	95% KM Bootstrap t UCL	0.2
90% KM Chebyshev UCL	0.222	95% KM Chebyshev UCL	0.255
97.5% KM Chebyshev UCL	0.299	99% KM Chebyshev UCL	0.387

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.182	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.766	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.192	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.151	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.56	k star (bias corrected MLE)	1.445
Theta hat (MLE)	0.097	Theta star (bias corrected MLE)	0.105
nu hat (MLE)	109.2	nu star (bias corrected)	101.1

Mean (detects)	0.151		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.036	Mean	0.15
Maximum	0.675	Median	0.0875
SD	0.138	CV	0.921
k hat (MLE)	1.597	k star (bias corrected MLE)	1.483
Theta hat (MLE)	0.0941	Theta star (bias corrected MLE)	0.101
nu hat (MLE)	115	nu star (bias corrected)	106.8
Adjusted Level of Significance (β)	0.0428		
Approximate Chi Square Value (106.75, α)	83.91	Adjusted Chi Square Value (106.75, β)	82.99
95% Gamma Approximate UCL (use when n>=50)	0.191	95% Gamma Adjusted UCL (use when n<50)	0.193
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.151	SD (KM)	0.138
Variance (KM)	0.0191	SE of Mean (KM)	0.0237
k hat (KM)	1.195	k star (KM)	1.114
nu hat (KM)	86.04	nu star (KM)	80.21
theta hat (KM)	0.127	theta star (KM)	0.136
80% gamma percentile (KM)	0.241	90% gamma percentile (KM)	0.339
95% gamma percentile (KM)	0.436	99% gamma percentile (KM)	0.66
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (80.21, α)	60.57	Adjusted Chi Square Value (80.21, β)	59.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.2	95% Gamma Adjusted KM-UCL (use when n<50)	0.203
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.148	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.15	Mean in Log Scale	-2.243
SD in Original Scale	0.139	SD in Log Scale	0.826
95% t UCL (assumes normality of ROS data)	0.189	95% Percentile Bootstrap UCL	0.19
95% BCA Bootstrap UCL	0.2	95% Bootstrap t UCL	0.2
95% H-UCL (Log ROS)	0.203		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.243	KM Geo Mean	0.106
KM SD (logged)	0.826	95% Critical H Value (KM-Log)	2.197
KM Standard Error of Mean (logged)	0.142	95% H-UCL (KM -Log)	0.203

KM SD (logged)	0.826	95% Critical H Value (KM-Log)	2.197
KM Standard Error of Mean (logged)	0.142		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.161	Mean in Log Scale	-2.2
SD in Original Scale	0.15	SD in Log Scale	0.865
95% t UCL (Assumes normality)	0.203	95% H-Stat UCL	0.224
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.203		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:38:46 AM		
From File	MacLellan Region (All Lakes), Fish - Muscle, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Muscle, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	44
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.21	Maximum Non-Detect	0.1
Variance Detects	0.00197	Percent Non-Detects	89.8%
Mean Detects	0.148	SD Detects	0.0444
Median Detects	0.12	CV Detects	0.3
Skewness Detects	0.821	Kurtosis Detects	-1.835
Mean of Logged Detects	-1.945	SD of Logged Detects	0.288
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.105	KM Standard Error of Mean	0.00308
KM SD	0.0193	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.11	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.11	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.114	95% KM Chebyshev UCL	0.118
97.5% KM Chebyshev UCL	0.124	99% KM Chebyshev UCL	0.136
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.56	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.356	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	14.82	k star (bias corrected MLE)	6.063
Theta hat (MLE)	0.00998	Theta star (bias corrected MLE)	0.0244
nu hat (MLE)	148.2	nu star (bias corrected)	60.63

Mean (detects)	0.148		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0288
Maximum	0.21	Median	0.01
SD	0.0448	CV	1.552
k hat (MLE)	0.973	k star (bias corrected MLE)	0.927
Theta hat (MLE)	0.0297	Theta star (bias corrected MLE)	0.0311
nu hat (MLE)	95.31	nu star (bias corrected)	90.81
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (90.81, α)	69.83	Adjusted Chi Square Value (90.81, β)	69.28
95% Gamma Approximate UCL (use when n>=50)	0.0375	95% Gamma Adjusted UCL (use when n<50)	0.0378
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.105	SD (KM)	0.0193
Variance (KM)	3.7193E-4	SE of Mean (KM)	0.00308
k hat (KM)	29.59	k star (KM)	27.79
nu hat (KM)	2899	nu star (KM)	2723
theta hat (KM)	0.00355	theta star (KM)	0.00378
80% gamma percentile (KM)	0.121	90% gamma percentile (KM)	0.131
95% gamma percentile (KM)	0.14	99% gamma percentile (KM)	0.157
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	2603	Adjusted Chi Square Value (N/A, β)	2599
95% Gamma Approximate KM-UCL (use when n>=50)	0.11	95% Gamma Adjusted KM-UCL (use when n<50)	0.11
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0436	Mean in Log Scale	-3.518
SD in Original Scale	0.0429	SD in Log Scale	0.893
95% t UCL (assumes normality of ROS data)	0.0539	95% Percentile Bootstrap UCL	0.0542
95% BCA Bootstrap UCL	0.0554	95% Bootstrap t UCL	0.058
95% H-UCL (Log ROS)	0.0589		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.266	KM Geo Mean	0.104
KM SD (logged)	0.136	95% Critical H Value (KM-Log)	1.745
KM Standard Error of Mean (logged)	0.0217	95% H-UCL (KM -Log)	0.108

KM SD (logged)	0.136	95% Critical H Value (KM-Log)	1.745
KM Standard Error of Mean (logged)	0.0217		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.06	Mean in Log Scale	-2.888
SD in Original Scale	0.0326	SD in Log Scale	0.332
95% t UCL (Assumes normality)	0.0678	95% H-Stat UCL	0.0641
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.11		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:39:25 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	17
Number of Detects	48	Number of Non-Detects	1
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.34	Maximum Non-Detect	0.1
Variance Detects	0.00508	Percent Non-Detects	2.041%
Mean Detects	0.202	SD Detects	0.0713
Median Detects	0.215	CV Detects	0.354
Skewness Detects	0.215	Kurtosis Detects	-1.205
Mean of Logged Detects	-1.666	SD of Logged Detects	0.369

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.2	KM Standard Error of Mean	0.0103
KM SD	0.0713	95% KM (BCA) UCL	0.216
95% KM (t) UCL	0.217	95% KM (Percentile Bootstrap) UCL	0.216
95% KM (z) UCL	0.217	95% KM Bootstrap t UCL	0.218
90% KM Chebyshev UCL	0.23	95% KM Chebyshev UCL	0.244
97.5% KM Chebyshev UCL	0.264	99% KM Chebyshev UCL	0.302

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	2.112	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.751	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.218	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.128	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	7.901	k star (bias corrected MLE)	7.421
Theta hat (MLE)	0.0255	Theta star (bias corrected MLE)	0.0272
nu hat (MLE)	758.5	nu star (bias corrected)	712.4

Mean (detects)	0.202		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0648	Mean	0.199
Maximum	0.34	Median	0.21
SD	0.0732	CV	0.368
k hat (MLE)	7.057	k star (bias corrected MLE)	6.638
Theta hat (MLE)	0.0282	Theta star (bias corrected MLE)	0.03
nu hat (MLE)	691.6	nu star (bias corrected)	650.6
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (650.55, α)	592.4	Adjusted Chi Square Value (650.55, β)	590.7
95% Gamma Approximate UCL (use when n>=50)	0.218	95% Gamma Adjusted UCL (use when n<50)	0.219
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.2	SD (KM)	0.0713
Variance (KM)	0.00508	SE of Mean (KM)	0.0103
k hat (KM)	7.84	k star (KM)	7.373
nu hat (KM)	768.3	nu star (KM)	722.6
theta hat (KM)	0.0255	theta star (KM)	0.0271
80% gamma percentile (KM)	0.257	90% gamma percentile (KM)	0.298
95% gamma percentile (KM)	0.334	99% gamma percentile (KM)	0.409
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (722.58, α)	661.2	Adjusted Chi Square Value (722.58, β)	659.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.218	95% Gamma Adjusted KM-UCL (use when n<50)	0.219
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.199	Mean in Log Scale	-1.685
SD in Original Scale	0.0728	SD in Log Scale	0.388
95% t UCL (assumes normality of ROS data)	0.217	95% Percentile Bootstrap UCL	0.216
95% BCA Bootstrap UCL	0.216	95% Bootstrap t UCL	0.216
95% H-UCL (Log ROS)	0.221		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.679	KM Geo Mean	0.187
KM SD (logged)	0.372	95% Critical H Value (KM-Log)	1.814
KM Standard Error of Mean (logged)	0.0537	95% H-UCL (KM -Log)	0.22

KM SD (logged)	0.372	95% Critical H Value (KM-Log)	1.814
KM Standard Error of Mean (logged)	0.0537		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.199	Mean in Log Scale	-1.693
SD in Original Scale	0.0738	SD in Log Scale	0.411
95% t UCL (Assumes normality)	0.216	95% H-Stat UCL	0.223
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.217	KM H-UCL	0.22
95% KM (BCA) UCL	0.216		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:40:05 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	0.115	Mean	0.47
Maximum	1.63	Median	0.353
SD	0.339	Std. Error of Mean	0.0485
Coefficient of Variation	0.721	Skewness	1.533

Normal GOF Test		
Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.552	95% Adjusted-CLT UCL (Chen-1995)	0.561
		95% Modified-t UCL (Johnson-1978)	0.553

Gamma GOF Test		
A-D Test Statistic	0.87	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.141	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	2.419	k star (bias corrected MLE)	2.284
Theta hat (MLE)	0.194	Theta star (bias corrected MLE)	0.206
nu hat (MLE)	237	nu star (bias corrected)	223.9
MLE Mean (bias corrected)	0.47	MLE Sd (bias corrected)	0.311
		Approximate Chi Square Value (0.05)	190.2
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	189.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.553	95% Adjusted Gamma UCL (use when n<50)	0.556

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0944	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.163	Mean of logged Data	-0.975
Maximum of Logged Data	0.489	SD of logged Data	0.665
Assuming Lognormal Distribution			
95% H-UCL	0.571	90% Chebyshev (MVUE) UCL	0.613
95% Chebyshev (MVUE) UCL	0.678	97.5% Chebyshev (MVUE) UCL	0.769
99% Chebyshev (MVUE) UCL	0.948		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.55	95% Jackknife UCL	0.552
95% Standard Bootstrap UCL	0.55	95% Bootstrap-t UCL	0.563
95% Hall's Bootstrap UCL	0.565	95% Percentile Bootstrap UCL	0.548
95% BCA Bootstrap UCL	0.555		
90% Chebyshev(Mean, Sd) UCL	0.616	95% Chebyshev(Mean, Sd) UCL	0.682
97.5% Chebyshev(Mean, Sd) UCL	0.773	99% Chebyshev(Mean, Sd) UCL	0.953
Suggested UCL to Use			
95% H-UCL	0.571		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:40:44 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Thallium (Tl), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	46
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0061	Minimum Non-Detect	0.006
Maximum Detect	0.0075	Maximum Non-Detect	0.006
Variance Detects	4.9333E-7	Percent Non-Detects	93.88%
Mean Detects	0.00677	SD Detects	7.0238E-4
Median Detects	0.0067	CV Detects	0.104
Skewness Detects	0.423	Kurtosis Detects	N/A
Mean of Logged Detects	-4.999	SD of Logged Detects	0.103

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.993	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00605	KM Standard Error of Mean	4.0627E-5
KM SD	2.3221E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00612	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00611	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00617	95% KM Chebyshev UCL	0.00622
97.5% KM Chebyshev UCL	0.0063	99% KM Chebyshev UCL	0.00645

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	140	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.8331E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	840	nu star (bias corrected)	N/A

Mean (detects)	0.00677		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0061	Mean	0.0098
Maximum	0.01	Median	0.01
SD	7.9621E-4	CV	0.0812
k hat (MLE)	121	k star (bias corrected MLE)	113.6
Theta hat (MLE)	8.0996E-5	Theta star (bias corrected MLE)	8.6268E-5
nu hat (MLE)	11860	nu star (bias corrected)	11135
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (N/A, α)	10891	Adjusted Chi Square Value (N/A, β)	10883
95% Gamma Approximate UCL (use when n>=50)	0.01	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00605	SD (KM)	2.3221E-4
Variance (KM)	5.3919E-8	SE of Mean (KM)	4.0627E-5
k hat (KM)	678.2	k star (KM)	636.6
nu hat (KM)	66459	nu star (KM)	62391
theta hat (KM)	8.9168E-6	theta star (KM)	9.4981E-6
80% gamma percentile (KM)	0.00625	90% gamma percentile (KM)	0.00636
95% gamma percentile (KM)	0.00645	99% gamma percentile (KM)	0.00662
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	61812	Adjusted Chi Square Value (N/A, β)	61794
95% Gamma Approximate KM-UCL (use when n>=50)	0.0061	95% Gamma Adjusted KM-UCL (use when n<50)	0.00611
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.997	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00323	Mean in Log Scale	-5.817
SD in Original Scale	0.00137	SD in Log Scale	0.411
95% t UCL (assumes normality of ROS data)	0.00356	95% Percentile Bootstrap UCL	0.00358
95% BCA Bootstrap UCL	0.0036	95% Bootstrap t UCL	0.00361
95% H-UCL (Log ROS)	0.00361		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.109	KM Geo Mean	0.00604
KM SD (logged)	0.0349	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.00611	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0349	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.00611		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00323	Mean in Log Scale	-5.76
SD in Original Scale	9.2358E-4	SD in Log Scale	0.197
95% t UCL (Assumes normality)	0.00345	95% H-Stat UCL	0.00338
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00612		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:42:42 AM
From File	MacLellan Region (All Lakes), Fish - Muscle, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Muscle, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	3.09	Mean	6.156
Maximum	12.2	Median	5.79
SD	1.905	Std. Error of Mean	0.272
Coefficient of Variation	0.309	Skewness	1.177

Normal GOF Test		
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.612	95% Adjusted-CLT UCL (Chen-1995)	6.652
		95% Modified-t UCL (Johnson-1978)	6.62

Gamma GOF Test		
A-D Test Statistic	0.593	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.116	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.126	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	11.94	k star (bias corrected MLE)	11.23
Theta hat (MLE)	0.515	Theta star (bias corrected MLE)	0.548
nu hat (MLE)	1170	nu star (bias corrected)	1100
MLE Mean (bias corrected)	6.156	MLE Sd (bias corrected)	1.837
		Approximate Chi Square Value (0.05)	1024
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	1022

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	6.613	95% Adjusted Gamma UCL (use when n<50)	6.627

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0968	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.128	Mean of logged Data	1.775
Maximum of Logged Data	2.501	SD of logged Data	0.29
Assuming Lognormal Distribution			
95% H-UCL	6.635	90% Chebyshev (MVUE) UCL	6.924
95% Chebyshev (MVUE) UCL	7.276	97.5% Chebyshev (MVUE) UCL	7.765
99% Chebyshev (MVUE) UCL	8.724		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.603	95% Jackknife UCL	6.612
95% Standard Bootstrap UCL	6.606	95% Bootstrap-t UCL	6.694
95% Hall's Bootstrap UCL	6.665	95% Percentile Bootstrap UCL	6.616
95% BCA Bootstrap UCL	6.628		
90% Chebyshev(Mean, Sd) UCL	6.972	95% Chebyshev(Mean, Sd) UCL	7.342
97.5% Chebyshev(Mean, Sd) UCL	7.855	99% Chebyshev(Mean, Sd) UCL	8.863
Suggested UCL to Use			
95% Adjusted Gamma UCL	6.627		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.17
PROUCL OUTPUTS
FISH MUSCLE TISSUE (SWEDE LAKE)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:22:33 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Muscle, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:23:12 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	23
		Number of Missing Observations	0
Minimum	0.011	Mean	0.0417
Maximum	0.108	Median	0.024
SD	0.0288	Std. Error of Mean	0.00502
Coefficient of Variation	0.691	Skewness	0.89
Normal GOF Test			
Shapiro Wilk Test Statistic	0.832	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0502	95% Adjusted-CLT UCL (Chen-1995)	0.0508
		95% Modified-t UCL (Johnson-1978)	0.0504
Gamma GOF Test			
A-D Test Statistic	1.71	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.226	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.155	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.388	k star (bias corrected MLE)	2.192
Theta hat (MLE)	0.0175	Theta star (bias corrected MLE)	0.019
nu hat (MLE)	157.6	nu star (bias corrected)	144.6
MLE Mean (bias corrected)	0.0417	MLE Sd (bias corrected)	0.0282
		Approximate Chi Square Value (0.05)	117.8
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	116.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0512	95% Adjusted Gamma UCL (use when n<50)	0.0518

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.203	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.51	Mean of logged Data	-3.4
Maximum of Logged Data	-2.226	SD of logged Data	0.673
Assuming Lognormal Distribution			
95% H-UCL	0.0537	90% Chebyshev (MVUE) UCL	0.0573
95% Chebyshev (MVUE) UCL	0.0644	97.5% Chebyshev (MVUE) UCL	0.0743
99% Chebyshev (MVUE) UCL	0.0937		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.05	95% Jackknife UCL	0.0502
95% Standard Bootstrap UCL	0.0499	95% Bootstrap-t UCL	0.0512
95% Hall's Bootstrap UCL	0.0507	95% Percentile Bootstrap UCL	0.0497
95% BCA Bootstrap UCL	0.0509		
90% Chebyshev(Mean, Sd) UCL	0.0568	95% Chebyshev(Mean, Sd) UCL	0.0636
97.5% Chebyshev(Mean, Sd) UCL	0.0731	99% Chebyshev(Mean, Sd) UCL	0.0917
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0636		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:23:51 PM		
From File	Gordon Region (Sweed Lake), Fish - Muscle, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (Sweed Lake), Fish - Muscle, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	17
Number of Detects	17	Number of Non-Detects	16
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.041	Minimum Non-Detect	0.04
Maximum Detect	0.314	Maximum Non-Detect	0.04
Variance Detects	0.00771	Percent Non-Detects	48.48%
Mean Detects	0.135	SD Detects	0.0878
Median Detects	0.117	CV Detects	0.653
Skewness Detects	0.801	Kurtosis Detects	-0.34
Mean of Logged Detects	-2.22	SD of Logged Detects	0.693
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0887	Standard Error of Mean	0.0139
SD	0.0773	95% KM (BCA) UCL	0.113
95% KM (t) UCL	0.112	95% KM (Percentile Bootstrap) UCL	0.113
95% KM (z) UCL	0.112	95% KM Bootstrap t UCL	0.117
90% KM Chebyshev UCL	0.13	95% KM Chebyshev UCL	0.149
97.5% KM Chebyshev UCL	0.175	99% KM Chebyshev UCL	0.227
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.35	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.115	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.211	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.489	k star (bias corrected MLE)	2.089
Theta hat (MLE)	0.054	Theta star (bias corrected MLE)	0.0644
nu hat (MLE)	84.63	nu star (bias corrected)	71.03
MLE Mean (bias corrected)	0.135	MLE Sd (bias corrected)	0.0931

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.317	nu hat (KM)	86.94
Approximate Chi Square Value (86.94, α)	66.45	Adjusted Chi Square Value (86.94, β)	65.52
95% Gamma Approximate KM-UCL (use when n>=50)	0.116	95% Gamma Adjusted KM-UCL (use when n<50)	0.118
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0744
Maximum	0.314	Median	0.041
SD	0.0884	CV	1.189
k hat (MLE)	0.783	k star (bias corrected MLE)	0.732
Theta hat (MLE)	0.095	Theta star (bias corrected MLE)	0.102
nu hat (MLE)	51.68	nu star (bias corrected)	48.31
MLE Mean (bias corrected)	0.0744	MLE Sd (bias corrected)	0.0869
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (48.31, α)	33.36	Adjusted Chi Square Value (48.31, β)	32.72
95% Gamma Approximate UCL (use when n>=50)	0.108	95% Gamma Adjusted UCL (use when n<50)	0.11
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0786	Mean in Log Scale	-3.144
SD in Original Scale	0.0857	SD in Log Scale	1.173
95% t UCL (assumes normality of ROS data)	0.104	95% Percentile Bootstrap UCL	0.103
95% BCA Bootstrap UCL	0.107	95% Bootstrap t UCL	0.111
95% H-UCL (Log ROS)	0.149		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.704	95% H-UCL (KM -Log)	0.11
KM SD (logged)	0.694	95% Critical H Value (KM-Log)	2.107
KM Standard Error of Mean (logged)	0.125		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.079	Mean in Log Scale	-3.04
SD in Original Scale	0.0851	SD in Log Scale	0.989
95% t UCL (Assumes normality)	0.104	95% H-Stat UCL	0.119
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.112	95% KM (Percentile Bootstrap) UCL					0.113
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/5/2020 10:24:43 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Chromium (Cr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Chromium (Cr), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Muscle, Chromium (Cr), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:25:26 PM		
From File	Gordon Region (Sweed Lake), Fish - Muscle, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (Sweed Lake), Fish - Muscle, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.088	Mean	0.146
Maximum	0.223	Median	0.146
SD	0.0344	Std. Error of Mean	0.00599
Coefficient of Variation	0.235	Skewness	0.409

Normal GOF Test			
Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.156	95% Adjusted-CLT UCL (Chen-1995)	0.156
		95% Modified-t UCL (Johnson-1978)	0.156

Gamma GOF Test			
A-D Test Statistic	0.21	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0913	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	18.76	k star (bias corrected MLE)	17.08
Theta hat (MLE)	0.00779	Theta star (bias corrected MLE)	0.00856
nu hat (MLE)	1238	nu star (bias corrected)	1127
MLE Mean (bias corrected)	0.146	MLE Sd (bias corrected)	0.0354
		Approximate Chi Square Value (0.05)	1050
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	1046

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.157	95% Adjusted Gamma UCL (use when n<50)	0.157

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0781	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.43	Mean of logged Data	-1.95
Maximum of Logged Data	-1.501	SD of logged Data	0.236
Assuming Lognormal Distribution			
95% H-UCL	0.157	90% Chebyshev (MVUE) UCL	0.164
95% Chebyshev (MVUE) UCL	0.173	97.5% Chebyshev (MVUE) UCL	0.184
99% Chebyshev (MVUE) UCL	0.207		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.156	95% Jackknife UCL	0.156
95% Standard Bootstrap UCL	0.156	95% Bootstrap-t UCL	0.157
95% Hall's Bootstrap UCL	0.156	95% Percentile Bootstrap UCL	0.156
95% BCA Bootstrap UCL	0.156		
90% Chebyshev(Mean, Sd) UCL	0.164	95% Chebyshev(Mean, Sd) UCL	0.172
97.5% Chebyshev(Mean, Sd) UCL	0.184	99% Chebyshev(Mean, Sd) UCL	0.206
Suggested UCL to Use			
95% Student's-t UCL	0.156		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:26:13 PM		
From File	Gordon Region (Sweed Lake), Fish - Muscle, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (Sweed Lake), Fish - Muscle, Manganese (Mn), mg/kg ww			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	0.115	Mean	0.522
Maximum	2.18	Median	0.285
SD	0.475	Std. Error of Mean	0.0826
Coefficient of Variation	0.91	Skewness	1.655
Normal GOF Test			
Shapiro Wilk Test Statistic	0.804	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.662	95% Adjusted-CLT UCL (Chen-1995)	0.683
		95% Modified-t UCL (Johnson-1978)	0.666
Gamma GOF Test			
A-D Test Statistic	1.154	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.765	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.203	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.156	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.52	k star (bias corrected MLE)	1.402
Theta hat (MLE)	0.343	Theta star (bias corrected MLE)	0.372
nu hat (MLE)	100.3	nu star (bias corrected)	92.55
MLE Mean (bias corrected)	0.522	MLE Sd (bias corrected)	0.441
		Approximate Chi Square Value (0.05)	71.36
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	70.41
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.677	95% Adjusted Gamma UCL (use when n<50)	0.686

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.163	Mean of logged Data	-1.014
Maximum of Logged Data	0.779	SD of logged Data	0.862
Assuming Lognormal Distribution			
95% H-UCL	0.744	90% Chebyshev (MVUE) UCL	0.779
95% Chebyshev (MVUE) UCL	0.898	97.5% Chebyshev (MVUE) UCL	1.062
99% Chebyshev (MVUE) UCL	1.385		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.658	95% Jackknife UCL	0.662
95% Standard Bootstrap UCL	0.658	95% Bootstrap-t UCL	0.692
95% Hall's Bootstrap UCL	0.71	95% Percentile Bootstrap UCL	0.658
95% BCA Bootstrap UCL	0.689		
90% Chebyshev(Mean, Sd) UCL	0.77	95% Chebyshev(Mean, Sd) UCL	0.882
97.5% Chebyshev(Mean, Sd) UCL	1.038	99% Chebyshev(Mean, Sd) UCL	1.344
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.882		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:26:52 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	0.145	Mean	0.414
Maximum	0.88	Median	0.356
SD	0.217	Std. Error of Mean	0.0511
Coefficient of Variation	0.523	Skewness	0.849
Normal GOF Test			
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.503	95% Adjusted-CLT UCL (Chen-1995)	0.509
		95% Modified-t UCL (Johnson-1978)	0.505
Gamma GOF Test			
A-D Test Statistic	0.268	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.107	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.205	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.08	k star (bias corrected MLE)	3.437
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	0.121
nu hat (MLE)	146.9	nu star (bias corrected)	123.7
MLE Mean (bias corrected)	0.414	MLE Sd (bias corrected)	0.223
		Approximate Chi Square Value (0.05)	99.05
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	96.93
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.518	95% Adjusted Gamma UCL (use when n<50)	0.529

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0946	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.209	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.931	Mean of logged Data	-1.009
Maximum of Logged Data	-0.128	SD of logged Data	0.523
Assuming Lognormal Distribution			
95% H-UCL	0.542	90% Chebyshev (MVUE) UCL	0.574
95% Chebyshev (MVUE) UCL	0.646	97.5% Chebyshev (MVUE) UCL	0.746
99% Chebyshev (MVUE) UCL	0.943		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.498	95% Jackknife UCL	0.503
95% Standard Bootstrap UCL	0.495	95% Bootstrap-t UCL	0.524
95% Hall's Bootstrap UCL	0.513	95% Percentile Bootstrap UCL	0.498
95% BCA Bootstrap UCL	0.507		
90% Chebyshev(Mean, Sd) UCL	0.568	95% Chebyshev(Mean, Sd) UCL	0.637
97.5% Chebyshev(Mean, Sd) UCL	0.733	99% Chebyshev(Mean, Sd) UCL	0.923
Suggested UCL to Use			
95% Student's-t UCL	0.503		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/5/2020 10:28:18 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	11
Number of Detects	30	Number of Non-Detects	3
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.23	Maximum Non-Detect	0.1
Variance Detects	0.00137	Percent Non-Detects	9.091%
Mean Detects	0.147	SD Detects	0.037
Median Detects	0.14	CV Detects	0.252
Skewness Detects	0.818	Kurtosis Detects	-0.095
Mean of Logged Detects	-1.948	SD of Logged Detects	0.241

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.141	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.142	Standard Error of Mean	0.00658
SD	0.0372	95% KM (BCA) UCL	0.153
95% KM (t) UCL	0.154	95% KM (Percentile Bootstrap) UCL	0.154
95% KM (z) UCL	0.153	95% KM Bootstrap t UCL	0.154
90% KM Chebyshev UCL	0.162	95% KM Chebyshev UCL	0.171
97.5% KM Chebyshev UCL	0.184	99% KM Chebyshev UCL	0.208

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.543	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.127	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	17.49	k star (bias corrected MLE)	15.77
Theta hat (MLE)	0.00838	Theta star (bias corrected MLE)	0.0093
nu hat (MLE)	1050	nu star (bias corrected)	945.9
MLE Mean (bias corrected)	0.147	MLE Sd (bias corrected)	0.0369

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	14.68	nu hat (KM)	968.7
Approximate Chi Square Value (968.73, α)	897.5	Adjusted Chi Square Value (968.73, β)	894
95% Gamma Approximate KM-UCL (use when n>=50)	0.154	95% Gamma Adjusted KM-UCL (use when n<50)	0.154
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0634	Mean	0.14
Maximum	0.23	Median	0.13
SD	0.0414	CV	0.296
k hat (MLE)	11.57	k star (bias corrected MLE)	10.54
Theta hat (MLE)	0.0121	Theta star (bias corrected MLE)	0.0133
nu hat (MLE)	763.6	nu star (bias corrected)	695.5
MLE Mean (bias corrected)	0.14	MLE Sd (bias corrected)	0.0431
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (695.50, α)	635.3	Adjusted Chi Square Value (695.50, β)	632.4
95% Gamma Approximate UCL (use when n>=50)	0.153	95% Gamma Adjusted UCL (use when n<50)	0.154
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.162	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.141	Mean in Log Scale	-2
SD in Original Scale	0.0401	SD in Log Scale	0.284
95% t UCL (assumes normality of ROS data)	0.153	95% Percentile Bootstrap UCL	0.152
95% BCA Bootstrap UCL	0.152	95% Bootstrap t UCL	0.154
95% H-UCL (Log ROS)	0.154		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.981	95% H-UCL (KM -Log)	0.154
KM SD (logged)	0.248	95% Critical H Value (KM-Log)	1.769
KM Standard Error of Mean (logged)	0.0439		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.138	Mean in Log Scale	-2.044
SD in Original Scale	0.0451	SD in Log Scale	0.382
95% t UCL (Assumes normality)	0.151	95% H-Stat UCL	0.158
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.154	95% KM (Percentile Bootstrap) UCL					0.154
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:29:01 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Strontium (Sr), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	0.012	Mean	0.333
Maximum	1.02	Median	0.297
SD	0.262	Std. Error of Mean	0.0456
Coefficient of Variation	0.786	Skewness	0.833

Normal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.41	95% Adjusted-CLT UCL (Chen-1995)	0.415
		95% Modified-t UCL (Johnson-1978)	0.411

Gamma GOF Test

A-D Test Statistic	0.366	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.77	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0977	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.157	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.291	k star (bias corrected MLE)	1.194
Theta hat (MLE)	0.258	Theta star (bias corrected MLE)	0.279
nu hat (MLE)	85.21	nu star (bias corrected)	78.79
MLE Mean (bias corrected)	0.333	MLE Sd (bias corrected)	0.305
		Approximate Chi Square Value (0.05)	59.34
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	58.47

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	0.442	95% Adjusted Gamma UCL (use when n<50)	0.449

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.423	Mean of logged Data	-1.534
Maximum of Logged Data	0.0198	SD of logged Data	1.113
Assuming Lognormal Distribution			
95% H-UCL	0.665	90% Chebyshev (MVUE) UCL	0.656
95% Chebyshev (MVUE) UCL	0.778	97.5% Chebyshev (MVUE) UCL	0.946
99% Chebyshev (MVUE) UCL	1.276		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.408	95% Jackknife UCL	0.41
95% Standard Bootstrap UCL	0.407	95% Bootstrap-t UCL	0.423
95% Hall's Bootstrap UCL	0.413	95% Percentile Bootstrap UCL	0.409
95% BCA Bootstrap UCL	0.41		
90% Chebyshev(Mean, Sd) UCL	0.47	95% Chebyshev(Mean, Sd) UCL	0.532
97.5% Chebyshev(Mean, Sd) UCL	0.618	99% Chebyshev(Mean, Sd) UCL	0.787
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.449		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:31:10 PM
From File	Gordon Region (Sweed Lake), Fish - Muscle, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Muscle, Zinc (Zn), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	3.11	Mean	4.754
Maximum	8.07	Median	4.45
SD	1.391	Std. Error of Mean	0.242
Coefficient of Variation	0.293	Skewness	0.677

Normal GOF Test

Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.164	95% Adjusted-CLT UCL (Chen-1995)	5.182
		95% Modified-t UCL (Johnson-1978)	5.168

Gamma GOF Test

A-D Test Statistic	1.083	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.165	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.153	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.85	k star (bias corrected MLE)	11.71
Theta hat (MLE)	0.37	Theta star (bias corrected MLE)	0.406
nu hat (MLE)	848.4	nu star (bias corrected)	772.6
MLE Mean (bias corrected)	4.754	MLE Sd (bias corrected)	1.389
		Approximate Chi Square Value (0.05)	709.1
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	706

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	5.179	95% Adjusted Gamma UCL (use when n<50)	5.202

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.159	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.135	Mean of logged Data	1.52
Maximum of Logged Data	2.088	SD of logged Data	0.282
Assuming Lognormal Distribution			
95% H-UCL	5.197	90% Chebyshev (MVUE) UCL	5.458
95% Chebyshev (MVUE) UCL	5.779	97.5% Chebyshev (MVUE) UCL	6.225
99% Chebyshev (MVUE) UCL	7.101		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.152	95% Jackknife UCL	5.164
95% Standard Bootstrap UCL	5.141	95% Bootstrap-t UCL	5.22
95% Hall's Bootstrap UCL	5.167	95% Percentile Bootstrap UCL	5.142
95% BCA Bootstrap UCL	5.18		
90% Chebyshev(Mean, Sd) UCL	5.48	95% Chebyshev(Mean, Sd) UCL	5.809
97.5% Chebyshev(Mean, Sd) UCL	6.266	99% Chebyshev(Mean, Sd) UCL	7.163
Suggested UCL to Use			
95% Student's-t UCL	5.164	or 95% Modified-t UCL	5.168
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

APPENDIX C.18
PROUCL OUTPUTS
FISH MUSCLE TISSUE (COCKERAM LAKE)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:06:29 AM		
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Antimony (Sb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Muscle, Antimony (Sb), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	27
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.013	Minimum Non-Detect	0.01
Maximum Detect	0.029	Maximum Non-Detect	0.03
Variance Detects	1.2800E-4	Percent Non-Detects	93.1%
Mean Detects	0.021	SD Detects	0.0113
Median Detects	0.021	CV Detects	0.539
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.942	SD of Logged Detects	0.567
Warning: Data set has only 2 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Not Enough Data to Perform GOF Test			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0114	Standard Error of Mean	0.00163
SD	0.00461	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0141	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0141	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0163	95% KM Chebyshev UCL	0.0185
97.5% KM Chebyshev UCL	0.0215	99% KM Chebyshev UCL	0.0276
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	6.54	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00321	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	26.16	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	6.093	nu hat (KM)	353.4
		Adjusted Level of Significance (β)	0.0407

Approximate Chi Square Value (353.42, α)	310.9	Adjusted Chi Square Value (353.42, β)	308.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0129	95% Gamma Adjusted KM-UCL (use when n<50)	0.013
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00296	Mean in Log Scale	-7.509
SD in Original Scale	0.00625	SD in Log Scale	2.005
95% t UCL (assumes normality of ROS data)	0.00493	95% Percentile Bootstrap UCL	0.00501
95% BCA Bootstrap UCL	0.0058	95% Bootstrap t UCL	0.00712
95% H-UCL (Log ROS)	0.0181		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0106	Mean in Log Scale	-4.712
SD in Original Scale	0.00608	SD in Log Scale	0.59
95% t UCL (Assumes normality)	0.0125	95% H-Stat UCL	0.0134
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0141	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:07:09 AM		
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Arsenic (As), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Muscle, Arsenic (As), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	14
Number of Detects	22	Number of Non-Detects	7
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.04	Maximum Non-Detect	0.01
Variance Detects	5.2262E-5	Percent Non-Detects	24.14%
Mean Detects	0.0175	SD Detects	0.00723
Median Detects	0.0145	CV Detects	0.413
Skewness Detects	1.923	Kurtosis Detects	4.065
Mean of Logged Detects	-4.109	SD of Logged Detects	0.347
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0157	Standard Error of Mean	0.00132
SD	0.00694	95% KM (BCA) UCL	0.0181
95% KM (t) UCL	0.0179	95% KM (Percentile Bootstrap) UCL	0.018
95% KM (z) UCL	0.0179	95% KM Bootstrap t UCL	0.019
90% KM Chebyshev UCL	0.0196	95% KM Chebyshev UCL	0.0214
97.5% KM Chebyshev UCL	0.0239	99% KM Chebyshev UCL	0.0288
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.864	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.188	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.186	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	8.015	k star (bias corrected MLE)	6.953
Theta hat (MLE)	0.00218	Theta star (bias corrected MLE)	0.00252
nu hat (MLE)	352.7	nu star (bias corrected)	305.9
MLE Mean (bias corrected)	0.0175	MLE Sd (bias corrected)	0.00664

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	5.113	nu hat (KM)	296.6
Approximate Chi Square Value (296.55, α)	257.7	Adjusted Chi Square Value (296.55, β)	255.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0181	95% Gamma Adjusted KM-UCL (use when n<50)	0.0182
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0157
Maximum	0.04	Median	0.014
SD	0.00706	CV	0.45
k hat (MLE)	6.902	k star (bias corrected MLE)	6.211
Theta hat (MLE)	0.00227	Theta star (bias corrected MLE)	0.00253
nu hat (MLE)	400.3	nu star (bias corrected)	360.3
MLE Mean (bias corrected)	0.0157	MLE Sd (bias corrected)	0.0063
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (360.25, α)	317.3	Adjusted Chi Square Value (360.25, β)	314.9
95% Gamma Approximate UCL (use when n>=50)	0.0178	95% Gamma Adjusted UCL (use when n<50)	0.018
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0151	Mean in Log Scale	-4.307
SD in Original Scale	0.00769	SD in Log Scale	0.474
95% t UCL (assumes normality of ROS data)	0.0175	95% Percentile Bootstrap UCL	0.0177
95% BCA Bootstrap UCL	0.0177	95% Bootstrap t UCL	0.0183
95% H-UCL (Log ROS)	0.0179		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.229	95% H-UCL (KM -Log)	0.0177
KM SD (logged)	0.364	95% Critical H Value (KM-Log)	1.845
KM Standard Error of Mean (logged)	0.0691		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0145	Mean in Log Scale	-4.396
SD in Original Scale	0.0083	SD in Log Scale	0.599
95% t UCL (Assumes normality)	0.0171	95% H-Stat UCL	0.0186
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.0179	95% KM (Percentile Bootstrap) UCL					0.018
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 11:07:49 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	19
Number of Detects	19	Number of Non-Detects	10
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.042	Minimum Non-Detect	0.04
Maximum Detect	0.337	Maximum Non-Detect	0.04
Variance Detects	0.00442	Percent Non-Detects	34.48%
Mean Detects	0.0932	SD Detects	0.0665
Median Detects	0.07	CV Detects	0.713
Skewness Detects	2.947	Kurtosis Detects	10.59
Mean of Logged Detects	-2.525	SD of Logged Detects	0.522

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.667	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.203	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0749	Standard Error of Mean	0.0111
SD	0.0582	95% KM (BCA) UCL	0.0972
95% KM (t) UCL	0.0937	95% KM (Percentile Bootstrap) UCL	0.0955
95% KM (z) UCL	0.0931	95% KM Bootstrap t UCL	0.109
90% KM Chebyshev UCL	0.108	95% KM Chebyshev UCL	0.123
97.5% KM Chebyshev UCL	0.144	99% KM Chebyshev UCL	0.185

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.756	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.747	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.155	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.2	Detected data appear Gamma Distributed at 5% Significance Level
Detected data follow Appr. Gamma Distribution at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.441	k star (bias corrected MLE)	2.933
Theta hat (MLE)	0.0271	Theta star (bias corrected MLE)	0.0318
nu hat (MLE)	130.8	nu star (bias corrected)	111.5
MLE Mean (bias corrected)	0.0932	MLE Sd (bias corrected)	0.0544

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.656	nu hat (KM)	96.03
Approximate Chi Square Value (96.03, α)	74.43	Adjusted Chi Square Value (96.03, β)	73.29
95% Gamma Approximate KM-UCL (use when n>=50)	0.0966	95% Gamma Adjusted KM-UCL (use when n<50)	0.0981
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0645
Maximum	0.337	Median	0.052
SD	0.0668	CV	1.035
k hat (MLE)	1.138	k star (bias corrected MLE)	1.043
Theta hat (MLE)	0.0567	Theta star (bias corrected MLE)	0.0619
nu hat (MLE)	66	nu star (bias corrected)	60.51
MLE Mean (bias corrected)	0.0645	MLE Sd (bias corrected)	0.0632
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (60.51, α)	43.62	Adjusted Chi Square Value (60.51, β)	42.76
95% Gamma Approximate UCL (use when n>=50)	0.0895	95% Gamma Adjusted UCL (use when n<50)	0.0913
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.203	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0691	Mean in Log Scale	-2.972
SD in Original Scale	0.0633	SD in Log Scale	0.782
95% t UCL (assumes normality of ROS data)	0.0891	95% Percentile Bootstrap UCL	0.0886
95% BCA Bootstrap UCL	0.0967	95% Bootstrap t UCL	0.0989
95% H-UCL (Log ROS)	0.0964		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.764	95% H-UCL (KM -Log)	0.0881
KM SD (logged)	0.527	95% Critical H Value (KM-Log)	1.969
KM Standard Error of Mean (logged)	0.101		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.068	Mean in Log Scale	-3.003
SD in Original Scale	0.064	SD in Log Scale	0.791
95% t UCL (Assumes normality)	0.0882	95% H-Stat UCL	0.0946
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (Percentile Bootstrap) UCL	0.0955	95% GROS Adjusted Gamma UCL	0.0913
95% Adjusted Gamma KM-UCL	0.0981		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:08:38 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Cadmium (Cd), mg/kg ww

General Statistics

Total Number of Observations	29	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	27
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.0059	Minimum Non-Detect	0.004
Maximum Detect	0.007	Maximum Non-Detect	0.004
Variance Detects	6.0500E-7	Percent Non-Detects	93.1%
Mean Detects	0.00645	SD Detects	7.7782E-4
Median Detects	0.00645	CV Detects	0.121
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.047	SD of Logged Detects	0.121

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.00417	Standard Error of Mean	1.6739E-4
SD	6.3740E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00445	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00444	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00467	95% KM Chebyshev UCL	0.0049
97.5% KM Chebyshev UCL	0.00521	99% KM Chebyshev UCL	0.00583

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	137.2	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.7013E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	548.8	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	42.78	nu hat (KM)	2481
		Adjusted Level of Significance (β)	0.0407

Approximate Chi Square Value (N/A, α)	2366	Adjusted Chi Square Value (N/A, β)	2360
95% Gamma Approximate KM-UCL (use when n>=50)	0.00437	95% Gamma Adjusted KM-UCL (use when n<50)	0.00438
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00267	Mean in Log Scale	-6.056
SD in Original Scale	0.00145	SD in Log Scale	0.516
95% t UCL (assumes normality of ROS data)	0.00312	95% Percentile Bootstrap UCL	0.00313
95% BCA Bootstrap UCL	0.00316	95% Bootstrap t UCL	0.00323
95% H-UCL (Log ROS)	0.00324		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00231	Mean in Log Scale	-6.134
SD in Original Scale	0.00116	SD in Log Scale	0.302
95% t UCL (Assumes normality)	0.00267	95% H-Stat UCL	0.00251
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00445	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:09:22 AM		
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Muscle, Cobalt (Co), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	7
Number of Detects	7	Number of Non-Detects	22
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.053	Maximum Non-Detect	0.02
Variance Detects	1.9295E-4	Percent Non-Detects	75.86%
Mean Detects	0.0356	SD Detects	0.0139
Median Detects	0.037	CV Detects	0.391
Skewness Detects	-0.00592	Kurtosis Detects	-2.269
Mean of Logged Detects	-3.408	SD of Logged Detects	0.417
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0238	Standard Error of Mean	0.00184
SD	0.00918	95% KM (BCA) UCL	0.0267
95% KM (t) UCL	0.0269	95% KM (Percentile Bootstrap) UCL	0.0267
95% KM (z) UCL	0.0268	95% KM Bootstrap t UCL	0.028
90% KM Chebyshev UCL	0.0293	95% KM Chebyshev UCL	0.0318
97.5% KM Chebyshev UCL	0.0353	99% KM Chebyshev UCL	0.0421
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.514	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.233	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	7.142	k star (bias corrected MLE)	4.177
Theta hat (MLE)	0.00498	Theta star (bias corrected MLE)	0.00852
nu hat (MLE)	99.99	nu star (bias corrected)	58.47
MLE Mean (bias corrected)	0.0356	MLE Sd (bias corrected)	0.0174

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	6.694	nu hat (KM)	388.3
Approximate Chi Square Value (388.27, α)	343.6	Adjusted Chi Square Value (388.27, β)	341.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.0268	95% Gamma Adjusted KM-UCL (use when n<50)	0.027
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0164
Maximum	0.053	Median	0.01
SD	0.0128	CV	0.778
k hat (MLE)	2.842	k star (bias corrected MLE)	2.571
Theta hat (MLE)	0.00578	Theta star (bias corrected MLE)	0.00639
nu hat (MLE)	164.8	nu star (bias corrected)	149.1
MLE Mean (bias corrected)	0.0164	MLE Sd (bias corrected)	0.0102
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (149.10, α)	121.9	Adjusted Chi Square Value (149.10, β)	120.4
95% Gamma Approximate UCL (use when n>=50)	0.0201	95% Gamma Adjusted UCL (use when n<50)	0.0203
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0144	Mean in Log Scale	-4.666
SD in Original Scale	0.0143	SD in Log Scale	0.956
95% t UCL (assumes normality of ROS data)	0.0189	95% Percentile Bootstrap UCL	0.019
95% BCA Bootstrap UCL	0.0198	95% Bootstrap t UCL	0.0205
95% H-UCL (Log ROS)	0.023		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.79	95% H-UCL (KM -Log)	0.026
KM SD (logged)	0.287	95% Critical H Value (KM-Log)	1.798
KM Standard Error of Mean (logged)	0.0576		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0162	Mean in Log Scale	-4.316
SD in Original Scale	0.0129	SD in Log Scale	0.556
95% t UCL (Assumes normality)	0.0202	95% H-Stat UCL	0.0192
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.0269	95% KM (Percentile Bootstrap) UCL					0.0267
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 11:10:02 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.133	Mean	0.215
Maximum	0.448	Median	0.192
SD	0.0777	Std. Error of Mean	0.0144
Coefficient of Variation	0.361	Skewness	1.572
Normal GOF Test			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.24	95% Adjusted-CLT UCL (Chen-1995)	0.244
		95% Modified-t UCL (Johnson-1978)	0.241
Gamma GOF Test			
A-D Test Statistic	0.828	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.163	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	9.722	k star (bias corrected MLE)	8.739
Theta hat (MLE)	0.0222	Theta star (bias corrected MLE)	0.0247
nu hat (MLE)	563.9	nu star (bias corrected)	506.9
MLE Mean (bias corrected)	0.215	MLE Sd (bias corrected)	0.0729
		Approximate Chi Square Value (0.05)	455.7
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	452.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.24	95% Adjusted Gamma UCL (use when n<50)	0.241

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.017	Mean of logged Data	-1.587
Maximum of Logged Data	-0.803	SD of logged Data	0.317
Assuming Lognormal Distribution			
95% H-UCL	0.24	90% Chebyshev (MVUE) UCL	0.253
95% Chebyshev (MVUE) UCL	0.271	97.5% Chebyshev (MVUE) UCL	0.295
99% Chebyshev (MVUE) UCL	0.343		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.239	95% Jackknife UCL	0.24
95% Standard Bootstrap UCL	0.239	95% Bootstrap-t UCL	0.248
95% Hall's Bootstrap UCL	0.249	95% Percentile Bootstrap UCL	0.239
95% BCA Bootstrap UCL	0.243		
90% Chebyshev(Mean, Sd) UCL	0.259	95% Chebyshev(Mean, Sd) UCL	0.278
97.5% Chebyshev(Mean, Sd) UCL	0.306	99% Chebyshev(Mean, Sd) UCL	0.359
Suggested UCL to Use			
95% Student's-t UCL	0.24	or 95% Modified-t UCL	0.241
or 95% H-UCL	0.24		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:10:51 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	0.114	Mean	0.415
Maximum	1.07	Median	0.346
SD	0.252	Std. Error of Mean	0.0467
Coefficient of Variation	0.606	Skewness	1.385
Normal GOF Test			
Shapiro Wilk Test Statistic	0.836	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.495	95% Adjusted-CLT UCL (Chen-1995)	0.505
		95% Modified-t UCL (Johnson-1978)	0.497
Gamma GOF Test			
A-D Test Statistic	0.733	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.185	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.164	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.424	k star (bias corrected MLE)	3.093
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.134
nu hat (MLE)	198.6	nu star (bias corrected)	179.4
MLE Mean (bias corrected)	0.415	MLE Sd (bias corrected)	0.236
		Approximate Chi Square Value (0.05)	149.4
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	147.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.499	95% Adjusted Gamma UCL (use when n<50)	0.504

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.147	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.172	Mean of logged Data	-1.032
Maximum of Logged Data	0.0677	SD of logged Data	0.554
Assuming Lognormal Distribution			
95% H-UCL	0.512	90% Chebyshev (MVUE) UCL	0.547
95% Chebyshev (MVUE) UCL	0.608	97.5% Chebyshev (MVUE) UCL	0.692
99% Chebyshev (MVUE) UCL	0.857		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.492	95% Jackknife UCL	0.495
95% Standard Bootstrap UCL	0.488	95% Bootstrap-t UCL	0.515
95% Hall's Bootstrap UCL	0.505	95% Percentile Bootstrap UCL	0.491
95% BCA Bootstrap UCL	0.51		
90% Chebyshev(Mean, Sd) UCL	0.555	95% Chebyshev(Mean, Sd) UCL	0.619
97.5% Chebyshev(Mean, Sd) UCL	0.707	99% Chebyshev(Mean, Sd) UCL	0.88
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.504		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:11:31 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.128	Minimum Non-Detect	1
Maximum Detect	0.675	Maximum Non-Detect	1
Variance Detects	0.0194	Percent Non-Detects	6.25%
Mean Detects	0.273	SD Detects	0.139
Median Detects	0.269	CV Detects	0.511
Skewness Detects	1.723	Kurtosis Detects	4.281
Mean of Logged Detects	-1.402	SD of Logged Detects	0.461

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.273	Standard Error of Mean	0.036
SD	0.135	95% KM (BCA) UCL	0.34
95% KM (t) UCL	0.336	95% KM (Percentile Bootstrap) UCL	0.334
95% KM (z) UCL	0.332	95% KM Bootstrap t UCL	0.359
90% KM Chebyshev UCL	0.381	95% KM Chebyshev UCL	0.43
97.5% KM Chebyshev UCL	0.498	99% KM Chebyshev UCL	0.631

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.385	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.129	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.222	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.989	k star (bias corrected MLE)	4.035
Theta hat (MLE)	0.0547	Theta star (bias corrected MLE)	0.0677
nu hat (MLE)	149.7	nu star (bias corrected)	121.1
MLE Mean (bias corrected)	0.273	MLE Sd (bias corrected)	0.136

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	4.109	nu hat (KM)	131.5
Approximate Chi Square Value (131.50, α)	106	Adjusted Chi Square Value (131.50, β)	103.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.339	95% Gamma Adjusted KM-UCL (use when n<50)	0.347
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.128	Mean	0.272
Maximum	0.675	Median	0.263
SD	0.135	CV	0.495
k hat (MLE)	5.305	k star (bias corrected MLE)	4.352
Theta hat (MLE)	0.0513	Theta star (bias corrected MLE)	0.0625
nu hat (MLE)	169.8	nu star (bias corrected)	139.3
MLE Mean (bias corrected)	0.272	MLE Sd (bias corrected)	0.13
		Adjusted Level of Significance (β)	0.0335
Approximate Chi Square Value (139.27, α)	113	Adjusted Chi Square Value (139.27, β)	110.3
95% Gamma Approximate UCL (use when n>=50)	0.335	95% Gamma Adjusted UCL (use when n<50)	0.343
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.271	Mean in Log Scale	-1.402
SD in Original Scale	0.135	SD in Log Scale	0.446
95% t UCL (assumes normality of ROS data)	0.33	95% Percentile Bootstrap UCL	0.33
95% BCA Bootstrap UCL	0.343	95% Bootstrap t UCL	0.356
95% H-UCL (Log ROS)	0.342		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.402	95% H-UCL (KM -Log)	0.342
KM SD (logged)	0.446	95% Critical H Value (KM-Log)	1.996
KM Standard Error of Mean (logged)	0.119		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.287	Mean in Log Scale	-1.357
SD in Original Scale	0.146	SD in Log Scale	0.48
95% t UCL (Assumes normality)	0.351	95% H-Stat UCL	0.371
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.336	95% KM (Percentile Bootstrap) UCL					0.334
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:12:56 AM		
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Muscle, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	24
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.21	Maximum Non-Detect	0.1
Variance Detects	0.00197	Percent Non-Detects	82.76%
Mean Detects	0.148	SD Detects	0.0444
Median Detects	0.12	CV Detects	0.3
Skewness Detects	0.821	Kurtosis Detects	-1.835
Mean of Logged Detects	-1.945	SD of Logged Detects	0.288
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.108	Standard Error of Mean	0.00509
SD	0.0245	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.117	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.117	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.124	95% KM Chebyshev UCL	0.13
97.5% KM Chebyshev UCL	0.14	99% KM Chebyshev UCL	0.159
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.56	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.356	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	14.82	k star (bias corrected MLE)	6.063
Theta hat (MLE)	0.00998	Theta star (bias corrected MLE)	0.0244
nu hat (MLE)	148.2	nu star (bias corrected)	60.63
MLE Mean (bias corrected)	0.148	MLE Sd (bias corrected)	0.0601

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	19.52	nu hat (KM)	1132
Approximate Chi Square Value (N/A, α)	1055	Adjusted Chi Square Value (N/A, β)	1051
95% Gamma Approximate KM-UCL (use when n>=50)	0.116	95% Gamma Adjusted KM-UCL (use when n<50)	0.117
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.041
Maximum	0.21	Median	0.01
SD	0.055	CV	1.342
k hat (MLE)	0.884	k star (bias corrected MLE)	0.815
Theta hat (MLE)	0.0464	Theta star (bias corrected MLE)	0.0503
nu hat (MLE)	51.27	nu star (bias corrected)	47.3
MLE Mean (bias corrected)	0.041	MLE Sd (bias corrected)	0.0454
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (47.30, α)	32.51	Adjusted Chi Square Value (47.30, β)	31.78
95% Gamma Approximate UCL (use when n>=50)	0.0596	95% Gamma Adjusted UCL (use when n<50)	0.061
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0588	Mean in Log Scale	-3.128
SD in Original Scale	0.0489	SD in Log Scale	0.784
95% t UCL (assumes normality of ROS data)	0.0742	95% Percentile Bootstrap UCL	0.0733
95% BCA Bootstrap UCL	0.0769	95% Bootstrap t UCL	0.0803
95% H-UCL (Log ROS)	0.0827		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.241	95% H-UCL (KM -Log)	0.114
KM SD (logged)	0.172	95% Critical H Value (KM-Log)	1.738
KM Standard Error of Mean (logged)	0.0358		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0669	Mean in Log Scale	-2.815
SD in Original Scale	0.0412	SD in Log Scale	0.418
95% t UCL (Assumes normality)	0.0799	95% H-Stat UCL	0.0759
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.117					95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!							
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:13:36 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.14	Mean	0.251
Maximum	0.34	Median	0.25
SD	0.0446	Std. Error of Mean	0.00829
Coefficient of Variation	0.177	Skewness	0.172
Normal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.265	95% Adjusted-CLT UCL (Chen-1995)	0.265
		95% Modified-t UCL (Johnson-1978)	0.266
Gamma GOF Test			
A-D Test Statistic	0.477	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.144	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	31.82	k star (bias corrected MLE)	28.55
Theta hat (MLE)	0.0079	Theta star (bias corrected MLE)	0.0088
nu hat (MLE)	1846	nu star (bias corrected)	1656
MLE Mean (bias corrected)	0.251	MLE Sd (bias corrected)	0.047
		Approximate Chi Square Value (0.05)	1563
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	1557
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.266	95% Adjusted Gamma UCL (use when n<50)	0.267

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.966	Mean of logged Data	-1.397
Maximum of Logged Data	-1.079	SD of logged Data	0.184
Assuming Lognormal Distribution			
95% H-UCL	0.267	90% Chebyshev (MVUE) UCL	0.277
95% Chebyshev (MVUE) UCL	0.289	97.5% Chebyshev (MVUE) UCL	0.305
99% Chebyshev (MVUE) UCL	0.337		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.265	95% Jackknife UCL	0.265
95% Standard Bootstrap UCL	0.265	95% Bootstrap-t UCL	0.266
95% Hall's Bootstrap UCL	0.266	95% Percentile Bootstrap UCL	0.265
95% BCA Bootstrap UCL	0.264		
90% Chebyshev(Mean, Sd) UCL	0.276	95% Chebyshev(Mean, Sd) UCL	0.287
97.5% Chebyshev(Mean, Sd) UCL	0.303	99% Chebyshev(Mean, Sd) UCL	0.334
Suggested UCL to Use			
95% Student's-t UCL	0.265		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:14:20 AM		
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Strontium (Sr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Maclellan Region (Cockram Lake), Fish - Muscle, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	0.115	Mean	0.574
Maximum	1.63	Median	0.416
SD	0.394	Std. Error of Mean	0.0732
Coefficient of Variation	0.686	Skewness	0.961

Normal GOF Test			
Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.173	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.699	95% Adjusted-CLT UCL (Chen-1995)	0.709
		95% Modified-t UCL (Johnson-1978)	0.701

Gamma GOF Test			
A-D Test Statistic	0.307	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.104	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.165	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.183	k star (bias corrected MLE)	1.98
Theta hat (MLE)	0.263	Theta star (bias corrected MLE)	0.29
nu hat (MLE)	126.6	nu star (bias corrected)	114.9
MLE Mean (bias corrected)	0.574	MLE Sd (bias corrected)	0.408
		Approximate Chi Square Value (0.05)	91.12
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	89.85

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.724	95% Adjusted Gamma UCL (use when n<50)	0.734

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.163	Mean of logged Data	-0.801
Maximum of Logged Data	0.489	SD of logged Data	0.748
Assuming Lognormal Distribution			
95% H-UCL	0.809	90% Chebyshev (MVUE) UCL	0.854
95% Chebyshev (MVUE) UCL	0.975	97.5% Chebyshev (MVUE) UCL	1.143
99% Chebyshev (MVUE) UCL	1.473		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.695	95% Jackknife UCL	0.699
95% Standard Bootstrap UCL	0.696	95% Bootstrap-t UCL	0.724
95% Hall's Bootstrap UCL	0.706	95% Percentile Bootstrap UCL	0.689
95% BCA Bootstrap UCL	0.717		
90% Chebyshev(Mean, Sd) UCL	0.794	95% Chebyshev(Mean, Sd) UCL	0.894
97.5% Chebyshev(Mean, Sd) UCL	1.032	99% Chebyshev(Mean, Sd) UCL	1.303
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.734		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 11:15:01 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Thallium (Tl), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	27
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.0061	Minimum Non-Detect	0.006
Maximum Detect	0.0075	Maximum Non-Detect	0.006
Variance Detects	9.8000E-7	Percent Non-Detects	93.1%
Mean Detects	0.0068	SD Detects	9.8995E-4
Median Detects	0.0068	CV Detects	0.146
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-4.996	SD of Logged Detects	0.146

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.00606	Standard Error of Mean	7.1865E-5
SD	2.7365E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00618	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00617	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00627	95% KM Chebyshev UCL	0.00637
97.5% KM Chebyshev UCL	0.0065	99% KM Chebyshev UCL	0.00677

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	94.03	k star (bias corrected MLE)	N/A
Theta hat (MLE)	7.2315E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	376.1	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	489.6	nu hat (KM)	28397
		Adjusted Level of Significance (β)	0.0407

Approximate Chi Square Value (N/A, α)	28006	Adjusted Chi Square Value (N/A, β)	27983
95% Gamma Approximate KM-UCL (use when n>=50)	0.00614	95% Gamma Adjusted KM-UCL (use when n<50)	0.00614
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00241	Mean in Log Scale	-6.216
SD in Original Scale	0.00161	SD in Log Scale	0.624
95% t UCL (assumes normality of ROS data)	0.00292	95% Percentile Bootstrap UCL	0.00295
95% BCA Bootstrap UCL	0.00295	95% Bootstrap t UCL	0.00305
95% H-UCL (Log ROS)	0.00309		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00326	Mean in Log Scale	-5.753
SD in Original Scale	9.9765E-4	SD in Log Scale	0.211
95% t UCL (Assumes normality)	0.00358	95% H-Stat UCL	0.00348
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00618	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:17:10 AM
From File	Maclellan Region (Cockram Lake), Fish - Muscle, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Muscle, Zinc (Zn), mg/kg ww

General Statistics

Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	3.09	Mean	5.679
Maximum	10.9	Median	5.27
SD	1.84	Std. Error of Mean	0.342
Coefficient of Variation	0.324	Skewness	1.413

Normal GOF Test

Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.26	95% Adjusted-CLT UCL (Chen-1995)	6.337
		95% Modified-t UCL (Johnson-1978)	6.275

Gamma GOF Test

A-D Test Statistic	0.76	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.168	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.162	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.55	k star (bias corrected MLE)	10.37
Theta hat (MLE)	0.492	Theta star (bias corrected MLE)	0.547
nu hat (MLE)	669.6	nu star (bias corrected)	601.7
MLE Mean (bias corrected)	5.679	MLE Sd (bias corrected)	1.763
		Approximate Chi Square Value (0.05)	545.8
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	542.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	6.261	95% Adjusted Gamma UCL (use when n<50)	6.298

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.151	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.128	Mean of logged Data	1.693
Maximum of Logged Data	2.389	SD of logged Data	0.294
Assuming Lognormal Distribution			
95% H-UCL	6.271	90% Chebyshev (MVUE) UCL	6.607
95% Chebyshev (MVUE) UCL	7.034	97.5% Chebyshev (MVUE) UCL	7.626
99% Chebyshev (MVUE) UCL	8.788		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.241	95% Jackknife UCL	6.26
95% Standard Bootstrap UCL	6.235	95% Bootstrap-t UCL	6.407
95% Hall's Bootstrap UCL	6.457	95% Percentile Bootstrap UCL	6.248
95% BCA Bootstrap UCL	6.308		
90% Chebyshev(Mean, Sd) UCL	6.704	95% Chebyshev(Mean, Sd) UCL	7.168
97.5% Chebyshev(Mean, Sd) UCL	7.813	99% Chebyshev(Mean, Sd) UCL	9.078
Suggested UCL to Use			
95% Student's-t UCL	6.26	or 95% Modified-t UCL	6.275
or 95% H-UCL	6.271		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

APPENDIX C.19
PROUCL OUTPUTS
FISH CARCASS TISSUE (ALL LAKES)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:01:27 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	61
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.015	Minimum Non-Detect	0.01
Maximum Detect	0.03	Maximum Non-Detect	0.03
Variance Detects	1.1250E-4	Percent Non-Detects	96.83%
Mean Detects	0.0225	SD Detects	0.0106
Median Detects	0.0225	CV Detects	0.471
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.853	SD of Logged Detects	0.49

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0104	KM Standard Error of Mean	4.6660E-4
KM SD	0.00259	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0112	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0112	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0118	95% KM Chebyshev UCL	0.0125
97.5% KM Chebyshev UCL	0.0133	99% KM Chebyshev UCL	0.0151

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.653	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0026	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	34.61	nu star (bias corrected)	N/A
Mean (detects)	0.0225		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0104	SD (KM)	0.00259

Variance (KM)	6.6945E-6	SE of Mean (KM)	4.6660E-4
k hat (KM)	16.23	k star (KM)	15.46
nu hat (KM)	2044	nu star (KM)	1948
theta hat (KM)	6.4233E-4	theta star (KM)	6.7399E-4
80% gamma percentile (KM)	0.0126	90% gamma percentile (KM)	0.0139
95% gamma percentile (KM)	0.0151	99% gamma percentile (KM)	0.0176
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0462
Approximate Chi Square Value (N/A, α)	1847	Adjusted Chi Square Value (N/A, β)	1845
95% Gamma Approximate KM-UCL (use when n>=50)	0.011	95% Gamma Adjusted KM-UCL (use when n<50)	0.011
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00226	Mean in Log Scale	-7.02
SD in Original Scale	0.00436	SD in Log Scale	1.368
95% t UCL (assumes normality of ROS data)	0.00318	95% Percentile Bootstrap UCL	0.00333
95% BCA Bootstrap UCL	0.00375	95% Bootstrap t UCL	0.00417
95% H-UCL (Log ROS)	0.00341		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.579	KM Geo Mean	0.0103
KM SD (logged)	0.148	95% Critical H Value (KM-Log)	1.694
KM Standard Error of Mean (logged)	0.027	95% H-UCL (KM -Log)	0.0107
KM SD (logged)	0.148	95% Critical H Value (KM-Log)	1.694
KM Standard Error of Mean (logged)	0.027		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00794	Mean in Log Scale	-4.991
SD in Original Scale	0.00521	SD in Log Scale	0.517
95% t UCL (Assumes normality)	0.00903	95% H-Stat UCL	0.00879
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0112	KM H-UCL	0.0107
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:02:06 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Arsenic (As), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	39
		Number of Missing Observations	0
Minimum	0.01	Mean	0.0374
Maximum	0.083	Median	0.033
SD	0.0188	Std. Error of Mean	0.00237
Coefficient of Variation	0.503	Skewness	0.509

Normal GOF Test

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	3.0825E-4	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0414	95% Adjusted-CLT UCL (Chen-1995)	0.0415
		95% Modified-t UCL (Johnson-1978)	0.0414

Gamma GOF Test

A-D Test Statistic	1.115	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.117	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.113	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.918	k star (bias corrected MLE)	3.742
Theta hat (MLE)	0.00955	Theta star (bias corrected MLE)	0.01
nu hat (MLE)	493.7	nu star (bias corrected)	471.5
MLE Mean (bias corrected)	0.0374	MLE Sd (bias corrected)	0.0193
		Approximate Chi Square Value (0.05)	422.2
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	421.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.0418	95% Adjusted Gamma UCL (use when n<50)	0.0419

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0126	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.605	Mean of logged Data	-3.418
Maximum of Logged Data	-2.489	SD of logged Data	0.532
Assuming Lognormal Distribution			
95% H-UCL	0.0429	90% Chebyshev (MVUE) UCL	0.0457
95% Chebyshev (MVUE) UCL	0.0493	97.5% Chebyshev (MVUE) UCL	0.0544
99% Chebyshev (MVUE) UCL	0.0643		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0413	95% Jackknife UCL	0.0414
95% Standard Bootstrap UCL	0.0413	95% Bootstrap-t UCL	0.0416
95% Hall's Bootstrap UCL	0.0413	95% Percentile Bootstrap UCL	0.0413
95% BCA Bootstrap UCL	0.0416		
90% Chebyshev(Mean, Sd) UCL	0.0445	95% Chebyshev(Mean, Sd) UCL	0.0478
97.5% Chebyshev(Mean, Sd) UCL	0.0522	99% Chebyshev(Mean, Sd) UCL	0.061
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0478		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:09:44 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	61
		Number of Missing Observations	0
Minimum	0.174	Mean	1.186
Maximum	6.69	Median	0.706
SD	1.159	Std. Error of Mean	0.146
Coefficient of Variation	0.977	Skewness	2.427
Normal GOF Test			
Shapiro Wilk Test Statistic	0.764	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	2.170E-13	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.43	95% Adjusted-CLT UCL (Chen-1995)	1.474
		95% Modified-t UCL (Johnson-1978)	1.438
Gamma GOF Test			
A-D Test Statistic	0.963	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.769	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.142	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.114	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.486	k star (bias corrected MLE)	1.426
Theta hat (MLE)	0.798	Theta star (bias corrected MLE)	0.832
nu hat (MLE)	187.3	nu star (bias corrected)	179.7
MLE Mean (bias corrected)	1.186	MLE Sd (bias corrected)	0.993
		Approximate Chi Square Value (0.05)	149.7
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	149
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.424	95% Adjusted Gamma UCL (use when n<50)	1.43

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.214	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.749	Mean of logged Data	-0.202
Maximum of Logged Data	1.901	SD of logged Data	0.866
Assuming Lognormal Distribution			
95% H-UCL	1.506	90% Chebyshev (MVUE) UCL	1.621
95% Chebyshev (MVUE) UCL	1.821	97.5% Chebyshev (MVUE) UCL	2.098
99% Chebyshev (MVUE) UCL	2.644		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.427	95% Jackknife UCL	1.43
95% Standard Bootstrap UCL	1.431	95% Bootstrap-t UCL	1.498
95% Hall's Bootstrap UCL	1.521	95% Percentile Bootstrap UCL	1.43
95% BCA Bootstrap UCL	1.482		
90% Chebyshev(Mean, Sd) UCL	1.625	95% Chebyshev(Mean, Sd) UCL	1.823
97.5% Chebyshev(Mean, Sd) UCL	2.099	99% Chebyshev(Mean, Sd) UCL	2.64
Suggested UCL to Use			
95% H-UCL	1.506		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:10:22 PM		
From File	Gordon Region (All Lakes), Fish - Carcass, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Carcass, Cadmium (Cd), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	12
Number of Detects	17	Number of Non-Detects	46
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.004	Minimum Non-Detect	0.004
Maximum Detect	0.0089	Maximum Non-Detect	0.004
Variance Detects	2.7964E-6	Percent Non-Detects	73.02%
Mean Detects	0.00575	SD Detects	0.00167
Median Detects	0.0059	CV Detects	0.291
Skewness Detects	0.524	Kurtosis Detects	-1.075
Mean of Logged Detects	-5.198	SD of Logged Detects	0.285
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.26	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.207	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00447	KM Standard Error of Mean	1.4873E-4
KM SD	0.00115	95% KM (BCA) UCL	0.00473
95% KM (t) UCL	0.00472	95% KM (Percentile Bootstrap) UCL	0.00472
95% KM (z) UCL	0.00472	95% KM Bootstrap t UCL	0.00478
90% KM Chebyshev UCL	0.00492	95% KM Chebyshev UCL	0.00512
97.5% KM Chebyshev UCL	0.0054	99% KM Chebyshev UCL	0.00595
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.992	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.739	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.267	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.209	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	13.06	k star (bias corrected MLE)	10.79
Theta hat (MLE)	4.4019E-4	Theta star (bias corrected MLE)	5.3258E-4
nu hat (MLE)	443.9	nu star (bias corrected)	366.9

Mean (detects)	0.00575		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.004	Mean	0.00885
Maximum	0.01	Median	0.01
SD	0.00208	CV	0.235
k hat (MLE)	13.31	k star (bias corrected MLE)	12.69
Theta hat (MLE)	6.6502E-4	Theta star (bias corrected MLE)	6.9769E-4
nu hat (MLE)	1677	nu star (bias corrected)	1599
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (N/A, α)	1507	Adjusted Chi Square Value (N/A, β)	1505
95% Gamma Approximate UCL (use when n>=50)	0.00939	95% Gamma Adjusted UCL (use when n<50)	0.0094
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00447	SD (KM)	0.00115
Variance (KM)	1.3116E-6	SE of Mean (KM)	1.4873E-4
k hat (KM)	15.24	k star (KM)	14.53
nu hat (KM)	1921	nu star (KM)	1831
theta hat (KM)	2.9332E-4	theta star (KM)	3.0776E-4
80% gamma percentile (KM)	0.00542	90% gamma percentile (KM)	0.00603
95% gamma percentile (KM)	0.00656	99% gamma percentile (KM)	0.00764
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	1732	Adjusted Chi Square Value (N/A, β)	1730
95% Gamma Approximate KM-UCL (use when n>=50)	0.00473	95% Gamma Adjusted KM-UCL (use when n<50)	0.00473
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.207	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00313	Mean in Log Scale	-5.945
SD in Original Scale	0.00195	SD in Log Scale	0.602
95% t UCL (assumes normality of ROS data)	0.00354	95% Percentile Bootstrap UCL	0.00355
95% BCA Bootstrap UCL	0.00357	95% Bootstrap t UCL	0.00358
95% H-UCL (Log ROS)	0.00364		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.434	KM Geo Mean	0.00436
KM SD (logged)	0.203	95% Critical H Value (KM-Log)	1.713
KM Standard Error of Mean (logged)	0.0264	95% H-UCL (KM -Log)	0.00466

KM SD (logged)	0.203	95% Critical H Value (KM-Log)	1.713
KM Standard Error of Mean (logged)	0.0264		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00301	Mean in Log Scale	-5.94
SD in Original Scale	0.00188	SD in Log Scale	0.477
95% t UCL (Assumes normality)	0.00341	95% H-Stat UCL	0.0033
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00472	KM H-UCL	0.00466
95% KM (BCA) UCL	0.00473		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:11:02 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Chromium (Cr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Chromium (Cr), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Carcass, Chromium (Cr), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:11:40 PM		
From File	Gordon Region (All Lakes), Fish - Carcass, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Carcass, Copper (Cu), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	54
		Number of Missing Observations	0
Minimum	0.197	Mean	0.299
Maximum	0.455	Median	0.294
SD	0.0567	Std. Error of Mean	0.00714
Coefficient of Variation	0.19	Skewness	0.415
Normal GOF Test			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.152	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0675	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.311	95% Adjusted-CLT UCL (Chen-1995)	0.311
		95% Modified-t UCL (Johnson-1978)	0.311
Gamma GOF Test			
A-D Test Statistic	0.37	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0705	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	28.59	k star (bias corrected MLE)	27.24
Theta hat (MLE)	0.0104	Theta star (bias corrected MLE)	0.011
nu hat (MLE)	3602	nu star (bias corrected)	3432
MLE Mean (bias corrected)	0.299	MLE Sd (bias corrected)	0.0572
		Approximate Chi Square Value (0.05)	3297
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	3294
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.311	95% Adjusted Gamma UCL (use when n<50)	0.311

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.398	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0734	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.625	Mean of logged Data	-1.226
Maximum of Logged Data	-0.787	SD of logged Data	0.189
Assuming Lognormal Distribution			
95% H-UCL	0.311	90% Chebyshev (MVUE) UCL	0.32
95% Chebyshev (MVUE) UCL	0.33	97.5% Chebyshev (MVUE) UCL	0.344
99% Chebyshev (MVUE) UCL	0.37		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.311	95% Jackknife UCL	0.311
95% Standard Bootstrap UCL	0.31	95% Bootstrap-t UCL	0.31
95% Hall's Bootstrap UCL	0.311	95% Percentile Bootstrap UCL	0.311
95% BCA Bootstrap UCL	0.311		
90% Chebyshev(Mean, Sd) UCL	0.32	95% Chebyshev(Mean, Sd) UCL	0.33
97.5% Chebyshev(Mean, Sd) UCL	0.343	99% Chebyshev(Mean, Sd) UCL	0.37
Suggested UCL to Use			
95% Student's-t UCL	0.311		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:12:19 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Carcass, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:12:57 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Manganese (Mn), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	61
		Number of Missing Observations	0
Minimum	0.623	Mean	5.264
Maximum	19.2	Median	5.02
SD	3.575	Std. Error of Mean	0.45
Coefficient of Variation	0.679	Skewness	1.189

Normal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	2.2322E-4	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.0971	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.111	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.016	95% Adjusted-CLT UCL (Chen-1995)	6.077
		95% Modified-t UCL (Johnson-1978)	6.028

Gamma GOF Test

A-D Test Statistic	0.811	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0995	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.114	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.98	k star (bias corrected MLE)	1.897
Theta hat (MLE)	2.658	Theta star (bias corrected MLE)	2.776
nu hat (MLE)	249.5	nu star (bias corrected)	239
MLE Mean (bias corrected)	5.264	MLE Sd (bias corrected)	3.823
		Approximate Chi Square Value (0.05)	204.2
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	203.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	6.161	95% Adjusted Gamma UCL (use when n<50)	6.184

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.00104	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.473	Mean of logged Data	1.388
Maximum of Logged Data	2.955	SD of logged Data	0.82
Assuming Lognormal Distribution			
95% H-UCL	6.98	90% Chebyshev (MVUE) UCL	7.515
95% Chebyshev (MVUE) UCL	8.399	97.5% Chebyshev (MVUE) UCL	9.625
99% Chebyshev (MVUE) UCL	12.03		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.005	95% Jackknife UCL	6.016
95% Standard Bootstrap UCL	5.998	95% Bootstrap-t UCL	6.088
95% Hall's Bootstrap UCL	6.104	95% Percentile Bootstrap UCL	6.013
95% BCA Bootstrap UCL	6.12		
90% Chebyshev(Mean, Sd) UCL	6.616	95% Chebyshev(Mean, Sd) UCL	7.228
97.5% Chebyshev(Mean, Sd) UCL	8.077	99% Chebyshev(Mean, Sd) UCL	9.746
Suggested UCL to Use			
95% Student's-t UCL	6.016		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:13:36 PM		
From File	Gordon Region (All Lakes), Fish - Carcass, Mercury (Hg), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Carcass, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.075	Mean	0.202
Maximum	0.612	Median	0.159
SD	0.116	Std. Error of Mean	0.0168
Coefficient of Variation	0.574	Skewness	1.622
Normal GOF Test			
Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.23	95% Adjusted-CLT UCL (Chen-1995)	0.234
		95% Modified-t UCL (Johnson-1978)	0.231
Gamma GOF Test			
A-D Test Statistic	0.696	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.136	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.867	k star (bias corrected MLE)	3.64
Theta hat (MLE)	0.0523	Theta star (bias corrected MLE)	0.0555
nu hat (MLE)	371.3	nu star (bias corrected)	349.4
MLE Mean (bias corrected)	0.202	MLE Sd (bias corrected)	0.106
		Approximate Chi Square Value (0.05)	307.1
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	305.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.23	95% Adjusted Gamma UCL (use when n<50)	0.231

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.59	Mean of logged Data	-1.734
Maximum of Logged Data	-0.491	SD of logged Data	0.511
Assuming Lognormal Distribution			
95% H-UCL	0.232	90% Chebyshev (MVUE) UCL	0.247
95% Chebyshev (MVUE) UCL	0.269	97.5% Chebyshev (MVUE) UCL	0.298
99% Chebyshev (MVUE) UCL	0.356		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.23	95% Jackknife UCL	0.23
95% Standard Bootstrap UCL	0.23	95% Bootstrap-t UCL	0.237
95% Hall's Bootstrap UCL	0.236	95% Percentile Bootstrap UCL	0.231
95% BCA Bootstrap UCL	0.233		
90% Chebyshev(Mean, Sd) UCL	0.252	95% Chebyshev(Mean, Sd) UCL	0.275
97.5% Chebyshev(Mean, Sd) UCL	0.307	99% Chebyshev(Mean, Sd) UCL	0.369
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.231		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:14:15 PM		
From File	Gordon Region (All Lakes), Fish - Carcass, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Carcass, Molybdenum (Mo), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	58
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.292	Maximum Non-Detect	0.02
Variance Detects	0.015	Percent Non-Detects	92.06%
Mean Detects	0.0742	SD Detects	0.122
Median Detects	0.017	CV Detects	1.648
Skewness Detects	2.189	Kurtosis Detects	4.821
Mean of Logged Detects	-3.5	SD of Logged Detects	1.367
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.627	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.413	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0151	KM Standard Error of Mean	0.00498
KM SD	0.0354	95% KM (BCA) UCL	0.0241
95% KM (t) UCL	0.0235	95% KM (Percentile Bootstrap) UCL	0.024
95% KM (z) UCL	0.0233	95% KM Bootstrap t UCL	0.11
90% KM Chebyshev UCL	0.0301	95% KM Chebyshev UCL	0.0369
97.5% KM Chebyshev UCL	0.0463	99% KM Chebyshev UCL	0.0647
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.701	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.702	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.321	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.368	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.676	k star (bias corrected MLE)	0.404
Theta hat (MLE)	0.11	Theta star (bias corrected MLE)	0.184
nu hat (MLE)	6.759	nu star (bias corrected)	4.037

Mean (detects)	0.0742		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0151
Maximum	0.292	Median	0.01
SD	0.0356	CV	2.362
k hat (MLE)	1.69	k star (bias corrected MLE)	1.621
Theta hat (MLE)	0.00893	Theta star (bias corrected MLE)	0.00931
nu hat (MLE)	213	nu star (bias corrected)	204.2
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (204.19, α)	172.1	Adjusted Chi Square Value (204.19, β)	171.4
95% Gamma Approximate UCL (use when n>=50)	0.0179	95% Gamma Adjusted UCL (use when n<50)	0.018
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0151	SD (KM)	0.0354
Variance (KM)	0.00125	SE of Mean (KM)	0.00498
k hat (KM)	0.183	k star (KM)	0.185
nu hat (KM)	23.12	nu star (KM)	23.35
theta hat (KM)	0.0825	theta star (KM)	0.0817
80% gamma percentile (KM)	0.0191	90% gamma percentile (KM)	0.0457
95% gamma percentile (KM)	0.0796	99% gamma percentile (KM)	0.174
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (23.35, α)	13.36	Adjusted Chi Square Value (23.35, β)	13.18
95% Gamma Approximate KM-UCL (use when n>=50)	0.0265	95% Gamma Adjusted KM-UCL (use when n<50)	0.0268
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.841	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00629	Mean in Log Scale	-9.774
SD in Original Scale	0.037	SD in Log Scale	3.317
95% t UCL (assumes normality of ROS data)	0.0141	95% Percentile Bootstrap UCL	0.0153
95% BCA Bootstrap UCL	0.0206	95% Bootstrap t UCL	0.0758
95% H-UCL (Log ROS)	0.091		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.513	KM Geo Mean	0.011
KM SD (logged)	0.457	95% Critical H Value (KM-Log)	1.836
KM Standard Error of Mean (logged)	0.0648	95% H-UCL (KM -Log)	0.0135

KM SD (logged)	0.457	95% Critical H Value (KM-Log)	1.836
KM Standard Error of Mean (logged)	0.0648		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0117	Mean in Log Scale	-4.991
SD in Original Scale	0.0362	SD in Log Scale	0.634
95% t UCL (Assumes normality)	0.0193	95% H-Stat UCL	0.00973
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Approximate Gamma UCL	0.0265		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:14:54 PM		
From File	Gordon Region (All Lakes), Fish - Carcass, Selenium (Se), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Carcass, Selenium (Se), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	0.12	Mean	0.156
Maximum	0.27	Median	0.14
SD	0.0376	Std. Error of Mean	0.00473
Coefficient of Variation	0.241	Skewness	1.826
Normal GOF Test			
Shapiro Wilk Test Statistic	0.736	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	6.883E-15	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.164	95% Adjusted-CLT UCL (Chen-1995)	0.165
		95% Modified-t UCL (Johnson-1978)	0.164
Gamma GOF Test			
A-D Test Statistic	4.905	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.233	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	21.56	k star (bias corrected MLE)	20.54
Theta hat (MLE)	0.00723	Theta star (bias corrected MLE)	0.00759
nu hat (MLE)	2716	nu star (bias corrected)	2588
MLE Mean (bias corrected)	0.156	MLE Sd (bias corrected)	0.0344
		Approximate Chi Square Value (0.05)	2471
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	2469
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.163	95% Adjusted Gamma UCL (use when n<50)	0.163

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	4.520E-11	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.12	Mean of logged Data	-1.882
Maximum of Logged Data	-1.309	SD of logged Data	0.208
Assuming Lognormal Distribution			
95% H-UCL	0.163	90% Chebyshev (MVUE) UCL	0.168
95% Chebyshev (MVUE) UCL	0.173	97.5% Chebyshev (MVUE) UCL	0.181
99% Chebyshev (MVUE) UCL	0.196		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.164	95% Jackknife UCL	0.164
95% Standard Bootstrap UCL	0.164	95% Bootstrap-t UCL	0.165
95% Hall's Bootstrap UCL	0.165	95% Percentile Bootstrap UCL	0.164
95% BCA Bootstrap UCL	0.164		
90% Chebyshev(Mean, Sd) UCL	0.17	95% Chebyshev(Mean, Sd) UCL	0.177
97.5% Chebyshev(Mean, Sd) UCL	0.185	99% Chebyshev(Mean, Sd) UCL	0.203
Suggested UCL to Use			
95% Student's-t UCL	0.164	or 95% Modified-t UCL	0.164
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:15:33 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	60
		Number of Missing Observations	0
Minimum	2.34	Mean	5.864
Maximum	19.2	Median	5.38
SD	3.106	Std. Error of Mean	0.391
Coefficient of Variation	0.53	Skewness	2.581

Normal GOF Test			
Shapiro Wilk Test Statistic	0.754	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	6.295E-14	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.517	95% Adjusted-CLT UCL (Chen-1995)	6.644
		95% Modified-t UCL (Johnson-1978)	6.539

Gamma GOF Test			
A-D Test Statistic	1.222	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.123	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.113	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	5.228	k star (bias corrected MLE)	4.99
Theta hat (MLE)	1.122	Theta star (bias corrected MLE)	1.175
nu hat (MLE)	658.8	nu star (bias corrected)	628.8
MLE Mean (bias corrected)	5.864	MLE Sd (bias corrected)	2.625
		Approximate Chi Square Value (0.05)	571.6
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	570.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.45	95% Adjusted Gamma UCL (use when n<50)	6.465

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0461	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0904	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.85	Mean of logged Data	1.67
Maximum of Logged Data	2.955	SD of logged Data	0.425
Assuming Lognormal Distribution			
95% H-UCL	6.416	90% Chebyshev (MVUE) UCL	6.776
95% Chebyshev (MVUE) UCL	7.215	97.5% Chebyshev (MVUE) UCL	7.825
99% Chebyshev (MVUE) UCL	9.022		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.508	95% Jackknife UCL	6.517
95% Standard Bootstrap UCL	6.511	95% Bootstrap-t UCL	6.684
95% Hall's Bootstrap UCL	6.835	95% Percentile Bootstrap UCL	6.516
95% BCA Bootstrap UCL	6.629		
90% Chebyshev(Mean, Sd) UCL	7.038	95% Chebyshev(Mean, Sd) UCL	7.57
97.5% Chebyshev(Mean, Sd) UCL	8.308	99% Chebyshev(Mean, Sd) UCL	9.758
Suggested UCL to Use			
95% Student's-t UCL	6.517	or 95% Modified-t UCL	6.539
or 95% H-UCL	6.416		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:16:51 PM		
From File	Gordon Region (All Lakes), Fish - Carcass, Uranium (U), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Carcass, Uranium (U), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	4
Number of Detects	4	Number of Non-Detects	59
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.002	Minimum Non-Detect	0.002
Maximum Detect	0.0078	Maximum Non-Detect	0.002
Variance Detects	6.0100E-6	Percent Non-Detects	93.65%
Mean Detects	0.00455	SD Detects	0.00245
Median Detects	0.0042	CV Detects	0.539
Skewness Detects	0.765	Kurtosis Detects	0.773
Mean of Logged Detects	-5.509	SD of Logged Detects	0.569
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00216	KM Standard Error of Mean	1.1933E-4
KM SD	8.2026E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00236	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00236	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00252	95% KM Chebyshev UCL	0.00268
97.5% KM Chebyshev UCL	0.00291	99% KM Chebyshev UCL	0.00335
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.195	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.473	k star (bias corrected MLE)	1.285
Theta hat (MLE)	0.00102	Theta star (bias corrected MLE)	0.00354
nu hat (MLE)	35.79	nu star (bias corrected)	10.28

Mean (detects)	0.00455		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.002	Mean	0.00965
Maximum	0.01	Median	0.01
SD	0.00144	CV	0.15
k hat (MLE)	22.75	k star (bias corrected MLE)	21.67
Theta hat (MLE)	4.2440E-4	Theta star (bias corrected MLE)	4.4540E-4
nu hat (MLE)	2866	nu star (bias corrected)	2731
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (N/A, α)	2611	Adjusted Chi Square Value (N/A, β)	2608
95% Gamma Approximate UCL (use when n>=50)	0.0101	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00216	SD (KM)	8.2026E-4
Variance (KM)	6.7283E-7	SE of Mean (KM)	1.1933E-4
k hat (KM)	6.946	k star (KM)	6.626
nu hat (KM)	875.3	nu star (KM)	834.9
theta hat (KM)	3.1122E-4	theta star (KM)	3.2626E-4
80% gamma percentile (KM)	0.00282	90% gamma percentile (KM)	0.00328
95% gamma percentile (KM)	0.0037	99% gamma percentile (KM)	0.00458
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (834.91, α)	768.9	Adjusted Chi Square Value (834.91, β)	767.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.00235	95% Gamma Adjusted KM-UCL (use when n<50)	0.00235
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.997	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	4.6299E-4	Mean in Log Scale	-9.568
SD in Original Scale	0.00123	SD in Log Scale	2.06
95% t UCL (assumes normality of ROS data)	7.2267E-4	95% Percentile Bootstrap UCL	7.3562E-4
95% BCA Bootstrap UCL	8.3629E-4	95% Bootstrap t UCL	0.00106
95% H-UCL (Log ROS)	0.00133		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.17	KM Geo Mean	0.00209
KM SD (logged)	0.212	95% Critical H Value (KM-Log)	1.717
KM Standard Error of Mean (logged)	0.0309	95% H-UCL (KM -Log)	0.00224

KM SD (logged)	0.212	95% Critical H Value (KM-Log)	1.717
KM Standard Error of Mean (logged)	0.0309		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00123	Mean in Log Scale	-6.819
SD in Original Scale	0.00103	SD in Log Scale	0.366
95% t UCL (Assumes normality)	0.00144	95% H-Stat UCL	0.00127
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00236		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:17:30 PM
From File	Gordon Region (All Lakes), Fish - Carcass, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Carcass, Zinc (Zn), mg/kg ww

	General Statistics		
Total Number of Observations	63	Number of Distinct Observations	62
		Number of Missing Observations	0
Minimum	9.08	Mean	44.06
Maximum	115	Median	43.8
SD	20.76	Std. Error of Mean	2.615
Coefficient of Variation	0.471	Skewness	0.662
	Normal GOF Test		
Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.105	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0763	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Normal at 5% Significance Level	
	Data appear Normal at 5% Significance Level		
	Assuming Normal Distribution		
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	48.43	95% Adjusted-CLT UCL (Chen-1995)	48.59
		95% Modified-t UCL (Johnson-1978)	48.46
	Gamma GOF Test		
A-D Test Statistic	0.865	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.104	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.113	Detected data appear Gamma Distributed at 5% Significance Level	
	Detected data follow Appr. Gamma Distribution at 5% Significance Level		
	Gamma Statistics		
k hat (MLE)	3.966	k star (bias corrected MLE)	3.788
Theta hat (MLE)	11.11	Theta star (bias corrected MLE)	11.63
nu hat (MLE)	499.7	nu star (bias corrected)	477.3
MLE Mean (bias corrected)	44.06	MLE Sd (bias corrected)	22.64
		Approximate Chi Square Value (0.05)	427.6
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	426.5
	Assuming Gamma Distribution		
95% Approximate Gamma UCL (use when n>=50))	49.18	95% Adjusted Gamma UCL (use when n<50)	49.3

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	3.8939E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.138	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.206	Mean of logged Data	3.654
Maximum of Logged Data	4.745	SD of logged Data	0.56
Assuming Lognormal Distribution			
95% H-UCL	51.73	90% Chebyshev (MVUE) UCL	55.2
95% Chebyshev (MVUE) UCL	59.8	97.5% Chebyshev (MVUE) UCL	66.18
99% Chebyshev (MVUE) UCL	78.71		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	48.36	95% Jackknife UCL	48.43
95% Standard Bootstrap UCL	48.44	95% Bootstrap-t UCL	48.51
95% Hall's Bootstrap UCL	48.85	95% Percentile Bootstrap UCL	48.59
95% BCA Bootstrap UCL	48.71		
90% Chebyshev(Mean, Sd) UCL	51.9	95% Chebyshev(Mean, Sd) UCL	55.46
97.5% Chebyshev(Mean, Sd) UCL	60.39	99% Chebyshev(Mean, Sd) UCL	70.08
Suggested UCL to Use			
95% Student's-t UCL	48.43		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.20
PROUCL OUTPUTS
FISH CARCASS TISSUE (ALL LAKES)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:08:02 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Antimony (Sb), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	47
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.013	Minimum Non-Detect	0.01
Maximum Detect	0.023	Maximum Non-Detect	0.03
Variance Detects	5.0000E-5	Percent Non-Detects	95.92%
Mean Detects	0.018	SD Detects	0.00707
Median Detects	0.018	CV Detects	0.393
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-4.058	SD of Logged Detects	0.403

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0104	KM Standard Error of Mean	5.1353E-4
KM SD	0.00218	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0113	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0113	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.012	95% KM Chebyshev UCL	0.0127
97.5% KM Chebyshev UCL	0.0137	99% KM Chebyshev UCL	0.0156

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	12.62	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00143	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	50.47	nu star (bias corrected)	N/A
Mean (detects)	0.018		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0104	SD (KM)	0.00218

Variance (KM)	4.7469E-6	SE of Mean (KM)	5.1353E-4
k hat (KM)	22.98	k star (KM)	21.59
nu hat (KM)	2252	nu star (KM)	2116
theta hat (KM)	4.5449E-4	theta star (KM)	4.8383E-4
80% gamma percentile (KM)	0.0123	90% gamma percentile (KM)	0.0134
95% gamma percentile (KM)	0.0144	99% gamma percentile (KM)	0.0164
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (N/A, α)	2010	Adjusted Chi Square Value (N/A, β)	2007
95% Gamma Approximate KM-UCL (use when n>=50)	0.011	95% Gamma Adjusted KM-UCL (use when n<50)	0.011
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00174	Mean in Log Scale	-7.739
SD in Original Scale	0.00386	SD in Log Scale	1.742
95% t UCL (assumes normality of ROS data)	0.00266	95% Percentile Bootstrap UCL	0.00271
95% BCA Bootstrap UCL	0.00311	95% Bootstrap t UCL	0.00388
95% H-UCL (Log ROS)	0.0045		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.575	KM Geo Mean	0.0103
KM SD (logged)	0.142	95% Critical H Value (KM-Log)	1.753
KM Standard Error of Mean (logged)	0.0335	95% H-UCL (KM -Log)	0.0108
KM SD (logged)	0.142	95% Critical H Value (KM-Log)	1.753
KM Standard Error of Mean (logged)	0.0335		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00818	Mean in Log Scale	-4.956
SD in Original Scale	0.00498	SD in Log Scale	0.524
95% t UCL (Assumes normality)	0.00938	95% H-Stat UCL	0.00933
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0113	KM H-UCL	0.0108
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:08:41 AM		
From File	MacLellan Region (All Lakes), Fish - Carcass, Arsenic (As), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Carcass, Arsenic (As), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	19
Number of Detects	33	Number of Non-Detects	16
Number of Distinct Detects	19	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.044	Maximum Non-Detect	0.01
Variance Detects	1.1295E-4	Percent Non-Detects	32.65%
Mean Detects	0.0217	SD Detects	0.0106
Median Detects	0.018	CV Detects	0.489
Skewness Detects	0.588	Kurtosis Detects	-1.066
Mean of Logged Detects	-3.945	SD of Logged Detects	0.488
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0179	KM Standard Error of Mean	0.00148
KM SD	0.0102	95% KM (BCA) UCL	0.0203
95% KM (t) UCL	0.0204	95% KM (Percentile Bootstrap) UCL	0.0203
95% KM (z) UCL	0.0203	95% KM Bootstrap t UCL	0.0205
90% KM Chebyshev UCL	0.0223	95% KM Chebyshev UCL	0.0243
97.5% KM Chebyshev UCL	0.0271	99% KM Chebyshev UCL	0.0326
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.3	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.75	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.153	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.154	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.481	k star (bias corrected MLE)	4.094
Theta hat (MLE)	0.00485	Theta star (bias corrected MLE)	0.00531
nu hat (MLE)	295.7	nu star (bias corrected)	270.2

Mean (detects)	0.0217		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0179
Maximum	0.044	Median	0.012
SD	0.0103	CV	0.576
k hat (MLE)	3.797	k star (bias corrected MLE)	3.578
Theta hat (MLE)	0.00471	Theta star (bias corrected MLE)	0.005
nu hat (MLE)	372.1	nu star (bias corrected)	350.6
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (350.63, α)	308.2	Adjusted Chi Square Value (350.63, β)	307
95% Gamma Approximate UCL (use when n>=50)	0.0204	95% Gamma Adjusted UCL (use when n<50)	0.0204
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0179	SD (KM)	0.0102
Variance (KM)	1.0401E-4	SE of Mean (KM)	0.00148
k hat (KM)	3.08	k star (KM)	2.905
nu hat (KM)	301.8	nu star (KM)	284.7
theta hat (KM)	0.00581	theta star (KM)	0.00616
80% gamma percentile (KM)	0.0256	90% gamma percentile (KM)	0.032
95% gamma percentile (KM)	0.0379	99% gamma percentile (KM)	0.0508
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (284.68, α)	246.6	Adjusted Chi Square Value (284.68, β)	245.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0207	95% Gamma Adjusted KM-UCL (use when n<50)	0.0208
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0167	Mean in Log Scale	-4.328
SD in Original Scale	0.0114	SD in Log Scale	0.709
95% t UCL (assumes normality of ROS data)	0.0194	95% Percentile Bootstrap UCL	0.0193
95% BCA Bootstrap UCL	0.0196	95% Bootstrap t UCL	0.0197
95% H-UCL (Log ROS)	0.0209		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.161	KM Geo Mean	0.0156
KM SD (logged)	0.502	95% Critical H Value (KM-Log)	1.89
KM Standard Error of Mean (logged)	0.0728	95% H-UCL (KM -Log)	0.0203

KM SD (logged)	0.502	95% Critical H Value (KM-Log)	1.89
KM Standard Error of Mean (logged)	0.0728		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0163	Mean in Log Scale	-4.387
SD in Original Scale	0.0118	SD in Log Scale	0.755
95% t UCL (Assumes normality)	0.0191	95% H-Stat UCL	0.0208
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.0208	95% GROS Adjusted Gamma UCL	0.0204
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:09:21 AM		
From File	MacLellan Region (All Lakes), Fish - Carcass, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Carcass, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	0.242	Mean	0.63
Maximum	1.66	Median	0.585
SD	0.306	Std. Error of Mean	0.0437
Coefficient of Variation	0.485	Skewness	1.564
Normal GOF Test			
Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.704	95% Adjusted-CLT UCL (Chen-1995)	0.713
		95% Modified-t UCL (Johnson-1978)	0.705
Gamma GOF Test			
A-D Test Statistic	0.562	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.114	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.127	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.224	k star (bias corrected MLE)	4.917
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.128
nu hat (MLE)	511.9	nu star (bias corrected)	481.9
MLE Mean (bias corrected)	0.63	MLE Sd (bias corrected)	0.284
		Approximate Chi Square Value (0.05)	432
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	430.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.703	95% Adjusted Gamma UCL (use when n<50)	0.705

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0855	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.419	Mean of logged Data	-0.56
Maximum of Logged Data	0.507	SD of logged Data	0.441
Assuming Lognormal Distribution			
95% H-UCL	0.708	90% Chebyshev (MVUE) UCL	0.751
95% Chebyshev (MVUE) UCL	0.807	97.5% Chebyshev (MVUE) UCL	0.885
99% Chebyshev (MVUE) UCL	1.037		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.702	95% Jackknife UCL	0.704
95% Standard Bootstrap UCL	0.701	95% Bootstrap-t UCL	0.724
95% Hall's Bootstrap UCL	0.713	95% Percentile Bootstrap UCL	0.705
95% BCA Bootstrap UCL	0.713		
90% Chebyshev(Mean, Sd) UCL	0.761	95% Chebyshev(Mean, Sd) UCL	0.821
97.5% Chebyshev(Mean, Sd) UCL	0.903	99% Chebyshev(Mean, Sd) UCL	1.065
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.705		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:10:00 AM		
From File	MacLellan Region (All Lakes), Fish - Carcass, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Carcass, Cadmium (Cd), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	27
Number of Detects	30	Number of Non-Detects	19
Number of Distinct Detects	26	Number of Distinct Non-Detects	1
Minimum Detect	0.0042	Minimum Non-Detect	0.004
Maximum Detect	0.0333	Maximum Non-Detect	0.004
Variance Detects	2.7320E-5	Percent Non-Detects	38.78%
Mean Detects	0.0105	SD Detects	0.00523
Median Detects	0.01	CV Detects	0.497
Skewness Detects	2.877	Kurtosis Detects	12.36
Mean of Logged Detects	-4.644	SD of Logged Detects	0.416
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.74	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00799	KM Standard Error of Mean	7.4416E-4
KM SD	0.00512	95% KM (BCA) UCL	0.0092
95% KM (t) UCL	0.00923	95% KM (Percentile Bootstrap) UCL	0.00922
95% KM (z) UCL	0.00921	95% KM Bootstrap t UCL	0.00954
90% KM Chebyshev UCL	0.0102	95% KM Chebyshev UCL	0.0112
97.5% KM Chebyshev UCL	0.0126	99% KM Chebyshev UCL	0.0154
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.7	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.119	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	5.785	k star (bias corrected MLE)	5.229
Theta hat (MLE)	0.00182	Theta star (bias corrected MLE)	0.00201
nu hat (MLE)	347.1	nu star (bias corrected)	313.7

Mean (detects)	0.0105		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0042	Mean	0.0103
Maximum	0.0333	Median	0.01
SD	0.00407	CV	0.395
k hat (MLE)	9.3	k star (bias corrected MLE)	8.744
Theta hat (MLE)	0.00111	Theta star (bias corrected MLE)	0.00118
nu hat (MLE)	911.4	nu star (bias corrected)	856.9
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (856.94, α)	790	Adjusted Chi Square Value (856.94, β)	788.1
95% Gamma Approximate UCL (use when n>=50)	0.0112	95% Gamma Adjusted UCL (use when n<50)	0.0112
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00799	SD (KM)	0.00512
Variance (KM)	2.6230E-5	SE of Mean (KM)	7.4416E-4
k hat (KM)	2.431	k star (KM)	2.296
nu hat (KM)	238.3	nu star (KM)	225
theta hat (KM)	0.00328	theta star (KM)	0.00348
80% gamma percentile (KM)	0.0118	90% gamma percentile (KM)	0.015
95% gamma percentile (KM)	0.0181	99% gamma percentile (KM)	0.025
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (225.01, α)	191.3	Adjusted Chi Square Value (225.01, β)	190.3
95% Gamma Approximate KM-UCL (use when n>=50)	0.00939	95% Gamma Adjusted KM-UCL (use when n<50)	0.00944
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00786	Mean in Log Scale	-5.033
SD in Original Scale	0.00531	SD in Log Scale	0.62
95% t UCL (assumes normality of ROS data)	0.00914	95% Percentile Bootstrap UCL	0.00913
95% BCA Bootstrap UCL	0.00945	95% Bootstrap t UCL	0.00951
95% H-UCL (Log ROS)	0.00943		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.984	KM Geo Mean	0.00684
KM SD (logged)	0.534	95% Critical H Value (KM-Log)	1.913
KM Standard Error of Mean (logged)	0.0776	95% H-UCL (KM -Log)	0.00915

KM SD (logged)	0.534	95% Critical H Value (KM-Log)	1.913
KM Standard Error of Mean (logged)	0.0776		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00721	Mean in Log Scale	-5.253
SD in Original Scale	0.00584	SD in Log Scale	0.838
95% t UCL (Assumes normality)	0.00861	95% H-Stat UCL	0.00967
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.00944	95% GROS Adjusted Gamma UCL	0.0112
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:10:39 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	23
Number of Detects	25	Number of Non-Detects	24
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.022	Minimum Non-Detect	0.02
Maximum Detect	0.105	Maximum Non-Detect	0.02
Variance Detects	6.1797E-4	Percent Non-Detects	48.98%
Mean Detects	0.0488	SD Detects	0.0249
Median Detects	0.042	CV Detects	0.509
Skewness Detects	1.021	Kurtosis Detects	-0.0504
Mean of Logged Detects	-3.133	SD of Logged Detects	0.478

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0347	KM Standard Error of Mean	0.00329
KM SD	0.0226	95% KM (BCA) UCL	0.0401
95% KM (t) UCL	0.0402	95% KM (Percentile Bootstrap) UCL	0.0402
95% KM (z) UCL	0.0401	95% KM Bootstrap t UCL	0.0413
90% KM Chebyshev UCL	0.0446	95% KM Chebyshev UCL	0.0491
97.5% KM Chebyshev UCL	0.0553	99% KM Chebyshev UCL	0.0675

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.624	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.146	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.175	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	4.567	k star (bias corrected MLE)	4.045
Theta hat (MLE)	0.0107	Theta star (bias corrected MLE)	0.0121
nu hat (MLE)	228.3	nu star (bias corrected)	202.3

Mean (detects)	0.0488		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0301
Maximum	0.105	Median	0.022
SD	0.0261	CV	0.867
k hat (MLE)	1.681	k star (bias corrected MLE)	1.592
Theta hat (MLE)	0.0179	Theta star (bias corrected MLE)	0.0189
nu hat (MLE)	164.8	nu star (bias corrected)	156
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (156.01, α)	128.1	Adjusted Chi Square Value (156.01, β)	127.4
95% Gamma Approximate UCL (use when n>=50)	0.0367	95% Gamma Adjusted UCL (use when n<50)	0.0369
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0347	SD (KM)	0.0226
Variance (KM)	5.1053E-4	SE of Mean (KM)	0.00329
k hat (KM)	2.36	k star (KM)	2.23
nu hat (KM)	231.3	nu star (KM)	218.5
theta hat (KM)	0.0147	theta star (KM)	0.0156
80% gamma percentile (KM)	0.0513	90% gamma percentile (KM)	0.0658
95% gamma percentile (KM)	0.0796	99% gamma percentile (KM)	0.11
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (218.49, α)	185.3	Adjusted Chi Square Value (218.49, β)	184.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.0409	95% Gamma Adjusted KM-UCL (use when n<50)	0.0411
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.173	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0312	Mean in Log Scale	-3.779
SD in Original Scale	0.0256	SD in Log Scale	0.813
95% t UCL (assumes normality of ROS data)	0.0373	95% Percentile Bootstrap UCL	0.0373
95% BCA Bootstrap UCL	0.0377	95% Bootstrap t UCL	0.0384
95% H-UCL (Log ROS)	0.0409		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.514	KM Geo Mean	0.0298
KM SD (logged)	0.514	95% Critical H Value (KM-Log)	1.898
KM Standard Error of Mean (logged)	0.0749	95% H-UCL (KM -Log)	0.0391

KM SD (logged)	0.514	95% Critical H Value (KM-Log)	1.898
KM Standard Error of Mean (logged)	0.0749		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0298	Mean in Log Scale	-3.854
SD in Original Scale	0.0263	SD in Log Scale	0.817
95% t UCL (Assumes normality)	0.0361	95% H-Stat UCL	0.0382
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.0411	95% GROS Adjusted Gamma UCL	0.0369
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:11:18 AM		
From File	MacLellan Region (All Lakes), Fish - Carcass, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region (All Lakes), Fish - Carcass, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.185	Mean	0.312
Maximum	0.881	Median	0.272
SD	0.12	Std. Error of Mean	0.0171
Coefficient of Variation	0.384	Skewness	2.802

Normal GOF Test			
Shapiro Wilk Test Statistic	0.731	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.34	95% Adjusted-CLT UCL (Chen-1995)	0.347
		95% Modified-t UCL (Johnson-1978)	0.342

Gamma GOF Test			
A-D Test Statistic	2.296	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.188	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	10.07	k star (bias corrected MLE)	9.465
Theta hat (MLE)	0.031	Theta star (bias corrected MLE)	0.0329
nu hat (MLE)	986.7	nu star (bias corrected)	927.6
MLE Mean (bias corrected)	0.312	MLE Sd (bias corrected)	0.101
		Approximate Chi Square Value (0.05)	857.9
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	855.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.337	95% Adjusted Gamma UCL (use when n<50)	0.338

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.89	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.687	Mean of logged Data	-1.216
Maximum of Logged Data	-0.127	SD of logged Data	0.298
Assuming Lognormal Distribution			
95% H-UCL	0.335	90% Chebyshev (MVUE) UCL	0.35
95% Chebyshev (MVUE) UCL	0.368	97.5% Chebyshev (MVUE) UCL	0.393
99% Chebyshev (MVUE) UCL	0.443		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.34	95% Jackknife UCL	0.34
95% Standard Bootstrap UCL	0.34	95% Bootstrap-t UCL	0.356
95% Hall's Bootstrap UCL	0.366	95% Percentile Bootstrap UCL	0.34
95% BCA Bootstrap UCL	0.348		
90% Chebyshev(Mean, Sd) UCL	0.363	95% Chebyshev(Mean, Sd) UCL	0.386
97.5% Chebyshev(Mean, Sd) UCL	0.419	99% Chebyshev(Mean, Sd) UCL	0.482
Suggested UCL to Use			
95% Student's-t UCL	0.34	or 95% Modified-t UCL	0.342
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:11:58 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	0.822	Mean	3.114
Maximum	27.7	Median	2.4
SD	3.783	Std. Error of Mean	0.54
Coefficient of Variation	1.215	Skewness	5.959

Normal GOF Test		
Shapiro Wilk Test Statistic	0.405	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.02	95% Adjusted-CLT UCL (Chen-1995)	4.494
		95% Modified-t UCL (Johnson-1978)	4.096

Gamma GOF Test		
A-D Test Statistic	2.433	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.761	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.165	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	2.32	k star (bias corrected MLE)	2.192
Theta hat (MLE)	1.342	Theta star (bias corrected MLE)	1.421
nu hat (MLE)	227.4	nu star (bias corrected)	214.8
MLE Mean (bias corrected)	3.114	MLE Sd (bias corrected)	2.103
		Approximate Chi Square Value (0.05)	181.9
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	180.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	3.677	95% Adjusted Gamma UCL (use when n<50)	3.696

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.196	Mean of logged Data	0.905
Maximum of Logged Data	3.321	SD of logged Data	0.574
Assuming Lognormal Distribution			
95% H-UCL	3.424	90% Chebyshev (MVUE) UCL	3.665
95% Chebyshev (MVUE) UCL	4.009	97.5% Chebyshev (MVUE) UCL	4.488
99% Chebyshev (MVUE) UCL	5.428		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.002	95% Jackknife UCL	4.02
95% Standard Bootstrap UCL	3.992	95% Bootstrap-t UCL	5.753
95% Hall's Bootstrap UCL	7.567	95% Percentile Bootstrap UCL	4.166
95% BCA Bootstrap UCL	4.7		
90% Chebyshev(Mean, Sd) UCL	4.735	95% Chebyshev(Mean, Sd) UCL	5.469
97.5% Chebyshev(Mean, Sd) UCL	6.488	99% Chebyshev(Mean, Sd) UCL	8.49
Suggested UCL to Use			
95% H-UCL	3.424		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:12:37 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	36	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	0.025	Mean	0.116
Maximum	0.505	Median	0.0658
SD	0.117	Std. Error of Mean	0.0196
Coefficient of Variation	1.011	Skewness	2.147

Normal GOF Test

Shapiro Wilk Test Statistic	0.732	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.935	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.145	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.149	95% Adjusted-CLT UCL (Chen-1995)	0.156
		95% Modified-t UCL (Johnson-1978)	0.15

Gamma GOF Test

A-D Test Statistic	1.055	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.768	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.165	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.15	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.415	k star (bias corrected MLE)	1.316
Theta hat (MLE)	0.0821	Theta star (bias corrected MLE)	0.0883
nu hat (MLE)	101.9	nu star (bias corrected)	94.72
MLE Mean (bias corrected)	0.116	MLE Sd (bias corrected)	0.101
		Approximate Chi Square Value (0.05)	73.28
Adjusted Level of Significance	0.0428	Adjusted Chi Square Value	72.42

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.15	95% Adjusted Gamma UCL (use when n<50)	0.152

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.935	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.113	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.145	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.689	Mean of logged Data	-2.546
Maximum of Logged Data	-0.683	SD of logged Data	0.881
Assuming Lognormal Distribution			
95% H-UCL	0.162	90% Chebyshev (MVUE) UCL	0.17
95% Chebyshev (MVUE) UCL	0.196	97.5% Chebyshev (MVUE) UCL	0.232
99% Chebyshev (MVUE) UCL	0.302		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.148	95% Jackknife UCL	0.149
95% Standard Bootstrap UCL	0.148	95% Bootstrap-t UCL	0.161
95% Hall's Bootstrap UCL	0.173	95% Percentile Bootstrap UCL	0.149
95% BCA Bootstrap UCL	0.159		
90% Chebyshev(Mean, Sd) UCL	0.175	95% Chebyshev(Mean, Sd) UCL	0.201
97.5% Chebyshev(Mean, Sd) UCL	0.238	99% Chebyshev(Mean, Sd) UCL	0.311
Suggested UCL to Use			
95% H-UCL	0.162		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:13:16 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Molybdenum (Mo), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	46
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.016	Maximum Non-Detect	0.02
Variance Detects	1.2000E-5	Percent Non-Detects	93.88%
Mean Detects	0.012	SD Detects	0.00346
Median Detects	0.01	CV Detects	0.289
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-4.449	SD of Logged Detects	0.271

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0102	KM Standard Error of Mean	2.0127E-4
KM SD	9.8601E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0105	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0105	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0108	95% KM Chebyshev UCL	0.011
97.5% KM Chebyshev UCL	0.0114	99% KM Chebyshev UCL	0.0122

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	19.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.1051E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	117.9	nu star (bias corrected)	N/A

Mean (detects)	0.012		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0101
Maximum	0.016	Median	0.01
SD	8.5714E-4	CV	0.0847
k hat (MLE)	194.1	k star (bias corrected MLE)	182.2
Theta hat (MLE)	5.2159E-5	Theta star (bias corrected MLE)	5.5557E-5
nu hat (MLE)	19019	nu star (bias corrected)	17856
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (N/A, α)	17546	Adjusted Chi Square Value (N/A, β)	17537
95% Gamma Approximate UCL (use when n>=50)	0.0103	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0102	SD (KM)	9.8601E-4
Variance (KM)	9.7222E-7	SE of Mean (KM)	2.0127E-4
k hat (KM)	106.3	k star (KM)	99.82
nu hat (KM)	10419	nu star (KM)	9782
theta hat (KM)	9.5628E-5	theta star (KM)	1.0185E-4
80% gamma percentile (KM)	0.011	90% gamma percentile (KM)	0.0115
95% gamma percentile (KM)	0.0119	99% gamma percentile (KM)	0.0127
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	9553	Adjusted Chi Square Value (N/A, β)	9547
95% Gamma Approximate KM-UCL (use when n>=50)	0.0104	95% Gamma Adjusted KM-UCL (use when n<50)	0.0104
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00304	Mean in Log Scale	-6.187
SD in Original Scale	0.00304	SD in Log Scale	0.902
95% t UCL (assumes normality of ROS data)	0.00377	95% Percentile Bootstrap UCL	0.00379
95% BCA Bootstrap UCL	0.00392	95% Bootstrap t UCL	0.00398
95% H-UCL (Log ROS)	0.00413		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.592	KM Geo Mean	0.0101
KM SD (logged)	0.0772	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0158	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0772	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0158		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00676	Mean in Log Scale	-5.062
SD in Original Scale	0.00268	SD in Log Scale	0.349
95% t UCL (Assumes normality)	0.0074	95% H-Stat UCL	0.00737
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0105		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:13:55 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Nickel (Ni), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	17
Number of Detects	26	Number of Non-Detects	23
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.68	Maximum Non-Detect	0.1
Variance Detects	0.0209	Percent Non-Detects	46.94%
Mean Detects	0.222	SD Detects	0.145
Median Detects	0.19	CV Detects	0.651
Skewness Detects	2.294	Kurtosis Detects	5.387
Mean of Logged Detects	-1.643	SD of Logged Detects	0.498

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.701	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.17	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.165	KM Standard Error of Mean	0.0175
KM SD	0.12	95% KM (BCA) UCL	0.197
95% KM (t) UCL	0.194	95% KM (Percentile Bootstrap) UCL	0.194
95% KM (z) UCL	0.194	95% KM Bootstrap t UCL	0.212
90% KM Chebyshev UCL	0.217	95% KM Chebyshev UCL	0.241
97.5% KM Chebyshev UCL	0.274	99% KM Chebyshev UCL	0.339

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.291	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.752	k star (bias corrected MLE)	3.344
Theta hat (MLE)	0.0593	Theta star (bias corrected MLE)	0.0665
nu hat (MLE)	195.1	nu star (bias corrected)	173.9

Mean (detects)	0.222		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.125
Maximum	0.68	Median	0.11
SD	0.148	CV	1.19
k hat (MLE)	0.708	k star (bias corrected MLE)	0.678
Theta hat (MLE)	0.176	Theta star (bias corrected MLE)	0.184
nu hat (MLE)	69.38	nu star (bias corrected)	66.46
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (66.46, α)	48.7	Adjusted Chi Square Value (66.46, β)	48.24
95% Gamma Approximate UCL (use when n>=50)	0.17	95% Gamma Adjusted UCL (use when n<50)	0.172
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.165	SD (KM)	0.12
Variance (KM)	0.0144	SE of Mean (KM)	0.0175
k hat (KM)	1.888	k star (KM)	1.786
nu hat (KM)	185	nu star (KM)	175
theta hat (KM)	0.0873	theta star (KM)	0.0923
80% gamma percentile (KM)	0.25	90% gamma percentile (KM)	0.329
95% gamma percentile (KM)	0.406	99% gamma percentile (KM)	0.576
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (175.05, α)	145.5	Adjusted Chi Square Value (175.05, β)	144.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.198	95% Gamma Adjusted KM-UCL (use when n<50)	0.2
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.17	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.144	Mean in Log Scale	-2.272
SD in Original Scale	0.135	SD in Log Scale	0.826
95% t UCL (assumes normality of ROS data)	0.176	95% Percentile Bootstrap UCL	0.178
95% BCA Bootstrap UCL	0.184	95% Bootstrap t UCL	0.187
95% H-UCL (Log ROS)	0.188		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.953	KM Geo Mean	0.142
KM SD (logged)	0.485	95% Critical H Value (KM-Log)	1.877
KM Standard Error of Mean (logged)	0.0706	95% H-UCL (KM -Log)	0.182

KM SD (logged)	0.485	95% Critical H Value (KM-Log)	1.877
KM Standard Error of Mean (logged)	0.0706		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.141	Mean in Log Scale	-2.278
SD in Original Scale	0.136	SD in Log Scale	0.771
95% t UCL (Assumes normality)	0.174	95% H-Stat UCL	0.174
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.2	95% GROS Adjusted Gamma UCL	0.172
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:14:35 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	0.12	Mean	0.219
Maximum	0.39	Median	0.23
SD	0.0697	Std. Error of Mean	0.00995
Coefficient of Variation	0.318	Skewness	0.292
Normal GOF Test			
Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.235	95% Adjusted-CLT UCL (Chen-1995)	0.236
		95% Modified-t UCL (Johnson-1978)	0.236
Gamma GOF Test			
A-D Test Statistic	1.658	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.155	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	9.89	k star (bias corrected MLE)	9.298
Theta hat (MLE)	0.0221	Theta star (bias corrected MLE)	0.0235
nu hat (MLE)	969.2	nu star (bias corrected)	911.2
MLE Mean (bias corrected)	0.219	MLE Sd (bias corrected)	0.0717
		Approximate Chi Square Value (0.05)	842.2
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	840.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.237	95% Adjusted Gamma UCL (use when n<50)	0.237

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.173	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.12	Mean of logged Data	-1.571
Maximum of Logged Data	-0.942	SD of logged Data	0.328
Assuming Lognormal Distribution			
95% H-UCL	0.239	90% Chebyshev (MVUE) UCL	0.25
95% Chebyshev (MVUE) UCL	0.265	97.5% Chebyshev (MVUE) UCL	0.284
99% Chebyshev (MVUE) UCL	0.323		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.235	95% Jackknife UCL	0.235
95% Standard Bootstrap UCL	0.235	95% Bootstrap-t UCL	0.235
95% Hall's Bootstrap UCL	0.236	95% Percentile Bootstrap UCL	0.235
95% BCA Bootstrap UCL	0.235		
90% Chebyshev(Mean, Sd) UCL	0.249	95% Chebyshev(Mean, Sd) UCL	0.262
97.5% Chebyshev(Mean, Sd) UCL	0.281	99% Chebyshev(Mean, Sd) UCL	0.318
Suggested UCL to Use			
95% Student's-t UCL	0.235	or 95% Modified-t UCL	0.236
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:15:14 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	1.85	Mean	6.031
Maximum	11.7	Median	5.56
SD	2.708	Std. Error of Mean	0.387
Coefficient of Variation	0.449	Skewness	0.584

Normal GOF Test		
Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.126	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.68	95% Adjusted-CLT UCL (Chen-1995)	6.702
		95% Modified-t UCL (Johnson-1978)	6.686

Gamma GOF Test		
A-D Test Statistic	0.271	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0676	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.127	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	5.012	k star (bias corrected MLE)	4.719
Theta hat (MLE)	1.203	Theta star (bias corrected MLE)	1.278
nu hat (MLE)	491.2	nu star (bias corrected)	462.4
MLE Mean (bias corrected)	6.031	MLE Sd (bias corrected)	2.777
		Approximate Chi Square Value (0.05)	413.6
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	412.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	6.744	95% Adjusted Gamma UCL (use when n<50)	6.767

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.06	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.615	Mean of logged Data	1.694
Maximum of Logged Data	2.46	SD of logged Data	0.469
Assuming Lognormal Distribution			
95% H-UCL	6.893	90% Chebyshev (MVUE) UCL	7.333
95% Chebyshev (MVUE) UCL	7.91	97.5% Chebyshev (MVUE) UCL	8.71
99% Chebyshev (MVUE) UCL	10.28		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.668	95% Jackknife UCL	6.68
95% Standard Bootstrap UCL	6.667	95% Bootstrap-t UCL	6.764
95% Hall's Bootstrap UCL	6.683	95% Percentile Bootstrap UCL	6.682
95% BCA Bootstrap UCL	6.671		
90% Chebyshev(Mean, Sd) UCL	7.192	95% Chebyshev(Mean, Sd) UCL	7.718
97.5% Chebyshev(Mean, Sd) UCL	8.447	99% Chebyshev(Mean, Sd) UCL	9.881
Suggested UCL to Use			
95% Adjusted Gamma UCL	6.767		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:15:53 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Thallium (Tl), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	4
Number of Detects	4	Number of Non-Detects	45
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0062	Minimum Non-Detect	0.006
Maximum Detect	0.0074	Maximum Non-Detect	0.006
Variance Detects	3.3000E-7	Percent Non-Detects	91.84%
Mean Detects	0.00665	SD Detects	5.7446E-4
Median Detects	0.0065	CV Detects	0.0864
Skewness Detects	0.855	Kurtosis Detects	-1.289
Mean of Logged Detects	-5.016	SD of Logged Detects	0.0851

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00605	KM Standard Error of Mean	3.7572E-5
KM SD	2.2777E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00612	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00611	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00617	95% KM Chebyshev UCL	0.00622
97.5% KM Chebyshev UCL	0.00629	99% KM Chebyshev UCL	0.00643

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.427	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.319	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	182.5	k star (bias corrected MLE)	45.8
Theta hat (MLE)	3.6429E-5	Theta star (bias corrected MLE)	1.4519E-4
nu hat (MLE)	1460	nu star (bias corrected)	366.4

Mean (detects)	0.00665		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0062	Mean	0.00973
Maximum	0.01	Median	0.01
SD	9.3781E-4	CV	0.0964
k hat (MLE)	86.38	k star (bias corrected MLE)	81.11
Theta hat (MLE)	1.1260E-4	Theta star (bias corrected MLE)	1.1992E-4
nu hat (MLE)	8465	nu star (bias corrected)	7948
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (N/A, α)	7742	Adjusted Chi Square Value (N/A, β)	7736
95% Gamma Approximate UCL (use when n>=50)	0.00999	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00605	SD (KM)	2.2777E-4
Variance (KM)	5.1878E-8	SE of Mean (KM)	3.7572E-5
k hat (KM)	706.3	k star (KM)	663
nu hat (KM)	69213	nu star (KM)	64977
theta hat (KM)	8.5706E-6	theta star (KM)	9.1294E-6
80% gamma percentile (KM)	0.00625	90% gamma percentile (KM)	0.00636
95% gamma percentile (KM)	0.00644	99% gamma percentile (KM)	0.00661
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	64385	Adjusted Chi Square Value (N/A, β)	64368
95% Gamma Approximate KM-UCL (use when n>=50)	0.00611	95% Gamma Adjusted KM-UCL (use when n<50)	0.00611
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.286	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.004	Mean in Log Scale	-5.563
SD in Original Scale	0.0012	SD in Log Scale	0.293
95% t UCL (assumes normality of ROS data)	0.00429	95% Percentile Bootstrap UCL	0.00429
95% BCA Bootstrap UCL	0.00429	95% Bootstrap t UCL	0.00431
95% H-UCL (Log ROS)	0.00432		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.108	KM Geo Mean	0.00605
KM SD (logged)	0.0346	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0057	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0346	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0057		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0033	Mean in Log Scale	-5.744
SD in Original Scale	0.00102	SD in Log Scale	0.22
95% t UCL (Assumes normality)	0.00354	95% H-Stat UCL	0.00347
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00612		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:17:12 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Uranium (U), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Uranium (U), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	46
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0021	Minimum Non-Detect	0.002
Maximum Detect	0.0031	Maximum Non-Detect	0.002
Variance Detects	2.5333E-7	Percent Non-Detects	93.88%
Mean Detects	0.00263	SD Detects	5.0332E-4
Median Detects	0.0027	CV Detects	0.191
Skewness Detects	-0.586	Kurtosis Detects	N/A
Mean of Logged Detects	-5.952	SD of Logged Detects	0.197

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00204	KM Standard Error of Mean	3.1973E-5
KM SD	1.8274E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00209	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00209	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00213	95% KM Chebyshev UCL	0.00218
97.5% KM Chebyshev UCL	0.00224	99% KM Chebyshev UCL	0.00236

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	39.47	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.6711E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	236.8	nu star (bias corrected)	N/A

Mean (detects)	0.00263		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0021	Mean	0.00955
Maximum	0.01	Median	0.01
SD	0.00179	CV	0.187
k hat (MLE)	13.93	k star (bias corrected MLE)	13.09
Theta hat (MLE)	6.8548E-4	Theta star (bias corrected MLE)	7.2942E-4
nu hat (MLE)	1365	nu star (bias corrected)	1283
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (N/A, α)	1201	Adjusted Chi Square Value (N/A, β)	1198
95% Gamma Approximate UCL (use when n>=50)	0.0102	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00204	SD (KM)	1.8274E-4
Variance (KM)	3.3394E-8	SE of Mean (KM)	3.1973E-5
k hat (KM)	124.5	k star (KM)	116.9
nu hat (KM)	12198	nu star (KM)	11453
theta hat (KM)	1.6380E-5	theta star (KM)	1.7446E-5
80% gamma percentile (KM)	0.0022	90% gamma percentile (KM)	0.00228
95% gamma percentile (KM)	0.00236	99% gamma percentile (KM)	0.0025
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	11205	Adjusted Chi Square Value (N/A, β)	11197
95% Gamma Approximate KM-UCL (use when n>=50)	0.00208	95% Gamma Adjusted KM-UCL (use when n<50)	0.00209
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	7.6659E-4	Mean in Log Scale	-7.45
SD in Original Scale	6.2911E-4	SD in Log Scale	0.753
95% t UCL (assumes normality of ROS data)	9.1732E-4	95% Percentile Bootstrap UCL	9.1989E-4
95% BCA Bootstrap UCL	9.4203E-4	95% Bootstrap t UCL	9.5416E-4
95% H-UCL (Log ROS)	9.6785E-4		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.199	KM Geo Mean	0.00203
KM SD (logged)	0.0745	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.013	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0745	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.013		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0011	Mean in Log Scale	-6.849
SD in Original Scale	4.0876E-4	SD in Log Scale	0.235
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00116
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00209		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:17:51 AM
From File	MacLellan Region (All Lakes), Fish - Carcass, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Carcass, Zinc (Zn), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	11.6	Mean	33.44
Maximum	85.9	Median	34.8
SD	15.79	Std. Error of Mean	2.255
Coefficient of Variation	0.472	Skewness	0.848

Normal GOF Test

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.0917	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.23	95% Adjusted-CLT UCL (Chen-1995)	37.45
		95% Modified-t UCL (Johnson-1978)	37.27

Gamma GOF Test

A-D Test Statistic	0.91	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.121	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.127	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.55	k star (bias corrected MLE)	4.285
Theta hat (MLE)	7.351	Theta star (bias corrected MLE)	7.805
nu hat (MLE)	445.9	nu star (bias corrected)	419.9
MLE Mean (bias corrected)	33.44	MLE Sd (bias corrected)	16.16
		Approximate Chi Square Value (0.05)	373.4
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	372.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	37.61	95% Adjusted Gamma UCL (use when n<50)	37.74

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.451	Mean of logged Data	3.396
Maximum of Logged Data	4.453	SD of logged Data	0.495
Assuming Lognormal Distribution			
95% H-UCL	38.61	90% Chebyshev (MVUE) UCL	41.14
95% Chebyshev (MVUE) UCL	44.54	97.5% Chebyshev (MVUE) UCL	49.25
99% Chebyshev (MVUE) UCL	58.51		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	37.15	95% Jackknife UCL	37.23
95% Standard Bootstrap UCL	37.09	95% Bootstrap-t UCL	37.53
95% Hall's Bootstrap UCL	37.58	95% Percentile Bootstrap UCL	37.13
95% BCA Bootstrap UCL	37.46		
90% Chebyshev(Mean, Sd) UCL	40.21	95% Chebyshev(Mean, Sd) UCL	43.27
97.5% Chebyshev(Mean, Sd) UCL	47.53	99% Chebyshev(Mean, Sd) UCL	55.88
Suggested UCL to Use			
95% Student's-t UCL	37.23		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.21
PROUCL OUTPUTS
FISH CARCASS TISSUE (SWEDE LAKE)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 9:53:54 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Carcass, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 9:54:33 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.01	Mean	0.0361
Maximum	0.083	Median	0.026
SD	0.021	Std. Error of Mean	0.00365
Coefficient of Variation	0.581	Skewness	0.7
Normal GOF Test			
Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0423	95% Adjusted-CLT UCL (Chen-1995)	0.0426
		95% Modified-t UCL (Johnson-1978)	0.0423
Gamma GOF Test			
A-D Test Statistic	1.261	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.188	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.154	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.199	k star (bias corrected MLE)	2.928
Theta hat (MLE)	0.0113	Theta star (bias corrected MLE)	0.0123
nu hat (MLE)	211.1	nu star (bias corrected)	193.3
MLE Mean (bias corrected)	0.0361	MLE Sd (bias corrected)	0.0211
		Approximate Chi Square Value (0.05)	162.1
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	160.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.043	95% Adjusted Gamma UCL (use when n<50)	0.0434

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.605	Mean of logged Data	-3.486
Maximum of Logged Data	-2.489	SD of logged Data	0.585
Assuming Lognormal Distribution			
95% H-UCL	0.0447	90% Chebyshev (MVUE) UCL	0.0478
95% Chebyshev (MVUE) UCL	0.0531	97.5% Chebyshev (MVUE) UCL	0.0605
99% Chebyshev (MVUE) UCL	0.0749		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0421	95% Jackknife UCL	0.0423
95% Standard Bootstrap UCL	0.042	95% Bootstrap-t UCL	0.0431
95% Hall's Bootstrap UCL	0.0422	95% Percentile Bootstrap UCL	0.0419
95% BCA Bootstrap UCL	0.0424		
90% Chebyshev(Mean, Sd) UCL	0.047	95% Chebyshev(Mean, Sd) UCL	0.052
97.5% Chebyshev(Mean, Sd) UCL	0.0589	99% Chebyshev(Mean, Sd) UCL	0.0724
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.052		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 9:55:12 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	33
		Number of Missing Observations	0
Minimum	0.174	Mean	0.739
Maximum	3.03	Median	0.483
SD	0.691	Std. Error of Mean	0.12
Coefficient of Variation	0.934	Skewness	1.953
Normal GOF Test			
Shapiro Wilk Test Statistic	0.744	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.943	95% Adjusted-CLT UCL (Chen-1995)	0.981
		95% Modified-t UCL (Johnson-1978)	0.95
Gamma GOF Test			
A-D Test Statistic	1.274	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.762	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.156	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.727	k star (bias corrected MLE)	1.59
Theta hat (MLE)	0.428	Theta star (bias corrected MLE)	0.465
nu hat (MLE)	114	nu star (bias corrected)	105
MLE Mean (bias corrected)	0.739	MLE Sd (bias corrected)	0.586
		Approximate Chi Square Value (0.05)	82.31
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	81.28
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.943	95% Adjusted Gamma UCL (use when n<50)	0.955

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.749	Mean of logged Data	-0.619
Maximum of Logged Data	1.109	SD of logged Data	0.768
Assuming Lognormal Distribution			
95% H-UCL	0.973	90% Chebyshev (MVUE) UCL	1.031
95% Chebyshev (MVUE) UCL	1.174	97.5% Chebyshev (MVUE) UCL	1.372
99% Chebyshev (MVUE) UCL	1.762		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.937	95% Jackknife UCL	0.943
95% Standard Bootstrap UCL	0.933	95% Bootstrap-t UCL	1.042
95% Hall's Bootstrap UCL	1.029	95% Percentile Bootstrap UCL	0.952
95% BCA Bootstrap UCL	0.986		
90% Chebyshev(Mean, Sd) UCL	1.1	95% Chebyshev(Mean, Sd) UCL	1.263
97.5% Chebyshev(Mean, Sd) UCL	1.49	99% Chebyshev(Mean, Sd) UCL	1.936
Suggested UCL to Use			
95% H-UCL	0.973		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 9:55:59 PM		
From File	Gordon Region (Sweed Lake), Fish - Carcass, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (Sweed Lake), Fish - Carcass, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	11
Number of Detects	14	Number of Non-Detects	19
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.004	Minimum Non-Detect	0.004
Maximum Detect	0.0082	Maximum Non-Detect	0.004
Variance Detects	2.3757E-6	Percent Non-Detects	57.58%
Mean Detects	0.00572	SD Detects	0.00154
Median Detects	0.00595	CV Detects	0.269
Skewness Detects	0.273	Kurtosis Detects	-1.321
Mean of Logged Detects	-5.198	SD of Logged Detects	0.272

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.00473	Standard Error of Mean	2.3273E-4
SD	0.00129	95% KM (BCA) UCL	0.00517
95% KM (t) UCL	0.00512	95% KM (Percentile Bootstrap) UCL	0.00513
95% KM (z) UCL	0.00511	95% KM Bootstrap t UCL	0.00521
90% KM Chebyshev UCL	0.00543	95% KM Chebyshev UCL	0.00574
97.5% KM Chebyshev UCL	0.00618	99% KM Chebyshev UCL	0.00705

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.844	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.734	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.239	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.228	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	14.84	k star (bias corrected MLE)	11.71
Theta hat (MLE)	3.8554E-4	Theta star (bias corrected MLE)	4.8869E-4
nu hat (MLE)	415.5	nu star (bias corrected)	327.8
MLE Mean (bias corrected)	0.00572	MLE Sd (bias corrected)	0.00167

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	13.48	nu hat (KM)	889.8
Approximate Chi Square Value (889.81, α)	821.6	Adjusted Chi Square Value (889.81, β)	818.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.00512	95% Gamma Adjusted KM-UCL (use when n<50)	0.00514
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.004	Mean	0.00818
Maximum	0.01	Median	0.01
SD	0.00236	CV	0.289
k hat (MLE)	9.961	k star (bias corrected MLE)	9.075
Theta hat (MLE)	8.2172E-4	Theta star (bias corrected MLE)	9.0188E-4
nu hat (MLE)	657.4	nu star (bias corrected)	599
MLE Mean (bias corrected)	0.00818	MLE Sd (bias corrected)	0.00272
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (598.97, α)	543.2	Adjusted Chi Square Value (598.97, β)	540.5
95% Gamma Approximate UCL (use when n>=50)	0.00903	95% Gamma Adjusted UCL (use when n<50)	0.00907
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00391	Mean in Log Scale	-5.659
SD in Original Scale	0.00193	SD in Log Scale	0.492
95% t UCL (assumes normality of ROS data)	0.00448	95% Percentile Bootstrap UCL	0.00444
95% BCA Bootstrap UCL	0.00452	95% Bootstrap t UCL	0.00452
95% H-UCL (Log ROS)	0.00465		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-5.384	95% H-UCL (KM -Log)	0.00507
KM SD (logged)	0.234	95% Critical H Value (KM-Log)	1.762
KM Standard Error of Mean (logged)	0.0422		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00358	Mean in Log Scale	-5.783
SD in Original Scale	0.00211	SD in Log Scale	0.539
95% t UCL (Assumes normality)	0.0042	95% H-Stat UCL	0.00429
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.00512	95% KM (Percentile Bootstrap) UCL					0.00513
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 9:56:46 PM		
From File	Gordon Region (Sweed Lake), Fish - Carcass, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (Sweed Lake), Fish - Carcass, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	0.197	Mean	0.3
Maximum	0.455	Median	0.297
SD	0.0676	Std. Error of Mean	0.0118
Coefficient of Variation	0.225	Skewness	0.422

Normal GOF Test			
Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.32	95% Adjusted-CLT UCL (Chen-1995)	0.32
		95% Modified-t UCL (Johnson-1978)	0.32

Gamma GOF Test			
A-D Test Statistic	0.406	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.102	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	20.62	k star (bias corrected MLE)	18.76
Theta hat (MLE)	0.0146	Theta star (bias corrected MLE)	0.016
nu hat (MLE)	1361	nu star (bias corrected)	1238
MLE Mean (bias corrected)	0.3	MLE Sd (bias corrected)	0.0693
		Approximate Chi Square Value (0.05)	1158
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	1154

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.321	95% Adjusted Gamma UCL (use when n<50)	0.322

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0961	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.625	Mean of logged Data	-1.228
Maximum of Logged Data	-0.787	SD of logged Data	0.225
Assuming Lognormal Distribution			
95% H-UCL	0.322	90% Chebyshev (MVUE) UCL	0.336
95% Chebyshev (MVUE) UCL	0.352	97.5% Chebyshev (MVUE) UCL	0.374
99% Chebyshev (MVUE) UCL	0.418		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.32	95% Jackknife UCL	0.32
95% Standard Bootstrap UCL	0.319	95% Bootstrap-t UCL	0.321
95% Hall's Bootstrap UCL	0.321	95% Percentile Bootstrap UCL	0.319
95% BCA Bootstrap UCL	0.319		
90% Chebyshev(Mean, Sd) UCL	0.336	95% Chebyshev(Mean, Sd) UCL	0.352
97.5% Chebyshev(Mean, Sd) UCL	0.374	99% Chebyshev(Mean, Sd) UCL	0.417
Suggested UCL to Use			
95% Student's-t UCL	0.32		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/5/2020 9:57:33 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	0.623	Mean	3.592
Maximum	10.4	Median	2.56
SD	2.816	Std. Error of Mean	0.49
Coefficient of Variation	0.784	Skewness	0.837

Normal GOF Test			
Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.422	95% Adjusted-CLT UCL (Chen-1995)	4.474
		95% Modified-t UCL (Johnson-1978)	4.434

Gamma GOF Test			
A-D Test Statistic	0.824	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.151	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.666	k star (bias corrected MLE)	1.534
Theta hat (MLE)	2.156	Theta star (bias corrected MLE)	2.341
nu hat (MLE)	109.9	nu star (bias corrected)	101.3
MLE Mean (bias corrected)	3.592	MLE Sd (bias corrected)	2.899
		Approximate Chi Square Value (0.05)	79.06
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	78.05

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	4.601	95% Adjusted Gamma UCL (use when n<50)	4.661

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.934	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.473	Mean of logged Data	0.949
Maximum of Logged Data	2.342	SD of logged Data	0.854
Assuming Lognormal Distribution			
95% H-UCL	5.241	90% Chebyshev (MVUE) UCL	5.494
95% Chebyshev (MVUE) UCL	6.323	97.5% Chebyshev (MVUE) UCL	7.473
99% Chebyshev (MVUE) UCL	9.731		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.398	95% Jackknife UCL	4.422
95% Standard Bootstrap UCL	4.39	95% Bootstrap-t UCL	4.504
95% Hall's Bootstrap UCL	4.473	95% Percentile Bootstrap UCL	4.399
95% BCA Bootstrap UCL	4.454		
90% Chebyshev(Mean, Sd) UCL	5.063	95% Chebyshev(Mean, Sd) UCL	5.729
97.5% Chebyshev(Mean, Sd) UCL	6.653	99% Chebyshev(Mean, Sd) UCL	8.47
Suggested UCL to Use			
95% Adjusted Gamma UCL	4.661		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 9:58:12 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	18	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	0.099	Mean	0.295
Maximum	0.612	Median	0.271
SD	0.134	Std. Error of Mean	0.0316
Coefficient of Variation	0.454	Skewness	0.847

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.141	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.209	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.35	95% Adjusted-CLT UCL (Chen-1995)	0.354
		95% Modified-t UCL (Johnson-1978)	0.351

Gamma GOF Test

A-D Test Statistic	0.145	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0894	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.204	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.228	k star (bias corrected MLE)	4.394
Theta hat (MLE)	0.0564	Theta star (bias corrected MLE)	0.0671
nu hat (MLE)	188.2	nu star (bias corrected)	158.2
MLE Mean (bias corrected)	0.295	MLE Sd (bias corrected)	0.141
		Approximate Chi Square Value (0.05)	130.1
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	127.7

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.359	95% Adjusted Gamma UCL (use when n<50)	0.366

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.117	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.209	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.313	Mean of logged Data	-1.319
Maximum of Logged Data	-0.491	SD of logged Data	0.466
Assuming Lognormal Distribution			
95% H-UCL	0.373	90% Chebyshev (MVUE) UCL	0.397
95% Chebyshev (MVUE) UCL	0.442	97.5% Chebyshev (MVUE) UCL	0.505
99% Chebyshev (MVUE) UCL	0.63		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.347	95% Jackknife UCL	0.35
95% Standard Bootstrap UCL	0.345	95% Bootstrap-t UCL	0.357
95% Hall's Bootstrap UCL	0.365	95% Percentile Bootstrap UCL	0.346
95% BCA Bootstrap UCL	0.354		
90% Chebyshev(Mean, Sd) UCL	0.39	95% Chebyshev(Mean, Sd) UCL	0.433
97.5% Chebyshev(Mean, Sd) UCL	0.492	99% Chebyshev(Mean, Sd) UCL	0.609
Suggested UCL to Use			
95% Student's-t UCL	0.35		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 9:59:30 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Molybdenum (Mo), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Carcass, Molybdenum (Mo), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:00:14 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.13	Mean	0.172
Maximum	0.27	Median	0.16
SD	0.0449	Std. Error of Mean	0.00782
Coefficient of Variation	0.261	Skewness	1.045
Normal GOF Test			
Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.186	95% Adjusted-CLT UCL (Chen-1995)	0.187
		95% Modified-t UCL (Johnson-1978)	0.186
Gamma GOF Test			
A-D Test Statistic	1.909	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.225	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.153	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	17.14	k star (bias corrected MLE)	15.6
Theta hat (MLE)	0.0101	Theta star (bias corrected MLE)	0.0111
nu hat (MLE)	1131	nu star (bias corrected)	1030
MLE Mean (bias corrected)	0.172	MLE Sd (bias corrected)	0.0437
		Approximate Chi Square Value (0.05)	956.1
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	952.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.186	95% Adjusted Gamma UCL (use when n<50)	0.186

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.04	Mean of logged Data	-1.787
Maximum of Logged Data	-1.309	SD of logged Data	0.24
Assuming Lognormal Distribution			
95% H-UCL	0.186	90% Chebyshev (MVUE) UCL	0.194
95% Chebyshev (MVUE) UCL	0.204	97.5% Chebyshev (MVUE) UCL	0.218
99% Chebyshev (MVUE) UCL	0.244		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.185	95% Jackknife UCL	0.186
95% Standard Bootstrap UCL	0.185	95% Bootstrap-t UCL	0.188
95% Hall's Bootstrap UCL	0.186	95% Percentile Bootstrap UCL	0.186
95% BCA Bootstrap UCL	0.186		
90% Chebyshev(Mean, Sd) UCL	0.196	95% Chebyshev(Mean, Sd) UCL	0.207
97.5% Chebyshev(Mean, Sd) UCL	0.221	99% Chebyshev(Mean, Sd) UCL	0.25
Suggested UCL to Use			
95% Student's-t UCL	0.186	or 95% Modified-t UCL	0.186
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:00:57 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	2.8	Mean	5.738
Maximum	9.87	Median	5.84
SD	1.761	Std. Error of Mean	0.307
Coefficient of Variation	0.307	Skewness	0.615
Normal GOF Test			
Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.257	95% Adjusted-CLT UCL (Chen-1995)	6.278
		95% Modified-t UCL (Johnson-1978)	6.263
Gamma GOF Test			
A-D Test Statistic	0.312	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.117	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	11.04	k star (bias corrected MLE)	10.06
Theta hat (MLE)	0.52	Theta star (bias corrected MLE)	0.57
nu hat (MLE)	728.9	nu star (bias corrected)	664
MLE Mean (bias corrected)	5.738	MLE Sd (bias corrected)	1.809
		Approximate Chi Square Value (0.05)	605.2
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	602.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.296	95% Adjusted Gamma UCL (use when n<50)	6.326

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.105	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.03	Mean of logged Data	1.701
Maximum of Logged Data	2.289	SD of logged Data	0.311
Assuming Lognormal Distribution			
95% H-UCL	6.353	90% Chebyshev (MVUE) UCL	6.694
95% Chebyshev (MVUE) UCL	7.125	97.5% Chebyshev (MVUE) UCL	7.722
99% Chebyshev (MVUE) UCL	8.896		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.242	95% Jackknife UCL	6.257
95% Standard Bootstrap UCL	6.234	95% Bootstrap-t UCL	6.303
95% Hall's Bootstrap UCL	6.308	95% Percentile Bootstrap UCL	6.238
95% BCA Bootstrap UCL	6.263		
90% Chebyshev(Mean, Sd) UCL	6.658	95% Chebyshev(Mean, Sd) UCL	7.075
97.5% Chebyshev(Mean, Sd) UCL	7.653	99% Chebyshev(Mean, Sd) UCL	8.789
Suggested UCL to Use			
95% Student's-t UCL	6.257		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:06:02 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Uranium (U), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Uranium (U), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Carcass, Uranium (U), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/5/2020 10:06:44 PM
From File	Gordon Region (Sweed Lake), Fish - Carcass, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Carcass, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	9.08	Mean	39.39
Maximum	115	Median	33.1
SD	23.91	Std. Error of Mean	4.162
Coefficient of Variation	0.607	Skewness	0.94

Normal GOF Test		
Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level
Data appear Approximate Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	46.44	95% Adjusted-CLT UCL (Chen-1995)	46.96
		95% Modified-t UCL (Johnson-1978)	46.55

Gamma GOF Test		
A-D Test Statistic	0.493	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.116	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.155	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	2.66	k star (bias corrected MLE)	2.439
Theta hat (MLE)	14.81	Theta star (bias corrected MLE)	16.15
nu hat (MLE)	175.6	nu star (bias corrected)	161
MLE Mean (bias corrected)	39.39	MLE Sd (bias corrected)	25.22
		Approximate Chi Square Value (0.05)	132.6
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	131.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	47.8	95% Adjusted Gamma UCL (use when n<50)	48.28

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.206	Mean of logged Data	3.474
Maximum of Logged Data	4.745	SD of logged Data	0.676
Assuming Lognormal Distribution			
95% H-UCL	52.06	90% Chebyshev (MVUE) UCL	55.54
95% Chebyshev (MVUE) UCL	62.49	97.5% Chebyshev (MVUE) UCL	72.13
99% Chebyshev (MVUE) UCL	91.06		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	46.23	95% Jackknife UCL	46.44
95% Standard Bootstrap UCL	46	95% Bootstrap-t UCL	47
95% Hall's Bootstrap UCL	47.69	95% Percentile Bootstrap UCL	46.1
95% BCA Bootstrap UCL	47		
90% Chebyshev(Mean, Sd) UCL	51.87	95% Chebyshev(Mean, Sd) UCL	57.53
97.5% Chebyshev(Mean, Sd) UCL	65.38	99% Chebyshev(Mean, Sd) UCL	80.8
Suggested UCL to Use			
95% Student's-t UCL	46.44		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

APPENDIX C.22
PROUCL OUTPUTS
FISH CARCASS TISSUE (COCKERAM LAKE)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:40:04 AM		
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Arsenic (As), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Carcass, Arsenic (As), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	14
Number of Detects	22	Number of Non-Detects	7
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.035	Maximum Non-Detect	0.01
Variance Detects	4.9777E-5	Percent Non-Detects	24.14%
Mean Detects	0.0166	SD Detects	0.00706
Median Detects	0.014	CV Detects	0.425
Skewness Detects	1.514	Kurtosis Detects	1.746
Mean of Logged Detects	-4.17	SD of Logged Detects	0.368
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.815	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.015	Standard Error of Mean	0.00126
SD	0.00663	95% KM (BCA) UCL	0.0174
95% KM (t) UCL	0.0171	95% KM (Percentile Bootstrap) UCL	0.0172
95% KM (z) UCL	0.0171	95% KM Bootstrap t UCL	0.018
90% KM Chebyshev UCL	0.0188	95% KM Chebyshev UCL	0.0205
97.5% KM Chebyshev UCL	0.0229	99% KM Chebyshev UCL	0.0275
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.928	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.186	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	7.234	k star (bias corrected MLE)	6.278
Theta hat (MLE)	0.00229	Theta star (bias corrected MLE)	0.00264
nu hat (MLE)	318.3	nu star (bias corrected)	276.2
MLE Mean (bias corrected)	0.0166	MLE Sd (bias corrected)	0.00662

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	5.114	nu hat (KM)	296.6
Approximate Chi Square Value (296.59, α)	257.7	Adjusted Chi Square Value (296.59, β)	255.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0173	95% Gamma Adjusted KM-UCL (use when n<50)	0.0174
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.015
Maximum	0.035	Median	0.012
SD	0.00675	CV	0.45
k hat (MLE)	6.826	k star (bias corrected MLE)	6.143
Theta hat (MLE)	0.0022	Theta star (bias corrected MLE)	0.00244
nu hat (MLE)	395.9	nu star (bias corrected)	356.3
MLE Mean (bias corrected)	0.015	MLE Sd (bias corrected)	0.00605
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (356.27, α)	313.5	Adjusted Chi Square Value (356.27, β)	311.1
95% Gamma Approximate UCL (use when n>=50)	0.017	95% Gamma Adjusted UCL (use when n<50)	0.0172
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0142	Mean in Log Scale	-4.381
SD in Original Scale	0.00754	SD in Log Scale	0.506
95% t UCL (assumes normality of ROS data)	0.0165	95% Percentile Bootstrap UCL	0.0164
95% BCA Bootstrap UCL	0.0168	95% Bootstrap t UCL	0.0172
95% H-UCL (Log ROS)	0.0171		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.275	95% H-UCL (KM -Log)	0.0169
KM SD (logged)	0.364	95% Critical H Value (KM-Log)	1.846
KM Standard Error of Mean (logged)	0.0693		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0138	Mean in Log Scale	-4.442
SD in Original Scale	0.00793	SD in Log Scale	0.586
95% t UCL (Assumes normality)	0.0163	95% H-Stat UCL	0.0175
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.0171	95% KM (Percentile Bootstrap) UCL					0.0172
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:40:45 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	0.292	Mean	0.639
Maximum	1.66	Median	0.585
SD	0.317	Std. Error of Mean	0.0589
Coefficient of Variation	0.497	Skewness	1.961
Normal GOF Test			
Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.739	95% Adjusted-CLT UCL (Chen-1995)	0.759
		95% Modified-t UCL (Johnson-1978)	0.743
Gamma GOF Test			
A-D Test Statistic	0.821	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.192	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.511	k star (bias corrected MLE)	4.964
Theta hat (MLE)	0.116	Theta star (bias corrected MLE)	0.129
nu hat (MLE)	319.6	nu star (bias corrected)	287.9
MLE Mean (bias corrected)	0.639	MLE Sd (bias corrected)	0.287
		Approximate Chi Square Value (0.05)	249.6
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	247.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.737	95% Adjusted Gamma UCL (use when n<50)	0.743

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.161	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.231	Mean of logged Data	-0.541
Maximum of Logged Data	0.507	SD of logged Data	0.423
Assuming Lognormal Distribution			
95% H-UCL	0.74	90% Chebyshev (MVUE) UCL	0.789
95% Chebyshev (MVUE) UCL	0.859	97.5% Chebyshev (MVUE) UCL	0.956
99% Chebyshev (MVUE) UCL	1.146		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.736	95% Jackknife UCL	0.739
95% Standard Bootstrap UCL	0.735	95% Bootstrap-t UCL	0.79
95% Hall's Bootstrap UCL	0.854	95% Percentile Bootstrap UCL	0.742
95% BCA Bootstrap UCL	0.752		
90% Chebyshev(Mean, Sd) UCL	0.816	95% Chebyshev(Mean, Sd) UCL	0.896
97.5% Chebyshev(Mean, Sd) UCL	1.007	99% Chebyshev(Mean, Sd) UCL	1.225
Suggested UCL to Use			
95% Student's-t UCL	0.739	or 95% Modified-t UCL	0.743
or 95% H-UCL	0.74		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 10:41:33 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.0047	Mean	0.0107
Maximum	0.0333	Median	0.01
SD	0.00518	Std. Error of Mean	9.6177E-4
Coefficient of Variation	0.483	Skewness	3.004

Normal GOF Test			
Shapiro Wilk Test Statistic	0.722	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0124	95% Adjusted-CLT UCL (Chen-1995)	0.0129
		95% Modified-t UCL (Johnson-1978)	0.0125

Gamma GOF Test			
A-D Test Statistic	0.748	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.123	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.347	k star (bias corrected MLE)	5.714
Theta hat (MLE)	0.00169	Theta star (bias corrected MLE)	0.00188
nu hat (MLE)	368.2	nu star (bias corrected)	331.4
MLE Mean (bias corrected)	0.0107	MLE Sd (bias corrected)	0.00449
		Approximate Chi Square Value (0.05)	290.2
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	287.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.0122	95% Adjusted Gamma UCL (use when n<50)	0.0123

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-5.36	Mean of logged Data	-4.616
Maximum of Logged Data	-3.402	SD of logged Data	0.392
Assuming Lognormal Distribution			
95% H-UCL	0.0123	90% Chebyshev (MVUE) UCL	0.013
95% Chebyshev (MVUE) UCL	0.0141	97.5% Chebyshev (MVUE) UCL	0.0156
99% Chebyshev (MVUE) UCL	0.0186		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0123	95% Jackknife UCL	0.0124
95% Standard Bootstrap UCL	0.0123	95% Bootstrap-t UCL	0.0133
95% Hall's Bootstrap UCL	0.0201	95% Percentile Bootstrap UCL	0.0123
95% BCA Bootstrap UCL	0.0132		
90% Chebyshev(Mean, Sd) UCL	0.0136	95% Chebyshev(Mean, Sd) UCL	0.0149
97.5% Chebyshev(Mean, Sd) UCL	0.0167	99% Chebyshev(Mean, Sd) UCL	0.0203
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.0123		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 10:42:18 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	29	Number of Distinct Observations	23
Number of Detects	25	Number of Non-Detects	4
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.022	Minimum Non-Detect	0.02
Maximum Detect	0.105	Maximum Non-Detect	0.02
Variance Detects	6.1797E-4	Percent Non-Detects	13.79%
Mean Detects	0.0488	SD Detects	0.0249
Median Detects	0.042	CV Detects	0.509
Skewness Detects	1.021	Kurtosis Detects	-0.0504
Mean of Logged Detects	-3.133	SD of Logged Detects	0.478

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0449	Standard Error of Mean	0.00468
SD	0.0247	95% KM (BCA) UCL	0.0528
95% KM (t) UCL	0.0528	95% KM (Percentile Bootstrap) UCL	0.0522
95% KM (z) UCL	0.0526	95% KM Bootstrap t UCL	0.054
90% KM Chebyshev UCL	0.0589	95% KM Chebyshev UCL	0.0653
97.5% KM Chebyshev UCL	0.0741	99% KM Chebyshev UCL	0.0914

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.624	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.146	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.175	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.567	k star (bias corrected MLE)	4.045
Theta hat (MLE)	0.0107	Theta star (bias corrected MLE)	0.0121
nu hat (MLE)	228.3	nu star (bias corrected)	202.3
MLE Mean (bias corrected)	0.0488	MLE Sd (bias corrected)	0.0243

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.298	nu hat (KM)	191.3
Approximate Chi Square Value (191.26, α)	160.3	Adjusted Chi Square Value (191.26, β)	158.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.0535	95% Gamma Adjusted KM-UCL (use when n<50)	0.0541
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0435
Maximum	0.105	Median	0.038
SD	0.0267	CV	0.614
k hat (MLE)	2.673	k star (bias corrected MLE)	2.419
Theta hat (MLE)	0.0163	Theta star (bias corrected MLE)	0.018
nu hat (MLE)	155	nu star (bias corrected)	140.3
MLE Mean (bias corrected)	0.0435	MLE Sd (bias corrected)	0.028
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (140.33, α)	114	Adjusted Chi Square Value (140.33, β)	112.5
95% Gamma Approximate UCL (use when n>=50)	0.0536	95% Gamma Adjusted UCL (use when n<50)	0.0543
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0441	Mean in Log Scale	-3.286
SD in Original Scale	0.026	SD in Log Scale	0.594
95% t UCL (assumes normality of ROS data)	0.0523	95% Percentile Bootstrap UCL	0.052
95% BCA Bootstrap UCL	0.0524	95% Bootstrap t UCL	0.0536
95% H-UCL (Log ROS)	0.056		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.24	95% H-UCL (KM -Log)	0.0539
KM SD (logged)	0.511	95% Critical H Value (KM-Log)	1.956
KM Standard Error of Mean (logged)	0.0969		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0435	Mean in Log Scale	-3.336
SD in Original Scale	0.0267	SD in Log Scale	0.681
95% t UCL (Assumes normality)	0.0519	95% H-Stat UCL	0.0588
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (BCA) UCL	0.0528	95% GROS Adjusted Gamma UCL					0.0543
95% Adjusted Gamma KM-UCL	0.0541						
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:42:58 AM		
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Copper (Cu), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Carcass, Copper (Cu), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	0.214	Mean	0.355
Maximum	0.881	Median	0.312
SD	0.138	Std. Error of Mean	0.0256
Coefficient of Variation	0.388	Skewness	2.311
Normal GOF Test			
Shapiro Wilk Test Statistic	0.774	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.399	95% Adjusted-CLT UCL (Chen-1995)	0.409
		95% Modified-t UCL (Johnson-1978)	0.4
Gamma GOF Test			
A-D Test Statistic	1.112	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.208	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	9.351	k star (bias corrected MLE)	8.406
Theta hat (MLE)	0.038	Theta star (bias corrected MLE)	0.0422
nu hat (MLE)	542.3	nu star (bias corrected)	487.6
MLE Mean (bias corrected)	0.355	MLE Sd (bias corrected)	0.122
		Approximate Chi Square Value (0.05)	437.4
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	434.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.396	95% Adjusted Gamma UCL (use when n<50)	0.398

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.542	Mean of logged Data	-1.09
Maximum of Logged Data	-0.127	SD of logged Data	0.316
Assuming Lognormal Distribution			
95% H-UCL	0.394	90% Chebyshev (MVUE) UCL	0.416
95% Chebyshev (MVUE) UCL	0.445	97.5% Chebyshev (MVUE) UCL	0.484
99% Chebyshev (MVUE) UCL	0.563		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.397	95% Jackknife UCL	0.399
95% Standard Bootstrap UCL	0.396	95% Bootstrap-t UCL	0.42
95% Hall's Bootstrap UCL	0.441	95% Percentile Bootstrap UCL	0.398
95% BCA Bootstrap UCL	0.411		
90% Chebyshev(Mean, Sd) UCL	0.432	95% Chebyshev(Mean, Sd) UCL	0.467
97.5% Chebyshev(Mean, Sd) UCL	0.515	99% Chebyshev(Mean, Sd) UCL	0.61
Suggested UCL to Use			
95% Student's-t UCL	0.399	or 95% Modified-t UCL	0.4
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:43:47 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	1.09	Mean	3.736
Maximum	27.7	Median	2.68
SD	4.788	Std. Error of Mean	0.889
Coefficient of Variation	1.282	Skewness	4.781
Normal GOF Test			
Shapiro Wilk Test Statistic	0.422	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.312	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.249	95% Adjusted-CLT UCL (Chen-1995)	6.042
		95% Modified-t UCL (Johnson-1978)	5.38
Gamma GOF Test			
A-D Test Statistic	1.962	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.758	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.21	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.946	k star (bias corrected MLE)	1.768
Theta hat (MLE)	1.92	Theta star (bias corrected MLE)	2.114
nu hat (MLE)	112.9	nu star (bias corrected)	102.5
MLE Mean (bias corrected)	3.736	MLE Sd (bias corrected)	2.81
		Approximate Chi Square Value (0.05)	80.16
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	78.98
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	4.778	95% Adjusted Gamma UCL (use when n<50)	4.85

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.0862	Mean of logged Data	1.04
Maximum of Logged Data	3.321	SD of logged Data	0.631
Assuming Lognormal Distribution			
95% H-UCL	4.411	90% Chebyshev (MVUE) UCL	4.706
95% Chebyshev (MVUE) UCL	5.287	97.5% Chebyshev (MVUE) UCL	6.093
99% Chebyshev (MVUE) UCL	7.678		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.199	95% Jackknife UCL	5.249
95% Standard Bootstrap UCL	5.148	95% Bootstrap-t UCL	8.682
95% Hall's Bootstrap UCL	11.08	95% Percentile Bootstrap UCL	5.346
95% BCA Bootstrap UCL	6.383		
90% Chebyshev(Mean, Sd) UCL	6.404	95% Chebyshev(Mean, Sd) UCL	7.612
97.5% Chebyshev(Mean, Sd) UCL	9.289	99% Chebyshev(Mean, Sd) UCL	12.58
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	7.612		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:44:27 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Mercury (Hg), mg/kg ww

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	0.081	Mean	0.207
Maximum	0.505	Median	0.158
SD	0.126	Std. Error of Mean	0.0315
Coefficient of Variation	0.609	Skewness	1.77

Normal GOF Test

Shapiro Wilk Test Statistic	0.76	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.262	95% Adjusted-CLT UCL (Chen-1995)	0.274
		95% Modified-t UCL (Johnson-1978)	0.265

Gamma GOF Test

A-D Test Statistic	0.734	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.184	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.817	k star (bias corrected MLE)	3.143
Theta hat (MLE)	0.0542	Theta star (bias corrected MLE)	0.0659
nu hat (MLE)	122.2	nu star (bias corrected)	100.6
MLE Mean (bias corrected)	0.207	MLE Sd (bias corrected)	0.117
		Approximate Chi Square Value (0.05)	78.45
Adjusted Level of Significance	0.0335	Adjusted Chi Square Value	76.23

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	0.266	95% Adjusted Gamma UCL (use when n<50)	0.273

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.513	Mean of logged Data	-1.711
Maximum of Logged Data	-0.683	SD of logged Data	0.517
Assuming Lognormal Distribution			
95% H-UCL	0.272	90% Chebyshev (MVUE) UCL	0.287
95% Chebyshev (MVUE) UCL	0.324	97.5% Chebyshev (MVUE) UCL	0.375
99% Chebyshev (MVUE) UCL	0.477		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.259	95% Jackknife UCL	0.262
95% Standard Bootstrap UCL	0.258	95% Bootstrap-t UCL	0.32
95% Hall's Bootstrap UCL	0.588	95% Percentile Bootstrap UCL	0.262
95% BCA Bootstrap UCL	0.275		
90% Chebyshev(Mean, Sd) UCL	0.302	95% Chebyshev(Mean, Sd) UCL	0.345
97.5% Chebyshev(Mean, Sd) UCL	0.404	99% Chebyshev(Mean, Sd) UCL	0.521
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.273		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:45:47 AM		
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Maclellan Region (Cockram Lake), Fish - Carcass, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	26
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.016	Maximum Non-Detect	0.02
Variance Detects	1.2000E-5	Percent Non-Detects	89.66%
Mean Detects	0.012	SD Detects	0.00346
Median Detects	0.01	CV Detects	0.289
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-4.449	SD of Logged Detects	0.271

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0104	Standard Error of Mean	4.4470E-4
SD	0.00145	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0111	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0111	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0117	95% KM Chebyshev UCL	0.0123
97.5% KM Chebyshev UCL	0.0132	99% KM Chebyshev UCL	0.0148

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	19.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.1051E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	117.9	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	51.03	nu hat (KM)	2960
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (N/A, α)	2834	Adjusted Chi Square Value (N/A, β)	2827
95% Gamma Approximate KM-UCL (use when n>=50)	0.0108	95% Gamma Adjusted KM-UCL (use when n<50)	0.0109
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00491	Mean in Log Scale	-5.565
SD in Original Scale	0.00367	SD in Log Scale	0.72
95% t UCL (assumes normality of ROS data)	0.00607	95% Percentile Bootstrap UCL	0.00606
95% BCA Bootstrap UCL	0.00606	95% Bootstrap t UCL	0.00649
95% H-UCL (Log ROS)	0.00665		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.576	95% H-UCL (KM -Log)	0.0108
KM SD (logged)	0.114	95% Critical H Value (KM-Log)	1.713
KM Standard Error of Mean (logged)	0.0348		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00797	Mean in Log Scale	-4.9
SD in Original Scale	0.00293	SD in Log Scale	0.376
95% t UCL (Assumes normality)	0.00889	95% H-Stat UCL	0.00912
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0111	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 10:46:27 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Nickel (Ni), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	17
Number of Detects	26	Number of Non-Detects	3
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	0.68	Maximum Non-Detect	0.1
Variance Detects	0.0209	Percent Non-Detects	10.34%
Mean Detects	0.222	SD Detects	0.145
Median Detects	0.19	CV Detects	0.651
Skewness Detects	2.294	Kurtosis Detects	5.387
Mean of Logged Detects	-1.643	SD of Logged Detects	0.498

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.701	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.174	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.21	Standard Error of Mean	0.0264
SD	0.139	95% KM (BCA) UCL	0.261
95% KM (t) UCL	0.255	95% KM (Percentile Bootstrap) UCL	0.255
95% KM (z) UCL	0.253	95% KM Bootstrap t UCL	0.285
90% KM Chebyshev UCL	0.289	95% KM Chebyshev UCL	0.325
97.5% KM Chebyshev UCL	0.374	99% KM Chebyshev UCL	0.472

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.291	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.172	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.752	k star (bias corrected MLE)	3.344
Theta hat (MLE)	0.0593	Theta star (bias corrected MLE)	0.0665
nu hat (MLE)	195.1	nu star (bias corrected)	173.9
MLE Mean (bias corrected)	0.222	MLE Sd (bias corrected)	0.122

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	2.263	nu hat (KM)	131.3
Approximate Chi Square Value (131.25, α)	105.8	Adjusted Chi Square Value (131.25, β)	104.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.26	95% Gamma Adjusted KM-UCL (use when n<50)	0.264
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.201
Maximum	0.68	Median	0.16
SD	0.151	CV	0.755
k hat (MLE)	1.675	k star (bias corrected MLE)	1.525
Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.132
nu hat (MLE)	97.15	nu star (bias corrected)	88.43
MLE Mean (bias corrected)	0.201	MLE Sd (bias corrected)	0.162
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (88.43, α)	67.75	Adjusted Chi Square Value (88.43, β)	66.67
95% Gamma Approximate UCL (use when n>=50)	0.262	95% Gamma Adjusted UCL (use when n<50)	0.266
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.174	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.206	Mean in Log Scale	-1.76
SD in Original Scale	0.145	SD in Log Scale	0.589
95% t UCL (assumes normality of ROS data)	0.252	95% Percentile Bootstrap UCL	0.25
95% BCA Bootstrap UCL	0.261	95% Bootstrap t UCL	0.28
95% H-UCL (Log ROS)	0.256		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.711	95% H-UCL (KM -Log)	0.247
KM SD (logged)	0.504	95% Critical H Value (KM-Log)	1.95
KM Standard Error of Mean (logged)	0.0955		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.204	Mean in Log Scale	-1.783
SD in Original Scale	0.147	SD in Log Scale	0.63
95% t UCL (Assumes normality)	0.251	95% H-Stat UCL	0.262
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (BCA) UCL	0.261	95% GROS Adjusted Gamma UCL	0.266
95% Adjusted Gamma KM-UCL	0.264		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:47:08 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	0.18	Mean	0.269
Maximum	0.39	Median	0.26
SD	0.043	Std. Error of Mean	0.00798
Coefficient of Variation	0.16	Skewness	0.849
Normal GOF Test			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.282	95% Adjusted-CLT UCL (Chen-1995)	0.283
		95% Modified-t UCL (Johnson-1978)	0.282
Gamma GOF Test			
A-D Test Statistic	0.726	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.184	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.162	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	42.38	k star (bias corrected MLE)	38.02
Theta hat (MLE)	0.00634	Theta star (bias corrected MLE)	0.00707
nu hat (MLE)	2458	nu star (bias corrected)	2205
MLE Mean (bias corrected)	0.269	MLE Sd (bias corrected)	0.0436
		Approximate Chi Square Value (0.05)	2097
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	2091
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.282	95% Adjusted Gamma UCL (use when n<50)	0.283

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.715	Mean of logged Data	-1.326
Maximum of Logged Data	-0.942	SD of logged Data	0.156
Assuming Lognormal Distribution			
95% H-UCL	0.283	90% Chebyshev (MVUE) UCL	0.292
95% Chebyshev (MVUE) UCL	0.303	97.5% Chebyshev (MVUE) UCL	0.317
99% Chebyshev (MVUE) UCL	0.346		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.282	95% Jackknife UCL	0.282
95% Standard Bootstrap UCL	0.281	95% Bootstrap-t UCL	0.284
95% Hall's Bootstrap UCL	0.285	95% Percentile Bootstrap UCL	0.282
95% BCA Bootstrap UCL	0.282		
90% Chebyshev(Mean, Sd) UCL	0.293	95% Chebyshev(Mean, Sd) UCL	0.303
97.5% Chebyshev(Mean, Sd) UCL	0.318	99% Chebyshev(Mean, Sd) UCL	0.348
Suggested UCL to Use			
95% Student's-t UCL	0.282		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:47:52 AM		
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Strontium (Sr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Maclellan Region (Cockram Lake), Fish - Carcass, Strontium (Sr), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	3.24	Mean	7.167
Maximum	11.7	Median	6.74
SD	2.509	Std. Error of Mean	0.466
Coefficient of Variation	0.35	Skewness	0.329
Normal GOF Test			
Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0999	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.959	95% Adjusted-CLT UCL (Chen-1995)	7.963
		95% Modified-t UCL (Johnson-1978)	7.964
Gamma GOF Test			
A-D Test Statistic	0.242	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0891	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	8.185	k star (bias corrected MLE)	7.361
Theta hat (MLE)	0.876	Theta star (bias corrected MLE)	0.974
nu hat (MLE)	474.7	nu star (bias corrected)	427
MLE Mean (bias corrected)	7.167	MLE Sd (bias corrected)	2.641
		Approximate Chi Square Value (0.05)	380.1
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	377.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.051	95% Adjusted Gamma UCL (use when n<50)	8.107

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0784	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.176	Mean of logged Data	1.907
Maximum of Logged Data	2.46	SD of logged Data	0.366
Assuming Lognormal Distribution			
95% H-UCL	8.183	90% Chebyshev (MVUE) UCL	8.684
95% Chebyshev (MVUE) UCL	9.364	97.5% Chebyshev (MVUE) UCL	10.31
99% Chebyshev (MVUE) UCL	12.16		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.933	95% Jackknife UCL	7.959
95% Standard Bootstrap UCL	7.925	95% Bootstrap-t UCL	7.994
95% Hall's Bootstrap UCL	7.956	95% Percentile Bootstrap UCL	7.966
95% BCA Bootstrap UCL	7.941		
90% Chebyshev(Mean, Sd) UCL	8.564	95% Chebyshev(Mean, Sd) UCL	9.197
97.5% Chebyshev(Mean, Sd) UCL	10.08	99% Chebyshev(Mean, Sd) UCL	11.8
Suggested UCL to Use			
95% Student's-t UCL	7.959		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:48:33 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Thallium (Tl), mg/kg ww

General Statistics

Total Number of Observations	29	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	27
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.0062	Minimum Non-Detect	0.006
Maximum Detect	0.0068	Maximum Non-Detect	0.006
Variance Detects	1.8000E-7	Percent Non-Detects	93.1%
Mean Detects	0.0065	SD Detects	4.2426E-4
Median Detects	0.0065	CV Detects	0.0653
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.037	SD of Logged Detects	0.0653

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.00603	Standard Error of Mean	3.9181E-5
SD	1.4920E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0061	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0061	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00615	95% KM Chebyshev UCL	0.00621
97.5% KM Chebyshev UCL	0.00628	99% KM Chebyshev UCL	0.00642

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	469.1	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.3856E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1876	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1636	nu hat (KM)	94885
		Adjusted Level of Significance (β)	0.0407

Approximate Chi Square Value (N/A, α)	94170	Adjusted Chi Square Value (N/A, β)	94127
95% Gamma Approximate KM-UCL (use when n>=50)	0.00608	95% Gamma Adjusted KM-UCL (use when n<50)	0.00608
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00391	Mean in Log Scale	-5.582
SD in Original Scale	0.00111	SD in Log Scale	0.279
95% t UCL (assumes normality of ROS data)	0.00426	95% Percentile Bootstrap UCL	0.00425
95% BCA Bootstrap UCL	0.00426	95% Bootstrap t UCL	0.00429
95% H-UCL (Log ROS)	0.0043		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00324	Mean in Log Scale	-5.756
SD in Original Scale	9.0614E-4	SD in Log Scale	0.199
95% t UCL (Assumes normality)	0.00353	95% H-Stat UCL	0.00345
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0061	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:49:58 AM		
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Uranium (U), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Carcass, Uranium (U), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	26
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0021	Minimum Non-Detect	0.002
Maximum Detect	0.0031	Maximum Non-Detect	0.002
Variance Detects	2.5333E-7	Percent Non-Detects	89.66%
Mean Detects	0.00263	SD Detects	5.0332E-4
Median Detects	0.0027	CV Detects	0.191
Skewness Detects	-0.586	Kurtosis Detects	N/A
Mean of Logged Detects	-5.952	SD of Logged Detects	0.197
Warning: Data set has only 3 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.00207	Standard Error of Mean	5.3178E-5
SD	2.3382E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00216	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00215	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00223	95% KM Chebyshev UCL	0.0023
97.5% KM Chebyshev UCL	0.0024	99% KM Chebyshev UCL	0.00259
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	39.47	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.6711E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	236.8	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	78.03	nu hat (KM)	4526
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (N/A, α)	4371	Adjusted Chi Square Value (N/A, β)	4362
95% Gamma Approximate KM-UCL (use when n>=50)	0.00214	95% Gamma Adjusted KM-UCL (use when n<50)	0.00214
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	9.8494E-4	Mean in Log Scale	-7.141
SD in Original Scale	7.0445E-4	SD in Log Scale	0.673
95% t UCL (assumes normality of ROS data)	0.00121	95% Percentile Bootstrap UCL	0.00121
95% BCA Bootstrap UCL	0.00124	95% Bootstrap t UCL	0.00126
95% H-UCL (Log ROS)	0.0013		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-6.187	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0953	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0217		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00117	Mean in Log Scale	-6.809
SD in Original Scale	5.2379E-4	SD in Log Scale	0.301
95% t UCL (Assumes normality)	0.00133	95% H-Stat UCL	0.00128
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00216	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:50:42 AM
From File	Maclellan Region (Cockram Lake), Fish - Carcass, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Carcass, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	11.6	Mean	31.33
Maximum	85.9	Median	23.4
SD	19.1	Std. Error of Mean	3.546
Coefficient of Variation	0.609	Skewness	1.167
Normal GOF Test			
Shapiro Wilk Test Statistic	0.863	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	37.36	95% Adjusted-CLT UCL (Chen-1995)	37.98
		95% Modified-t UCL (Johnson-1978)	37.49
Gamma GOF Test			
A-D Test Statistic	0.906	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.158	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.164	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.176	k star (bias corrected MLE)	2.87
Theta hat (MLE)	9.865	Theta star (bias corrected MLE)	10.92
nu hat (MLE)	184.2	nu star (bias corrected)	166.5
MLE Mean (bias corrected)	31.33	MLE Sd (bias corrected)	18.49
		Approximate Chi Square Value (0.05)	137.7
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	136.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	37.89	95% Adjusted Gamma UCL (use when n<50)	38.33

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.451	Mean of logged Data	3.279
Maximum of Logged Data	4.453	SD of logged Data	0.579
Assuming Lognormal Distribution			
95% H-UCL	39.15	90% Chebyshev (MVUE) UCL	41.84
95% Chebyshev (MVUE) UCL	46.66	97.5% Chebyshev (MVUE) UCL	53.36
99% Chebyshev (MVUE) UCL	66.51		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	37.16	95% Jackknife UCL	37.36
95% Standard Bootstrap UCL	37.05	95% Bootstrap-t UCL	39.02
95% Hall's Bootstrap UCL	38.16	95% Percentile Bootstrap UCL	37.51
95% BCA Bootstrap UCL	37.69		
90% Chebyshev(Mean, Sd) UCL	41.97	95% Chebyshev(Mean, Sd) UCL	46.79
97.5% Chebyshev(Mean, Sd) UCL	53.48	99% Chebyshev(Mean, Sd) UCL	66.61
Suggested UCL to Use			
95% Adjusted Gamma UCL	38.33		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

APPENDIX C.23
PROUCL OUTPUTS
FISH LIVER TISSUE (ALL LAKES)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:19:25 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Arsenic (As), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Liver, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	39
Number of Detects	61	Number of Non-Detects	2
Number of Distinct Detects	39	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.104	Maximum Non-Detect	0.01
Variance Detects	4.2268E-4	Percent Non-Detects	3.175%
Mean Detects	0.0326	SD Detects	0.0206
Median Detects	0.025	CV Detects	0.631
Skewness Detects	1.36	Kurtosis Detects	1.994
Mean of Logged Detects	-3.602	SD of Logged Detects	0.595

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.864	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	2.3278E-7	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.152	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.113	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0318	KM Standard Error of Mean	0.0026
KM SD	0.0204	95% KM (BCA) UCL	0.0361
95% KM (t) UCL	0.0362	95% KM (Percentile Bootstrap) UCL	0.036
95% KM (z) UCL	0.0361	95% KM Bootstrap t UCL	0.037
90% KM Chebyshev UCL	0.0396	95% KM Chebyshev UCL	0.0432
97.5% KM Chebyshev UCL	0.0481	99% KM Chebyshev UCL	0.0577

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.08	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.758	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.136	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.115	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.98	k star (bias corrected MLE)	2.844
Theta hat (MLE)	0.0109	Theta star (bias corrected MLE)	0.0114
nu hat (MLE)	363.6	nu star (bias corrected)	347

Mean (detects)	0.0326		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0318
Maximum	0.104	Median	0.025
SD	0.0206	CV	0.647
k hat (MLE)	2.834	k star (bias corrected MLE)	2.71
Theta hat (MLE)	0.0112	Theta star (bias corrected MLE)	0.0118
nu hat (MLE)	357.1	nu star (bias corrected)	341.4
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (341.42, α)	299.6	Adjusted Chi Square Value (341.42, β)	298.7
95% Gamma Approximate UCL (use when n>=50)	0.0363	95% Gamma Adjusted UCL (use when n<50)	0.0364
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0318	SD (KM)	0.0204
Variance (KM)	4.1820E-4	SE of Mean (KM)	0.0026
k hat (KM)	2.424	k star (KM)	2.32
nu hat (KM)	305.5	nu star (KM)	292.3
theta hat (KM)	0.0131	theta star (KM)	0.0137
80% gamma percentile (KM)	0.0468	90% gamma percentile (KM)	0.0598
95% gamma percentile (KM)	0.0721	99% gamma percentile (KM)	0.0991
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (292.26, α)	253.7	Adjusted Chi Square Value (292.26, β)	252.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0367	95% Gamma Adjusted KM-UCL (use when n<50)	0.0368
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.949	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0244	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.113	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0317	Mean in Log Scale	-3.649
SD in Original Scale	0.0208	SD in Log Scale	0.641
95% t UCL (assumes normality of ROS data)	0.0361	95% Percentile Bootstrap UCL	0.036
95% BCA Bootstrap UCL	0.0362	95% Bootstrap t UCL	0.0367
95% H-UCL (Log ROS)	0.0375		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.634	KM Geo Mean	0.0264
KM SD (logged)	0.607	95% Critical H Value (KM-Log)	1.936
KM Standard Error of Mean (logged)	0.0771	95% H-UCL (KM -Log)	0.0369

KM SD (logged)	0.607	95% Critical H Value (KM-Log)	1.936
KM Standard Error of Mean (logged)	0.0771		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0317	Mean in Log Scale	-3.656
SD in Original Scale	0.0208	SD in Log Scale	0.658
95% t UCL (Assumes normality)	0.0361	95% H-Stat UCL	0.0378
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0432		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:20:04 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Liver, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	59
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.043	Minimum Non-Detect	0.04
Maximum Detect	0.457	Maximum Non-Detect	0.04
Variance Detects	0.0471	Percent Non-Detects	93.65%
Mean Detects	0.269	SD Detects	0.217
Median Detects	0.288	CV Detects	0.807
Skewness Detects	-0.116	Kurtosis Detects	-5.329
Mean of Logged Detects	-1.705	SD of Logged Detects	1.142
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0545	KM Standard Error of Mean	0.0106
KM SD	0.0732	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0723	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.072	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0865	95% KM Chebyshev UCL	0.101
97.5% KM Chebyshev UCL	0.121	99% KM Chebyshev UCL	0.16
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.448	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.663	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.329	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.4	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.423	k star (bias corrected MLE)	0.522
Theta hat (MLE)	0.189	Theta star (bias corrected MLE)	0.514
nu hat (MLE)	11.38	nu star (bias corrected)	4.179

Mean (detects)	0.269		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0264
Maximum	0.457	Median	0.01
SD	0.0795	CV	3.009
k hat (MLE)	0.759	k star (bias corrected MLE)	0.733
Theta hat (MLE)	0.0348	Theta star (bias corrected MLE)	0.036
nu hat (MLE)	95.61	nu star (bias corrected)	92.39
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (92.39, α)	71.22	Adjusted Chi Square Value (92.39, β)	70.79
95% Gamma Approximate UCL (use when n>=50)	0.0343	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0545	SD (KM)	0.0732
Variance (KM)	0.00535	SE of Mean (KM)	0.0106
k hat (KM)	0.555	k star (KM)	0.539
nu hat (KM)	69.97	nu star (KM)	67.98
theta hat (KM)	0.0982	theta star (KM)	0.101
80% gamma percentile (KM)	0.0898	90% gamma percentile (KM)	0.145
95% gamma percentile (KM)	0.204	99% gamma percentile (KM)	0.347
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (67.98, α)	50	Adjusted Chi Square Value (67.98, β)	49.64
95% Gamma Approximate KM-UCL (use when n>=50)	0.0741	95% Gamma Adjusted KM-UCL (use when n<50)	0.0747
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.287	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0187	Mean in Log Scale	-9.139
SD in Original Scale	0.0813	SD in Log Scale	3.775
95% t UCL (assumes normality of ROS data)	0.0358	95% Percentile Bootstrap UCL	0.0371
95% BCA Bootstrap UCL	0.0475	95% Bootstrap t UCL	0.101
95% H-UCL (Log ROS)	1.536		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.123	KM Geo Mean	0.044
KM SD (logged)	0.445	95% Critical H Value (KM-Log)	1.829
KM Standard Error of Mean (logged)	0.0648	95% H-UCL (KM -Log)	0.0539

KM SD (logged)	0.445	95% Critical H Value (KM-Log)	1.829
KM Standard Error of Mean (logged)	0.0648		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0358	Mean in Log Scale	-3.772
SD in Original Scale	0.0776	SD in Log Scale	0.598
95% t UCL (Assumes normality)	0.0521	95% H-Stat UCL	0.0319
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0723		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:20:43 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Liver, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	54
Number of Detects	61	Number of Non-Detects	2
Number of Distinct Detects	53	Number of Distinct Non-Detects	1
Minimum Detect	0.0055	Minimum Non-Detect	0.004
Maximum Detect	0.24	Maximum Non-Detect	0.004
Variance Detects	0.00197	Percent Non-Detects	3.175%
Mean Detects	0.0417	SD Detects	0.0444
Median Detects	0.0229	CV Detects	1.064
Skewness Detects	2.024	Kurtosis Detects	5.498
Mean of Logged Detects	-3.66	SD of Logged Detects	0.985

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.764	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	7.423E-13	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.113	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0405	KM Standard Error of Mean	0.00557
KM SD	0.0438	95% KM (BCA) UCL	0.0511
95% KM (t) UCL	0.0498	95% KM (Percentile Bootstrap) UCL	0.05
95% KM (z) UCL	0.0497	95% KM Bootstrap t UCL	0.0513
90% KM Chebyshev UCL	0.0572	95% KM Chebyshev UCL	0.0648
97.5% KM Chebyshev UCL	0.0753	99% KM Chebyshev UCL	0.0959

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.992	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.776	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.145	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.117	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.174	k star (bias corrected MLE)	1.127
Theta hat (MLE)	0.0355	Theta star (bias corrected MLE)	0.037
nu hat (MLE)	143.2	nu star (bias corrected)	137.5

Mean (detects)	0.0417		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0055	Mean	0.0407
Maximum	0.24	Median	0.0229
SD	0.044	CV	1.082
k hat (MLE)	1.162	k star (bias corrected MLE)	1.117
Theta hat (MLE)	0.035	Theta star (bias corrected MLE)	0.0365
nu hat (MLE)	146.4	nu star (bias corrected)	140.7
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (140.73, α)	114.3	Adjusted Chi Square Value (140.73, β)	113.8
95% Gamma Approximate UCL (use when n>=50)	0.0501	95% Gamma Adjusted UCL (use when n<50)	0.0504
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0405	SD (KM)	0.0438
Variance (KM)	0.00192	SE of Mean (KM)	0.00557
k hat (KM)	0.854	k star (KM)	0.824
nu hat (KM)	107.6	nu star (KM)	103.9
theta hat (KM)	0.0474	theta star (KM)	0.0492
80% gamma percentile (KM)	0.0661	90% gamma percentile (KM)	0.0978
95% gamma percentile (KM)	0.13	99% gamma percentile (KM)	0.206
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (103.85, α)	81.34	Adjusted Chi Square Value (103.85, β)	80.87
95% Gamma Approximate KM-UCL (use when n>=50)	0.0517	95% Gamma Adjusted KM-UCL (use when n<50)	0.052
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00217	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.113	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0405	Mean in Log Scale	-3.737
SD in Original Scale	0.0442	SD in Log Scale	1.061
95% t UCL (assumes normality of ROS data)	0.0498	95% Percentile Bootstrap UCL	0.0501
95% BCA Bootstrap UCL	0.0519	95% Bootstrap t UCL	0.0515
95% H-UCL (Log ROS)	0.0568		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.719	KM Geo Mean	0.0243
KM SD (logged)	1.016	95% Critical H Value (KM-Log)	2.259
KM Standard Error of Mean (logged)	0.129	95% H-UCL (KM -Log)	0.0544

KM SD (logged)	1.016	95% Critical H Value (KM-Log)	2.259
KM Standard Error of Mean (logged)	0.129		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0405	Mean in Log Scale	-3.741
SD in Original Scale	0.0442	SD in Log Scale	1.069
95% t UCL (Assumes normality)	0.0498	95% H-Stat UCL	0.0573
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0648		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:21:22 PM
From File	Gordon Region (All Lakes), Fish - Liver, Chromium (Cr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Chromium (Cr), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Chromium (Cr), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:22:00 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Liver, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	21
Number of Detects	50	Number of Non-Detects	13
Number of Distinct Detects	21	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.744	Maximum Non-Detect	0.02
Variance Detects	0.0196	Percent Non-Detects	20.63%
Mean Detects	0.0589	SD Detects	0.14
Median Detects	0.0295	CV Detects	2.378
Skewness Detects	4.799	Kurtosis Detects	22.06
Mean of Logged Detects	-3.394	SD of Logged Detects	0.685

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.255	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.462	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.125	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0509	KM Standard Error of Mean	0.0159
KM SD	0.125	95% KM (BCA) UCL	0.0831
95% KM (t) UCL	0.0774	95% KM (Percentile Bootstrap) UCL	0.0824
95% KM (z) UCL	0.077	95% KM Bootstrap t UCL	0.347
90% KM Chebyshev UCL	0.0985	95% KM Chebyshev UCL	0.12
97.5% KM Chebyshev UCL	0.15	99% KM Chebyshev UCL	0.209

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	12.51	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.779	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.408	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.129	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.024	k star (bias corrected MLE)	0.976
Theta hat (MLE)	0.0576	Theta star (bias corrected MLE)	0.0604
nu hat (MLE)	102.4	nu star (bias corrected)	97.57

Mean (detects)	0.0589		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0488
Maximum	0.744	Median	0.027
SD	0.126	CV	2.584
k hat (MLE)	0.932	k star (bias corrected MLE)	0.899
Theta hat (MLE)	0.0524	Theta star (bias corrected MLE)	0.0543
nu hat (MLE)	117.5	nu star (bias corrected)	113.2
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (113.21, α)	89.65	Adjusted Chi Square Value (113.21, β)	89.16
95% Gamma Approximate UCL (use when n>=50)	0.0617	95% Gamma Adjusted UCL (use when n<50)	0.062
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0509	SD (KM)	0.125
Variance (KM)	0.0155	SE of Mean (KM)	0.0159
k hat (KM)	0.167	k star (KM)	0.17
nu hat (KM)	21.03	nu star (KM)	21.36
theta hat (KM)	0.305	theta star (KM)	0.3
80% gamma percentile (KM)	0.0607	90% gamma percentile (KM)	0.153
95% gamma percentile (KM)	0.273	99% gamma percentile (KM)	0.613
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (21.36, α)	11.86	Adjusted Chi Square Value (21.36, β)	11.69
95% Gamma Approximate KM-UCL (use when n>=50)	0.0917	95% Gamma Adjusted KM-UCL (use when n<50)	0.093
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.508	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.316	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.125	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.049	Mean in Log Scale	-3.638
SD in Original Scale	0.126	SD in Log Scale	0.786
95% t UCL (assumes normality of ROS data)	0.0755	95% Percentile Bootstrap UCL	0.0775
95% BCA Bootstrap UCL	0.0931	95% Bootstrap t UCL	0.298
95% H-UCL (Log ROS)	0.0441		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.501	KM Geo Mean	0.0302
KM SD (logged)	0.639	95% Critical H Value (KM-Log)	1.961
KM Standard Error of Mean (logged)	0.0814	95% H-UCL (KM -Log)	0.0434

KM SD (logged)	0.639	95% Critical H Value (KM-Log)	1.961
KM Standard Error of Mean (logged)	0.0814		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0488	Mean in Log Scale	-3.644
SD in Original Scale	0.126	SD in Log Scale	0.784
95% t UCL (Assumes normality)	0.0754	95% H-Stat UCL	0.0437
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.12		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:22:39 PM
From File	Gordon Region (All Lakes), Fish - Liver, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	63
		Number of Missing Observations	0
Minimum	1.87	Mean	17.91
Maximum	60	Median	14.4
SD	14.74	Std. Error of Mean	1.857
Coefficient of Variation	0.823	Skewness	1.32
Normal GOF Test			
Shapiro Wilk Test Statistic	0.845	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.0316E-8	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	21.01	95% Adjusted-CLT UCL (Chen-1995)	21.3
		95% Modified-t UCL (Johnson-1978)	21.06
Gamma GOF Test			
A-D Test Statistic	0.407	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0669	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.114	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.573	k star (bias corrected MLE)	1.508
Theta hat (MLE)	11.39	Theta star (bias corrected MLE)	11.88
nu hat (MLE)	198.1	nu star (bias corrected)	190
MLE Mean (bias corrected)	17.91	MLE Sd (bias corrected)	14.59
		Approximate Chi Square Value (0.05)	159.1
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	158.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	21.39	95% Adjusted Gamma UCL (use when n<50)	21.48

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0538	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0949	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.626	Mean of logged Data	2.535
Maximum of Logged Data	4.094	SD of logged Data	0.897
Assuming Lognormal Distribution			
95% H-UCL	24.19	90% Chebyshev (MVUE) UCL	26.03
95% Chebyshev (MVUE) UCL	29.34	97.5% Chebyshev (MVUE) UCL	33.94
99% Chebyshev (MVUE) UCL	42.98		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	20.97	95% Jackknife UCL	21.01
95% Standard Bootstrap UCL	20.94	95% Bootstrap-t UCL	21.27
95% Hall's Bootstrap UCL	21.25	95% Percentile Bootstrap UCL	21.1
95% BCA Bootstrap UCL	21.15		
90% Chebyshev(Mean, Sd) UCL	23.48	95% Chebyshev(Mean, Sd) UCL	26.01
97.5% Chebyshev(Mean, Sd) UCL	29.51	99% Chebyshev(Mean, Sd) UCL	36.39
Suggested UCL to Use			
95% Approximate Gamma UCL	21.39		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:23:18 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Lead (Pb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Liver, Lead (Pb), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:23:56 PM
From File	Gordon Region (All Lakes), Fish - Liver, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	53
		Number of Missing Observations	0
Minimum	0.463	Mean	1.316
Maximum	3.21	Median	1.13
SD	0.585	Std. Error of Mean	0.0736
Coefficient of Variation	0.444	Skewness	1.343

Normal GOF Test			
Shapiro Wilk Test Statistic	0.879	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.1843E-6	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.439	95% Adjusted-CLT UCL (Chen-1995)	1.45
		95% Modified-t UCL (Johnson-1978)	1.441

Gamma GOF Test			
A-D Test Statistic	0.959	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.122	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.067	k star (bias corrected MLE)	5.789
Theta hat (MLE)	0.217	Theta star (bias corrected MLE)	0.227
nu hat (MLE)	764.5	nu star (bias corrected)	729.4
MLE Mean (bias corrected)	1.316	MLE Sd (bias corrected)	0.547
		Approximate Chi Square Value (0.05)	667.8
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	666.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.437	95% Adjusted Gamma UCL (use when n<50)	1.44

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.508	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0947	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.77	Mean of logged Data	0.19
Maximum of Logged Data	1.166	SD of logged Data	0.407
Assuming Lognormal Distribution			
95% H-UCL	1.442	90% Chebyshev (MVUE) UCL	1.52
95% Chebyshev (MVUE) UCL	1.615	97.5% Chebyshev (MVUE) UCL	1.746
99% Chebyshev (MVUE) UCL	2.004		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.437	95% Jackknife UCL	1.439
95% Standard Bootstrap UCL	1.436	95% Bootstrap-t UCL	1.451
95% Hall's Bootstrap UCL	1.454	95% Percentile Bootstrap UCL	1.441
95% BCA Bootstrap UCL	1.452		
90% Chebyshev(Mean, Sd) UCL	1.537	95% Chebyshev(Mean, Sd) UCL	1.637
97.5% Chebyshev(Mean, Sd) UCL	1.776	99% Chebyshev(Mean, Sd) UCL	2.049
Suggested UCL to Use			
95% Student's-t UCL	1.439	or 95% Modified-t UCL	1.441
or 95% H-UCL	1.442		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:24:35 PM
From File	Gordon Region (All Lakes), Fish - Liver, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	0.029	Mean	0.149
Maximum	1.11	Median	0.093
SD	0.169	Std. Error of Mean	0.0244
Coefficient of Variation	1.13	Skewness	4.201

Normal GOF Test		
Shapiro Wilk Test Statistic	0.59	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.19	95% Adjusted-CLT UCL (Chen-1995)	0.205
		95% Modified-t UCL (Johnson-1978)	0.193

Gamma GOF Test		
A-D Test Statistic	1.539	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.765	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.13	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.703	k star (bias corrected MLE)	1.611
Theta hat (MLE)	0.0877	Theta star (bias corrected MLE)	0.0927
nu hat (MLE)	163.5	nu star (bias corrected)	154.6
MLE Mean (bias corrected)	0.149	MLE Sd (bias corrected)	0.118
		Approximate Chi Square Value (0.05)	126.9
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	126.1

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.182	95% Adjusted Gamma UCL (use when n<50)	0.183

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.54	Mean of logged Data	-2.223
Maximum of Logged Data	0.104	SD of logged Data	0.744
Assuming Lognormal Distribution			
95% H-UCL	0.179	90% Chebyshev (MVUE) UCL	0.192
95% Chebyshev (MVUE) UCL	0.215	97.5% Chebyshev (MVUE) UCL	0.247
99% Chebyshev (MVUE) UCL	0.309		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.189	95% Jackknife UCL	0.19
95% Standard Bootstrap UCL	0.188	95% Bootstrap-t UCL	0.226
95% Hall's Bootstrap UCL	0.366	95% Percentile Bootstrap UCL	0.194
95% BCA Bootstrap UCL	0.208		
90% Chebyshev(Mean, Sd) UCL	0.223	95% Chebyshev(Mean, Sd) UCL	0.256
97.5% Chebyshev(Mean, Sd) UCL	0.302	99% Chebyshev(Mean, Sd) UCL	0.392
Suggested UCL to Use			
95% H-UCL	0.179		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:25:14 PM
From File	Gordon Region (All Lakes), Fish - Liver, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	50
		Number of Missing Observations	0
Minimum	0.086	Mean	0.163
Maximum	0.302	Median	0.152
SD	0.0492	Std. Error of Mean	0.0062
Coefficient of Variation	0.301	Skewness	0.799

Normal GOF Test			
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00252	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.174	95% Adjusted-CLT UCL (Chen-1995)	0.174
		95% Modified-t UCL (Johnson-1978)	0.174

Gamma GOF Test			
A-D Test Statistic	0.571	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0807	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	11.94	k star (bias corrected MLE)	11.38
Theta hat (MLE)	0.0137	Theta star (bias corrected MLE)	0.0143
nu hat (MLE)	1504	nu star (bias corrected)	1434
MLE Mean (bias corrected)	0.163	MLE Sd (bias corrected)	0.0484
		Approximate Chi Square Value (0.05)	1347
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	1345

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.174	95% Adjusted Gamma UCL (use when n<50)	0.174

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.359	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0702	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.453	Mean of logged Data	-1.855
Maximum of Logged Data	-1.197	SD of logged Data	0.292
Assuming Lognormal Distribution			
95% H-UCL	0.174	90% Chebyshev (MVUE) UCL	0.181
95% Chebyshev (MVUE) UCL	0.19	97.5% Chebyshev (MVUE) UCL	0.201
99% Chebyshev (MVUE) UCL	0.224		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.173	95% Jackknife UCL	0.174
95% Standard Bootstrap UCL	0.173	95% Bootstrap-t UCL	0.174
95% Hall's Bootstrap UCL	0.174	95% Percentile Bootstrap UCL	0.173
95% BCA Bootstrap UCL	0.174		
90% Chebyshev(Mean, Sd) UCL	0.182	95% Chebyshev(Mean, Sd) UCL	0.19
97.5% Chebyshev(Mean, Sd) UCL	0.202	99% Chebyshev(Mean, Sd) UCL	0.225
Suggested UCL to Use			
95% Approximate Gamma UCL	0.174		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:25:52 PM
From File	Gordon Region (All Lakes), Fish - Liver, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Nickel (Ni), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	62
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Nickel (Ni), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:26:31 PM
From File	Gordon Region (All Lakes), Fish - Liver, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Selenium (Se), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	43
		Number of Missing Observations	0
Minimum	0.58	Mean	1.053
Maximum	1.46	Median	1.04
SD	0.189	Std. Error of Mean	0.0238
Coefficient of Variation	0.179	Skewness	0.15

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.54	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.067	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.111	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.093	95% Adjusted-CLT UCL (Chen-1995)	1.092
		95% Modified-t UCL (Johnson-1978)	1.093

Gamma GOF Test

A-D Test Statistic	0.274	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0665	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.112	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	30.81	k star (bias corrected MLE)	29.35
Theta hat (MLE)	0.0342	Theta star (bias corrected MLE)	0.0359
nu hat (MLE)	3882	nu star (bias corrected)	3698
MLE Mean (bias corrected)	1.053	MLE Sd (bias corrected)	0.194
		Approximate Chi Square Value (0.05)	3558
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	3555

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.094	95% Adjusted Gamma UCL (use when n<50)	1.095

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.467	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0769	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.545	Mean of logged Data	0.0352
Maximum of Logged Data	0.378	SD of logged Data	0.184
Assuming Lognormal Distribution			
95% H-UCL	1.096	90% Chebyshev (MVUE) UCL	1.127
95% Chebyshev (MVUE) UCL	1.161	97.5% Chebyshev (MVUE) UCL	1.207
99% Chebyshev (MVUE) UCL	1.298		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.092	95% Jackknife UCL	1.093
95% Standard Bootstrap UCL	1.092	95% Bootstrap-t UCL	1.093
95% Hall's Bootstrap UCL	1.094	95% Percentile Bootstrap UCL	1.09
95% BCA Bootstrap UCL	1.092		
90% Chebyshev(Mean, Sd) UCL	1.124	95% Chebyshev(Mean, Sd) UCL	1.157
97.5% Chebyshev(Mean, Sd) UCL	1.201	99% Chebyshev(Mean, Sd) UCL	1.29
Suggested UCL to Use			
95% Student's-t UCL	1.093		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:27:09 PM
From File	Gordon Region (All Lakes), Fish - Liver, Silver (Ag), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Silver (Ag), mg/kg ww

General Statistics

Total Number of Observations	63	Number of Distinct Observations	49
Number of Detects	49	Number of Non-Detects	14
Number of Distinct Detects	48	Number of Distinct Non-Detects	1
Minimum Detect	0.021	Minimum Non-Detect	0.02
Maximum Detect	0.605	Maximum Non-Detect	0.02
Variance Detects	0.0207	Percent Non-Detects	22.22%
Mean Detects	0.216	SD Detects	0.144
Median Detects	0.176	CV Detects	0.664
Skewness Detects	0.813	Kurtosis Detects	-0.0657
Mean of Logged Detects	-1.793	SD of Logged Detects	0.805

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.173	KM Standard Error of Mean	0.019
KM SD	0.15	95% KM (BCA) UCL	0.203
95% KM (t) UCL	0.204	95% KM (Percentile Bootstrap) UCL	0.204
95% KM (z) UCL	0.204	95% KM Bootstrap t UCL	0.207
90% KM Chebyshev UCL	0.23	95% KM Chebyshev UCL	0.256
97.5% KM Chebyshev UCL	0.292	99% KM Chebyshev UCL	0.362

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.244	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.762	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.069	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.128	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.058	k star (bias corrected MLE)	1.945
Theta hat (MLE)	0.105	Theta star (bias corrected MLE)	0.111
nu hat (MLE)	201.6	nu star (bias corrected)	190.6

Mean (detects)	0.216		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.172
Maximum	0.605	Median	0.142
SD	0.152	CV	0.884
k hat (MLE)	0.994	k star (bias corrected MLE)	0.957
Theta hat (MLE)	0.173	Theta star (bias corrected MLE)	0.179
nu hat (MLE)	125.2	nu star (bias corrected)	120.6
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (120.58, α)	96.22	Adjusted Chi Square Value (120.58, β)	95.71
95% Gamma Approximate UCL (use when n>=50)	0.215	95% Gamma Adjusted UCL (use when n<50)	0.216
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.173	SD (KM)	0.15
Variance (KM)	0.0224	SE of Mean (KM)	0.019
k hat (KM)	1.331	k star (KM)	1.279
nu hat (KM)	167.8	nu star (KM)	161.1
theta hat (KM)	0.13	theta star (KM)	0.135
80% gamma percentile (KM)	0.272	90% gamma percentile (KM)	0.374
95% gamma percentile (KM)	0.475	99% gamma percentile (KM)	0.704
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (161.10, α)	132.8	Adjusted Chi Square Value (161.10, β)	132.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.21	95% Gamma Adjusted KM-UCL (use when n<50)	0.21
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0975	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.175	Mean in Log Scale	-2.186
SD in Original Scale	0.149	SD in Log Scale	1.043
95% t UCL (assumes normality of ROS data)	0.206	95% Percentile Bootstrap UCL	0.207
95% BCA Bootstrap UCL	0.206	95% Bootstrap t UCL	0.208
95% H-UCL (Log ROS)	0.262		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.264	KM Geo Mean	0.104
KM SD (logged)	1.127	95% Critical H Value (KM-Log)	2.276
KM Standard Error of Mean (logged)	0.143	95% H-UCL (KM -Log)	0.271

KM SD (logged)	1.127	95% Critical H Value (KM-Log)	2.276
KM Standard Error of Mean (logged)	0.143		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.17	Mean in Log Scale	-2.418
SD in Original Scale	0.153	SD in Log Scale	1.375
95% t UCL (Assumes normality)	0.203	95% H-Stat UCL	0.344
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Approximate Gamma UCL	0.21	95% GROS Approximate Gamma UCL	0.215
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:27:48 PM
From File	Gordon Region (All Lakes), Fish - Liver, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.016	Mean	0.0686
Maximum	0.967	Median	0.037
SD	0.124	Std. Error of Mean	0.0157
Coefficient of Variation	1.813	Skewness	6.398

Normal GOF Test		
Shapiro Wilk Test Statistic	0.366	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0947	95% Adjusted-CLT UCL (Chen-1995)	0.108
		95% Modified-t UCL (Johnson-1978)	0.0968

Gamma GOF Test		
A-D Test Statistic	4.885	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.772	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.115	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.338	k star (bias corrected MLE)	1.285
Theta hat (MLE)	0.0512	Theta star (bias corrected MLE)	0.0534
nu hat (MLE)	168.6	nu star (bias corrected)	161.9
MLE Mean (bias corrected)	0.0686	MLE Sd (bias corrected)	0.0605
		Approximate Chi Square Value (0.05)	133.5
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	132.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0832	95% Adjusted Gamma UCL (use when n<50)	0.0835

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.5338E-6	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.135	Mean of logged Data	-3.098
Maximum of Logged Data	-0.0336	SD of logged Data	0.734
Assuming Lognormal Distribution			
95% H-UCL	0.0714	90% Chebyshev (MVUE) UCL	0.0768
95% Chebyshev (MVUE) UCL	0.085	97.5% Chebyshev (MVUE) UCL	0.0964
99% Chebyshev (MVUE) UCL	0.119		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0943	95% Jackknife UCL	0.0947
95% Standard Bootstrap UCL	0.0945	95% Bootstrap-t UCL	0.14
95% Hall's Bootstrap UCL	0.191	95% Percentile Bootstrap UCL	0.0968
95% BCA Bootstrap UCL	0.118		
90% Chebyshev(Mean, Sd) UCL	0.116	95% Chebyshev(Mean, Sd) UCL	0.137
97.5% Chebyshev(Mean, Sd) UCL	0.166	99% Chebyshev(Mean, Sd) UCL	0.224
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.137		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:28:27 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Thallium (Tl), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Liver, Thallium (Tl), mg/kg ww			
General Statistics			
Total Number of Observations	63	Number of Distinct Observations	19
Number of Detects	18	Number of Non-Detects	45
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.0081	Minimum Non-Detect	0.006
Maximum Detect	0.05	Maximum Non-Detect	0.006
Variance Detects	1.0828E-4	Percent Non-Detects	71.43%
Mean Detects	0.0219	SD Detects	0.0104
Median Detects	0.0188	CV Detects	0.475
Skewness Detects	1.042	Kurtosis Detects	1.724
Mean of Logged Detects	-3.926	SD of Logged Detects	0.483
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0105	KM Standard Error of Mean	0.00117
KM SD	0.009	95% KM (BCA) UCL	0.0124
95% KM (t) UCL	0.0125	95% KM (Percentile Bootstrap) UCL	0.0126
95% KM (z) UCL	0.0125	95% KM Bootstrap t UCL	0.013
90% KM Chebyshev UCL	0.014	95% KM Chebyshev UCL	0.0156
97.5% KM Chebyshev UCL	0.0178	99% KM Chebyshev UCL	0.0222
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.25	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.113	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.204	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.874	k star (bias corrected MLE)	4.099
Theta hat (MLE)	0.0045	Theta star (bias corrected MLE)	0.00535
nu hat (MLE)	175.5	nu star (bias corrected)	147.6

Mean (detects)	0.0219		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0081	Mean	0.0134
Maximum	0.05	Median	0.01
SD	0.00769	CV	0.574
k hat (MLE)	5.202	k star (bias corrected MLE)	4.965
Theta hat (MLE)	0.00258	Theta star (bias corrected MLE)	0.0027
nu hat (MLE)	655.4	nu star (bias corrected)	625.6
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (625.56, α)	568.5	Adjusted Chi Square Value (625.56, β)	567.3
95% Gamma Approximate UCL (use when n>=50)	0.0148	95% Gamma Adjusted UCL (use when n<50)	0.0148
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0105	SD (KM)	0.009
Variance (KM)	8.0956E-5	SE of Mean (KM)	0.00117
k hat (KM)	1.375	k star (KM)	1.32
nu hat (KM)	173.2	nu star (KM)	166.3
theta hat (KM)	0.00767	theta star (KM)	0.00799
80% gamma percentile (KM)	0.0165	90% gamma percentile (KM)	0.0227
95% gamma percentile (KM)	0.0287	99% gamma percentile (KM)	0.0424
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (166.29, α)	137.5	Adjusted Chi Square Value (166.29, β)	136.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.0128	95% Gamma Adjusted KM-UCL (use when n<50)	0.0128
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00953	Mean in Log Scale	-5.113
SD in Original Scale	0.00985	SD in Log Scale	0.986
95% t UCL (assumes normality of ROS data)	0.0116	95% Percentile Bootstrap UCL	0.0117
95% BCA Bootstrap UCL	0.0118	95% Bootstrap t UCL	0.0119
95% H-UCL (Log ROS)	0.013		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.776	KM Geo Mean	0.00843
KM SD (logged)	0.593	95% Critical H Value (KM-Log)	1.927
KM Standard Error of Mean (logged)	0.0769	95% H-UCL (KM -Log)	0.0116

KM SD (logged)	0.593	95% Critical H Value (KM-Log)	1.927
KM Standard Error of Mean (logged)	0.0769		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00841	Mean in Log Scale	-5.271
SD in Original Scale	0.0102	SD in Log Scale	0.894
95% t UCL (Assumes normality)	0.0106	95% H-Stat UCL	0.00981
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0125		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:30:24 PM		
From File	Gordon Region (All Lakes), Fish - Liver, Uranium (U), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Liver, Uranium (U), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	5
Number of Detects	6	Number of Non-Detects	57
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.0027	Minimum Non-Detect	0.002
Maximum Detect	0.004	Maximum Non-Detect	0.002
Variance Detects	3.3467E-7	Percent Non-Detects	90.48%
Mean Detects	0.00343	SD Detects	5.7850E-4
Median Detects	0.0037	CV Detects	0.168
Skewness Detects	-0.805	Kurtosis Detects	-1.814
Mean of Logged Detects	-5.687	SD of Logged Detects	0.178

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.783	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.344	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00214	KM Standard Error of Mean	6.2272E-5
KM SD	4.5121E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00224	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00224	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00232	95% KM Chebyshev UCL	0.00241
97.5% KM Chebyshev UCL	0.00253	99% KM Chebyshev UCL	0.00276

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.819	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.697	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.368	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.332	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	39.27	k star (bias corrected MLE)	19.74
Theta hat (MLE)	8.7436E-5	Theta star (bias corrected MLE)	1.7389E-4
nu hat (MLE)	471.2	nu star (bias corrected)	236.9

Mean (detects)	0.00343		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0027	Mean	0.00937
Maximum	0.01	Median	0.01
SD	0.00195	CV	0.208
k hat (MLE)	13.17	k star (bias corrected MLE)	12.55
Theta hat (MLE)	7.1193E-4	Theta star (bias corrected MLE)	7.4690E-4
nu hat (MLE)	1659	nu star (bias corrected)	1581
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (N/A, α)	1490	Adjusted Chi Square Value (N/A, β)	1488
95% Gamma Approximate UCL (use when n>=50)	0.00995	95% Gamma Adjusted UCL (use when n<50)	0.00996
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00214	SD (KM)	4.5121E-4
Variance (KM)	2.0359E-7	SE of Mean (KM)	6.2272E-5
k hat (KM)	22.42	k star (KM)	21.36
nu hat (KM)	2825	nu star (KM)	2692
theta hat (KM)	9.5290E-5	theta star (KM)	1.0000E-4
80% gamma percentile (KM)	0.00251	90% gamma percentile (KM)	0.00275
95% gamma percentile (KM)	0.00295	99% gamma percentile (KM)	0.00336
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	2572	Adjusted Chi Square Value (N/A, β)	2570
95% Gamma Approximate KM-UCL (use when n>=50)	0.00224	95% Gamma Adjusted KM-UCL (use when n<50)	0.00224
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.763	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.355	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00163	Mean in Log Scale	-6.532
SD in Original Scale	8.0105E-4	SD in Log Scale	0.473
95% t UCL (assumes normality of ROS data)	0.00179	95% Percentile Bootstrap UCL	0.0018
95% BCA Bootstrap UCL	0.0018	95% Bootstrap t UCL	0.00182
95% H-UCL (Log ROS)	0.00182		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.164	KM Geo Mean	0.0021
KM SD (logged)	0.163	95% Critical H Value (KM-Log)	1.699
KM Standard Error of Mean (logged)	0.0225	95% H-UCL (KM -Log)	0.00221

KM SD (logged)	0.163	95% Critical H Value (KM-Log)	1.699
KM Standard Error of Mean (logged)	0.0225		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00123	Mean in Log Scale	-6.791
SD in Original Scale	7.3853E-4	SD in Log Scale	0.365
95% t UCL (Assumes normality)	0.00139	95% H-Stat UCL	0.0013
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00224	KM H-UCL	0.00221
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:31:03 PM
From File	Gordon Region (All Lakes), Fish - Liver, Vanadium (V), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Vanadium (V), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	28
Number of Detects	33	Number of Non-Detects	30
Number of Distinct Detects	28	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.77	Maximum Non-Detect	0.1
Variance Detects	0.0223	Percent Non-Detects	47.62%
Mean Detects	0.276	SD Detects	0.149
Median Detects	0.25	CV Detects	0.541
Skewness Detects	1.246	Kurtosis Detects	2.312
Mean of Logged Detects	-1.424	SD of Logged Detects	0.535

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.152	Detected Data appear Normal at 5% Significance Level
Detected Data appear Approximate Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.192	KM Standard Error of Mean	0.0176
KM SD	0.138	95% KM (BCA) UCL	0.224
95% KM (t) UCL	0.222	95% KM (Percentile Bootstrap) UCL	0.223
95% KM (z) UCL	0.221	95% KM Bootstrap t UCL	0.226
90% KM Chebyshev UCL	0.245	95% KM Chebyshev UCL	0.269
97.5% KM Chebyshev UCL	0.302	99% KM Chebyshev UCL	0.368

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.285	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0898	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.154	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.835	k star (bias corrected MLE)	3.507
Theta hat (MLE)	0.0719	Theta star (bias corrected MLE)	0.0786
nu hat (MLE)	253.1	nu star (bias corrected)	231.5

Mean (detects)	0.276		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.156
Maximum	0.77	Median	0.1
SD	0.166	CV	1.065
k hat (MLE)	0.733	k star (bias corrected MLE)	0.709
Theta hat (MLE)	0.213	Theta star (bias corrected MLE)	0.221
nu hat (MLE)	92.37	nu star (bias corrected)	89.31
Adjusted Level of Significance (β)	0.0462		
Approximate Chi Square Value (89.31, α)	68.52	Adjusted Chi Square Value (89.31, β)	68.09
95% Gamma Approximate UCL (use when n>=50)	0.204	95% Gamma Adjusted UCL (use when n<50)	0.205
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.192	SD (KM)	0.138
Variance (KM)	0.019	SE of Mean (KM)	0.0176
k hat (KM)	1.939	k star (KM)	1.858
nu hat (KM)	244.4	nu star (KM)	234.1
theta hat (KM)	0.099	theta star (KM)	0.103
80% gamma percentile (KM)	0.29	90% gamma percentile (KM)	0.38
95% gamma percentile (KM)	0.466	99% gamma percentile (KM)	0.659
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (234.07, α)	199.7	Adjusted Chi Square Value (234.07, β)	198.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.225	95% Gamma Adjusted KM-UCL (use when n<50)	0.226
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0874	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.175	Mean in Log Scale	-2.1
SD in Original Scale	0.152	SD in Log Scale	0.879
95% t UCL (assumes normality of ROS data)	0.207	95% Percentile Bootstrap UCL	0.207
95% BCA Bootstrap UCL	0.209	95% Bootstrap t UCL	0.212
95% H-UCL (Log ROS)	0.229		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.842	KM Geo Mean	0.158
KM SD (logged)	0.581	95% Critical H Value (KM-Log)	1.918
KM Standard Error of Mean (logged)	0.0743	95% H-UCL (KM -Log)	0.216

KM SD (logged)	0.581	95% Critical H Value (KM-Log)	1.918
KM Standard Error of Mean (logged)	0.0743		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.168	Mean in Log Scale	-2.173
SD in Original Scale	0.156	SD in Log Scale	0.88
95% t UCL (Assumes normality)	0.201	95% H-Stat UCL	0.213
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.222		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:31:42 PM
From File	Gordon Region (All Lakes), Fish - Liver, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Liver, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	63	Number of Distinct Observations	56
		Number of Missing Observations	0
Minimum	12.9	Mean	115.1
Maximum	733	Median	33.4
SD	202.2	Std. Error of Mean	25.48
Coefficient of Variation	1.757	Skewness	2.301
Normal GOF Test			
Shapiro Wilk Test Statistic	0.494	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.438	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	157.7	95% Adjusted-CLT UCL (Chen-1995)	164.9
		95% Modified-t UCL (Johnson-1978)	158.9
Gamma GOF Test			
A-D Test Statistic	10.66	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.796	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.367	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.117	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.712	k star (bias corrected MLE)	0.689
Theta hat (MLE)	161.7	Theta star (bias corrected MLE)	167.2
nu hat (MLE)	89.69	nu star (bias corrected)	86.75
MLE Mean (bias corrected)	115.1	MLE Sd (bias corrected)	138.7
		Approximate Chi Square Value (0.05)	66.28
Adjusted Level of Significance	0.0462	Adjusted Chi Square Value	65.86
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	150.7	95% Adjusted Gamma UCL (use when n<50)	151.6

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.724	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.665E-15	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.557	Mean of logged Data	3.899
Maximum of Logged Data	6.597	SD of logged Data	1.083
Assuming Lognormal Distribution			
95% H-UCL	121.4	90% Chebyshev (MVUE) UCL	130.9
95% Chebyshev (MVUE) UCL	150.5	97.5% Chebyshev (MVUE) UCL	177.8
99% Chebyshev (MVUE) UCL	231.4		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	157	95% Jackknife UCL	157.7
95% Standard Bootstrap UCL	155.9	95% Bootstrap-t UCL	172.3
95% Hall's Bootstrap UCL	160.4	95% Percentile Bootstrap UCL	159.4
95% BCA Bootstrap UCL	162.3		
90% Chebyshev(Mean, Sd) UCL	191.6	95% Chebyshev(Mean, Sd) UCL	226.2
97.5% Chebyshev(Mean, Sd) UCL	274.2	99% Chebyshev(Mean, Sd) UCL	368.6
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	226.2		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.24
PROUCL OUTPUTS
FISH LIVER TISSUE (ALL LAKES)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:19:48 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	47
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.022	Minimum Non-Detect	0.01
Maximum Detect	0.03	Maximum Non-Detect	0.03
Variance Detects	3.2000E-5	Percent Non-Detects	95.92%
Mean Detects	0.026	SD Detects	0.00566
Median Detects	0.026	CV Detects	0.218
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.662	SD of Logged Detects	0.219

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0107	KM Standard Error of Mean	7.2314E-4
KM SD	0.0034	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0119	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0119	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0129	95% KM Chebyshev UCL	0.0139
97.5% KM Chebyshev UCL	0.0153	99% KM Chebyshev UCL	0.0179

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	41.91	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.2032E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	167.7	nu star (bias corrected)	N/A
Mean (detects)	0.026		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0107	SD (KM)	0.0034

Variance (KM)	1.1542E-5	SE of Mean (KM)	7.2314E-4
k hat (KM)	9.984	k star (KM)	9.386
nu hat (KM)	978.4	nu star (KM)	919.9
theta hat (KM)	0.00108	theta star (KM)	0.00114
80% gamma percentile (KM)	0.0135	90% gamma percentile (KM)	0.0154
95% gamma percentile (KM)	0.0171	99% gamma percentile (KM)	0.0205
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0451
Approximate Chi Square Value (919.86, α)	850.5	Adjusted Chi Square Value (919.86, β)	848.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0116	95% Gamma Adjusted KM-UCL (use when n<50)	0.0116
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00833	Mean in Log Scale	-4.957
SD in Original Scale	0.00533	SD in Log Scale	0.581
95% t UCL (assumes normality of ROS data)	0.0096	95% Percentile Bootstrap UCL	0.00963
95% BCA Bootstrap UCL	0.00975	95% Bootstrap t UCL	0.00996
95% H-UCL (Log ROS)	0.00981		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.561	KM Geo Mean	0.0104
KM SD (logged)	0.199	95% Critical H Value (KM-Log)	1.804
KM Standard Error of Mean (logged)	0.0429	95% H-UCL (KM -Log)	0.0112
KM SD (logged)	0.199	95% Critical H Value (KM-Log)	1.804
KM Standard Error of Mean (logged)	0.0429		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00831	Mean in Log Scale	-4.962
SD in Original Scale	0.00573	SD in Log Scale	0.547
95% t UCL (Assumes normality)	0.00968	95% H-Stat UCL	0.00946
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0119	KM H-UCL	0.0112
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:20:27 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Arsenic (As), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	18
Number of Detects	26	Number of Non-Detects	23
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.041	Maximum Non-Detect	0.01
Variance Detects	6.1515E-5	Percent Non-Detects	46.94%
Mean Detects	0.0197	SD Detects	0.00784
Median Detects	0.0185	CV Detects	0.399
Skewness Detects	0.883	Kurtosis Detects	0.42
Mean of Logged Detects	-4.002	SD of Logged Detects	0.386

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.17	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0151	KM Standard Error of Mean	0.00108
KM SD	0.00739	95% KM (BCA) UCL	0.0169
95% KM (t) UCL	0.0169	95% KM (Percentile Bootstrap) UCL	0.0169
95% KM (z) UCL	0.0169	95% KM Bootstrap t UCL	0.0172
90% KM Chebyshev UCL	0.0184	95% KM Chebyshev UCL	0.0198
97.5% KM Chebyshev UCL	0.0218	99% KM Chebyshev UCL	0.0258

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.492	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.135	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.171	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.05	k star (bias corrected MLE)	6.262
Theta hat (MLE)	0.00279	Theta star (bias corrected MLE)	0.00314
nu hat (MLE)	366.6	nu star (bias corrected)	325.6

Mean (detects)	0.0197		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0151
Maximum	0.041	Median	0.011
SD	0.00747	CV	0.494
k hat (MLE)	5.504	k star (bias corrected MLE)	5.18
Theta hat (MLE)	0.00275	Theta star (bias corrected MLE)	0.00292
nu hat (MLE)	539.4	nu star (bias corrected)	507.7
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (507.68, α)	456.4	Adjusted Chi Square Value (507.68, β)	455
95% Gamma Approximate UCL (use when n>=50)	0.0168	95% Gamma Adjusted UCL (use when n<50)	0.0169
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0151	SD (KM)	0.00739
Variance (KM)	5.4597E-5	SE of Mean (KM)	0.00108
k hat (KM)	4.189	k star (KM)	3.946
nu hat (KM)	410.5	nu star (KM)	386.7
theta hat (KM)	0.00361	theta star (KM)	0.00383
80% gamma percentile (KM)	0.0209	90% gamma percentile (KM)	0.0253
95% gamma percentile (KM)	0.0294	99% gamma percentile (KM)	0.0382
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (386.69, α)	342.1	Adjusted Chi Square Value (386.69, β)	340.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0171	95% Gamma Adjusted KM-UCL (use when n<50)	0.0172
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.92	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.17	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0136	Mean in Log Scale	-4.49
SD in Original Scale	0.00872	SD in Log Scale	0.641
95% t UCL (assumes normality of ROS data)	0.0157	95% Percentile Bootstrap UCL	0.0156
95% BCA Bootstrap UCL	0.0159	95% Bootstrap t UCL	0.016
95% H-UCL (Log ROS)	0.0166		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.285	KM Geo Mean	0.0138
KM SD (logged)	0.408	95% Critical H Value (KM-Log)	1.83
KM Standard Error of Mean (logged)	0.0595	95% H-UCL (KM -Log)	0.0167

KM SD (logged)	0.408	95% Critical H Value (KM-Log)	1.83
KM Standard Error of Mean (logged)	0.0595		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0128	Mean in Log Scale	-4.611
SD in Original Scale	0.00931	SD in Log Scale	0.71
95% t UCL (Assumes normality)	0.015	95% H-Stat UCL	0.0158
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0169		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:21:07 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Barium (Ba), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	10
Number of Detects	9	Number of Non-Detects	40
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	0.042	Minimum Non-Detect	0.04
Maximum Detect	1.99	Maximum Non-Detect	0.04
Variance Detects	0.438	Percent Non-Detects	81.63%
Mean Detects	0.533	SD Detects	0.662
Median Detects	0.217	CV Detects	1.242
Skewness Detects	1.594	Kurtosis Detects	2.212
Mean of Logged Detects	-1.445	SD of Logged Detects	1.44

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.789	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.131	KM Standard Error of Mean	0.0498
KM SD	0.328	95% KM (BCA) UCL	0.219
95% KM (t) UCL	0.214	95% KM (Percentile Bootstrap) UCL	0.214
95% KM (z) UCL	0.212	95% KM Bootstrap t UCL	0.308
90% KM Chebyshev UCL	0.28	95% KM Chebyshev UCL	0.347
97.5% KM Chebyshev UCL	0.441	99% KM Chebyshev UCL	0.626

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.41	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.214	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.29	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.736	k star (bias corrected MLE)	0.565
Theta hat (MLE)	0.724	Theta star (bias corrected MLE)	0.943
nu hat (MLE)	13.25	nu star (bias corrected)	10.16

Mean (detects)	0.533		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.106
Maximum	1.99	Median	0.01
SD	0.339	CV	3.196
k hat (MLE)	0.374	k star (bias corrected MLE)	0.364
Theta hat (MLE)	0.284	Theta star (bias corrected MLE)	0.291
nu hat (MLE)	36.62	nu star (bias corrected)	35.71
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (35.71, α)	23.03	Adjusted Chi Square Value (35.71, β)	22.72
95% Gamma Approximate UCL (use when n>=50)	0.164	95% Gamma Adjusted UCL (use when n<50)	0.167
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.131	SD (KM)	0.328
Variance (KM)	0.108	SE of Mean (KM)	0.0498
k hat (KM)	0.158	k star (KM)	0.162
nu hat (KM)	15.47	nu star (KM)	15.86
theta hat (KM)	0.827	theta star (KM)	0.806
80% gamma percentile (KM)	0.151	90% gamma percentile (KM)	0.391
95% gamma percentile (KM)	0.707	99% gamma percentile (KM)	1.613
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (15.86, α)	7.863	Adjusted Chi Square Value (15.86, β)	7.691
95% Gamma Approximate KM-UCL (use when n>=50)	0.263	95% Gamma Adjusted KM-UCL (use when n<50)	0.269
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.183	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.1	Mean in Log Scale	-6.778
SD in Original Scale	0.34	SD in Log Scale	3.636
95% t UCL (assumes normality of ROS data)	0.182	95% Percentile Bootstrap UCL	0.194
95% BCA Bootstrap UCL	0.226	95% Bootstrap t UCL	0.325
95% H-UCL (Log ROS)	20.05		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.893	KM Geo Mean	0.0554
KM SD (logged)	0.9	95% Critical H Value (KM-Log)	2.235
KM Standard Error of Mean (logged)	0.136	95% H-UCL (KM -Log)	0.111

KM SD (logged)	0.9	95% Critical H Value (KM-Log)	2.235
KM Standard Error of Mean (logged)	0.136		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.114	Mean in Log Scale	-3.459
SD in Original Scale	0.336	SD in Log Scale	1.13
95% t UCL (Assumes normality)	0.195	95% H-Stat UCL	0.0893
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.214		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:21:46 AM		
From File	MacLellan Region (All Lakes), Fish - Liver, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Liver, Cadmium (Cd), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	38
Number of Detects	39	Number of Non-Detects	10
Number of Distinct Detects	37	Number of Distinct Non-Detects	1
Minimum Detect	0.0049	Minimum Non-Detect	0.004
Maximum Detect	0.454	Maximum Non-Detect	0.004
Variance Detects	0.0127	Percent Non-Detects	20.41%
Mean Detects	0.125	SD Detects	0.113
Median Detects	0.092	CV Detects	0.901
Skewness Detects	1.198	Kurtosis Detects	1.312
Mean of Logged Detects	-2.639	SD of Logged Detects	1.256
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.879	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.1	KM Standard Error of Mean	0.016
KM SD	0.11	95% KM (BCA) UCL	0.129
95% KM (t) UCL	0.127	95% KM (Percentile Bootstrap) UCL	0.128
95% KM (z) UCL	0.127	95% KM Bootstrap t UCL	0.133
90% KM Chebyshev UCL	0.148	95% KM Chebyshev UCL	0.17
97.5% KM Chebyshev UCL	0.2	99% KM Chebyshev UCL	0.259
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.399	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.777	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.104	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.145	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.028	k star (bias corrected MLE)	0.966
Theta hat (MLE)	0.122	Theta star (bias corrected MLE)	0.129
nu hat (MLE)	80.2	nu star (bias corrected)	75.37

Mean (detects)	0.125		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0049	Mean	0.101
Maximum	0.454	Median	0.0552
SD	0.111	CV	1.089
k hat (MLE)	0.79	k star (bias corrected MLE)	0.755
Theta hat (MLE)	0.128	Theta star (bias corrected MLE)	0.134
nu hat (MLE)	77.4	nu star (bias corrected)	73.99
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (73.99, α)	55.18	Adjusted Chi Square Value (73.99, β)	54.69
95% Gamma Approximate UCL (use when n>=50)	0.136	95% Gamma Adjusted UCL (use when n<50)	0.137
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.1	SD (KM)	0.11
Variance (KM)	0.0122	SE of Mean (KM)	0.016
k hat (KM)	0.824	k star (KM)	0.787
nu hat (KM)	80.72	nu star (KM)	77.11
theta hat (KM)	0.122	theta star (KM)	0.127
80% gamma percentile (KM)	0.164	90% gamma percentile (KM)	0.245
95% gamma percentile (KM)	0.327	99% gamma percentile (KM)	0.522
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (77.11, α)	57.88	Adjusted Chi Square Value (77.11, β)	57.38
95% Gamma Approximate KM-UCL (use when n>=50)	0.134	95% Gamma Adjusted KM-UCL (use when n<50)	0.135
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.101	Mean in Log Scale	-3.201
SD in Original Scale	0.111	SD in Log Scale	1.606
95% t UCL (assumes normality of ROS data)	0.127	95% Percentile Bootstrap UCL	0.127
95% BCA Bootstrap UCL	0.13	95% Bootstrap t UCL	0.131
95% H-UCL (Log ROS)	0.301		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.228	KM Geo Mean	0.0397
KM SD (logged)	1.604	95% Critical H Value (KM-Log)	3.071
KM Standard Error of Mean (logged)	0.232	95% H-UCL (KM -Log)	0.292

KM SD (logged)	1.604	95% Critical H Value (KM-Log)	3.071
KM Standard Error of Mean (logged)	0.232		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0998	Mean in Log Scale	-3.369
SD in Original Scale	0.112	SD in Log Scale	1.835
95% t UCL (Assumes normality)	0.127	95% H-Stat UCL	0.454
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.135		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:22:25 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Chromium (Cr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Chromium (Cr), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	46
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.13	Minimum Non-Detect	0.1
Maximum Detect	0.14	Maximum Non-Detect	0.1
Variance Detects	3.3333E-5	Percent Non-Detects	93.88%
Mean Detects	0.137	SD Detects	0.00577
Median Detects	0.14	CV Detects	0.0422
Skewness Detects	-1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-1.991	SD of Logged Detects	0.0428

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.102	KM Standard Error of Mean	0.00155
KM SD	0.00887	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.105	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.105	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.107	95% KM Chebyshev UCL	0.109
97.5% KM Chebyshev UCL	0.112	99% KM Chebyshev UCL	0.118

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	826.5	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.6536E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4959	nu star (bias corrected)	N/A

Mean (detects)	0.137		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0642	Mean	0.101
Maximum	0.14	Median	0.101
SD	0.0175	CV	0.173
k hat (MLE)	33.43	k star (bias corrected MLE)	31.4
Theta hat (MLE)	0.00303	Theta star (bias corrected MLE)	0.00322
nu hat (MLE)	3276	nu star (bias corrected)	3077
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (N/A, α)	2949	Adjusted Chi Square Value (N/A, β)	2946
95% Gamma Approximate UCL (use when n>=50)	0.106	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.102	SD (KM)	0.00887
Variance (KM)	7.8634E-5	SE of Mean (KM)	0.00155
k hat (KM)	132.9	k star (KM)	124.8
nu hat (KM)	13029	nu star (KM)	12232
theta hat (KM)	7.6907E-4	theta star (KM)	8.1914E-4
80% gamma percentile (KM)	0.11	90% gamma percentile (KM)	0.114
95% gamma percentile (KM)	0.118	99% gamma percentile (KM)	0.125
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	11976	Adjusted Chi Square Value (N/A, β)	11969
95% Gamma Approximate KM-UCL (use when n>=50)	0.104	95% Gamma Adjusted KM-UCL (use when n<50)	0.104
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.105	Mean in Log Scale	-2.261
SD in Original Scale	0.0144	SD in Log Scale	0.136
95% t UCL (assumes normality of ROS data)	0.109	95% Percentile Bootstrap UCL	0.108
95% BCA Bootstrap UCL	0.109	95% Bootstrap t UCL	0.109
95% H-UCL (Log ROS)	0.109		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.283	KM Geo Mean	0.102
KM SD (logged)	0.0752	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0132	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0752	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0132		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0553	Mean in Log Scale	-2.934
SD in Original Scale	0.021	SD in Log Scale	0.244
95% t UCL (Assumes normality)	0.0603	95% H-Stat UCL	0.0584
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.105		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:23:05 AM		
From File	MacLellan Region (All Lakes), Fish - Liver, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Liver, Cobalt (Co), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	32
Number of Detects	40	Number of Non-Detects	9
Number of Distinct Detects	32	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.365	Maximum Non-Detect	0.02
Variance Detects	0.00739	Percent Non-Detects	18.37%
Mean Detects	0.11	SD Detects	0.086
Median Detects	0.099	CV Detects	0.785
Skewness Detects	1.196	Kurtosis Detects	1.317
Mean of Logged Detects	-2.555	SD of Logged Detects	0.901
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.139	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0931	KM Standard Error of Mean	0.0122
KM SD	0.0842	95% KM (BCA) UCL	0.114
95% KM (t) UCL	0.114	95% KM (Percentile Bootstrap) UCL	0.114
95% KM (z) UCL	0.113	95% KM Bootstrap t UCL	0.117
90% KM Chebyshev UCL	0.13	95% KM Chebyshev UCL	0.146
97.5% KM Chebyshev UCL	0.169	99% KM Chebyshev UCL	0.214
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.941	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.764	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.138	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.142	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.602	k star (bias corrected MLE)	1.498
Theta hat (MLE)	0.0684	Theta star (bias corrected MLE)	0.0731
nu hat (MLE)	128.2	nu star (bias corrected)	119.9

Mean (detects)	0.11		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0913
Maximum	0.365	Median	0.086
SD	0.0867	CV	0.95
k hat (MLE)	1.066	k star (bias corrected MLE)	1.014
Theta hat (MLE)	0.0856	Theta star (bias corrected MLE)	0.09
nu hat (MLE)	104.5	nu star (bias corrected)	99.41
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (99.41, α)	77.41	Adjusted Chi Square Value (99.41, β)	76.82
95% Gamma Approximate UCL (use when n>=50)	0.117	95% Gamma Adjusted UCL (use when n<50)	0.118
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0931	SD (KM)	0.0842
Variance (KM)	0.00709	SE of Mean (KM)	0.0122
k hat (KM)	1.223	k star (KM)	1.162
nu hat (KM)	119.9	nu star (KM)	113.9
theta hat (KM)	0.0761	theta star (KM)	0.0801
80% gamma percentile (KM)	0.148	90% gamma percentile (KM)	0.207
95% gamma percentile (KM)	0.265	99% gamma percentile (KM)	0.398
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (113.87, α)	90.24	Adjusted Chi Square Value (113.87, β)	89.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.117	95% Gamma Adjusted KM-UCL (use when n<50)	0.118
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.94	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.139	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0915	Mean in Log Scale	-2.923
SD in Original Scale	0.0865	SD in Log Scale	1.143
95% t UCL (assumes normality of ROS data)	0.112	95% Percentile Bootstrap UCL	0.112
95% BCA Bootstrap UCL	0.113	95% Bootstrap t UCL	0.115
95% H-UCL (Log ROS)	0.156		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.804	KM Geo Mean	0.0606
KM SD (logged)	0.96	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.139	95% H-UCL (KM -Log)	0.132

KM SD (logged)	0.96	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.139		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0913	Mean in Log Scale	-2.931
SD in Original Scale	0.0867	SD in Log Scale	1.142
95% t UCL (Assumes normality)	0.112	95% H-Stat UCL	0.154
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.118	95% GROS Adjusted Gamma UCL	0.118
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:23:44 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	2.11	Mean	13.02
Maximum	50.3	Median	8.1
SD	11.48	Std. Error of Mean	1.641
Coefficient of Variation	0.882	Skewness	1.684

Normal GOF Test			
Shapiro Wilk Test Statistic	0.798	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	15.77	95% Adjusted-CLT UCL (Chen-1995)	16.14
		95% Modified-t UCL (Johnson-1978)	15.83

Gamma GOF Test			
A-D Test Statistic	1.012	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.766	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.143	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.676	k star (bias corrected MLE)	1.587
Theta hat (MLE)	7.765	Theta star (bias corrected MLE)	8.2
nu hat (MLE)	164.3	nu star (bias corrected)	155.6
MLE Mean (bias corrected)	13.02	MLE Sd (bias corrected)	10.33
		Approximate Chi Square Value (0.05)	127.7
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	127

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	15.85	95% Adjusted Gamma UCL (use when n<50)	15.95

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.104	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.747	Mean of logged Data	2.239
Maximum of Logged Data	3.918	SD of logged Data	0.809
Assuming Lognormal Distribution			
95% H-UCL	16.73	90% Chebyshev (MVUE) UCL	17.93
95% Chebyshev (MVUE) UCL	20.21	97.5% Chebyshev (MVUE) UCL	23.37
99% Chebyshev (MVUE) UCL	29.57		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	15.72	95% Jackknife UCL	15.77
95% Standard Bootstrap UCL	15.68	95% Bootstrap-t UCL	16.29
95% Hall's Bootstrap UCL	16.26	95% Percentile Bootstrap UCL	15.74
95% BCA Bootstrap UCL	16.14		
90% Chebyshev(Mean, Sd) UCL	17.94	95% Chebyshev(Mean, Sd) UCL	20.17
97.5% Chebyshev(Mean, Sd) UCL	23.26	99% Chebyshev(Mean, Sd) UCL	29.34
Suggested UCL to Use			
95% H-UCL	16.73		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:24:23 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.583	Mean	1.198
Maximum	3.14	Median	0.946
SD	0.589	Std. Error of Mean	0.0842
Coefficient of Variation	0.492	Skewness	1.287
Normal GOF Test			
Shapiro Wilk Test Statistic	0.861	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.339	95% Adjusted-CLT UCL (Chen-1995)	1.353
		95% Modified-t UCL (Johnson-1978)	1.342
Gamma GOF Test			
A-D Test Statistic	1.274	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.15	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.034	k star (bias corrected MLE)	4.739
Theta hat (MLE)	0.238	Theta star (bias corrected MLE)	0.253
nu hat (MLE)	493.3	nu star (bias corrected)	464.4
MLE Mean (bias corrected)	1.198	MLE Sd (bias corrected)	0.55
		Approximate Chi Square Value (0.05)	415.5
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	414.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.339	95% Adjusted Gamma UCL (use when n<50)	1.344

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.54	Mean of logged Data	0.078
Maximum of Logged Data	1.144	SD of logged Data	0.445
Assuming Lognormal Distribution			
95% H-UCL	1.344	90% Chebyshev (MVUE) UCL	1.427
95% Chebyshev (MVUE) UCL	1.534	97.5% Chebyshev (MVUE) UCL	1.683
99% Chebyshev (MVUE) UCL	1.975		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.336	95% Jackknife UCL	1.339
95% Standard Bootstrap UCL	1.332	95% Bootstrap-t UCL	1.369
95% Hall's Bootstrap UCL	1.358	95% Percentile Bootstrap UCL	1.337
95% BCA Bootstrap UCL	1.351		
90% Chebyshev(Mean, Sd) UCL	1.451	95% Chebyshev(Mean, Sd) UCL	1.565
97.5% Chebyshev(Mean, Sd) UCL	1.724	99% Chebyshev(Mean, Sd) UCL	2.036
Suggested UCL to Use			
95% Student's-t UCL	1.339	or 95% Modified-t UCL	1.342
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:25:02 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	0.019	Mean	0.105
Maximum	0.933	Median	0.0545
SD	0.186	Std. Error of Mean	0.0311
Coefficient of Variation	1.782	Skewness	3.863

Normal GOF Test		
Shapiro Wilk Test Statistic	0.433	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.935	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.337	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.145	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.157	95% Adjusted-CLT UCL (Chen-1995)	0.177
		95% Modified-t UCL (Johnson-1978)	0.16

Gamma GOF Test		
A-D Test Statistic	2.915	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.776	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.203	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.151	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	1.005	k star (bias corrected MLE)	0.94
Theta hat (MLE)	0.104	Theta star (bias corrected MLE)	0.111
nu hat (MLE)	72.36	nu star (bias corrected)	67.66
MLE Mean (bias corrected)	0.105	MLE Sd (bias corrected)	0.108
		Approximate Chi Square Value (0.05)	49.73
Adjusted Level of Significance	0.0428	Adjusted Chi Square Value	49.03

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.142	95% Adjusted Gamma UCL (use when n<50)	0.144

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.935	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.145	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.963	Mean of logged Data	-2.831
Maximum of Logged Data	-0.0694	SD of logged Data	0.898
Assuming Lognormal Distribution			
95% H-UCL	0.125	90% Chebyshev (MVUE) UCL	0.131
95% Chebyshev (MVUE) UCL	0.151	97.5% Chebyshev (MVUE) UCL	0.179
99% Chebyshev (MVUE) UCL	0.234		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.156	95% Jackknife UCL	0.157
95% Standard Bootstrap UCL	0.156	95% Bootstrap-t UCL	0.324
95% Hall's Bootstrap UCL	0.426	95% Percentile Bootstrap UCL	0.163
95% BCA Bootstrap UCL	0.184		
90% Chebyshev(Mean, Sd) UCL	0.198	95% Chebyshev(Mean, Sd) UCL	0.24
97.5% Chebyshev(Mean, Sd) UCL	0.299	99% Chebyshev(Mean, Sd) UCL	0.414
Suggested UCL to Use			
95% H-UCL	0.125		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:25:41 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.075	Mean	0.148
Maximum	0.312	Median	0.138
SD	0.0484	Std. Error of Mean	0.00691
Coefficient of Variation	0.326	Skewness	1.245

Normal GOF Test			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.16	95% Adjusted-CLT UCL (Chen-1995)	0.161
		95% Modified-t UCL (Johnson-1978)	0.16

Gamma GOF Test			
A-D Test Statistic	0.542	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0995	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.126	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	10.74	k star (bias corrected MLE)	10.09
Theta hat (MLE)	0.0138	Theta star (bias corrected MLE)	0.0147
nu hat (MLE)	1052	nu star (bias corrected)	989.2
MLE Mean (bias corrected)	0.148	MLE Sd (bias corrected)	0.0467
		Approximate Chi Square Value (0.05)	917.2
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	915.1

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.16	95% Adjusted Gamma UCL (use when n<50)	0.16

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0806	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.59	Mean of logged Data	-1.956
Maximum of Logged Data	-1.165	SD of logged Data	0.307
Assuming Lognormal Distribution			
95% H-UCL	0.16	90% Chebyshev (MVUE) UCL	0.168
95% Chebyshev (MVUE) UCL	0.177	97.5% Chebyshev (MVUE) UCL	0.189
99% Chebyshev (MVUE) UCL	0.214		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.16	95% Jackknife UCL	0.16
95% Standard Bootstrap UCL	0.159	95% Bootstrap-t UCL	0.162
95% Hall's Bootstrap UCL	0.162	95% Percentile Bootstrap UCL	0.16
95% BCA Bootstrap UCL	0.161		
90% Chebyshev(Mean, Sd) UCL	0.169	95% Chebyshev(Mean, Sd) UCL	0.178
97.5% Chebyshev(Mean, Sd) UCL	0.191	99% Chebyshev(Mean, Sd) UCL	0.217
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.16		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:26:20 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Nickel (Ni), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	23
Number of Detects	28	Number of Non-Detects	21
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.18	Minimum Non-Detect	0.1
Maximum Detect	1.04	Maximum Non-Detect	0.1
Variance Detects	0.0439	Percent Non-Detects	42.86%
Mean Detects	0.401	SD Detects	0.209
Median Detects	0.35	CV Detects	0.523
Skewness Detects	1.55	Kurtosis Detects	2.638
Mean of Logged Detects	-1.027	SD of Logged Detects	0.472

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.272	KM Standard Error of Mean	0.0313
KM SD	0.215	95% KM (BCA) UCL	0.324
95% KM (t) UCL	0.324	95% KM (Percentile Bootstrap) UCL	0.327
95% KM (z) UCL	0.323	95% KM Bootstrap t UCL	0.335
90% KM Chebyshev UCL	0.366	95% KM Chebyshev UCL	0.408
97.5% KM Chebyshev UCL	0.467	99% KM Chebyshev UCL	0.583

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.457	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.109	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.166	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.615	k star (bias corrected MLE)	4.144
Theta hat (MLE)	0.0868	Theta star (bias corrected MLE)	0.0967
nu hat (MLE)	258.4	nu star (bias corrected)	232.1

Mean (detects)	0.401		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.245
Maximum	1.04	Median	0.19
SD	0.241	CV	0.985
k hat (MLE)	0.742	k star (bias corrected MLE)	0.71
Theta hat (MLE)	0.33	Theta star (bias corrected MLE)	0.345
nu hat (MLE)	72.7	nu star (bias corrected)	69.58
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (69.58, α)	51.38	Adjusted Chi Square Value (69.58, β)	50.9
95% Gamma Approximate UCL (use when n>=50)	0.332	95% Gamma Adjusted UCL (use when n<50)	0.335
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.272	SD (KM)	0.215
Variance (KM)	0.0463	SE of Mean (KM)	0.0313
k hat (KM)	1.595	k star (KM)	1.511
nu hat (KM)	156.3	nu star (KM)	148.1
theta hat (KM)	0.17	theta star (KM)	0.18
80% gamma percentile (KM)	0.42	90% gamma percentile (KM)	0.565
95% gamma percentile (KM)	0.706	99% gamma percentile (KM)	1.024
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (148.09, α)	121	Adjusted Chi Square Value (148.09, β)	120.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.333	95% Gamma Adjusted KM-UCL (use when n<50)	0.335
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.277	Mean in Log Scale	-1.557
SD in Original Scale	0.215	SD in Log Scale	0.759
95% t UCL (assumes normality of ROS data)	0.328	95% Percentile Bootstrap UCL	0.329
95% BCA Bootstrap UCL	0.336	95% Bootstrap t UCL	0.333
95% H-UCL (Log ROS)	0.354		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.574	KM Geo Mean	0.207
KM SD (logged)	0.722	95% Critical H Value (KM-Log)	2.056
KM Standard Error of Mean (logged)	0.105	95% H-UCL (KM -Log)	0.333

KM SD (logged)	0.722	95% Critical H Value (KM-Log)	2.056
KM Standard Error of Mean (logged)	0.105		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.25	Mean in Log Scale	-1.871
SD in Original Scale	0.235	SD in Log Scale	1.046
95% t UCL (Assumes normality)	0.307	95% H-Stat UCL	0.382
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.335	95% GROS Adjusted Gamma UCL	0.335
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:27:00 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Selenium (Se), mg/kg ww

General Statistics

Total Number of Observations	49	Number of Distinct Observations	43
		Number of Missing Observations	0
Minimum	0.65	Mean	1.268
Maximum	2.48	Median	1.22
SD	0.323	Std. Error of Mean	0.0461
Coefficient of Variation	0.255	Skewness	1.297

Normal GOF Test

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.345	95% Adjusted-CLT UCL (Chen-1995)	1.353
		95% Modified-t UCL (Johnson-1978)	1.346

Gamma GOF Test

A-D Test Statistic	0.469	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.12	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.126	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.43	k star (bias corrected MLE)	16.37
Theta hat (MLE)	0.0728	Theta star (bias corrected MLE)	0.0774
nu hat (MLE)	1708	nu star (bias corrected)	1604
MLE Mean (bias corrected)	1.268	MLE Sd (bias corrected)	0.313
		Approximate Chi Square Value (0.05)	1512
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	1510

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.345	95% Adjusted Gamma UCL (use when n<50)	1.347

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.989	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.105	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.431	Mean of logged Data	0.208
Maximum of Logged Data	0.908	SD of logged Data	0.24
Assuming Lognormal Distribution			
95% H-UCL	1.35	90% Chebyshev (MVUE) UCL	1.399
95% Chebyshev (MVUE) UCL	1.459	97.5% Chebyshev (MVUE) UCL	1.542
99% Chebyshev (MVUE) UCL	1.704		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.344	95% Jackknife UCL	1.345
95% Standard Bootstrap UCL	1.341	95% Bootstrap-t UCL	1.355
95% Hall's Bootstrap UCL	1.366	95% Percentile Bootstrap UCL	1.343
95% BCA Bootstrap UCL	1.351		
90% Chebyshev(Mean, Sd) UCL	1.406	95% Chebyshev(Mean, Sd) UCL	1.469
97.5% Chebyshev(Mean, Sd) UCL	1.556	99% Chebyshev(Mean, Sd) UCL	1.726
Suggested UCL to Use			
95% Adjusted Gamma UCL	1.347		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:27:39 AM		
From File	MacLellan Region (All Lakes), Fish - Liver, Silver (Ag), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region (All Lakes), Fish - Liver, Silver (Ag), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	24
Number of Detects	33	Number of Non-Detects	16
Number of Distinct Detects	23	Number of Distinct Non-Detects	1
Minimum Detect	0.022	Minimum Non-Detect	0.02
Maximum Detect	0.175	Maximum Non-Detect	0.02
Variance Detects	0.00138	Percent Non-Detects	32.65%
Mean Detects	0.0576	SD Detects	0.0371
Median Detects	0.044	CV Detects	0.644
Skewness Detects	1.433	Kurtosis Detects	1.812
Mean of Logged Detects	-3.025	SD of Logged Detects	0.576

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0453	KM Standard Error of Mean	0.00504
KM SD	0.0348	95% KM (BCA) UCL	0.0547
95% KM (t) UCL	0.0538	95% KM (Percentile Bootstrap) UCL	0.0536
95% KM (z) UCL	0.0536	95% KM Bootstrap t UCL	0.0558
90% KM Chebyshev UCL	0.0605	95% KM Chebyshev UCL	0.0673
97.5% KM Chebyshev UCL	0.0768	99% KM Chebyshev UCL	0.0955

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.01	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.197	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.154	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.086	k star (bias corrected MLE)	2.826
Theta hat (MLE)	0.0187	Theta star (bias corrected MLE)	0.0204
nu hat (MLE)	203.7	nu star (bias corrected)	186.5

Mean (detects)	0.0576		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0421
Maximum	0.175	Median	0.031
SD	0.0378	CV	0.898
k hat (MLE)	1.488	k star (bias corrected MLE)	1.411
Theta hat (MLE)	0.0283	Theta star (bias corrected MLE)	0.0298
nu hat (MLE)	145.8	nu star (bias corrected)	138.2
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (138.24, α)	112.1	Adjusted Chi Square Value (138.24, β)	111.4
95% Gamma Approximate UCL (use when n>=50)	0.0519	95% Gamma Adjusted UCL (use when n<50)	0.0522
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0453	SD (KM)	0.0348
Variance (KM)	0.00121	SE of Mean (KM)	0.00504
k hat (KM)	1.699	k star (KM)	1.609
nu hat (KM)	166.5	nu star (KM)	157.6
theta hat (KM)	0.0267	theta star (KM)	0.0282
80% gamma percentile (KM)	0.0696	90% gamma percentile (KM)	0.0929
95% gamma percentile (KM)	0.115	99% gamma percentile (KM)	0.166
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (157.65, α)	129.6	Adjusted Chi Square Value (157.65, β)	128.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.0551	95% Gamma Adjusted KM-UCL (use when n<50)	0.0555
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0429	Mean in Log Scale	-3.487
SD in Original Scale	0.0371	SD in Log Scale	0.851
95% t UCL (assumes normality of ROS data)	0.0518	95% Percentile Bootstrap UCL	0.0519
95% BCA Bootstrap UCL	0.0528	95% Bootstrap t UCL	0.0537
95% H-UCL (Log ROS)	0.0574		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.314	KM Geo Mean	0.0364
KM SD (logged)	0.624	95% Critical H Value (KM-Log)	1.982
KM Standard Error of Mean (logged)	0.0906	95% H-UCL (KM -Log)	0.0528

KM SD (logged)	0.624	95% Critical H Value (KM-Log)	1.982
KM Standard Error of Mean (logged)	0.0906		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0421	Mean in Log Scale	-3.541
SD in Original Scale	0.0378	SD in Log Scale	0.884
95% t UCL (Assumes normality)	0.0511	95% H-Stat UCL	0.0569
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.0528		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:28:18 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	38
		Number of Missing Observations	0
Minimum	0.021	Mean	0.342
Maximum	8.33	Median	0.042
SD	1.292	Std. Error of Mean	0.185
Coefficient of Variation	3.777	Skewness	5.58

Normal GOF Test			
Shapiro Wilk Test Statistic	0.267	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.456	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.651	95% Adjusted-CLT UCL (Chen-1995)	0.803
		95% Modified-t UCL (Johnson-1978)	0.676

Gamma GOF Test			
A-D Test Statistic	8.135	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.835	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.28	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.135	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	0.415	k star (bias corrected MLE)	0.403
Theta hat (MLE)	0.824	Theta star (bias corrected MLE)	0.848
nu hat (MLE)	40.68	nu star (bias corrected)	39.52
MLE Mean (bias corrected)	0.342	MLE Sd (bias corrected)	0.538
		Approximate Chi Square Value (0.05)	26.12
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	25.79

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.517	95% Adjusted Gamma UCL (use when n<50)	0.524

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.789	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.182	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.863	Mean of logged Data	-2.649
Maximum of Logged Data	2.12	SD of logged Data	1.275
Assuming Lognormal Distribution			
95% H-UCL	0.26	90% Chebyshev (MVUE) UCL	0.261
95% Chebyshev (MVUE) UCL	0.31	97.5% Chebyshev (MVUE) UCL	0.377
99% Chebyshev (MVUE) UCL	0.508		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.645	95% Jackknife UCL	0.651
95% Standard Bootstrap UCL	0.643	95% Bootstrap-t UCL	3.079
95% Hall's Bootstrap UCL	2.155	95% Percentile Bootstrap UCL	0.687
95% BCA Bootstrap UCL	0.947		
90% Chebyshev(Mean, Sd) UCL	0.895	95% Chebyshev(Mean, Sd) UCL	1.146
97.5% Chebyshev(Mean, Sd) UCL	1.494	99% Chebyshev(Mean, Sd) UCL	2.178
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1.146		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:28:57 AM		
From File	MacLellan Region (All Lakes), Fish - Liver, Thallium (Tl), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Liver, Thallium (Tl), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	22
Number of Detects	24	Number of Non-Detects	25
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.006	Minimum Non-Detect	0.006
Maximum Detect	0.0661	Maximum Non-Detect	0.006
Variance Detects	1.8706E-4	Percent Non-Detects	51.02%
Mean Detects	0.0162	SD Detects	0.0137
Median Detects	0.0122	CV Detects	0.844
Skewness Detects	2.53	Kurtosis Detects	7.415
Mean of Logged Detects	-4.347	SD of Logged Detects	0.635
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.705	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.011	KM Standard Error of Mean	0.00156
KM SD	0.0107	95% KM (BCA) UCL	0.0139
95% KM (t) UCL	0.0136	95% KM (Percentile Bootstrap) UCL	0.0138
95% KM (z) UCL	0.0136	95% KM Bootstrap t UCL	0.0155
90% KM Chebyshev UCL	0.0157	95% KM Chebyshev UCL	0.0178
97.5% KM Chebyshev UCL	0.0207	99% KM Chebyshev UCL	0.0265
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.933	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.184	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.18	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.378	k star (bias corrected MLE)	2.108
Theta hat (MLE)	0.00682	Theta star (bias corrected MLE)	0.00769
nu hat (MLE)	114.1	nu star (bias corrected)	101.2

Mean (detects)	0.0162		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.006	Mean	0.013
Maximum	0.0661	Median	0.01
SD	0.00997	CV	0.765
k hat (MLE)	3.754	k star (bias corrected MLE)	3.537
Theta hat (MLE)	0.00347	Theta star (bias corrected MLE)	0.00369
nu hat (MLE)	367.9	nu star (bias corrected)	346.7
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (346.67, α)	304.5	Adjusted Chi Square Value (346.67, β)	303.3
95% Gamma Approximate UCL (use when n>=50)	0.0148	95% Gamma Adjusted UCL (use when n<50)	0.0149
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.011	SD (KM)	0.0107
Variance (KM)	1.1387E-4	SE of Mean (KM)	0.00156
k hat (KM)	1.063	k star (KM)	1.012
nu hat (KM)	104.2	nu star (KM)	99.13
theta hat (KM)	0.0103	theta star (KM)	0.0109
80% gamma percentile (KM)	0.0177	90% gamma percentile (KM)	0.0253
95% gamma percentile (KM)	0.0328	99% gamma percentile (KM)	0.0504
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (99.13, α)	77.16	Adjusted Chi Square Value (99.13, β)	76.58
95% Gamma Approximate KM-UCL (use when n>=50)	0.0141	95% Gamma Adjusted KM-UCL (use when n<50)	0.0142
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00923	Mean in Log Scale	-5.266
SD in Original Scale	0.0118	SD in Log Scale	1.108
95% t UCL (assumes normality of ROS data)	0.0121	95% Percentile Bootstrap UCL	0.0122
95% BCA Bootstrap UCL	0.013	95% Bootstrap t UCL	0.0136
95% H-UCL (Log ROS)	0.0141		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.739	KM Geo Mean	0.00875
KM SD (logged)	0.58	95% Critical H Value (KM-Log)	1.948
KM Standard Error of Mean (logged)	0.0847	95% H-UCL (KM -Log)	0.0122

KM SD (logged)	0.58	95% Critical H Value (KM-Log)	1.948
KM Standard Error of Mean (logged)	0.0847		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00947	Mean in Log Scale	-5.093
SD in Original Scale	0.0116	SD in Log Scale	0.859
95% t UCL (Assumes normality)	0.0122	95% H-Stat UCL	0.0117
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Lognormal Distributed at 5% Significance Level			
Suggested UCL to Use			
KM H-UCL	0.0122		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:30:55 AM		
From File	MacLellan Region (All Lakes), Fish - Liver, Vanadium (V), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Liver, Vanadium (V), mg/kg ww			
General Statistics			
Total Number of Observations	49	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	41
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.43	Maximum Non-Detect	0.1
Variance Detects	0.0145	Percent Non-Detects	83.67%
Mean Detects	0.204	SD Detects	0.121
Median Detects	0.16	CV Detects	0.592
Skewness Detects	1.322	Kurtosis Detects	0.468
Mean of Logged Detects	-1.722	SD of Logged Detects	0.526
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.117	KM Standard Error of Mean	0.0091
KM SD	0.0596	95% KM (BCA) UCL	0.135
95% KM (t) UCL	0.132	95% KM (Percentile Bootstrap) UCL	0.133
95% KM (z) UCL	0.132	95% KM Bootstrap t UCL	0.161
90% KM Chebyshev UCL	0.144	95% KM Chebyshev UCL	0.157
97.5% KM Chebyshev UCL	0.174	99% KM Chebyshev UCL	0.207
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.523	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.238	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.98	k star (bias corrected MLE)	2.571
Theta hat (MLE)	0.0512	Theta star (bias corrected MLE)	0.0792
nu hat (MLE)	63.68	nu star (bias corrected)	41.14

Mean (detects)	0.204		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0421
Maximum	0.43	Median	0.01
SD	0.0857	CV	2.036
k hat (MLE)	0.649	k star (bias corrected MLE)	0.623
Theta hat (MLE)	0.0648	Theta star (bias corrected MLE)	0.0676
nu hat (MLE)	63.58	nu star (bias corrected)	61.02
Adjusted Level of Significance (β)	0.0451		
Approximate Chi Square Value (61.02, α)	44.05	Adjusted Chi Square Value (61.02, β)	43.62
95% Gamma Approximate UCL (use when n>=50)	0.0583	95% Gamma Adjusted UCL (use when n<50)	0.0589
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.117	SD (KM)	0.0596
Variance (KM)	0.00355	SE of Mean (KM)	0.0091
k hat (KM)	3.854	k star (KM)	3.632
nu hat (KM)	377.7	nu star (KM)	355.9
theta hat (KM)	0.0303	theta star (KM)	0.0322
80% gamma percentile (KM)	0.163	90% gamma percentile (KM)	0.199
95% gamma percentile (KM)	0.233	99% gamma percentile (KM)	0.304
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (355.94, α)	313.2	Adjusted Chi Square Value (355.94, β)	312
95% Gamma Approximate KM-UCL (use when n>=50)	0.133	95% Gamma Adjusted KM-UCL (use when n<50)	0.133
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0519	Mean in Log Scale	-3.87
SD in Original Scale	0.084	SD in Log Scale	1.404
95% t UCL (assumes normality of ROS data)	0.0721	95% Percentile Bootstrap UCL	0.0737
95% BCA Bootstrap UCL	0.0778	95% Bootstrap t UCL	0.0855
95% H-UCL (Log ROS)	0.0988		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.208	KM Geo Mean	0.11
KM SD (logged)	0.292	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.0447	95% H-UCL (KM -Log)	0.124

KM SD (logged)	0.292	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.0447		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0751	Mean in Log Scale	-2.788
SD in Original Scale	0.0736	SD in Log Scale	0.516
95% t UCL (Assumes normality)	0.0927	95% H-Stat UCL	0.081
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.133	95% GROS Adjusted Gamma UCL	0.0589
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:31:35 AM
From File	MacLellan Region (All Lakes), Fish - Liver, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Liver, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	17	Mean	34.67
Maximum	109	Median	31.3
SD	14.38	Std. Error of Mean	2.054
Coefficient of Variation	0.415	Skewness	3.261
Normal GOF Test			
Shapiro Wilk Test Statistic	0.719	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.126	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	38.12	95% Adjusted-CLT UCL (Chen-1995)	39.07
		95% Modified-t UCL (Johnson-1978)	38.28
Gamma GOF Test			
A-D Test Statistic	1.518	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.125	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.127	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	8.999	k star (bias corrected MLE)	8.462
Theta hat (MLE)	3.853	Theta star (bias corrected MLE)	4.098
nu hat (MLE)	881.9	nu star (bias corrected)	829.3
MLE Mean (bias corrected)	34.67	MLE Sd (bias corrected)	11.92
		Approximate Chi Square Value (0.05)	763.4
Adjusted Level of Significance	0.0451	Adjusted Chi Square Value	761.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	37.66	95% Adjusted Gamma UCL (use when n<50)	37.76

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.116	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.126	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.833	Mean of logged Data	3.489
Maximum of Logged Data	4.691	SD of logged Data	0.316
Assuming Lognormal Distribution			
95% H-UCL	37.38	90% Chebyshev (MVUE) UCL	39.15
95% Chebyshev (MVUE) UCL	41.3	97.5% Chebyshev (MVUE) UCL	44.29
99% Chebyshev (MVUE) UCL	50.16		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	38.05	95% Jackknife UCL	38.12
95% Standard Bootstrap UCL	37.91	95% Bootstrap-t UCL	39.89
95% Hall's Bootstrap UCL	53.21	95% Percentile Bootstrap UCL	38.2
95% BCA Bootstrap UCL	39.45		
90% Chebyshev(Mean, Sd) UCL	40.84	95% Chebyshev(Mean, Sd) UCL	43.63
97.5% Chebyshev(Mean, Sd) UCL	47.5	99% Chebyshev(Mean, Sd) UCL	55.11
Suggested UCL to Use			
95% Adjusted Gamma UCL	37.76		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.25
PROUCL OUTPUTS
FISH LIVER TISSUE (SWEDE LAKE)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:08:06 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Arsenic (As), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	24
Number of Detects	32	Number of Non-Detects	1
Number of Distinct Detects	23	Number of Distinct Non-Detects	1
Minimum Detect	0.011	Minimum Non-Detect	0.01
Maximum Detect	0.104	Maximum Non-Detect	0.01
Variance Detects	5.9664E-4	Percent Non-Detects	3.03%
Mean Detects	0.0374	SD Detects	0.0244
Median Detects	0.036	CV Detects	0.652
Skewness Detects	1.027	Kurtosis Detects	0.664
Mean of Logged Detects	-3.492	SD of Logged Detects	0.663

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.157	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0366	Standard Error of Mean	0.00427
SD	0.0241	95% KM (BCA) UCL	0.0436
95% KM (t) UCL	0.0438	95% KM (Percentile Bootstrap) UCL	0.0437
95% KM (z) UCL	0.0436	95% KM Bootstrap t UCL	0.045
90% KM Chebyshev UCL	0.0494	95% KM Chebyshev UCL	0.0552
97.5% KM Chebyshev UCL	0.0633	99% KM Chebyshev UCL	0.0791

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.845	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.756	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.162	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.157	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.57	k star (bias corrected MLE)	2.35
Theta hat (MLE)	0.0146	Theta star (bias corrected MLE)	0.0159
nu hat (MLE)	164.5	nu star (bias corrected)	150.4
MLE Mean (bias corrected)	0.0374	MLE Sd (bias corrected)	0.0244

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	2.3	nu hat (KM)	151.8
Approximate Chi Square Value (151.80, α)	124.3	Adjusted Chi Square Value (151.80, β)	123
95% Gamma Approximate KM-UCL (use when n>=50)	0.0447	95% Gamma Adjusted KM-UCL (use when n<50)	0.0452
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0366
Maximum	0.104	Median	0.036
SD	0.0245	CV	0.67
k hat (MLE)	2.445	k star (bias corrected MLE)	2.243
Theta hat (MLE)	0.015	Theta star (bias corrected MLE)	0.0163
nu hat (MLE)	161.4	nu star (bias corrected)	148
MLE Mean (bias corrected)	0.0366	MLE Sd (bias corrected)	0.0244
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (148.03, α)	120.9	Adjusted Chi Square Value (148.03, β)	119.7
95% Gamma Approximate UCL (use when n>=50)	0.0448	95% Gamma Adjusted UCL (use when n<50)	0.0453
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.157	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0365	Mean in Log Scale	-3.542
SD in Original Scale	0.0247	SD in Log Scale	0.714
95% t UCL (assumes normality of ROS data)	0.0438	95% Percentile Bootstrap UCL	0.0439
95% BCA Bootstrap UCL	0.044	95% Bootstrap t UCL	0.0452
95% H-UCL (Log ROS)	0.0488		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.526	95% H-UCL (KM -Log)	0.0472
KM SD (logged)	0.67	95% Critical H Value (KM-Log)	2.084
KM Standard Error of Mean (logged)	0.119		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0365	Mean in Log Scale	-3.547
SD in Original Scale	0.0247	SD in Log Scale	0.724
95% t UCL (Assumes normality)	0.0437	95% H-Stat UCL	0.0492
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (Chebyshev) UCL	0.0552						
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:08:45 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Barium (Ba), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Barium (Ba), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	31
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.123	Minimum Non-Detect	0.04
Maximum Detect	0.457	Maximum Non-Detect	0.04
Variance Detects	0.0558	Percent Non-Detects	93.94%
Mean Detects	0.29	SD Detects	0.236
Median Detects	0.29	CV Detects	0.814
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.439	SD of Logged Detects	0.928

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0552	Standard Error of Mean	0.0178
SD	0.0724	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0854	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0845	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.109	95% KM Chebyshev UCL	0.133
97.5% KM Chebyshev UCL	0.167	99% KM Chebyshev UCL	0.233

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.637	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.11	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	10.55	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.58	nu hat (KM)	38.25
		Adjusted Level of Significance (β)	0.0419

Approximate Chi Square Value (38.25, α)	25.09	Adjusted Chi Square Value (38.25, β)	24.54
95% Gamma Approximate KM-UCL (use when n>=50)	0.0841	95% Gamma Adjusted KM-UCL (use when n<50)	0.086
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.019	Mean in Log Scale	-9.612
SD in Original Scale	0.0815	SD in Log Scale	4.072
95% t UCL (assumes normality of ROS data)	0.0431	95% Percentile Bootstrap UCL	0.0467
95% BCA Bootstrap UCL	0.0635	95% Bootstrap t UCL	0.402
95% H-UCL (Log ROS)	48.56		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0364	Mean in Log Scale	-3.762
SD in Original Scale	0.0776	SD in Log Scale	0.621
95% t UCL (Assumes normality)	0.0592	95% H-Stat UCL	0.0352
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0854	95% KM (% Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:09:32 PM		
From File	Gordon Region (Sweed Lake), Fish - Liver, Cadmium (Cd), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (Sweed Lake), Fish - Liver, Cadmium (Cd), mg/kg ww			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	0.0055	Mean	0.0633
Maximum	0.24	Median	0.063
SD	0.0508	Std. Error of Mean	0.00885
Coefficient of Variation	0.802	Skewness	1.318
Normal GOF Test			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0783	95% Adjusted-CLT UCL (Chen-1995)	0.08
		95% Modified-t UCL (Johnson-1978)	0.0786
Gamma GOF Test			
A-D Test Statistic	0.734	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.15	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.365	k star (bias corrected MLE)	1.261
Theta hat (MLE)	0.0464	Theta star (bias corrected MLE)	0.0502
nu hat (MLE)	90.07	nu star (bias corrected)	83.21
MLE Mean (bias corrected)	0.0633	MLE Sd (bias corrected)	0.0564
		Approximate Chi Square Value (0.05)	63.19
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	62.29
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0834	95% Adjusted Gamma UCL (use when n<50)	0.0846

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-5.203	Mean of logged Data	-3.169
Maximum of Logged Data	-1.427	SD of logged Data	1.041
Assuming Lognormal Distribution			
95% H-UCL	0.114	90% Chebyshev (MVUE) UCL	0.115
95% Chebyshev (MVUE) UCL	0.135	97.5% Chebyshev (MVUE) UCL	0.164
99% Chebyshev (MVUE) UCL	0.219		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0779	95% Jackknife UCL	0.0783
95% Standard Bootstrap UCL	0.0775	95% Bootstrap-t UCL	0.081
95% Hall's Bootstrap UCL	0.0846	95% Percentile Bootstrap UCL	0.0785
95% BCA Bootstrap UCL	0.0809		
90% Chebyshev(Mean, Sd) UCL	0.0899	95% Chebyshev(Mean, Sd) UCL	0.102
97.5% Chebyshev(Mean, Sd) UCL	0.119	99% Chebyshev(Mean, Sd) UCL	0.151
Suggested UCL to Use			
95% Student's-t UCL	0.0783		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:10:12 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Chromium (Cr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Chromium (Cr), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Chromium (Cr), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:10:51 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	17
Number of Detects	24	Number of Non-Detects	9
Number of Distinct Detects	17	Number of Distinct Non-Detects	1
Minimum Detect	0.02	Minimum Non-Detect	0.02
Maximum Detect	0.744	Maximum Non-Detect	0.02
Variance Detects	0.0398	Percent Non-Detects	27.27%
Mean Detects	0.0908	SD Detects	0.199
Median Detects	0.028	CV Detects	2.198
Skewness Detects	3.191	Kurtosis Detects	9
Mean of Logged Detects	-3.243	SD of Logged Detects	0.963
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.365	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.452	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0715	Standard Error of Mean	0.0301
SD	0.169	95% KM (BCA) UCL	0.134
95% KM (t) UCL	0.122	95% KM (Percentile Bootstrap) UCL	0.118
95% KM (z) UCL	0.121	95% KM Bootstrap t UCL	0.647
90% KM Chebyshev UCL	0.162	95% KM Chebyshev UCL	0.203
97.5% KM Chebyshev UCL	0.26	99% KM Chebyshev UCL	0.371
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	5.544	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.786	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.386	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.185	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.715	k star (bias corrected MLE)	0.653
Theta hat (MLE)	0.127	Theta star (bias corrected MLE)	0.139
nu hat (MLE)	34.3	nu star (bias corrected)	31.34
MLE Mean (bias corrected)	0.0908	MLE Sd (bias corrected)	0.112

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.178	nu hat (KM)	11.74
Approximate Chi Square Value (11.74, α)	5.054	Adjusted Chi Square Value (11.74, β)	4.829
95% Gamma Approximate KM-UCL (use when n>=50)	0.166	95% Gamma Adjusted KM-UCL (use when n<50)	0.174
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0687
Maximum	0.744	Median	0.024
SD	0.173	CV	2.517
k hat (MLE)	0.652	k star (bias corrected MLE)	0.613
Theta hat (MLE)	0.105	Theta star (bias corrected MLE)	0.112
nu hat (MLE)	43.01	nu star (bias corrected)	40.43
MLE Mean (bias corrected)	0.0687	MLE Sd (bias corrected)	0.0878
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (40.43, α)	26.86	Adjusted Chi Square Value (40.43, β)	26.29
95% Gamma Approximate UCL (use when n>=50)	0.103	95% Gamma Adjusted UCL (use when n<50)	0.106
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.592	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0677	Mean in Log Scale	-3.768
SD in Original Scale	0.173	SD in Log Scale	1.218
95% t UCL (assumes normality of ROS data)	0.119	95% Percentile Bootstrap UCL	0.116
95% BCA Bootstrap UCL	0.151	95% Bootstrap t UCL	0.603
95% H-UCL (Log ROS)	0.0871		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0687	Mean in Log Scale	-3.615
SD in Original Scale	0.173	SD in Log Scale	1.023
95% t UCL (Assumes normality)	0.12	95% H-Stat UCL	0.071
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (BCA) UCL	0.134		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			

Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:11:30 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	33
		Number of Missing Observations	0
Minimum	1.87	Mean	12.1
Maximum	55.1	Median	7.88
SD	12.54	Std. Error of Mean	2.183
Coefficient of Variation	1.036	Skewness	2.177
Normal GOF Test			
Shapiro Wilk Test Statistic	0.729	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	15.8	95% Adjusted-CLT UCL (Chen-1995)	16.58
		95% Modified-t UCL (Johnson-1978)	15.94
Gamma GOF Test			
A-D Test Statistic	0.8	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.768	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.142	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.369	k star (bias corrected MLE)	1.265
Theta hat (MLE)	8.841	Theta star (bias corrected MLE)	9.57
nu hat (MLE)	90.34	nu star (bias corrected)	83.46
MLE Mean (bias corrected)	12.1	MLE Sd (bias corrected)	10.76
		Approximate Chi Square Value (0.05)	63.4
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	62.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	15.93	95% Adjusted Gamma UCL (use when n<50)	16.16

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.116	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.626	Mean of logged Data	2.085
Maximum of Logged Data	4.009	SD of logged Data	0.904
Assuming Lognormal Distribution			
95% H-UCL	17.59	90% Chebyshev (MVUE) UCL	18.28
95% Chebyshev (MVUE) UCL	21.16	97.5% Chebyshev (MVUE) UCL	25.17
99% Chebyshev (MVUE) UCL	33.03		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	15.69	95% Jackknife UCL	15.8
95% Standard Bootstrap UCL	15.66	95% Bootstrap-t UCL	17.87
95% Hall's Bootstrap UCL	17.51	95% Percentile Bootstrap UCL	15.89
95% BCA Bootstrap UCL	16.39		
90% Chebyshev(Mean, Sd) UCL	18.65	95% Chebyshev(Mean, Sd) UCL	21.62
97.5% Chebyshev(Mean, Sd) UCL	25.73	99% Chebyshev(Mean, Sd) UCL	33.82
Suggested UCL to Use			
95% Adjusted Gamma UCL	16.16		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:12:08 PM		
From File	Gordon Region (Sweed Lake), Fish - Liver, Lead (Pb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (Sweed Lake), Fish - Liver, Lead (Pb), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:12:51 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Manganese (Mn), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	0.641	Mean	1.529
Maximum	3.21	Median	1.31
SD	0.672	Std. Error of Mean	0.117
Coefficient of Variation	0.439	Skewness	0.938

Normal GOF Test

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.727	95% Adjusted-CLT UCL (Chen-1995)	1.742
		95% Modified-t UCL (Johnson-1978)	1.73

Gamma GOF Test

A-D Test Statistic	0.444	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.114	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.878	k star (bias corrected MLE)	5.364
Theta hat (MLE)	0.26	Theta star (bias corrected MLE)	0.285
nu hat (MLE)	388	nu star (bias corrected)	354
MLE Mean (bias corrected)	1.529	MLE Sd (bias corrected)	0.66
		Approximate Chi Square Value (0.05)	311.4
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	309.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.738	95% Adjusted Gamma UCL (use when n<50)	1.75

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0876	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.445	Mean of logged Data	0.337
Maximum of Logged Data	1.166	SD of logged Data	0.421
Assuming Lognormal Distribution			
95% H-UCL	1.76	90% Chebyshev (MVUE) UCL	1.873
95% Chebyshev (MVUE) UCL	2.03	97.5% Chebyshev (MVUE) UCL	2.248
99% Chebyshev (MVUE) UCL	2.676		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.721	95% Jackknife UCL	1.727
95% Standard Bootstrap UCL	1.719	95% Bootstrap-t UCL	1.747
95% Hall's Bootstrap UCL	1.747	95% Percentile Bootstrap UCL	1.721
95% BCA Bootstrap UCL	1.738		
90% Chebyshev(Mean, Sd) UCL	1.88	95% Chebyshev(Mean, Sd) UCL	2.039
97.5% Chebyshev(Mean, Sd) UCL	2.259	99% Chebyshev(Mean, Sd) UCL	2.692
Suggested UCL to Use			
95% Adjusted Gamma UCL	1.75		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:13:30 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	18	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	0.057	Mean	0.239
Maximum	1.11	Median	0.187
SD	0.236	Std. Error of Mean	0.0557
Coefficient of Variation	0.991	Skewness	3.22
Normal GOF Test			
Shapiro Wilk Test Statistic	0.621	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.335	95% Adjusted-CLT UCL (Chen-1995)	0.375
		95% Modified-t UCL (Johnson-1978)	0.342
Gamma GOF Test			
A-D Test Statistic	0.604	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.206	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.964	k star (bias corrected MLE)	1.674
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.142
nu hat (MLE)	70.71	nu star (bias corrected)	60.26
MLE Mean (bias corrected)	0.239	MLE Sd (bias corrected)	0.184
		Approximate Chi Square Value (0.05)	43.41
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	42.04
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.331	95% Adjusted Gamma UCL (use when n<50)	0.342

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.209	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.865	Mean of logged Data	-1.709
Maximum of Logged Data	0.104	SD of logged Data	0.716
Assuming Lognormal Distribution			
95% H-UCL	0.346	90% Chebyshev (MVUE) UCL	0.354
95% Chebyshev (MVUE) UCL	0.41	97.5% Chebyshev (MVUE) UCL	0.488
99% Chebyshev (MVUE) UCL	0.641		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.33	95% Jackknife UCL	0.335
95% Standard Bootstrap UCL	0.326	95% Bootstrap-t UCL	0.46
95% Hall's Bootstrap UCL	0.704	95% Percentile Bootstrap UCL	0.338
95% BCA Bootstrap UCL	0.389		
90% Chebyshev(Mean, Sd) UCL	0.406	95% Chebyshev(Mean, Sd) UCL	0.481
97.5% Chebyshev(Mean, Sd) UCL	0.586	99% Chebyshev(Mean, Sd) UCL	0.793
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.342		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:14:47 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Molybdenum (Mo), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.088	Mean	0.161
Maximum	0.302	Median	0.143
SD	0.0551	Std. Error of Mean	0.00958
Coefficient of Variation	0.343	Skewness	0.938

Normal GOF Test

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.177	95% Adjusted-CLT UCL (Chen-1995)	0.178
		95% Modified-t UCL (Johnson-1978)	0.177

Gamma GOF Test

A-D Test Statistic	0.673	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.142	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.72	k star (bias corrected MLE)	8.857
Theta hat (MLE)	0.0165	Theta star (bias corrected MLE)	0.0181
nu hat (MLE)	641.5	nu star (bias corrected)	584.6
MLE Mean (bias corrected)	0.161	MLE Sd (bias corrected)	0.054
		Approximate Chi Square Value (0.05)	529.5
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	526.8

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.177	95% Adjusted Gamma UCL (use when n<50)	0.178

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.43	Mean of logged Data	-1.88
Maximum of Logged Data	-1.197	SD of logged Data	0.323
Assuming Lognormal Distribution			
95% H-UCL	0.178	90% Chebyshev (MVUE) UCL	0.188
95% Chebyshev (MVUE) UCL	0.201	97.5% Chebyshev (MVUE) UCL	0.218
99% Chebyshev (MVUE) UCL	0.252		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.176	95% Jackknife UCL	0.177
95% Standard Bootstrap UCL	0.176	95% Bootstrap-t UCL	0.178
95% Hall's Bootstrap UCL	0.178	95% Percentile Bootstrap UCL	0.177
95% BCA Bootstrap UCL	0.179		
90% Chebyshev(Mean, Sd) UCL	0.189	95% Chebyshev(Mean, Sd) UCL	0.203
97.5% Chebyshev(Mean, Sd) UCL	0.221	99% Chebyshev(Mean, Sd) UCL	0.256
Suggested UCL to Use			
95% Student's-t UCL	0.177		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/5/2020 10:15:26 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Nickel (Ni), mg/kg ww

General Statistics

Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Nickel (Ni), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:16:05 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.74	Mean	1.013
Maximum	1.41	Median	1.01
SD	0.164	Std. Error of Mean	0.0286
Coefficient of Variation	0.162	Skewness	0.681
Normal GOF Test			
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.061	95% Adjusted-CLT UCL (Chen-1995)	1.063
		95% Modified-t UCL (Johnson-1978)	1.062
Gamma GOF Test			
A-D Test Statistic	0.387	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	40.68	k star (bias corrected MLE)	37
Theta hat (MLE)	0.0249	Theta star (bias corrected MLE)	0.0274
nu hat (MLE)	2685	nu star (bias corrected)	2442
MLE Mean (bias corrected)	1.013	MLE Sd (bias corrected)	0.166
		Approximate Chi Square Value (0.05)	2329
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	2323
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.062	95% Adjusted Gamma UCL (use when n<50)	1.065

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.301	Mean of logged Data	3.0647E-4
Maximum of Logged Data	0.344	SD of logged Data	0.159
Assuming Lognormal Distribution			
95% H-UCL	1.063	90% Chebyshev (MVUE) UCL	1.097
95% Chebyshev (MVUE) UCL	1.135	97.5% Chebyshev (MVUE) UCL	1.188
99% Chebyshev (MVUE) UCL	1.292		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.06	95% Jackknife UCL	1.061
95% Standard Bootstrap UCL	1.059	95% Bootstrap-t UCL	1.068
95% Hall's Bootstrap UCL	1.067	95% Percentile Bootstrap UCL	1.061
95% BCA Bootstrap UCL	1.066		
90% Chebyshev(Mean, Sd) UCL	1.099	95% Chebyshev(Mean, Sd) UCL	1.137
97.5% Chebyshev(Mean, Sd) UCL	1.191	99% Chebyshev(Mean, Sd) UCL	1.297
Suggested UCL to Use			
95% Student's-t UCL	1.061		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:16:44 PM		
From File	Gordon Region (Sweed Lake), Fish - Liver, Silver (Ag), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (Sweed Lake), Fish - Liver, Silver (Ag), mg/kg ww			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	20
Number of Detects	19	Number of Non-Detects	14
Number of Distinct Detects	19	Number of Distinct Non-Detects	1
Minimum Detect	0.021	Minimum Non-Detect	0.02
Maximum Detect	0.43	Maximum Non-Detect	0.02
Variance Detects	0.0187	Percent Non-Detects	42.42%
Mean Detects	0.177	SD Detects	0.137
Median Detects	0.157	CV Detects	0.772
Skewness Detects	0.628	Kurtosis Detects	-0.874
Mean of Logged Detects	-2.108	SD of Logged Detects	0.983
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.203	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.11	Standard Error of Mean	0.0228
SD	0.127	95% KM (BCA) UCL	0.148
95% KM (t) UCL	0.149	95% KM (Percentile Bootstrap) UCL	0.149
95% KM (z) UCL	0.148	95% KM Bootstrap t UCL	0.155
90% KM Chebyshev UCL	0.179	95% KM Chebyshev UCL	0.21
97.5% KM Chebyshev UCL	0.253	99% KM Chebyshev UCL	0.337
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.346	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.126	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.202	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.47	k star (bias corrected MLE)	1.273
Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.139
nu hat (MLE)	55.87	nu star (bias corrected)	48.38
MLE Mean (bias corrected)	0.177	MLE Sd (bias corrected)	0.157

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.752	nu hat (KM)	49.62
Approximate Chi Square Value (49.62, α)	34.45	Adjusted Chi Square Value (49.62, β)	33.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.159	95% Gamma Adjusted KM-UCL (use when n<50)	0.162
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.106
Maximum	0.43	Median	0.031
SD	0.132	CV	1.247
k hat (MLE)	0.659	k star (bias corrected MLE)	0.619
Theta hat (MLE)	0.161	Theta star (bias corrected MLE)	0.172
nu hat (MLE)	43.48	nu star (bias corrected)	40.86
MLE Mean (bias corrected)	0.106	MLE Sd (bias corrected)	0.135
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (40.86, α)	27.21	Adjusted Chi Square Value (40.86, β)	26.64
95% Gamma Approximate UCL (use when n>=50)	0.159	95% Gamma Adjusted UCL (use when n<50)	0.163
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.203	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.107	Mean in Log Scale	-3.159
SD in Original Scale	0.132	SD in Log Scale	1.531
95% t UCL (assumes normality of ROS data)	0.146	95% Percentile Bootstrap UCL	0.146
95% BCA Bootstrap UCL	0.151	95% Bootstrap t UCL	0.155
95% H-UCL (Log ROS)	0.321		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.873	95% H-UCL (KM -Log)	0.187
KM SD (logged)	1.15	95% Critical H Value (KM-Log)	2.625
KM Standard Error of Mean (logged)	0.206		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.106	Mean in Log Scale	-3.167
SD in Original Scale	0.132	SD in Log Scale	1.454
95% t UCL (Assumes normality)	0.145	95% H-Stat UCL	0.265
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.149	95% KM (Percentile Bootstrap) UCL					0.149
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/5/2020 10:17:22 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.018	Mean	0.0942
Maximum	0.967	Median	0.058
SD	0.166	Std. Error of Mean	0.0289
Coefficient of Variation	1.759	Skewness	4.882
Normal GOF Test			
Shapiro Wilk Test Statistic	0.412	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.143	95% Adjusted-CLT UCL (Chen-1995)	0.168
		95% Modified-t UCL (Johnson-1978)	0.147
Gamma GOF Test			
A-D Test Statistic	2.136	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.773	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.18	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.157	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.141	k star (bias corrected MLE)	1.057
Theta hat (MLE)	0.0826	Theta star (bias corrected MLE)	0.0891
nu hat (MLE)	75.28	nu star (bias corrected)	69.77
MLE Mean (bias corrected)	0.0942	MLE Sd (bias corrected)	0.0917
		Approximate Chi Square Value (0.05)	51.54
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	50.73
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.128	95% Adjusted Gamma UCL (use when n<50)	0.13

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.017	Mean of logged Data	-2.86
Maximum of Logged Data	-0.0336	SD of logged Data	0.847
Assuming Lognormal Distribution			
95% H-UCL	0.115	90% Chebyshev (MVUE) UCL	0.121
95% Chebyshev (MVUE) UCL	0.139	97.5% Chebyshev (MVUE) UCL	0.164
99% Chebyshev (MVUE) UCL	0.213		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.142	95% Jackknife UCL	0.143
95% Standard Bootstrap UCL	0.14	95% Bootstrap-t UCL	0.259
95% Hall's Bootstrap UCL	0.338	95% Percentile Bootstrap UCL	0.146
95% BCA Bootstrap UCL	0.177		
90% Chebyshev(Mean, Sd) UCL	0.181	95% Chebyshev(Mean, Sd) UCL	0.22
97.5% Chebyshev(Mean, Sd) UCL	0.274	99% Chebyshev(Mean, Sd) UCL	0.381
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.22		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:18:01 PM		
From File	Gordon Region (Sweed Lake), Fish - Liver, Thallium (Tl), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (Sweed Lake), Fish - Liver, Thallium (Tl), mg/kg ww			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	19
Number of Detects	18	Number of Non-Detects	15
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.0081	Minimum Non-Detect	0.006
Maximum Detect	0.05	Maximum Non-Detect	0.006
Variance Detects	1.0828E-4	Percent Non-Detects	45.45%
Mean Detects	0.0219	SD Detects	0.0104
Median Detects	0.0188	CV Detects	0.475
Skewness Detects	1.042	Kurtosis Detects	1.724
Mean of Logged Detects	-3.926	SD of Logged Detects	0.483
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0147	Standard Error of Mean	0.00195
SD	0.0109	95% KM (BCA) UCL	0.0179
95% KM (t) UCL	0.018	95% KM (Percentile Bootstrap) UCL	0.0179
95% KM (z) UCL	0.0179	95% KM Bootstrap t UCL	0.0187
90% KM Chebyshev UCL	0.0205	95% KM Chebyshev UCL	0.0232
97.5% KM Chebyshev UCL	0.0269	99% KM Chebyshev UCL	0.0341
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.25	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.113	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.204	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.874	k star (bias corrected MLE)	4.099
Theta hat (MLE)	0.0045	Theta star (bias corrected MLE)	0.00535
nu hat (MLE)	175.5	nu star (bias corrected)	147.6
MLE Mean (bias corrected)	0.0219	MLE Sd (bias corrected)	0.0108

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.818	nu hat (KM)	120
Approximate Chi Square Value (119.97, α)	95.68	Adjusted Chi Square Value (119.97, β)	94.56
95% Gamma Approximate KM-UCL (use when n>=50)	0.0184	95% Gamma Adjusted KM-UCL (use when n<50)	0.0186
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0081	Mean	0.0165
Maximum	0.05	Median	0.01
SD	0.00969	CV	0.587
k hat (MLE)	3.985	k star (bias corrected MLE)	3.643
Theta hat (MLE)	0.00414	Theta star (bias corrected MLE)	0.00453
nu hat (MLE)	263	nu star (bias corrected)	240.4
MLE Mean (bias corrected)	0.0165	MLE Sd (bias corrected)	0.00865
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (240.44, α)	205.5	Adjusted Chi Square Value (240.44, β)	203.9
95% Gamma Approximate UCL (use when n>=50)	0.0193	95% Gamma Adjusted UCL (use when n<50)	0.0195
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.209	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0147	Mean in Log Scale	-4.505
SD in Original Scale	0.0112	SD in Log Scale	0.785
95% t UCL (assumes normality of ROS data)	0.018	95% Percentile Bootstrap UCL	0.0179
95% BCA Bootstrap UCL	0.0183	95% Bootstrap t UCL	0.0186
95% H-UCL (Log ROS)	0.0204		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.467	95% H-UCL (KM -Log)	0.0187
KM SD (logged)	0.686	95% Critical H Value (KM-Log)	2.099
KM Standard Error of Mean (logged)	0.123		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0133	Mean in Log Scale	-4.782
SD in Original Scale	0.0122	SD in Log Scale	1.015
95% t UCL (Assumes normality)	0.0169	95% H-Stat UCL	0.0218
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.018	95% KM (Percentile Bootstrap) UCL					0.0179
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/5/2020 10:19:58 PM
From File	Gordon Region (Sweed Lake), Fish - Liver, Uranium (U), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (Sweed Lake), Fish - Liver, Uranium (U), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	32
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Liver, Uranium (U), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:20:37 PM		
From File	Gordon Region (Sweed Lake), Fish - Liver, Vanadium (V), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (Sweed Lake), Fish - Liver, Vanadium (V), mg/kg ww			
General Statistics			
Total Number of Observations	33	Number of Distinct Observations	13
Number of Detects	13	Number of Non-Detects	20
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.77	Maximum Non-Detect	0.1
Variance Detects	0.0331	Percent Non-Detects	60.61%
Mean Detects	0.303	SD Detects	0.182
Median Detects	0.26	CV Detects	0.6
Skewness Detects	1.569	Kurtosis Detects	2.811
Mean of Logged Detects	-1.34	SD of Logged Detects	0.56
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.18	Standard Error of Mean	0.0268
SD	0.148	95% KM (BCA) UCL	0.221
95% KM (t) UCL	0.225	95% KM (Percentile Bootstrap) UCL	0.223
95% KM (z) UCL	0.224	95% KM Bootstrap t UCL	0.248
90% KM Chebyshev UCL	0.26	95% KM Chebyshev UCL	0.297
97.5% KM Chebyshev UCL	0.347	99% KM Chebyshev UCL	0.447
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.245	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.238	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.568	k star (bias corrected MLE)	2.796
Theta hat (MLE)	0.0849	Theta star (bias corrected MLE)	0.108
nu hat (MLE)	92.77	nu star (bias corrected)	72.69
MLE Mean (bias corrected)	0.303	MLE Sd (bias corrected)	0.181

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.48	nu hat (KM)	97.71
Approximate Chi Square Value (97.71, α)	75.91	Adjusted Chi Square Value (97.71, β)	74.92
95% Gamma Approximate KM-UCL (use when n>=50)	0.232	95% Gamma Adjusted KM-UCL (use when n<50)	0.235
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.128
Maximum	0.77	Median	0.01
SD	0.182	CV	1.425
k hat (MLE)	0.541	k star (bias corrected MLE)	0.512
Theta hat (MLE)	0.236	Theta star (bias corrected MLE)	0.249
nu hat (MLE)	35.69	nu star (bias corrected)	33.78
MLE Mean (bias corrected)	0.128	MLE Sd (bias corrected)	0.178
		Adjusted Level of Significance (β)	0.0419
Approximate Chi Square Value (33.78, α)	21.49	Adjusted Chi Square Value (33.78, β)	20.98
95% Gamma Approximate UCL (use when n>=50)	0.201	95% Gamma Adjusted UCL (use when n<50)	0.206
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.152	Mean in Log Scale	-2.414
SD in Original Scale	0.168	SD in Log Scale	1.077
95% t UCL (assumes normality of ROS data)	0.201	95% Percentile Bootstrap UCL	0.202
95% BCA Bootstrap UCL	0.215	95% Bootstrap t UCL	0.218
95% H-UCL (Log ROS)	0.259		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.924	95% H-UCL (KM -Log)	0.212
KM SD (logged)	0.579	95% Critical H Value (KM-Log)	2
KM Standard Error of Mean (logged)	0.105		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.15	Mean in Log Scale	-2.344
SD in Original Scale	0.168	SD in Log Scale	0.89
95% t UCL (Assumes normality)	0.199	95% H-Stat UCL	0.205
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.225	95% KM (Percentile Bootstrap) UCL					0.223
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/5/2020 10:21:16 PM		
From File	Gordon Region (Sweed Lake), Fish - Liver, Zinc (Zn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (Sweed Lake), Fish - Liver, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	33	Number of Distinct Observations	31
		Number of Missing Observations	0
Minimum	17.7	Mean	189.1
Maximum	733	Median	38.9
SD	259.4	Std. Error of Mean	45.15
Coefficient of Variation	1.372	Skewness	1.274
Normal GOF Test			
Shapiro Wilk Test Statistic	0.651	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.38	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	265.6	95% Adjusted-CLT UCL (Chen-1995)	274.1
		95% Modified-t UCL (Johnson-1978)	267.3
Gamma GOF Test			
A-D Test Statistic	3.796	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.798	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.316	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.16	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.643	k star (bias corrected MLE)	0.605
Theta hat (MLE)	294	Theta star (bias corrected MLE)	312.6
nu hat (MLE)	42.45	nu star (bias corrected)	39.93
MLE Mean (bias corrected)	189.1	MLE Sd (bias corrected)	243.1
		Approximate Chi Square Value (0.05)	26.45
Adjusted Level of Significance	0.0419	Adjusted Chi Square Value	25.88
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	285.5	95% Adjusted Gamma UCL (use when n<50)	291.7

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.252	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.154	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.874	Mean of logged Data	4.291
Maximum of Logged Data	6.597	SD of logged Data	1.356
Assuming Lognormal Distribution			
95% H-UCL	367.3	90% Chebyshev (MVUE) UCL	327.6
95% Chebyshev (MVUE) UCL	397.1	97.5% Chebyshev (MVUE) UCL	493.5
99% Chebyshev (MVUE) UCL	682.8		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	263.4	95% Jackknife UCL	265.6
95% Standard Bootstrap UCL	261.6	95% Bootstrap-t UCL	283.6
95% Hall's Bootstrap UCL	266.9	95% Percentile Bootstrap UCL	261.3
95% BCA Bootstrap UCL	270		
90% Chebyshev(Mean, Sd) UCL	324.6	95% Chebyshev(Mean, Sd) UCL	385.9
97.5% Chebyshev(Mean, Sd) UCL	471.1	99% Chebyshev(Mean, Sd) UCL	638.4
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	385.9		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

APPENDIX C.26
PROUCL OUTPUTS
FISH LIVER TISSUE (COCKERAM LAKE)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:52:02 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Antimony (Sb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Antimony (Sb), mg/kg ww

General Statistics

Total Number of Observations	29	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	28
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Fish - Liver, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:52:42 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Arsenic (As), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Arsenic (As), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	13
Number of Detects	16	Number of Non-Detects	13
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	0.041	Maximum Non-Detect	0.01
Variance Detects	8.5533E-5	Percent Non-Detects	44.83%
Mean Detects	0.0198	SD Detects	0.00925
Median Detects	0.017	CV Detects	0.468
Skewness Detects	0.855	Kurtosis Detects	-0.061
Mean of Logged Detects	-4.022	SD of Logged Detects	0.453
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0154	Standard Error of Mean	0.00158
SD	0.00823	95% KM (BCA) UCL	0.0179
95% KM (t) UCL	0.0181	95% KM (Percentile Bootstrap) UCL	0.018
95% KM (z) UCL	0.018	95% KM Bootstrap t UCL	0.0187
90% KM Chebyshev UCL	0.0201	95% KM Chebyshev UCL	0.0223
97.5% KM Chebyshev UCL	0.0252	99% KM Chebyshev UCL	0.0311
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.608	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.162	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	5.272	k star (bias corrected MLE)	4.325
Theta hat (MLE)	0.00375	Theta star (bias corrected MLE)	0.00457
nu hat (MLE)	168.7	nu star (bias corrected)	138.4
MLE Mean (bias corrected)	0.0198	MLE Sd (bias corrected)	0.0095

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.491	nu hat (KM)	202.5
Approximate Chi Square Value (202.48, α)	170.6	Adjusted Chi Square Value (202.48, β)	168.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0183	95% Gamma Adjusted KM-UCL (use when n<50)	0.0184
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0154
Maximum	0.041	Median	0.011
SD	0.00838	CV	0.545
k hat (MLE)	4.751	k star (bias corrected MLE)	4.282
Theta hat (MLE)	0.00324	Theta star (bias corrected MLE)	0.00359
nu hat (MLE)	275.5	nu star (bias corrected)	248.4
MLE Mean (bias corrected)	0.0154	MLE Sd (bias corrected)	0.00743
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (248.37, α)	212.9	Adjusted Chi Square Value (248.37, β)	210.9
95% Gamma Approximate UCL (use when n>=50)	0.0179	95% Gamma Adjusted UCL (use when n<50)	0.0181
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0134	Mean in Log Scale	-4.572
SD in Original Scale	0.00993	SD in Log Scale	0.75
95% t UCL (assumes normality of ROS data)	0.0166	95% Percentile Bootstrap UCL	0.0167
95% BCA Bootstrap UCL	0.0167	95% Bootstrap t UCL	0.017
95% H-UCL (Log ROS)	0.0187		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.284	95% H-UCL (KM -Log)	0.0177
KM SD (logged)	0.436	95% Critical H Value (KM-Log)	1.897
KM Standard Error of Mean (logged)	0.0836		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0131	Mean in Log Scale	-4.594
SD in Original Scale	0.0101	SD in Log Scale	0.726
95% t UCL (Assumes normality)	0.0163	95% H-Stat UCL	0.0177
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.0181	95% KM (Percentile Bootstrap) UCL					0.018
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:53:22 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	23
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.094	Minimum Non-Detect	0.04
Maximum Detect	1.99	Maximum Non-Detect	0.04
Variance Detects	0.493	Percent Non-Detects	79.31%
Mean Detects	0.773	SD Detects	0.702
Median Detects	0.599	CV Detects	0.908
Skewness Detects	1.169	Kurtosis Detects	1.032
Mean of Logged Detects	-0.687	SD of Logged Detects	1.112
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.192	Standard Error of Mean	0.0846
SD	0.416	95% KM (BCA) UCL	0.34
95% KM (t) UCL	0.336	95% KM (Percentile Bootstrap) UCL	0.337
95% KM (z) UCL	0.331	95% KM Bootstrap t UCL	0.4
90% KM Chebyshev UCL	0.446	95% KM Chebyshev UCL	0.561
97.5% KM Chebyshev UCL	0.72	99% KM Chebyshev UCL	1.034
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.155	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.145	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.339	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	1.305	k star (bias corrected MLE)	0.764
Theta hat (MLE)	0.592	Theta star (bias corrected MLE)	1.012
nu hat (MLE)	15.66	nu star (bias corrected)	9.164
MLE Mean (bias corrected)	0.773	MLE Sd (bias corrected)	0.885

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	0.212	nu hat (KM)	12.31
Approximate Chi Square Value (12.31, α)	5.43	Adjusted Chi Square Value (12.31, β)	5.158
95% Gamma Approximate KM-UCL (use when n>=50)	0.434	95% Gamma Adjusted KM-UCL (use when n<50)	0.457
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.168
Maximum	1.99	Median	0.01
SD	0.432	CV	2.576
k hat (MLE)	0.337	k star (bias corrected MLE)	0.325
Theta hat (MLE)	0.499	Theta star (bias corrected MLE)	0.517
nu hat (MLE)	19.53	nu star (bias corrected)	18.84
MLE Mean (bias corrected)	0.168	MLE Sd (bias corrected)	0.295
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (18.84, α)	10	Adjusted Chi Square Value (18.84, β)	9.616
95% Gamma Approximate UCL (use when n>=50)	0.316	95% Gamma Adjusted UCL (use when n<50)	0.329
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.171	Mean in Log Scale	-4.618
SD in Original Scale	0.431	SD in Log Scale	2.791
95% t UCL (assumes normality of ROS data)	0.308	95% Percentile Bootstrap UCL	0.317
95% BCA Bootstrap UCL	0.365	95% Bootstrap t UCL	0.502
95% H-UCL (Log ROS)	7.527		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.695	95% H-UCL (KM -Log)	0.222
KM SD (logged)	1.125	95% Critical H Value (KM-Log)	2.625
KM Standard Error of Mean (logged)	0.229		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.176	Mean in Log Scale	-3.245
SD in Original Scale	0.429	SD in Log Scale	1.41
95% t UCL (Assumes normality)	0.311	95% H-Stat UCL	0.235
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.336	95% KM (Percentile Bootstrap) UCL					0.337
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:54:11 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.0197	Mean	0.162
Maximum	0.454	Median	0.156
SD	0.108	Std. Error of Mean	0.02
Coefficient of Variation	0.665	Skewness	1.138
Normal GOF Test			
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.196	95% Adjusted-CLT UCL (Chen-1995)	0.199
		95% Modified-t UCL (Johnson-1978)	0.197
Gamma GOF Test			
A-D Test Statistic	0.167	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0836	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.165	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.276	k star (bias corrected MLE)	2.064
Theta hat (MLE)	0.0711	Theta star (bias corrected MLE)	0.0785
nu hat (MLE)	132	nu star (bias corrected)	119.7
MLE Mean (bias corrected)	0.162	MLE Sd (bias corrected)	0.113
		Approximate Chi Square Value (0.05)	95.44
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	94.15
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.203	95% Adjusted Gamma UCL (use when n<50)	0.206

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.927	Mean of logged Data	-2.056
Maximum of Logged Data	-0.79	SD of logged Data	0.749
Assuming Lognormal Distribution			
95% H-UCL	0.231	90% Chebyshev (MVUE) UCL	0.244
95% Chebyshev (MVUE) UCL	0.278	97.5% Chebyshev (MVUE) UCL	0.326
99% Chebyshev (MVUE) UCL	0.42		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.195	95% Jackknife UCL	0.196
95% Standard Bootstrap UCL	0.195	95% Bootstrap-t UCL	0.2
95% Hall's Bootstrap UCL	0.206	95% Percentile Bootstrap UCL	0.193
95% BCA Bootstrap UCL	0.202		
90% Chebyshev(Mean, Sd) UCL	0.222	95% Chebyshev(Mean, Sd) UCL	0.249
97.5% Chebyshev(Mean, Sd) UCL	0.287	99% Chebyshev(Mean, Sd) UCL	0.361
Suggested UCL to Use			
95% Student's-t UCL	0.196		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:54:51 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Chromium (Cr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Chromium (Cr), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	26
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.13	Minimum Non-Detect	0.1
Maximum Detect	0.14	Maximum Non-Detect	0.1
Variance Detects	3.3333E-5	Percent Non-Detects	89.66%
Mean Detects	0.137	SD Detects	0.00577
Median Detects	0.14	CV Detects	0.0422
Skewness Detects	-1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-1.991	SD of Logged Detects	0.0428
Warning: Data set has only 3 Detected Values.			
This is not enough to compute meaningful or reliable statistics and estimates.			
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.104	Standard Error of Mean	0.00256
SD	0.0113	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.108	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.108	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.111	95% KM Chebyshev UCL	0.115
97.5% KM Chebyshev UCL	0.12	99% KM Chebyshev UCL	0.129
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	826.5	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.6536E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4959	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	84.83	nu hat (KM)	4920
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (N/A, α)	4758	Adjusted Chi Square Value (N/A, β)	4749
95% Gamma Approximate KM-UCL (use when n>=50)	0.107	95% Gamma Adjusted KM-UCL (use when n<50)	0.108
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.111	Mean in Log Scale	-2.206
SD in Original Scale	0.0136	SD in Log Scale	0.122
95% t UCL (assumes normality of ROS data)	0.115	95% Percentile Bootstrap UCL	0.115
95% BCA Bootstrap UCL	0.115	95% Bootstrap t UCL	0.116
95% H-UCL (Log ROS)	0.115		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.27	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0956	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0217		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.059	Mean in Log Scale	-2.892
SD in Original Scale	0.0269	SD in Log Scale	0.312
95% t UCL (Assumes normality)	0.0675	95% H-Stat UCL	0.0648
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.108	95% KM (Percentile Bootstrap) UCL	N/A
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	3/9/2020 10:55:32 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Cobalt (Co), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.025	Mean	0.142
Maximum	0.365	Median	0.115
SD	0.0793	Std. Error of Mean	0.0147
Coefficient of Variation	0.558	Skewness	1.313

Normal GOF Test			
Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.167	95% Adjusted-CLT UCL (Chen-1995)	0.17
		95% Modified-t UCL (Johnson-1978)	0.168

Gamma GOF Test			
A-D Test Statistic	0.489	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.112	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.164	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.652	k star (bias corrected MLE)	3.298
Theta hat (MLE)	0.0389	Theta star (bias corrected MLE)	0.0431
nu hat (MLE)	211.8	nu star (bias corrected)	191.3
MLE Mean (bias corrected)	0.142	MLE Sd (bias corrected)	0.0783
		Approximate Chi Square Value (0.05)	160.3
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	158.6

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.17	95% Adjusted Gamma UCL (use when n<50)	0.171

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.689	Mean of logged Data	-2.094
Maximum of Logged Data	-1.008	SD of logged Data	0.56
Assuming Lognormal Distribution			
95% H-UCL	0.178	90% Chebyshev (MVUE) UCL	0.19
95% Chebyshev (MVUE) UCL	0.212	97.5% Chebyshev (MVUE) UCL	0.241
99% Chebyshev (MVUE) UCL	0.3		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.166	95% Jackknife UCL	0.167
95% Standard Bootstrap UCL	0.166	95% Bootstrap-t UCL	0.173
95% Hall's Bootstrap UCL	0.172	95% Percentile Bootstrap UCL	0.168
95% BCA Bootstrap UCL	0.17		
90% Chebyshev(Mean, Sd) UCL	0.186	95% Chebyshev(Mean, Sd) UCL	0.206
97.5% Chebyshev(Mean, Sd) UCL	0.234	99% Chebyshev(Mean, Sd) UCL	0.289
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.171		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:56:12 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Copper (Cu), mg/kg ww

General Statistics

Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	2.11	Mean	15.62
Maximum	50.3	Median	12.4
SD	13.7	Std. Error of Mean	2.545
Coefficient of Variation	0.877	Skewness	1.177

Normal GOF Test

Shapiro Wilk Test Statistic	0.854	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	19.95	95% Adjusted-CLT UCL (Chen-1995)	20.4
		95% Modified-t UCL (Johnson-1978)	20.04

Gamma GOF Test

A-D Test Statistic	0.467	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.765	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.126	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.166	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.383	k star (bias corrected MLE)	1.263
Theta hat (MLE)	11.3	Theta star (bias corrected MLE)	12.37
nu hat (MLE)	80.19	nu star (bias corrected)	73.23
MLE Mean (bias corrected)	15.62	MLE Sd (bias corrected)	13.9
		Approximate Chi Square Value (0.05)	54.52
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	53.56

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	20.98	95% Adjusted Gamma UCL (use when n<50)	21.36

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.747	Mean of logged Data	2.345
Maximum of Logged Data	3.918	SD of logged Data	0.956
Assuming Lognormal Distribution			
95% H-UCL	25.5	90% Chebyshev (MVUE) UCL	25.9
95% Chebyshev (MVUE) UCL	30.32	97.5% Chebyshev (MVUE) UCL	36.46
99% Chebyshev (MVUE) UCL	48.52		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	19.8	95% Jackknife UCL	19.95
95% Standard Bootstrap UCL	19.73	95% Bootstrap-t UCL	20.48
95% Hall's Bootstrap UCL	20.26	95% Percentile Bootstrap UCL	19.87
95% BCA Bootstrap UCL	20.38		
90% Chebyshev(Mean, Sd) UCL	23.25	95% Chebyshev(Mean, Sd) UCL	26.71
97.5% Chebyshev(Mean, Sd) UCL	31.51	99% Chebyshev(Mean, Sd) UCL	40.94
Suggested UCL to Use			
95% Adjusted Gamma UCL	21.36		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 10:57:00 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.657	Mean	1.457
Maximum	3.14	Median	1.38
SD	0.622	Std. Error of Mean	0.116
Coefficient of Variation	0.427	Skewness	0.816
Normal GOF Test			
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.654	95% Adjusted-CLT UCL (Chen-1995)	1.666
		95% Modified-t UCL (Johnson-1978)	1.657
Gamma GOF Test			
A-D Test Statistic	0.291	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.11	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.938	k star (bias corrected MLE)	5.347
Theta hat (MLE)	0.245	Theta star (bias corrected MLE)	0.272
nu hat (MLE)	344.4	nu star (bias corrected)	310.1
MLE Mean (bias corrected)	1.457	MLE Sd (bias corrected)	0.63
		Approximate Chi Square Value (0.05)	270.3
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	268.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.671	95% Adjusted Gamma UCL (use when n<50)	1.685

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.42	Mean of logged Data	0.29
Maximum of Logged Data	1.144	SD of logged Data	0.426
Assuming Lognormal Distribution			
95% H-UCL	1.703	90% Chebyshev (MVUE) UCL	1.815
95% Chebyshev (MVUE) UCL	1.976	97.5% Chebyshev (MVUE) UCL	2.2
99% Chebyshev (MVUE) UCL	2.641		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.647	95% Jackknife UCL	1.654
95% Standard Bootstrap UCL	1.646	95% Bootstrap-t UCL	1.683
95% Hall's Bootstrap UCL	1.679	95% Percentile Bootstrap UCL	1.652
95% BCA Bootstrap UCL	1.661		
90% Chebyshev(Mean, Sd) UCL	1.804	95% Chebyshev(Mean, Sd) UCL	1.961
97.5% Chebyshev(Mean, Sd) UCL	2.179	99% Chebyshev(Mean, Sd) UCL	2.607
Suggested UCL to Use			
95% Student's-t UCL	1.654		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:57:40 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Mercury (Hg), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Maclellan Region (Cockram Lake), Fish - Liver, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	0.059	Mean	0.192
Maximum	0.933	Median	0.102
SD	0.257	Std. Error of Mean	0.0643
Coefficient of Variation	1.338	Skewness	2.523

Normal GOF Test			
Shapiro Wilk Test Statistic	0.524	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.422	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.305	95% Adjusted-CLT UCL (Chen-1995)	0.341
		95% Modified-t UCL (Johnson-1978)	0.312

Gamma GOF Test			
A-D Test Statistic	2.307	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.758	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.33	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.22	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.287	k star (bias corrected MLE)	1.087
Theta hat (MLE)	0.149	Theta star (bias corrected MLE)	0.177
nu hat (MLE)	41.19	nu star (bias corrected)	34.8
MLE Mean (bias corrected)	0.192	MLE Sd (bias corrected)	0.184
		Approximate Chi Square Value (0.05)	22.3
Adjusted Level of Significance	0.0335	Adjusted Chi Square Value	21.17

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.3	95% Adjusted Gamma UCL (use when n<50)	0.316

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.759	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.83	Mean of logged Data	-2.085
Maximum of Logged Data	-0.0694	SD of logged Data	0.806
Assuming Lognormal Distribution			
95% H-UCL	0.285	90% Chebyshev (MVUE) UCL	0.276
95% Chebyshev (MVUE) UCL	0.326	97.5% Chebyshev (MVUE) UCL	0.394
99% Chebyshev (MVUE) UCL	0.528		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.298	95% Jackknife UCL	0.305
95% Standard Bootstrap UCL	0.293	95% Bootstrap-t UCL	0.958
95% Hall's Bootstrap UCL	0.964	95% Percentile Bootstrap UCL	0.3
95% BCA Bootstrap UCL	0.341		
90% Chebyshev(Mean, Sd) UCL	0.385	95% Chebyshev(Mean, Sd) UCL	0.473
97.5% Chebyshev(Mean, Sd) UCL	0.594	99% Chebyshev(Mean, Sd) UCL	0.832
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.473		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:59:00 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Molybdenum (Mo), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Maclellan Region (Cockram Lake), Fish - Liver, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.075	Mean	0.14
Maximum	0.253	Median	0.131
SD	0.0454	Std. Error of Mean	0.00844
Coefficient of Variation	0.325	Skewness	0.933
Normal GOF Test			
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.154	95% Adjusted-CLT UCL (Chen-1995)	0.155
		95% Modified-t UCL (Johnson-1978)	0.154
Gamma GOF Test			
A-D Test Statistic	0.407	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.102	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	10.6	k star (bias corrected MLE)	9.526
Theta hat (MLE)	0.0132	Theta star (bias corrected MLE)	0.0147
nu hat (MLE)	614.8	nu star (bias corrected)	552.5
MLE Mean (bias corrected)	0.14	MLE Sd (bias corrected)	0.0453
		Approximate Chi Square Value (0.05)	499
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	496
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.155	95% Adjusted Gamma UCL (use when n<50)	0.156

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.59	Mean of logged Data	-2.015
Maximum of Logged Data	-1.374	SD of logged Data	0.313
Assuming Lognormal Distribution			
95% H-UCL	0.156	90% Chebyshev (MVUE) UCL	0.165
95% Chebyshev (MVUE) UCL	0.176	97.5% Chebyshev (MVUE) UCL	0.191
99% Chebyshev (MVUE) UCL	0.222		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.154	95% Jackknife UCL	0.154
95% Standard Bootstrap UCL	0.153	95% Bootstrap-t UCL	0.155
95% Hall's Bootstrap UCL	0.157	95% Percentile Bootstrap UCL	0.154
95% BCA Bootstrap UCL	0.155		
90% Chebyshev(Mean, Sd) UCL	0.165	95% Chebyshev(Mean, Sd) UCL	0.177
97.5% Chebyshev(Mean, Sd) UCL	0.193	99% Chebyshev(Mean, Sd) UCL	0.224
Suggested UCL to Use			
95% Student's-t UCL	0.154		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 10:59:40 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	23
Number of Detects	28	Number of Non-Detects	1
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.18	Minimum Non-Detect	0.1
Maximum Detect	1.04	Maximum Non-Detect	0.1
Variance Detects	0.0439	Percent Non-Detects	3.448%
Mean Detects	0.401	SD Detects	0.209
Median Detects	0.35	CV Detects	0.523
Skewness Detects	1.55	Kurtosis Detects	2.638
Mean of Logged Detects	-1.027	SD of Logged Detects	0.472
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.39	Standard Error of Mean	0.0396
SD	0.209	95% KM (BCA) UCL	0.464
95% KM (t) UCL	0.458	95% KM (Percentile Bootstrap) UCL	0.458
95% KM (z) UCL	0.455	95% KM Bootstrap t UCL	0.476
90% KM Chebyshev UCL	0.509	95% KM Chebyshev UCL	0.563
97.5% KM Chebyshev UCL	0.638	99% KM Chebyshev UCL	0.784
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.457	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.109	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.166	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.615	k star (bias corrected MLE)	4.144
Theta hat (MLE)	0.0868	Theta star (bias corrected MLE)	0.0967
nu hat (MLE)	258.4	nu star (bias corrected)	232.1
MLE Mean (bias corrected)	0.401	MLE Sd (bias corrected)	0.197

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	3.474	nu hat (KM)	201.5
Approximate Chi Square Value (201.47, α)	169.6	Adjusted Chi Square Value (201.47, β)	167.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.464	95% Gamma Adjusted KM-UCL (use when n<50)	0.468
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0335	Mean	0.388
Maximum	1.04	Median	0.35
SD	0.217	CV	0.558
k hat (MLE)	3.247	k star (bias corrected MLE)	2.934
Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.132
nu hat (MLE)	188.3	nu star (bias corrected)	170.2
MLE Mean (bias corrected)	0.388	MLE Sd (bias corrected)	0.227
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (170.16, α)	141	Adjusted Chi Square Value (170.16, β)	139.4
95% Gamma Approximate UCL (use when n>=50)	0.468	95% Gamma Adjusted UCL (use when n<50)	0.474
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.391	Mean in Log Scale	-1.068
SD in Original Scale	0.213	SD in Log Scale	0.513
95% t UCL (assumes normality of ROS data)	0.458	95% Percentile Bootstrap UCL	0.456
95% BCA Bootstrap UCL	0.467	95% Bootstrap t UCL	0.475
95% H-UCL (Log ROS)	0.474		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-1.071	95% H-UCL (KM -Log)	0.472
KM SD (logged)	0.511	95% Critical H Value (KM-Log)	1.956
KM Standard Error of Mean (logged)	0.0967		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.389	Mean in Log Scale	-1.095
SD in Original Scale	0.216	SD in Log Scale	0.59
95% t UCL (Assumes normality)	0.457	95% H-Stat UCL	0.499
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM (BCA) UCL	0.464	95% GROS Adjusted Gamma UCL	0.474
95% Adjusted Gamma KM-UCL	0.468		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:00:20 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	0.92	Mean	1.378
Maximum	2.48	Median	1.29
SD	0.337	Std. Error of Mean	0.0625
Coefficient of Variation	0.244	Skewness	1.43
Normal GOF Test			
Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.485	95% Adjusted-CLT UCL (Chen-1995)	1.499
		95% Modified-t UCL (Johnson-1978)	1.487
Gamma GOF Test			
A-D Test Statistic	0.557	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.137	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	19.86	k star (bias corrected MLE)	17.83
Theta hat (MLE)	0.0694	Theta star (bias corrected MLE)	0.0773
nu hat (MLE)	1152	nu star (bias corrected)	1034
MLE Mean (bias corrected)	1.378	MLE Sd (bias corrected)	0.326
		Approximate Chi Square Value (0.05)	960.3
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	956.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.484	95% Adjusted Gamma UCL (use when n<50)	1.491

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.124	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.0834	Mean of logged Data	0.295
Maximum of Logged Data	0.908	SD of logged Data	0.223
Assuming Lognormal Distribution			
95% H-UCL	1.484	90% Chebyshev (MVUE) UCL	1.549
95% Chebyshev (MVUE) UCL	1.628	97.5% Chebyshev (MVUE) UCL	1.736
99% Chebyshev (MVUE) UCL	1.95		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.481	95% Jackknife UCL	1.485
95% Standard Bootstrap UCL	1.479	95% Bootstrap-t UCL	1.505
95% Hall's Bootstrap UCL	1.521	95% Percentile Bootstrap UCL	1.485
95% BCA Bootstrap UCL	1.502		
90% Chebyshev(Mean, Sd) UCL	1.566	95% Chebyshev(Mean, Sd) UCL	1.651
97.5% Chebyshev(Mean, Sd) UCL	1.769	99% Chebyshev(Mean, Sd) UCL	2
Suggested UCL to Use			
95% Student's-t UCL	1.485		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:01:01 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Silver (Ag), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Silver (Ag), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	17
Number of Detects	17	Number of Non-Detects	12
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.023	Minimum Non-Detect	0.02
Maximum Detect	0.175	Maximum Non-Detect	0.02
Variance Detects	0.00176	Percent Non-Detects	41.38%
Mean Detects	0.0712	SD Detects	0.042
Median Detects	0.069	CV Detects	0.59
Skewness Detects	0.959	Kurtosis Detects	0.715
Mean of Logged Detects	-2.809	SD of Logged Detects	0.607
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.05	Standard Error of Mean	0.00768
SD	0.0401	95% KM (BCA) UCL	0.0627
95% KM (t) UCL	0.0631	95% KM (Percentile Bootstrap) UCL	0.0631
95% KM (z) UCL	0.0627	95% KM Bootstrap t UCL	0.0662
90% KM Chebyshev UCL	0.0731	95% KM Chebyshev UCL	0.0835
97.5% KM Chebyshev UCL	0.098	99% KM Chebyshev UCL	0.126
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.259	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.128	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.211	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.154	k star (bias corrected MLE)	2.636
Theta hat (MLE)	0.0226	Theta star (bias corrected MLE)	0.027
nu hat (MLE)	107.2	nu star (bias corrected)	89.64
MLE Mean (bias corrected)	0.0712	MLE Sd (bias corrected)	0.0439

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.555	nu hat (KM)	90.16
Approximate Chi Square Value (90.16, α)	69.27	Adjusted Chi Square Value (90.16, β)	68.17
95% Gamma Approximate KM-UCL (use when n>=50)	0.0651	95% Gamma Adjusted KM-UCL (use when n<50)	0.0662
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.046
Maximum	0.175	Median	0.031
SD	0.0441	CV	0.958
k hat (MLE)	1.219	k star (bias corrected MLE)	1.116
Theta hat (MLE)	0.0378	Theta star (bias corrected MLE)	0.0412
nu hat (MLE)	70.69	nu star (bias corrected)	64.71
MLE Mean (bias corrected)	0.046	MLE Sd (bias corrected)	0.0436
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (64.71, α)	47.2	Adjusted Chi Square Value (64.71, β)	46.31
95% Gamma Approximate UCL (use when n>=50)	0.0631	95% Gamma Adjusted UCL (use when n<50)	0.0643
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.892	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.215	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0474	Mean in Log Scale	-3.466
SD in Original Scale	0.0431	SD in Log Scale	0.97
95% t UCL (assumes normality of ROS data)	0.061	95% Percentile Bootstrap UCL	0.0604
95% BCA Bootstrap UCL	0.0622	95% Bootstrap t UCL	0.0645
95% H-UCL (Log ROS)	0.0781		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-3.265	95% H-UCL (KM -Log)	0.0652
KM SD (logged)	0.706	95% Critical H Value (KM-Log)	2.135
KM Standard Error of Mean (logged)	0.135		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0459	Mean in Log Scale	-3.552
SD in Original Scale	0.0442	SD in Log Scale	1.011
95% t UCL (Assumes normality)	0.0598	95% H-Stat UCL	0.0767
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.0631	95% KM (Percentile Bootstrap) UCL					0.0631
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:01:41 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.026	Mean	0.551
Maximum	8.33	Median	0.089
SD	1.658	Std. Error of Mean	0.308
Coefficient of Variation	3.007	Skewness	4.257
Normal GOF Test			
Shapiro Wilk Test Statistic	0.344	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.46	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.075	95% Adjusted-CLT UCL (Chen-1995)	1.318
		95% Modified-t UCL (Johnson-1978)	1.115
Gamma GOF Test			
A-D Test Statistic	3.914	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.829	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.338	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.174	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.419	k star (bias corrected MLE)	0.399
Theta hat (MLE)	1.314	Theta star (bias corrected MLE)	1.381
nu hat (MLE)	24.33	nu star (bias corrected)	23.14
MLE Mean (bias corrected)	0.551	MLE Sd (bias corrected)	0.873
		Approximate Chi Square Value (0.05)	13.2
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	12.75
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.967	95% Adjusted Gamma UCL (use when n<50)	1.001

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.161	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.65	Mean of logged Data	-2.153
Maximum of Logged Data	2.12	SD of logged Data	1.425
Assuming Lognormal Distribution			
95% H-UCL	0.727	90% Chebyshev (MVUE) UCL	0.597
95% Chebyshev (MVUE) UCL	0.731	97.5% Chebyshev (MVUE) UCL	0.917
99% Chebyshev (MVUE) UCL	1.283		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.058	95% Jackknife UCL	1.075
95% Standard Bootstrap UCL	1.051	95% Bootstrap-t UCL	4.931
95% Hall's Bootstrap UCL	3.929	95% Percentile Bootstrap UCL	1.121
95% BCA Bootstrap UCL	1.427		
90% Chebyshev(Mean, Sd) UCL	1.475	95% Chebyshev(Mean, Sd) UCL	1.893
97.5% Chebyshev(Mean, Sd) UCL	2.474	99% Chebyshev(Mean, Sd) UCL	3.614
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	1.893		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:02:23 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Thallium (Tl), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Thallium (Tl), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	15
Number of Detects	16	Number of Non-Detects	13
Number of Distinct Detects	15	Number of Distinct Non-Detects	1
Minimum Detect	0.006	Minimum Non-Detect	0.006
Maximum Detect	0.0661	Maximum Non-Detect	0.006
Variance Detects	2.4823E-4	Percent Non-Detects	44.83%
Mean Detects	0.0192	SD Detects	0.0158
Median Detects	0.0137	CV Detects	0.82
Skewness Detects	2.069	Kurtosis Detects	4.728
Mean of Logged Detects	-4.191	SD of Logged Detects	0.683
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.766	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.0133	Standard Error of Mean	0.00251
SD	0.0131	95% KM (BCA) UCL	0.018
95% KM (t) UCL	0.0176	95% KM (Percentile Bootstrap) UCL	0.0176
95% KM (z) UCL	0.0174	95% KM Bootstrap t UCL	0.021
90% KM Chebyshev UCL	0.0208	95% KM Chebyshev UCL	0.0242
97.5% KM Chebyshev UCL	0.029	99% KM Chebyshev UCL	0.0383
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.512	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.201	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.248	k star (bias corrected MLE)	1.868
Theta hat (MLE)	0.00854	Theta star (bias corrected MLE)	0.0103
nu hat (MLE)	71.95	nu star (bias corrected)	59.79
MLE Mean (bias corrected)	0.0192	MLE Sd (bias corrected)	0.0141

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	1.029	nu hat (KM)	59.69
Approximate Chi Square Value (59.69, α)	42.92	Adjusted Chi Square Value (59.69, β)	42.07
95% Gamma Approximate KM-UCL (use when n>=50)	0.0185	95% Gamma Adjusted KM-UCL (use when n<50)	0.0188
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.006	Mean	0.0151
Maximum	0.0661	Median	0.01
SD	0.0124	CV	0.825
k hat (MLE)	2.899	k star (bias corrected MLE)	2.622
Theta hat (MLE)	0.0052	Theta star (bias corrected MLE)	0.00575
nu hat (MLE)	168.1	nu star (bias corrected)	152.1
MLE Mean (bias corrected)	0.0151	MLE Sd (bias corrected)	0.00931
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (152.08, α)	124.6	Adjusted Chi Square Value (152.08, β)	123.1
95% Gamma Approximate UCL (use when n>=50)	0.0184	95% Gamma Adjusted UCL (use when n<50)	0.0186
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0118	Mean in Log Scale	-5.03
SD in Original Scale	0.0143	SD in Log Scale	1.143
95% t UCL (assumes normality of ROS data)	0.0163	95% Percentile Bootstrap UCL	0.0165
95% BCA Bootstrap UCL	0.0177	95% Bootstrap t UCL	0.0189
95% H-UCL (Log ROS)	0.0223		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-4.606	95% H-UCL (KM -Log)	0.0164
KM SD (logged)	0.673	95% Critical H Value (KM-Log)	2.101
KM Standard Error of Mean (logged)	0.129		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0119	Mean in Log Scale	-4.916
SD in Original Scale	0.0142	SD in Log Scale	0.959
95% t UCL (Assumes normality)	0.0164	95% H-Stat UCL	0.018
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.0176	95% GROS Adjusted Gamma UCL					0.0186
95% Adjusted Gamma KM-UCL	0.0188						
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	3/9/2020 11:04:28 AM		
From File	Maclellan Region (Cockram Lake), Fish - Liver, Vanadium (V), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Maclellan Region (Cockram Lake), Fish - Liver, Vanadium (V), mg/kg ww			
General Statistics			
Total Number of Observations	29	Number of Distinct Observations	7
Number of Detects	7	Number of Non-Detects	22
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.43	Maximum Non-Detect	0.1
Variance Detects	0.0153	Percent Non-Detects	75.86%
Mean Detects	0.217	SD Detects	0.124
Median Detects	0.17	CV Detects	0.569
Skewness Detects	1.147	Kurtosis Detects	-0.138
Mean of Logged Detects	-1.652	SD of Logged Detects	0.527
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
Mean	0.128	Standard Error of Mean	0.0151
SD	0.0753	95% KM (BCA) UCL	0.156
95% KM (t) UCL	0.154	95% KM (Percentile Bootstrap) UCL	0.153
95% KM (z) UCL	0.153	95% KM Bootstrap t UCL	0.189
90% KM Chebyshev UCL	0.174	95% KM Chebyshev UCL	0.194
97.5% KM Chebyshev UCL	0.223	99% KM Chebyshev UCL	0.279
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.436	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.254	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.155	k star (bias corrected MLE)	2.469
Theta hat (MLE)	0.0523	Theta star (bias corrected MLE)	0.0879
nu hat (MLE)	58.17	nu star (bias corrected)	34.57
MLE Mean (bias corrected)	0.217	MLE Sd (bias corrected)	0.138

Gamma Kaplan-Meier (KM) Statistics			
k hat (KM)	2.899	nu hat (KM)	168.1
Approximate Chi Square Value (168.13, α)	139.1	Adjusted Chi Square Value (168.13, β)	137.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.155	95% Gamma Adjusted KM-UCL (use when n<50)	0.157
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detected data is small such as < 0.1			
For such situations, GROS method tends to yield inflated values of UCLs and BTVs			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0607
Maximum	0.43	Median	0.01
SD	0.107	CV	1.755
k hat (MLE)	0.589	k star (bias corrected MLE)	0.551
Theta hat (MLE)	0.103	Theta star (bias corrected MLE)	0.11
nu hat (MLE)	34.15	nu star (bias corrected)	31.95
MLE Mean (bias corrected)	0.0607	MLE Sd (bias corrected)	0.0818
		Adjusted Level of Significance (β)	0.0407
Approximate Chi Square Value (31.95, α)	20.04	Adjusted Chi Square Value (31.95, β)	19.47
95% Gamma Approximate UCL (use when n>=50)	0.0968	95% Gamma Adjusted UCL (use when n<50)	0.0996
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0746	Mean in Log Scale	-3.336
SD in Original Scale	0.102	SD in Log Scale	1.276
95% t UCL (assumes normality of ROS data)	0.107	95% Percentile Bootstrap UCL	0.107
95% BCA Bootstrap UCL	0.115	95% Bootstrap t UCL	0.126
95% H-UCL (Log ROS)	0.159		
UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed			
KM Mean (logged)	-2.146	95% H-UCL (KM -Log)	0.142
KM SD (logged)	0.367	95% Critical H Value (KM-Log)	1.848
KM Standard Error of Mean (logged)	0.0736		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0903	Mean in Log Scale	-2.671
SD in Original Scale	0.0926	SD in Log Scale	0.634
95% t UCL (Assumes normality)	0.12	95% H-Stat UCL	0.108
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			

Suggested UCL to Use							
95% KM (t) UCL	0.154	95% KM (Percentile Bootstrap) UCL					0.153
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
Recommendations are based upon data size, data distribution, and skewness.							
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/9/2020 11:05:08 AM
From File	Maclellan Region (Cockram Lake), Fish - Liver, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Maclellan Region (Cockram Lake), Fish - Liver, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	29	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	17	Mean	34.68
Maximum	109	Median	31.3
SD	16.46	Std. Error of Mean	3.056
Coefficient of Variation	0.475	Skewness	3.48
Normal GOF Test			
Shapiro Wilk Test Statistic	0.656	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	39.88	95% Adjusted-CLT UCL (Chen-1995)	41.81
		95% Modified-t UCL (Johnson-1978)	40.2
Gamma GOF Test			
A-D Test Statistic	1.139	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.163	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	7.508	k star (bias corrected MLE)	6.755
Theta hat (MLE)	4.618	Theta star (bias corrected MLE)	5.134
nu hat (MLE)	435.5	nu star (bias corrected)	391.8
MLE Mean (bias corrected)	34.68	MLE Sd (bias corrected)	13.34
		Approximate Chi Square Value (0.05)	346.9
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	344.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	39.16	95% Adjusted Gamma UCL (use when n<50)	39.45

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.165	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.833	Mean of logged Data	3.478
Maximum of Logged Data	4.691	SD of logged Data	0.344
Assuming Lognormal Distribution			
95% H-UCL	38.71	90% Chebyshev (MVUE) UCL	40.99
95% Chebyshev (MVUE) UCL	44.03	97.5% Chebyshev (MVUE) UCL	48.24
99% Chebyshev (MVUE) UCL	56.52		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	39.7	95% Jackknife UCL	39.88
95% Standard Bootstrap UCL	39.54	95% Bootstrap-t UCL	44.03
95% Hall's Bootstrap UCL	61.83	95% Percentile Bootstrap UCL	40.26
95% BCA Bootstrap UCL	42.86		
90% Chebyshev(Mean, Sd) UCL	43.85	95% Chebyshev(Mean, Sd) UCL	48
97.5% Chebyshev(Mean, Sd) UCL	53.76	99% Chebyshev(Mean, Sd) UCL	65.09
Suggested UCL to Use			
95% Adjusted Gamma UCL	39.45		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)			
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.			
For additional insight the user may want to consult a statistician.			

APPENDIX C.27
PROUCL OUTPUTS
FISH WHOLE BODY TISSUE (ALL LAKES)
GORDON REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:43:19 PM		
From File	Gordon Region (All Lakes), Fish - Whole Body, Arsenic (As), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Whole Body, Arsenic (As), mg/kg ww			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	23
Number of Detects	27	Number of Non-Detects	1
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	0.017	Minimum Non-Detect	0.01
Maximum Detect	0.112	Maximum Non-Detect	0.01
Variance Detects	9.4123E-4	Percent Non-Detects	3.571%
Mean Detects	0.058	SD Detects	0.0307
Median Detects	0.045	CV Detects	0.529
Skewness Detects	0.745	Kurtosis Detects	-1.063
Mean of Logged Detects	-2.977	SD of Logged Detects	0.518
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0563	KM Standard Error of Mean	0.00595
KM SD	0.0309	95% KM (BCA) UCL	0.0655
95% KM (t) UCL	0.0664	95% KM (Percentile Bootstrap) UCL	0.0655
95% KM (z) UCL	0.0661	95% KM Bootstrap t UCL	0.0673
90% KM Chebyshev UCL	0.0741	95% KM Chebyshev UCL	0.0822
97.5% KM Chebyshev UCL	0.0934	99% KM Chebyshev UCL	0.115
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.322	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.749	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.201	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.169	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	4.002	k star (bias corrected MLE)	3.582
Theta hat (MLE)	0.0145	Theta star (bias corrected MLE)	0.0162
nu hat (MLE)	216.1	nu star (bias corrected)	193.4

Mean (detects)	0.058		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0563
Maximum	0.112	Median	0.0445
SD	0.0314	CV	0.559
k hat (MLE)	3.317	k star (bias corrected MLE)	2.986
Theta hat (MLE)	0.017	Theta star (bias corrected MLE)	0.0189
nu hat (MLE)	185.8	nu star (bias corrected)	167.2
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (167.20, α)	138.3	Adjusted Chi Square Value (167.20, β)	136.7
95% Gamma Approximate UCL (use when n>=50)	0.068	95% Gamma Adjusted UCL (use when n<50)	0.0689
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0563	SD (KM)	0.0309
Variance (KM)	9.5335E-4	SE of Mean (KM)	0.00595
k hat (KM)	3.323	k star (KM)	2.991
nu hat (KM)	186.1	nu star (KM)	167.5
theta hat (KM)	0.0169	theta star (KM)	0.0188
80% gamma percentile (KM)	0.0803	90% gamma percentile (KM)	0.0999
95% gamma percentile (KM)	0.118	99% gamma percentile (KM)	0.158
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (167.49, α)	138.6	Adjusted Chi Square Value (167.49, β)	136.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.068	95% Gamma Adjusted KM-UCL (use when n<50)	0.0688
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.923	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.167	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0564	Mean in Log Scale	-3.023
SD in Original Scale	0.0312	SD in Log Scale	0.562
95% t UCL (assumes normality of ROS data)	0.0665	95% Percentile Bootstrap UCL	0.0665
95% BCA Bootstrap UCL	0.0666	95% Bootstrap t UCL	0.0675
95% H-UCL (Log ROS)	0.0707		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.036	KM Geo Mean	0.048
KM SD (logged)	0.583	95% Critical H Value (KM-Log)	2.012
KM Standard Error of Mean (logged)	0.112	95% H-UCL (KM -Log)	0.0714

KM SD (logged)	0.583	95% Critical H Value (KM-Log)	2.012
KM Standard Error of Mean (logged)	0.112		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0561	Mean in Log Scale	-3.06
SD in Original Scale	0.0317	SD in Log Scale	0.671
95% t UCL (Assumes normality)	0.0663	95% H-Stat UCL	0.077
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.0822		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:43:58 PM		
From File	Gordon Region (All Lakes), Fish - Whole Body, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region (All Lakes), Fish - Whole Body, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	28	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.676	Mean	1.344
Maximum	2.25	Median	1.38
SD	0.425	Std. Error of Mean	0.0804
Coefficient of Variation	0.317	Skewness	0.17
Normal GOF Test			
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.117	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.48	95% Adjusted-CLT UCL (Chen-1995)	1.478
		95% Modified-t UCL (Johnson-1978)	1.481
Gamma GOF Test			
A-D Test Statistic	0.412	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.148	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.165	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	9.821	k star (bias corrected MLE)	8.793
Theta hat (MLE)	0.137	Theta star (bias corrected MLE)	0.153
nu hat (MLE)	550	nu star (bias corrected)	492.4
MLE Mean (bias corrected)	1.344	MLE Sd (bias corrected)	0.453
		Approximate Chi Square Value (0.05)	441.9
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	439
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.497	95% Adjusted Gamma UCL (use when n<50)	1.507

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.157	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.392	Mean of logged Data	0.244
Maximum of Logged Data	0.811	SD of logged Data	0.335
Assuming Lognormal Distribution			
95% H-UCL	1.518	90% Chebyshev (MVUE) UCL	1.607
95% Chebyshev (MVUE) UCL	1.725	97.5% Chebyshev (MVUE) UCL	1.889
99% Chebyshev (MVUE) UCL	2.211		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.476	95% Jackknife UCL	1.48
95% Standard Bootstrap UCL	1.474	95% Bootstrap-t UCL	1.488
95% Hall's Bootstrap UCL	1.485	95% Percentile Bootstrap UCL	1.479
95% BCA Bootstrap UCL	1.48		
90% Chebyshev(Mean, Sd) UCL	1.585	95% Chebyshev(Mean, Sd) UCL	1.694
97.5% Chebyshev(Mean, Sd) UCL	1.845	99% Chebyshev(Mean, Sd) UCL	2.143
Suggested UCL to Use			
95% Student's-t UCL	1.48		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:44:37 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	18
Number of Detects	20	Number of Non-Detects	8
Number of Distinct Detects	17	Number of Distinct Non-Detects	1
Minimum Detect	0.0044	Minimum Non-Detect	0.004
Maximum Detect	0.0087	Maximum Non-Detect	0.004
Variance Detects	1.3700E-6	Percent Non-Detects	28.57%
Mean Detects	0.00616	SD Detects	0.00117
Median Detects	0.00595	CV Detects	0.19
Skewness Detects	0.666	Kurtosis Detects	-0.104
Mean of Logged Detects	-5.107	SD of Logged Detects	0.185

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00554	KM Standard Error of Mean	2.6567E-4
KM SD	0.00137	95% KM (BCA) UCL	0.00595
95% KM (t) UCL	0.00599	95% KM (Percentile Bootstrap) UCL	0.00597
95% KM (z) UCL	0.00598	95% KM Bootstrap t UCL	0.00603
90% KM Chebyshev UCL	0.00634	95% KM Chebyshev UCL	0.0067
97.5% KM Chebyshev UCL	0.0072	99% KM Chebyshev UCL	0.00818

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.255	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.108	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.193	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	30.37	k star (bias corrected MLE)	25.85
Theta hat (MLE)	2.0267E-4	Theta star (bias corrected MLE)	2.3813E-4
nu hat (MLE)	1215	nu star (bias corrected)	1034

Mean (detects)	0.00616		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0044	Mean	0.00725
Maximum	0.01	Median	0.0066
SD	0.00202	CV	0.279
k hat (MLE)	13.54	k star (bias corrected MLE)	12.11
Theta hat (MLE)	5.3584E-4	Theta star (bias corrected MLE)	5.9896E-4
nu hat (MLE)	758.1	nu star (bias corrected)	678.2
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (678.18, α)	618.8	Adjusted Chi Square Value (678.18, β)	615.3
95% Gamma Approximate UCL (use when n>=50)	0.00795	95% Gamma Adjusted UCL (use when n<50)	0.008
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00554	SD (KM)	0.00137
Variance (KM)	1.8774E-6	SE of Mean (KM)	2.6567E-4
k hat (KM)	16.34	k star (KM)	14.62
nu hat (KM)	915.3	nu star (KM)	818.5
theta hat (KM)	3.3892E-4	theta star (KM)	3.7897E-4
80% gamma percentile (KM)	0.00671	90% gamma percentile (KM)	0.00746
95% gamma percentile (KM)	0.00812	99% gamma percentile (KM)	0.00945
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (818.53, α)	753.1	Adjusted Chi Square Value (818.53, β)	749.3
95% Gamma Approximate KM-UCL (use when n>=50)	0.00602	95% Gamma Adjusted KM-UCL (use when n<50)	0.00605
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0977	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0055	Mean in Log Scale	-5.237
SD in Original Scale	0.00146	SD in Log Scale	0.267
95% t UCL (assumes normality of ROS data)	0.00597	95% Percentile Bootstrap UCL	0.00595
95% BCA Bootstrap UCL	0.00597	95% Bootstrap t UCL	0.00599
95% H-UCL (Log ROS)	0.00604		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.225	KM Geo Mean	0.00538
KM SD (logged)	0.242	95% Critical H Value (KM-Log)	1.77
KM Standard Error of Mean (logged)	0.0468	95% H-UCL (KM -Log)	0.00601

KM SD (logged)	0.242	95% Critical H Value (KM-Log)	1.77
KM Standard Error of Mean (logged)	0.0468		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00497	Mean in Log Scale	-5.423
SD in Original Scale	0.00215	SD in Log Scale	0.533
95% t UCL (Assumes normality)	0.00566	95% H-Stat UCL	0.00622
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00599		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:45:16 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Cobalt (Co), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Cobalt (Co), mg/kg ww

General Statistics

Total Number of Observations	28	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	27
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Whole Body, Cobalt (Co), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:45:54 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.325	Mean	1.014
Maximum	1.94	Median	1.01
SD	0.409	Std. Error of Mean	0.0772
Coefficient of Variation	0.403	Skewness	0.241

Normal GOF Test		
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level
Data appear Approximate Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.146	95% Adjusted-CLT UCL (Chen-1995)	1.145
		95% Modified-t UCL (Johnson-1978)	1.147

Gamma GOF Test		
A-D Test Statistic	0.91	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.186	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.166	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	5.87	k star (bias corrected MLE)	5.265
Theta hat (MLE)	0.173	Theta star (bias corrected MLE)	0.193
nu hat (MLE)	328.7	nu star (bias corrected)	294.9
MLE Mean (bias corrected)	1.014	MLE Sd (bias corrected)	0.442
		Approximate Chi Square Value (0.05)	256.1
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	253.8

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.168	95% Adjusted Gamma UCL (use when n<50)	1.178

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.124	Mean of logged Data	-0.0733
Maximum of Logged Data	0.663	SD of logged Data	0.442
Assuming Lognormal Distribution			
95% H-UCL	1.205	90% Chebyshev (MVUE) UCL	1.286
95% Chebyshev (MVUE) UCL	1.406	97.5% Chebyshev (MVUE) UCL	1.572
99% Chebyshev (MVUE) UCL	1.899		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.141	95% Jackknife UCL	1.146
95% Standard Bootstrap UCL	1.138	95% Bootstrap-t UCL	1.147
95% Hall's Bootstrap UCL	1.143	95% Percentile Bootstrap UCL	1.139
95% BCA Bootstrap UCL	1.133		
90% Chebyshev(Mean, Sd) UCL	1.246	95% Chebyshev(Mean, Sd) UCL	1.351
97.5% Chebyshev(Mean, Sd) UCL	1.497	99% Chebyshev(Mean, Sd) UCL	1.783
Suggested UCL to Use			
95% Student's-t UCL	1.146		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:46:33 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	28	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	27
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gordon Site, Fish - Whole Body, Lead (Pb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:47:12 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Manganese (Mn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Manganese (Mn), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	2.95	Mean	9.073
Maximum	19.3	Median	8.225
SD	4.75	Std. Error of Mean	0.898
Coefficient of Variation	0.524	Skewness	0.778

Normal GOF Test			
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.6	95% Adjusted-CLT UCL (Chen-1995)	10.69
		95% Modified-t UCL (Johnson-1978)	10.62

Gamma GOF Test			
A-D Test Statistic	0.404	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.127	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.166	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.897	k star (bias corrected MLE)	3.503
Theta hat (MLE)	2.328	Theta star (bias corrected MLE)	2.59
nu hat (MLE)	218.2	nu star (bias corrected)	196.2
MLE Mean (bias corrected)	9.073	MLE Sd (bias corrected)	4.847
		Approximate Chi Square Value (0.05)	164.8
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	163

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	10.8	95% Adjusted Gamma UCL (use when n<50)	10.92

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.118	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.082	Mean of logged Data	2.071
Maximum of Logged Data	2.96	SD of logged Data	0.534
Assuming Lognormal Distribution			
95% H-UCL	11.21	90% Chebyshev (MVUE) UCL	11.99
95% Chebyshev (MVUE) UCL	13.3	97.5% Chebyshev (MVUE) UCL	15.12
99% Chebyshev (MVUE) UCL	18.69		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	10.55	95% Jackknife UCL	10.6
95% Standard Bootstrap UCL	10.56	95% Bootstrap-t UCL	10.86
95% Hall's Bootstrap UCL	10.67	95% Percentile Bootstrap UCL	10.52
95% BCA Bootstrap UCL	10.64		
90% Chebyshev(Mean, Sd) UCL	11.77	95% Chebyshev(Mean, Sd) UCL	12.99
97.5% Chebyshev(Mean, Sd) UCL	14.68	99% Chebyshev(Mean, Sd) UCL	18
Suggested UCL to Use			
95% Student's-t UCL	10.6		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:47:51 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Mercury (Hg), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	0.015	Mean	0.0246
Maximum	0.063	Median	0.0195
SD	0.0113	Std. Error of Mean	0.00213
Coefficient of Variation	0.457	Skewness	1.861

Normal GOF Test			
Shapiro Wilk Test Statistic	0.777	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0283	95% Adjusted-CLT UCL (Chen-1995)	0.0289
		95% Modified-t UCL (Johnson-1978)	0.0284

Gamma GOF Test			
A-D Test Statistic	1.575	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.194	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.166	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.612	k star (bias corrected MLE)	5.927
Theta hat (MLE)	0.00373	Theta star (bias corrected MLE)	0.00416
nu hat (MLE)	370.3	nu star (bias corrected)	331.9
MLE Mean (bias corrected)	0.0246	MLE Sd (bias corrected)	0.0101
		Approximate Chi Square Value (0.05)	290.7
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	288.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0281	95% Adjusted Gamma UCL (use when n<50)	0.0284

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.2	Mean of logged Data	-3.781
Maximum of Logged Data	-2.765	SD of logged Data	0.378
Assuming Lognormal Distribution			
95% H-UCL	0.028	90% Chebyshev (MVUE) UCL	0.0298
95% Chebyshev (MVUE) UCL	0.0322	97.5% Chebyshev (MVUE) UCL	0.0356
99% Chebyshev (MVUE) UCL	0.0422		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0281	95% Jackknife UCL	0.0283
95% Standard Bootstrap UCL	0.0281	95% Bootstrap-t UCL	0.0294
95% Hall's Bootstrap UCL	0.0299	95% Percentile Bootstrap UCL	0.0281
95% BCA Bootstrap UCL	0.0291		
90% Chebyshev(Mean, Sd) UCL	0.031	95% Chebyshev(Mean, Sd) UCL	0.0339
97.5% Chebyshev(Mean, Sd) UCL	0.0379	99% Chebyshev(Mean, Sd) UCL	0.0458
Suggested UCL to Use			
95% Student's-t UCL	0.0283	or 95% Modified-t UCL	0.0284
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:48:30 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	0.021	Mean	0.0311
Maximum	0.053	Median	0.0265
SD	0.0104	Std. Error of Mean	0.00197
Coefficient of Variation	0.334	Skewness	1.017

Normal GOF Test		
Shapiro Wilk Test Statistic	0.781	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0345	95% Adjusted-CLT UCL (Chen-1995)	0.0347
		95% Modified-t UCL (Johnson-1978)	0.0345

Gamma GOF Test		
A-D Test Statistic	2.369	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.272	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	10.71	k star (bias corrected MLE)	9.585
Theta hat (MLE)	0.0029	Theta star (bias corrected MLE)	0.00325
nu hat (MLE)	599.7	nu star (bias corrected)	536.8
MLE Mean (bias corrected)	0.0311	MLE Sd (bias corrected)	0.01
		Approximate Chi Square Value (0.05)	484
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	480.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0345	95% Adjusted Gamma UCL (use when n<50)	0.0347

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.822	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.254	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-3.863	Mean of logged Data	-3.518
Maximum of Logged Data	-2.937	SD of logged Data	0.303
Assuming Lognormal Distribution			
95% H-UCL	0.0345	90% Chebyshev (MVUE) UCL	0.0364
95% Chebyshev (MVUE) UCL	0.0389	97.5% Chebyshev (MVUE) UCL	0.0423
99% Chebyshev (MVUE) UCL	0.049		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0343	95% Jackknife UCL	0.0345
95% Standard Bootstrap UCL	0.0343	95% Bootstrap-t UCL	0.0352
95% Hall's Bootstrap UCL	0.0345	95% Percentile Bootstrap UCL	0.0342
95% BCA Bootstrap UCL	0.0345		
90% Chebyshev(Mean, Sd) UCL	0.037	95% Chebyshev(Mean, Sd) UCL	0.0397
97.5% Chebyshev(Mean, Sd) UCL	0.0434	99% Chebyshev(Mean, Sd) UCL	0.0507
Suggested UCL to Use			
95% Student's-t UCL	0.0345	or 95% Modified-t UCL	0.0345
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:49:09 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Nickel (Ni), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Nickel (Ni), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	26
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.33	Minimum Non-Detect	0.1
Maximum Detect	0.42	Maximum Non-Detect	0.1
Variance Detects	0.00405	Percent Non-Detects	92.86%
Mean Detects	0.375	SD Detects	0.0636
Median Detects	0.375	CV Detects	0.17
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.988	SD of Logged Detects	0.171

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.12	KM Standard Error of Mean	0.0192
KM SD	0.0718	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.152	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.151	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.177	95% KM Chebyshev UCL	0.203
97.5% KM Chebyshev UCL	0.24	99% KM Chebyshev UCL	0.311

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	69.11	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00543	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	276.4	nu star (bias corrected)	N/A
Mean (detects)	0.375		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.12	SD (KM)	0.0718

Variance (KM)	0.00516	SE of Mean (KM)	0.0192
k hat (KM)	2.774	k star (KM)	2.5
nu hat (KM)	155.3	nu star (KM)	140
theta hat (KM)	0.0431	theta star (KM)	0.0478
80% gamma percentile (KM)	0.174	90% gamma percentile (KM)	0.221
95% gamma percentile (KM)	0.265	99% gamma percentile (KM)	0.361
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0404
Approximate Chi Square Value (140.02, α)	113.7	Adjusted Chi Square Value (140.02, β)	112.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.147	95% Gamma Adjusted KM-UCL (use when n<50)	0.149
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.118	Mean in Log Scale	-2.39
SD in Original Scale	0.0924	SD in Log Scale	0.722
95% t UCL (assumes normality of ROS data)	0.148	95% Percentile Bootstrap UCL	0.146
95% BCA Bootstrap UCL	0.152	95% Bootstrap t UCL	0.159
95% H-UCL (Log ROS)	0.16		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.209	KM Geo Mean	0.11
KM SD (logged)	0.34	95% Critical H Value (KM-Log)	1.827
KM Standard Error of Mean (logged)	0.0909	95% H-UCL (KM -Log)	0.131
KM SD (logged)	0.34	95% Critical H Value (KM-Log)	1.827
KM Standard Error of Mean (logged)	0.0909		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0732	Mean in Log Scale	-2.852
SD in Original Scale	0.0861	SD in Log Scale	0.528
95% t UCL (Assumes normality)	0.101	95% H-Stat UCL	0.081
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.152	KM H-UCL	0.131
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:49:48 PM		
From File	Gordon Region (All Lakes), Fish - Whole Body, Selenium (Se), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Whole Body, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	0.11	Mean	0.182
Maximum	0.28	Median	0.19
SD	0.0515	Std. Error of Mean	0.00973
Coefficient of Variation	0.283	Skewness	0.128

Normal GOF Test			
Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.198	95% Adjusted-CLT UCL (Chen-1995)	0.198
		95% Modified-t UCL (Johnson-1978)	0.198

Gamma GOF Test			
A-D Test Statistic	1.001	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.171	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	12.51	k star (bias corrected MLE)	11.2
Theta hat (MLE)	0.0145	Theta star (bias corrected MLE)	0.0162
nu hat (MLE)	700.8	nu star (bias corrected)	627.1
MLE Mean (bias corrected)	0.182	MLE Sd (bias corrected)	0.0543
		Approximate Chi Square Value (0.05)	570
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	566.6

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.2	95% Adjusted Gamma UCL (use when n<50)	0.201

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.207	Mean of logged Data	-1.745
Maximum of Logged Data	-1.273	SD of logged Data	0.293
Assuming Lognormal Distribution			
95% H-UCL	0.202	90% Chebyshev (MVUE) UCL	0.213
95% Chebyshev (MVUE) UCL	0.227	97.5% Chebyshev (MVUE) UCL	0.246
99% Chebyshev (MVUE) UCL	0.284		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.198	95% Jackknife UCL	0.198
95% Standard Bootstrap UCL	0.197	95% Bootstrap-t UCL	0.198
95% Hall's Bootstrap UCL	0.197	95% Percentile Bootstrap UCL	0.198
95% BCA Bootstrap UCL	0.197		
90% Chebyshev(Mean, Sd) UCL	0.211	95% Chebyshev(Mean, Sd) UCL	0.224
97.5% Chebyshev(Mean, Sd) UCL	0.243	99% Chebyshev(Mean, Sd) UCL	0.279
Suggested UCL to Use			
95% Student's-t UCL	0.198	or 95% Modified-t UCL	0.198
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:50:27 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Strontium (Sr), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Strontium (Sr), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	2.83	Mean	6.028
Maximum	9.07	Median	6.495
SD	1.789	Std. Error of Mean	0.338
Coefficient of Variation	0.297	Skewness	-0.126

Normal GOF Test		
Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.138	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.604	95% Adjusted-CLT UCL (Chen-1995)	6.576
		95% Modified-t UCL (Johnson-1978)	6.603

Gamma GOF Test		
A-D Test Statistic	0.603	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level
Detected data follow Appr. Gamma Distribution at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	10.63	k star (bias corrected MLE)	9.518
Theta hat (MLE)	0.567	Theta star (bias corrected MLE)	0.633
nu hat (MLE)	595.5	nu star (bias corrected)	533
MLE Mean (bias corrected)	6.028	MLE Sd (bias corrected)	1.954
		Approximate Chi Square Value (0.05)	480.5
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	477.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	6.687	95% Adjusted Gamma UCL (use when n<50)	6.731

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.181	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.04	Mean of logged Data	1.749
Maximum of Logged Data	2.205	SD of logged Data	0.325
Assuming Lognormal Distribution			
95% H-UCL	6.79	90% Chebyshev (MVUE) UCL	7.184
95% Chebyshev (MVUE) UCL	7.699	97.5% Chebyshev (MVUE) UCL	8.413
99% Chebyshev (MVUE) UCL	9.817		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	6.584	95% Jackknife UCL	6.604
95% Standard Bootstrap UCL	6.582	95% Bootstrap-t UCL	6.599
95% Hall's Bootstrap UCL	6.547	95% Percentile Bootstrap UCL	6.563
95% BCA Bootstrap UCL	6.554		
90% Chebyshev(Mean, Sd) UCL	7.043	95% Chebyshev(Mean, Sd) UCL	7.502
97.5% Chebyshev(Mean, Sd) UCL	8.14	99% Chebyshev(Mean, Sd) UCL	9.393
Suggested UCL to Use			
95% Student's-t UCL	6.604		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:51:45 PM
From File	Gordon Region (All Lakes), Fish - Whole Body, Uranium (U), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region (All Lakes), Fish - Whole Body, Uranium (U), mg/kg ww

General Statistics

Total Number of Observations	28	Number of Distinct Observations	11
Number of Detects	11	Number of Non-Detects	17
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.002	Minimum Non-Detect	0.002
Maximum Detect	0.0055	Maximum Non-Detect	0.002
Variance Detects	1.3249E-6	Percent Non-Detects	60.71%
Mean Detects	0.00319	SD Detects	0.00115
Median Detects	0.003	CV Detects	0.361
Skewness Detects	1.201	Kurtosis Detects	0.668
Mean of Logged Detects	-5.8	SD of Logged Detects	0.331

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00247	KM Standard Error of Mean	1.7855E-4
KM SD	9.0081E-4	95% KM (BCA) UCL	0.00281
95% KM (t) UCL	0.00277	95% KM (Percentile Bootstrap) UCL	0.00279
95% KM (z) UCL	0.00276	95% KM Bootstrap t UCL	0.00299
90% KM Chebyshev UCL	0.003	95% KM Chebyshev UCL	0.00325
97.5% KM Chebyshev UCL	0.00358	99% KM Chebyshev UCL	0.00424

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.465	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.198	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.255	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.686	k star (bias corrected MLE)	7.105
Theta hat (MLE)	3.2945E-4	Theta star (bias corrected MLE)	4.4912E-4
nu hat (MLE)	213.1	nu star (bias corrected)	156.3

Mean (detects)	0.00319		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.002	Mean	0.00733
Maximum	0.01	Median	0.01
SD	0.00346	CV	0.472
k hat (MLE)	3.32	k star (bias corrected MLE)	2.988
Theta hat (MLE)	0.00221	Theta star (bias corrected MLE)	0.00245
nu hat (MLE)	185.9	nu star (bias corrected)	167.3
Adjusted Level of Significance (β)	0.0404		
Approximate Chi Square Value (167.34, α)	138.4	Adjusted Chi Square Value (167.34, β)	136.8
95% Gamma Approximate UCL (use when n>=50)	0.00885	95% Gamma Adjusted UCL (use when n<50)	0.00896
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00247	SD (KM)	9.0081E-4
Variance (KM)	8.1147E-7	SE of Mean (KM)	1.7855E-4
k hat (KM)	7.505	k star (KM)	6.725
nu hat (KM)	420.3	nu star (KM)	376.6
theta hat (KM)	3.2881E-4	theta star (KM)	3.6697E-4
80% gamma percentile (KM)	0.00321	90% gamma percentile (KM)	0.00374
95% gamma percentile (KM)	0.00421	99% gamma percentile (KM)	0.0052
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (376.60, α)	332.6	Adjusted Chi Square Value (376.60, β)	330.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.00279	95% Gamma Adjusted KM-UCL (use when n<50)	0.00282
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00193	Mean in Log Scale	-6.451
SD in Original Scale	0.00129	SD in Log Scale	0.649
95% t UCL (assumes normality of ROS data)	0.00234	95% Percentile Bootstrap UCL	0.00233
95% BCA Bootstrap UCL	0.00239	95% Bootstrap t UCL	0.00245
95% H-UCL (Log ROS)	0.00253		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.052	KM Geo Mean	0.00235
KM SD (logged)	0.283	95% Critical H Value (KM-Log)	1.792
KM Standard Error of Mean (logged)	0.0561	95% H-UCL (KM -Log)	0.0027

KM SD (logged)	0.283	95% Critical H Value (KM-Log)	1.792
KM Standard Error of Mean (logged)	0.0561		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00186	Mean in Log Scale	-6.473
SD in Original Scale	0.0013	SD in Log Scale	0.587
95% t UCL (Assumes normality)	0.00228	95% H-Stat UCL	0.0023
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00277		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:52:24 PM		
From File	Gordon Region (All Lakes), Fish - Whole Body, Zinc (Zn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region (All Lakes), Fish - Whole Body, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	16.2	Mean	31.86
Maximum	42	Median	32.95
SD	6.685	Std. Error of Mean	1.263
Coefficient of Variation	0.21	Skewness	-0.705

Normal GOF Test			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.164	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34.02	95% Adjusted-CLT UCL (Chen-1995)	33.76
		95% Modified-t UCL (Johnson-1978)	33.99

Gamma GOF Test			
A-D Test Statistic	0.831	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.174	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	20.3	k star (bias corrected MLE)	18.15
Theta hat (MLE)	1.57	Theta star (bias corrected MLE)	1.756
nu hat (MLE)	1137	nu star (bias corrected)	1016
MLE Mean (bias corrected)	31.86	MLE Sd (bias corrected)	7.48
		Approximate Chi Square Value (0.05)	943.2
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	938.9

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	34.33	95% Adjusted Gamma UCL (use when n<50)	34.49

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.924	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.164	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.785	Mean of logged Data	3.437
Maximum of Logged Data	3.738	SD of logged Data	0.237
Assuming Lognormal Distribution			
95% H-UCL	34.65	90% Chebyshev (MVUE) UCL	36.27
95% Chebyshev (MVUE) UCL	38.23	97.5% Chebyshev (MVUE) UCL	40.96
99% Chebyshev (MVUE) UCL	46.31		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	33.94	95% Jackknife UCL	34.02
95% Standard Bootstrap UCL	33.91	95% Bootstrap-t UCL	33.8
95% Hall's Bootstrap UCL	33.75	95% Percentile Bootstrap UCL	33.81
95% BCA Bootstrap UCL	33.74		
90% Chebyshev(Mean, Sd) UCL	35.65	95% Chebyshev(Mean, Sd) UCL	37.37
97.5% Chebyshev(Mean, Sd) UCL	39.75	99% Chebyshev(Mean, Sd) UCL	44.44
Suggested UCL to Use			
95% Student's-t UCL	34.02		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

APPENDIX C.28
PROUCL OUTPUTS
FISH WHOLE BODY TISSUE (ALL LAKES)
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:44:39 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Antimony (Sb), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region (All Lakes), Fish - Whole Body, Antimony (Sb), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	38
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Maclellan Site, Fish - Whole Body, Antimony (Sb), mg/kg ww was not processed!

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:45:19 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Arsenic (As), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Arsenic (As), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.013	Mean	0.0369
Maximum	0.07	Median	0.038
SD	0.0189	Std. Error of Mean	0.00303
Coefficient of Variation	0.513	Skewness	0.0656

Normal GOF Test		
Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.042	95% Adjusted-CLT UCL (Chen-1995)	0.0419
		95% Modified-t UCL (Johnson-1978)	0.042

Gamma GOF Test		
A-D Test Statistic	2.111	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.188	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.142	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.369	k star (bias corrected MLE)	3.127
Theta hat (MLE)	0.011	Theta star (bias corrected MLE)	0.0118
nu hat (MLE)	262.8	nu star (bias corrected)	243.9
MLE Mean (bias corrected)	0.0369	MLE Sd (bias corrected)	0.0209
		Approximate Chi Square Value (0.05)	208.7
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	207.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0431	95% Adjusted Gamma UCL (use when n<50)	0.0434

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.198	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.343	Mean of logged Data	-3.455
Maximum of Logged Data	-2.659	SD of logged Data	0.592
Assuming Lognormal Distribution			
95% H-UCL	0.0456	90% Chebyshev (MVUE) UCL	0.0488
95% Chebyshev (MVUE) UCL	0.054	97.5% Chebyshev (MVUE) UCL	0.0611
99% Chebyshev (MVUE) UCL	0.0751		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0419	95% Jackknife UCL	0.042
95% Standard Bootstrap UCL	0.042	95% Bootstrap-t UCL	0.0422
95% Hall's Bootstrap UCL	0.0418	95% Percentile Bootstrap UCL	0.0418
95% BCA Bootstrap UCL	0.0421		
90% Chebyshev(Mean, Sd) UCL	0.046	95% Chebyshev(Mean, Sd) UCL	0.0501
97.5% Chebyshev(Mean, Sd) UCL	0.0559	99% Chebyshev(Mean, Sd) UCL	0.0671
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	0.0501		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:45:58 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Barium (Ba), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Whole Body, Barium (Ba), mg/kg ww			
General Statistics			
Total Number of Observations	39	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	1.18	Mean	2.416
Maximum	6.69	Median	1.97
SD	1.227	Std. Error of Mean	0.196
Coefficient of Variation	0.508	Skewness	1.689
Normal GOF Test			
Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.236	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.747	95% Adjusted-CLT UCL (Chen-1995)	2.796
		95% Modified-t UCL (Johnson-1978)	2.756
Gamma GOF Test			
A-D Test Statistic	1.67	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.198	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.142	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	5.22	k star (bias corrected MLE)	4.836
Theta hat (MLE)	0.463	Theta star (bias corrected MLE)	0.5
nu hat (MLE)	407.2	nu star (bias corrected)	377.2
MLE Mean (bias corrected)	2.416	MLE Sd (bias corrected)	1.099
		Approximate Chi Square Value (0.05)	333.2
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	331.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	2.735	95% Adjusted Gamma UCL (use when n<50)	2.749

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.166	Mean of logged Data	0.783
Maximum of Logged Data	1.901	SD of logged Data	0.428
Assuming Lognormal Distribution			
95% H-UCL	2.731	90% Chebyshev (MVUE) UCL	2.902
95% Chebyshev (MVUE) UCL	3.133	97.5% Chebyshev (MVUE) UCL	3.453
99% Chebyshev (MVUE) UCL	4.083		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.739	95% Jackknife UCL	2.747
95% Standard Bootstrap UCL	2.737	95% Bootstrap-t UCL	2.83
95% Hall's Bootstrap UCL	2.8	95% Percentile Bootstrap UCL	2.756
95% BCA Bootstrap UCL	2.792		
90% Chebyshev(Mean, Sd) UCL	3.006	95% Chebyshev(Mean, Sd) UCL	3.273
97.5% Chebyshev(Mean, Sd) UCL	3.643	99% Chebyshev(Mean, Sd) UCL	4.371
Suggested UCL to Use			
95% Student's-t UCL	2.747	or 95% Modified-t UCL	2.756
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:46:37 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Cadmium (Cd), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Cadmium (Cd), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	32
Number of Detects	34	Number of Non-Detects	5
Number of Distinct Detects	32	Number of Distinct Non-Detects	1
Minimum Detect	0.004	Minimum Non-Detect	0.004
Maximum Detect	0.0263	Maximum Non-Detect	0.004
Variance Detects	5.1094E-5	Percent Non-Detects	12.82%
Mean Detects	0.0124	SD Detects	0.00715
Median Detects	0.0102	CV Detects	0.575
Skewness Detects	0.6	Kurtosis Detects	-0.908
Mean of Logged Detects	-4.559	SD of Logged Detects	0.607

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.152	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0113	KM Standard Error of Mean	0.00116
KM SD	0.00715	95% KM (BCA) UCL	0.0134
95% KM (t) UCL	0.0133	95% KM (Percentile Bootstrap) UCL	0.0133
95% KM (z) UCL	0.0133	95% KM Bootstrap t UCL	0.0134
90% KM Chebyshev UCL	0.0148	95% KM Chebyshev UCL	0.0164
97.5% KM Chebyshev UCL	0.0186	99% KM Chebyshev UCL	0.0229

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.71	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.138	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.152	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.083	k star (bias corrected MLE)	2.83
Theta hat (MLE)	0.00403	Theta star (bias corrected MLE)	0.00439
nu hat (MLE)	209.6	nu star (bias corrected)	192.5

Mean (detects)	0.0124		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.004	Mean	0.0121
Maximum	0.0263	Median	0.01
SD	0.00671	CV	0.554
k hat (MLE)	3.459	k star (bias corrected MLE)	3.21
Theta hat (MLE)	0.0035	Theta star (bias corrected MLE)	0.00378
nu hat (MLE)	269.8	nu star (bias corrected)	250.4
Adjusted Level of Significance (β)	0.0437		
Approximate Chi Square Value (250.36, α)	214.7	Adjusted Chi Square Value (250.36, β)	213.4
95% Gamma Approximate UCL (use when n>=50)	0.0141	95% Gamma Adjusted UCL (use when n<50)	0.0142
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0113	SD (KM)	0.00715
Variance (KM)	5.1175E-5	SE of Mean (KM)	0.00116
k hat (KM)	2.517	k star (KM)	2.34
nu hat (KM)	196.3	nu star (KM)	182.5
theta hat (KM)	0.00451	theta star (KM)	0.00485
80% gamma percentile (KM)	0.0167	90% gamma percentile (KM)	0.0213
95% gamma percentile (KM)	0.0256	99% gamma percentile (KM)	0.0352
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (182.54, α)	152.3	Adjusted Chi Square Value (182.54, β)	151.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.0136	95% Gamma Adjusted KM-UCL (use when n<50)	0.0137
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0112	Mean in Log Scale	-4.736
SD in Original Scale	0.00744	SD in Log Scale	0.739
95% t UCL (assumes normality of ROS data)	0.0132	95% Percentile Bootstrap UCL	0.0132
95% BCA Bootstrap UCL	0.0133	95% Bootstrap t UCL	0.0134
95% H-UCL (Log ROS)	0.0149		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.682	KM Geo Mean	0.00926
KM SD (logged)	0.644	95% Critical H Value (KM-Log)	2.036
KM Standard Error of Mean (logged)	0.105	95% H-UCL (KM -Log)	0.0141

KM SD (logged)	0.644	95% Critical H Value (KM-Log)	2.036
KM Standard Error of Mean (logged)	0.105		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0111	Mean in Log Scale	-4.771
SD in Original Scale	0.00754	SD in Log Scale	0.796
95% t UCL (Assumes normality)	0.0131	95% H-Stat UCL	0.0154
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.0137	95% GROS Adjusted Gamma UCL	0.0142
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:47:17 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Cobalt (Co), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Whole Body, Cobalt (Co), mg/kg ww			
General Statistics			
Total Number of Observations	39	Number of Distinct Observations	7
Number of Detects	8	Number of Non-Detects	31
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.021	Minimum Non-Detect	0.02
Maximum Detect	0.028	Maximum Non-Detect	0.02
Variance Detects	6.2857E-6	Percent Non-Detects	79.49%
Mean Detects	0.024	SD Detects	0.00251
Median Detects	0.0245	CV Detects	0.104
Skewness Detects	0.145	Kurtosis Detects	-0.978
Mean of Logged Detects	-3.734	SD of Logged Detects	0.105
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0208	KM Standard Error of Mean	3.3092E-4
KM SD	0.00193	95% KM (BCA) UCL	0.0214
95% KM (t) UCL	0.0214	95% KM (Percentile Bootstrap) UCL	0.0214
95% KM (z) UCL	0.0214	95% KM Bootstrap t UCL	0.0214
90% KM Chebyshev UCL	0.0218	95% KM Chebyshev UCL	0.0223
97.5% KM Chebyshev UCL	0.0229	99% KM Chebyshev UCL	0.0241
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.337	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.176	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	104.8	k star (bias corrected MLE)	65.57
Theta hat (MLE)	2.2906E-4	Theta star (bias corrected MLE)	3.6602E-4
nu hat (MLE)	1676	nu star (bias corrected)	1049

Mean (detects)	0.024		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0162
Maximum	0.028	Median	0.0156
SD	0.00511	CV	0.315
k hat (MLE)	10.69	k star (bias corrected MLE)	9.882
Theta hat (MLE)	0.00152	Theta star (bias corrected MLE)	0.00164
nu hat (MLE)	833.6	nu star (bias corrected)	770.8
Adjusted Level of Significance (β)	0.0437		
Approximate Chi Square Value (770.79, α)	707.4	Adjusted Chi Square Value (770.79, β)	705
95% Gamma Approximate UCL (use when n>=50)	0.0177	95% Gamma Adjusted UCL (use when n<50)	0.0177
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0208	SD (KM)	0.00193
Variance (KM)	3.7370E-6	SE of Mean (KM)	3.3092E-4
k hat (KM)	116	k star (KM)	107.1
nu hat (KM)	9048	nu star (KM)	8353
theta hat (KM)	1.7949E-4	theta star (KM)	1.9441E-4
80% gamma percentile (KM)	0.0225	90% gamma percentile (KM)	0.0234
95% gamma percentile (KM)	0.0242	99% gamma percentile (KM)	0.0258
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	8142	Adjusted Chi Square Value (N/A, β)	8134
95% Gamma Approximate KM-UCL (use when n>=50)	0.0214	95% Gamma Adjusted KM-UCL (use when n<50)	0.0214
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0172	Mean in Log Scale	-4.095
SD in Original Scale	0.00445	SD in Log Scale	0.256
95% t UCL (assumes normality of ROS data)	0.0184	95% Percentile Bootstrap UCL	0.0183
95% BCA Bootstrap UCL	0.0184	95% Bootstrap t UCL	0.0185
95% H-UCL (Log ROS)	0.0185		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.876	KM Geo Mean	0.0207
KM SD (logged)	0.0843	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0144	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0843	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0144		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0129	Mean in Log Scale	-4.427
SD in Original Scale	0.00583	SD in Log Scale	0.359
95% t UCL (Assumes normality)	0.0144	95% H-Stat UCL	0.0142
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0214		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:47:56 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Copper (Cu), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Copper (Cu), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	0.563	Mean	1.166
Maximum	1.99	Median	1.15
SD	0.4	Std. Error of Mean	0.0641
Coefficient of Variation	0.343	Skewness	0.0427

Normal GOF Test			
Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.118	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.274	95% Adjusted-CLT UCL (Chen-1995)	1.272
		95% Modified-t UCL (Johnson-1978)	1.275

Gamma GOF Test			
A-D Test Statistic	0.784	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.128	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	7.937	k star (bias corrected MLE)	7.344
Theta hat (MLE)	0.147	Theta star (bias corrected MLE)	0.159
nu hat (MLE)	619.1	nu star (bias corrected)	572.8
MLE Mean (bias corrected)	1.166	MLE Sd (bias corrected)	0.43
		Approximate Chi Square Value (0.05)	518.3
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	516.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.289	95% Adjusted Gamma UCL (use when n<50)	1.294

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.574	Mean of logged Data	0.0897
Maximum of Logged Data	0.688	SD of logged Data	0.376
Assuming Lognormal Distribution			
95% H-UCL	1.313	90% Chebyshev (MVUE) UCL	1.389
95% Chebyshev (MVUE) UCL	1.487	97.5% Chebyshev (MVUE) UCL	1.624
99% Chebyshev (MVUE) UCL	1.892		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.272	95% Jackknife UCL	1.274
95% Standard Bootstrap UCL	1.27	95% Bootstrap-t UCL	1.276
95% Hall's Bootstrap UCL	1.274	95% Percentile Bootstrap UCL	1.266
95% BCA Bootstrap UCL	1.271		
90% Chebyshev(Mean, Sd) UCL	1.359	95% Chebyshev(Mean, Sd) UCL	1.446
97.5% Chebyshev(Mean, Sd) UCL	1.567	99% Chebyshev(Mean, Sd) UCL	1.804
Suggested UCL to Use			
95% Student's-t UCL	1.274		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:48:36 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Lead (Pb), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Lead (Pb), mg/kg ww

General Statistics

Total Number of Observations	39	Number of Distinct Observations	9
Number of Detects	8	Number of Non-Detects	31
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.046	Minimum Non-Detect	0.04
Maximum Detect	0.509	Maximum Non-Detect	0.04
Variance Detects	0.037	Percent Non-Detects	79.49%
Mean Detects	0.185	SD Detects	0.192
Median Detects	0.0865	CV Detects	1.041
Skewness Detects	1.278	Kurtosis Detects	-0.223
Mean of Logged Detects	-2.127	SD of Logged Detects	0.968

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.725	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.318	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0697	KM Standard Error of Mean	0.0172
KM SD	0.1	95% KM (BCA) UCL	0.102
95% KM (t) UCL	0.0987	95% KM (Percentile Bootstrap) UCL	0.0993
95% KM (z) UCL	0.098	95% KM Bootstrap t UCL	0.166
90% KM Chebyshev UCL	0.121	95% KM Chebyshev UCL	0.145
97.5% KM Chebyshev UCL	0.177	99% KM Chebyshev UCL	0.241

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.755	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.732	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.293	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.3	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.279	k star (bias corrected MLE)	0.883
Theta hat (MLE)	0.145	Theta star (bias corrected MLE)	0.209
nu hat (MLE)	20.46	nu star (bias corrected)	14.12

Mean (detects)	0.185		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0459
Maximum	0.509	Median	0.01
SD	0.109	CV	2.382
k hat (MLE)	0.608	k star (bias corrected MLE)	0.578
Theta hat (MLE)	0.0755	Theta star (bias corrected MLE)	0.0794
nu hat (MLE)	47.39	nu star (bias corrected)	45.08
Adjusted Level of Significance (β)	0.0437		
Approximate Chi Square Value (45.08, α)	30.68	Adjusted Chi Square Value (45.08, β)	30.21
95% Gamma Approximate UCL (use when n>=50)	0.0674	95% Gamma Adjusted UCL (use when n<50)	0.0685
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0697	SD (KM)	0.1
Variance (KM)	0.0101	SE of Mean (KM)	0.0172
k hat (KM)	0.483	k star (KM)	0.463
nu hat (KM)	37.65	nu star (KM)	36.08
theta hat (KM)	0.144	theta star (KM)	0.151
80% gamma percentile (KM)	0.114	90% gamma percentile (KM)	0.192
95% gamma percentile (KM)	0.275	99% gamma percentile (KM)	0.483
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (36.08, α)	23.34	Adjusted Chi Square Value (36.08, β)	22.93
95% Gamma Approximate KM-UCL (use when n>=50)	0.108	95% Gamma Adjusted KM-UCL (use when n<50)	0.11
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.248	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.042	Mean in Log Scale	-5.499
SD in Original Scale	0.111	SD in Log Scale	2.393
95% t UCL (assumes normality of ROS data)	0.0719	95% Percentile Bootstrap UCL	0.0734
95% BCA Bootstrap UCL	0.0856	95% Bootstrap t UCL	0.142
95% H-UCL (Log ROS)	0.389		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.995	KM Geo Mean	0.05
KM SD (logged)	0.602	95% Critical H Value (KM-Log)	2
KM Standard Error of Mean (logged)	0.103	95% H-UCL (KM -Log)	0.0729

KM SD (logged)	0.602	95% Critical H Value (KM-Log)	2
KM Standard Error of Mean (logged)	0.103		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0538	Mean in Log Scale	-3.546
SD in Original Scale	0.107	SD in Log Scale	0.84
95% t UCL (Assumes normality)	0.0826	95% H-Stat UCL	0.0556
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.11		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:49:15 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Manganese (Mn), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Whole Body, Manganese (Mn), mg/kg ww			
General Statistics			
Total Number of Observations	39	Number of Distinct Observations	38
		Number of Missing Observations	0
Minimum	2.52	Mean	5.18
Maximum	8.43	Median	5.39
SD	1.824	Std. Error of Mean	0.292
Coefficient of Variation	0.352	Skewness	0.0999
Normal GOF Test			
Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.672	95% Adjusted-CLT UCL (Chen-1995)	5.665
		95% Modified-t UCL (Johnson-1978)	5.673
Gamma GOF Test			
A-D Test Statistic	1.056	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.13	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	7.781	k star (bias corrected MLE)	7.199
Theta hat (MLE)	0.666	Theta star (bias corrected MLE)	0.719
nu hat (MLE)	606.9	nu star (bias corrected)	561.5
MLE Mean (bias corrected)	5.18	MLE Sd (bias corrected)	1.93
		Approximate Chi Square Value (0.05)	507.6
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	505.6
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	5.73	95% Adjusted Gamma UCL (use when n<50)	5.753

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.924	Mean of logged Data	1.579
Maximum of Logged Data	2.132	SD of logged Data	0.375
Assuming Lognormal Distribution			
95% H-UCL	5.819	90% Chebyshev (MVUE) UCL	6.157
95% Chebyshev (MVUE) UCL	6.593	97.5% Chebyshev (MVUE) UCL	7.198
99% Chebyshev (MVUE) UCL	8.386		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.66	95% Jackknife UCL	5.672
95% Standard Bootstrap UCL	5.654	95% Bootstrap-t UCL	5.656
95% Hall's Bootstrap UCL	5.677	95% Percentile Bootstrap UCL	5.661
95% BCA Bootstrap UCL	5.646		
90% Chebyshev(Mean, Sd) UCL	6.056	95% Chebyshev(Mean, Sd) UCL	6.453
97.5% Chebyshev(Mean, Sd) UCL	7.004	99% Chebyshev(Mean, Sd) UCL	8.086
Suggested UCL to Use			
95% Adjusted Gamma UCL	5.753		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:49:55 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Mercury (Hg), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region (All Lakes), Fish - Whole Body, Mercury (Hg), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	0.013	Mean	0.0309
Maximum	0.07	Median	0.03
SD	0.0139	Std. Error of Mean	0.00223
Coefficient of Variation	0.45	Skewness	0.775

Normal GOF Test			
Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.126	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0347	95% Adjusted-CLT UCL (Chen-1995)	0.0349
		95% Modified-t UCL (Johnson-1978)	0.0347

Gamma GOF Test			
A-D Test Statistic	0.456	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.142	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	5.287	k star (bias corrected MLE)	4.898
Theta hat (MLE)	0.00585	Theta star (bias corrected MLE)	0.00632
nu hat (MLE)	412.4	nu star (bias corrected)	382
MLE Mean (bias corrected)	0.0309	MLE Sd (bias corrected)	0.014
		Approximate Chi Square Value (0.05)	337.7
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	336.1

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.035	95% Adjusted Gamma UCL (use when n<50)	0.0352

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0901	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.343	Mean of logged Data	-3.573
Maximum of Logged Data	-2.659	SD of logged Data	0.45
Assuming Lognormal Distribution			
95% H-UCL	0.0356	90% Chebyshev (MVUE) UCL	0.0379
95% Chebyshev (MVUE) UCL	0.0411	97.5% Chebyshev (MVUE) UCL	0.0455
99% Chebyshev (MVUE) UCL	0.0541		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.0346	95% Jackknife UCL	0.0347
95% Standard Bootstrap UCL	0.0345	95% Bootstrap-t UCL	0.035
95% Hall's Bootstrap UCL	0.0349	95% Percentile Bootstrap UCL	0.0346
95% BCA Bootstrap UCL	0.0348		
90% Chebyshev(Mean, Sd) UCL	0.0376	95% Chebyshev(Mean, Sd) UCL	0.0406
97.5% Chebyshev(Mean, Sd) UCL	0.0448	99% Chebyshev(Mean, Sd) UCL	0.0531
Suggested UCL to Use			
95% Student's-t UCL	0.0347		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:50:34 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Molybdenum (Mo), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Molybdenum (Mo), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	22
		Number of Missing Observations	0
Minimum	0.015	Mean	0.0272
Maximum	0.056	Median	0.023
SD	0.0109	Std. Error of Mean	0.00175
Coefficient of Variation	0.402	Skewness	1.116

Normal GOF Test			
Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0301	95% Adjusted-CLT UCL (Chen-1995)	0.0304
		95% Modified-t UCL (Johnson-1978)	0.0302

Gamma GOF Test			
A-D Test Statistic	1.026	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	7.333	k star (bias corrected MLE)	6.786
Theta hat (MLE)	0.0037	Theta star (bias corrected MLE)	0.004
nu hat (MLE)	572	nu star (bias corrected)	529.3
MLE Mean (bias corrected)	0.0272	MLE Sd (bias corrected)	0.0104
		Approximate Chi Square Value (0.05)	477
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	475

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.0301	95% Adjusted Gamma UCL (use when n<50)	0.0303

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-4.2	Mean of logged Data	-3.676
Maximum of Logged Data	-2.882	SD of logged Data	0.369
Assuming Lognormal Distribution			
95% H-UCL	0.0303	90% Chebyshev (MVUE) UCL	0.032
95% Chebyshev (MVUE) UCL	0.0342	97.5% Chebyshev (MVUE) UCL	0.0373
99% Chebyshev (MVUE) UCL	0.0434		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.03	95% Jackknife UCL	0.0301
95% Standard Bootstrap UCL	0.03	95% Bootstrap-t UCL	0.0308
95% Hall's Bootstrap UCL	0.0304	95% Percentile Bootstrap UCL	0.0301
95% BCA Bootstrap UCL	0.0303		
90% Chebyshev(Mean, Sd) UCL	0.0324	95% Chebyshev(Mean, Sd) UCL	0.0348
97.5% Chebyshev(Mean, Sd) UCL	0.0381	99% Chebyshev(Mean, Sd) UCL	0.0445
Suggested UCL to Use			
95% Student's-t UCL	0.0301	or 95% Modified-t UCL	0.0302
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:51:13 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Nickel (Ni), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Whole Body, Nickel (Ni), mg/kg ww			
General Statistics			
Total Number of Observations	39	Number of Distinct Observations	10
Number of Detects	9	Number of Non-Detects	30
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	0.19	Minimum Non-Detect	0.1
Maximum Detect	0.31	Maximum Non-Detect	0.1
Variance Detects	0.00164	Percent Non-Detects	76.92%
Mean Detects	0.242	SD Detects	0.0406
Median Detects	0.24	CV Detects	0.167
Skewness Detects	0.314	Kurtosis Detects	-1.028
Mean of Logged Detects	-1.43	SD of Logged Detects	0.167
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.153	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.133	KM Standard Error of Mean	0.0106
KM SD	0.0627	95% KM (BCA) UCL	0.153
95% KM (t) UCL	0.151	95% KM (Percentile Bootstrap) UCL	0.151
95% KM (z) UCL	0.15	95% KM Bootstrap t UCL	0.153
90% KM Chebyshev UCL	0.165	95% KM Chebyshev UCL	0.179
97.5% KM Chebyshev UCL	0.199	99% KM Chebyshev UCL	0.239
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.227	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.153	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	40.52	k star (bias corrected MLE)	27.09
Theta hat (MLE)	0.00598	Theta star (bias corrected MLE)	0.00894
nu hat (MLE)	729.3	nu star (bias corrected)	487.5

Mean (detects)	0.242		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.126
Maximum	0.31	Median	0.119
SD	0.0816	CV	0.646
k hat (MLE)	1.719	k star (bias corrected MLE)	1.604
Theta hat (MLE)	0.0736	Theta star (bias corrected MLE)	0.0788
nu hat (MLE)	134.1	nu star (bias corrected)	125.1
Adjusted Level of Significance (β)	0.0437		
Approximate Chi Square Value (125.08, α)	100.2	Adjusted Chi Square Value (125.08, β)	99.37
95% Gamma Approximate UCL (use when n>=50)	0.158	95% Gamma Adjusted UCL (use when n<50)	0.159
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.133	SD (KM)	0.0627
Variance (KM)	0.00393	SE of Mean (KM)	0.0106
k hat (KM)	4.491	k star (KM)	4.163
nu hat (KM)	350.3	nu star (KM)	324.7
theta hat (KM)	0.0296	theta star (KM)	0.0319
80% gamma percentile (KM)	0.182	90% gamma percentile (KM)	0.22
95% gamma percentile (KM)	0.255	99% gamma percentile (KM)	0.329
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (324.70, α)	284	Adjusted Chi Square Value (324.70, β)	282.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.152	95% Gamma Adjusted KM-UCL (use when n<50)	0.153
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.152	Mean in Log Scale	-1.963
SD in Original Scale	0.0613	SD in Log Scale	0.397
95% t UCL (assumes normality of ROS data)	0.168	95% Percentile Bootstrap UCL	0.168
95% BCA Bootstrap UCL	0.169	95% Bootstrap t UCL	0.169
95% H-UCL (Log ROS)	0.171		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.101	KM Geo Mean	0.122
KM SD (logged)	0.375	95% Critical H Value (KM-Log)	1.832
KM Standard Error of Mean (logged)	0.0637	95% H-UCL (KM -Log)	0.147

KM SD (logged)	0.375	95% Critical H Value (KM-Log)	1.832
KM Standard Error of Mean (logged)	0.0637		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0944	Mean in Log Scale	-2.634
SD in Original Scale	0.0841	SD in Log Scale	0.673
95% t UCL (Assumes normality)	0.117	95% H-Stat UCL	0.113
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.151		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:51:53 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Selenium (Se), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Selenium (Se), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	0.15	Mean	0.216
Maximum	0.38	Median	0.19
SD	0.0582	Std. Error of Mean	0.00933
Coefficient of Variation	0.269	Skewness	1.168
Normal GOF Test			
Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.25	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.232	95% Adjusted-CLT UCL (Chen-1995)	0.233
		95% Modified-t UCL (Johnson-1978)	0.232
Gamma GOF Test			
A-D Test Statistic	2.317	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.23	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	16.23	k star (bias corrected MLE)	15
Theta hat (MLE)	0.0133	Theta star (bias corrected MLE)	0.0144
nu hat (MLE)	1266	nu star (bias corrected)	1170
MLE Mean (bias corrected)	0.216	MLE Sd (bias corrected)	0.0558
		Approximate Chi Square Value (0.05)	1091
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	1088
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.232	95% Adjusted Gamma UCL (use when n<50)	0.232

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.897	Mean of logged Data	-1.563
Maximum of Logged Data	-0.968	SD of logged Data	0.245
Assuming Lognormal Distribution			
95% H-UCL	0.232	90% Chebyshev (MVUE) UCL	0.241
95% Chebyshev (MVUE) UCL	0.253	97.5% Chebyshev (MVUE) UCL	0.269
99% Chebyshev (MVUE) UCL	0.301		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.231	95% Jackknife UCL	0.232
95% Standard Bootstrap UCL	0.231	95% Bootstrap-t UCL	0.235
95% Hall's Bootstrap UCL	0.234	95% Percentile Bootstrap UCL	0.232
95% BCA Bootstrap UCL	0.233		
90% Chebyshev(Mean, Sd) UCL	0.244	95% Chebyshev(Mean, Sd) UCL	0.257
97.5% Chebyshev(Mean, Sd) UCL	0.274	99% Chebyshev(Mean, Sd) UCL	0.309
Suggested UCL to Use			
95% Student's-t UCL	0.232	or 95% Modified-t UCL	0.232
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:52:33 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Strontium (Sr), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region (All Lakes), Fish - Whole Body, Strontium (Sr), mg/kg ww			
General Statistics			
Total Number of Observations	39	Number of Distinct Observations	38
		Number of Missing Observations	0
Minimum	5.79	Mean	10.11
Maximum	20.2	Median	9.47
SD	2.983	Std. Error of Mean	0.478
Coefficient of Variation	0.295	Skewness	1.31
Normal GOF Test			
Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.92	95% Adjusted-CLT UCL (Chen-1995)	11
		95% Modified-t UCL (Johnson-1978)	10.93
Gamma GOF Test			
A-D Test Statistic	0.693	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.129	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	13.4	k star (bias corrected MLE)	12.38
Theta hat (MLE)	0.755	Theta star (bias corrected MLE)	0.817
nu hat (MLE)	1045	nu star (bias corrected)	965.8
MLE Mean (bias corrected)	10.11	MLE Sd (bias corrected)	2.873
		Approximate Chi Square Value (0.05)	894.7
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	892
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	10.91	95% Adjusted Gamma UCL (use when n<50)	10.95

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.111	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.756	Mean of logged Data	2.276
Maximum of Logged Data	3.006	SD of logged Data	0.273
Assuming Lognormal Distribution			
95% H-UCL	10.93	90% Chebyshev (MVUE) UCL	11.44
95% Chebyshev (MVUE) UCL	12.05	97.5% Chebyshev (MVUE) UCL	12.89
99% Chebyshev (MVUE) UCL	14.55		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	10.9	95% Jackknife UCL	10.92
95% Standard Bootstrap UCL	10.89	95% Bootstrap-t UCL	11.02
95% Hall's Bootstrap UCL	11.12	95% Percentile Bootstrap UCL	10.89
95% BCA Bootstrap UCL	11.03		
90% Chebyshev(Mean, Sd) UCL	11.54	95% Chebyshev(Mean, Sd) UCL	12.19
97.5% Chebyshev(Mean, Sd) UCL	13.09	99% Chebyshev(Mean, Sd) UCL	14.86
Suggested UCL to Use			
95% Adjusted Gamma UCL	10.95		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:53:12 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Thallium (Tl), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Thallium (Tl), mg/kg ww

General Statistics

Total Number of Observations	39	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	34
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.0063	Minimum Non-Detect	0.006
Maximum Detect	0.0085	Maximum Non-Detect	0.006
Variance Detects	7.7000E-7	Percent Non-Detects	87.18%
Mean Detects	0.007	SD Detects	8.7750E-4
Median Detects	0.0067	CV Detects	0.125
Skewness Detects	1.776	Kurtosis Detects	3.328
Mean of Logged Detects	-4.968	SD of Logged Detects	0.118

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.813	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.3	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00613	KM Standard Error of Mean	7.8189E-5
KM SD	4.3674E-4	95% KM (BCA) UCL	0.00626
95% KM (t) UCL	0.00626	95% KM (Percentile Bootstrap) UCL	0.00626
95% KM (z) UCL	0.00626	95% KM Bootstrap t UCL	0.00628
90% KM Chebyshev UCL	0.00636	95% KM Chebyshev UCL	0.00647
97.5% KM Chebyshev UCL	0.00662	99% KM Chebyshev UCL	0.00691

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.525	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.286	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	86.03	k star (bias corrected MLE)	34.55
Theta hat (MLE)	8.1365E-5	Theta star (bias corrected MLE)	2.0263E-4
nu hat (MLE)	860.3	nu star (bias corrected)	345.5

Mean (detects)	0.007		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0063	Mean	0.00962
Maximum	0.01	Median	0.01
SD	0.00106	CV	0.11
k hat (MLE)	69.1	k star (bias corrected MLE)	63.8
Theta hat (MLE)	1.3915E-4	Theta star (bias corrected MLE)	1.5071E-4
nu hat (MLE)	5390	nu star (bias corrected)	4977
Adjusted Level of Significance (β)	0.0437		
Approximate Chi Square Value (N/A, α)	4814	Adjusted Chi Square Value (N/A, β)	4807
95% Gamma Approximate UCL (use when n>=50)	0.00994	95% Gamma Adjusted UCL (use when n<50)	0.00995
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00613	SD (KM)	4.3674E-4
Variance (KM)	1.9074E-7	SE of Mean (KM)	7.8189E-5
k hat (KM)	196.9	k star (KM)	181.8
nu hat (KM)	15357	nu star (KM)	14177
theta hat (KM)	3.1125E-5	theta star (KM)	3.3716E-5
80% gamma percentile (KM)	0.00651	90% gamma percentile (KM)	0.00672
95% gamma percentile (KM)	0.00689	99% gamma percentile (KM)	0.00723
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	13901	Adjusted Chi Square Value (N/A, β)	13891
95% Gamma Approximate KM-UCL (use when n>=50)	0.00625	95% Gamma Adjusted KM-UCL (use when n<50)	0.00625
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00414	Mean in Log Scale	-5.547
SD in Original Scale	0.00148	SD in Log Scale	0.35
95% t UCL (assumes normality of ROS data)	0.00454	95% Percentile Bootstrap UCL	0.00455
95% BCA Bootstrap UCL	0.00455	95% Bootstrap t UCL	0.00457
95% H-UCL (Log ROS)	0.00459		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.097	KM Geo Mean	0.00612
KM SD (logged)	0.0624	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0112	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0624	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0112		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00351	Mean in Log Scale	-5.701
SD in Original Scale	0.00138	SD in Log Scale	0.288
95% t UCL (Assumes normality)	0.00389	95% H-Stat UCL	0.00378
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00626		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:55:10 AM		
From File	MacLellan Region (All Lakes), Fish - Whole Body, Uranium (U), mg_kg ww.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region (All Lakes), Fish - Whole Body, Uranium (U), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	5
Number of Detects	6	Number of Non-Detects	33
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.0021	Minimum Non-Detect	0.002
Maximum Detect	0.0024	Maximum Non-Detect	0.002
Variance Detects	1.9000E-8	Percent Non-Detects	84.62%
Mean Detects	0.00225	SD Detects	1.3784E-4
Median Detects	0.00225	CV Detects	0.0613
Skewness Detects	4.164E-16	Kurtosis Detects	-2.299
Mean of Logged Detects	-6.098	SD of Logged Detects	0.0614

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00204	KM Standard Error of Mean	1.8036E-5
KM SD	1.0282E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00207	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00207	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00209	95% KM Chebyshev UCL	0.00212
97.5% KM Chebyshev UCL	0.00215	99% KM Chebyshev UCL	0.00222

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.452	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.218	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	319.2	k star (bias corrected MLE)	159.7
Theta hat (MLE)	7.0483E-6	Theta star (bias corrected MLE)	1.4087E-5
nu hat (MLE)	3831	nu star (bias corrected)	1917

Mean (detects)	0.00225		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0021	Mean	0.00881
Maximum	0.01	Median	0.01
SD	0.00283	CV	0.322
k hat (MLE)	5.026	k star (bias corrected MLE)	4.657
Theta hat (MLE)	0.00175	Theta star (bias corrected MLE)	0.00189
nu hat (MLE)	392	nu star (bias corrected)	363.2
Adjusted Level of Significance (β)	0.0437		
Approximate Chi Square Value (363.21, α)	320	Adjusted Chi Square Value (363.21, β)	318.5
95% Gamma Approximate UCL (use when n>=50)	0.01	95% Gamma Adjusted UCL (use when n<50)	0.01
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00204	SD (KM)	1.0282E-4
Variance (KM)	1.0572E-8	SE of Mean (KM)	1.8036E-5
k hat (KM)	393.1	k star (KM)	362.8
nu hat (KM)	30658	nu star (KM)	28301
theta hat (KM)	5.1863E-6	theta star (KM)	5.6182E-6
80% gamma percentile (KM)	0.00213	90% gamma percentile (KM)	0.00218
95% gamma percentile (KM)	0.00222	99% gamma percentile (KM)	0.0023
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	27911	Adjusted Chi Square Value (N/A, β)	27896
95% Gamma Approximate KM-UCL (use when n>=50)	0.00207	95% Gamma Adjusted KM-UCL (use when n<50)	0.00207
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00176	Mean in Log Scale	-6.355
SD in Original Scale	2.9143E-4	SD in Log Scale	0.164
95% t UCL (assumes normality of ROS data)	0.00184	95% Percentile Bootstrap UCL	0.00184
95% BCA Bootstrap UCL	0.00184	95% Bootstrap t UCL	0.00184
95% H-UCL (Log ROS)	0.00184		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.197	KM Geo Mean	0.00204
KM SD (logged)	0.0473	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0083	95% H-UCL (KM -Log)	N/A

KM SD (logged)	0.0473	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0083		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00119	Mean in Log Scale	-6.783
SD in Original Scale	4.5962E-4	SD in Log Scale	0.297
95% t UCL (Assumes normality)	0.00132	95% H-Stat UCL	0.00129
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.00207		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:55:49 AM
From File	MacLellan Region (All Lakes), Fish - Whole Body, Zinc (Zn), mg_kg ww.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region (All Lakes), Fish - Whole Body, Zinc (Zn), mg/kg ww

General Statistics			
Total Number of Observations	39	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	24.5	Mean	41.25
Maximum	63.1	Median	39.4
SD	9.276	Std. Error of Mean	1.485
Coefficient of Variation	0.225	Skewness	0.424

Normal GOF Test		
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.939	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.14	Data Not Normal at 5% Significance Level
Data appear Approximate Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	43.75	95% Adjusted-CLT UCL (Chen-1995)	43.8
		95% Modified-t UCL (Johnson-1978)	43.77

Gamma GOF Test		
A-D Test Statistic	0.497	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.114	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.141	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	20.42	k star (bias corrected MLE)	18.86
Theta hat (MLE)	2.02	Theta star (bias corrected MLE)	2.187
nu hat (MLE)	1592	nu star (bias corrected)	1471
MLE Mean (bias corrected)	41.25	MLE Sd (bias corrected)	9.497
		Approximate Chi Square Value (0.05)	1383
Adjusted Level of Significance	0.0437	Adjusted Chi Square Value	1380

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	43.87	95% Adjusted Gamma UCL (use when n<50)	43.98

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.939	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.14	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.199	Mean of logged Data	3.695
Maximum of Logged Data	4.145	SD of logged Data	0.226
Assuming Lognormal Distribution			
95% H-UCL	44.02	90% Chebyshev (MVUE) UCL	45.79
95% Chebyshev (MVUE) UCL	47.84	97.5% Chebyshev (MVUE) UCL	50.69
99% Chebyshev (MVUE) UCL	56.28		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	43.69	95% Jackknife UCL	43.75
95% Standard Bootstrap UCL	43.69	95% Bootstrap-t UCL	43.95
95% Hall's Bootstrap UCL	43.82	95% Percentile Bootstrap UCL	43.7
95% BCA Bootstrap UCL	43.62		
90% Chebyshev(Mean, Sd) UCL	45.7	95% Chebyshev(Mean, Sd) UCL	47.72
97.5% Chebyshev(Mean, Sd) UCL	50.52	99% Chebyshev(Mean, Sd) UCL	56.03
Suggested UCL to Use			
95% Student's-t UCL	43.75		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.29
PROUCL OUTPUTS
SEDIMENT
GORDON REGION

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:54:19 PM
From File	Gordon Region, Sediment, Antimony (Sb), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Antimony (Sb), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	16
Number of Detects	29	Number of Non-Detects	19
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.52	Maximum Non-Detect	0.1
Variance Detects	0.00832	Percent Non-Detects	39.58%
Mean Detects	0.176	SD Detects	0.0912
Median Detects	0.14	CV Detects	0.52
Skewness Detects	2.318	Kurtosis Detects	6.476
Mean of Logged Detects	-1.832	SD of Logged Detects	0.405

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.737	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.146	KM Standard Error of Mean	0.0116
KM SD	0.0788	95% KM (BCA) UCL	0.167
95% KM (t) UCL	0.165	95% KM (Percentile Bootstrap) UCL	0.166
95% KM (z) UCL	0.165	95% KM Bootstrap t UCL	0.172
90% KM Chebyshev UCL	0.18	95% KM Chebyshev UCL	0.196
97.5% KM Chebyshev UCL	0.218	99% KM Chebyshev UCL	0.261

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.654	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.747	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.242	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.163	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	5.592	k star (bias corrected MLE)	5.036
Theta hat (MLE)	0.0314	Theta star (bias corrected MLE)	0.0348
nu hat (MLE)	324.3	nu star (bias corrected)	292.1

Mean (detects)	0.176		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.115
Maximum	0.52	Median	0.11
SD	0.104	CV	0.905
k hat (MLE)	1.054	k star (bias corrected MLE)	1.002
Theta hat (MLE)	0.109	Theta star (bias corrected MLE)	0.115
nu hat (MLE)	101.2	nu star (bias corrected)	96.22
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (96.22, α)	74.6	Adjusted Chi Square Value (96.22, β)	74.01
95% Gamma Approximate UCL (use when n>=50)	0.148	95% Gamma Adjusted UCL (use when n<50)	0.149
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.146	SD (KM)	0.0788
Variance (KM)	0.00622	SE of Mean (KM)	0.0116
k hat (KM)	3.411	k star (KM)	3.212
nu hat (KM)	327.5	nu star (KM)	308.4
theta hat (KM)	0.0427	theta star (KM)	0.0453
80% gamma percentile (KM)	0.206	90% gamma percentile (KM)	0.255
95% gamma percentile (KM)	0.3	99% gamma percentile (KM)	0.397
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (308.37, α)	268.7	Adjusted Chi Square Value (308.37, β)	267.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.167	95% Gamma Adjusted KM-UCL (use when n<50)	0.168
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.161	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.13	Mean in Log Scale	-2.24
SD in Original Scale	0.0913	SD in Log Scale	0.63
95% t UCL (assumes normality of ROS data)	0.152	95% Percentile Bootstrap UCL	0.152
95% BCA Bootstrap UCL	0.157	95% Bootstrap t UCL	0.159
95% H-UCL (Log ROS)	0.156		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.018	KM Geo Mean	0.133
KM SD (logged)	0.386	95% Critical H Value (KM-Log)	1.816
KM Standard Error of Mean (logged)	0.0567	95% H-UCL (KM -Log)	0.159

KM SD (logged)	0.386	95% Critical H Value (KM-Log)	1.816
KM Standard Error of Mean (logged)	0.0567		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.126	Mean in Log Scale	-2.293
SD in Original Scale	0.0938	SD in Log Scale	0.655
95% t UCL (Assumes normality)	0.149	95% H-Stat UCL	0.151
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.165	KM H-UCL	0.159
95% KM (BCA) UCL	0.167		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:54:58 PM
From File	Gordon Region, Sediment, Arsenic (As), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Arsenic (As), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.85	Mean	4.32
Maximum	13.8	Median	3.715
SD	2.486	Std. Error of Mean	0.359
Coefficient of Variation	0.575	Skewness	1.522
Normal GOF Test			
Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	4.923	95% Adjusted-CLT UCL (Chen-1995)	4.995
		95% Modified-t UCL (Johnson-1978)	4.936
Gamma GOF Test			
A-D Test Statistic	0.335	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0842	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.285	k star (bias corrected MLE)	3.094
Theta hat (MLE)	1.315	Theta star (bias corrected MLE)	1.397
nu hat (MLE)	315.4	nu star (bias corrected)	297
MLE Mean (bias corrected)	4.32	MLE Sd (bias corrected)	2.456
		Approximate Chi Square Value (0.05)	258.1
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	256.9
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	4.972	95% Adjusted Gamma UCL (use when n<50)	4.994

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.163	Mean of logged Data	1.304
Maximum of Logged Data	2.625	SD of logged Data	0.597
Assuming Lognormal Distribution			
95% H-UCL	5.221	90% Chebyshev (MVUE) UCL	5.595
95% Chebyshev (MVUE) UCL	6.144	97.5% Chebyshev (MVUE) UCL	6.907
99% Chebyshev (MVUE) UCL	8.404		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	4.911	95% Jackknife UCL	4.923
95% Standard Bootstrap UCL	4.898	95% Bootstrap-t UCL	5.062
95% Hall's Bootstrap UCL	5.155	95% Percentile Bootstrap UCL	4.954
95% BCA Bootstrap UCL	5.029		
90% Chebyshev(Mean, Sd) UCL	5.397	95% Chebyshev(Mean, Sd) UCL	5.885
97.5% Chebyshev(Mean, Sd) UCL	6.562	99% Chebyshev(Mean, Sd) UCL	7.891
Suggested UCL to Use			
95% Adjusted Gamma UCL	4.994		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/5/2019 11:55:36 PM		
From File	Gordon Region, Sediment, Barium (Ba), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Sediment, Barium (Ba), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	44
		Number of Missing Observations	0
Minimum	15.6	Mean	125.1
Maximum	246	Median	123.5
SD	51.34	Std. Error of Mean	7.41
Coefficient of Variation	0.41	Skewness	-0.0886

Normal GOF Test			
Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0599	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	137.6	95% Adjusted-CLT UCL (Chen-1995)	137.2
		95% Modified-t UCL (Johnson-1978)	137.6

Gamma GOF Test			
A-D Test Statistic	1.321	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.139	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.073	k star (bias corrected MLE)	3.832
Theta hat (MLE)	30.72	Theta star (bias corrected MLE)	32.65
nu hat (MLE)	391	nu star (bias corrected)	367.9
MLE Mean (bias corrected)	125.1	MLE Sd (bias corrected)	63.92
		Approximate Chi Square Value (0.05)	324.5
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	323.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	141.9	95% Adjusted Gamma UCL (use when n<50)	142.5

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.801	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.747	Mean of logged Data	4.702
Maximum of Logged Data	5.505	SD of logged Data	0.6
Assuming Lognormal Distribution			
95% H-UCL	156.6	90% Chebyshev (MVUE) UCL	167.8
95% Chebyshev (MVUE) UCL	184.4	97.5% Chebyshev (MVUE) UCL	207.4
99% Chebyshev (MVUE) UCL	252.5		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	137.3	95% Jackknife UCL	137.6
95% Standard Bootstrap UCL	137.3	95% Bootstrap-t UCL	137.6
95% Hall's Bootstrap UCL	137.2	95% Percentile Bootstrap UCL	137.4
95% BCA Bootstrap UCL	137		
90% Chebyshev(Mean, Sd) UCL	147.4	95% Chebyshev(Mean, Sd) UCL	157.4
97.5% Chebyshev(Mean, Sd) UCL	171.4	99% Chebyshev(Mean, Sd) UCL	198.9
Suggested UCL to Use			
95% Student's-t UCL	137.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:56:14 PM
From File	Gordon Region, Sediment, Beryllium (Be), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Beryllium (Be), mg/kg

General Statistics

Total Number of Observations	48	Number of Distinct Observations	33
Number of Detects	46	Number of Non-Detects	2
Number of Distinct Detects	32	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.1
Maximum Detect	2.52	Maximum Non-Detect	0.1
Variance Detects	0.125	Percent Non-Detects	4.167%
Mean Detects	0.64	SD Detects	0.353
Median Detects	0.605	CV Detects	0.551
Skewness Detects	3.294	Kurtosis Detects	17.62
Mean of Logged Detects	-0.566	SD of Logged Detects	0.514

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.729	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.945	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.129	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.618	KM Standard Error of Mean	0.0523
KM SD	0.359	95% KM (BCA) UCL	0.717
95% KM (t) UCL	0.706	95% KM (Percentile Bootstrap) UCL	0.711
95% KM (z) UCL	0.704	95% KM Bootstrap t UCL	0.745
90% KM Chebyshev UCL	0.775	95% KM Chebyshev UCL	0.846
97.5% KM Chebyshev UCL	0.945	99% KM Chebyshev UCL	1.138

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.251	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.139	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.131	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.309	k star (bias corrected MLE)	4.043
Theta hat (MLE)	0.149	Theta star (bias corrected MLE)	0.158
nu hat (MLE)	396.5	nu star (bias corrected)	371.9

Mean (detects)	0.64		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0994	Mean	0.619
Maximum	2.52	Median	0.595
SD	0.361	CV	0.584
k hat (MLE)	3.453	k star (bias corrected MLE)	3.251
Theta hat (MLE)	0.179	Theta star (bias corrected MLE)	0.19
nu hat (MLE)	331.5	nu star (bias corrected)	312.1
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (312.11, α)	272.2	Adjusted Chi Square Value (312.11, β)	271
95% Gamma Approximate UCL (use when n>=50)	0.709	95% Gamma Adjusted UCL (use when n<50)	0.712
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.618	SD (KM)	0.359
Variance (KM)	0.129	SE of Mean (KM)	0.0523
k hat (KM)	2.97	k star (KM)	2.798
nu hat (KM)	285.1	nu star (KM)	268.6
theta hat (KM)	0.208	theta star (KM)	0.221
80% gamma percentile (KM)	0.889	90% gamma percentile (KM)	1.113
95% gamma percentile (KM)	1.323	99% gamma percentile (KM)	1.78
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (268.63, α)	231.7	Adjusted Chi Square Value (268.63, β)	230.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.716	95% Gamma Adjusted KM-UCL (use when n<50)	0.72
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.141	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.129	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.621	Mean in Log Scale	-0.614
SD in Original Scale	0.358	SD in Log Scale	0.555
95% t UCL (assumes normality of ROS data)	0.708	95% Percentile Bootstrap UCL	0.708
95% BCA Bootstrap UCL	0.735	95% Bootstrap t UCL	0.738
95% H-UCL (Log ROS)	0.737		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.639	KM Geo Mean	0.528
KM SD (logged)	0.606	95% Critical H Value (KM-Log)	1.966
KM Standard Error of Mean (logged)	0.0885	95% H-UCL (KM -Log)	0.755

KM SD (logged)	0.606	95% Critical H Value (KM-Log)	1.966
KM Standard Error of Mean (logged)	0.0885		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.616	Mean in Log Scale	-0.667
SD in Original Scale	0.365	SD in Log Scale	0.702
95% t UCL (Assumes normality)	0.704	95% H-Stat UCL	0.809
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	0.846		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:57:31 PM
From File	Gordon Region, Sediment, Cadmium (Cd), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Cadmium (Cd), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	0.055	Mean	0.336
Maximum	1.19	Median	0.296
SD	0.207	Std. Error of Mean	0.0299
Coefficient of Variation	0.618	Skewness	1.876
Normal GOF Test			
Shapiro Wilk Test Statistic	0.859	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.386	95% Adjusted-CLT UCL (Chen-1995)	0.393
		95% Modified-t UCL (Johnson-1978)	0.387
Gamma GOF Test			
A-D Test Statistic	0.365	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.097	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.142	k star (bias corrected MLE)	2.96
Theta hat (MLE)	0.107	Theta star (bias corrected MLE)	0.113
nu hat (MLE)	301.6	nu star (bias corrected)	284.1
MLE Mean (bias corrected)	0.336	MLE Sd (bias corrected)	0.195
		Approximate Chi Square Value (0.05)	246.1
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	245
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.387	95% Adjusted Gamma UCL (use when n<50)	0.389

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.9	Mean of logged Data	-1.259
Maximum of Logged Data	0.174	SD of logged Data	0.598
Assuming Lognormal Distribution			
95% H-UCL	0.403	90% Chebyshev (MVUE) UCL	0.432
95% Chebyshev (MVUE) UCL	0.474	97.5% Chebyshev (MVUE) UCL	0.533
99% Chebyshev (MVUE) UCL	0.649		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.385	95% Jackknife UCL	0.386
95% Standard Bootstrap UCL	0.384	95% Bootstrap-t UCL	0.396
95% Hall's Bootstrap UCL	0.408	95% Percentile Bootstrap UCL	0.383
95% BCA Bootstrap UCL	0.394		
90% Chebyshev(Mean, Sd) UCL	0.425	95% Chebyshev(Mean, Sd) UCL	0.466
97.5% Chebyshev(Mean, Sd) UCL	0.522	99% Chebyshev(Mean, Sd) UCL	0.633
Suggested UCL to Use			
95% Adjusted Gamma UCL	0.389		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:58:10 PM
From File	Gordon Region, Sediment, Chromium (Cr), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Chromium (Cr), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	3.5	Mean	31.77
Maximum	126	Median	32.15
SD	18.93	Std. Error of Mean	2.732
Coefficient of Variation	0.596	Skewness	2.417

Normal GOF Test			
Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.184	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	36.36	95% Adjusted-CLT UCL (Chen-1995)	37.28
		95% Modified-t UCL (Johnson-1978)	36.51

Gamma GOF Test			
A-D Test Statistic	2.779	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.198	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.543	k star (bias corrected MLE)	2.398
Theta hat (MLE)	12.5	Theta star (bias corrected MLE)	13.25
nu hat (MLE)	244.1	nu star (bias corrected)	230.2
MLE Mean (bias corrected)	31.77	MLE Sd (bias corrected)	20.52
		Approximate Chi Square Value (0.05)	196
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	195.1

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	37.3	95% Adjusted Gamma UCL (use when n<50)	37.49

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.786	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.253	Mean of logged Data	3.249
Maximum of Logged Data	4.836	SD of logged Data	0.763
Assuming Lognormal Distribution			
95% H-UCL	43.51	90% Chebyshev (MVUE) UCL	46.73
95% Chebyshev (MVUE) UCL	52.41	97.5% Chebyshev (MVUE) UCL	60.28
99% Chebyshev (MVUE) UCL	75.76		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	36.27	95% Jackknife UCL	36.36
95% Standard Bootstrap UCL	36.2	95% Bootstrap-t UCL	37.59
95% Hall's Bootstrap UCL	41.04	95% Percentile Bootstrap UCL	36.6
95% BCA Bootstrap UCL	38.01		
90% Chebyshev(Mean, Sd) UCL	39.97	95% Chebyshev(Mean, Sd) UCL	43.68
97.5% Chebyshev(Mean, Sd) UCL	48.83	99% Chebyshev(Mean, Sd) UCL	58.95
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	43.68		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:58:48 PM
From File	Gordon Region, Sediment, Cobalt (Co), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Cobalt (Co), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	44
		Number of Missing Observations	0
Minimum	1.32	Mean	9.376
Maximum	19.2	Median	10.1
SD	3.955	Std. Error of Mean	0.571
Coefficient of Variation	0.422	Skewness	-0.265

Normal GOF Test		
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.108	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.127	Data appear Normal at 5% Significance Level
Data appear Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.33	95% Adjusted-CLT UCL (Chen-1995)	10.29
		95% Modified-t UCL (Johnson-1978)	10.33

Gamma GOF Test		
A-D Test Statistic	2.275	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.169	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	3.682	k star (bias corrected MLE)	3.466
Theta hat (MLE)	2.547	Theta star (bias corrected MLE)	2.705
nu hat (MLE)	353.5	nu star (bias corrected)	332.7
MLE Mean (bias corrected)	9.376	MLE Sd (bias corrected)	5.037
		Approximate Chi Square Value (0.05)	291.4
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	290.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	10.7	95% Adjusted Gamma UCL (use when n<50)	10.75

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.202	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.278	Mean of logged Data	2.096
Maximum of Logged Data	2.955	SD of logged Data	0.631
Assuming Lognormal Distribution			
95% H-UCL	11.92	90% Chebyshev (MVUE) UCL	12.79
95% Chebyshev (MVUE) UCL	14.1	97.5% Chebyshev (MVUE) UCL	15.93
99% Chebyshev (MVUE) UCL	19.52		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	10.32	95% Jackknife UCL	10.33
95% Standard Bootstrap UCL	10.34	95% Bootstrap-t UCL	10.3
95% Hall's Bootstrap UCL	10.29	95% Percentile Bootstrap UCL	10.32
95% BCA Bootstrap UCL	10.28		
90% Chebyshev(Mean, Sd) UCL	11.09	95% Chebyshev(Mean, Sd) UCL	11.86
97.5% Chebyshev(Mean, Sd) UCL	12.94	99% Chebyshev(Mean, Sd) UCL	15.06
Suggested UCL to Use			
95% Student's-t UCL	10.33		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/5/2019 11:59:27 PM
From File	Gordon Region, Sediment, Copper (Cu), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Copper (Cu), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	2.3	Mean	18.54
Maximum	31.3	Median	19.3
SD	7.148	Std. Error of Mean	1.032
Coefficient of Variation	0.386	Skewness	-0.41
Normal GOF Test			
Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0838	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20.27	95% Adjusted-CLT UCL (Chen-1995)	20.17
		95% Modified-t UCL (Johnson-1978)	20.26
Gamma GOF Test			
A-D Test Statistic	1.851	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.157	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	4.263	k star (bias corrected MLE)	4.011
Theta hat (MLE)	4.349	Theta star (bias corrected MLE)	4.622
nu hat (MLE)	409.3	nu star (bias corrected)	385
MLE Mean (bias corrected)	18.54	MLE Sd (bias corrected)	9.257
		Approximate Chi Square Value (0.05)	340.6
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	339.3
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	20.96	95% Adjusted Gamma UCL (use when n<50)	21.04

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.762	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.833	Mean of logged Data	2.798
Maximum of Logged Data	3.444	SD of logged Data	0.595
Assuming Lognormal Distribution			
95% H-UCL	23.22	90% Chebyshev (MVUE) UCL	24.89
95% Chebyshev (MVUE) UCL	27.32	97.5% Chebyshev (MVUE) UCL	30.7
99% Chebyshev (MVUE) UCL	37.35		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	20.24	95% Jackknife UCL	20.27
95% Standard Bootstrap UCL	20.17	95% Bootstrap-t UCL	20.14
95% Hall's Bootstrap UCL	20.28	95% Percentile Bootstrap UCL	20.14
95% BCA Bootstrap UCL	20.12		
90% Chebyshev(Mean, Sd) UCL	21.63	95% Chebyshev(Mean, Sd) UCL	23.04
97.5% Chebyshev(Mean, Sd) UCL	24.98	99% Chebyshev(Mean, Sd) UCL	28.81
Suggested UCL to Use			
95% Student's-t UCL	20.27		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:00:43 AM
From File	Gordon Region, Sediment, Lead (Pb), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Lead (Pb), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	1.62	Mean	7.98
Maximum	15	Median	7.755
SD	3.086	Std. Error of Mean	0.445
Coefficient of Variation	0.387	Skewness	0.123

Normal GOF Test			
Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0914	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.728	95% Adjusted-CLT UCL (Chen-1995)	8.721
		95% Modified-t UCL (Johnson-1978)	8.729

Gamma GOF Test			
A-D Test Statistic	0.926	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.135	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	5.398	k star (bias corrected MLE)	5.075
Theta hat (MLE)	1.478	Theta star (bias corrected MLE)	1.573
nu hat (MLE)	518.2	nu star (bias corrected)	487.2
MLE Mean (bias corrected)	7.98	MLE Sd (bias corrected)	3.543
		Approximate Chi Square Value (0.05)	437
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	435.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	8.897	95% Adjusted Gamma UCL (use when n<50)	8.927

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.168	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.482	Mean of logged Data	1.982
Maximum of Logged Data	2.708	SD of logged Data	0.487
Assuming Lognormal Distribution			
95% H-UCL	9.335	90% Chebyshev (MVUE) UCL	9.947
95% Chebyshev (MVUE) UCL	10.76	97.5% Chebyshev (MVUE) UCL	11.9
99% Chebyshev (MVUE) UCL	14.12		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	8.713	95% Jackknife UCL	8.728
95% Standard Bootstrap UCL	8.725	95% Bootstrap-t UCL	8.746
95% Hall's Bootstrap UCL	8.708	95% Percentile Bootstrap UCL	8.698
95% BCA Bootstrap UCL	8.696		
90% Chebyshev(Mean, Sd) UCL	9.316	95% Chebyshev(Mean, Sd) UCL	9.922
97.5% Chebyshev(Mean, Sd) UCL	10.76	99% Chebyshev(Mean, Sd) UCL	12.41
Suggested UCL to Use			
95% Student's-t UCL	8.728		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:02:00 AM
From File	Gordon Region, Sediment, Manganese (Mn), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Manganese (Mn), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	112	Mean	612.3
Maximum	3420	Median	498.3
SD	563.8	Std. Error of Mean	81.38
Coefficient of Variation	0.921	Skewness	3.299

Normal GOF Test			
Shapiro Wilk Test Statistic	0.678	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	748.9	95% Adjusted-CLT UCL (Chen-1995)	787.6
		95% Modified-t UCL (Johnson-1978)	755.3

Gamma GOF Test			
A-D Test Statistic	0.728	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.762	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.118	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	2.034	k star (bias corrected MLE)	1.921
Theta hat (MLE)	301	Theta star (bias corrected MLE)	318.7
nu hat (MLE)	195.3	nu star (bias corrected)	184.4
MLE Mean (bias corrected)	612.3	MLE Sd (bias corrected)	441.8
		Approximate Chi Square Value (0.05)	154
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	153.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	733.3	95% Adjusted Gamma UCL (use when n<50)	737.4

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0847	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	4.718	Mean of logged Data	6.152
Maximum of Logged Data	8.137	SD of logged Data	0.714
Assuming Lognormal Distribution			
95% H-UCL	750.1	90% Chebyshev (MVUE) UCL	806.3
95% Chebyshev (MVUE) UCL	898.9	97.5% Chebyshev (MVUE) UCL	1027
99% Chebyshev (MVUE) UCL	1280		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	746.2	95% Jackknife UCL	748.9
95% Standard Bootstrap UCL	742.9	95% Bootstrap-t UCL	836
95% Hall's Bootstrap UCL	1398	95% Percentile Bootstrap UCL	758.9
95% BCA Bootstrap UCL	801.5		
90% Chebyshev(Mean, Sd) UCL	856.5	95% Chebyshev(Mean, Sd) UCL	967.1
97.5% Chebyshev(Mean, Sd) UCL	1121	99% Chebyshev(Mean, Sd) UCL	1422
Suggested UCL to Use			
95% Adjusted Gamma UCL	737.4		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:02:38 AM		
From File	Gordon Region, Sediment, Mercury (Hg), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Sediment, Mercury (Hg), mg/kg			
General Statistics			
Total Number of Observations	48	Number of Distinct Observations	42
Number of Detects	45	Number of Non-Detects	3
Number of Distinct Detects	41	Number of Distinct Non-Detects	1
Minimum Detect	0.0303	Minimum Non-Detect	0.05
Maximum Detect	0.141	Maximum Non-Detect	0.05
Variance Detects	7.8317E-4	Percent Non-Detects	6.25%
Mean Detects	0.0787	SD Detects	0.028
Median Detects	0.075	CV Detects	0.356
Skewness Detects	0.168	Kurtosis Detects	-0.745
Mean of Logged Detects	-2.611	SD of Logged Detects	0.39
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0834	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0762	KM Standard Error of Mean	0.00417
KM SD	0.0285	95% KM (BCA) UCL	0.0827
95% KM (t) UCL	0.0832	95% KM (Percentile Bootstrap) UCL	0.0832
95% KM (z) UCL	0.0831	95% KM Bootstrap t UCL	0.0835
90% KM Chebyshev UCL	0.0887	95% KM Chebyshev UCL	0.0944
97.5% KM Chebyshev UCL	0.102	99% KM Chebyshev UCL	0.118
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.467	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0793	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.132	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	7.408	k star (bias corrected MLE)	6.929
Theta hat (MLE)	0.0106	Theta star (bias corrected MLE)	0.0114
nu hat (MLE)	666.7	nu star (bias corrected)	623.6

Mean (detects)	0.0787		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0303	Mean	0.0765
Maximum	0.141	Median	0.0746
SD	0.0285	CV	0.373
k hat (MLE)	6.87	k star (bias corrected MLE)	6.454
Theta hat (MLE)	0.0111	Theta star (bias corrected MLE)	0.0118
nu hat (MLE)	659.5	nu star (bias corrected)	619.6
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (619.63, α)	562.9	Adjusted Chi Square Value (619.63, β)	561.2
95% Gamma Approximate UCL (use when n>=50)	0.0842	95% Gamma Adjusted UCL (use when n<50)	0.0844
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0762	SD (KM)	0.0285
Variance (KM)	8.1419E-4	SE of Mean (KM)	0.00417
k hat (KM)	7.133	k star (KM)	6.701
nu hat (KM)	684.8	nu star (KM)	643.3
theta hat (KM)	0.0107	theta star (KM)	0.0114
80% gamma percentile (KM)	0.0992	90% gamma percentile (KM)	0.116
95% gamma percentile (KM)	0.13	99% gamma percentile (KM)	0.161
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (643.29, α)	585.5	Adjusted Chi Square Value (643.29, β)	583.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0837	95% Gamma Adjusted KM-UCL (use when n<50)	0.084
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0764	Mean in Log Scale	-2.646
SD in Original Scale	0.0285	SD in Log Scale	0.402
95% t UCL (assumes normality of ROS data)	0.0834	95% Percentile Bootstrap UCL	0.0832
95% BCA Bootstrap UCL	0.0831	95% Bootstrap t UCL	0.0833
95% H-UCL (Log ROS)	0.0856		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.652	KM Geo Mean	0.0705
KM SD (logged)	0.407	95% Critical H Value (KM-Log)	1.828
KM Standard Error of Mean (logged)	0.0597	95% H-UCL (KM -Log)	0.0854

KM SD (logged)	0.407	95% Critical H Value (KM-Log)	1.828
KM Standard Error of Mean (logged)	0.0597		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0754	Mean in Log Scale	-2.678
SD in Original Scale	0.0301	SD in Log Scale	0.46
95% t UCL (Assumes normality)	0.0827	95% H-Stat UCL	0.0865
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0832		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:03:17 AM
From File	Gordon Region, Sediment, Molybdenum (Mo), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Molybdenum (Mo), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.42	Mean	4.245
Maximum	23.7	Median	1.795
SD	5.744	Std. Error of Mean	0.829
Coefficient of Variation	1.353	Skewness	2.374

Normal GOF Test		
Shapiro Wilk Test Statistic	0.63	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level
Data Not Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.636	95% Adjusted-CLT UCL (Chen-1995)	5.912
		95% Modified-t UCL (Johnson-1978)	5.683

Gamma GOF Test		
A-D Test Statistic	2.373	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.78	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.188	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.132	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	0.967	k star (bias corrected MLE)	0.92
Theta hat (MLE)	4.391	Theta star (bias corrected MLE)	4.613
nu hat (MLE)	92.81	nu star (bias corrected)	88.35
MLE Mean (bias corrected)	4.245	MLE Sd (bias corrected)	4.425
		Approximate Chi Square Value (0.05)	67.68
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	67.12

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	5.541	95% Adjusted Gamma UCL (use when n<50)	5.588

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.868	Mean of logged Data	0.846
Maximum of Logged Data	3.165	SD of logged Data	1.037
Assuming Lognormal Distribution			
95% H-UCL	5.72	90% Chebyshev (MVUE) UCL	6.017
95% Chebyshev (MVUE) UCL	6.964	97.5% Chebyshev (MVUE) UCL	8.279
99% Chebyshev (MVUE) UCL	10.86		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	5.609	95% Jackknife UCL	5.636
95% Standard Bootstrap UCL	5.601	95% Bootstrap-t UCL	6.188
95% Hall's Bootstrap UCL	5.798	95% Percentile Bootstrap UCL	5.605
95% BCA Bootstrap UCL	5.835		
90% Chebyshev(Mean, Sd) UCL	6.732	95% Chebyshev(Mean, Sd) UCL	7.859
97.5% Chebyshev(Mean, Sd) UCL	9.423	99% Chebyshev(Mean, Sd) UCL	12.49
Suggested UCL to Use			
95% H-UCL	5.72		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:03:56 AM
From File	Gordon Region, Sediment, Nickel (Ni), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Nickel (Ni), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	2.68	Mean	22.86
Maximum	86.1	Median	23.45
SD	13.09	Std. Error of Mean	1.889
Coefficient of Variation	0.572	Skewness	2.182
Normal GOF Test			
Shapiro Wilk Test Statistic	0.826	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	26.03	95% Adjusted-CLT UCL (Chen-1995)	26.6
		95% Modified-t UCL (Johnson-1978)	26.13
Gamma GOF Test			
A-D Test Statistic	1.861	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.144	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.863	k star (bias corrected MLE)	2.698
Theta hat (MLE)	7.986	Theta star (bias corrected MLE)	8.475
nu hat (MLE)	274.8	nu star (bias corrected)	259
MLE Mean (bias corrected)	22.86	MLE Sd (bias corrected)	13.92
		Approximate Chi Square Value (0.05)	222.7
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	221.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	26.58	95% Adjusted Gamma UCL (use when n<50)	26.71

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.845	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.986	Mean of logged Data	2.945
Maximum of Logged Data	4.456	SD of logged Data	0.697
Assuming Lognormal Distribution			
95% H-UCL	29.81	90% Chebyshev (MVUE) UCL	32.04
95% Chebyshev (MVUE) UCL	35.64	97.5% Chebyshev (MVUE) UCL	40.64
99% Chebyshev (MVUE) UCL	50.45		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	25.97	95% Jackknife UCL	26.03
95% Standard Bootstrap UCL	25.92	95% Bootstrap-t UCL	26.77
95% Hall's Bootstrap UCL	28.74	95% Percentile Bootstrap UCL	26.14
95% BCA Bootstrap UCL	26.69		
90% Chebyshev(Mean, Sd) UCL	28.53	95% Chebyshev(Mean, Sd) UCL	31.1
97.5% Chebyshev(Mean, Sd) UCL	34.66	99% Chebyshev(Mean, Sd) UCL	41.66
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	31.1		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:04:34 AM		
From File	Gordon Region, Sediment, Selenium (Se), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Sediment, Selenium (Se), mg/kg			
General Statistics			
Total Number of Observations	48	Number of Distinct Observations	39
Number of Detects	42	Number of Non-Detects	6
Number of Distinct Detects	37	Number of Distinct Non-Detects	2
Minimum Detect	0.21	Minimum Non-Detect	0.2
Maximum Detect	1.4	Maximum Non-Detect	0.5
Variance Detects	0.129	Percent Non-Detects	12.5%
Mean Detects	0.753	SD Detects	0.359
Median Detects	0.758	CV Detects	0.477
Skewness Detects	0.011	Kurtosis Detects	-1.085
Mean of Logged Detects	-0.428	SD of Logged Detects	0.585
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.89	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.118	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.693	KM Standard Error of Mean	0.0541
KM SD	0.369	95% KM (BCA) UCL	0.786
95% KM (t) UCL	0.784	95% KM (Percentile Bootstrap) UCL	0.782
95% KM (z) UCL	0.782	95% KM Bootstrap t UCL	0.786
90% KM Chebyshev UCL	0.855	95% KM Chebyshev UCL	0.929
97.5% KM Chebyshev UCL	1.031	99% KM Chebyshev UCL	1.231
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.029	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.11	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.137	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.633	k star (bias corrected MLE)	3.389
Theta hat (MLE)	0.207	Theta star (bias corrected MLE)	0.222
nu hat (MLE)	305.2	nu star (bias corrected)	284.7

Mean (detects)	0.753		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.124	Mean	0.699
Maximum	1.4	Median	0.705
SD	0.368	CV	0.527
k hat (MLE)	3.107	k star (bias corrected MLE)	2.927
Theta hat (MLE)	0.225	Theta star (bias corrected MLE)	0.239
nu hat (MLE)	298.3	nu star (bias corrected)	281
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (281.00, α)	243.2	Adjusted Chi Square Value (281.00, β)	242.1
95% Gamma Approximate UCL (use when n>=50)	0.807	95% Gamma Adjusted UCL (use when n<50)	0.811
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.693	SD (KM)	0.369
Variance (KM)	0.136	SE of Mean (KM)	0.0541
k hat (KM)	3.53	k star (KM)	3.323
nu hat (KM)	338.9	nu star (KM)	319.1
theta hat (KM)	0.196	theta star (KM)	0.209
80% gamma percentile (KM)	0.976	90% gamma percentile (KM)	1.203
95% gamma percentile (KM)	1.413	99% gamma percentile (KM)	1.866
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (319.05, α)	278.7	Adjusted Chi Square Value (319.05, β)	277.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.793	95% Gamma Adjusted KM-UCL (use when n<50)	0.797
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.141	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.696	Mean in Log Scale	-0.534
SD in Original Scale	0.37	SD in Log Scale	0.63
95% t UCL (assumes normality of ROS data)	0.785	95% Percentile Bootstrap UCL	0.781
95% BCA Bootstrap UCL	0.783	95% Bootstrap t UCL	0.787
95% H-UCL (Log ROS)	0.857		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.541	KM Geo Mean	0.582
KM SD (logged)	0.625	95% Critical H Value (KM-Log)	1.98
KM Standard Error of Mean (logged)	0.0924	95% H-UCL (KM -Log)	0.848

KM SD (logged)	0.625	95% Critical H Value (KM-Log)	1.98
KM Standard Error of Mean (logged)	0.0924		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.687	Mean in Log Scale	-0.567
SD in Original Scale	0.38	SD in Log Scale	0.672
95% t UCL (Assumes normality)	0.779	95% H-Stat UCL	0.866
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.784		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:05:13 AM		
From File	Gordon Region, Sediment, Silver (Ag), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Sediment, Silver (Ag), mg/kg			
General Statistics			
Total Number of Observations	48	Number of Distinct Observations	26
Number of Detects	30	Number of Non-Detects	18
Number of Distinct Detects	24	Number of Distinct Non-Detects	2
Minimum Detect	0.053	Minimum Non-Detect	0.05
Maximum Detect	0.115	Maximum Non-Detect	0.1
Variance Detects	3.2950E-4	Percent Non-Detects	37.5%
Mean Detects	0.0826	SD Detects	0.0182
Median Detects	0.083	CV Detects	0.22
Skewness Detects	0.11	Kurtosis Detects	-1.081
Mean of Logged Detects	-2.517	SD of Logged Detects	0.225
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.076	KM Standard Error of Mean	0.00315
KM SD	0.0192	95% KM (BCA) UCL	0.0812
95% KM (t) UCL	0.0813	95% KM (Percentile Bootstrap) UCL	0.0811
95% KM (z) UCL	0.0812	95% KM Bootstrap t UCL	0.0812
90% KM Chebyshev UCL	0.0854	95% KM Chebyshev UCL	0.0897
97.5% KM Chebyshev UCL	0.0957	99% KM Chebyshev UCL	0.107
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.382	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.108	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	20.96	k star (bias corrected MLE)	18.88
Theta hat (MLE)	0.00394	Theta star (bias corrected MLE)	0.00438
nu hat (MLE)	1257	nu star (bias corrected)	1133

Mean (detects)	0.0826		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.04	Mean	0.0755
Maximum	0.115	Median	0.0738
SD	0.0195	CV	0.258
k hat (MLE)	14.96	k star (bias corrected MLE)	14.04
Theta hat (MLE)	0.00505	Theta star (bias corrected MLE)	0.00538
nu hat (MLE)	1436	nu star (bias corrected)	1347
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (N/A, α)	1263	Adjusted Chi Square Value (N/A, β)	1261
95% Gamma Approximate UCL (use when n>=50)	0.0806	95% Gamma Adjusted UCL (use when n<50)	0.0807
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.076	SD (KM)	0.0192
Variance (KM)	3.6767E-4	SE of Mean (KM)	0.00315
k hat (KM)	15.71	k star (KM)	14.74
nu hat (KM)	1508	nu star (KM)	1415
theta hat (KM)	0.00484	theta star (KM)	0.00516
80% gamma percentile (KM)	0.092	90% gamma percentile (KM)	0.102
95% gamma percentile (KM)	0.111	99% gamma percentile (KM)	0.129
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	1329	Adjusted Chi Square Value (N/A, β)	1326
95% Gamma Approximate KM-UCL (use when n>=50)	0.0809	95% Gamma Adjusted KM-UCL (use when n<50)	0.0811
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.104	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0757	Mean in Log Scale	-2.613
SD in Original Scale	0.0191	SD in Log Scale	0.256
95% t UCL (assumes normality of ROS data)	0.0803	95% Percentile Bootstrap UCL	0.0802
95% BCA Bootstrap UCL	0.0805	95% Bootstrap t UCL	0.0803
95% H-UCL (Log ROS)	0.081		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.609	KM Geo Mean	0.0736
KM SD (logged)	0.256	95% Critical H Value (KM-Log)	1.803
KM Standard Error of Mean (logged)	0.0428	95% H-UCL (KM -Log)	0.0813

KM SD (logged)	0.256	95% Critical H Value (KM-Log)	1.803
KM Standard Error of Mean (logged)	0.0428		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0678	Mean in Log Scale	-2.769
SD in Original Scale	0.025	SD in Log Scale	0.419
95% t UCL (Assumes normality)	0.0739	95% H-Stat UCL	0.0766
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0813		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:05:51 AM		
From File	Gordon Region, Sediment, Strontium (Sr), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

Gordon Region, Sediment, Strontium (Sr), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	4.18	Mean	28.37
Maximum	50.4	Median	28.6
SD	11.07	Std. Error of Mean	1.598
Coefficient of Variation	0.39	Skewness	-0.12

Normal GOF Test			
Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.053	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	31.05	95% Adjusted-CLT UCL (Chen-1995)	30.97
		95% Modified-t UCL (Johnson-1978)	31.05

Gamma GOF Test			
A-D Test Statistic	1.117	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.121	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.128	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.73	k star (bias corrected MLE)	4.449
Theta hat (MLE)	5.998	Theta star (bias corrected MLE)	6.378
nu hat (MLE)	454.1	nu star (bias corrected)	427.1
MLE Mean (bias corrected)	28.37	MLE Sd (bias corrected)	13.45
		Approximate Chi Square Value (0.05)	380.1
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	378.8

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	31.87	95% Adjusted Gamma UCL (use when n<50)	31.99

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.825	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.43	Mean of logged Data	3.236
Maximum of Logged Data	3.92	SD of logged Data	0.543
Assuming Lognormal Distribution			
95% H-UCL	34.32	90% Chebyshev (MVUE) UCL	36.69
95% Chebyshev (MVUE) UCL	40	97.5% Chebyshev (MVUE) UCL	44.6
99% Chebyshev (MVUE) UCL	53.63		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	31	95% Jackknife UCL	31.05
95% Standard Bootstrap UCL	30.91	95% Bootstrap-t UCL	30.95
95% Hall's Bootstrap UCL	31.03	95% Percentile Bootstrap UCL	30.76
95% BCA Bootstrap UCL	31		
90% Chebyshev(Mean, Sd) UCL	33.17	95% Chebyshev(Mean, Sd) UCL	35.34
97.5% Chebyshev(Mean, Sd) UCL	38.35	99% Chebyshev(Mean, Sd) UCL	44.27
Suggested UCL to Use			
95% Student's-t UCL	31.05		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:06:30 AM		
From File	Gordon Region, Sediment, Thallium (Tl), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Sediment, Thallium (Tl), mg/kg			
General Statistics			
Total Number of Observations	48	Number of Distinct Observations	41
Number of Detects	42	Number of Non-Detects	6
Number of Distinct Detects	39	Number of Distinct Non-Detects	2
Minimum Detect	0.137	Minimum Non-Detect	0.05
Maximum Detect	0.393	Maximum Non-Detect	0.1
Variance Detects	0.00441	Percent Non-Detects	12.5%
Mean Detects	0.242	SD Detects	0.0664
Median Detects	0.232	CV Detects	0.274
Skewness Detects	0.271	Kurtosis Detects	-0.855
Mean of Logged Detects	-1.455	SD of Logged Detects	0.28
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0901	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Approximate Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.218	KM Standard Error of Mean	0.0129
KM SD	0.0884	95% KM (BCA) UCL	0.24
95% KM (t) UCL	0.24	95% KM (Percentile Bootstrap) UCL	0.239
95% KM (z) UCL	0.24	95% KM Bootstrap t UCL	0.239
90% KM Chebyshev UCL	0.257	95% KM Chebyshev UCL	0.275
97.5% KM Chebyshev UCL	0.299	99% KM Chebyshev UCL	0.347
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.521	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.102	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.136	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	13.46	k star (bias corrected MLE)	12.52
Theta hat (MLE)	0.018	Theta star (bias corrected MLE)	0.0194
nu hat (MLE)	1131	nu star (bias corrected)	1051

Mean (detects)	0.242		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.098	Mean	0.226
Maximum	0.393	Median	0.22
SD	0.0755	CV	0.333
k hat (MLE)	8.601	k star (bias corrected MLE)	8.077
Theta hat (MLE)	0.0263	Theta star (bias corrected MLE)	0.028
nu hat (MLE)	825.7	nu star (bias corrected)	775.4
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (775.38, α)	711.8	Adjusted Chi Square Value (775.38, β)	709.9
95% Gamma Approximate UCL (use when n>=50)	0.247	95% Gamma Adjusted UCL (use when n<50)	0.247
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.218	SD (KM)	0.0884
Variance (KM)	0.00782	SE of Mean (KM)	0.0129
k hat (KM)	6.099	k star (KM)	5.732
nu hat (KM)	585.5	nu star (KM)	550.2
theta hat (KM)	0.0358	theta star (KM)	0.0381
80% gamma percentile (KM)	0.289	90% gamma percentile (KM)	0.34
95% gamma percentile (KM)	0.387	99% gamma percentile (KM)	0.484
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (550.23, α)	496.8	Adjusted Chi Square Value (550.23, β)	495.3
95% Gamma Approximate KM-UCL (use when n>=50)	0.242	95% Gamma Adjusted KM-UCL (use when n<50)	0.243
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.228	Mean in Log Scale	-1.534
SD in Original Scale	0.0736	SD in Log Scale	0.338
95% t UCL (assumes normality of ROS data)	0.246	95% Percentile Bootstrap UCL	0.245
95% BCA Bootstrap UCL	0.245	95% Bootstrap t UCL	0.246
95% H-UCL (Log ROS)	0.249		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.647	KM Geo Mean	0.193
KM SD (logged)	0.572	95% Critical H Value (KM-Log)	1.939
KM Standard Error of Mean (logged)	0.0835	95% H-UCL (KM -Log)	0.267

KM SD (logged)	0.572	95% Critical H Value (KM-Log)	1.939
KM Standard Error of Mean (logged)	0.0835		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.217	Mean in Log Scale	-1.691
SD in Original Scale	0.0925	SD in Log Scale	0.694
95% t UCL (Assumes normality)	0.239	95% H-Stat UCL	0.288
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.24		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:09:42 AM
From File	Gordon Region, Sediment, Uranium (U), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Uranium (U), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	0.407	Mean	2.798
Maximum	7.25	Median	2.631
SD	1.561	Std. Error of Mean	0.225
Coefficient of Variation	0.558	Skewness	1.056
Normal GOF Test			
Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.176	95% Adjusted-CLT UCL (Chen-1995)	3.205
		95% Modified-t UCL (Johnson-1978)	3.182
Gamma GOF Test			
A-D Test Statistic	0.584	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0935	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.083	k star (bias corrected MLE)	2.904
Theta hat (MLE)	0.907	Theta star (bias corrected MLE)	0.963
nu hat (MLE)	296	nu star (bias corrected)	278.8
MLE Mean (bias corrected)	2.798	MLE Sd (bias corrected)	1.642
		Approximate Chi Square Value (0.05)	241.1
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	240.1
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	3.235	95% Adjusted Gamma UCL (use when n<50)	3.249

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.899	Mean of logged Data	0.858
Maximum of Logged Data	1.981	SD of logged Data	0.638
Assuming Lognormal Distribution			
95% H-UCL	3.479	90% Chebyshev (MVUE) UCL	3.734
95% Chebyshev (MVUE) UCL	4.123	97.5% Chebyshev (MVUE) UCL	4.662
99% Chebyshev (MVUE) UCL	5.721		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	3.169	95% Jackknife UCL	3.176
95% Standard Bootstrap UCL	3.17	95% Bootstrap-t UCL	3.227
95% Hall's Bootstrap UCL	3.211	95% Percentile Bootstrap UCL	3.142
95% BCA Bootstrap UCL	3.214		
90% Chebyshev(Mean, Sd) UCL	3.474	95% Chebyshev(Mean, Sd) UCL	3.78
97.5% Chebyshev(Mean, Sd) UCL	4.205	99% Chebyshev(Mean, Sd) UCL	5.04
Suggested UCL to Use			
95% Adjusted Gamma UCL	3.249		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 12:10:21 AM		
From File	Gordon Region, Sediment, Vanadium (V), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Gordon Region, Sediment, Vanadium (V), mg/kg			
General Statistics			
Total Number of Observations	48	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	5.45	Mean	34.31
Maximum	109	Median	34.75
SD	17.18	Std. Error of Mean	2.48
Coefficient of Variation	0.501	Skewness	1.349
Normal GOF Test			
Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	38.48	95% Adjusted-CLT UCL (Chen-1995)	38.91
		95% Modified-t UCL (Johnson-1978)	38.56
Gamma GOF Test			
A-D Test Statistic	2.727	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.178	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.22	k star (bias corrected MLE)	3.033
Theta hat (MLE)	10.66	Theta star (bias corrected MLE)	11.31
nu hat (MLE)	309.1	nu star (bias corrected)	291.1
MLE Mean (bias corrected)	34.31	MLE Sd (bias corrected)	19.7
		Approximate Chi Square Value (0.05)	252.6
Adjusted Level of Significance	0.045	Adjusted Chi Square Value	251.5
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	39.55	95% Adjusted Gamma UCL (use when n<50)	39.72

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.216	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.127	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.696	Mean of logged Data	3.372
Maximum of Logged Data	4.691	SD of logged Data	0.663
Assuming Lognormal Distribution			
95% H-UCL	44.1	90% Chebyshev (MVUE) UCL	47.37
95% Chebyshev (MVUE) UCL	52.47	97.5% Chebyshev (MVUE) UCL	59.54
99% Chebyshev (MVUE) UCL	73.44		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	38.39	95% Jackknife UCL	38.48
95% Standard Bootstrap UCL	38.36	95% Bootstrap-t UCL	38.96
95% Hall's Bootstrap UCL	39.9	95% Percentile Bootstrap UCL	38.28
95% BCA Bootstrap UCL	39.03		
90% Chebyshev(Mean, Sd) UCL	41.75	95% Chebyshev(Mean, Sd) UCL	45.12
97.5% Chebyshev(Mean, Sd) UCL	49.8	99% Chebyshev(Mean, Sd) UCL	58.99
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	45.12		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 12:10:59 AM
From File	Gordon Region, Sediment, Zinc (Zn), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Gordon Region, Sediment, Zinc (Zn), mg/kg

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	45
Number of Detects	47	Number of Non-Detects	1
Number of Distinct Detects	45	Number of Distinct Non-Detects	1
Minimum Detect	10	Minimum Non-Detect	10
Maximum Detect	321	Maximum Non-Detect	10
Variance Detects	2116	Percent Non-Detects	2.083%
Mean Detects	78.01	SD Detects	46
Median Detects	76.3	CV Detects	0.59
Skewness Detects	3.151	Kurtosis Detects	16.58
Mean of Logged Detects	4.208	SD of Logged Detects	0.591

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.946	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.128	Detected Data Not Normal at 5% Significance Level
Detected Data Not Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	76.59	KM Standard Error of Mean	6.722
KM SD	46.07	95% KM (BCA) UCL	87.56
95% KM (t) UCL	87.87	95% KM (Percentile Bootstrap) UCL	88.77
95% KM (z) UCL	87.65	95% KM Bootstrap t UCL	91.54
90% KM Chebyshev UCL	96.76	95% KM Chebyshev UCL	105.9
97.5% KM Chebyshev UCL	118.6	99% KM Chebyshev UCL	143.5

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.181	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.137	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.13	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.52	k star (bias corrected MLE)	3.31
Theta hat (MLE)	22.16	Theta star (bias corrected MLE)	23.57
nu hat (MLE)	330.9	nu star (bias corrected)	311.1

Mean (detects)	78.01		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	10	Mean	76.6
Maximum	321	Median	75.7
SD	46.55	CV	0.608
k hat (MLE)	3.101	k star (bias corrected MLE)	2.921
Theta hat (MLE)	24.7	Theta star (bias corrected MLE)	26.22
nu hat (MLE)	297.7	nu star (bias corrected)	280.4
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (280.43, α)	242.6	Adjusted Chi Square Value (280.43, β)	241.6
95% Gamma Approximate UCL (use when n>=50)	88.53	95% Gamma Adjusted UCL (use when n<50)	88.92
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	76.59	SD (KM)	46.07
Variance (KM)	2122	SE of Mean (KM)	6.722
k hat (KM)	2.764	k star (KM)	2.605
nu hat (KM)	265.4	nu star (KM)	250.1
theta hat (KM)	27.71	theta star (KM)	29.4
80% gamma percentile (KM)	111.1	90% gamma percentile (KM)	140.2
95% gamma percentile (KM)	167.5	99% gamma percentile (KM)	227.2
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (250.10, α)	214.5	Adjusted Chi Square Value (250.10, β)	213.5
95% Gamma Approximate KM-UCL (use when n>=50)	89.31	95% Gamma Adjusted KM-UCL (use when n<50)	89.74
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.946	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.128	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	76.73	Mean in Log Scale	4.179
SD in Original Scale	46.37	SD in Log Scale	0.62
95% t UCL (assumes normality of ROS data)	87.96	95% Percentile Bootstrap UCL	88.42
95% BCA Bootstrap UCL	92.01	95% Bootstrap t UCL	92.54
95% H-UCL (Log ROS)	94.55		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	4.168	KM Geo Mean	64.61
KM SD (logged)	0.64	95% Critical H Value (KM-Log)	1.991
KM Standard Error of Mean (logged)	0.0933	95% H-UCL (KM -Log)	95.45

KM SD (logged)	0.64	95% Critical H Value (KM-Log)	1.991
KM Standard Error of Mean (logged)	0.0933		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	76.49	Mean in Log Scale	4.154
SD in Original Scale	46.72	SD in Log Scale	0.695
95% t UCL (Assumes normality)	87.8	95% H-Stat UCL	99.61
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	105.9		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.30
PROUCL OUTPUTS
SEDIMENT
MACLELLAN REGION

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:57:45 AM		
From File	MacLellan Region, Sediment, Antimony (Sb), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Sediment, Antimony (Sb), mg/kg			
General Statistics			
Total Number of Observations	51	Number of Distinct Observations	6
Number of Detects	14	Number of Non-Detects	37
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.1	Minimum Non-Detect	0.1
Maximum Detect	0.21	Maximum Non-Detect	0.1
Variance Detects	8.8626E-4	Percent Non-Detects	72.55%
Mean Detects	0.126	SD Detects	0.0298
Median Detects	0.12	CV Detects	0.235
Skewness Detects	2.079	Kurtosis Detects	4.519
Mean of Logged Detects	-2.089	SD of Logged Detects	0.203
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.746	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.107	KM Standard Error of Mean	0.00278
KM SD	0.0191	95% KM (BCA) UCL	0.112
95% KM (t) UCL	0.112	95% KM (Percentile Bootstrap) UCL	0.112
95% KM (z) UCL	0.112	95% KM Bootstrap t UCL	0.116
90% KM Chebyshev UCL	0.116	95% KM Chebyshev UCL	0.119
97.5% KM Chebyshev UCL	0.125	99% KM Chebyshev UCL	0.135
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	1.116	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.734	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.276	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.228	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	23.88	k star (bias corrected MLE)	18.81
Theta hat (MLE)	0.0053	Theta star (bias corrected MLE)	0.00672
nu hat (MLE)	668.5	nu star (bias corrected)	526.6

Mean (detects)	0.126		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0636
Maximum	0.21	Median	0.0558
SD	0.0473	CV	0.744
k hat (MLE)	1.571	k star (bias corrected MLE)	1.491
Theta hat (MLE)	0.0405	Theta star (bias corrected MLE)	0.0426
nu hat (MLE)	160.2	nu star (bias corrected)	152.1
Adjusted Level of Significance (β)	0.0453		
Approximate Chi Square Value (152.11, α)	124.6	Adjusted Chi Square Value (152.11, β)	123.9
95% Gamma Approximate UCL (use when n>=50)	0.0776	95% Gamma Adjusted UCL (use when n<50)	0.0781
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.107	SD (KM)	0.0191
Variance (KM)	3.6501E-4	SE of Mean (KM)	0.00278
k hat (KM)	31.52	k star (KM)	29.67
nu hat (KM)	3215	nu star (KM)	3027
theta hat (KM)	0.0034	theta star (KM)	0.00361
80% gamma percentile (KM)	0.123	90% gamma percentile (KM)	0.133
95% gamma percentile (KM)	0.142	99% gamma percentile (KM)	0.158
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (N/A, α)	2900	Adjusted Chi Square Value (N/A, β)	2896
95% Gamma Approximate KM-UCL (use when n>=50)	0.112	95% Gamma Adjusted KM-UCL (use when n<50)	0.112
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.262	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0798	Mean in Log Scale	-2.62
SD in Original Scale	0.0359	SD in Log Scale	0.431
95% t UCL (assumes normality of ROS data)	0.0882	95% Percentile Bootstrap UCL	0.0878
95% BCA Bootstrap UCL	0.0893	95% Bootstrap t UCL	0.0899
95% H-UCL (Log ROS)	0.0893		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.244	KM Geo Mean	0.106
KM SD (logged)	0.14	95% Critical H Value (KM-Log)	1.702
KM Standard Error of Mean (logged)	0.0203	95% H-UCL (KM -Log)	0.111

KM SD (logged)	0.14	95% Critical H Value (KM-Log)	1.702
KM Standard Error of Mean (logged)	0.0203		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.071	Mean in Log Scale	-2.747
SD in Original Scale	0.0376	SD in Log Scale	0.422
95% t UCL (Assumes normality)	0.0798	95% H-Stat UCL	0.0782
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.112	KM H-UCL	0.111
95% KM (BCA) UCL	0.112		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 2:58:25 AM
From File	MacLellan Region, Sediment, Arsenic (As), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Arsenic (As), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	50
		Number of Missing Observations	0
Minimum	0.88	Mean	2.436
Maximum	6.49	Median	2.24
SD	1.123	Std. Error of Mean	0.157
Coefficient of Variation	0.461	Skewness	2.003
Normal GOF Test			
Shapiro Wilk Test Statistic	0.809	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.6504E-8	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.7	95% Adjusted-CLT UCL (Chen-1995)	2.742
		95% Modified-t UCL (Johnson-1978)	2.707
Gamma GOF Test			
A-D Test Statistic	1.051	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.135	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.124	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	6.041	k star (bias corrected MLE)	5.699
Theta hat (MLE)	0.403	Theta star (bias corrected MLE)	0.427
nu hat (MLE)	616.2	nu star (bias corrected)	581.3
MLE Mean (bias corrected)	2.436	MLE Sd (bias corrected)	1.02
		Approximate Chi Square Value (0.05)	526.4
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	524.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	2.69	95% Adjusted Gamma UCL (use when n<50)	2.698

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.067	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.128	Mean of logged Data	0.805
Maximum of Logged Data	1.87	SD of logged Data	0.409
Assuming Lognormal Distribution			
95% H-UCL	2.702	90% Chebyshev (MVUE) UCL	2.859
95% Chebyshev (MVUE) UCL	3.055	97.5% Chebyshev (MVUE) UCL	3.326
99% Chebyshev (MVUE) UCL	3.858		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	2.695	95% Jackknife UCL	2.7
95% Standard Bootstrap UCL	2.688	95% Bootstrap-t UCL	2.763
95% Hall's Bootstrap UCL	2.805	95% Percentile Bootstrap UCL	2.711
95% BCA Bootstrap UCL	2.733		
90% Chebyshev(Mean, Sd) UCL	2.908	95% Chebyshev(Mean, Sd) UCL	3.121
97.5% Chebyshev(Mean, Sd) UCL	3.418	99% Chebyshev(Mean, Sd) UCL	4
Suggested UCL to Use			
95% Student's-t UCL	2.7	or 95% Modified-t UCL	2.707
or 95% H-UCL	2.702		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:59:03 AM		
From File	MacLellan Region, Sediment, Barium (Ba), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Sediment, Barium (Ba), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	13.3	Mean	85.52
Maximum	167	Median	86.3
SD	33.55	Std. Error of Mean	4.699
Coefficient of Variation	0.392	Skewness	-0.035

Normal GOF Test			
Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.929	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0651	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	93.39	95% Adjusted-CLT UCL (Chen-1995)	93.22
		95% Modified-t UCL (Johnson-1978)	93.39

Gamma GOF Test			
A-D Test Statistic	0.968	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.134	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.125	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.995	k star (bias corrected MLE)	4.714
Theta hat (MLE)	17.12	Theta star (bias corrected MLE)	18.14
nu hat (MLE)	509.5	nu star (bias corrected)	480.9
MLE Mean (bias corrected)	85.52	MLE Sd (bias corrected)	39.39
		Approximate Chi Square Value (0.05)	431
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	429.6

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	95.41	95% Adjusted Gamma UCL (use when n<50)	95.71

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	2.9240E-5	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.588	Mean of logged Data	4.345
Maximum of Logged Data	5.118	SD of logged Data	0.514
Assuming Lognormal Distribution			
95% H-UCL	100.9	90% Chebyshev (MVUE) UCL	107.7
95% Chebyshev (MVUE) UCL	116.7	97.5% Chebyshev (MVUE) UCL	129.2
99% Chebyshev (MVUE) UCL	153.9		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	93.25	95% Jackknife UCL	93.39
95% Standard Bootstrap UCL	93.07	95% Bootstrap-t UCL	93.35
95% Hall's Bootstrap UCL	93.25	95% Percentile Bootstrap UCL	92.92
95% BCA Bootstrap UCL	93.25		
90% Chebyshev(Mean, Sd) UCL	99.61	95% Chebyshev(Mean, Sd) UCL	106
97.5% Chebyshev(Mean, Sd) UCL	114.9	99% Chebyshev(Mean, Sd) UCL	132.3
Suggested UCL to Use			
95% Student's-t UCL	93.39		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 2:59:42 AM		
From File	MacLellan Region, Sediment, Beryllium (Be), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Sediment, Beryllium (Be), mg/kg			
General Statistics			
Total Number of Observations	51	Number of Distinct Observations	37
Number of Detects	48	Number of Non-Detects	3
Number of Distinct Detects	36	Number of Distinct Non-Detects	1
Minimum Detect	0.17	Minimum Non-Detect	0.1
Maximum Detect	0.79	Maximum Non-Detect	0.1
Variance Detects	0.0202	Percent Non-Detects	5.882%
Mean Detects	0.395	SD Detects	0.142
Median Detects	0.395	CV Detects	0.36
Skewness Detects	0.322	Kurtosis Detects	-0.191
Mean of Logged Detects	-0.998	SD of Logged Detects	0.387
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0818	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.377	KM Standard Error of Mean	0.0217
KM SD	0.153	95% KM (BCA) UCL	0.415
95% KM (t) UCL	0.414	95% KM (Percentile Bootstrap) UCL	0.412
95% KM (z) UCL	0.413	95% KM Bootstrap t UCL	0.414
90% KM Chebyshev UCL	0.442	95% KM Chebyshev UCL	0.472
97.5% KM Chebyshev UCL	0.513	99% KM Chebyshev UCL	0.593
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.513	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.103	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.128	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	7.412	k star (bias corrected MLE)	6.962
Theta hat (MLE)	0.0533	Theta star (bias corrected MLE)	0.0567
nu hat (MLE)	711.5	nu star (bias corrected)	668.4

Mean (detects)	0.395		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.111	Mean	0.379
Maximum	0.79	Median	0.37
SD	0.151	CV	0.399
k hat (MLE)	5.744	k star (bias corrected MLE)	5.419
Theta hat (MLE)	0.0661	Theta star (bias corrected MLE)	0.07
nu hat (MLE)	585.9	nu star (bias corrected)	552.7
Adjusted Level of Significance (β)	0.0453		
Approximate Chi Square Value (552.73, α)	499.2	Adjusted Chi Square Value (552.73, β)	497.7
95% Gamma Approximate UCL (use when n>=50)	0.42	95% Gamma Adjusted UCL (use when n<50)	0.421
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.377	SD (KM)	0.153
Variance (KM)	0.0234	SE of Mean (KM)	0.0217
k hat (KM)	6.081	k star (KM)	5.737
nu hat (KM)	620.3	nu star (KM)	585.1
theta hat (KM)	0.0621	theta star (KM)	0.0658
80% gamma percentile (KM)	0.5	90% gamma percentile (KM)	0.588
95% gamma percentile (KM)	0.668	99% gamma percentile (KM)	0.837
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (585.14, α)	530	Adjusted Chi Square Value (585.14, β)	528.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.417	95% Gamma Adjusted KM-UCL (use when n<50)	0.418
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.947	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.127	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.38	Mean in Log Scale	-1.052
SD in Original Scale	0.15	SD in Log Scale	0.433
95% t UCL (assumes normality of ROS data)	0.416	95% Percentile Bootstrap UCL	0.416
95% BCA Bootstrap UCL	0.415	95% Bootstrap t UCL	0.415
95% H-UCL (Log ROS)	0.429		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.075	KM Geo Mean	0.341
KM SD (logged)	0.482	95% Critical H Value (KM-Log)	1.867
KM Standard Error of Mean (logged)	0.0682	95% H-UCL (KM -Log)	0.435

KM SD (logged)	0.482	95% Critical H Value (KM-Log)	1.867
KM Standard Error of Mean (logged)	0.0682		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.375	Mean in Log Scale	-1.116
SD in Original Scale	0.16	SD in Log Scale	0.605
95% t UCL (Assumes normality)	0.412	95% H-Stat UCL	0.465
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.414		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:00:21 AM		
From File	MacLellan Region, Sediment, Cadmium (Cd), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Sediment, Cadmium (Cd), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	0.078	Mean	0.399
Maximum	0.843	Median	0.368
SD	0.19	Std. Error of Mean	0.0266
Coefficient of Variation	0.476	Skewness	0.472

Normal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.129	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.444	95% Adjusted-CLT UCL (Chen-1995)	0.445
		95% Modified-t UCL (Johnson-1978)	0.444

Gamma GOF Test			
A-D Test Statistic	0.38	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.107	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.125	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.909	k star (bias corrected MLE)	3.692
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	0.108
nu hat (MLE)	398.7	nu star (bias corrected)	376.6
MLE Mean (bias corrected)	0.399	MLE Sd (bias corrected)	0.208
		Approximate Chi Square Value (0.05)	332.6
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	331.4

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	0.452	95% Adjusted Gamma UCL (use when n<50)	0.454

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.00565	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-2.551	Mean of logged Data	-1.051
Maximum of Logged Data	-0.171	SD of logged Data	0.564
Assuming Lognormal Distribution			
95% H-UCL	0.477	90% Chebyshev (MVUE) UCL	0.511
95% Chebyshev (MVUE) UCL	0.557	97.5% Chebyshev (MVUE) UCL	0.622
99% Chebyshev (MVUE) UCL	0.749		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.443	95% Jackknife UCL	0.444
95% Standard Bootstrap UCL	0.443	95% Bootstrap-t UCL	0.446
95% Hall's Bootstrap UCL	0.447	95% Percentile Bootstrap UCL	0.443
95% BCA Bootstrap UCL	0.448		
90% Chebyshev(Mean, Sd) UCL	0.479	95% Chebyshev(Mean, Sd) UCL	0.515
97.5% Chebyshev(Mean, Sd) UCL	0.565	99% Chebyshev(Mean, Sd) UCL	0.664
Suggested UCL to Use			
95% Student's-t UCL	0.444		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:01:00 AM		
From File	MacLellan Region, Sediment, Chromium (Cr), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		

MacLellan Region, Sediment, Chromium (Cr), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	50
		Number of Missing Observations	0
Minimum	3.2	Mean	60.44
Maximum	235.5	Median	29.4
SD	65.13	Std. Error of Mean	9.121
Coefficient of Variation	1.078	Skewness	1.522

Normal GOF Test			
Shapiro Wilk Test Statistic	0.746	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	4.511E-11	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.288	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	75.72	95% Adjusted-CLT UCL (Chen-1995)	77.52
		95% Modified-t UCL (Johnson-1978)	76.05

Gamma GOF Test			
A-D Test Statistic	1.661	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.778	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.182	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.128	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.081	k star (bias corrected MLE)	1.031
Theta hat (MLE)	55.9	Theta star (bias corrected MLE)	58.64
nu hat (MLE)	110.3	nu star (bias corrected)	105.1
MLE Mean (bias corrected)	60.44	MLE Sd (bias corrected)	59.53
		Approximate Chi Square Value (0.05)	82.46
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	81.88

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	77.04	95% Adjusted Gamma UCL (use when n<50)	77.59

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.048	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Lognormal at 5% Significance Level	
Data appear Approximate Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.163	Mean of logged Data	3.572
Maximum of Logged Data	5.462	SD of logged Data	1.068
Assuming Lognormal Distribution			
95% H-UCL	90.14	90% Chebyshev (MVUE) UCL	95.14
95% Chebyshev (MVUE) UCL	110.2	97.5% Chebyshev (MVUE) UCL	131.1
99% Chebyshev (MVUE) UCL	172.1		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	75.44	95% Jackknife UCL	75.72
95% Standard Bootstrap UCL	75.48	95% Bootstrap-t UCL	78.28
95% Hall's Bootstrap UCL	75.48	95% Percentile Bootstrap UCL	76.32
95% BCA Bootstrap UCL	77.47		
90% Chebyshev(Mean, Sd) UCL	87.8	95% Chebyshev(Mean, Sd) UCL	100.2
97.5% Chebyshev(Mean, Sd) UCL	117.4	99% Chebyshev(Mean, Sd) UCL	151.2
Suggested UCL to Use			
95% H-UCL	90.14		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:01:39 AM		
From File	MacLellan Region, Sediment, Cobalt (Co), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Sediment, Cobalt (Co), mg/kg			
General Statistics			
Total Number of Observations	51	Number of Distinct Observations	51
		Number of Missing Observations	0
Minimum	3.12	Mean	24.1
Maximum	123.5	Median	12.6
SD	25.16	Std. Error of Mean	3.523
Coefficient of Variation	1.044	Skewness	1.837
Normal GOF Test			
Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.2185E-9	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	30.01	95% Adjusted-CLT UCL (Chen-1995)	30.86
		95% Modified-t UCL (Johnson-1978)	30.16
Gamma GOF Test			
A-D Test Statistic	1.423	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.776	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	1.169	k star (bias corrected MLE)	1.114
Theta hat (MLE)	20.61	Theta star (bias corrected MLE)	21.64
nu hat (MLE)	119.3	nu star (bias corrected)	113.6
MLE Mean (bias corrected)	24.1	MLE Sd (bias corrected)	22.84
		Approximate Chi Square Value (0.05)	89.98
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	89.37
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	30.42	95% Adjusted Gamma UCL (use when n<50)	30.63

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0202	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.138	Mean of logged Data	2.697
Maximum of Logged Data	4.816	SD of logged Data	1.002
Assuming Lognormal Distribution			
95% H-UCL	33.99	90% Chebyshev (MVUE) UCL	36.13
95% Chebyshev (MVUE) UCL	41.56	97.5% Chebyshev (MVUE) UCL	49.09
99% Chebyshev (MVUE) UCL	63.88		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	29.9	95% Jackknife UCL	30.01
95% Standard Bootstrap UCL	29.8	95% Bootstrap-t UCL	31.3
95% Hall's Bootstrap UCL	31.32	95% Percentile Bootstrap UCL	30.06
95% BCA Bootstrap UCL	30.93		
90% Chebyshev(Mean, Sd) UCL	34.67	95% Chebyshev(Mean, Sd) UCL	39.46
97.5% Chebyshev(Mean, Sd) UCL	46.1	99% Chebyshev(Mean, Sd) UCL	59.16
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	39.46		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:02:17 AM
From File	MacLellan Region, Sediment, Copper (Cu), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Copper (Cu), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	4.5	Mean	75.13
Maximum	355.5	Median	27.9
SD	93.16	Std. Error of Mean	13.04
Coefficient of Variation	1.24	Skewness	1.726
Normal GOF Test			
Shapiro Wilk Test Statistic	0.739	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	2.271E-11	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	96.99	95% Adjusted-CLT UCL (Chen-1995)	99.95
		95% Modified-t UCL (Johnson-1978)	97.52
Gamma GOF Test			
A-D Test Statistic	1.569	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.792	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.182	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.129	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.78	k star (bias corrected MLE)	0.747
Theta hat (MLE)	96.37	Theta star (bias corrected MLE)	100.6
nu hat (MLE)	79.52	nu star (bias corrected)	76.18
MLE Mean (bias corrected)	75.13	MLE Sd (bias corrected)	86.94
		Approximate Chi Square Value (0.05)	57.07
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	56.59
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	100.3	95% Adjusted Gamma UCL (use when n<50)	101.1

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.00449	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.504	Mean of logged Data	3.555
Maximum of Logged Data	5.874	SD of logged Data	1.295
Assuming Lognormal Distribution			
95% H-UCL	131.1	90% Chebyshev (MVUE) UCL	132.8
95% Chebyshev (MVUE) UCL	157.4	97.5% Chebyshev (MVUE) UCL	191.4
99% Chebyshev (MVUE) UCL	258.3		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	96.58	95% Jackknife UCL	96.99
95% Standard Bootstrap UCL	96.1	95% Bootstrap-t UCL	103.7
95% Hall's Bootstrap UCL	102.2	95% Percentile Bootstrap UCL	96.76
95% BCA Bootstrap UCL	100.1		
90% Chebyshev(Mean, Sd) UCL	114.3	95% Chebyshev(Mean, Sd) UCL	132
97.5% Chebyshev(Mean, Sd) UCL	156.6	99% Chebyshev(Mean, Sd) UCL	204.9
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	132		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:02:56 AM
From File	MacLellan Region, Sediment, Lead (Pb), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Lead (Pb), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	1.78	Mean	6.827
Maximum	11.9	Median	7.03
SD	2.403	Std. Error of Mean	0.337
Coefficient of Variation	0.352	Skewness	-0.195

Normal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.387	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0885	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.391	95% Adjusted-CLT UCL (Chen-1995)	7.371
		95% Modified-t UCL (Johnson-1978)	7.39

Gamma GOF Test			
A-D Test Statistic	1.076	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.142	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.124	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	6.689	k star (bias corrected MLE)	6.309
Theta hat (MLE)	1.021	Theta star (bias corrected MLE)	1.082
nu hat (MLE)	682.3	nu star (bias corrected)	643.5
MLE Mean (bias corrected)	6.827	MLE Sd (bias corrected)	2.718
		Approximate Chi Square Value (0.05)	585.6
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	584

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.502	95% Adjusted Gamma UCL (use when n<50)	7.522

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	5.6440E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.577	Mean of logged Data	1.844
Maximum of Logged Data	2.477	SD of logged Data	0.425
Assuming Lognormal Distribution			
95% H-UCL	7.727	90% Chebyshev (MVUE) UCL	8.187
95% Chebyshev (MVUE) UCL	8.767	97.5% Chebyshev (MVUE) UCL	9.571
99% Chebyshev (MVUE) UCL	11.15		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	7.381	95% Jackknife UCL	7.391
95% Standard Bootstrap UCL	7.379	95% Bootstrap-t UCL	7.388
95% Hall's Bootstrap UCL	7.36	95% Percentile Bootstrap UCL	7.358
95% BCA Bootstrap UCL	7.345		
90% Chebyshev(Mean, Sd) UCL	7.837	95% Chebyshev(Mean, Sd) UCL	8.294
97.5% Chebyshev(Mean, Sd) UCL	8.929	99% Chebyshev(Mean, Sd) UCL	10.18
Suggested UCL to Use			
95% Student's-t UCL	7.391		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:04:14 AM		
From File	MacLellan Region, Sediment, Manganese (Mn), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Sediment, Manganese (Mn), mg/kg			
General Statistics			
Total Number of Observations	51	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	113	Mean	453.2
Maximum	1900	Median	399
SD	315.4	Std. Error of Mean	44.17
Coefficient of Variation	0.696	Skewness	2.596
Normal GOF Test			
Shapiro Wilk Test Statistic	0.76	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.606E-10	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	527.2	95% Adjusted-CLT UCL (Chen-1995)	543
		95% Modified-t UCL (Johnson-1978)	529.9
Gamma GOF Test			
A-D Test Statistic	1.02	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.159	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.125	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	3.051	k star (bias corrected MLE)	2.884
Theta hat (MLE)	148.5	Theta star (bias corrected MLE)	157.1
nu hat (MLE)	311.2	nu star (bias corrected)	294.2
MLE Mean (bias corrected)	453.2	MLE Sd (bias corrected)	266.8
		Approximate Chi Square Value (0.05)	255.5
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	254.4
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	521.9	95% Adjusted Gamma UCL (use when n<50)	524

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.357	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	4.727	Mean of logged Data	5.943
Maximum of Logged Data	7.55	SD of logged Data	0.577
Assuming Lognormal Distribution			
95% H-UCL	527.3	90% Chebyshev (MVUE) UCL	564.8
95% Chebyshev (MVUE) UCL	617.3	97.5% Chebyshev (MVUE) UCL	690.3
99% Chebyshev (MVUE) UCL	833.6		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	525.8	95% Jackknife UCL	527.2
95% Standard Bootstrap UCL	524.7	95% Bootstrap-t UCL	560.4
95% Hall's Bootstrap UCL	563.5	95% Percentile Bootstrap UCL	524.2
95% BCA Bootstrap UCL	545.9		
90% Chebyshev(Mean, Sd) UCL	585.7	95% Chebyshev(Mean, Sd) UCL	645.7
97.5% Chebyshev(Mean, Sd) UCL	729	99% Chebyshev(Mean, Sd) UCL	892.6
Suggested UCL to Use			
95% H-UCL	527.3		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
ProUCL computes and outputs H-statistic based UCLs for historical reasons only.			
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.			
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.			
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:04:53 AM
From File	MacLellan Region, Sediment, Mercury (Hg), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Mercury (Hg), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	45
Number of Detects	45	Number of Non-Detects	6
Number of Distinct Detects	44	Number of Distinct Non-Detects	1
Minimum Detect	0.0262	Minimum Non-Detect	0.05
Maximum Detect	0.127	Maximum Non-Detect	0.05
Variance Detects	4.9521E-4	Percent Non-Detects	11.76%
Mean Detects	0.0624	SD Detects	0.0223
Median Detects	0.0617	CV Detects	0.357
Skewness Detects	0.573	Kurtosis Detects	0.422
Mean of Logged Detects	-2.839	SD of Logged Detects	0.371

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0684	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0597	KM Standard Error of Mean	0.00316
KM SD	0.0221	95% KM (BCA) UCL	0.0649
95% KM (t) UCL	0.065	95% KM (Percentile Bootstrap) UCL	0.0647
95% KM (z) UCL	0.0649	95% KM Bootstrap t UCL	0.0651
90% KM Chebyshev UCL	0.0692	95% KM Chebyshev UCL	0.0735
97.5% KM Chebyshev UCL	0.0794	99% KM Chebyshev UCL	0.0911

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.286	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0777	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.132	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	7.917	k star (bias corrected MLE)	7.404
Theta hat (MLE)	0.00788	Theta star (bias corrected MLE)	0.00843
nu hat (MLE)	712.5	nu star (bias corrected)	666.3

Mean (detects)	0.0624		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0262	Mean	0.0598
Maximum	0.127	Median	0.0587
SD	0.0223	CV	0.372
k hat (MLE)	7.497	k star (bias corrected MLE)	7.069
Theta hat (MLE)	0.00797	Theta star (bias corrected MLE)	0.00845
nu hat (MLE)	764.7	nu star (bias corrected)	721
Adjusted Level of Significance (β)	0.0453		
Approximate Chi Square Value (721.01, α)	659.7	Adjusted Chi Square Value (721.01, β)	658
95% Gamma Approximate UCL (use when n>=50)	0.0653	95% Gamma Adjusted UCL (use when n<50)	0.0655
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0597	SD (KM)	0.0221
Variance (KM)	4.8904E-4	SE of Mean (KM)	0.00316
k hat (KM)	7.283	k star (KM)	6.868
nu hat (KM)	742.9	nu star (KM)	700.5
theta hat (KM)	0.00819	theta star (KM)	0.00869
80% gamma percentile (KM)	0.0775	90% gamma percentile (KM)	0.0901
95% gamma percentile (KM)	0.101	99% gamma percentile (KM)	0.125
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (700.49, α)	640.1	Adjusted Chi Square Value (700.49, β)	638.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.0653	95% Gamma Adjusted KM-UCL (use when n<50)	0.0655
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.945	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.1	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.131	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0598	Mean in Log Scale	-2.884
SD in Original Scale	0.0222	SD in Log Scale	0.374
95% t UCL (assumes normality of ROS data)	0.065	95% Percentile Bootstrap UCL	0.065
95% BCA Bootstrap UCL	0.065	95% Bootstrap t UCL	0.0653
95% H-UCL (Log ROS)	0.0659		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.888	KM Geo Mean	0.0557
KM SD (logged)	0.375	95% Critical H Value (KM-Log)	1.78
KM Standard Error of Mean (logged)	0.0543	95% H-UCL (KM -Log)	0.0657

KM SD (logged)	0.375	95% Critical H Value (KM-Log)	1.78
KM Standard Error of Mean (logged)	0.0543		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.058	Mean in Log Scale	-2.939
SD in Original Scale	0.0242	SD in Log Scale	0.444
95% t UCL (Assumes normality)	0.0637	95% H-Stat UCL	0.0656
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.065		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:05:32 AM
From File	MacLellan Region, Sediment, Molybdenum (Mo), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Molybdenum (Mo), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.138	Mean	0.668
Maximum	2.37	Median	0.65
SD	0.403	Std. Error of Mean	0.0564
Coefficient of Variation	0.604	Skewness	1.866

Normal GOF Test			
Shapiro Wilk Test Statistic	0.859	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	2.7710E-6	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.165	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.762	95% Adjusted-CLT UCL (Chen-1995)	0.776
		95% Modified-t UCL (Johnson-1978)	0.765

Gamma GOF Test			
A-D Test Statistic	0.415	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.094	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.125	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	3.339	k star (bias corrected MLE)	3.156
Theta hat (MLE)	0.2	Theta star (bias corrected MLE)	0.212
nu hat (MLE)	340.6	nu star (bias corrected)	321.9
MLE Mean (bias corrected)	0.668	MLE Sd (bias corrected)	0.376
		Approximate Chi Square Value (0.05)	281.3
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	280.2

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	0.764	95% Adjusted Gamma UCL (use when n<50)	0.767

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.802	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0995	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-1.981	Mean of logged Data	-0.561
Maximum of Logged Data	0.863	SD of logged Data	0.573
Assuming Lognormal Distribution			
95% H-UCL	0.786	90% Chebyshev (MVUE) UCL	0.842
95% Chebyshev (MVUE) UCL	0.92	97.5% Chebyshev (MVUE) UCL	1.028
99% Chebyshev (MVUE) UCL	1.241		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	0.761	95% Jackknife UCL	0.762
95% Standard Bootstrap UCL	0.761	95% Bootstrap-t UCL	0.789
95% Hall's Bootstrap UCL	0.787	95% Percentile Bootstrap UCL	0.766
95% BCA Bootstrap UCL	0.783		
90% Chebyshev(Mean, Sd) UCL	0.837	95% Chebyshev(Mean, Sd) UCL	0.914
97.5% Chebyshev(Mean, Sd) UCL	1.02	99% Chebyshev(Mean, Sd) UCL	1.229
Suggested UCL to Use			
95% Approximate Gamma UCL	0.764		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:06:10 AM
From File	MacLellan Region, Sediment, Nickel (Ni), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Nickel (Ni), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	9.62	Mean	189.5
Maximum	978.5	Median	36.7
SD	234.5	Std. Error of Mean	32.83
Coefficient of Variation	1.237	Skewness	1.592
Normal GOF Test			
Shapiro Wilk Test Statistic	0.761	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.705E-10	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	244.5	95% Adjusted-CLT UCL (Chen-1995)	251.3
		95% Modified-t UCL (Johnson-1978)	245.7
Gamma GOF Test			
A-D Test Statistic	3.175	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.805	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.24	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.13	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	0.617	k star (bias corrected MLE)	0.593
Theta hat (MLE)	307.3	Theta star (bias corrected MLE)	319.3
nu hat (MLE)	62.89	nu star (bias corrected)	60.52
MLE Mean (bias corrected)	189.5	MLE Sd (bias corrected)	246
		Approximate Chi Square Value (0.05)	43.63
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	43.21
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	262.8	95% Adjusted Gamma UCL (use when n<50)	265.3

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	1.9151E-7	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.216	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	2.264	Mean of logged Data	4.246
Maximum of Logged Data	6.886	SD of logged Data	1.558
Assuming Lognormal Distribution			
95% H-UCL	450.2	90% Chebyshev (MVUE) UCL	420.6
95% Chebyshev (MVUE) UCL	509.8	97.5% Chebyshev (MVUE) UCL	633.6
99% Chebyshev (MVUE) UCL	876.9		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	243.5	95% Jackknife UCL	244.5
95% Standard Bootstrap UCL	242	95% Bootstrap-t UCL	260
95% Hall's Bootstrap UCL	252.5	95% Percentile Bootstrap UCL	245.2
95% BCA Bootstrap UCL	249.6		
90% Chebyshev(Mean, Sd) UCL	288	95% Chebyshev(Mean, Sd) UCL	332.6
97.5% Chebyshev(Mean, Sd) UCL	394.5	99% Chebyshev(Mean, Sd) UCL	516.1
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	332.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:06:49 AM		
From File	MacLellan Region, Sediment, Selenium (Se), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Sediment, Selenium (Se), mg/kg			
General Statistics			
Total Number of Observations	51	Number of Distinct Observations	38
Number of Detects	44	Number of Non-Detects	7
Number of Distinct Detects	37	Number of Distinct Non-Detects	2
Minimum Detect	0.17	Minimum Non-Detect	0.2
Maximum Detect	1.535	Maximum Non-Detect	0.5
Variance Detects	0.0898	Percent Non-Detects	13.73%
Mean Detects	0.535	SD Detects	0.3
Median Detects	0.5	CV Detects	0.561
Skewness Detects	1.41	Kurtosis Detects	2.179
Mean of Logged Detects	-0.763	SD of Logged Detects	0.524
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.944	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.5	KM Standard Error of Mean	0.0413
KM SD	0.29	95% KM (BCA) UCL	0.567
95% KM (t) UCL	0.57	95% KM (Percentile Bootstrap) UCL	0.569
95% KM (z) UCL	0.568	95% KM Bootstrap t UCL	0.581
90% KM Chebyshev UCL	0.625	95% KM Chebyshev UCL	0.681
97.5% KM Chebyshev UCL	0.759	99% KM Chebyshev UCL	0.912
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.629	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.104	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.134	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	3.818	k star (bias corrected MLE)	3.573
Theta hat (MLE)	0.14	Theta star (bias corrected MLE)	0.15
nu hat (MLE)	336	nu star (bias corrected)	314.4

Mean (detects)	0.535		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0534	Mean	0.497
Maximum	1.535	Median	0.433
SD	0.298	CV	0.599
k hat (MLE)	3.119	k star (bias corrected MLE)	2.948
Theta hat (MLE)	0.159	Theta star (bias corrected MLE)	0.168
nu hat (MLE)	318.1	nu star (bias corrected)	300.7
Adjusted Level of Significance (β)	0.0453		
Approximate Chi Square Value (300.74, α)	261.6	Adjusted Chi Square Value (300.74, β)	260.5
95% Gamma Approximate UCL (use when n>=50)	0.571	95% Gamma Adjusted UCL (use when n<50)	0.573
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.5	SD (KM)	0.29
Variance (KM)	0.0842	SE of Mean (KM)	0.0413
k hat (KM)	2.977	k star (KM)	2.815
nu hat (KM)	303.6	nu star (KM)	287.1
theta hat (KM)	0.168	theta star (KM)	0.178
80% gamma percentile (KM)	0.719	90% gamma percentile (KM)	0.9
95% gamma percentile (KM)	1.07	99% gamma percentile (KM)	1.439
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (287.09, α)	248.8	Adjusted Chi Square Value (287.09, β)	247.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.577	95% Gamma Adjusted KM-UCL (use when n<50)	0.58
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.944	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0966	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.501	Mean in Log Scale	-0.837
SD in Original Scale	0.293	SD in Log Scale	0.538
95% t UCL (assumes normality of ROS data)	0.569	95% Percentile Bootstrap UCL	0.571
95% BCA Bootstrap UCL	0.576	95% Bootstrap t UCL	0.582
95% H-UCL (Log ROS)	0.578		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.837	KM Geo Mean	0.433
KM SD (logged)	0.529	95% Critical H Value (KM-Log)	1.896
KM Standard Error of Mean (logged)	0.0766	95% H-UCL (KM -Log)	0.574

KM SD (logged)	0.529	95% Critical H Value (KM-Log)	1.896
KM Standard Error of Mean (logged)	0.0766		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.493	Mean in Log Scale	-0.867
SD in Original Scale	0.298	SD in Log Scale	0.565
95% t UCL (Assumes normality)	0.563	95% H-Stat UCL	0.575
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Approximate Gamma UCL	0.577	95% GROS Approximate Gamma UCL	0.571
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:07:28 AM
From File	MacLellan Region, Sediment, Silver (Ag), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Silver (Ag), mg/kg

General Statistics

Total Number of Observations	51	Number of Distinct Observations	31
Number of Detects	31	Number of Non-Detects	20
Number of Distinct Detects	30	Number of Distinct Non-Detects	2
Minimum Detect	0.05	Minimum Non-Detect	0.05
Maximum Detect	1.48	Maximum Non-Detect	0.1
Variance Detects	0.069	Percent Non-Detects	39.22%
Mean Detects	0.207	SD Detects	0.263
Median Detects	0.114	CV Detects	1.267
Skewness Detects	4.009	Kurtosis Detects	19.18
Mean of Logged Detects	-1.975	SD of Logged Detects	0.838

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.552	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.275	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.156	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.147	KM Standard Error of Mean	0.0306
KM SD	0.215	95% KM (BCA) UCL	0.205
95% KM (t) UCL	0.199	95% KM (Percentile Bootstrap) UCL	0.203
95% KM (z) UCL	0.198	95% KM Bootstrap t UCL	0.247
90% KM Chebyshev UCL	0.239	95% KM Chebyshev UCL	0.281
97.5% KM Chebyshev UCL	0.338	99% KM Chebyshev UCL	0.452

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.35	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.766	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.161	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.388	k star (bias corrected MLE)	1.275
Theta hat (MLE)	0.149	Theta star (bias corrected MLE)	0.163
nu hat (MLE)	86.04	nu star (bias corrected)	79.05

Mean (detects)	0.207		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.132
Maximum	1.48	Median	0.061
SD	0.225	CV	1.696
k hat (MLE)	0.676	k star (bias corrected MLE)	0.649
Theta hat (MLE)	0.196	Theta star (bias corrected MLE)	0.204
nu hat (MLE)	68.95	nu star (bias corrected)	66.22
Adjusted Level of Significance (β)	0.0453		
Approximate Chi Square Value (66.22, α)	48.5	Adjusted Chi Square Value (66.22, β)	48.06
95% Gamma Approximate UCL (use when n>=50)	0.181	95% Gamma Adjusted UCL (use when n<50)	0.182
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.147	SD (KM)	0.215
Variance (KM)	0.0462	SE of Mean (KM)	0.0306
k hat (KM)	0.469	k star (KM)	0.454
nu hat (KM)	47.83	nu star (KM)	46.35
theta hat (KM)	0.314	theta star (KM)	0.324
80% gamma percentile (KM)	0.24	90% gamma percentile (KM)	0.406
95% gamma percentile (KM)	0.585	99% gamma percentile (KM)	1.029
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (46.35, α)	31.73	Adjusted Chi Square Value (46.35, β)	31.37
95% Gamma Approximate KM-UCL (use when n>=50)	0.215	95% Gamma Adjusted KM-UCL (use when n<50)	0.217
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.139	Mean in Log Scale	-2.63
SD in Original Scale	0.221	SD in Log Scale	1.133
95% t UCL (assumes normality of ROS data)	0.191	95% Percentile Bootstrap UCL	0.196
95% BCA Bootstrap UCL	0.221	95% Bootstrap t UCL	0.241
95% H-UCL (Log ROS)	0.203		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.349	KM Geo Mean	0.0955
KM SD (logged)	0.798	95% Critical H Value (KM-Log)	2.111
KM Standard Error of Mean (logged)	0.114	95% H-UCL (KM -Log)	0.167

KM SD (logged)	0.798	95% Critical H Value (KM-Log)	2.111
KM Standard Error of Mean (logged)	0.114		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.141	Mean in Log Scale	-2.511
SD in Original Scale	0.22	SD in Log Scale	0.961
95% t UCL (Assumes normality)	0.192	95% H-Stat UCL	0.175
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Gamma Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM Approximate Gamma UCL	0.215	95% GROS Approximate Gamma UCL	0.181
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.112/6/2019 3:08:07 AM		
From File	MacLellan Region, Sediment, Strontium (Sr), mg_kg.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
MacLellan Region, Sediment, Strontium (Sr), mg/kg			
General Statistics			
Total Number of Observations	51	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	2.53	Mean	24.88
Maximum	83.35	Median	21.7
SD	16.06	Std. Error of Mean	2.249
Coefficient of Variation	0.646	Skewness	2.217
Normal GOF Test			
Shapiro Wilk Test Statistic	0.76	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.642E-10	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	28.65	95% Adjusted-CLT UCL (Chen-1995)	29.32
		95% Modified-t UCL (Johnson-1978)	28.76
Gamma GOF Test			
A-D Test Statistic	1.822	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.174	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.125	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.988	k star (bias corrected MLE)	2.825
Theta hat (MLE)	8.325	Theta star (bias corrected MLE)	8.805
nu hat (MLE)	304.8	nu star (bias corrected)	288.2
MLE Mean (bias corrected)	24.88	MLE Sd (bias corrected)	14.8
		Approximate Chi Square Value (0.05)	249.9
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	248.8
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	28.69	95% Adjusted Gamma UCL (use when n<50)	28.81

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.881	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk P Value	2.6780E-5	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	0.928	Mean of logged Data	3.037
Maximum of Logged Data	4.423	SD of logged Data	0.635
Assuming Lognormal Distribution			
95% H-UCL	30.46	90% Chebyshev (MVUE) UCL	32.71
95% Chebyshev (MVUE) UCL	36.03	97.5% Chebyshev (MVUE) UCL	40.63
99% Chebyshev (MVUE) UCL	49.66		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	28.58	95% Jackknife UCL	28.65
95% Standard Bootstrap UCL	28.55	95% Bootstrap-t UCL	30
95% Hall's Bootstrap UCL	29.86	95% Percentile Bootstrap UCL	28.5
95% BCA Bootstrap UCL	29.47		
90% Chebyshev(Mean, Sd) UCL	31.62	95% Chebyshev(Mean, Sd) UCL	34.68
97.5% Chebyshev(Mean, Sd) UCL	38.92	99% Chebyshev(Mean, Sd) UCL	47.25
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	34.68		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:08:46 AM
From File	MacLellan Region, Sediment, Thallium (Tl), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Thallium (Tl), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	45
Number of Detects	44	Number of Non-Detects	7
Number of Distinct Detects	43	Number of Distinct Non-Detects	2
Minimum Detect	0.056	Minimum Non-Detect	0.05
Maximum Detect	0.431	Maximum Non-Detect	0.1
Variance Detects	0.00508	Percent Non-Detects	13.73%
Mean Detects	0.188	SD Detects	0.0713
Median Detects	0.186	CV Detects	0.379
Skewness Detects	0.961	Kurtosis Detects	2.059
Mean of Logged Detects	-1.741	SD of Logged Detects	0.389

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.944	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.08	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.132	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.17	KM Standard Error of Mean	0.0113
KM SD	0.0794	95% KM (BCA) UCL	0.19
95% KM (t) UCL	0.189	95% KM (Percentile Bootstrap) UCL	0.189
95% KM (z) UCL	0.189	95% KM Bootstrap t UCL	0.19
90% KM Chebyshev UCL	0.204	95% KM Chebyshev UCL	0.22
97.5% KM Chebyshev UCL	0.241	99% KM Chebyshev UCL	0.283

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.364	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0989	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.134	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	7.248	k star (bias corrected MLE)	6.769
Theta hat (MLE)	0.0259	Theta star (bias corrected MLE)	0.0278
nu hat (MLE)	637.8	nu star (bias corrected)	595.7

Mean (detects)	0.188		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0435	Mean	0.171
Maximum	0.431	Median	0.179
SD	0.0793	CV	0.464
k hat (MLE)	4.359	k star (bias corrected MLE)	4.115
Theta hat (MLE)	0.0392	Theta star (bias corrected MLE)	0.0415
nu hat (MLE)	444.6	nu star (bias corrected)	419.8
Adjusted Level of Significance (β)	0.0453		
Approximate Chi Square Value (419.77, α)	373.3	Adjusted Chi Square Value (419.77, β)	372
95% Gamma Approximate UCL (use when n>=50)	0.192	95% Gamma Adjusted UCL (use when n<50)	0.193
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.17	SD (KM)	0.0794
Variance (KM)	0.0063	SE of Mean (KM)	0.0113
k hat (KM)	4.604	k star (KM)	4.346
nu hat (KM)	469.6	nu star (KM)	443.3
theta hat (KM)	0.037	theta star (KM)	0.0392
80% gamma percentile (KM)	0.233	90% gamma percentile (KM)	0.28
95% gamma percentile (KM)	0.323	99% gamma percentile (KM)	0.415
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (443.28, α)	395.5	Adjusted Chi Square Value (443.28, β)	394.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.191	95% Gamma Adjusted KM-UCL (use when n<50)	0.192
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.944	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.124	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.132	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.173	Mean in Log Scale	-1.856
SD in Original Scale	0.0767	SD in Log Scale	0.466
95% t UCL (assumes normality of ROS data)	0.191	95% Percentile Bootstrap UCL	0.191
95% BCA Bootstrap UCL	0.192	95% Bootstrap t UCL	0.193
95% H-UCL (Log ROS)	0.197		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.896	KM Geo Mean	0.15
KM SD (logged)	0.533	95% Critical H Value (KM-Log)	1.898
KM Standard Error of Mean (logged)	0.0774	95% H-UCL (KM -Log)	0.2

KM SD (logged)	0.533	95% Critical H Value (KM-Log)	1.898
KM Standard Error of Mean (logged)	0.0774		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.168	Mean in Log Scale	-1.941
SD in Original Scale	0.0833	SD in Log Scale	0.631
95% t UCL (Assumes normality)	0.188	95% H-Stat UCL	0.209
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.189		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

UCL Statistics for Data Sets with Non-Detects	
User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:12:01 AM
From File	MacLellan Region, Sediment, Uranium (U), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Uranium (U), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	0.372	Mean	1.516
Maximum	2.39	Median	1.59
SD	0.564	Std. Error of Mean	0.079
Coefficient of Variation	0.372	Skewness	-0.489

Normal GOF Test		
Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.00813	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.118	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.123	Data appear Normal at 5% Significance Level
Data appear Approximate Normal at 5% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.648	95% Adjusted-CLT UCL (Chen-1995)	1.64
		95% Modified-t UCL (Johnson-1978)	1.647

Gamma GOF Test		
A-D Test Statistic	1.909	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.124	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics			
k hat (MLE)	5.398	k star (bias corrected MLE)	5.093
Theta hat (MLE)	0.281	Theta star (bias corrected MLE)	0.298
nu hat (MLE)	550.6	nu star (bias corrected)	519.5
MLE Mean (bias corrected)	1.516	MLE Sd (bias corrected)	0.672
		Approximate Chi Square Value (0.05)	467.7
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	466.3

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.684	95% Adjusted Gamma UCL (use when n<50)	1.689

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	7.4315E-7	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.99	Mean of logged Data	0.32
Maximum of Logged Data	0.871	SD of logged Data	0.487
Assuming Lognormal Distribution			
95% H-UCL	1.765	90% Chebyshev (MVUE) UCL	1.879
95% Chebyshev (MVUE) UCL	2.03	97.5% Chebyshev (MVUE) UCL	2.238
99% Chebyshev (MVUE) UCL	2.648		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.646	95% Jackknife UCL	1.648
95% Standard Bootstrap UCL	1.642	95% Bootstrap-t UCL	1.641
95% Hall's Bootstrap UCL	1.636	95% Percentile Bootstrap UCL	1.642
95% BCA Bootstrap UCL	1.634		
90% Chebyshev(Mean, Sd) UCL	1.753	95% Chebyshev(Mean, Sd) UCL	1.86
97.5% Chebyshev(Mean, Sd) UCL	2.009	99% Chebyshev(Mean, Sd) UCL	2.302
Suggested UCL to Use			
95% Student's-t UCL	1.648		
When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:12:40 AM
From File	MacLellan Region, Sediment, Vanadium (V), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Vanadium (V), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	50
		Number of Missing Observations	0
Minimum	3.83	Mean	24.5
Maximum	47.2	Median	25.2
SD	9.164	Std. Error of Mean	1.283
Coefficient of Variation	0.374	Skewness	-0.0982

Normal GOF Test			
Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.896	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0557	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	26.65	95% Adjusted-CLT UCL (Chen-1995)	26.59
		95% Modified-t UCL (Johnson-1978)	26.65

Gamma GOF Test			
A-D Test Statistic	1.07	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0931	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.124	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	5.282	k star (bias corrected MLE)	4.985
Theta hat (MLE)	4.638	Theta star (bias corrected MLE)	4.915
nu hat (MLE)	538.8	nu star (bias corrected)	508.4
MLE Mean (bias corrected)	24.5	MLE Sd (bias corrected)	10.97
		Approximate Chi Square Value (0.05)	457.1
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	455.7

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	27.25	95% Adjusted Gamma UCL (use when n<50)	27.33

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	3.1356E-7	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	1.343	Mean of logged Data	3.101
Maximum of Logged Data	3.854	SD of logged Data	0.508
Assuming Lognormal Distribution			
95% H-UCL	28.93	90% Chebyshev (MVUE) UCL	30.86
95% Chebyshev (MVUE) UCL	33.42	97.5% Chebyshev (MVUE) UCL	36.98
99% Chebyshev (MVUE) UCL	43.96		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	26.61	95% Jackknife UCL	26.65
95% Standard Bootstrap UCL	26.61	95% Bootstrap-t UCL	26.62
95% Hall's Bootstrap UCL	26.66	95% Percentile Bootstrap UCL	26.51
95% BCA Bootstrap UCL	26.65		
90% Chebyshev(Mean, Sd) UCL	28.35	95% Chebyshev(Mean, Sd) UCL	30.09
97.5% Chebyshev(Mean, Sd) UCL	32.51	99% Chebyshev(Mean, Sd) UCL	37.27
Suggested UCL to Use			
95% Student's-t UCL	26.65		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be			
reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.			

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.112/6/2019 3:13:19 AM
From File	MacLellan Region, Sediment, Zinc (Zn), mg_kg.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

MacLellan Region, Sediment, Zinc (Zn), mg/kg

General Statistics			
Total Number of Observations	51	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	26	Mean	129.3
Maximum	461	Median	117
SD	88.73	Std. Error of Mean	12.43
Coefficient of Variation	0.686	Skewness	1.596
Normal GOF Test			
Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	8.0259E-6	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.123	Data Not Normal at 5% Significance Level	
Data Not Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	150.1	95% Adjusted-CLT UCL (Chen-1995)	152.7
		95% Modified-t UCL (Johnson-1978)	150.6
Gamma GOF Test			
A-D Test Statistic	0.286	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0677	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.126	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	2.424	k star (bias corrected MLE)	2.295
Theta hat (MLE)	53.34	Theta star (bias corrected MLE)	56.36
nu hat (MLE)	247.3	nu star (bias corrected)	234.1
MLE Mean (bias corrected)	129.3	MLE Sd (bias corrected)	85.37
		Approximate Chi Square Value (0.05)	199.7
Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	198.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	151.6	95% Adjusted Gamma UCL (use when n<50)	152.3

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.36	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0836	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.123	Data appear Lognormal at 5% Significance Level	
Data appear Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	3.258	Mean of logged Data	4.642
Maximum of Logged Data	6.133	SD of logged Data	0.69
Assuming Lognormal Distribution			
95% H-UCL	160.3	90% Chebyshev (MVUE) UCL	172.3
95% Chebyshev (MVUE) UCL	191.1	97.5% Chebyshev (MVUE) UCL	217.2
99% Chebyshev (MVUE) UCL	268.3		
Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution at 5% Significance Level			
Nonparametric Distribution Free UCLs			
95% CLT UCL	149.8	95% Jackknife UCL	150.1
95% Standard Bootstrap UCL	149.6	95% Bootstrap-t UCL	152.9
95% Hall's Bootstrap UCL	155.2	95% Percentile Bootstrap UCL	150.8
95% BCA Bootstrap UCL	151.7		
90% Chebyshev(Mean, Sd) UCL	166.6	95% Chebyshev(Mean, Sd) UCL	183.5
97.5% Chebyshev(Mean, Sd) UCL	206.9	99% Chebyshev(Mean, Sd) UCL	253
Suggested UCL to Use			
95% Approximate Gamma UCL	151.6		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

APPENDIX C.31
ADDITIONAL INFORMATION RELATED TO EPC SELECTION

Additional Information Related to EPC Selection

For some samples, measured baseline COPC concentrations were reported as being below the laboratory detection limits. In these situations, the concentrations can be represented as being present at the detection limit or as being present at half the detection limit. Using the detection limit concentration to represent these concentrations over-estimates the actual concentrations and this results in an over-estimation of the baseline EPC. This over-estimation of baseline conditions, in turn, results in an under-estimation of the Project's contribution to future environmental conditions by decreasing the Project's percent contribution to the Future Case concentration (Baseline + Project). To limit the over-estimation of baseline conditions, where measured baseline COPC concentrations were reported as less than the detection limit, a concentration equal to half the detection limit was used in the calculation of the EPC.

In the case of laboratory duplicates and field duplicates, the average of the parent sample and the duplicate sample was used in the calculation of the EPC. ProUCL data preparation included the following steps to calculate discrete results for duplicate samples:

1. Identify parent sample, field duplicate, laboratory duplicate of parent sample and laboratory duplicate of field duplicate.
2. Calculate average of the available concentrations using half the value of the detection limit for non-detects.
3. If all results are non-detect or the average from step B is less than the highest detection limit, use the highest detection limit and flag result as a non-detected value.

Selection of the UCLM based on the ProUCL Output was based on the following steps:

1. Select the highest of the "Suggested UCL to Use". Disregard H-statistic results due to their unstable (both high and low) tendencies.
2. If no "Suggested UCL to Use" are available, review the "Gamma Goodness of Fit (GOF) Test" results.
3. If GOF result indicates that the data is Gamma distributed, then select one of the two "95% Approximate Gamma UCL" results, depending on whether the number of observations is >=50 or <50.
4. If GOF result indicates that "Data Not Gamma Distributed at 5% Significance Level" then select the maximum UCL value from the 8 (95% UCL) listed in the "Nonparametric Distribution Free UCLs" section of the ProUCL output.
5. If the selected UCL is greater than the maximum value in the dataset, then select the maximum value
6. If the selected UCL is less than either the mean or the median, then select the highest of the mean or median.
7. In cases where analytical data is insufficient for ProUCL to provide UCL values, the maximum value between the detected and half of the non-detected concentration concentrations is selected.

Appendix D UBIQUITOUS ELEMENTS

APPENDIX D
UBIQUITOUS ELEMENTS

1.0 NON-TOXIC, UBIQUOUTOUS COMPOUNDS: ALUMINUM, BISMUTH, CALCIUM, IRON, MAGNESIUM, PHOSPHOROUS, POTASSIUM, SODIUM AND TITANIUM

Aluminum, bismuth, calcium, magnesium, phosphorous, potassium, sodium, tin and titanium were not considered to pose a risk for one or both of the following reasons: 1) these parameters are ubiquitous, naturally occurring elements that, in some cases, play a role in the proper function of biological systems; 2) these parameters are generally not regarded as being particularly toxic. These parameters are not included in the screening tables and are not evaluated in the HHERA.

Further support for not evaluating these elements is provided below.

1.1 ALUMINUM

Aluminum is the most common metal in the Earth's crust, with an average concentration of 82 300 mg/kg (Lide, 2004). In terms of toxicity, occupational exposures in the aluminum production industry have been found by IARC to be carcinogenic to humans (IARC, 1987), but the causative agents in these exposures are thought to be pitch volatiles, and not aluminum itself (IARC, 1987). Health Canada states that no consistent, convincing evidence exists that aluminum in drinking water causes adverse health effects in human receptors (HC, 1998). No studies could be located involving dermal exposure of humans or animals to aluminum, and no toxicity information could be found on the US EPA IRIS or in Health Canada documents; however, US EPA (2004) Region 9 does provide a provisional value for aluminum of 20000 mg/kg. Given the lack of toxicity information available, a quantitative evaluation of aluminum is considered unfeasible, and since it is very common in the environment, it is not expected to pose any excess risk through any pathway. No human health risks due to aluminum in media are therefore anticipated; therefore it has not been carried forward as a COPC in this assessment.

1.2 BISMUTH

Bismuth is considered a rare metal that is found in the earth's crust at an average concentration of 0.17 ppm or mg/kg in the Earth's crust (Geological Survey, NL). With its low solubility, it is considered non-toxic and is widely used in the pharmaceutical and cosmetic industry, It is the principal ingredient in the manufacture of an antiacid medication called Pepto-Bismol. Most Bismuth compounds are insoluble and poorly absorbed from the GI tract or when applied to the skin, even if the skin is abraded or burned (Goyer et. al. 2001). Due to its high density that is comparable to that of lead and due to its low toxicity, it has been used as a replacement for lead shots for the hunting of water fowl, as ingestion of lead shots by the birds lead to high mortality rates due to lead-poisoning. The *Migratory Birds Regulations* also includes gun shots made of bismuth as non-toxic shots (Canada, 1994). The low toxicity of bismuth has also allowed it to be used as a replacement for lead in soldering, plumbing fittings for drinking water systems and in food processing equipment (Suzuki et al., 2001). Given its low solubility and low toxicity, bismuth is expected to pose a negligible risk; therefore it has not been carried forward as a COPC in this assessment.

1.3 CALCIUM

Calcium is an essential mineral for living organisms, and one of the major components of bone in animals: in humans, over 99% of the calcium stored in the human body is found in the skeletal system (IOM, 1997). Calcium serves many functions in living organisms, but in the human body, its other major roles are the mediation of vascular contraction, vasodilation, muscle contraction, nerve transmission, and glandular secretion (IOM, 1997). It is also ubiquitous, as it makes up over 3% of the Earth's crust by weight, corresponding to an average concentration of 41 500 mg/kg (CRC, 2004), and is found at an average concentration of 412 mg/L in seawater. Given its essentiality and its common occurrence in the environment, calcium in environmental media is therefore not expected to contribute to excess health risks to human receptors and a quantitative assessment of the risk due to calcium is therefore considered unnecessary.

1.4 IRON

Iron is an essential nutrient which aids in the formation of haemoglobin, whose primary function is to transport oxygen in red blood cells. Anaemia is a deficiency condition that results from insufficient nutrient intake and can cause adverse health effects such as decreased cognitive performance and growth in children (WHO, 2006). Given that iron is an essential nutrient and a naturally occurring metal, toxicity reference values do not exist from any of the major regulatory agencies; however, US EPA Region 3 does provide a provisional value of 62000 mg/kg. Nevertheless, iron can still be excluded as a potential source of human health risk based upon its ubiquitous environmental nature and essential nutritional value.

1.5 MAGNESIUM

Magnesium is expected to be present in its ionic form in groundwater (CRC, 2004). Magnesium is an essential mineral for living organisms; the average adult human body contains about 25 g of magnesium (IOM, 1997). It is a required cofactor for various enzymes, and plays a role in both anaerobic and aerobic energy generation in the body, as part of the glycolysis and oxidative phosphorylation processes (IOM, 1997). It is also a fundamental component of chlorophyll in green plants (CRC, 2004). It makes up an average of 23 300 mg/kg of the Earth's crust, and can be found in seawater at an average concentration of 1290 mg/L. Because it is essential for life, and because it occurs commonly, magnesium is not expected to pose any excess health risk to the construction worker receptor through the dermal exposure to groundwater, and a quantitative evaluation is thus not necessary. The appropriate site specific standards for Magnesium were therefore set at the maximum measured concentrations.

1.6 PHOSPHOROUS

Making up an average of 1050 mg/kg of the Earth's crust, phosphorus in nature is most commonly found as phosphate (PO43-) (CRC, 2004), and is therefore assumed to be present in this form in the soil, sediment and water. Phosphorus, as phosphate, is an essential constituent of plant and animal tissues, where it plays several roles, including pH maintenance, catalytic protein activation, and energy transfer and temporary storage (IOM, 1997). Phosphorus itself makes up 0.65% to 1.1% of adult human body weight (IOM, 1997). Given its essentiality to life, and its relative abundance in the Earth's crust, phosphorus in the soil or water is not expected to pose any excess risk to receptors, and a quantitative evaluation for phosphorus is therefore considered unnecessary.

1.7 POTASSIUM

Potassium ions are required for plant growth (CRC, 2004), and for normal cellular function in both plants and animals (IOM, 2004). Potassium is also abundant in the Earth's crust, making up 2.4% of the crust by weight, at an average concentration of 29 000 mg/kg (CRC, 2004), and is present in seawater at a concentration of 399 mg/L (CRC, 2004). Given its ubiquity and its essentiality to life, it is therefore reasonable to conclude that potassium in the soil or water is not expected to result in excess risk to the construction worker, and a quantitative evaluation of this COPC is therefore considered unnecessary.

1.8 SODIUM

Sodium ions are essential to life, as they are required in living organisms to maintain extracellular fluid volume and serum osmolality (IOM, 2004). Given that sodium also makes up 2.6% of the Earth's crust, at an average concentration of 23 600 mg/kg (CRC, 2004), and exists in seawater at a concentration of 10 800 mg/L, combined with its essentiality to life, it is not expected that sodium in soil or water will pose excess risk to the human receptor, and a quantitative assessment of sodium is therefore considered unnecessary.

1.9 TITANIUM

Titanium exists in the Earth's crust at an average concentration of 5650 mg/kg (CRC, 2004). It does not exist in its metallic state in nature, but is found instead in ionic compounds such as titanium dioxide (WHO, 1982). Titanium has not been shown to be essential to life, but has a wide variety of uses in consumer products, including food additives, as a material for implants and prostheses, and several dermal applications (WHO, 1982). For instance, titanium dioxide is used in cosmetics, sunscreen, and anti- acne ointments, among other uses, with no reported adverse effects. Titanium tetrachloride, on the other hand, is corrosive, and irritates the skin, eyes, mucous membranes, and the lungs on exposure (ATSDR, 1997); as this compound is not found in the environment (ATSDR, 1997), however, it is not expected that the titanium at the Site would be in this form. Given its existing uses as a physiologically inert material, it is not expected that titanium will pose excess risk to exposure to humans and a quantitative evaluation of titanium is therefore considered inappropriate.

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Appendix E EXAMPLE CALCULATIONS, DERMAL RAF, UPTAKE FACTORS

APPENDIX E
EXAMPLE CALCULATIONS, DERMAL RAF, UPTAKE FACTORS

APPENDIX E.1
EXAMPLE CALCULATIONS

Example calculations for exposure point concentrations (EPCs), human health exposures and human health and ecological health risks are provided below. The Baseline Case and Future Case EPCs are summarized in Section 4.0. The receptor characteristics for humans and ecological receptors are provided in Sections 5.0 and Section 6.0, respectively. The toxic reference values (TRVs) used for the assessment of human exposures are provided in Section 4.2 and the TRVs for ecological receptors are provided in **Appendix G**.

Exposure Point Concentrations

CALCULATION OF EXPOSURE POINT CONCENTRATION IN SOIL

WORKED EXAMPLE FOR FUTURE CASE ARSENIC CONCENTRATIONS IN SOIL IN THE GORDON REGION

(1) ***Calculate Total Deposition Rate of Arsenic at each Receptor Location in the Gordon region***

Total deposition rate is the sum of 5 times the yearly deposition rate for Gordon and 13 times the yearly deposition rate for MacLellan.

Where:

Predicted Deposition Rate of Arsenic at Potential Indigenous Receptor 1 (5 years of Deposition from Gordon)	=	1.18E-05 g/m^2/year x 5 years	=	5.91E-05 g/m^2
Predicted Deposition Rate of Arsenic at Potential Indigenous Receptor 1 (13 years of Deposition from MacLellan)	=	2.90E-05 g/m^2/year x 13 years	=	3.77E-04 g/m^2

Result:

Total Deposition Rate of Arsenic at Potential Indigenous Receptor 1 (end of mine life)	=	1.46E-04 g/m^2

(2) ***Calculate the 95% UCLM concentration for each metal for receptor locations in the Gordon region.***

Result:

95% UCLM of the Arsenic Deposition Rate for Receptor Locations in Gordon	=	1.24E-03 g/m^2

(3) ***Calculate the Concentration of Arsenic in Gordon region soil due to deposition. Assume a 1m x 1m plot and a 0.02 m mixing depth.***

Where:

95% UCLM of the Arsenic Deposition Rate for Receptor Locations in Gordon	=	1.24E-03 g/m^2

Weight of Top 2 cm per 1m^2 Area of Soil	=	Weight of the surface horizon of 1 m^2 area of untilled soil that is assumed to be mixed with Arsenic deposited at the end of project operations at the Gordon region
	=	*Area of Soil Plot x Mixing Depth of Metals in Soil x Soil Bulk Density*
Area of Soil Plot	=	1 m^2
Mixing Depth Thickness	=	2 cm or 0.02 m
Soil Bulk Density	=	1000 kg/m^3

Results:

Weight of Top 2 cm per 1 m^2 area of Soil	=	0.02 m x 1000 kg/m^3 = 2.00E+01 kg/m^2
Concentration of Arsenic in Soil due to Deposition	=	(1.24E-03 g/m^2) / (2.00E+01 kg/m^2) = 6.20E-02 mg/kg

(4) *Calculation of Future Case Exposure Point Concentration of Arsenic in Soil in the Gordon Region*

Future Case Concentration of Arsenic = *Baseline Concentration of Arsenic* + *Concentration of Arsenic*

Where:

Baseline Concentration of Arsenic (Measured Concentration)	=	1.09E+00 mg/kg
Concentration of Arsenic in Soil due to Deposition	=	6.20E-02 mg/kg

Result:

Future Case Concentration of Arsenic in soil in Gordon region.	=	1.15E+00 mg/kg

CALCULATION OF EXPOSURE POINT CONCENTRATION IN SEDIMENT

WORKED EXAMPLE FOR FUTURE CASE ARSENIC CONCENTRATIONS IN SEDIMENT IN THE GORDON REGION

$$EPC_{sed\ (future)} = EPC_{sed\ (baseline)} + \Delta EPC_{sed}$$

And:

$$\Delta EPC_{sed} = \Delta EPC_{sw} \times KD_{site\ specific}$$

$$\Delta EPC_{sw} = EPC_{sw\ future} - EPC_{sw\ baseline}$$

$$KD_{site\ specific} = \frac{FOC \times KD_{literature}}{FOC_{deep}}$$

Where:

FOC_{deep}	:	Fraction of organic carbon in biogenic deep sediment (mg/kg)	=	2.00E-01 mg/kg
FOC	:	Fraction of organic carbon in sediment (mg/kg)	=	1.49E-01 mg/kg
$KD_{literature}$	:	Partition coefficient from surface water to sediment (Sheppard et. al. 2010) (L/kg)	=	1.40E+03 L/kg
$EPC_{sw\ future}$	:	Predicted future Exposure Point Concentrations of Arsenic in surface water in the Gordon region (mg/L)	=	5.84E-04 mg/L
$EPC_{sw\ baseline}$	:	Measured Exposure Point Concentration of Arsenic in water under Baseline conditions in the Gordon region (mg/L)	=	2.93E-04 mg/L
$EPC_{sed\ (baseline)}$	:	Measured Exposure Point Concentration of Arsenic in sediment under Baseline conditions in the Gordon region (mg/kg)	=	4.99E+00 mg/kg

Result:

$KD_{site\ specific}$	:	Partition coefficient from surface water to sediment in the Gordon region (L/kg)	=	1.05E+03 L/kg
ΔEPC_{sw}	:	Predicted change of Arsenic Exposure Point Concentration in surface water between Baseline and Future Case in the Gordon region (mg/L)	=	2.91E-04 mg/L
ΔEPC_{sed}	:	Predicted change of Arsenic Exposure Point Concentration in sediment between Baseline and Future Case in the Gordon region (mg/kg)	=	3.04E-01 mg/kg
$EPC_{sed\ (future)}$	:	Predicted Future Arsenic Exposure Point Concentration of Arsenic in sediment in the Gordon region (mg/kg)	=	5.30E+00 mg/kg

CALCULATION OF EXPOSURE CONCENTRATION IN AIR

WORKED EXAMPLE FOR FUTURE CASE COPC CONCENTRATIONS IN AIR IN THE GORDON REGION

Example Calculation of Future Case Inhalation Exposures to 1-hour SO_2, 24-hour SO_2 and Annual NO_2 in the Gordon Region

$$SO_{2\ (Future\ Case)} = SO_{2\ (\text{Max 99th Perc 1-hour})} + SO_{2\ (Background\ \text{99th Perc 1-hour})}$$

Where:

$SO_{2\ (Max\ 99th\ Perc\ 1\text{-}hour)}$	:	Maximum of modelled 99th Percentile Daily Maximum 1-hour SO_2 based on Project operations at the Gordon Region (µg/m³)	=	3.87E+01 µg/m³
$SO_{2\ (Bg\ 99th\ Perc\ 1\text{-}hour)}$	:	Measured Background 99th Percentile Daily Maximum 1-hour SO_2 (µg/m³)	=	6.00E+00 µg/m³

Result:

$SO_{2\ (Future\ Case)}$	:	Future Case Exposure Point Concentration of 1-hour SO_2 at the Gordon Region (µg/m³)	=	4.47E+01 µg/m³

CALCULATION OF EXPOSURE POINT CONCENTRATION IN FISH FOR HUMAN CONSUMPTION

WORKED EXAMPLE FOR EXPOSURE POINT CONCENTRATION IN FISH AND THE PROPORTIONING APPROACH

Calculation of Predicted Future Case Arsenic Concentration in Fish Tissue Using Predicted Future Case Arsenic Concentration in Water in the Gordon region (Swede Lake)

$$EPC_{Fish\ (Future)} = \frac{EPC_{Fish\ carcass\ (Future)} + EPC_{Fish\ liver\ (Future)} + EPC_{Fish\ muscle\ (Future)}}{3}$$

And:

$$EPC_{Fish\ muscle\ (\ Future)} = Expected\ Magnitude\ Change \times\ EPC_{Fish\ muscle(Measured\ Baseline)}$$

$$Expected\ Magnitude\ Change = \frac{EPC_{Fish(Pred.\ Future)}}{EPC_{Fish(\ Pred.Baseline)}}$$

$$EPC_{Fish(Pred.\ Future)} = EPC_{Water\ (Future)} \times UP_{Fish\ (Future)}$$

$$EPC_{Fish(Pred.\ Baseline)} = EPC_{Water\ (Baseline)} \times UP_{Fish\ (Baseline)}$$

Where:

$EPC_{Fish\ muscle\ (measured\ baseline)}$	:	Measured Exposure Point Concentration of Arsenic in Fish tissue (muscle) under Baseline conditions (mg/kg wet weight) (95% UCLM concentration)	=	6.36E-02 mg/kg wet weight
$EPC_{Water\ (Baseline)}$	:	Baseline Exposure Point Concentration of Arsenic in surface water of Swede Lake (Gordon region) (mg/L)	=	2.87E-04 mg/L
$EPC_{Water\ (Future)}$	:	Modelled Future Exposure Point Concentration of Arsenic in surface water of Swede Lake (Gordon region) (mg/L)	=	7.07E-04 mg/L
$UP_{Fish\ (Baseline)}$	:	Uptake Factor for Arsenic uptake in Fish from surface water under Baseline conditions (mg/kg wet-tissue / mg/L water)	=	50 mg/kg-wet tissue/ mg/L-water wet tissue

$UP_{Fish\ (Future)}$	:	Uptake Factor for Arsenic uptake in Fish from surface water under Future Case conditions (mg/kg wet-tissue / mg/L water)	=	50 mg/kg-wet tissue/ mg/L-water wet tissue
$EPC_{Fish\ carcass\ (Future)}$	:	Calculated Exposure Point Concentration of Arsenic in Fish Tissue (carcass) based on Future Case conditions using the proportioning approach. Calculations similar to that of $EPC_{Fish\ muscle\ (Future)}$ (mg/kg wet weight)	=	1.28E-01 mg/kg wet weight
$EPC_{Fish\ liver\ (Future)}$	:	Calculated Exposure Point Concentration of Arsenic in Fish Tissue (liver) based on Future Case conditions using the proportioning approach. Calculations similar to that of $EPC_{Fish\ muscle\ (Future)}$ mg/kg wet weight)	=	1.36E-01 mg/kg wet weight

Results:

$EPC_{Fish(Pred.\ Baseline)}$	:	Predicted Exposure Point Concentration of Arsenic in Fish based on uptake of Arsenic in water under Baseline conditions (mg/kg wet weight)	=	1.43E-02 mg/kg wet weight
$EPC_{Fish(Pred.\ Future)}$	:	Predicted Exposure Point Concentration of Arsenic in Fish based on uptake of Arsenic in water under Future Case conditions (mg/kg wet weight)	=	3.53E-02 mg/kg wet weight
$Expected\ Magnitude\ Change$	:	Expected Magnitude of Change in Arsenic concentrations in Fish based on predicted change in Arsenic concentrations in water (unitless)	=	2.46E+00
$EPC_{Fish\ muscle\ (Future)}$	:	Exposure Point Concentration of Arsenic in Fish Tissue (muscle) based on Future Case conditions using the proportioning approach (mg/kg wet weight)	=	1.57E-01 mg/kg wet tissue
$EPC_{Fish\ (Future)}$	:	Average of all Predicted Exposure Point Concentration of Arsenic in Fish tissue (carcass, liver, muscle) based on Future Case conditions using the proportioning approach (mg/kg wet weight)	=	1.40E-01 mg/kg wet weight

CALCULATION OF EXPOSURE POINT CONCENTRATION IN MOOSE MEAT

Calculation for the concentration of arsenic in moose tissue from the consumption of soil and plants (terrestrial and aquatic) under Future Case conditions in the Gordon Region

$$A_{moose} = \left(\sum (F_p \times Qp_{ter} \times P_{ter}) + (F_p \times Qp_{aq} \times P_{aq}) \times (Fs \times Qs \times Bs \times Cs) + (F_W \times Qw \times Cw) + (F_{sed} \times Q_{sed} \times C_{sed})\right) \times Ba_{moose} \times MF$$

And:

$$Ba_{moose} = \frac{L_{moose\%}}{L_{beef\%}} \times Ba_{beef}$$

Where:

Ba_{beef}	:	Arsenic biotransfer factor for beef (day/kg FW tissue)	=	2.00E-03 day/kg FW tissue
$L_{beef\%}$	:	Lipid content in beef cattle (%)	=	19%
$L_{moose\%}$	:	Lipid content in moose (%)	=	10%
MF	:	Metabolism Factor (unitless)	=	1.00E+00
Fp	:	Fraction of plant type (terrestrial and aquatic) ingested by the moose (unitless)	=	1.00E+00
Qp_{ter}	:	Quantity of terrestrial plant eaten by the moose per day (kg DW plant / day)	=	6.40E+00 kg/day
Qp_{aq}	:	Quantity of plant type (aquatic) eaten by the moose per day (kg DW plant / day)		1.60E+00 kg/day
P_{ter}	:	Concentration of Arsenic in terrestrial plants eaten by the moose (mg/kg DW)	=	9.57E-02 mg/kg
P_{aq}	:	Concentration of Arsenic in aquatic plants eaten by the moose (mg/kg DW)		1.99E-01 mg/kg
F_s	:	Fraction of soil contaminated and ingested by the moose (unitless)	=	1.00E+00
Qs	:	Quantity of soil eaten by the moose each day (kg/day)	=	1.20E-01 kg/day
Bs	:	Soil bioavailability factor (unitless)	=	1.00E+00
Cs	:	Average soil concentration over exposure duration (mg Arsenic/kg soil)	=	1.15E+00 mg/kg
F_W	:	Fraction of water contaminated and ingested by the moose (unitless)	=	1.00E+00
Qw	:	Quantity of water taken up by the moose per day (L/day)	=	2.16E+01 L/day
Cw	:	Arsenic concentration in water (maximum concentration of water taken from lake (mg/L)	=	5.84E-04 mg/L
F_{sed}	:	Fraction of sediment contaminated and ingested by the moose (unitless)	=	1.00E+00
Q_{sed}	:	Quantity of sediment eaten by the moose per day (kg DW/day)	=	2.60E-02 kg/day

C_{sed} : Arsenic concentration in sediment (mg Arsenic/kg soil) = 5.30E+00 mg/kg

Results:

Ba_{moose} : Arsenic biotransfer factor for moose (day/kg FW tissue) = 1.05E-03 day/kg

A_{moose} : Arsenic concentration in moose meat in the Gordon Region under Future Case conditions (mg Arsenic/kg FW tissue) = 1.28E-03 mg/kg FW tissue

Human Health

CALCULATION OF LIFETIME AVERAGED DAILY INHALATION EXPOSURES

Calculation of Lifetime Averaged Daily Concentration (LADC) of Arsenic in air during Project Alone Case in the Gordon Region

$$LADC_{(Inhalation)} = As_{(Max\ Annual)} \times AF$$

And:

$$AF_{(Project)} = T_{(Project\ Operations)} \div T_{(Lifetime)}$$

Where:

$T_{(Lifetime)}$: Average lifetime of human receptors in years = 80 years

$T_{(Project\ Operations)}$: Estimated duration of project operations in years = 13 years

$As_{(Max\ Annual)}$: Maximum modelled annual concentration of Arsenic in air in the Gordon region based on Future Case conditions ($\mu g/m^3$) = 5.59E-05 $\mu g/m^3$

Result:

$AF_{(Project)}$: Averaging Factor for inhalation exposures to carcinogenic chemicals (unitless) = 1.63E-01

$LADC_{(Inhalation)}$: Lifetime Averaged Daily Concentration of Arsenic in air based on Project Alone Case conditions in the Gordon region ($\mu g/m^3$) = 9.08E-06 $\mu g/m^3$

CALCULATION OF NON-CARCINOGENIC INGESTION EXPOSURES (ORAL AND DERMAL) OF COPCS BY INDIGENOUS TODDLER RECEPTOR AT GORDON UNDER BASELINE CONDITIONS

(1) *Calculation of Chronic Daily Intake of Soil through Oral Ingestion*

$$CDI_{Ingestion} = \frac{C_{soil} \times IR_{soil} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

Where:

C_{soil}	:	Maximum Baseline Arsenic concentration in soil (mg/kg)	=	1.09E+00 mg/kg
IR_{soil}	:	Soil Ingestion Rate (g/day)	=	8.00E-02 g/day
CF	:	Conversion Factor (kg to g)	=	1E-03 g/kg
AF_{GIT}	:	Absorption Factor from the Gastrointestinal Tract (unitless)	=	1.00E+00
D_1	:	Days per week exposed (7) / 7 days (unitless)	=	1.0
D_2	:	Weeks per year exposed (52) / 52 weeks (unitless)	=	1.0
BW	:	Average body weight of receptor (kg)	=	1.65E+01 kg

Result:

$CDI_{Ingestion}$	:	Chronic daily intake from ingestion (mg/kg/day)	=	5.28E-06 mg/kg/day

(2) *Calculation of Chronic Daily Intake of Soil through Dermal Contact*

$$CDI_{Dermal} = \frac{C_{soil} \times SA_{total} \times SF \times AF_{skin} \times CF \times D_1 \times D_2}{BW}$$

Where:

C_{soil}	:	Maximum Baseline Arsenic concentration in soil (mg/kg)	=	1.09E+00 mg/kg
SA_{total}	:	Total skin surface area of hands upper and lower arms and upper and lower legs (cm^2)	=	3.01E+03 cm^2
SF	:	Soil Adhesion Factor (g/cm^2)	=	2.29E-05 g/cm^2
AF_{skin}	:	Dermal Absorption Factor (unitless)	=	3.00E-02
CF	:	Conversion Factor (kg to g)	=	1.00E-03 g/kg
D_1	:	Days per week exposed (7) / 7 days	=	1.00
D_2	:	Weeks per year exposed (52) / 52 weeks	=	1.00
BW	:	Average body weight of receptor (kg)	=	1.65E+01 kg

Result:

CDI Dermal	:	Chronic daily intake from dermal contact (mg/kg/day)	= 1.36E-07 mg/kg/day

(3) *Calculation of Chronic Daily Intake of Arsenic through Consumption of Fish by Indigenous Toddler Receptor at Gordon (Baseline Case)*

$$CDI_{Fish} = \frac{EPC_{\text{Fish (Baseline)}} \times IR_{fish} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

Where:

$EPC_{\text{Fish (Baseline)}}$	:	Baseline Exposure Point Concentration of Arsenic in Fish (mg/kg wet weight) = Average of 95% UCLM concentration of Arsenic in fish carcass, fish liver and fish muscle (mg/kg wet weight)	= 5.69E-02 mg/kg wet weight
IR_{fish}	:	Ingestion rate of local fish (g/day)	= 1.57E+00
CF	:	Conversion Factor (kg to g)	= 1.00E-03 g/kg
AF_{GIT}	:	Absorption Factor from the Gastrointestinal Tract (unitless)	= 1.00
D_1	:	Days per week exposed (7) / 7 days	= 1.00
D_2	:	Weeks per year exposed (52) / 52 weeks	= 1.00
BW	:	Average body weight of Toddler	= 1.65E+01 kg

Result:

CDI_{Fish}	:	Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through consumption of Fish under Baseline conditions	= 5.41E-06 mg/kg/day

(4) *Calculation of Chronic Daily Intake of Arsenic through Consumption of Wild Meat by Indigenous Toddler Receptor at Gordon (Baseline Case)*

$$CDI_{Wild\ Meat} = CDI_{Lg\ Mam} + CDI_{Sm\ Mam} + CDI_{Aq\ Mam} + CDI_{Tr\ Bir} + CDI_{Wt\ Fow}$$

And:

$$CDI_{Lg\ Mam} = \frac{C_{\text{Lg Mam (Baseline)}} \times IR_{Lg\ Mam} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

$$CDI_{Sm\ Mam} = \frac{C_{\text{Sm Mam (Baseline)}} \times IR_{Sm\ Mam} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

$$CDI_{Aq\ Mam} = \frac{C_{\text{Aq Mam (Baseline)}} \times IR_{Aq\ Mam} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

$$CDI_{Tr\ Bir} = \frac{C_{\text{Tr Bir (Baseline)}} \times IR_{Tr\ Bir} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

$$CDI_{Wt\ Fow} = \frac{C_{\text{Wt Fow (Baseline)}} \times IR_{Wt\ Fow} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

Where:

$C_{\text{Lg Mam (Baseline)}}$	:	Concentration of Arsenic in large mammal tissue under Baseline conditions (mg/kg wet wight)	=	1.21E-03 mg/kg wet weight
$C_{\text{Sm Mam (Baseline)}}$	:	Concentration of Arsenic in small mammal tissue under Baseline conditions (mg/kg wet wight)	=	1.31E-05 mg/kg wet weight
$C_{\text{Aq Mam (Baseline)}}$	:	Concentration of Arsenic in aquatic mammal tissue under Baseline conditions (mg/kg wet wight)	=	4.78E-05 mg/kg wet weight
$C_{\text{Tr Bir (Baseline)}}$	:	Concentration of Arsenic in terrestrial bird tissue under Baseline conditions (mg/kg wet wight)	=	7.46E-06 mg/kg wet weight
$C_{\text{Wt Fow (Baseline)}}$	:	Concentration of Arsenic in water fowl tissue under Baseline conditions (mg/kg wet wight)	=	2.78E-04 mg/kg wet weight
$IR_{\text{Lg Mam}}$	:	Ingestion Rate of large mammal meat (g/day)	=	1.80E+01 g/day
IR_{SmMam}	:	Ingestion Rate of small mammal meat (g/day)	=	1.56E+00 g/day
$IR_{\text{Aq Mam}}$	:	Ingestion Rate of aquatic mammal meat (g/day)	=	5.76E-01 g/day
$IR_{\text{Tr Bir}}$	:	Ingestion Rate of terrestrial bird meat (g/day)	=	6.11E-01 g/day
$IR_{\text{Wt Fow}}$	:	Ingestion Rate of water fowl meat (g/day)	=	1.04E+01 g/day
CF	:	Conversion Factor (g to kg)	=	1.00E-03 kg/g
AF_{GIT}	:	Absorption Factor from the Gastrointestinal Tract (unitless)	=	1.00
D_1	:	Days per week exposed (7) / 7 days	=	1.00
D_2	:	Weeks per year exposed (52) / 52 weeks	=	1.00
BW	:	Average body weight of toddler	=	1.65E+01 kg

Results:

$CDI_{Lg\ Mam}$	:	Chronic Daily Intake of Arsenic through consumption of meat of large mammals	=	1.32E-06 mg/kg/day
$CDI_{Sm\ Mam}$	:	Chronic Daily Intake of Arsenic through consumption of meat of small mammals	=	1.24E-09 mg/kg/day
$CDI_{Aq\ Mam}$	:	Chronic Daily Intake of Arsenic through consumption of meat of aquatic mammals	=	1.67E-09 mg/kg/day

$CDI_{Tr\ Bir}$	:	Chronic Daily Intake of Arsenic through consumption of meat of terrestrial birds	= 2.76E-10 mg/kg/day
$CDI_{Wt\ Fow}$	:	Chronic Daily Intake of Arsenic through consumption of water fowl	= 1.74E-07 mg/kg/day
$CDI_{Wild\ Meat}$	:	Chronic Daily Intake of Arsenic through consumption of all wild meat at Gordon under Baseline conditions	= 1.50E-06 mg/kg/day

(5) ***Calculation of Chronic Daily Intake of Arsenic through Consumption of Traditional Plants by Indigenous Toddler Receptor at Gordon (Baseline Case)***

$$CDI_{Total\ \ Pla} = CDI_{Berries} + CDI_{Ot\ Pla}$$

And:

$$CDI_{Berries} = \frac{C_{\text{Ber (Baseline)}} \times IR_{Ber} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

$$CDI_{Ot\ Pla} = \frac{C_{\text{Ot Pla (Baseline)}} \times IR_{Ot\ Pla} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

Where:

$C_{\text{Ber (Baseline)}}$	:	Concentration of Arsenic in Berries Tissue under Baseline conditions (mg/kg wet wight)	= 9.60E-03 mg/kg wet weight
$C_{\text{Ot Pla (Baseline)}}$	:	Concentration of Arsenic in Other Traditional Plant Tissue under Baseline conditions (mg/kg wet wight)	= 1.38E-02 mg/kg wet weight
IR_{Ber}	:	Ingestion Rate of Berries (g/day)	= 1.62E+01 g/day
$IR_{Oth\ Pla}$	:	Ingestion Rate of Other Traditional Plants (g/day)	= 4.75E+00 g/day
CF	:	Conversion Factor (g to kg)	= 1.00E-03 kg/g
AF_{GIT}	:	Absorption Factor from the Gastrointestinal Tract (unitless)	= 1.00
D_1	:	Days per week exposed (7) / 7 days	= 1.00
D_2	:	Weeks per year exposed (52) / 52 weeks	= 1.00
BW	:	Average body weight of toddler	= 1.65E+01 kg

Results:

$CDI_{Berries}$	:	Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through the consumption of Berries at Gordon under Baseline conditions (mg/kg/day)	= 9.42E-06 mg/kg/day
$CDI_{Ot\ Pla}$	:	Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through the consumption of Other Traditional Plants at	= 3.97E-06 mg/kg/day

		Gordon under Baseline conditions (mg/kg/day)	
$CDI_{Total\ Pla}$	:	Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through the consumption of Berries and Other Traditional Plants at Gordon under Baseline conditions (mg/kg/day)	= 1.34E-05 mg/kg/day

(6) ***Calculation of Chronic Daily Intake of Arsenic through Consumption of Garden Produce by Indigenous Toddler Receptor at Gordon (Baseline Case)***

$$CDI_{Produce} = \frac{C_{\text{Prod (Baseline)}} \times IR_{Prod} \times CF \times AF_{GIT} \times D_1 \times D_2}{BW}$$

Where:

$C_{\text{Prod (Baseline)}}$	:	Concentration of Arsenic in Garden (Backyard) Produce under Baseline conditions (mg/kg wet weight)	= 8.35E-03 mg/kg wet weight
IR_{Prod}	:	Ingestion Rate of Garden (Backyard) Produce (assume 10% of intake of vegetables from garden produce).	= 1.72E+01 g/day
CF	:	Conversion Factor (g to kg)	= 1.00E-03 kg/g
AF_{GIT}	:	Absorption Factor from the Gastrointestinal Tract (unitless)	= 1.00
D_1	:	Days per week exposed (7) / 7 days	= 1.00
D_2	:	Weeks per year exposed (52) / 52 weeks	= 1.00
BW	:	Average body weight of toddler	= 1.65E+01 kg

Result:

$CDI_{Produce}$	:	Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through the consumption of Garden (Backyard) Produce at Gordon under Baseline conditions (mg/kg/day)	= 8.70E-06 mg/kg/day

Calculation of Lifetime Averaged Daily Dose of Arsenic for Indigenous Receptor exposed to Arsenic through soil ingestion in the Gordon Region (Future Case)

$$LADD_{ingestion} = \left(\frac{\text{ED}_i}{\text{LE}} \times DI_i\right) + \left(\frac{\text{ED}_t}{\text{LE}} \times DI_t\right) + \left(\frac{\text{ED}_c}{\text{LE}} \times DI_c\right) + \left(\frac{\text{ED}_{\text{teen}}}{\text{LE}} \times DI_{teen}\right) + \left(\frac{\text{ED}_a}{\text{LE}} \times DI_a\right)$$

Where:

ED_i	:	Exposure duration for an infant in years	= 5.00E-01 years

ED_t	:	Exposure duration for a toddler in years	= 4.50E+00 years
ED_c	:	Exposure duration for a child in years	= 4.00E+00 years
ED_{teen}	:	Exposure duration for a teen in years	= 8.00E+00 years
ED_a	:	Exposure duration for an adult in years	= 6.00E+01 years
LE	:	Life Expectancy	= 80 years
DI_i	:	Soil ingestion daily intake for a toddler (mg/kg-day)	= 2.80E-06 mg/kg/day
DI_t	:	Soil ingestion daily intake for a toddler (mg/kg-day)	= 5.58E-06 mg/kg/day
DI_c	:	Soil ingestion daily intake for a child (mg/kg-day)	= 6.99E-07 mg/kg/day
DI_{teen}	:	Soil ingestion daily intake for a teen (mg/kg-day)	= 3.85E-07 mg/kg/day
DI_a	:	Soil ingestion daily intake for an adult (mg/kg-day)	= 3.25E-07 mg/kg/day

Result:

$LADD_{Ingestion}$	:	Lifetime Averaged Daily Dose of Arsenic through ingestion of soil by Indigenous Receptor in Gordon region (mg/kg/day)	= 6.75E-07 mg/kg/day

CALCULATION OF HEALTH RISKS FROM INHALATION

WORKED EXAMPLE FOR FUTURE CASE INHALATION RISKS ON EXPOSURE TO COPC IN AIR IN THE GORDON REGION

(1) ***Calculation of Concentration Ratio for 1-hour SO_2 exposures to Receptors in the Gordon Region under Future conditions***

$$CR_{(Future\ Case)} = \frac{SO_{2\ (Future\ Case)}}{TRV}$$

Where:

$SO_{2\ (Future\ Case)}$	:	Calculate Future Case Exposure Point Concentration of 1-hour SO_2 at the Gordon Region (µg/m^3)	= 4.47E+01 µg/m^3
TRV	:	Toxicological Reference Value for 1-hour SO_2 (µg/m^3)	= 1.70E+02 µg/m^3

Result:

$CR_{(Future\ Case)}$	:	Concentration Ratio for 1-hour SO_2 inhalation exposures to receptors in the Gordon region under Future conditions	= 2.63E-01

(2) ***Calculation of Concentration Ratio for 24-hour SO_2 exposures to Receptors in the Gordon Region under Future conditions***

$$CR_{(Future\ Case)} = \frac{SO_{2\ (Future\ Case)}}{TRV}$$

Where:

$SO_{2\ (Future\ Case)}$	:	Calculate Future Case Exposure Point Concentration of 24-hour SO_2 at the Gordon Region (µg/m^3)	= 1.35E+01 µg/m^3
TRV	:	Toxicological Reference Value for 24-hour SO_2 (µg/m^3)	= 1.25E+02 µg/m^3

Result:

$CR_{(Future\ Case)}$	:	Concentration Ratio for 24-hour SO_2 inhalation exposures to receptors in the Gordon region under Future conditions	= 1.08E-01

(3) ***Calculation of Concentration Ratio for Annual NO_2 exposures to Receptors in the Gordon Region under Future conditions***

$$CR_{(Future\ Case)} = \frac{NO_{2\ (Future\ Case)}}{TRV}$$

Where:

$NO_{2\ (Future\ Case)}$	:	Calculated Future Case Exposure Point Concentrations of Annual NO_2 at the Gordon Region (µg/m^3)	= 3.61E+00 µg/m^3
TRV	:	Toxicological Reference Value for Annual NO_2 (µg/m^3)	= 2.30E+01 µg/m^3

Result:

$CR_{(Future\ Case)}$	:	Concentration Ratio for Annual NO_2 inhalation exposures to receptors in the Gordon region under Future conditions	= 1.57E-01

(4) ***Calculation of Concentration Ratio for long-term inhalation exposures to carcinogenic Arsenic in the Gordon region based on emissions during Project Alone Case conditions***

$$CR_{(Project\ )} = \frac{LADC_{\ (Inhalation)}}{TRV_{\ RsC}}$$

And:

$$TRV_{\ RsC} = \frac{Cancer_{\ (Benchmark)}}{TRV_{Unit\ Risk}}$$

Where:

$Cancer_{(Benchmark)}$	:	Benchmark for carcinogenic risks (unitless)	= 1.00E-05
$TRV_{Unit\ Risk}$	:	Toxicological Reference Value (Inhalation Unit Risk) for carcinogenic Arsenic in air $(\mu g/m^3)^{-1}$	= 6.40E-03 $(\mu g/m^3)^{-1}$
$LADC_{(Inhalation)}$	:	Calculated Lifetime Averaged Daily Concentration of Arsenic in air based on Project Alone Case conditions in the Gordon region $(\mu g/m^3)$	= 9.08E-06 $\mu g/m^3$

Result:

TRV_{RsC}	:	Toxicological Reference Value (Reference Concentration) for carcinogenic Arsenic in air $(\mu g/m^3)$	= 1.56E-03 $\mu g/m^3$
$CR_{(Project)}$		Concentration Ratio for inhalation exposures of carcinogenic Arsenic in air by receptors in the Gordon region based on Project Alone Case conditions (unitless)	= 5.82E-03

CALCULATION OF HEALTH RISKS FROM INGESTION OF SOIL

Calculation of HQ for Arsenic through Ingestion of Soil by Indigenous Toddler Receptor at Gordon (Baseline Case)

$$HQ_{Total\ Soil} = HQ_{Inc\ Ing} + HQ_{Derm\ Con}$$

And:

$$HQ_{Inc\ Ing} = \frac{CDI_{Ingestion}}{TRV}$$

$$HQ_{Derm\ Con} = \frac{CDI_{Dermal}}{TRV}$$

Where:

TRV	:	Toxicological Reference Value for Arsenic [NOTE: TRV obtained from US EPA IRIS 1991. Arsenic. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0278_summary.pdf#nameddest=rfd]	= 3.00E-04 mg/kg/day
$CDI_{Ingestion}$	:	Calculated Chronic daily intake from ingestion by Toddler (mg/kg/day)	= 5.28E-06 mg/kg/day
CDI_{Dermal}	:	Calculated Chronic daily intake from dermal contact by Toddler (mg/kg/day)	= 1.36E-07 mg/kg/day

Results:

$HQ_{Inc\ Ing}$	:	Hazard Quotient for Arsenic through incidental soil ingestion by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless)	= 1.76E-02
$HQ_{Derm\ Con}$	:	Hazard Quotient for Arsenic through dermal contact with soil by the Indigenous Toddler	= 4.54E-04

Receptor at Gordon under Baseline conditions (unitless)

$HQ_{Total\ Soil}$: Hazard Quotient for Arsenic through dermal contact of soil and incidental ingestion of soil by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 1.80E-02

CALCULATION OF HEALTH RISKS FROM TOTAL INGESTION- SOIL AND FOOD

Calculation of HQ for Arsenic through Total Ingestion of Soil and Food by Indigenous Toddler Receptor at Gordon (Baseline Case)

$$HQ_{Total} = HQ_{Total\ Soil} + HQ_{Fish} + HQ_{Wild\ Meat} + HQ_{Total\ Pla} + HQ_{Produce}$$

And:

$$HQ_{Fish} = \frac{CDI_{Fish}}{TRV}$$

$$HQ_{Wild\ Meat} = \frac{CDI_{Wild\ Meat}}{TRV}$$

$$HQ_{Total\ Pla} = \frac{CDI_{Total\ Pla}}{TRV}$$

$$HQ_{Produce} = \frac{CDI_{Prod}}{TRV}$$

Where:

TRV : Oral Toxicological Reference Value for Arsenic (mg/kg/day) = 3.00E-04 mg/kg/day

[NOTE: TRV obtained from US EPA IRIS 1991. Arsenic. Available at: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0278_summary.pdf#nameddest=rfd]

$HQ_{Total\ Soil}$: Calculated Hazard Quotient for Arsenic through dermal contact of soil and incidental ingestion of soil by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 1.80E-02

CDI_{Fish} : Calculated Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through consumption of Fish under Baseline conditions (mg/kg/day) = 5.41E-06 mg/kg/day

$CDI_{Wild\ Meat}$: Calculated Chronic Daily Intake of Arsenic through consumption of all wild meat at Gordon under Baseline conditions (mg/kg/day) = 1.50E-06 mg/kg/day

$CDI_{Total\ Pla}$: Calculated Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through the consumption of Berries and Other Traditional = 1.34E-05 mg/kg/day

Plants at Gordon under Baseline conditions (mg/kg/day)

$CDI_{Produce}$: Calculated Chronic Daily Intake of Arsenic by Indigenous Toddler Receptor through the consumption of Garden (Backyard) Produce at Gordon under Baseline conditions (mg/kg/day) = 8.70E-06 mg/kg/day

Results:

HQ_{Fish} : Hazard Quotient for Arsenic through the daily intake of fish by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 1.80E-02

$HQ_{Wild\ Meat}$: Hazard Quotient for Arsenic through the daily intake of wild meat by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 4.99E-03

$HQ_{Total\ Pla}$: Hazard Quotient for Arsenic through the daily intake of berries and other traditional plants by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 4.46E-02

$HQ_{Produce}$: Hazard Quotient for Arsenic through the daily intake of garden (backyard) produce by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 2.90E-02

HQ_{Total} : Hazard Quotient for Arsenic through the daily intake of soil and food by the Indigenous Toddler Receptor at Gordon under Baseline conditions (unitless) = 1.15E-01

CALCULATION OF INCREMENTAL LIFETIME CANCER RISK (ILCR) FROM INGESTION OF SOIL

Incremental Lifetime Cancer Risk (ILCR) for the Indigenous Receptor exposed to Arsenic via soil ingestion in the Gordon Region (Project Case)

$$ILCR_{Ingestion} = LADD_{Ingestion} \times SF_{Oral}$$

Where:

$LADD_{Ingestion}$: Calculated Lifetime Averaged Daily Dose of Arsenic through ingestion of soil by Indigenous Receptor in Gordon region (mg/kg/day) = 6.75E-07 mg/kg/day

SF_{Oral}	:	Oral Slope Factor (Toxicological Reference Value) $(mg/kg/day)^{-1}$	= 1.80E+00 $(mg/kg/day)^{-1}$

Result for Future Case:

$ILCR_{Ingestion}$	:	Incremental Lifetime Cancer Risk (unitless) for Indigenous Receptor exposed to Arsenic via soil ingestion in the Gordon Region during Future Case.	= 1.21473 E-06

Result for Baseline Case:

$ILCR_{Ingestion}$	:	Incremental Lifetime Cancer Risk (unitless) for Indigenous Receptor exposed to Arsenic via soil ingestion in the Gordon Region during Baseline Case:	= 1.14924E-06

Result for Project-Alone Case:

$ILCR_{Ingestion}$	:	$ICLR_{Future\ Case} - ICLR_{Baseline\ Case}$	= 6.5E-08

Ecological Health

ECOLOGICAL RISK ASSESSMENT CALCULATIONS
RQ Worked Example

CALCULATION OF HEALTH RISKS FROM INGESTION OF SOIL

Health Risks to the Northern River Otter exposed to arsenic in soil (Future Case - MacLellan region):

Calculation of Average Daily Dose from Ingestion of Soil

$$ADD_{arsenic} = IF \times AF \times EPC_{arsenic}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from soil ingestion (mg/kg body weight/day)
IF	=	Intake factor (kg soil/kg body weight/day) (see equation below)
AF	=	Absorption Factor for arsenic from the gastrointestinal tract (unitless)
$EPC_{arsenic}$	=	Exposure point concentration for arsenic in soil (mg/kg dw soil)

And:

$$IF = \frac{(IR \times f_{site})}{BW}$$

Where:

IR	=	Soil Ingestion Rate (kg dw/day)
f_{site}	=	Fraction of time the Northern River Otter spends at the site
BW	=	Average body weight of the Northern River Otter (kg)

Values:

IR	=	2.9E-04 kg dw/day
f_{site}	=	100% (assumed to spend 100% of time at the site)
BW	=	7.5 kg
IF	=	3.8E-05 kg soil/kg body weight/day
AF	=	1 (assumed 100% absorption)
$EPC_{arsenic}$	=	2.1E+00 mg/kg dw
$ADD_{arsenic}$	=	7.8E-05 mg/kg body weight/day

Calculation of Risk Quotient from Ingestion of Soil

$$RQ_{soil} = \frac{ADD_{arsenic}}{TRV}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from soil ingestion (mg/kg body weight/day)
TRV	=	Oral Toxicity Reference Value (mg/kg body weight/day)

RQ_{soil}	=	Risk Quotient for soil ingestion (unitless)

Values:

$ADD_{ingestion}$	=	7.8E-05 mg/kg body weight/day
TRV	=	5.5E-01 mg/kg body weight/day
RQ_{soil}	=	1.4E-04

CALCULATION OF HEALTH RISKS FROM INGESTION OF SMALL MAMMALS

Health Risks to the Northern River Otter exposed to arsenic in small mammals (Future Case - MacLellan region):

Calculation of Average Daily Dose from Ingestion of Small Mammals

$$ADD_{arsenic} = IF \times AF \times EPC_{arsenic}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from small mammal ingestion (mg/kg body weight/day)
IF	=	Intake factor (kg small mammal/kg body weight/day) (see equation below)
AF	=	Absorption Factor for arsenic from the gastrointestinal tract (unitless)
$EPC_{arsenic}$	=	Exposure point concentration for arsenic in small mammals (mg/kg ww)

And:

$$IF = \frac{(IR \times f_{site})}{BW}$$

Where:

IR	=	Small Mammal Ingestion Rate (kg ww/day)
f_{site}	=	Fraction of time the Northern River Otter spends at the site
BW	=	Average body weight of the Northern River Otter (kg)

Values:

IR	=	4.5E-02 kg ww/day
f_{site}	=	100% (assumed to spend 100% of time at the site)
BW	=	7.5 kg
IF	=	6.*0E-03 kg small mammal/kg body weight/day
AF	=	1 (assumed 100% absorption)
$EPC_{arsenic}$	=	6.0E-02 mg/kg ww
$ADD_{arsenic}$	=	3.6E-04 mg/kg body weight/day

Calculation of Risk Quotient from Ingestion of Small Mammals

$$RQ_{\text{small mammals}} = \frac{ADD_{\text{arsenic}}}{TRV}$$

Where:

ADD_{arsenic}	=	Average daily dose of arsenic from small mammal ingestion (mg/kg body weight/day)
TRV	=	Oral Toxicity Reference Value (mg/kg body weight/day)
$RQ_{\text{small mammal}}$	=	Risk Quotient for small mammal ingestion (unitless)

Values:

$ADD_{\text{ingestion}}$	=	3.6E-04 mg/kg body weight/day
TRV	=	5.5E-01 mg/kg body weight/day
$RQ_{\text{small mammal}}$	=	6.4E-04

CALCULATION OF HEALTH RISKS FROM INGESTION OF WATER

Health Risks to the Northern River Otter exposed to arsenic in water (Future Case - MacLellan region):

Calculation of Average Daily Dose from Ingestion of Water

$$ADD_{\text{arsenic}} = IF \times AF \times EPC_{\text{arsenic}}$$

Where:

ADD_{arsenic}	=	Average daily dose of arsenic from water ingestion (mg/kg body weight/day)
IF	=	Intake factor (L water/kg body weight/day) (see equation below)
AF	=	Absorption Factor for arsenic from the gastrointestinal tract (unitless)
EPC_{arsenic}	=	Exposure point concentration for arsenic in water (mg/L water)

And:

$$IF = \frac{(IR \times f_{\text{site}})}{BW}$$

Where:

IR	=	Water Ingestion Rate (L/day)
f_{site}	=	Fraction of time the Northern River Otter spends at the site
BW	=	Average body weight of the Northern River Otter (kg)

Values:

IR	=	6.1E-01 L/day
f_{site}	=	100% (assumed to spend 100% of time at the site)
BW	=	7.5 kg
IF	=	8.1E-02 L/kg body weight/day
AF	=	1 (assumed 100% absorption)
$EPC_{arsenic}$	=	6.0E-04 mg/L
$ADD_{arsenic}$	=	4.9E-05 mg/kg body weight/day

Calculation of Risk Quotient from Ingestion of Water

$$RQ_{water} = \frac{ADD_{arsenic}}{TRV}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from water ingestion (mg/kg body weight/day)
TRV	=	Oral Toxicity Reference Value (mg/kg body weight/day)
RQ_{water}	=	Risk Quotient for water ingestion (unitless)

Values:

$ADD_{ingestion}$	=	4.9E-05 mg/kg body weight/day
TRV	=	5.5E-01 mg/kg body weight/day
RQ_{water}	=	8.8E-05

CALCULATION OF HEALTH RISKS FROM INGESTION OF SEDIMENT

RQ Worked Example

Health Risks to the Northern River Otter Exposed to Arsenic in Sediment (Future Case - MacLellan region):

Calculation of Average Daily Dose from Ingestion of Sediment

$$ADD_{arsenic} = IF \times AF \times EPC_{arsenic}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from sediment ingestion (mg/kg body weight/day)
IF	=	Intake factor (kg sediment/kg body weight/day) (see equation below)
AF	=	Absorption Factor for arsenic from the gastrointestinal tract (unitless)
$EPC_{arsenic}$	=	Exposure point concentration for in sediment (mg/kg dw)

And:

$$IF = \frac{(IR \times f_{site})}{BW}$$

Where:

IR	=	Sediment Ingestion Rate (kg dw/day)
f_{site}	=	Fraction of time the Northern River Otter spends at the site
BW	=	Average body weight of the Northern River Otter (kg)

Values:

IR	=	4.2E-03 kg dw/day
f_{site}	=	100% (assumed to spend 100% of time at the site)
BW	=	7.5 kg
IF	=	5.6E-04 kg sediment/kg body weight/day
AF	=	1 (assumed 100% absorption)
$EPC_{arsenic}$	=	2.9E+00 mg/kg dw
$ADD_{arsenic}$	=	1.6E-03 mg/kg body weight/day

Calculation of Risk Quotient from Ingestion of Sediment

$$RQ_{sediment} = \frac{ADD_{arsenic}}{TRV}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from sediment ingestion (mg/kg body weight/day)
TRV	=	Oral Toxicity Reference Value (mg/kg body weight/day)
$RQ_{sediment}$	=	Risk Quotient for sediment ingestion (dimensionless)

Values:

$ADD_{ingestion}$	=	1.6E-03 mg/kg body weight/day
TRV	=	5.5E-01 mg/kg body weight/day
$RQ_{sediment}$	=	3.0E-03

CALCULATION OF HEALTH RISKS FROM INGESTION OF BENTHIC INVERTEBRATE

RQ Worked Example

Health Risks to the River Otter Exposed to Arsenic in Benthic Invertebrate (Future Case - MacLellan region):

Calculation of Average Daily Dose from Ingestion of Benthic Invertebrate

$$ADD_{arsenic} = IF \times AF \times EPC_{arsenic}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from benthic invertebrate ingestion (mg/kg body weight/day)
IF	=	Intake factor (kg benthic invertebrate/kg body weight/day) (see equation below)
AF	=	Absorption Factor for arsenic from the gastrointestinal tract (unitless)
$EPC_{arsenic}$	=	Exposure point concentration for in benthic invertebrate (mg/kg ww)

And:

$$IF = \frac{(IR \times f_{site})}{BW}$$

Where:

IR	=	Benthic invertebrate Ingestion Rate (kg ww/day)
f_{site}	=	Fraction of time the Northern River Otter spends at the site
BW	=	Average body weight of the Northern River Otter (kg)

Values:

IR	=	1.3E-01 kg ww/day
f_{site}	=	100% (assumed to spend 100% of time at the site)
BW	=	7.5 kg
IF	=	1.8E-02 kg benthic invertebrate/kg body weight/day
AF	=	1 (assumed 100% absorption)
$EPC_{arsenic}$	=	1.1E+00 mg/kg ww
$ADD_{arsenic}$	=	2.0E-02 mg/kg body weight/day

Calculation of Risk Quotient from Ingestion of Benthic Invertebrate

$$RQ_{benthic\ invertebrates} = \frac{ADD_{arsenic}}{TRV}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from benthic invertebrate ingestion (mg/kg body weight/day)
TRV	=	Oral Toxicity Reference Value (mg/kg body weight/day)
$RQ_{benthic invertebrate}$	=	Risk Quotient for benthic invertebrate ingestion (dimensionless)

Values:

$ADD_{ingestion}$	=	2.0E-02 mg/kg body weight/day
TRV	=	5.5E-01 mg/kg body weight/day
$RQ_{benthic\ invertebrate}$	=	3.7E-02

CALCULATION OF HEALTH RISKS FROM INGESTION OF FISH

RQ Worked Example

Health Risks to the Northern River Otter Exposed to Arsenic in Fish (Future Case - MacLellan region):

Calculation of Average Daily Dose from Ingestion of Fish

$$ADD_{arsenic} = IF \times AF \times EPC_{arsenic}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from fish ingestion (mg/kg body weight/day)
IF	=	Intake factor (kg fish/kg body weight/day) (see equation below)
AF	=	Absorption Factor for arsenic from the gastrointestinal tract (unitless)
$EPC_{arsenic}$	=	Exposure point concentration for in fish (mg/kg tissue)

And:

$$IF = \frac{(IR \times f_{site})}{BW}$$

Where:

IR	=	Fish Ingestion Rate (kg ww/day)
f_{site}	=	Fraction of time the Northern River Otter spends at the site
BW	=	Average body weight of the Northern River Otter (kg)

Values:

IR	=	7.1E-01 kg ww/day
f_{site}	=	100% (assumed to spend 100% of time at the site)
BW	=	7.5 kg
IF	=	9.5E-02 kg fish/kg body weight/day
AF	=	1 (assumed 100% absorption)
$EPC_{arsenic}$	=	1.1E-01mg/kg
$ADD_{arsenic}$	=	1.1E-02 mg/kg body weight/day

Calculation of Risk Quotient from Ingestion of Fish

$$RQ_{fish} = \frac{ADD_{arsenic}}{TRV}$$

Where:

$ADD_{arsenic}$	=	Average daily dose of arsenic from fish ingestion (mg/kg body

weight/day)

TRV	=	Oral Toxicity Reference Value (mg/kg body weight/day)
RQ_{fish}	=	Risk Quotient for fish ingestion (unitless)

Values:

$ADD_{ingestion}$	=	1.1E-02 mg/kg body weight/day
TRV	=	5.5E-01 mg/kg body weight/day
RQ_{fish}	=	1.9E-02

CALCULATION OF TOTAL HEALTH RISKS FROM ALL EXPOSURE PATHWAYS

RQ Worked Example

Total Health Risks to the Northern River Otter exposed to arsenic in surface soil, small mammals, surface water, freshwater sediment, freshwater benthic invertebrate, and freshwater fish (Future Case - MacLellan region):

$$RQ_{total} = RQ_{soil} + RQ_{small\ mammal} + RQ_{water} + RQ_{sediment} + RQ_{benthic\ invertebrate} + RQ_{fish}$$

Where:

RQ_{total}	=	Total Risk Quotient (unitless)
RQ_{soil}	=	Risk Quotient for soil ingestion (unitless)
$RQ_{small\ mammal}$	=	Risk Quotient for small mammal ingestion (unitless)
RQ_{water}	=	Risk Quotient for water ingestion (unitless)
$RQ_{sediment}$	=	Risk Quotient for sediment ingestion (unitless)
$RQ_{benthic\ invertebrate}$	=	Risk Quotient for benthic invertebrate ingestion (unitless)
RQ_{fish}	=	Risk Quotient for fish ingestion (unitless)
Values:	=	
RQ_{soil}	=	1.4E-04
$RQ_{small\ mammal}$	=	6.4E-04
RQ_{water}	=	8.8E-05
$RQ_{sediment}$	=	3.0E-03
$RQ_{benthic\ invertebrate}$	=	3.7E-02
RQ_{fish}	=	1.9E-02
RQ_{total}	=	6.0E-02

APPENDIX E.2
DERMAL RAF

Table 1. Relative Dermal Absorption Factors Used in the HHERA.

Chemical	Relative Dermal Absorption Factors (Unitless)[a]
Antimony	1.00E-02[b]
Arsenic	3.00E-02
Barium	1.00E-01
Beryllium	1.00E-02[b]
Cadmium	1.00E-02
Chromium	1.00E-01
Cobalt	1.00E-02[b]
Copper	6.00E-02
Lead	1.00E-02[b]
Manganese	1.00E-02[b]
Mercury	1.00E+00
Molybdenum	1.00E-02
Nickel	9.10E-02
Selenium	1.00E-02
Silver	1.00E-02[b]
Strontium	1.00E-02[b]
Thallium	1.00E-02[b]
Uranium	1.00E-01
Vanadium	1.00E-02[b]
Zinc	1.00E-01

NOTES:

[a] Relative Dermal Absorption Factors obtained from Health Canada (2010): Federal Contaminated Sites Risk Assessment in Canada, Part II: Health Canada Toxicological Reference Values (TRV) and Chemical-Specific Factors, Version 2.0. Available at: http://publications.gc.ca/collections/collection_2012/sc-hc/H128-1-11-638-eng.pdf

[b] Default value of 1% or 0.01 used as Relative Dermal Absorption Factor for chemicals for which no values have been calculated. Refer to Section 3.3, Health Canada (2010) and Section 2.6.2.1, MOE 2011 (Ontario Ministry of the Environment. Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario. April 15, 2011)

APPENDIX E.3
UPTAKE FACTORS

Soil to Plant Uptake Factors (Gordon Region - Baseline Case)

COPC	Soil Conc. (mg/kg)	UP_{SP} Uptake Factor: Soil to Plant (mg/kg-dry plant / mg/kg-dry soil)	Reference	Soil to Plant Bioavailability Factor (Unitless)[b]	Plant Metabolic Factor (Unitless)[b]	Terrestrial Plant Dry Weight to Wet Weight Conversion Factor	Soil to Plant Uptake Factor (mg/kg-wet plant / mg/kg-dry soil)
Antimony	1.2E-01	3.9E-02 [a]	US EPA (2007)	1.0E+00	1.0E+00	0.15	5.9E-03
Arsenic	1.1E+00	3.8E-02	Bechtel Jacobs (1998), in US EPA (2007)	1.0E+00	1.0E+00	0.15	5.6E-03
Barium	4.9E+01	1.6E-01	US EPA Eco-SSL (2005a)	1.0E+00	1.0E+00	0.15	2.3E-02
Beryllium	3.0E-01	8.1E-01 [a]	US EPA (2007)	1.0E+00	1.0E+00	0.15	1.2E-01
Cadmium	3.6E-01	9.9E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	0.15	1.5E-01
Chromium (Total)	7.7E+00	4.1E-02	Bechtel Jacobs (1998), in US EPA Eco-SSL (2007)	1.0E+00	1.0E+00	0.15	6.2E-03
Cobalt	3.1E+00	7.5E-03	Bechtel Jacobs (1998), in US EPA (2005a)	1.0E+00	1.0E+00	0.15	1.1E-03
Copper	3.8E+01	2.2E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	0.15	3.2E-02
Lead	8.2E+00	1.1E-01 [a]	Bechtel Jacobs (1998), in US EPA (2007)	1.0E+00	1.0E+00	0.15	1.6E-02
Manganese	8.0E+01	7.9E-02	US EPA Eco-SSL (2007)	1.0E+00	1.0E+00	0.15	1.2E-02
Mercury	1.1E-01	1.0E+00 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	0.15	1.5E-01
Molybdenum	8.2E+00	2.4E-01	Geometric mean, various sources	1.0E+00	1.0E+00	0.15	3.6E-02
Nickel	5.2E+00	7.1E-02 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	0.15	1.1E-02
Selenium	2.5E-01	4.4E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	0.15	6.6E-02
Silver	1.6E-01	3.5E-02	Geometric mean, various sources	1.0E+00	1.0E+00	0.15	5.2E-03
Strontium	2.1E+01	4.0E-01	Geometric mean, various sources	1.0E+00	1.0E+00	0.15	6.0E-02
Thallium	1.8E-01	2.5E-03	Geometric mean, various sources	1.0E+00	1.0E+00	0.15	3.7E-04
Uranium	4.5E-01	2.0E-02 [a]	Sheppard and Evenden (1988)	1.0E+00	1.0E+00	0.15	3.0E-03
Vanadium	1.2E+01	4.9E-03	Bechtel Jacobs (1998), in US EPA EcoSSL (2005a)	1.0E+00	1.0E+00	0.15	7.3E-04
Zinc	4.7E+01	8.7E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	0.15	1.3E-01

Notes:

[a] Dependent on soil concentration (mg/kg) and a non-linear relationship.

[b] Conservative default.

See final page for references.

Soil to Invertebrate Uptake Factors (Gordon Region - Baseline Case)

COPC	Soil Conc. (mg/kg)	UP_{SI} Uptake Factor: Soil to Invertebrate (mg/kg-dry tissue / mg/kg-dry soil)	Uptake Factor Reference	Soil to Invertebrate Bioavailability Factor (Unitless)[b]	Soil Invertebrate Metabolic Factor (Unitless)[b]	Earthworm Dry Weight to Wet Weight Conversion Factor	Soil to Invertebrate Uptake Factor (mg/kg-wet tissue / mg/kg-dry soil)
Antimony	1.2E-01	1.0E+00	Conservative Default - US EPA (2005b)	1.0E+00	1.0E+00	0.16	1.6E-01
Arsenic	1.1E+00	2.4E-01 [a]	Sample et al. (1998a) - Table 12	1.0E+00	1.0E+00	0.16	3.8E-02
Barium	4.9E+01	9.1E-02	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	1.5E-02
Beryllium	3.0E-01	4.5E-02	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	7.2E-03
Cadmium	3.6E-01	1.0E+01 [a]	Sample et al. (1998a) - Table 12	1.0E+00	1.0E+00	0.16	1.6E+00
Chromium (Total)	7.7E+00	3.1E-01	Sample et al. (1998a) - Table 11	1.0E+00	1.0E+00	0.16	4.9E-02
Cobalt	3.1E+00	1.2E-01	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	2.0E-02
Copper	3.8E+01	3.7E-01 [a]	Sample et al. (1998a) - Table 12	1.0E+00	1.0E+00	0.16	5.9E-02
Lead	8.2E+00	5.4E-01 [a]	Sample et al. (1998a) - Table 12	1.0E+00	1.0E+00	0.16	8.6E-02
Manganese	8.0E+01	8.8E-02 [a]	Sample et al. (1998a) - Table 12	1.0E+00	1.0E+00	0.16	1.4E-02
Mercury	1.1E-01	1.7E+00	Sample et al. (1998a) - Table 11	1.0E+00	1.0E+00	0.16	2.7E-01
Molybdenum	8.2E+00	9.5E-01	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	1.5E-01
Nickel	5.2E+00	1.1E+00	Sample et al. (1998a) - Table 11	1.0E+00	1.0E+00	0.16	1.7E-01
Selenium	2.5E-01	9.9E-01	Sample et al. (1998a) - Table 11	1.0E+00	1.0E+00	0.16	1.6E-01
Silver	1.6E-01	2.0E+00	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	3.3E-01
Strontium	2.1E+01	8.7E-02	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	1.4E-02
Thallium	1.8E-01	4.7E-02	Jacques Whitford Limited (2008)	1.0E+00	1.0E+00	0.16	7.5E-03
Uranium	4.5E-01	3.3E-02	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	5.3E-03
Vanadium	1.2E+01	4.2E-02	Sample et al. (1998a), App A, Table C1	1.0E+00	1.0E+00	0.16	6.7E-03
Zinc	4.7E+01	6.5E+00 [a]	Sample et al. (1998a) - Table 12	1.0E+00	1.0E+00	0.16	1.0E+00

Notes:

[a] Dependent on soil concentration (mg/kg) and a non-linear relationship.

[b] Conservative default.

See final page for references.

Soil to Terrestrial Prey Uptake Factors (Gordon Region - Baseline Case)

COPC	Soil Conc. (mg/kg)	UP_{SA} Uptake Factor: Soil to Terrestrial Prey (mg/kg-dry animal /mg/kg-dry soil)	Uptake Factor Reference	Dry Weight to Wet Weight Conversion Factor	Soil to Terrestrial Prey Uptake Factor (mg/kg-wet tissue / mg/kg-dry soil)
Antimony	1.2E-01	2.0E-03 [a]	US EPA (2005b) Eco SSL: assumes diet of 100% plants	0.32	6.3E-04
Arsenic	1.1E+00	6.7E-03 [b]	Sample et al. (1998b) - Table 8	0.32	2.1E-03
Barium	4.9E+01	7.0E-02	Sample et al. (1998b) - Table 7	0.32	2.2E-02
Beryllium	3.0E-01	4.0E-02 [a]	US EPA (2005a) Eco SSL: assumes diet of 100% plants	0.32	1.3E-02
Cadmium	3.6E-01	1.1E+00 [b]	Sample et al. (1998b) - Table 8	0.32	3.5E-01
Chromium (Total)	7.7E+00	1.2E-01 [b]	Sample et al. (1998b) - Table 8	0.32	3.9E-02
Cobalt	3.1E+00	2.2E-02 [b]	Sample et al. (1998b) - Table 8	0.32	7.0E-03
Copper	3.8E+01	3.4E-01 [b]	Sample et al. (1998b) - Table 8	0.32	1.1E-01
Lead	8.2E+00	3.3E-01 [b]	Sample et al. (1998b) - Table 8	0.32	1.1E-01
Manganese	8.0E+01	2.1E-02	US EPA (2007) Eco-SSL	0.32	6.6E-03
Mercury	1.1E-01	1.2E-01	Sample et al. (1998b) - Table 7	0.32	4.0E-02
Molybdenum	8.2E+00	2.2E-01	Jacques Whitford Limited (2008)	0.32	7.0E-02
Nickel	5.2E+00	3.2E-01 [b]	Sample et al. (1998b) - Table 8	0.32	1.0E-01
Selenium	2.5E-01	1.6E+00 [b]	Sample et al. (1998b) - Table 8	0.32	5.0E-01
Silver	1.6E-01	4.0E-03 [a]	Sample et al. (1998b) - Table C1	0.32	1.3E-03
Strontium	2.1E+01	4.8E-01	Jacques Whitford Limited (2008)	0.32	1.5E-01
Thallium	1.8E-01	1.1E-01	Sample et al. (1998b) - Table 7	0.32	3.6E-02
Uranium	4.5E-01	2.3E-03	Jacques Whitford Limited (2008)	0.32	7.4E-04
Vanadium	1.2E+01	2.8E-03	Jacques Whitford Limited (2008)	0.32	9.0E-04
Zinc	4.7E+01	2.5E+00 [b]	Sample et al. (1998b) - Table 8	0.32	8.0E-01

Notes:

[a] Calculated as 0.05 multiplied by the soil to plant bioavailability factor.

[b] Dependent on soil concentration (mg/kg) and a non-linear relationship.

See final page for references.

Freshwater Sediment to Aquatic Plant Uptake Factor (Gordon Region - Baseline Case)

COPC	Freshwater Sediment Conc.(mg/kg)	UP_{SAP}(fw) Uptake Factor: Freshwater Sediment to Aquatic Plant (mg/kg-wet tissue/ mg/kg-dry sed)	Reference for Uptake Factor	Sediment to Aquatic Plant Bioavailability Factor (Unitless)[b]	Aquatic Plant Metabolic Factor (Unitless)[b]	Aquatic Plant Dry Weight to Wet Weight Conversion Factor	Uptake Factor: Freshwater Sediment to Aquatic Plant (mg/kg-wet tissue/ mg/kg-dry sed)
Antimony	1.8E-01	3.9E-02 [a]	From UPsp	1.0E+00	1.0E+00	1.30E-01	5.1E-03
Arsenic	5.0E+00	3.8E-02	Bechtel Jacobs (1998), in US EPA EcoSSL (2005a)	1.0E+00	1.0E+00	1.30E-01	4.9E-03
Barium	1.4E+02	1.6E-01	From UPsp	1.0E+00	1.0E+00	1.30E-01	2.0E-02
Beryllium	8.5E-01	6.1E-01 [a]	US EPA (2005a) EcoSSL	1.0E+00	1.0E+00	1.30E-01	8.0E-02
Cadmium	3.9E-01	9.5E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	1.2E-01
Chromium (Total)	4.4E+01	4.1E-02	Bechtel Jacobs (1998), in US EPA (2005a) Eco-SSL	1.0E+00	1.0E+00	1.30E-01	5.3E-03
Cobalt	1.0E+01	7.5E-03	From UPsp	1.0E+00	1.0E+00	1.30E-01	9.8E-04
Copper	2.0E+01	3.2E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	4.1E-02
Lead	8.7E+00	1.0E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	1.3E-02
Manganese	7.4E+02	7.9E-02	US EPA (2007) Eco-SSL	1.0E+00	1.0E+00	1.30E-01	1.0E-02
Mercury	8.3E-02	1.1E+00 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	1.5E-01
Molybdenum	7.9E+00	2.4E-01	From UPsp	1.0E+00	1.0E+00	1.30E-01	3.1E-02
Nickel	3.1E+01	4.5E-02 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	5.9E-03
Selenium	7.8E-01	4.9E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	6.4E-02
Silver	8.3E-02	3.5E-02	From UPsp	1.0E+00	1.0E+00	1.30E-01	4.5E-03
Strontium	3.1E+01	4.0E-01	From UPsp	1.0E+00	1.0E+00	1.30E-01	5.2E-02
Thallium	2.4E-01	2.5E-03	From UPsp	1.0E+00	1.0E+00	1.30E-01	3.2E-04
Uranium	3.2E+00	5.8E-03 [a]	From UPsp	1.0E+00	1.0E+00	1.30E-01	7.6E-04
Vanadium	4.5E+01	4.9E-03	Bechtel Jacobs (1998), in US EPA EcoSSL (2005a)	1.0E+00	1.0E+00	1.30E-01	6.3E-04
Zinc	1.1E+02	6.1E-01 [a]	Bechtel Jacobs (1998)	1.0E+00	1.0E+00	1.30E-01	7.9E-02

Notes:

[a] Non-linear relationship dependent on sediment concentration.

[b] Conservative default.

See final page for references

Freshwater Sediment to Benthic Invertebrate Uptake Factor (Gordon Region - Baseline Case)

COPC	Sediment Conc. (mg/kg)	Benthic Invertebrate Dry Weight to Wet Weight Conversion Factor	$UP_{SBI(fw)}$ Uptake Factor: Freshwater Sediment to Benthic Invertebrate (mg/kg-wet tissue/ mg/kg-dry sed)	Reference for Uptake Factor
Antimony	1.8E-01	2.4E-01	7.2E-03	Modified from Haus et al. 2007
Arsenic	5.0E+00	2.4E-01	3.4E-01 [a]	ORNL 1998 (all data)
Barium	1.4E+02	2.4E-01	1.4E-01	Modified from Hamilton et al. 2002 and Garn et al. 2001
Beryllium	8.5E-01	2.4E-01	1.3E-01	Modified from Hamilton et al. 2002 and Garn et al. 2001
Cadmium	3.9E-01	2.4E-01	1.5E+00 [a]	ORNL 1998 (all data)
Chromium (Total)	4.4E+01	2.4E-01	1.5E-01 [a]	ORNL 1998 (all data)
Cobalt	1.0E+01	2.4E-01	2.4E-03	Garn et al. 2001
Copper	2.0E+01	2.4E-01	1.6E+00 [a]	ORNL 1998 (Non-depurated data)
Lead	8.7E+00	2.4E-01	1.1E-01 [a]	ORNL 1998 (all data)
Manganese	7.4E+02	2.4E-01	1.5E-01	Modified from Hamilton et al. 2002 and Garn et al. 2001
Mercury	8.3E-02	2.4E-01	1.2E-01	Modified from multiple sources
Molybdenum	7.9E+00	2.4E-01	5.2E-01	Modified from Hamilton et al. 2002 and Garn et al. 2001
Nickel	3.1E+01	2.4E-01	1.3E-01 [a]	ORNL 1998 (Depurated data)
Selenium	7.8E-01	2.4E-01	6.3E-01	Welsh and Maughan 1993
Silver	8.3E-02	2.4E-01	0.08	Average of freshwater snails UF from Ramskov et al. 2015
Strontium	3.1E+01	2.4E-01	0.06	Modified from Hamilton et al. 2002 and Garn et al. 2001
Thallium	2.4E-01	2.4E-01	0.20	Average from Dumas & Hare (2008) and Borgman et al. (1998)
Uranium	3.2E+00	2.4E-01	0.02	Garn et al. (2001)
Vanadium	4.5E+01	2.4E-01	1.8E-02	Modified from multiple sources
Zinc	1.1E+02	2.4E-01	1.6E+00 [a]	ORNL 1998 (all data)

Notes:

[a] Non-linear relationship dependent on sediment concentration

See final page for references

Surface Water to Freshwater Fish Uptake Factor (Gordon Region - Baseline Case)

COPC	Surface Water Conc. (mg/L)	$UP_{WF(fw)}$ Uptake Factor: Surface Water to Freshwater Fish (mg/kg-wet tissue/ mg/L-water)	Reference for Uptake Factor
Antimony	1.1E-04	2.0E+02	Canadian Standards Association 1987
Arsenic	2.9E-04	5.0E+01	Based on Trophic Level 3 fish (upper end of range of 19 to 96) from: US EPA. 2003. Technical summary of information available on the bioaccumulation of arsenic in aquatic organisms. Report No. EPA-822-R-03-032 and Lijzen et al. 2001.
Barium	2.1E-02	1.0E+01	Canadian Standards Association 1987
Beryllium	4.7E-05	1.0E+02	IAEA 1994
Cadmium	2.5E-06	8.9E+03 [a]	McGeer et al. 2003 (Salmonids)
Chromium (Total)	8.6E-05	2.0E+02	Canadian Standards Association 1987 and Lijzen et al. 2001
Cobalt	4.8E-05	1.0E+02	Canadian Standards Association 1987
Copper	2.2E-04	2.7E+03 [a]	McGeer et al. 2003 (Salmonids)
Lead	3.6E-05	4.7E+02 [a]	McGeer et al. 2003
Manganese	5.8E-02	3.4E+01	Based on upper end of range of 18 to 34.3 from Nussey et al. 1999
Mercury	7.3E-07	7.2E+02 [a]	McGeer et al. 2003
Molybdenum	3.2E-04	1.0E+01	Canadian Standards Association 1987
Nickel	1.8E-04	4.9E+02 [a]	McGeer et al. 2003
Selenium	2.9E-05	1.7E+02	Davis et al. 1993
Silver	3.6E-06	8.3E+03 [a]	McGeer et al. 2003
Strontium	9.5E-02	1.0E+02	Davis et al. 1993
Thallium	2.0E-05	NA	No data available
Uranium	5.2E-05	5.0E+01	Davis et al. 1993
Vanadium	1.1E-04	1.6E+02	Empirical measurements of Fish Tissue
Zinc	7.9E-04	3.8E+04 [a]	McGeer et al. 2003 (Salmonids)

Notes:

[a] Non-linear relationship dependent on sediment concentration

See final page for references

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Appendix F HHRA OUTPUTS

APPENDIX F
HHRA OUTPUTS

APPENDIX F.1
DAILY INTAKE RATES
BASELINE CASE
GORDON REGION

Total Daily Intake Rates for an Indigenous Toddler Receptor in the Gordon Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	5.87E-07	5.05E-09	2.19E-06	6.32E-07	1.91E-05	8.70E-06	3.12E-05
Arsenic	5.28E-06	1.36E-07	5.41E-06	1.50E-06	1.34E-05	8.70E-06	3.44E-05
Barium	2.35E-04	2.02E-05	5.35E-05	7.65E-05	1.38E-02	3.64E-03	1.78E-02
Beryllium	1.45E-06	1.25E-08	4.75E-07	9.49E-07	1.34E-05	8.70E-06	2.50E-05
Cadmium	1.74E-06	1.50E-08	2.73E-06	3.58E-07	7.49E-05	1.49E-05	9.47E-05
Chromium	3.74E-05	3.22E-06	1.62E-05	3.60E-05	1.34E-04	8.70E-05	3.14E-04
Cobalt	1.51E-05	1.30E-07	4.88E-06	6.44E-05	4.86E-05	1.74E-05	1.51E-04
Copper	1.85E-04	9.53E-06	5.27E-04	4.66E-04	1.24E-03	1.74E-03	4.16E-03
Lead	3.96E-05	3.40E-07	5.51E-06	1.54E-06	5.36E-05	3.48E-05	1.35E-04
Manganese	3.86E-04	3.32E-06	2.31E-04	2.57E-03	1.37E-01	1.94E-03	1.42E-01
Mercury	5.33E-07	4.59E-07	3.79E-05	2.26E-06	1.34E-05	8.70E-06	6.32E-05
Molybdenum	3.97E-05	3.42E-07	7.16E-06	7.61E-05	9.20E-05	2.54E-04	4.69E-04
Nickel	2.53E-05	1.98E-06	6.97E-06	7.69E-05	2.80E-04	3.85E-04	7.76E-04
Selenium	1.21E-06	1.04E-08	4.44E-05	8.50E-06	1.34E-04	8.70E-05	2.75E-04
Silver	7.66E-07	6.59E-09	6.24E-06	2.05E-06	2.68E-05	1.74E-05	5.33E-05
Strontium	1.00E-04	8.60E-07	2.19E-04	4.22E-05	2.70E-03	1.84E-03	4.90E-03
Thallium	8.82E-07	7.59E-09	8.84E-07	2.16E-05	1.63E-05	5.22E-06	4.49E-05
Uranium	2.19E-06	1.88E-07	3.04E-07	3.42E-08	2.68E-06	2.91E-06	8.30E-06
Vanadium	5.90E-05	5.07E-07	1.28E-05	1.29E-05	1.34E-04	8.70E-05	3.06E-04
Zinc	2.26E-04	1.95E-05	1.39E-02	4.22E-05	6.18E-03	4.78E-03	2.51E-02

Total Daily Intake Rates for an Indigenous Adult Receptor in the Gordon Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	3.42E-08	2.93E-09	1.18E-06	4.68E-07	8.42E-06	3.84E-06	1.39E-05
Arsenic	3.08E-07	7.90E-08	2.92E-06	1.11E-06	5.91E-06	3.84E-06	1.42E-05
Barium	1.37E-05	1.17E-05	2.89E-05	5.67E-05	6.07E-03	1.61E-03	7.79E-03
Beryllium	8.46E-08	7.24E-09	2.57E-07	7.04E-07	5.91E-06	3.84E-06	1.08E-05
Cadmium	1.02E-07	8.69E-09	1.48E-06	2.66E-07	3.30E-05	6.59E-06	4.15E-05
Chromium	2.18E-06	1.87E-06	8.73E-06	2.67E-05	5.91E-05	3.84E-05	1.37E-04
Cobalt	8.81E-07	7.54E-08	2.64E-06	4.77E-05	2.14E-05	7.68E-06	8.04E-05
Copper	1.08E-05	5.54E-06	2.85E-04	3.46E-04	5.47E-04	7.66E-04	1.96E-03
Lead	2.31E-06	1.98E-07	2.98E-06	1.14E-06	2.36E-05	1.54E-05	4.56E-05
Manganese	2.25E-05	1.93E-06	1.25E-04	1.90E-03	6.04E-02	8.56E-04	6.33E-02
Mercury	3.11E-08	2.66E-07	2.05E-05	1.68E-06	5.91E-06	3.84E-06	3.22E-05
Molybdenum	2.32E-06	1.98E-07	3.87E-06	5.64E-05	4.06E-05	1.12E-04	2.15E-04
Nickel	1.47E-06	1.15E-06	3.77E-06	5.70E-05	1.23E-04	1.70E-04	3.57E-04
Selenium	7.07E-08	6.05E-09	2.40E-05	6.30E-06	5.91E-05	3.84E-05	1.28E-04
Silver	4.47E-08	3.83E-09	3.37E-06	1.52E-06	1.18E-05	7.68E-06	2.44E-05
Strontium	5.84E-06	5.00E-07	1.19E-04	3.13E-05	1.19E-03	8.11E-04	2.16E-03
Thallium	5.15E-08	4.41E-09	4.78E-07	1.60E-05	7.20E-06	2.30E-06	2.60E-05
Uranium	1.28E-07	1.09E-07	1.64E-07	2.53E-08	1.18E-06	1.28E-06	2.89E-06
Vanadium	3.44E-06	2.94E-07	6.90E-06	9.54E-06	5.91E-05	3.84E-05	1.18E-04
Zinc	1.32E-05	1.13E-05	7.49E-03	3.13E-05	2.72E-03	2.11E-03	1.24E-02

Total Daily Intake Rates for a Resident Toddler Receptor in the Gordon Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	5.87E-07	5.05E-09	5.62E-07	1.90E-07	4.94E-06	8.70E-06	1.50E-05
Arsenic	5.28E-06	1.36E-07	1.39E-06	4.30E-07	3.36E-06	8.70E-06	1.93E-05
Barium	2.35E-04	2.02E-05	1.38E-05	2.30E-05	3.71E-03	3.64E-03	7.65E-03
Beryllium	1.45E-06	1.25E-08	1.22E-07	2.84E-07	3.36E-06	8.70E-06	1.39E-05
Cadmium	1.74E-06	1.50E-08	7.03E-07	1.07E-07	1.96E-05	1.49E-05	3.71E-05
Chromium	3.74E-05	3.22E-06	4.16E-06	1.06E-05	3.36E-05	8.70E-05	1.76E-04
Cobalt	1.51E-05	1.30E-07	1.25E-06	1.93E-05	1.21E-05	1.74E-05	6.53E-05
Copper	1.85E-04	9.53E-06	1.36E-04	1.38E-04	3.16E-04	1.74E-03	2.52E-03
Lead	3.96E-05	3.40E-07	1.42E-06	4.62E-07	1.34E-05	3.48E-05	9.00E-05
Manganese	3.86E-04	3.32E-06	5.94E-05	7.71E-04	3.63E-02	1.94E-03	3.95E-02
Mercury	5.33E-07	4.59E-07	9.74E-06	6.78E-07	3.36E-06	8.70E-06	2.35E-05
Molybdenum	3.97E-05	3.42E-07	1.84E-06	2.27E-05	2.30E-05	2.54E-04	3.41E-04
Nickel	2.53E-05	1.98E-06	1.79E-06	2.30E-05	7.13E-05	3.85E-04	5.08E-04
Selenium	1.21E-06	1.04E-08	1.14E-05	2.55E-06	3.36E-05	8.70E-05	1.36E-04
Silver	7.66E-07	6.59E-09	1.61E-06	6.16E-07	6.72E-06	1.74E-05	2.71E-05
Strontium	1.00E-04	8.60E-07	5.64E-05	1.27E-05	7.11E-04	1.84E-03	2.72E-03
Thallium	8.82E-07	7.59E-09	2.27E-07	6.47E-06	4.32E-06	5.22E-06	1.71E-05
Uranium	2.19E-06	1.88E-07	7.82E-08	1.01E-08	6.72E-07	2.91E-06	6.04E-06
Vanadium	5.90E-05	5.07E-07	3.28E-06	3.85E-06	3.36E-05	8.70E-05	1.87E-04
Zinc	2.26E-04	1.95E-05	3.56E-03	1.26E-05	1.59E-03	4.78E-03	1.02E-02

Total Daily Intake Rates for a Resident Adult Receptor in the Gordon Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	3.42E-08	2.93E-09	3.04E-07	1.41E-07	2.18E-06	3.84E-06	6.50E-06
Arsenic	3.08E-07	7.90E-08	7.52E-07	2.97E-07	1.48E-06	3.84E-06	6.76E-06
Barium	1.37E-05	1.17E-05	7.43E-06	1.70E-05	1.64E-03	1.61E-03	3.29E-03
Beryllium	8.46E-08	7.24E-09	6.61E-08	2.09E-07	1.48E-06	3.84E-06	5.69E-06
Cadmium	1.02E-07	8.69E-09	3.80E-07	7.90E-08	8.66E-06	6.59E-06	1.58E-05
Chromium	2.18E-06	1.87E-06	2.25E-06	7.61E-06	1.48E-05	3.84E-05	6.71E-05
Cobalt	8.81E-07	7.54E-08	6.78E-07	1.43E-05	5.33E-06	7.68E-06	2.89E-05
Copper	1.08E-05	5.54E-06	7.33E-05	1.01E-04	1.39E-04	7.66E-04	1.09E-03
Lead	2.31E-06	1.98E-07	7.66E-07	3.40E-07	5.93E-06	1.54E-05	2.49E-05
Manganese	2.25E-05	1.93E-06	3.21E-05	5.71E-04	1.60E-02	8.56E-04	1.75E-02
Mercury	3.11E-08	2.66E-07	5.26E-06	5.01E-07	1.48E-06	3.84E-06	1.14E-05
Molybdenum	2.32E-06	1.98E-07	9.95E-07	1.67E-05	1.01E-05	1.12E-04	1.42E-04
Nickel	1.47E-06	1.15E-06	9.69E-07	1.68E-05	3.14E-05	1.70E-04	2.22E-04
Selenium	7.07E-08	6.05E-09	6.17E-06	1.88E-06	1.48E-05	3.84E-05	6.13E-05
Silver	4.47E-08	3.83E-09	8.68E-07	4.57E-07	2.96E-06	7.68E-06	1.20E-05
Strontium	5.84E-06	5.00E-07	3.05E-05	9.38E-06	3.13E-04	8.11E-04	1.17E-03
Thallium	5.15E-08	4.41E-09	1.23E-07	4.79E-06	1.90E-06	2.30E-06	9.17E-06
Uranium	1.28E-07	1.09E-07	4.23E-08	7.38E-09	2.96E-07	1.28E-06	1.87E-06
Vanadium	3.44E-06	2.94E-07	1.77E-06	2.83E-06	1.48E-05	3.84E-05	6.15E-05
Zinc	1.32E-05	1.13E-05	1.93E-03	9.25E-06	7.01E-04	2.11E-03	4.77E-03

APPENDIX F.2
LIFETIME AVERAGED DAILY DOSE (LADD)
BASELINE CASE
GORDON REGION

Lifetime Averaged Daily Dose for an Indigenous Receptor in the Gordon Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.10E-08	3.17E-09	1.31E-06	4.63E-07	9.93E-06	4.33E-06	1.61E-05
Arsenic	6.38E-07	8.55E-08	3.24E-06	1.10E-06	6.97E-06	4.33E-06	1.64E-05
Barium	2.85E-05	1.27E-05	3.20E-05	5.61E-05	7.16E-03	1.81E-03	9.10E-03
Beryllium	1.75E-07	7.83E-09	2.84E-07	6.96E-07	6.97E-06	4.33E-06	1.25E-05
Cadmium	2.11E-07	9.40E-09	1.63E-06	2.63E-07	3.89E-05	7.44E-06	4.85E-05
Chromium	4.53E-06	2.02E-06	9.67E-06	2.64E-05	6.97E-05	4.33E-05	1.56E-04
Cobalt	1.83E-06	8.15E-08	2.92E-06	4.72E-05	2.53E-05	8.67E-06	8.60E-05
Copper	2.24E-05	5.99E-06	3.15E-04	3.42E-04	6.45E-04	8.64E-04	2.20E-03
Lead	4.79E-06	2.14E-07	3.30E-06	1.13E-06	2.79E-05	1.73E-05	5.46E-05
Manganese	4.67E-05	2.09E-06	1.38E-04	1.88E-03	7.13E-02	9.66E-04	7.43E-02
Mercury	6.46E-08	2.88E-07	2.26E-05	1.66E-06	6.97E-06	4.33E-06	3.60E-05
Molybdenum	4.81E-06	2.15E-07	4.28E-06	5.58E-05	4.79E-05	1.26E-04	2.39E-04
Nickel	3.06E-06	1.24E-06	4.17E-06	5.64E-05	1.46E-04	1.92E-04	4.02E-04
Selenium	1.47E-07	6.55E-09	2.66E-05	6.24E-06	6.97E-05	4.33E-05	1.46E-04
Silver	9.27E-08	4.14E-09	3.73E-06	1.50E-06	1.39E-05	8.67E-06	2.79E-05
Strontium	1.21E-05	5.40E-07	1.31E-04	3.09E-05	1.40E-03	9.16E-04	2.49E-03
Thallium	1.07E-07	4.77E-09	5.29E-07	1.58E-05	8.49E-06	2.60E-06	2.76E-05
Uranium	2.65E-07	1.18E-07	1.82E-07	2.51E-08	1.39E-06	1.45E-06	3.43E-06
Vanadium	7.14E-06	3.18E-07	7.64E-06	9.45E-06	6.97E-05	4.33E-05	1.38E-04
Zinc	2.74E-05	1.22E-05	8.29E-03	3.10E-05	3.21E-03	2.38E-03	1.40E-02

Lifetime Averaged Daily Dose for a Resident Receptor in the Gordon Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.10E-08	3.17E-09	3.36E-07	1.39E-07	2.96E-06	4.33E-06	7.84E-06
Arsenic	6.38E-07	8.55E-08	8.33E-07	3.00E-07	1.91E-06	4.33E-06	8.10E-06
Barium	2.85E-05	1.27E-05	8.23E-06	1.68E-05	2.37E-03	1.81E-03	4.25E-03
Beryllium	1.75E-07	7.83E-09	7.31E-08	2.07E-07	1.91E-06	4.33E-06	6.71E-06
Cadmium	2.11E-07	9.40E-09	4.20E-07	7.83E-08	1.20E-05	7.44E-06	2.02E-05
Chromium	4.53E-06	2.02E-06	2.49E-06	7.59E-06	1.91E-05	4.33E-05	7.90E-05
Cobalt	1.83E-06	8.15E-08	7.51E-07	1.42E-05	6.75E-06	8.67E-06	3.22E-05
Copper	2.24E-05	5.99E-06	8.11E-05	1.00E-04	1.84E-04	8.64E-04	1.26E-03
Lead	4.79E-06	2.14E-07	8.48E-07	3.37E-07	7.63E-06	1.73E-05	3.12E-05
Manganese	4.67E-05	2.09E-06	3.56E-05	5.66E-04	2.26E-02	9.66E-04	2.42E-02
Mercury	6.46E-08	2.88E-07	5.83E-06	4.97E-07	1.91E-06	4.33E-06	1.29E-05
Molybdenum	4.81E-06	2.15E-07	1.10E-06	1.65E-05	1.30E-05	1.26E-04	1.62E-04
Nickel	3.06E-06	1.24E-06	1.07E-06	1.67E-05	4.16E-05	1.92E-04	2.55E-04
Selenium	1.47E-07	6.55E-09	6.83E-06	1.86E-06	1.91E-05	4.33E-05	7.13E-05
Silver	9.27E-08	4.14E-09	9.60E-07	4.52E-07	3.81E-06	8.67E-06	1.40E-05
Strontium	1.21E-05	5.40E-07	3.38E-05	9.29E-06	4.37E-04	9.16E-04	1.41E-03
Thallium	1.07E-07	4.77E-09	1.36E-07	4.74E-06	2.68E-06	2.60E-06	1.03E-05
Uranium	2.65E-07	1.18E-07	4.68E-08	7.34E-09	3.81E-07	1.45E-06	2.27E-06
Vanadium	7.14E-06	3.18E-07	1.96E-06	2.80E-06	1.91E-05	4.33E-05	7.46E-05
Zinc	2.74E-05	1.22E-05	2.13E-03	9.18E-06	9.43E-04	2.38E-03	5.50E-03

APPENDIX F.3 DAILY INTAKE RATES FUTURE CASE GORDON REGION

Total Daily Intake Rates for Indigenous Toddler Receptor in the Gordon Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	5.87E-07	5.05E-09	4.52E-06	6.46E-07	1.91E-05	8.70E-06	3.36E-05
Arsenic	5.58E-06	1.44E-07	1.33E-05	1.59E-06	1.42E-05	9.20E-06	4.40E-05
Barium	2.35E-04	2.02E-05	8.76E-05	7.68E-05	1.38E-02	3.64E-03	1.78E-02
Beryllium	1.45E-06	1.25E-08	5.06E-07	9.57E-07	1.34E-05	8.71E-06	2.50E-05
Cadmium	1.74E-06	1.50E-08	2.85E-06	3.59E-07	7.49E-05	1.50E-05	9.48E-05
Chromium	3.76E-05	3.23E-06	1.66E-05	3.61E-05	1.35E-04	8.75E-05	3.16E-04
Cobalt	1.51E-05	1.30E-07	5.03E-06	6.46E-05	4.88E-05	1.75E-05	1.51E-04
Copper	1.85E-04	9.54E-06	5.32E-04	4.67E-04	1.24E-03	1.74E-03	4.17E-03
Lead	3.96E-05	3.41E-07	5.51E-06	1.55E-06	5.37E-05	3.49E-05	1.36E-04
Manganese	3.86E-04	3.32E-06	3.13E-04	2.57E-03	1.37E-01	1.94E-03	1.42E-01
Mercury	5.33E-07	4.59E-07	3.78E-05	2.26E-06	1.34E-05	8.70E-06	6.31E-05
Molybdenum	3.97E-05	3.42E-07	9.94E-06	7.64E-05	9.20E-05	2.54E-04	4.72E-04
Nickel	2.54E-05	1.99E-06	7.48E-06	7.73E-05	2.82E-04	3.87E-04	7.81E-04
Selenium	1.21E-06	1.04E-08	7.24E-05	8.52E-06	1.34E-04	8.72E-05	3.03E-04
Silver	7.68E-07	6.60E-09	6.38E-06	2.05E-06	2.68E-05	1.74E-05	5.35E-05
Strontium	1.00E-04	8.60E-07	4.36E-04	4.85E-05	2.70E-03	1.84E-03	5.12E-03
Thallium	8.84E-07	7.60E-09	9.40E-07	2.16E-05	1.63E-05	5.23E-06	4.50E-05
Uranium	2.19E-06	1.88E-07	1.62E-06	3.78E-08	2.68E-06	2.91E-06	9.62E-06
Vanadium	5.92E-05	5.09E-07	1.38E-05	1.29E-05	1.34E-04	8.73E-05	3.08E-04
Zinc	2.27E-04	1.95E-05	1.39E-02	4.23E-05	6.19E-03	4.78E-03	2.51E-02

Total Daily Intake Rates for an Indigenous Adult Receptor in the Gordon Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	3.42E-08	2.93E-09	2.44E-06	4.79E-07	8.42E-06	3.84E-06	1.52E-05
Arsenic	3.25E-07	8.35E-08	7.21E-06	1.18E-06	6.24E-06	4.06E-06	1.91E-05
Barium	1.37E-05	1.17E-05	4.73E-05	5.69E-05	6.07E-03	1.61E-03	7.81E-03
Beryllium	8.47E-08	7.25E-09	2.73E-07	7.09E-07	5.91E-06	3.84E-06	1.08E-05
Cadmium	1.02E-07	8.71E-09	1.54E-06	2.66E-07	3.30E-05	6.60E-06	4.15E-05
Chromium	2.19E-06	1.88E-06	8.95E-06	2.68E-05	5.94E-05	3.86E-05	1.38E-04
Cobalt	8.83E-07	7.56E-08	2.72E-06	4.79E-05	2.15E-05	7.70E-06	8.07E-05
Copper	1.08E-05	5.54E-06	2.87E-04	3.46E-04	5.47E-04	7.66E-04	1.96E-03
Lead	2.31E-06	1.98E-07	2.98E-06	1.15E-06	2.37E-05	1.54E-05	4.57E-05
Manganese	2.25E-05	1.93E-06	1.69E-04	1.90E-03	6.04E-02	8.56E-04	6.34E-02
Mercury	3.11E-08	2.66E-07	2.04E-05	1.68E-06	5.91E-06	3.84E-06	3.21E-05
Molybdenum	2.32E-06	1.98E-07	5.37E-06	5.66E-05	4.06E-05	1.12E-04	2.17E-04
Nickel	1.48E-06	1.16E-06	4.04E-06	5.73E-05	1.24E-04	1.71E-04	3.59E-04
Selenium	7.08E-08	6.06E-09	3.91E-05	6.31E-06	5.91E-05	3.84E-05	1.43E-04
Silver	4.48E-08	3.83E-09	3.45E-06	1.52E-06	1.18E-05	7.69E-06	2.45E-05
Strontium	5.84E-06	5.00E-07	2.36E-04	3.60E-05	1.19E-03	8.11E-04	2.28E-03
Thallium	5.16E-08	4.41E-09	5.08E-07	1.60E-05	7.21E-06	2.31E-06	2.61E-05
Uranium	1.28E-07	1.09E-07	8.74E-07	2.80E-08	1.18E-06	1.28E-06	3.60E-06
Vanadium	3.45E-06	2.95E-07	7.44E-06	9.57E-06	5.93E-05	3.85E-05	1.19E-04
Zinc	1.32E-05	1.13E-05	7.51E-03	3.13E-05	2.73E-03	2.11E-03	1.24E-02

Total Daily Intake Rates for Resident Toddler Receptor in the Gordon Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	5.87E-07	5.05E-09	1.16E-06	1.94E-07	4.94E-06	8.70E-06	1.56E-05
Arsenic	5.58E-06	1.44E-07	3.43E-06	4.57E-07	3.55E-06	9.20E-06	2.24E-05
Barium	2.35E-04	2.02E-05	2.25E-05	2.31E-05	3.71E-03	3.64E-03	7.66E-03
Beryllium	1.45E-06	1.25E-08	1.30E-07	2.86E-07	3.36E-06	8.71E-06	1.39E-05
Cadmium	1.74E-06	1.50E-08	7.34E-07	1.07E-07	1.96E-05	1.50E-05	3.72E-05
Chromium	3.76E-05	3.23E-06	4.26E-06	1.06E-05	3.38E-05	8.75E-05	1.77E-04
Cobalt	1.51E-05	1.30E-07	1.29E-06	1.94E-05	1.21E-05	1.75E-05	6.55E-05
Copper	1.85E-04	9.54E-06	1.37E-04	1.39E-04	3.16E-04	1.74E-03	2.52E-03
Lead	3.96E-05	3.41E-07	1.42E-06	4.62E-07	1.35E-05	3.49E-05	9.02E-05
Manganese	3.86E-04	3.32E-06	8.06E-05	7.72E-04	3.63E-02	1.94E-03	3.95E-02
Mercury	5.33E-07	4.59E-07	9.72E-06	6.78E-07	3.36E-06	8.70E-06	2.35E-05
Molybdenum	3.97E-05	3.42E-07	2.56E-06	2.28E-05	2.30E-05	2.54E-04	3.42E-04
Nickel	2.54E-05	1.99E-06	1.92E-06	2.31E-05	7.17E-05	3.87E-04	5.11E-04
Selenium	1.21E-06	1.04E-08	1.86E-05	2.55E-06	3.36E-05	8.72E-05	1.43E-04
Silver	7.68E-07	6.60E-09	1.64E-06	6.18E-07	6.73E-06	1.74E-05	2.72E-05
Strontium	1.00E-04	8.60E-07	1.12E-04	1.46E-05	7.11E-04	1.84E-03	2.78E-03
Thallium	8.84E-07	7.60E-09	2.42E-07	6.49E-06	4.32E-06	5.23E-06	1.72E-05
Uranium	2.19E-06	1.88E-07	4.16E-07	1.12E-08	6.73E-07	2.91E-06	6.39E-06
Vanadium	5.92E-05	5.09E-07	3.54E-06	3.86E-06	3.37E-05	8.73E-05	1.88E-04
Zinc	2.27E-04	1.95E-05	3.57E-03	1.26E-05	1.59E-03	4.78E-03	1.02E-02

Total Daily Intake Rates for a Resident Adult Receptor in the Gordon Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	3.42E-08	2.93E-09	6.29E-07	1.44E-07	2.18E-06	3.84E-06	6.83E-06
Arsenic	3.25E-07	8.35E-08	1.85E-06	3.16E-07	1.57E-06	4.06E-06	8.20E-06
Barium	1.37E-05	1.17E-05	1.22E-05	1.71E-05	1.64E-03	1.61E-03	3.30E-03
Beryllium	8.47E-08	7.25E-09	7.03E-08	2.11E-07	1.48E-06	3.84E-06	5.70E-06
Cadmium	1.02E-07	8.71E-09	3.96E-07	7.90E-08	8.66E-06	6.60E-06	1.58E-05
Chromium	2.19E-06	1.88E-06	2.30E-06	7.64E-06	1.49E-05	3.86E-05	6.75E-05
Cobalt	8.83E-07	7.56E-08	7.00E-07	1.43E-05	5.35E-06	7.70E-06	2.90E-05
Copper	1.08E-05	5.54E-06	7.39E-05	1.01E-04	1.39E-04	7.66E-04	1.10E-03
Lead	2.31E-06	1.98E-07	7.66E-07	3.40E-07	5.94E-06	1.54E-05	2.49E-05
Manganese	2.25E-05	1.93E-06	4.35E-05	5.72E-04	1.60E-02	8.56E-04	1.75E-02
Mercury	3.11E-08	2.66E-07	5.25E-06	5.01E-07	1.48E-06	3.84E-06	1.14E-05
Molybdenum	2.32E-06	1.98E-07	1.38E-06	1.67E-05	1.01E-05	1.12E-04	1.43E-04
Nickel	1.48E-06	1.16E-06	1.04E-06	1.69E-05	3.16E-05	1.71E-04	2.23E-04
Selenium	7.08E-08	6.06E-09	1.01E-05	1.89E-06	1.48E-05	3.84E-05	6.53E-05
Silver	4.48E-08	3.83E-09	8.86E-07	4.57E-07	2.97E-06	7.69E-06	1.21E-05
Strontium	5.84E-06	5.00E-07	6.06E-05	1.08E-05	3.13E-04	8.11E-04	1.20E-03
Thallium	5.16E-08	4.41E-09	1.31E-07	4.80E-06	1.91E-06	2.31E-06	9.19E-06
Uranium	1.28E-07	1.09E-07	2.25E-07	8.12E-09	2.97E-07	1.28E-06	2.05E-06
Vanadium	3.45E-06	2.95E-07	1.91E-06	2.83E-06	1.49E-05	3.85E-05	6.19E-05
Zinc	1.32E-05	1.13E-05	1.93E-03	9.26E-06	7.02E-04	2.11E-03	4.78E-03

APPENDIX F.4
LIFETIME AVERAGED DAILY DOSE (LADD)
FUTURE CASE
GORDON REGION

Lifetime Averaged Daily Dose for an Indigenous Receptor in the Gordon Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.10E-08	3.17E-09	2.71E-06	4.74E-07	9.93E-06	4.33E-06	1.75E-05
Arsenic	6.75E-07	9.03E-08	7.98E-06	1.17E-06	7.36E-06	4.58E-06	2.19E-05
Barium	2.85E-05	1.27E-05	5.24E-05	5.63E-05	7.16E-03	1.81E-03	9.12E-03
Beryllium	1.76E-07	7.84E-09	3.03E-07	7.02E-07	6.97E-06	4.34E-06	1.25E-05
Cadmium	2.11E-07	9.41E-09	1.71E-06	2.63E-07	3.90E-05	7.45E-06	4.86E-05
Chromium	4.55E-06	2.03E-06	9.91E-06	2.65E-05	7.00E-05	4.36E-05	1.57E-04
Cobalt	1.83E-06	8.18E-08	3.01E-06	4.74E-05	2.54E-05	8.69E-06	8.63E-05
Copper	2.24E-05	5.99E-06	3.18E-04	3.42E-04	6.45E-04	8.65E-04	2.20E-03
Lead	4.80E-06	2.14E-07	3.30E-06	1.13E-06	2.79E-05	1.74E-05	5.47E-05
Manganese	4.67E-05	2.09E-06	1.87E-04	1.88E-03	7.13E-02	9.66E-04	7.43E-02
Mercury	6.46E-08	2.88E-07	2.26E-05	1.66E-06	6.97E-06	4.33E-06	3.59E-05
Molybdenum	4.81E-06	2.15E-07	5.95E-06	5.60E-05	4.79E-05	1.26E-04	2.41E-04
Nickel	3.08E-06	1.25E-06	4.47E-06	5.67E-05	1.46E-04	1.93E-04	4.05E-04
Selenium	1.47E-07	6.56E-09	4.33E-05	6.25E-06	6.98E-05	4.34E-05	1.63E-04
Silver	9.29E-08	4.15E-09	3.81E-06	1.51E-06	1.40E-05	8.69E-06	2.81E-05
Strontium	1.21E-05	5.40E-07	2.61E-04	3.56E-05	1.40E-03	9.16E-04	2.63E-03
Thallium	1.07E-07	4.77E-09	5.62E-07	1.59E-05	8.50E-06	2.60E-06	2.76E-05
Uranium	2.65E-07	1.18E-07	9.67E-07	2.77E-08	1.39E-06	1.45E-06	4.22E-06
Vanadium	7.16E-06	3.20E-07	8.24E-06	9.47E-06	6.99E-05	4.35E-05	1.39E-04
Zinc	2.75E-05	1.23E-05	8.31E-03	3.10E-05	3.22E-03	2.38E-03	1.40E-02

Lifetime Averaged Daily Dose for a Resident Receptor in the Gordon Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.10E-08	3.17E-09	6.96E-07	1.42E-07	2.96E-06	4.33E-06	8.21E-06
Arsenic	6.75E-07	9.03E-08	2.05E-06	3.19E-07	2.02E-06	4.58E-06	9.73E-06
Barium	2.85E-05	1.27E-05	1.35E-05	1.69E-05	2.37E-03	1.81E-03	4.26E-03
Beryllium	1.76E-07	7.84E-09	7.78E-08	2.09E-07	1.91E-06	4.34E-06	6.71E-06
Cadmium	2.11E-07	9.41E-09	4.39E-07	7.83E-08	1.20E-05	7.45E-06	2.02E-05
Chromium	4.55E-06	2.03E-06	2.55E-06	7.62E-06	1.92E-05	4.36E-05	7.95E-05
Cobalt	1.83E-06	8.18E-08	7.75E-07	1.42E-05	6.77E-06	8.69E-06	3.24E-05
Copper	2.24E-05	5.99E-06	8.18E-05	1.00E-04	1.84E-04	8.65E-04	1.26E-03
Lead	4.80E-06	2.14E-07	8.48E-07	3.37E-07	7.64E-06	1.74E-05	3.12E-05
Manganese	4.67E-05	2.09E-06	4.82E-05	5.66E-04	2.26E-02	9.66E-04	2.43E-02
Mercury	6.46E-08	2.88E-07	5.81E-06	4.97E-07	1.91E-06	4.33E-06	1.29E-05
Molybdenum	4.81E-06	2.15E-07	1.53E-06	1.66E-05	1.30E-05	1.26E-04	1.62E-04
Nickel	3.08E-06	1.25E-06	1.15E-06	1.68E-05	4.18E-05	1.93E-04	2.57E-04
Selenium	1.47E-07	6.56E-09	1.11E-05	1.87E-06	1.91E-05	4.34E-05	7.57E-05
Silver	9.29E-08	4.15E-09	9.81E-07	4.53E-07	3.82E-06	8.69E-06	1.40E-05
Strontium	1.21E-05	5.40E-07	6.71E-05	1.07E-05	4.37E-04	9.16E-04	1.44E-03
Thallium	1.07E-07	4.77E-09	1.45E-07	4.75E-06	2.68E-06	2.60E-06	1.03E-05
Uranium	2.65E-07	1.18E-07	2.49E-07	8.07E-09	3.82E-07	1.45E-06	2.47E-06
Vanadium	7.16E-06	3.20E-07	2.12E-06	2.81E-06	1.91E-05	4.35E-05	7.50E-05
Zinc	2.75E-05	1.23E-05	2.14E-03	9.19E-06	9.45E-04	2.38E-03	5.51E-03

APPENDIX F.5 DAILY INTAKE RATES BASELINE CASE MACLELLAN REGION

Total Daily Intake Rates for an Indigenous Toddler Receptor in the MacLellan Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.27E-07	6.25E-09	2.09E-06	6.31E-07	1.54E-05	8.70E-06	2.76E-05
Arsenic	7.68E-06	1.98E-07	1.74E-06	1.20E-06	1.01E-05	8.70E-06	2.96E-05
Barium	1.80E-04	1.55E-05	5.11E-05	7.23E-05	1.25E-02	3.64E-03	1.65E-02
Beryllium	6.21E-07	5.34E-09	4.75E-07	7.96E-07	1.01E-05	8.70E-06	2.07E-05
Cadmium	1.70E-06	1.46E-08	6.80E-06	2.48E-07	4.79E-05	1.49E-05	7.16E-05
Chromium	2.37E-05	2.03E-06	7.60E-06	5.05E-05	1.01E-04	8.70E-05	2.72E-04
Cobalt	1.01E-05	8.68E-08	8.31E-06	7.24E-05	3.32E-05	1.74E-05	1.41E-04
Copper	3.81E-04	1.96E-05	6.97E-04	5.68E-04	1.25E-03	1.74E-03	4.66E-03
Lead	3.87E-05	3.33E-07	1.90E-06	8.63E-07	4.05E-05	3.48E-05	1.17E-04
Manganese	2.49E-04	2.14E-06	3.09E-04	2.46E-03	1.48E-01	1.94E-03	1.53E-01
Mercury	9.84E-07	8.46E-07	3.43E-05	1.77E-06	1.01E-05	8.70E-06	5.67E-05
Molybdenum	3.53E-06	3.04E-08	5.57E-06	7.02E-06	3.33E-05	2.54E-04	3.03E-04
Nickel	1.67E-04	1.31E-05	2.81E-05	4.59E-04	1.24E-03	3.85E-04	2.30E-03
Selenium	4.61E-06	3.96E-08	6.44E-05	7.57E-06	1.01E-04	8.70E-05	2.65E-04
Silver	1.02E-06	8.76E-09	2.89E-06	1.87E-06	2.02E-05	1.74E-05	4.34E-05
Strontium	7.23E-05	6.22E-07	3.35E-04	9.17E-05	2.55E-03	1.84E-03	4.89E-03
Thallium	6.30E-07	5.42E-09	1.03E-06	2.63E-05	1.84E-05	5.22E-06	5.16E-05
Uranium	1.94E-06	1.67E-07	1.49E-07	2.59E-08	2.02E-06	2.91E-06	7.21E-06
Vanadium	2.70E-05	2.32E-07	1.00E-05	9.87E-06	1.01E-04	8.70E-05	2.35E-04
Zinc	4.02E-04	3.46E-05	2.66E-03	5.42E-05	6.20E-03	4.78E-03	1.41E-02

Total Daily Intake Rates for an Indigenous Adult Receptor in the MacLellan Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	4.24E-08	3.63E-09	1.13E-06	4.68E-07	6.79E-06	3.84E-06	1.23E-05
Arsenic	4.48E-07	1.15E-07	9.42E-07	8.91E-07	4.46E-06	3.84E-06	1.07E-05
Barium	1.05E-05	9.01E-06	2.76E-05	5.36E-05	5.51E-03	1.61E-03	7.22E-03
Beryllium	3.62E-08	3.10E-09	2.57E-07	5.90E-07	4.46E-06	3.84E-06	9.18E-06
Cadmium	9.93E-08	8.50E-09	3.68E-06	1.84E-07	2.11E-05	6.59E-06	3.17E-05
Chromium	1.38E-06	1.18E-06	4.11E-06	3.74E-05	4.46E-05	3.84E-05	1.27E-04
Cobalt	5.89E-07	5.04E-08	4.49E-06	5.37E-05	1.46E-05	7.68E-06	8.11E-05
Copper	2.22E-05	1.14E-05	3.77E-04	4.21E-04	5.53E-04	7.66E-04	2.15E-03
Lead	2.26E-06	1.93E-07	1.03E-06	6.40E-07	1.78E-05	1.54E-05	3.73E-05
Manganese	1.45E-05	1.24E-06	1.67E-04	1.82E-03	6.53E-02	8.56E-04	6.82E-02
Mercury	5.74E-08	4.92E-07	1.85E-05	1.31E-06	4.46E-06	3.84E-06	2.87E-05
Molybdenum	2.06E-07	1.77E-08	3.01E-06	5.20E-06	1.47E-05	1.12E-04	1.35E-04
Nickel	9.75E-06	7.60E-06	1.52E-05	3.40E-04	5.49E-04	1.70E-04	1.09E-03
Selenium	2.69E-07	2.30E-08	3.48E-05	5.61E-06	4.46E-05	3.84E-05	1.24E-04
Silver	5.94E-08	5.09E-09	1.56E-06	1.39E-06	8.92E-06	7.68E-06	1.96E-05
Strontium	4.22E-06	3.61E-07	1.81E-04	6.80E-05	1.13E-03	8.11E-04	2.19E-03
Thallium	3.68E-08	3.15E-09	5.56E-07	1.95E-05	8.12E-06	2.30E-06	3.05E-05
Uranium	1.13E-07	9.69E-08	8.05E-08	1.92E-08	8.92E-07	1.28E-06	2.48E-06
Vanadium	1.58E-06	1.35E-07	5.43E-06	7.32E-06	4.46E-05	3.84E-05	9.74E-05
Zinc	2.35E-05	2.01E-05	1.44E-03	4.02E-05	2.74E-03	2.11E-03	6.36E-03

Total Daily Intake Rates for a Resident Toddler Receptor in the MacLellan Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.27E-07	6.25E-09	5.38E-07	1.90E-07	4.05E-06	8.70E-06	1.42E-05
Arsenic	7.68E-06	1.98E-07	4.48E-07	3.49E-07	2.59E-06	8.70E-06	2.00E-05
Barium	1.80E-04	1.55E-05	1.32E-05	2.17E-05	3.39E-03	3.64E-03	7.26E-03
Beryllium	6.21E-07	5.34E-09	1.22E-07	2.39E-07	2.59E-06	8.70E-06	1.23E-05
Cadmium	1.70E-06	1.46E-08	1.75E-06	7.39E-08	1.18E-05	1.49E-05	3.03E-05
Chromium	2.37E-05	2.03E-06	1.96E-06	1.48E-05	2.59E-05	8.70E-05	1.55E-04
Cobalt	1.01E-05	8.68E-08	2.14E-06	2.17E-05	8.52E-06	1.74E-05	5.99E-05
Copper	3.81E-04	1.96E-05	1.79E-04	1.67E-04	3.19E-04	1.74E-03	2.80E-03
Lead	3.87E-05	3.33E-07	4.89E-07	2.57E-07	1.03E-05	3.48E-05	8.49E-05
Manganese	2.49E-04	2.14E-06	7.96E-05	7.40E-04	3.95E-02	1.94E-03	4.25E-02
Mercury	9.84E-07	8.46E-07	8.82E-06	5.30E-07	2.59E-06	8.70E-06	2.25E-05
Molybdenum	3.53E-06	3.04E-08	1.43E-06	2.10E-06	8.31E-06	2.54E-04	2.69E-04
Nickel	1.67E-04	1.31E-05	7.24E-06	1.37E-04	3.24E-04	3.85E-04	1.03E-03
Selenium	4.61E-06	3.96E-08	1.66E-05	2.27E-06	2.59E-05	8.70E-05	1.36E-04
Silver	1.02E-06	8.76E-09	7.43E-07	5.63E-07	5.17E-06	1.74E-05	2.49E-05
Strontium	7.23E-05	6.22E-07	8.63E-05	2.76E-05	6.94E-04	1.84E-03	2.72E-03
Thallium	6.30E-07	5.42E-09	2.65E-07	7.89E-06	4.98E-06	5.22E-06	1.90E-05
Uranium	1.94E-06	1.67E-07	3.83E-08	7.73E-09	5.17E-07	2.91E-06	5.58E-06
Vanadium	2.70E-05	2.32E-07	2.58E-06	2.96E-06	2.59E-05	8.70E-05	1.46E-04
Zinc	4.02E-04	3.46E-05	6.85E-04	1.62E-05	1.59E-03	4.78E-03	7.51E-03

Total Daily Intake Rates for a Resident Adult Receptor in the MacLellan Region under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	4.24E-08	3.63E-09	2.91E-07	1.41E-07	1.79E-06	3.84E-06	6.10E-06
Arsenic	4.48E-07	1.15E-07	2.42E-07	2.45E-07	1.14E-06	3.84E-06	6.03E-06
Barium	1.05E-05	9.01E-06	7.11E-06	1.61E-05	1.49E-03	1.61E-03	3.14E-03
Beryllium	3.62E-08	3.10E-09	6.61E-08	1.76E-07	1.14E-06	3.84E-06	5.26E-06
Cadmium	9.93E-08	8.50E-09	9.46E-07	5.42E-08	5.19E-06	6.59E-06	1.29E-05
Chromium	1.38E-06	1.18E-06	1.06E-06	1.06E-05	1.14E-05	3.84E-05	6.40E-05
Cobalt	5.89E-07	5.04E-08	1.16E-06	1.59E-05	3.76E-06	7.68E-06	2.92E-05
Copper	2.22E-05	1.14E-05	9.69E-05	1.20E-04	1.41E-04	7.66E-04	1.16E-03
Lead	2.26E-06	1.93E-07	2.64E-07	1.89E-07	4.56E-06	1.54E-05	2.28E-05
Manganese	1.45E-05	1.24E-06	4.30E-05	5.48E-04	1.74E-02	8.56E-04	1.89E-02
Mercury	5.74E-08	4.92E-07	4.76E-06	3.92E-07	1.14E-06	3.84E-06	1.07E-05
Molybdenum	2.06E-07	1.77E-08	7.75E-07	1.54E-06	3.67E-06	1.12E-04	1.18E-04
Nickel	9.75E-06	7.60E-06	3.91E-06	1.00E-04	1.43E-04	1.70E-04	4.34E-04
Selenium	2.69E-07	2.30E-08	8.95E-06	1.68E-06	1.14E-05	3.84E-05	6.07E-05
Silver	5.94E-08	5.09E-09	4.02E-07	4.17E-07	2.28E-06	7.68E-06	1.08E-05
Strontium	4.22E-06	3.61E-07	4.66E-05	2.04E-05	3.06E-04	8.11E-04	1.19E-03
Thallium	3.68E-08	3.15E-09	1.43E-07	5.84E-06	2.19E-06	2.30E-06	1.05E-05
Uranium	1.13E-07	9.69E-08	2.07E-08	5.65E-09	2.28E-07	1.28E-06	1.75E-06
Vanadium	1.58E-06	1.35E-07	1.40E-06	2.18E-06	1.14E-05	3.84E-05	5.51E-05
Zinc	2.35E-05	2.01E-05	3.70E-04	1.19E-05	7.02E-04	2.11E-03	3.23E-03

APPENDIX F.6
LIFETIME AVERAGED DAILY DOSE (LADD)
BASELINE CASE
MACLELLAN REGION

Lifetime Averaged Daily Dose for an Indigenous Receptor in the MacLellan Location under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	8.80E-08	3.93E-09	1.25E-06	4.63E-07	8.01E-06	4.33E-06	1.41E-05
Arsenic	9.29E-07	1.24E-07	1.04E-06	8.82E-07	5.26E-06	4.33E-06	1.26E-05
Barium	2.18E-05	9.74E-06	3.06E-05	5.31E-05	6.50E-03	1.81E-03	8.43E-03
Beryllium	7.51E-08	3.35E-09	2.84E-07	5.84E-07	5.26E-06	4.33E-06	1.05E-05
Cadmium	2.06E-07	9.19E-09	4.07E-06	1.82E-07	2.49E-05	7.44E-06	3.68E-05
Chromium	2.86E-06	1.28E-06	4.55E-06	3.70E-05	5.26E-05	4.33E-05	1.42E-04
Cobalt	1.22E-06	5.45E-08	4.97E-06	5.31E-05	1.72E-05	8.67E-06	8.53E-05
Copper	4.61E-05	1.23E-05	4.17E-04	4.16E-04	6.53E-04	8.64E-04	2.41E-03
Lead	4.68E-06	2.09E-07	1.14E-06	6.33E-07	2.10E-05	1.73E-05	4.50E-05
Manganese	3.01E-05	1.34E-06	1.85E-04	1.81E-03	7.71E-02	9.66E-04	8.00E-02
Mercury	1.19E-07	5.32E-07	2.05E-05	1.30E-06	5.26E-06	4.33E-06	3.20E-05
Molybdenum	4.28E-07	1.91E-08	3.34E-06	5.15E-06	1.73E-05	1.26E-04	1.53E-04
Nickel	2.02E-05	8.21E-06	1.68E-05	3.37E-04	6.47E-04	1.92E-04	1.22E-03
Selenium	5.57E-07	2.49E-08	3.85E-05	5.55E-06	5.26E-05	4.33E-05	1.41E-04
Silver	1.23E-07	5.50E-09	1.73E-06	1.37E-06	1.05E-05	8.67E-06	2.24E-05
Strontium	8.76E-06	3.91E-07	2.01E-04	6.73E-05	1.33E-03	9.16E-04	2.52E-03
Thallium	7.63E-08	3.40E-09	6.16E-07	1.93E-05	9.57E-06	2.60E-06	3.21E-05
Uranium	2.35E-07	1.05E-07	8.91E-08	1.90E-08	1.05E-06	1.45E-06	2.95E-06
Vanadium	3.27E-06	1.46E-07	6.01E-06	7.24E-06	5.26E-05	4.33E-05	1.13E-04
Zinc	4.87E-05	2.17E-05	1.59E-03	3.98E-05	3.23E-03	2.38E-03	7.31E-03

Lifetime Averaged Daily Dose for a Resident Receptor in the MacLellan Reion under Baseline Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	8.80E-08	3.93E-09	3.22E-07	1.39E-07	2.49E-06	4.33E-06	7.38E-06
Arsenic	9.29E-07	1.24E-07	2.68E-07	2.46E-07	1.52E-06	4.33E-06	7.42E-06
Barium	2.18E-05	9.74E-06	7.87E-06	1.59E-05	2.17E-03	1.81E-03	4.04E-03
Beryllium	7.51E-08	3.35E-09	7.31E-08	1.74E-07	1.52E-06	4.33E-06	6.18E-06
Cadmium	2.06E-07	9.19E-09	1.05E-06	5.38E-08	6.46E-06	7.44E-06	1.52E-05
Chromium	2.86E-06	1.28E-06	1.17E-06	1.06E-05	1.52E-05	4.33E-05	7.45E-05
Cobalt	1.22E-06	5.45E-08	1.28E-06	1.58E-05	5.05E-06	8.67E-06	3.21E-05
Copper	4.61E-05	1.23E-05	1.07E-04	1.20E-04	1.86E-04	8.64E-04	1.34E-03
Lead	4.68E-06	2.09E-07	2.92E-07	1.87E-07	6.08E-06	1.73E-05	2.88E-05
Manganese	3.01E-05	1.34E-06	4.76E-05	5.43E-04	2.48E-02	9.66E-04	2.64E-02
Mercury	1.19E-07	5.32E-07	5.27E-06	3.88E-07	1.52E-06	4.33E-06	1.22E-05
Molybdenum	4.28E-07	1.91E-08	8.58E-07	1.52E-06	4.67E-06	1.26E-04	1.34E-04
Nickel	2.02E-05	8.21E-06	4.33E-06	9.94E-05	1.96E-04	1.92E-04	5.20E-04
Selenium	5.57E-07	2.49E-08	9.91E-06	1.66E-06	1.52E-05	4.33E-05	7.07E-05
Silver	1.23E-07	5.50E-09	4.45E-07	4.12E-07	3.04E-06	8.67E-06	1.27E-05
Strontium	8.76E-06	3.91E-07	5.16E-05	2.02E-05	4.49E-04	9.16E-04	1.45E-03
Thallium	7.63E-08	3.40E-09	1.58E-07	5.78E-06	3.19E-06	2.60E-06	1.18E-05
Uranium	2.35E-07	1.05E-07	2.29E-08	5.61E-09	3.04E-07	1.45E-06	2.12E-06
Vanadium	3.27E-06	1.46E-07	1.55E-06	2.16E-06	1.52E-05	4.33E-05	6.57E-05
Zinc	4.87E-05	2.17E-05	4.10E-04	1.18E-05	9.41E-04	2.38E-03	3.81E-03

APPENDIX F.7 DAILY INTAKE RATES FUTURE CASE MACLELLAN REGION

Total Daily Intake Rates for an Indigenous Toddler Receptor in the Maclellan Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.27E-07	6.25E-09	2.66E-06	6.35E-07	1.54E-05	8.70E-06	2.81E-05
Arsenic	9.96E-06	2.57E-07	2.45E-06	1.48E-06	1.31E-05	1.13E-05	3.86E-05
Barium	1.80E-04	1.55E-05	5.32E-05	7.24E-05	1.25E-02	3.64E-03	1.65E-02
Beryllium	6.22E-07	5.35E-09	4.79E-07	8.00E-07	1.01E-05	8.73E-06	2.08E-05
Cadmium	1.73E-06	1.49E-08	7.44E-06	2.50E-07	4.79E-05	1.51E-05	7.24E-05
Chromium	2.49E-05	2.14E-06	8.19E-06	5.14E-05	1.06E-04	9.16E-05	2.85E-04
Cobalt	1.03E-05	8.86E-08	9.37E-06	7.40E-05	3.38E-05	1.78E-05	1.45E-04
Copper	3.82E-04	1.97E-05	6.99E-04	5.68E-04	1.26E-03	1.74E-03	4.66E-03
Lead	3.95E-05	3.39E-07	2.07E-06	8.73E-07	4.11E-05	3.52E-05	1.19E-04
Manganese	2.49E-04	2.14E-06	3.32E-04	2.46E-03	1.48E-01	1.94E-03	1.53E-01
Mercury	9.85E-07	8.47E-07	3.53E-05	1.77E-06	1.01E-05	8.71E-06	5.77E-05
Molybdenum	3.54E-06	3.04E-08	8.11E-06	7.09E-06	3.34E-05	2.54E-04	3.06E-04
Nickel	1.69E-04	1.32E-05	2.82E-05	4.63E-04	1.25E-03	3.88E-04	2.31E-03
Selenium	4.62E-06	3.97E-08	6.80E-05	7.59E-06	1.01E-04	8.73E-05	2.69E-04
Silver	1.03E-06	8.87E-09	2.97E-06	1.90E-06	2.05E-05	1.76E-05	4.40E-05
Strontium	7.23E-05	6.22E-07	3.72E-04	9.21E-05	2.55E-03	1.84E-03	4.93E-03
Thallium	6.43E-07	5.53E-09	1.04E-06	2.68E-05	1.88E-05	5.33E-06	5.26E-05
Uranium	1.95E-06	1.68E-07	1.85E-07	2.65E-08	2.03E-06	2.92E-06	7.28E-06
Vanadium	2.75E-05	2.37E-07	1.05E-05	1.00E-05	1.03E-04	8.87E-05	2.40E-04
Zinc	4.07E-04	3.50E-05	2.66E-03	5.45E-05	6.26E-03	4.81E-03	1.42E-02

Total Daily Intake Rates for an Indigenous Adult Receptor in the MacLellan Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	4.24E-08	3.63E-09	1.44E-06	4.71E-07	6.79E-06	3.84E-06	1.26E-05
Arsenic	5.81E-07	1.49E-07	1.32E-06	1.10E-06	5.79E-06	4.98E-06	1.39E-05
Barium	1.05E-05	9.01E-06	2.88E-05	5.37E-05	5.51E-03	1.61E-03	7.22E-03
Beryllium	3.63E-08	3.11E-09	2.59E-07	5.93E-07	4.46E-06	3.85E-06	9.20E-06
Cadmium	1.01E-07	8.63E-09	4.02E-06	1.85E-07	2.11E-05	6.65E-06	3.21E-05
Chromium	1.45E-06	1.24E-06	4.43E-06	3.81E-05	4.69E-05	4.04E-05	1.33E-04
Cobalt	6.01E-07	5.14E-08	5.07E-06	5.48E-05	1.49E-05	7.83E-06	8.33E-05
Copper	2.23E-05	1.14E-05	3.78E-04	4.21E-04	5.54E-04	7.66E-04	2.15E-03
Lead	2.30E-06	1.97E-07	1.12E-06	6.47E-07	1.81E-05	1.55E-05	3.79E-05
Manganese	1.45E-05	1.24E-06	1.80E-04	1.83E-03	6.53E-02	8.56E-04	6.82E-02
Mercury	5.74E-08	4.92E-07	1.91E-05	1.31E-06	4.46E-06	3.84E-06	2.92E-05
Molybdenum	2.07E-07	1.77E-08	4.38E-06	5.25E-06	1.47E-05	1.12E-04	1.37E-04
Nickel	9.84E-06	7.66E-06	1.52E-05	3.43E-04	5.53E-04	1.71E-04	1.10E-03
Selenium	2.70E-07	2.31E-08	3.67E-05	5.63E-06	4.47E-05	3.85E-05	1.26E-04
Silver	6.02E-08	5.15E-09	1.61E-06	1.41E-06	9.04E-06	7.78E-06	1.99E-05
Strontium	4.22E-06	3.61E-07	2.01E-04	6.83E-05	1.13E-03	8.11E-04	2.21E-03
Thallium	3.75E-08	3.21E-09	5.61E-07	1.99E-05	8.28E-06	2.35E-06	3.11E-05
Uranium	1.14E-07	9.75E-08	9.99E-08	1.96E-08	8.96E-07	1.29E-06	2.51E-06
Vanadium	1.60E-06	1.37E-07	5.69E-06	7.44E-06	4.54E-05	3.91E-05	9.94E-05
Zinc	2.38E-05	2.03E-05	1.44E-03	4.04E-05	2.76E-03	2.12E-03	6.40E-03

Total Daily Intake Rates for a Resident Toddler Receptor in the Maclellan Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	7.27E-07	6.25E-09	6.83E-07	1.91E-07	4.05E-06	8.70E-06	1.44E-05
Arsenic	9.96E-06	2.57E-07	6.29E-07	4.33E-07	3.36E-06	1.13E-05	2.59E-05
Barium	1.80E-04	1.55E-05	1.37E-05	2.18E-05	3.39E-03	3.64E-03	7.26E-03
Beryllium	6.22E-07	5.35E-09	1.23E-07	2.40E-07	2.59E-06	8.73E-06	1.23E-05
Cadmium	1.73E-06	1.49E-08	1.91E-06	7.45E-08	1.18E-05	1.51E-05	3.06E-05
Chromium	2.49E-05	2.14E-06	2.11E-06	1.51E-05	2.72E-05	9.16E-05	1.63E-04
Cobalt	1.03E-05	8.86E-08	2.41E-06	2.21E-05	8.70E-06	1.78E-05	6.14E-05
Copper	3.82E-04	1.97E-05	1.80E-04	1.67E-04	3.20E-04	1.74E-03	2.81E-03
Lead	3.95E-05	3.39E-07	5.33E-07	2.60E-07	1.05E-05	3.52E-05	8.63E-05
Manganese	2.49E-04	2.14E-06	8.55E-05	7.40E-04	3.95E-02	1.94E-03	4.25E-02
Mercury	9.85E-07	8.47E-07	9.08E-06	5.30E-07	2.59E-06	8.71E-06	2.27E-05
Molybdenum	3.54E-06	3.04E-08	2.09E-06	2.12E-06	8.33E-06	2.54E-04	2.70E-04
Nickel	1.69E-04	1.32E-05	7.25E-06	1.38E-04	3.26E-04	3.88E-04	1.04E-03
Selenium	4.62E-06	3.97E-08	1.75E-05	2.28E-06	2.59E-05	8.73E-05	1.38E-04
Silver	1.03E-06	8.87E-09	7.65E-07	5.70E-07	5.24E-06	1.76E-05	2.53E-05
Strontium	7.23E-05	6.22E-07	9.58E-05	2.77E-05	6.94E-04	1.84E-03	2.73E-03
Thallium	6.43E-07	5.53E-09	2.67E-07	8.05E-06	5.08E-06	5.33E-06	1.94E-05
Uranium	1.95E-06	1.68E-07	4.76E-08	7.90E-09	5.20E-07	2.92E-06	5.61E-06
Vanadium	2.75E-05	2.37E-07	2.71E-06	3.00E-06	2.64E-05	8.87E-05	1.48E-04
Zinc	4.07E-04	3.50E-05	6.85E-04	1.63E-05	1.61E-03	4.81E-03	7.56E-03

Total Daily Intake Rates for a Resident Adult Receptor in the MacLellan Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	4.24E-08	3.63E-09	3.69E-07	1.41E-07	1.79E-06	3.84E-06	6.18E-06
Arsenic	5.81E-07	1.49E-07	3.40E-07	3.06E-07	1.48E-06	4.98E-06	7.84E-06
Barium	1.05E-05	9.01E-06	7.40E-06	1.61E-05	1.49E-03	1.61E-03	3.14E-03
Beryllium	3.63E-08	3.11E-09	6.66E-08	1.77E-07	1.14E-06	3.85E-06	5.27E-06
Cadmium	1.01E-07	8.63E-09	1.03E-06	5.46E-08	5.20E-06	6.65E-06	1.30E-05
Chromium	1.45E-06	1.24E-06	1.14E-06	1.08E-05	1.20E-05	4.04E-05	6.71E-05
Cobalt	6.01E-07	5.14E-08	1.30E-06	1.63E-05	3.84E-06	7.83E-06	2.99E-05
Copper	2.23E-05	1.14E-05	9.72E-05	1.20E-04	1.41E-04	7.66E-04	1.16E-03
Lead	2.30E-06	1.97E-07	2.88E-07	1.91E-07	4.64E-06	1.55E-05	2.31E-05
Manganese	1.45E-05	1.24E-06	4.62E-05	5.48E-04	1.74E-02	8.56E-04	1.89E-02
Mercury	5.74E-08	4.92E-07	4.91E-06	3.92E-07	1.14E-06	3.84E-06	1.08E-05
Molybdenum	2.07E-07	1.77E-08	1.13E-06	1.55E-06	3.67E-06	1.12E-04	1.19E-04
Nickel	9.84E-06	7.66E-06	3.92E-06	1.01E-04	1.44E-04	1.71E-04	4.37E-04
Selenium	2.70E-07	2.31E-08	9.45E-06	1.68E-06	1.14E-05	3.85E-05	6.14E-05
Silver	6.02E-08	5.15E-09	4.13E-07	4.22E-07	2.31E-06	7.78E-06	1.10E-05
Strontium	4.22E-06	3.61E-07	5.18E-05	2.05E-05	3.06E-04	8.11E-04	1.19E-03
Thallium	3.75E-08	3.21E-09	1.44E-07	5.96E-06	2.24E-06	2.35E-06	1.07E-05
Uranium	1.14E-07	9.75E-08	2.57E-08	5.77E-09	2.29E-07	1.29E-06	1.76E-06
Vanadium	1.60E-06	1.37E-07	1.46E-06	2.21E-06	1.16E-05	3.91E-05	5.61E-05
Zinc	2.38E-05	2.03E-05	3.70E-04	1.20E-05	7.09E-04	2.12E-03	3.26E-03

APPENDIX F.8
LIFETIME AVERAGED DAILY DOSE (LADD)
FUTURE CASE
MACLELLAN REGION

Lifetime Averaged Daily Dose for an Indigenous Receptor in the MacLellan Region under Future Case Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	8.80E-08	3.93E-09	1.59E-06	4.66E-07	8.01E-06	4.33E-06	1.45E-05
Arsenic	1.21E-06	1.61E-07	1.46E-06	1.09E-06	6.82E-06	5.62E-06	1.64E-05
Barium	2.18E-05	9.74E-06	3.18E-05	5.31E-05	6.50E-03	1.81E-03	8.43E-03
Beryllium	7.53E-08	3.36E-09	2.87E-07	5.87E-07	5.27E-06	4.35E-06	1.06E-05
Cadmium	2.09E-07	9.33E-09	4.45E-06	1.83E-07	2.49E-05	7.50E-06	3.73E-05
Chromium	3.01E-06	1.34E-06	4.90E-06	3.77E-05	5.54E-05	4.56E-05	1.48E-04
Cobalt	1.25E-06	5.56E-08	5.61E-06	5.43E-05	1.76E-05	8.85E-06	8.76E-05
Copper	4.62E-05	1.24E-05	4.18E-04	4.17E-04	6.54E-04	8.65E-04	2.41E-03
Lead	4.78E-06	2.13E-07	1.24E-06	6.40E-07	2.14E-05	1.75E-05	4.58E-05
Manganese	3.01E-05	1.34E-06	1.99E-04	1.81E-03	7.71E-02	9.66E-04	8.01E-02
Mercury	1.19E-07	5.32E-07	2.11E-05	1.30E-06	5.26E-06	4.33E-06	3.27E-05
Molybdenum	4.28E-07	1.91E-08	4.85E-06	5.20E-06	1.74E-05	1.27E-04	1.54E-04
Nickel	2.04E-05	8.29E-06	1.69E-05	3.39E-04	6.52E-04	1.93E-04	1.23E-03
Selenium	5.59E-07	2.49E-08	4.07E-05	5.57E-06	5.28E-05	4.35E-05	1.43E-04
Silver	1.25E-07	5.57E-09	1.78E-06	1.39E-06	1.07E-05	8.78E-06	2.27E-05
Strontium	8.76E-06	3.91E-07	2.23E-04	6.76E-05	1.33E-03	9.16E-04	2.54E-03
Thallium	7.78E-08	3.47E-09	6.21E-07	1.97E-05	9.76E-06	2.65E-06	3.28E-05
Uranium	2.36E-07	1.05E-07	1.11E-07	1.94E-08	1.06E-06	1.45E-06	2.98E-06
Vanadium	3.33E-06	1.49E-07	6.30E-06	7.36E-06	5.36E-05	4.42E-05	1.15E-04
Zinc	4.93E-05	2.20E-05	1.59E-03	4.00E-05	3.26E-03	2.39E-03	7.36E-03

Lifetime Averaged Daily Dose for a Resident Receptor in the MacLellan Region under Project Alone Conditions

Chemical	Soil Ingestion	Dermal Contact with Soil	Fish Consumption	Wild Meat Consumption	Traditional Plant Consumption	Backyard Produce Consumption	Total Ingestion Exposure
	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day
Antimony	8.80E-08	3.93E-09	4.09E-07	1.40E-07	2.49E-06	4.33E-06	7.47E-06
Arsenic	1.21E-06	1.61E-07	3.77E-07	3.07E-07	1.97E-06	5.62E-06	9.64E-06
Barium	2.18E-05	9.74E-06	8.19E-06	1.59E-05	2.17E-03	1.81E-03	4.04E-03
Beryllium	7.53E-08	3.36E-09	7.37E-08	1.75E-07	1.52E-06	4.35E-06	6.20E-06
Cadmium	2.09E-07	9.33E-09	1.15E-06	5.42E-08	6.47E-06	7.50E-06	1.54E-05
Chromium	3.01E-06	1.34E-06	1.26E-06	1.08E-05	1.60E-05	4.56E-05	7.80E-05
Cobalt	1.25E-06	5.56E-08	1.44E-06	1.62E-05	5.15E-06	8.85E-06	3.29E-05
Copper	4.62E-05	1.24E-05	1.08E-04	1.20E-04	1.86E-04	8.65E-04	1.34E-03
Lead	4.78E-06	2.13E-07	3.19E-07	1.89E-07	6.17E-06	1.75E-05	2.92E-05
Manganese	3.01E-05	1.34E-06	5.11E-05	5.43E-04	2.48E-02	9.66E-04	2.64E-02
Mercury	1.19E-07	5.32E-07	5.43E-06	3.88E-07	1.52E-06	4.33E-06	1.23E-05
Molybdenum	4.28E-07	1.91E-08	1.25E-06	1.54E-06	4.68E-06	1.27E-04	1.34E-04
Nickel	2.04E-05	8.29E-06	4.34E-06	1.00E-04	1.97E-04	1.93E-04	5.24E-04
Selenium	5.59E-07	2.49E-08	1.05E-05	1.67E-06	1.52E-05	4.35E-05	7.14E-05
Silver	1.25E-07	5.57E-09	4.58E-07	4.18E-07	3.08E-06	8.78E-06	1.29E-05
Strontium	8.76E-06	3.91E-07	5.73E-05	2.03E-05	4.49E-04	9.16E-04	1.45E-03
Thallium	7.78E-08	3.47E-09	1.60E-07	5.90E-06	3.25E-06	2.65E-06	1.20E-05
Uranium	2.36E-07	1.05E-07	2.85E-08	5.73E-09	3.05E-07	1.45E-06	2.13E-06
Vanadium	3.33E-06	1.49E-07	1.62E-06	2.19E-06	1.55E-05	4.42E-05	6.69E-05
Zinc	4.93E-05	2.20E-05	4.10E-04	1.19E-05	9.49E-04	2.39E-03	3.84E-03

Appendix G ERA OUTPUTS

APPENDIX G
ERA OUTPUTS

APPENDIX G.1
ECOLOGICAL TRV

APPENDIX G.1a TRV FOR COMMUNITY RECEPTORS

Community Screening Benchmarks

Constituent	Soil Invertebrate		Phytotoxicity		Freshwater		Sediment	
	Screening Benchmark (mg/kg)	Reference for Benchmark	Screening Benchmark (mg/kg)	Reference for Benchmark	Chronic Screening Benchmark (mg/L)	Reference for Benchmark	Screening Benchmark (mg/kg)	Reference for Benchmark
Antimony	20	CCME. 1999a.	20	CCME. 1999a.	0.03	USEPA Region 5. 2003.	4303	vanVlaardingen et al. 2005
Arsenic	17	CCME. 1999a.	17	CCME. 1999a.	0.005	CCME. 1999b.	17	CCME. 1999c.
Barium	500	CCME. 1999a.	750	CCME. 1999a.	0.22	Crommentuijn et al. 1997	2455	vanVlaardingen et al. 2005
Beryllium	4	CCME. 1999a.	4	CCME. 1999a.	0.0036	USEPA Region 5. 2003.	5.4	vanVlaardingen et al. 2005
Cadmium	10	CCME. 1999a.	10	CCME. 1999a.	0.00004	CCME. 1999b.	3.5	CCME. 1999c.
Chromium (Total)	64	CCME. 1999a.	64	CCME. 1999a.	0.0089	CCME. 1999b.	4300	Verbuggen et al. 2001
Cobalt	50	CCME. 1999a.	40	CCME. 1999a.	0.0028	Crommentuijn et al. 1997	459	vanVlaardingen et al. 2005
Copper	63	CCME. 1999a.	63	CCME. 1999a.	0.002	CCME. 1999b.	197	CCME. 1999c.
Lead	300	CCME. 1999a.	300	CCME. 1999a.	0.001	CCME. 1999b.	91.3	CCME. 1999c.
Manganese	450	USEPA. 2007.	220	USEPA. 2007.	90	CCME. 1999b.	No suitable screening benchmark identified.	
Mercury	12	CCME. 1999a.	12	CCME. 1999a.	0.026	CCME. 1999b.	0.486	CCME. 1999c.
Molybdenum	10	CCME. 1999a.	5	CCME. 1999a.	0.073	CCME. 1999b.	7000.5	vanVlaardingen et al. 2005
Nickel	45	CCME. 1999a.	45	CCME. 1999a.	0.025	CCME. 1999b.	295	Verbuggen et al. 2001
Selenium	1	CCME. 1999a.	1	CCME. 1999a.	0.001	CCME. 1999b.	14.7	vanVlaardingen et al. 2005
Silver	20	CCME. 1999a.	20	CCME. 1999a.	0.00025	CCME. 1999b.	No suitable screening benchmark identified.	
Strontium	No suitable screening benchmark identified.		No suitable screening benchmark identified.		No suitable screening benchmark identified.		No suitable screening benchmark identified.	
Thallium	1.4	CCME. 1999a.	1.4	CCME. 1999a.	0.0008	CCME. 1999b.	No suitable screening benchmark identified.	
Uranium	500	CCME. 1999a.	500	CCME. 1999a.	0.015	CCME. 1999b.	No suitable screening benchmark identified.	
Vanadium	130	CCME. 1999a.	130	CCME. 1999a.	0.012	USEPA Region 5. 2003.	103	vanVlaardingen et al. 2005
Zinc	250	CCME. 1999a.	250	CCME. 1999a.	2.03	CCME. 1999b.	315	CCME. 1999c.

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APPENDIX G.1b
TRV FOR MAMMALS AND BIRDS

Toxicity Reference Values for the American Beaver Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	American Beaver	0.35	1	2.1E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	American Beaver	0.89	1	4.9E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	American Beaver	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	American Beaver	0.35	1	1.8E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	American Beaver	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	American Beaver	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	American Beaver	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	American Beaver	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	American Beaver	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	American Beaver	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	American Beaver	0.45	1	4.6E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	American Beaver	0.19	1	4.9E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	American Beaver	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	American Beaver	0.35	1	1.1E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	American Beaver	0.78	1	1.6E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	American Beaver	0.35	1	9.1E+01
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	American Beaver	0.35	1	8.6E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	American Beaver	0.19	1	1.2E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	American Beaver	0.35	1	5.9E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	American Beaver	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the American Mink Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	American Mink	0.81	1	4.8E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	American Mink	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	American Mink	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	American Mink	0.81	1	4.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	American Mink	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	American Mink	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	American Mink	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	American Mink	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	American Mink	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	American Mink	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	American Mink	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	American Mink	0.44	1	1.1E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	American Mink	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	American Mink	0.81	1	2.7E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	American Mink	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	American Mink	0.81	1	2.1E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	American Mink	0.81	1	2.0E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	American Mink	0.44	1	2.7E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	American Mink	0.81	1	1.4E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	American Mink	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Black Bear Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Black Bear	0.27	1	1.6E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Black Bear	0.69	1	3.8E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Black Bear	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Black Bear	0.27	1	1.4E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Black Bear	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Black Bear	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Black Bear	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Black Bear	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Black Bear	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Black Bear	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Black Bear	0.35	1	3.5E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Black Bear	0.14	1	3.8E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Black Bear	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Black Bear	0.27	1	8.8E-02
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Black Bear	0.60	1	1.2E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Black Bear	0.27	1	7.0E+01
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Black Bear	0.27	1	6.6E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Black Bear	0.14	1	8.9E-01
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Black Bear	0.27	1	4.6E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Black Bear	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Common (Masked) Shrew Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Common (Masked) Shrew	--	1	5.9E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Common (Masked) Shrew	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Common (Masked) Shrew	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Common (Masked) Shrew	--	1	5.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Common (Masked) Shrew	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Common (Masked) Shrew	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Common (Masked) Shrew	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Common (Masked) Shrew	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Common (Masked) Shrew	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Common (Masked) Shrew	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Common (Masked) Shrew	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Common (Masked) Shrew	--	1	2.6E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Common (Masked) Shrew	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Common (Masked) Shrew	--	1	3.3E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Common (Masked) Shrew	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Common (Masked) Shrew	--	1	2.6E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Common (Masked) Shrew	--	1	2.5E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Common (Masked) Shrew	--	1	6.1E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Common (Masked) Shrew	--	1	1.7E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Common (Masked) Shrew	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Common (Masked) Shrew (SaR)	--	3	2.0E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Common (Masked) Shrew (SaR)	--	3	1.8E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Common (Masked) Shrew (SaR)	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Common (Masked) Shrew (SaR)	--	1	5.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Common (Masked) Shrew (SaR)	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Common (Masked) Shrew (SaR)	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Common (Masked) Shrew (SaR)	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Common (Masked) Shrew (SaR)	--	3	1.0E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Common (Masked) Shrew (SaR)	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Common (Masked) Shrew (SaR)	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Common (Masked) Shrew (SaR)	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Common (Masked) Shrew (SaR)	--	3	8.7E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Common (Masked) Shrew (SaR)	--	3	2.7E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Common (Masked) Shrew (SaR)	--	3	1.1E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Common (Masked) Shrew (SaR)	--	3	6.7E+00
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Common (Masked) Shrew (SaR)	--	1	2.6E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Common (Masked) Shrew (SaR)	--	3	8.2E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Common (Masked) Shrew (SaR)	--	3	2.0E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Common (Masked) Shrew (SaR)	--	3	5.7E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Common (Masked) Shrew (SaR)	--	3	2.5E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Deer Mouse Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Deer Mouse	--	1	5.9E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Deer Mouse	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Deer Mouse	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Deer Mouse	--	1	5.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Deer Mouse	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Deer Mouse	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Deer Mouse	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Deer Mouse	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Deer Mouse	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Deer Mouse	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Deer Mouse	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Deer Mouse	--	1	2.6E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Deer Mouse	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Deer Mouse	--	1	3.3E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Deer Mouse	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Deer Mouse	--	1	2.6E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Deer Mouse	--	1	2.5E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Deer Mouse	--	1	6.1E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Deer Mouse	--	1	1.7E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Deer Mouse	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Meadow Vole Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Meadow Vole	--	1	5.9E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Meadow Vole	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Meadow Vole	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Meadow Vole	--	1	5.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Meadow Vole	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Meadow Vole	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Meadow Vole	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Meadow Vole	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Meadow Vole	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Meadow Vole	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Meadow Vole	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Meadow Vole	0.96	1	2.5E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Meadow Vole	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Meadow Vole	--	1	3.3E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Meadow Vole	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Meadow Vole	--	1	2.6E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Meadow Vole	--	1	2.5E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Meadow Vole	0.96	1	5.9E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Meadow Vole	--	1	1.7E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Meadow Vole	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Moose Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Moose	0.17	1	1.0E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Moose	0.44	1	2.4E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Moose	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Moose	0.17	1	9.1E-02
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Moose	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Moose	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Moose	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Moose	0.71	1	2.2E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Moose	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Moose	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Moose	0.22	1	2.3E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Moose	0.09	1	2.4E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Moose	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Moose	0.17	1	5.7E-02
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Moose	0.39	1	7.7E+00
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Moose	0.17	1	4.5E+01
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Moose	0.17	1	4.2E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Moose	0.09	1	5.7E-01
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Moose	0.17	1	2.9E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Moose	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Muskrat Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Muskrat	0.77	1	4.6E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Muskrat	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Muskrat	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Muskrat	0.77	1	4.1E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Muskrat	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Muskrat	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Muskrat	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Muskrat	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Muskrat	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Muskrat	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Muskrat	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Muskrat	0.42	1	1.1E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Muskrat	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Muskrat	0.77	1	2.5E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Muskrat	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Muskrat	0.77	1	2.0E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Muskrat	0.77	1	1.9E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Muskrat	0.42	1	2.6E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Muskrat	0.77	1	1.3E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Muskrat	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Northern River Otter Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Northern River Otter	0.46	1	2.8E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Northern River Otter	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Northern River Otter	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Northern River Otter	0.46	1	2.5E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Northern River Otter	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Northern River Otter	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Northern River Otter	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Northern River Otter	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Northern River Otter	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Northern River Otter	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Northern River Otter	0.60	1	6.1E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Northern River Otter	0.25	1	6.5E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Northern River Otter	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Northern River Otter	0.46	1	1.5E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Northern River Otter	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Northern River Otter	0.46	1	1.2E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Northern River Otter	0.46	1	1.1E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Northern River Otter	0.25	1	1.5E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Northern River Otter	0.46	1	7.9E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Northern River Otter	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Short-tailed Weasel Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Short-tailed Weasel	--	1	5.9E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Short-tailed Weasel	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Short-tailed Weasel	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Short-tailed Weasel	--	1	5.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Short-tailed Weasel	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Short-tailed Weasel	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Short-tailed Weasel	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Short-tailed Weasel	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Short-tailed Weasel	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Short-tailed Weasel	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Short-tailed Weasel	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Short-tailed Weasel	0.76	1	2.0E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Short-tailed Weasel	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Short-tailed Weasel	--	1	3.3E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Short-tailed Weasel	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Short-tailed Weasel	--	1	2.6E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Short-tailed Weasel	--	1	2.5E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Short-tailed Weasel	0.76	1	4.7E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Short-tailed Weasel	--	1	1.7E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Short-tailed Weasel	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Short-tailed Weasel (SaR)	--	3	2.0E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Short-tailed Weasel (SaR)	--	3	1.8E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Short-tailed Weasel (SaR)	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Short-tailed Weasel (SaR)	--	1	5.3E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Short-tailed Weasel (SaR)	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Short-tailed Weasel (SaR)	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Short-tailed Weasel (SaR)	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Short-tailed Weasel (SaR)	--	3	1.0E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Short-tailed Weasel (SaR)	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Short-tailed Weasel (SaR)	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Short-tailed Weasel (SaR)	--	1	1.0E+00
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Short-tailed Weasel (SaR)	0.76	3	6.6E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Short-tailed Weasel (SaR)	--	3	2.7E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Short-tailed Weasel (SaR)	--	3	1.1E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Short-tailed Weasel (SaR)	--	3	6.7E+00
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Short-tailed Weasel (SaR)	--	1	2.6E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Short-tailed Weasel (SaR)	--	3	8.2E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Short-tailed Weasel (SaR)	0.76	3	1.6E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Short-tailed Weasel (SaR)	--	3	5.7E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Short-tailed Weasel (SaR)	--	3	2.5E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Snowshoe Hare Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Snowshoe Hare	0.72	1	4.3E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Snowshoe Hare	--	1	5.5E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Snowshoe Hare	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Snowshoe Hare	0.72	1	3.8E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Snowshoe Hare	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Snowshoe Hare	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Snowshoe Hare	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Snowshoe Hare	--	1	3.1E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Snowshoe Hare	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Snowshoe Hare	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Snowshoe Hare	0.94	1	9.5E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Snowshoe Hare	0.39	1	1.0E+00
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Snowshoe Hare	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Snowshoe Hare	0.72	1	2.4E-01
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Snowshoe Hare	--	1	2.0E+01
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Snowshoe Hare	0.72	1	1.9E+02
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Snowshoe Hare	0.72	1	1.8E-01
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Snowshoe Hare	0.39	1	2.4E+00
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Snowshoe Hare	0.72	1	1.2E+00
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Snowshoe Hare	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Woodland Caribou Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Woodland Caribou	0.22	1	1.3E-01
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Woodland Caribou	0.55	1	3.1E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Woodland Caribou	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Woodland Caribou	0.22	1	1.2E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Woodland Caribou	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Woodland Caribou	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Woodland Caribou	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Woodland Caribou	0.89	1	2.8E+00
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Woodland Caribou	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Woodland Caribou	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Woodland Caribou	0.28	1	2.8E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Woodland Caribou	0.12	1	3.0E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Woodland Caribou	--	1	8.1E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Woodland Caribou	0.22	1	7.1E-02
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Woodland Caribou	0.49	1	9.7E+00
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Woodland Caribou	0.22	1	5.7E+01
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Woodland Caribou	0.22	1	5.3E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Woodland Caribou	0.12	1	7.2E-01
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Woodland Caribou	0.22	1	3.7E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Woodland Caribou	--	1	7.6E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Woodland Caribou (SaR) Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Reference Dose - Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	Rat	0.35	USEPA (1988)	reproduction	Rossi et al. (1987), in USEPA Eco-SSL (2005)	chronic LOAEL	5.9E-01	1	5.9E-01	Woodland Caribou (SaR)	0.22	3	4.3E-02
Arsenic	Dog	15	Estimated	growth	Neiger and Osweiler (1989), in USEPA Eco-SSL (2005)	subchronic LOAEL	1.7E+00	3	5.5E-01	Woodland Caribou (SaR)	0.55	3	1.0E-01
Barium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Woodland Caribou (SaR)	--	1	5.2E+01
Beryllium	Rat	0.35	USEPA (1988)	longevity, growth	Schroeder & Mitchener (1975), in Sample et al. (1996) and USEPA Eco-SSL (2005)	chronic NOAEL	5.3E-01	1	5.3E-01	Woodland Caribou (SaR)	0.22	1	1.2E-01
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.9E+00	1	1.9E+00	Woodland Caribou (SaR)	--	1	1.9E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2008)	geometric mean of NOAEL	2.4E+00	1	2.4E+00	Woodland Caribou (SaR)	--	1	2.4E+00
Cobalt	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	7.3E+00	1	7.3E+00	Woodland Caribou (SaR)	--	1	7.3E+00
Copper	Pig	100	Estimated	mortality	Allcroft et al., (1961), in USEPA Eco-SSL (2007)	subchronic LOAEL	9.3E+00	3	3.1E+00	Woodland Caribou (SaR)	0.89	3	9.2E-01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	4.1E+01	1	4.1E+01	Woodland Caribou (SaR)	--	1	4.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	5.2E+01	1	5.2E+01	Woodland Caribou (SaR)	--	1	5.2E+01
Mercury	Mink	1	USEPA (1993e)	reproduction	Aulerich et al. (1974), Sample (1996)	chronic NOAEL	1.0E+00	1	1.0E+00	Woodland Caribou (SaR)	0.28	1	2.8E-01
Molybdenum	Mouse	0.03	USEPA (1988)	reproduction	Schroeder & Mitchner (1971), Sample et al. (1996)	chronic LOAEL	2.6E+00	1	2.6E+00	Woodland Caribou (SaR)	0.12	3	1.0E-01
Nickel	Mouse	--	Mouse is selected as most sensitive species in study. Body weight scaling is omitted.	reproduction	Pandey and Srivastava (2000), in USEPA Eco-SSL (2007)	subchronic LOAEL	2.4E+00	3	8.1E-01	Woodland Caribou (SaR)	--	3	2.7E-01
Selenium	Rat	0.35	USEPA (1988)	reproduction	Rosenfeld & Beath (1954), Sample et al. (1996)	chronic LOAEL	3.3E-01	1	3.3E-01	Woodland Caribou (SaR)	0.22	3	2.4E-02
Silver	Pig	8.86	Van Vleet (1976) in USEPA EcoSSL (2006)	body weight	Van Vleet (1976) in USEPA EcoSSL (2006)	subchronic LOAEL	6.0E+01	3	2.0E+01	Woodland Caribou (SaR)	0.49	3	3.2E+00
Strontium	Rat	0.35	USEPA (1988)	body weight & bone change	Skoryna (1981), Sample et al. (1996)	chronic NOAEL	2.6E+02	1	2.6E+02	Woodland Caribou (SaR)	0.22	1	5.7E+01
Thallium	Rat	0.35	USEPA (1988)	reproduction	Formigli et al. (1986), in Sample et al. (1996)	subchronic LOAEL	7.4E-01	3	2.5E-01	Woodland Caribou (SaR)	0.22	3	1.8E-02
Uranium	Mouse	0.03	USEPA (1988)	reproduction	Paternain et al. (1989), Sample et al. (1996)	chronic LOAEL	6.1E+00	1	6.1E+00	Woodland Caribou (SaR)	0.12	3	2.4E-01
Vanadium	Rat	0.35	USEPA (1988)	growth	Daniel and Lillie (1938), in USEPA (2005)	subchronic LOAEL	5.1E+00	3	1.7E+00	Woodland Caribou (SaR)	0.22	3	1.2E-01
Zinc	Cattle	580	Miller et al. (1989) in USEPA (2007)	reproduction	Miller et al. (1989) in USEPA (2007)	chronic LOAEL	7.6E+01	1	7.6E+01	Woodland Caribou (SaR)	--	3	2.5E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the American Robin Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	American Robin	--	1	1.3E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	American Robin	--	1	1.4E+02
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	American Robin	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	American Robin	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	American Robin	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	American Robin	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	American Robin	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	American Robin	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	American Robin	--	1	9.0E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	American Robin	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	American Robin	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	American Robin	--	1	1.0E+00
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	American Robin	--	1	6.7E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	American Robin	9.7E-01	1	3.4E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	American Robin	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	American Robin	--	1	2.3E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	American Robin	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the American Robin (SaR) Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony	No suitable study identified												--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	American Robin (SaR)	--	3	4.3E+00
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	American Robin (SaR)	--	3	4.6E+01
Beryllium	No suitable study identified												--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	American Robin (SaR)	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	American Robin (SaR)	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	American Robin (SaR)	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	American Robin (SaR)	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	American Robin (SaR)	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	American Robin (SaR)	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	American Robin (SaR)	--	3	3.0E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	American Robin (SaR)	--	3	1.2E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	American Robin (SaR)	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	American Robin (SaR)	--	3	3.3E-01
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	American Robin (SaR)	--	3	2.2E+00
Strontium	No suitable study identified												--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	American Robin (SaR)	9.7E-01	3	1.1E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	American Robin (SaR)	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	American Robin (SaR)	--	3	7.6E-02
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	American Robin (SaR)	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Barn Swallow Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Barn Swallow	--	1	1.3E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Barn Swallow	--	1	1.4E+02
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Barn Swallow	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Barn Swallow	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Barn Swallow	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Barn Swallow	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Barn Swallow	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Barn Swallow	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Barn Swallow	--	1	9.0E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Barn Swallow	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Barn Swallow	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Barn Swallow	--	1	1.0E+00
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Barn Swallow	--	1	6.7E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Barn Swallow	--	1	3.5E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Barn Swallow	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Barn Swallow	--	1	2.3E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Barn Swallow	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Barn Swallow (SaR) Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Barn Swallow (SaR)	--	3	4.3E+00
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Barn Swallow (SaR)	--	3	4.6E+01
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Barn Swallow (SaR)	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Barn Swallow (SaR)	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Barn Swallow (SaR)	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Barn Swallow (SaR)	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Barn Swallow (SaR)	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Barn Swallow (SaR)	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Barn Swallow (SaR)	--	3	3.0E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Barn Swallow (SaR)	--	3	1.2E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Barn Swallow (SaR)	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Barn Swallow (SaR)	--	3	3.3E-01
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Barn Swallow (SaR)	--	3	2.2E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Barn Swallow (SaR)	--	3	1.2E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Barn Swallow (SaR)	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Barn Swallow (SaR)	--	3	7.6E-02
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Barn Swallow (SaR)	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Common Loon Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Common Loon	6.6E-01	1	8.5E+00
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Common Loon	3.9E-01	1	5.4E+01
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Common Loon	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Common Loon	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Common Loon	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Common Loon	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Common Loon	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Common Loon	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Common Loon	4.1E-01	1	3.7E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Common Loon	7.3E-01	1	2.6E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Common Loon	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Common Loon	6.6E-01	1	6.6E-01
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Common Loon	5.9E-01	1	4.0E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Common Loon	3.4E-01	1	1.2E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Common Loon	7.0E-01	1	3.7E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Common Loon	3.9E-01	1	8.9E-02
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Common Loon	7.8E-01	1	7.0E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Lesser Scaup Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Lesser Scaup	--	1	1.3E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Lesser Scaup	6.4E-01	1	8.9E+01
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Lesser Scaup	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Lesser Scaup	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Lesser Scaup	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Lesser Scaup	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Lesser Scaup	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Lesser Scaup	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Lesser Scaup	6.8E-01	1	6.1E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Lesser Scaup	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Lesser Scaup	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Lesser Scaup	--	1	1.0E+00
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Lesser Scaup	9.8E-01	1	6.6E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Lesser Scaup	5.6E-01	1	1.9E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Lesser Scaup	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Lesser Scaup	6.4E-01	1	1.5E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Lesser Scaup	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Mallard Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Mallard	9.6E-01	1	1.2E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Mallard	5.6E-01	1	7.8E+01
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Mallard	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Mallard	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Mallard	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Mallard	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Mallard	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Mallard	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Mallard	5.9E-01	1	5.4E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Mallard	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Mallard	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Mallard	9.6E-01	1	9.6E-01
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Mallard	8.6E-01	1	5.8E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Mallard	4.9E-01	1	1.7E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Mallard	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Mallard	5.6E-01	1	1.3E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Mallard	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Red-tailed Hawk Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Red-tailed Hawk	9.8E-01	1	1.3E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Red-tailed Hawk	5.8E-01	1	8.0E+01
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Red-tailed Hawk	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Red-tailed Hawk	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Red-tailed Hawk	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Red-tailed Hawk	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Red-tailed Hawk	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Red-tailed Hawk	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Red-tailed Hawk	6.1E-01	1	5.5E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Red-tailed Hawk	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Red-tailed Hawk	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Red-tailed Hawk	9.8E-01	1	9.8E-01
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Red-tailed Hawk	8.8E-01	1	5.9E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Red-tailed Hawk	5.0E-01	1	1.7E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Red-tailed Hawk	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Red-tailed Hawk	5.8E-01	1	1.3E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Red-tailed Hawk	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Spotted Sandpiper Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Spotted Sandpiper	--	1	1.3E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Spotted Sandpiper	--	1	1.4E+02
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Spotted Sandpiper	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Spotted Sandpiper	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Spotted Sandpiper	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Spotted Sandpiper	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Spotted Sandpiper	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Spotted Sandpiper	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Spotted Sandpiper	--	1	9.0E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Spotted Sandpiper	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Spotted Sandpiper	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Spotted Sandpiper	--	1	1.0E+00
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Spotted Sandpiper	--	1	6.7E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Spotted Sandpiper	--	1	3.5E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Spotted Sandpiper	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Spotted Sandpiper	--	1	2.3E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Spotted Sandpiper	--	1	8.9E+01

Notes:

(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.

(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

Toxicity Reference Values for the Spruce Grouse Exposed to Constituents of Concern

Constituent	Test Species	Test Species Body Weight (kg wet)	Body Weight Reference	Effect	Reference	Endpoint	Daily Dose (mg/kg-day)	Total Uncertainty Factor (a)	Chronic LOAEL-Test Species (b) (mg/kg-day)	Receptor Species	Body Weight Scaling Factor	Sensitive Species Factor	Toxicity Reference Value (mg/kg-day)
Antimony					No suitable study identified								--
Arsenic	Mallard duck	1	Heinz et al. (1989)	mortality	USFWS (1964) in Sample et al. (1996)	chronic LOAEL	1.3E+01	1	1.3E+01	Spruce Grouse	--	1	1.3E+01
Barium	Chicken (chicks)	0.121	EPA (1988)	mortality	Johnson et al. 1960 in Sample et al. (1996)	subchronic LOAEL	4.2E+02	3	1.4E+02	Spruce Grouse	6.7E-01	1	9.3E+01
Beryllium					No suitable study identified								--
Cadmium	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	1.5E+00	1	1.5E+00	Spruce Grouse	--	1	1.5E+00
Chromium (Total)	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2005)	geometric mean of NOAEL	2.7E+00	1	2.7E+00	Spruce Grouse	--	1	2.7E+00
Cobalt	multiple	--	--	growth	USEPA Eco-SSL (2005)	geometric mean of subchronic NOAEL	7.6E+00	3	2.5E+00	Spruce Grouse	--	1	2.5E+00
Copper	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.9E+01	1	1.9E+01	Spruce Grouse	--	1	1.9E+01
Lead	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.1E+01	1	1.1E+01	Spruce Grouse	--	1	1.1E+01
Manganese	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	1.8E+02	1	1.8E+02	Spruce Grouse	--	1	1.8E+02
Mercury	Japanese quail	0.15	Vos et al. (1971)	reproduction	Hill & Schaffner (1976) in Sample et al. (1996)	chronic LOAEL	9.0E-01	1	9.0E-01	Spruce Grouse	7.1E-01	1	6.4E-01
Molybdenum	Chicken	1.5	USEPA (1988)	reproduction	Lepore and Miller (1965) in Sample et al. (1996)	chronic LOAEL	3.5E+01	1	3.5E+01	Spruce Grouse	--	1	3.5E+01
Nickel	multiple	--	--	growth, reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	6.7E+00	1	6.7E+00	Spruce Grouse	--	1	6.7E+00
Selenium	Mallard Duck	1	Heinz et al. (1989)	reproduction	Heinz et al. (1987) in Sample et al. (1996)	chronic LOAEL	1.0E+00	1	1.0E+00	Spruce Grouse	--	1	1.0E+00
Silver	Turkey	0.662	Jensen et al. (1974) in USEPA Eco-SSL (2006)	growth	Jensen et al. (1974) in USEPA Eco-SSL (2006)	subchronic LOAEL	2.0E+01	3	6.7E+00	Spruce Grouse	--	1	6.7E+00
Strontium					No suitable study identified								--
Thallium	Starling	0.07	Bonser and Rayner (1996)	mortality	Schafer (1972) in Shafer et al. (1983)	acute LD50	3.5E+01	100	3.5E-01	Spruce Grouse	5.8E-01	1	2.0E-01
Uranium	Black Duck	1.25	Dunning (1984)	various, including mortality	Haseltine and Sileo (1983) in Sample et al. (1996)	subchronic NOAEL	1.6E+02	3	5.3E+01	Spruce Grouse	--	1	5.3E+01
Vanadium	Chickens	0.121	USEPA (1998)	growth	Hill (1979) in USEPA Eco-SSL (2005)	subchronic LOAEL	6.9E-01	3	2.3E-01	Spruce Grouse	6.7E-01	1	1.5E-01
Zinc	Chicken	2	Gibson et al. (1986) in USEPA Eco-SSL (2007)	reproduction	USEPA Eco-SSL (2007)	geometric mean of NOAEL	8.9E+01	1	8.9E+01	Spruce Grouse	--	1	8.9E+01

Notes:
(a) The following uncertainty factors have been used to convert to chronic LOAEL/NOAEL:100 for acute LD50; 30 for sub-chronic LD50; 3 for subchronic LOAEL or NOAEL; 1 for chronic LOAEL or NOAEL.
(b) The chronic LOAEL is calculated as the Daily Dose divided by the Total Uncertainty Factor.

APPENDIX G.2
AVERAGE DAILY DOSE (ADD)

Average Daily Doses for the American Beaver Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.9E-05	3.0E-04	---	---	7.6E-06	4.5E-05	8.9E-06	---	---	3.8E-04
Arsenic	1.8E-04	1.6E-04	---	---	2.1E-05	1.3E-03	2.4E-04	---	---	1.9E-03
Barium	3.9E-04	2.4E-02	---	---	1.5E-03	3.5E-03	2.8E-03	---	---	3.2E-02
Beryllium	4.8E-05	2.1E-04	---	---	3.4E-06	2.2E-04	6.7E-04	---	---	1.1E-03
Cadmium	5.8E-05	1.3E-03	---	---	1.8E-07	1.0E-04	4.8E-04	---	---	1.9E-03
Chromium (Total)	1.2E-03	1.6E-03	---	---	6.2E-06	1.1E-02	2.3E-03	---	---	1.6E-02
Cobalt	5.0E-04	1.4E-03	---	---	3.5E-06	2.6E-03	1.0E-04	---	---	4.6E-03
Copper	6.1E-03	1.8E-02	---	---	1.6E-05	5.2E-03	8.2E-03	---	---	3.7E-02
Lead	1.3E-03	1.7E-03	---	---	2.6E-06	2.2E-03	1.2E-03	---	---	6.5E-03
Manganese	6.4E-04	3.1E-01	---	---	4.2E-03	1.9E-02	7.5E-03	---	---	3.4E-01
Mercury	1.8E-05	1.6E-04	---	---	5.3E-08	2.1E-05	1.2E-04	---	---	3.3E-04
Molybdenum	1.3E-03	4.9E-03	---	---	2.3E-05	2.0E-03	2.4E-03	---	---	1.1E-02
Nickel	8.4E-04	5.1E-03	---	---	1.3E-05	8.0E-03	1.8E-03	---	---	1.6E-02
Selenium	4.0E-05	1.6E-03	---	---	2.1E-06	2.0E-04	5.0E-04	---	---	2.4E-03
Silver	2.5E-05	3.3E-04	---	---	2.6E-07	2.1E-05	3.7E-06	---	---	3.8E-04
Strontium	3.3E-03	6.2E-02	---	---	6.8E-03	8.0E-03	1.6E-02	---	---	9.6E-02
Thallium	2.9E-05	2.6E-04	---	---	1.4E-06	6.2E-05	7.7E-07	---	---	3.5E-04
Uranium	7.3E-05	3.3E-05	---	---	3.8E-06	8.3E-04	2.4E-05	---	---	9.7E-04
Vanadium	2.0E-03	1.6E-03	---	---	8.1E-06	1.2E-02	2.8E-04	---	---	1.5E-02
Zinc	7.5E-03	1.9E-01	---	---	5.7E-05	2.7E-02	8.3E-02	---	---	3.1E-01

Average Daily Doses for the American Mink Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.7E-05	---	---	3.9E-04	3.2E-06	9.2E-05	---	1.8E-05	2.7E-03	3.3E-03
Arsenic	2.4E-04	---	---	6.6E-03	8.8E-06	2.6E-03	---	2.4E-02	1.0E-02	4.4E-02
Barium	5.4E-04	---	---	8.4E-02	6.2E-04	7.2E-03	---	2.6E-02	1.6E-02	1.3E-01
Beryllium	6.7E-05	---	---	1.8E-04	1.4E-06	4.4E-04	---	1.6E-03	4.6E-04	2.7E-03
Cadmium	8.0E-05	---	---	3.5E-03	7.4E-08	2.0E-04	---	8.0E-03	7.1E-03	1.9E-02
Chromium (Total)	1.7E-03	---	---	4.9E-03	2.6E-06	2.3E-02	---	9.0E-02	2.5E-02	1.4E-01
Cobalt	7.0E-04	---	---	2.2E-03	1.4E-06	5.4E-03	---	3.5E-04	1.2E-02	2.1E-02
Copper	8.5E-03	---	---	1.9E-01	6.5E-06	1.1E-02	---	4.5E-01	1.5E+00	2.1E+00
Lead	1.8E-03	---	---	2.3E-03	1.1E-06	4.6E-03	---	1.3E-02	1.2E-02	3.4E-02
Manganese	8.9E-04	---	---	3.1E-02	1.8E-03	3.9E-02	---	1.6E-01	4.5E-02	2.7E-01
Mercury	2.5E-05	---	---	1.0E-03	2.2E-08	4.3E-05	---	1.4E-04	4.6E-02	4.7E-02
Molybdenum	1.8E-03	---	---	1.1E-02	9.6E-06	4.1E-03	---	5.7E-02	1.6E-02	9.0E-02
Nickel	1.2E-03	---	---	5.3E-03	5.5E-06	1.6E-02	---	5.5E-02	3.8E-02	1.2E-01
Selenium	5.6E-05	---	---	1.7E-02	8.8E-07	4.1E-04	---	6.9E-03	9.7E-02	1.2E-01
Silver	3.5E-05	---	---	3.5E-04	1.1E-07	4.3E-05	---	9.1E-05	1.6E-02	1.7E-02
Strontium	4.6E-03	---	---	2.2E-01	2.8E-03	1.6E-02	---	2.7E-02	7.2E-01	9.9E-01
Thallium	4.1E-05	---	---	2.1E-03	6.0E-07	1.3E-04	---	6.7E-04	2.0E-03	5.0E-03
Uranium	1.0E-04	---	---	1.9E-04	1.6E-06	1.7E-03	---	7.6E-04	4.4E-04	3.2E-03
Vanadium	2.7E-03	---	---	5.3E-03	3.4E-06	2.4E-02	---	1.1E-02	2.8E-02	7.1E-02
Zinc	1.0E-02	---	---	1.1E+00	2.4E-05	5.5E-02	---	2.3E+00	3.5E+01	3.9E+01

Average Daily Doses for the Black Bear Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.3E-05	3.7E-03	1.8E-04	2.1E-04	6.8E-06	8.3E-06	---	---	2.8E-04	4.5E-03
Arsenic	6.5E-04	2.0E-03	3.9E-04	3.6E-03	1.9E-05	2.3E-04	---	---	1.1E-03	7.9E-03
Barium	1.5E-03	3.0E-01	3.3E-04	4.5E-02	1.3E-03	6.5E-04	---	---	1.7E-03	3.5E-01
Beryllium	1.8E-04	2.6E-03	2.0E-05	9.4E-05	3.1E-06	4.0E-05	---	---	4.7E-05	3.0E-03
Cadmium	2.2E-04	1.6E-02	5.5E-03	1.9E-03	1.6E-07	1.8E-05	---	---	7.4E-04	2.4E-02
Chromium (Total)	4.6E-03	2.0E-02	3.5E-03	2.6E-03	5.6E-06	2.1E-03	---	---	2.5E-03	3.6E-02
Cobalt	1.9E-03	1.7E-02	5.7E-04	1.2E-03	3.1E-06	4.9E-04	---	---	1.3E-03	2.2E-02
Copper	2.3E-02	2.2E-01	2.1E-02	1.0E-01	1.4E-05	9.5E-04	---	---	1.5E-01	5.2E-01
Lead	4.9E-03	2.2E-02	6.6E-03	1.2E-03	2.4E-06	4.1E-04	---	---	1.3E-03	3.6E-02
Manganese	2.4E-03	3.9E+00	5.3E-04	1.6E-02	3.8E-03	3.5E-03	---	---	4.6E-03	3.9E+00
Mercury	6.6E-05	2.0E-03	2.8E-04	5.5E-04	4.7E-08	3.9E-06	---	---	4.7E-03	7.7E-03
Molybdenum	4.9E-03	6.1E-02	1.2E-02	5.6E-03	2.1E-05	3.7E-04	---	---	1.7E-03	8.6E-02
Nickel	3.1E-03	6.4E-02	8.3E-03	2.8E-03	1.2E-05	1.5E-03	---	---	3.9E-03	8.3E-02
Selenium	1.5E-04	2.0E-02	3.7E-04	9.0E-03	1.9E-06	3.7E-05	---	---	1.0E-02	4.0E-02
Silver	9.5E-05	4.1E-03	4.9E-04	1.9E-04	2.3E-07	3.9E-06	---	---	1.7E-03	6.5E-03
Strontium	1.2E-02	7.7E-01	2.7E-03	1.2E-01	6.2E-03	1.5E-03	---	---	7.4E-02	9.8E-01
Thallium	1.1E-04	3.2E-03	1.3E-05	1.1E-03	1.3E-06	1.1E-05	---	---	2.1E-04	4.7E-03
Uranium	2.7E-04	4.1E-04	2.2E-05	1.0E-04	3.4E-06	1.5E-04	---	---	4.5E-05	1.0E-03
Vanadium	7.3E-03	2.0E-02	7.7E-04	2.8E-03	7.3E-06	2.1E-03	---	---	2.8E-03	3.6E-02
Zinc	2.8E-02	2.4E+00	4.5E-01	5.7E-01	5.1E-05	5.0E-03	---	---	3.6E+00	7.1E+00

Average Daily Doses for the Common (Masked) Shrew Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	8.1E-04	2.6E-03	3.9E-02	---	1.8E-05	---	---	---	---	4.2E-02
Arsenic	7.3E-03	1.4E-03	8.2E-02	---	5.0E-05	---	---	---	---	9.1E-02
Barium	1.6E-02	2.1E-01	7.1E-02	---	3.5E-03	---	---	---	---	3.0E-01
Beryllium	2.0E-03	1.8E-03	4.3E-03	---	8.1E-06	---	---	---	---	8.1E-03
Cadmium	2.4E-03	1.1E-02	1.2E+00	---	4.2E-07	---	---	---	---	1.2E+00
Chromium (Total)	5.2E-02	1.4E-02	7.5E-01	---	1.5E-05	---	---	---	---	8.2E-01
Cobalt	2.1E-02	1.2E-02	1.2E-01	---	8.2E-06	---	---	---	---	1.5E-01
Copper	2.6E-01	1.5E-01	4.5E+00	---	3.7E-05	---	---	---	---	4.9E+00
Lead	5.5E-02	1.5E-02	1.4E+00	---	6.2E-06	---	---	---	---	1.5E+00
Manganese	2.7E-02	2.7E+00	1.1E-01	---	1.0E-02	---	---	---	---	2.9E+00
Mercury	7.4E-04	1.4E-03	6.0E-02	---	1.3E-07	---	---	---	---	6.2E-02
Molybdenum	5.5E-02	4.3E-02	2.5E+00	---	5.5E-05	---	---	---	---	2.6E+00
Nickel	3.5E-02	4.5E-02	1.8E+00	---	3.1E-05	---	---	---	---	1.8E+00
Selenium	1.7E-03	1.4E-02	7.9E-02	---	5.0E-06	---	---	---	---	9.5E-02
Silver	1.1E-03	2.9E-03	1.0E-01	---	6.1E-07	---	---	---	---	1.1E-01
Strontium	1.4E-01	5.4E-01	5.7E-01	---	1.6E-02	---	---	---	---	1.3E+00
Thallium	1.2E-03	2.2E-03	2.7E-03	---	3.4E-06	---	---	---	---	6.2E-03
Uranium	3.0E-03	2.9E-04	4.8E-03	---	9.0E-06	---	---	---	---	8.1E-03
Vanadium	8.2E-02	1.4E-02	1.6E-01	---	1.9E-05	---	---	---	---	2.6E-01
Zinc	3.1E-01	1.7E+00	9.7E+01	---	1.4E-04	---	---	---	---	9.9E+01

Average Daily Doses for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	8.1E-04	2.6E-03	3.9E-02	---	1.8E-05	---	---	---	---	4.2E-02
Arsenic	7.3E-03	1.4E-03	8.2E-02	---	5.0E-05	---	---	---	---	9.1E-02
Barium	1.6E-02	2.1E-01	7.1E-02	---	3.5E-03	---	---	---	---	3.0E-01
Beryllium	2.0E-03	1.8E-03	4.3E-03	---	8.1E-06	---	---	---	---	8.1E-03
Cadmium	2.4E-03	1.1E-02	1.2E+00	---	4.2E-07	---	---	---	---	1.2E+00
Chromium (Total)	5.2E-02	1.4E-02	7.5E-01	---	1.5E-05	---	---	---	---	8.2E-01
Cobalt	2.1E-02	1.2E-02	1.2E-01	---	8.2E-06	---	---	---	---	1.5E-01
Copper	2.6E-01	1.5E-01	4.5E+00	---	3.7E-05	---	---	---	---	4.9E+00
Lead	5.5E-02	1.5E-02	1.4E+00	---	6.2E-06	---	---	---	---	1.5E+00
Manganese	2.7E-02	2.7E+00	1.1E-01	---	1.0E-02	---	---	---	---	2.9E+00
Mercury	7.4E-04	1.4E-03	6.0E-02	---	1.3E-07	---	---	---	---	6.2E-02
Molybdenum	5.5E-02	4.3E-02	2.5E+00	---	5.5E-05	---	---	---	---	2.6E+00
Nickel	3.5E-02	4.5E-02	1.8E+00	---	3.1E-05	---	---	---	---	1.8E+00
Selenium	1.7E-03	1.4E-02	7.9E-02	---	5.0E-06	---	---	---	---	9.5E-02
Silver	1.1E-03	2.9E-03	1.0E-01	---	6.1E-07	---	---	---	---	1.1E-01
Strontium	1.4E-01	5.4E-01	5.7E-01	---	1.6E-02	---	---	---	---	1.3E+00
Thallium	1.2E-03	2.2E-03	2.7E-03	---	3.4E-06	---	---	---	---	6.2E-03
Uranium	3.0E-03	2.9E-04	4.8E-03	---	9.0E-06	---	---	---	---	8.1E-03
Vanadium	8.2E-02	1.4E-02	1.6E-01	---	1.9E-05	---	---	---	---	2.6E-01
Zinc	3.1E-01	1.7E+00	9.7E+01	---	1.4E-04	---	---	---	---	9.9E+01

Average Daily Doses for the Deer Mouse Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.0E-04	3.4E-03	2.6E-03	---	2.0E-05	---	---	---	---	6.1E-03
Arsenic	9.1E-04	1.8E-03	5.5E-03	---	5.6E-05	---	---	---	---	8.3E-03
Barium	2.0E-03	2.7E-01	4.8E-03	---	3.9E-03	---	---	---	---	2.8E-01
Beryllium	2.5E-04	2.3E-03	2.9E-04	---	9.0E-06	---	---	---	---	2.9E-03
Cadmium	3.0E-04	1.4E-02	7.9E-02	---	4.7E-07	---	---	---	---	9.4E-02
Chromium (Total)	6.5E-03	1.8E-02	5.1E-02	---	1.6E-05	---	---	---	---	7.6E-02
Cobalt	2.6E-03	1.5E-02	8.2E-03	---	9.1E-06	---	---	---	---	2.6E-02
Copper	3.2E-02	2.0E-01	3.0E-01	---	4.1E-05	---	---	---	---	5.3E-01
Lead	6.8E-03	2.0E-02	9.4E-02	---	6.9E-06	---	---	---	---	1.2E-01
Manganese	3.3E-03	3.5E+00	7.6E-03	---	1.1E-02	---	---	---	---	3.5E+00
Mercury	9.2E-05	1.8E-03	4.0E-03	---	1.4E-07	---	---	---	---	5.9E-03
Molybdenum	6.9E-03	5.5E-02	1.7E-01	---	6.1E-05	---	---	---	---	2.3E-01
Nickel	4.4E-03	5.7E-02	1.2E-01	---	3.5E-05	---	---	---	---	1.8E-01
Selenium	2.1E-04	1.8E-02	5.3E-03	---	5.6E-06	---	---	---	---	2.4E-02
Silver	1.3E-04	3.7E-03	7.0E-03	---	6.8E-07	---	---	---	---	1.1E-02
Strontium	1.7E-02	6.9E-01	3.9E-02	---	1.8E-02	---	---	---	---	7.6E-01
Thallium	1.5E-04	2.9E-03	1.8E-04	---	3.8E-06	---	---	---	---	3.2E-03
Uranium	3.8E-04	3.7E-04	3.2E-04	---	9.9E-06	---	---	---	---	1.1E-03
Vanadium	1.0E-02	1.8E-02	1.1E-02	---	2.1E-05	---	---	---	---	4.0E-02
Zinc	3.9E-02	2.2E+00	6.5E+00	---	1.5E-04	---	---	---	---	8.7E+00

Average Daily Doses for the Meadow Vole Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.4E-04	8.1E-03	---	---	2.2E-05	---	---	---	---	8.3E-03
Arsenic	1.3E-03	4.4E-03	---	---	6.2E-05	---	---	---	---	5.7E-03
Barium	2.8E-03	6.4E-01	---	---	4.3E-03	---	---	---	---	6.5E-01
Beryllium	3.5E-04	5.6E-03	---	---	9.9E-06	---	---	---	---	6.0E-03
Cadmium	4.2E-04	3.4E-02	---	---	5.2E-07	---	---	---	---	3.4E-02
Chromium (Total)	9.0E-03	4.4E-02	---	---	1.8E-05	---	---	---	---	5.3E-02
Cobalt	3.6E-03	3.6E-02	---	---	1.0E-05	---	---	---	---	4.0E-02
Copper	4.5E-02	4.8E-01	---	---	4.5E-05	---	---	---	---	5.2E-01
Lead	9.5E-03	4.7E-02	---	---	7.6E-06	---	---	---	---	5.6E-02
Manganese	4.7E-03	8.4E+00	---	---	1.2E-02	---	---	---	---	8.4E+00
Mercury	1.3E-04	4.4E-03	---	---	1.5E-07	---	---	---	---	4.5E-03
Molybdenum	9.6E-03	1.3E-01	---	---	6.7E-05	---	---	---	---	1.4E-01
Nickel	6.1E-03	1.4E-01	---	---	3.8E-05	---	---	---	---	1.4E-01
Selenium	2.9E-04	4.4E-02	---	---	6.2E-06	---	---	---	---	4.4E-02
Silver	1.8E-04	8.8E-03	---	---	7.5E-07	---	---	---	---	9.0E-03
Strontium	2.4E-02	1.7E+00	---	---	2.0E-02	---	---	---	---	1.7E+00
Thallium	2.1E-04	6.9E-03	---	---	4.2E-06	---	---	---	---	7.1E-03
Uranium	5.3E-04	8.8E-04	---	---	1.1E-05	---	---	---	---	1.4E-03
Vanadium	1.4E-02	4.4E-02	---	---	2.4E-05	---	---	---	---	5.8E-02
Zinc	5.5E-02	5.2E+00	---	---	1.7E-04	---	---	---	---	5.3E+00

Average Daily Doses for the Moose Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.7E-05	2.5E-03	---	---	5.7E-06	1.2E-05	2.3E-05	---	---	2.6E-03
Arsenic	3.3E-04	1.4E-03	---	---	1.6E-05	3.3E-04	6.2E-04	---	---	2.7E-03
Barium	7.4E-04	2.0E-01	---	---	1.1E-03	9.1E-04	7.1E-03	---	---	2.1E-01
Beryllium	9.1E-05	1.8E-03	---	---	2.6E-06	5.6E-05	1.7E-03	---	---	3.6E-03
Cadmium	1.1E-04	1.1E-02	---	---	1.3E-07	2.6E-05	1.2E-03	---	---	1.2E-02
Chromium (Total)	2.4E-03	1.4E-02	---	---	4.7E-06	2.9E-03	5.9E-03	---	---	2.5E-02
Cobalt	9.5E-04	1.1E-02	---	---	2.6E-06	6.8E-04	2.6E-04	---	---	1.3E-02
Copper	1.2E-02	1.5E-01	---	---	1.2E-05	1.3E-03	2.1E-02	---	---	1.8E-01
Lead	2.5E-03	1.5E-02	---	---	2.0E-06	5.8E-04	3.0E-03	---	---	2.1E-02
Manganese	1.2E-03	2.6E+00	---	---	3.2E-03	4.9E-03	1.9E-02	---	---	2.6E+00
Mercury	3.4E-05	1.4E-03	---	---	4.0E-08	5.5E-06	3.2E-04	---	---	1.7E-03
Molybdenum	2.5E-03	4.1E-02	---	---	1.7E-05	5.2E-04	6.2E-03	---	---	5.1E-02
Nickel	1.6E-03	4.3E-02	---	---	1.0E-05	2.1E-03	4.7E-03	---	---	5.1E-02
Selenium	7.6E-05	1.4E-02	---	---	1.6E-06	5.2E-05	1.3E-03	---	---	1.5E-02
Silver	4.8E-05	2.8E-03	---	---	1.9E-07	5.5E-06	9.5E-06	---	---	2.8E-03
Strontium	6.3E-03	5.2E-01	---	---	5.2E-03	2.1E-03	4.1E-02	---	---	5.7E-01
Thallium	5.6E-05	2.1E-03	---	---	1.1E-06	1.6E-05	2.0E-06	---	---	2.2E-03
Uranium	1.4E-04	2.8E-04	---	---	2.8E-06	2.1E-04	6.3E-05	---	---	6.9E-04
Vanadium	3.7E-03	1.4E-02	---	---	6.1E-06	3.0E-03	7.2E-04	---	---	2.1E-02
Zinc	1.4E-02	1.6E+00	---	---	4.3E-05	7.0E-03	2.1E-01	---	---	1.9E+00

Average Daily Doses for the Muskrat Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	1.0E-05	2.5E-04	3.3E-04	8.7E-05	6.9E-04	1.4E-03
Arsenic	---	---	---	---	2.9E-05	7.0E-03	8.9E-03	1.2E-01	2.6E-03	1.4E-01
Barium	---	---	---	---	2.0E-03	1.9E-02	1.0E-01	1.3E-01	4.0E-03	2.6E-01
Beryllium	---	---	---	---	4.7E-06	1.2E-03	2.5E-02	7.7E-03	1.1E-04	3.4E-02
Cadmium	---	---	---	---	2.4E-07	5.4E-04	1.8E-02	3.9E-02	1.8E-03	5.9E-02
Chromium (Total)	---	---	---	---	8.6E-06	6.1E-02	8.5E-02	4.4E-01	6.2E-03	6.0E-01
Cobalt	---	---	---	---	4.8E-06	1.4E-02	3.7E-03	1.7E-03	3.1E-03	2.3E-02
Copper	---	---	---	---	2.1E-05	2.8E-02	3.1E-01	2.2E+00	3.7E-01	2.9E+00
Lead	---	---	---	---	3.6E-06	1.2E-02	4.3E-02	6.5E-02	3.1E-03	1.2E-01
Manganese	---	---	---	---	5.8E-03	1.0E-01	2.8E-01	7.7E-01	1.1E-02	1.2E+00
Mercury	---	---	---	---	7.2E-08	1.2E-04	4.6E-03	7.0E-04	1.2E-02	1.7E-02
Molybdenum	---	---	---	---	3.2E-05	1.1E-02	9.0E-02	2.8E-01	4.1E-03	3.9E-01
Nickel	---	---	---	---	1.8E-05	4.4E-02	6.8E-02	2.7E-01	9.6E-03	3.9E-01
Selenium	---	---	---	---	2.9E-06	1.1E-03	1.9E-02	3.4E-02	2.4E-02	7.8E-02
Silver	---	---	---	---	3.5E-07	1.2E-04	1.4E-04	4.5E-04	4.1E-03	4.8E-03
Strontium	---	---	---	---	9.4E-03	4.3E-02	5.9E-01	1.3E-01	1.8E-01	9.6E-01
Thallium	---	---	---	---	2.0E-06	3.4E-04	2.9E-05	3.3E-03	5.0E-04	4.2E-03
Uranium	---	---	---	---	5.2E-06	4.5E-03	9.0E-04	3.8E-03	1.1E-04	9.3E-03
Vanadium	---	---	---	---	1.1E-05	6.3E-02	1.0E-02	5.6E-02	7.0E-03	1.4E-01
Zinc	---	---	---	---	7.8E-05	1.5E-01	3.1E+00	1.1E+01	8.9E+00	2.4E+01

Average Daily Doses for the Northern River Otter Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	4.6E-06	---	---	6.5E-05	8.5E-06	9.9E-05	---	2.3E-05	2.9E-03	3.1E-03
Arsenic	4.1E-05	---	---	1.1E-03	2.4E-05	2.8E-03	---	3.1E-02	1.1E-02	4.5E-02
Barium	9.2E-05	---	---	1.4E-02	1.7E-03	7.7E-03	---	3.4E-02	1.7E-02	7.4E-02
Beryllium	1.1E-05	---	---	3.0E-05	3.8E-06	4.8E-04	---	2.0E-03	4.8E-04	3.0E-03
Cadmium	1.4E-05	---	---	6.0E-04	2.0E-07	2.2E-04	---	1.0E-02	7.5E-03	1.8E-02
Chromium (Total)	2.9E-04	---	---	8.3E-04	7.0E-06	2.5E-02	---	1.1E-01	2.6E-02	1.7E-01
Cobalt	1.2E-04	---	---	3.8E-04	3.9E-06	5.8E-03	---	4.4E-04	1.3E-02	2.0E-02
Copper	1.5E-03	---	---	3.3E-02	1.7E-05	1.1E-02	---	5.7E-01	1.5E+00	2.2E+00
Lead	3.1E-04	---	---	3.9E-04	2.9E-06	4.9E-03	---	1.7E-02	1.3E-02	3.5E-02
Manganese	1.5E-04	---	---	5.2E-03	4.7E-03	4.1E-02	---	2.0E-01	4.7E-02	3.0E-01
Mercury	4.2E-06	---	---	1.7E-04	5.9E-08	4.7E-05	---	1.8E-04	4.8E-02	4.8E-02
Molybdenum	3.1E-04	---	---	1.8E-03	2.6E-05	4.4E-03	---	7.3E-02	1.7E-02	9.7E-02
Nickel	2.0E-04	---	---	8.9E-04	1.5E-05	1.7E-02	---	7.1E-02	4.0E-02	1.3E-01
Selenium	9.5E-06	---	---	2.9E-03	2.4E-06	4.4E-04	---	8.8E-03	1.0E-01	1.1E-01
Silver	6.0E-06	---	---	6.0E-05	2.9E-07	4.7E-05	---	1.2E-04	1.7E-02	1.7E-02
Strontium	7.9E-04	---	---	3.7E-02	7.7E-03	1.7E-02	---	3.5E-02	7.5E-01	8.5E-01
Thallium	6.9E-06	---	---	3.6E-04	1.6E-06	1.4E-04	---	8.6E-04	2.1E-03	3.4E-03
Uranium	1.7E-05	---	---	3.2E-05	4.2E-06	1.8E-03	---	9.7E-04	4.6E-04	3.3E-03
Vanadium	4.6E-04	---	---	8.9E-04	9.1E-06	2.5E-02	---	1.5E-02	2.9E-02	7.0E-02
Zinc	1.8E-03	---	---	1.8E-01	6.4E-05	6.0E-02	---	3.0E+00	3.7E+01	4.0E+01

Average Daily Doses for the Short-tailed Weasel Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.6E-04	---	---	3.6E-03	1.3E-05	---	---	---	---	3.9E-03
Arsenic	2.3E-03	---	---	6.2E-02	3.7E-05	---	---	---	---	6.5E-02
Barium	5.1E-03	---	---	7.9E-01	2.6E-03	---	---	---	---	8.0E-01
Beryllium	6.3E-04	---	---	1.7E-03	5.9E-06	---	---	---	---	2.3E-03
Cadmium	7.6E-04	---	---	3.3E-02	3.1E-07	---	---	---	---	3.4E-02
Chromium (Total)	1.6E-02	---	---	4.6E-02	1.1E-05	---	---	---	---	6.3E-02
Cobalt	6.6E-03	---	---	2.1E-02	6.1E-06	---	---	---	---	2.8E-02
Copper	8.1E-02	---	---	1.8E+00	2.7E-05	---	---	---	---	1.9E+00
Lead	1.7E-02	---	---	2.1E-02	4.6E-06	---	---	---	---	3.9E-02
Manganese	8.4E-03	---	---	2.9E-01	7.4E-03	---	---	---	---	3.0E-01
Mercury	2.3E-04	---	---	9.6E-03	9.2E-08	---	---	---	---	9.8E-03
Molybdenum	1.7E-02	---	---	9.9E-02	4.0E-05	---	---	---	---	1.2E-01
Nickel	1.1E-02	---	---	5.0E-02	2.3E-05	---	---	---	---	6.1E-02
Selenium	5.3E-04	---	---	1.6E-01	3.7E-06	---	---	---	---	1.6E-01
Silver	3.3E-04	---	---	3.3E-03	4.5E-07	---	---	---	---	3.6E-03
Strontium	4.4E-02	---	---	2.1E+00	1.2E-02	---	---	---	---	2.1E+00
Thallium	3.8E-04	---	---	2.0E-02	2.5E-06	---	---	---	---	2.1E-02
Uranium	9.5E-04	---	---	1.8E-03	6.6E-06	---	---	---	---	2.7E-03
Vanadium	2.6E-02	---	---	5.0E-02	1.4E-05	---	---	---	---	7.5E-02
Zinc	9.9E-02	---	---	1.0E+01	9.9E-05	---	---	---	---	1.0E+01

Average Daily Doses for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.6E-04	---	---	3.6E-03	1.3E-05	---	---	---	---	3.9E-03
Arsenic	2.3E-03	---	---	6.2E-02	3.7E-05	---	---	---	---	6.5E-02
Barium	5.1E-03	---	---	7.9E-01	2.6E-03	---	---	---	---	8.0E-01
Beryllium	6.3E-04	---	---	1.7E-03	5.9E-06	---	---	---	---	2.3E-03
Cadmium	7.6E-04	---	---	3.3E-02	3.1E-07	---	---	---	---	3.4E-02
Chromium (Total)	1.6E-02	---	---	4.6E-02	1.1E-05	---	---	---	---	6.3E-02
Cobalt	6.6E-03	---	---	2.1E-02	6.1E-06	---	---	---	---	2.8E-02
Copper	8.1E-02	---	---	1.8E+00	2.7E-05	---	---	---	---	1.9E+00
Lead	1.7E-02	---	---	2.1E-02	4.6E-06	---	---	---	---	3.9E-02
Manganese	8.4E-03	---	---	2.9E-01	7.4E-03	---	---	---	---	3.0E-01
Mercury	2.3E-04	---	---	9.6E-03	9.2E-08	---	---	---	---	9.8E-03
Molybdenum	1.7E-02	---	---	9.9E-02	4.0E-05	---	---	---	---	1.2E-01
Nickel	1.1E-02	---	---	5.0E-02	2.3E-05	---	---	---	---	6.1E-02
Selenium	5.3E-04	---	---	1.6E-01	3.7E-06	---	---	---	---	1.6E-01
Silver	3.3E-04	---	---	3.3E-03	4.5E-07	---	---	---	---	3.6E-03
Strontium	4.4E-02	---	---	2.1E+00	1.2E-02	---	---	---	---	2.1E+00
Thallium	3.8E-04	---	---	2.0E-02	2.5E-06	---	---	---	---	2.1E-02
Uranium	9.5E-04	---	---	1.8E-03	6.6E-06	---	---	---	---	2.7E-03
Vanadium	2.6E-02	---	---	5.0E-02	1.4E-05	---	---	---	---	7.5E-02
Zinc	9.9E-02	---	---	1.0E+01	9.9E-05	---	---	---	---	1.0E+01

Average Daily Doses for the Snowshoe Hare Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	4.6E-04	1.0E-02	---	---	1.0E-05	---	---	---	---	1.0E-02
Arsenic	4.1E-03	5.4E-03	---	---	2.8E-05	---	---	---	---	9.6E-03
Barium	9.2E-03	7.9E-01	---	---	2.0E-03	---	---	---	---	8.0E-01
Beryllium	1.1E-03	6.9E-03	---	---	4.5E-06	---	---	---	---	8.1E-03
Cadmium	1.4E-03	4.2E-02	---	---	2.4E-07	---	---	---	---	4.3E-02
Chromium (Total)	2.9E-02	5.4E-02	---	---	8.3E-06	---	---	---	---	8.3E-02
Cobalt	1.2E-02	4.5E-02	---	---	4.6E-06	---	---	---	---	5.7E-02
Copper	1.4E-01	5.9E-01	---	---	2.1E-05	---	---	---	---	7.3E-01
Lead	3.1E-02	5.8E-02	---	---	3.5E-06	---	---	---	---	8.9E-02
Manganese	1.5E-02	1.0E+01	---	---	5.6E-03	---	---	---	---	1.0E+01
Mercury	4.2E-04	5.4E-03	---	---	7.0E-08	---	---	---	---	5.8E-03
Molybdenum	3.1E-02	1.6E-01	---	---	3.1E-05	---	---	---	---	1.9E-01
Nickel	2.0E-02	1.7E-01	---	---	1.8E-05	---	---	---	---	1.9E-01
Selenium	9.5E-04	5.4E-02	---	---	2.8E-06	---	---	---	---	5.5E-02
Silver	6.0E-04	1.1E-02	---	---	3.4E-07	---	---	---	---	1.1E-02
Strontium	7.8E-02	2.0E+00	---	---	9.2E-03	---	---	---	---	2.1E+00
Thallium	6.9E-04	8.4E-03	---	---	1.9E-06	---	---	---	---	9.1E-03
Uranium	1.7E-03	1.1E-03	---	---	5.0E-06	---	---	---	---	2.8E-03
Vanadium	4.6E-02	5.4E-02	---	---	1.1E-05	---	---	---	---	1.0E-01
Zinc	1.8E-01	6.4E+00	---	---	7.6E-05	---	---	---	---	6.6E+00

Average Daily Doses for the Woodland Caribou Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.3E-04	1.3E-03	---	---	6.2E-06	---	---	---	---	1.4E-03
Arsenic	1.2E-03	7.0E-04	---	---	1.7E-05	---	---	---	---	1.9E-03
Barium	2.6E-03	1.0E-01	---	---	1.2E-03	---	---	---	---	1.0E-01
Beryllium	3.2E-04	8.9E-04	---	---	2.8E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	5.4E-03	---	---	1.4E-07	---	---	---	---	5.8E-03
Chromium (Total)	8.2E-03	7.0E-03	---	---	5.1E-06	---	---	---	---	1.5E-02
Cobalt	3.3E-03	5.8E-03	---	---	2.8E-06	---	---	---	---	9.1E-03
Copper	4.1E-02	7.5E-02	---	---	1.3E-05	---	---	---	---	1.2E-01
Lead	8.7E-03	7.4E-03	---	---	2.1E-06	---	---	---	---	1.6E-02
Manganese	4.3E-03	1.3E+00	---	---	3.4E-03	---	---	---	---	1.3E+00
Mercury	1.2E-04	7.0E-04	---	---	4.3E-08	---	---	---	---	8.1E-04
Molybdenum	8.8E-03	2.1E-02	---	---	1.9E-05	---	---	---	---	3.0E-02
Nickel	5.6E-03	2.2E-02	---	---	1.1E-05	---	---	---	---	2.7E-02
Selenium	2.7E-04	7.0E-03	---	---	1.7E-06	---	---	---	---	7.2E-03
Silver	1.7E-04	1.4E-03	---	---	2.1E-07	---	---	---	---	1.6E-03
Strontium	2.2E-02	2.6E-01	---	---	5.6E-03	---	---	---	---	2.9E-01
Thallium	1.9E-04	1.1E-03	---	---	1.2E-06	---	---	---	---	1.3E-03
Uranium	4.8E-04	1.4E-04	---	---	3.1E-06	---	---	---	---	6.2E-04
Vanadium	1.3E-02	7.0E-03	---	---	6.6E-06	---	---	---	---	2.0E-02
Zinc	5.0E-02	8.3E-01	---	---	4.6E-05	---	---	---	---	8.8E-01

Average Daily Doses for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.3E-04	1.3E-03	---	---	6.2E-06	---	---	---	---	1.4E-03
Arsenic	1.2E-03	7.0E-04	---	---	1.7E-05	---	---	---	---	1.9E-03
Barium	2.6E-03	1.0E-01	---	---	1.2E-03	---	---	---	---	1.0E-01
Beryllium	3.2E-04	8.9E-04	---	---	2.8E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	5.4E-03	---	---	1.4E-07	---	---	---	---	5.8E-03
Chromium (Total)	8.2E-03	7.0E-03	---	---	5.1E-06	---	---	---	---	1.5E-02
Cobalt	3.3E-03	5.8E-03	---	---	2.8E-06	---	---	---	---	9.1E-03
Copper	4.1E-02	7.5E-02	---	---	1.3E-05	---	---	---	---	1.2E-01
Lead	8.7E-03	7.4E-03	---	---	2.1E-06	---	---	---	---	1.6E-02
Manganese	4.3E-03	1.3E+00	---	---	3.4E-03	---	---	---	---	1.3E+00
Mercury	1.2E-04	7.0E-04	---	---	4.3E-08	---	---	---	---	8.1E-04
Molybdenum	8.8E-03	2.1E-02	---	---	1.9E-05	---	---	---	---	3.0E-02
Nickel	5.6E-03	2.2E-02	---	---	1.1E-05	---	---	---	---	2.7E-02
Selenium	2.7E-04	7.0E-03	---	---	1.7E-06	---	---	---	---	7.2E-03
Silver	1.7E-04	1.4E-03	---	---	2.1E-07	---	---	---	---	1.6E-03
Strontium	2.2E-02	2.6E-01	---	---	5.6E-03	---	---	---	---	2.9E-01
Thallium	1.9E-04	1.1E-03	---	---	1.2E-06	---	---	---	---	1.3E-03
Uranium	4.8E-04	1.4E-04	---	---	3.1E-06	---	---	---	---	6.2E-04
Vanadium	1.3E-02	7.0E-03	---	---	6.6E-06	---	---	---	---	2.0E-02
Zinc	5.0E-02	8.3E-01	---	---	4.6E-05	---	---	---	---	8.8E-01

Average Daily Doses for the American Robin Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.0E-04	1.8E-02	9.4E-03	---	1.4E-05	---	---	---	---	2.8E-02
Arsenic	8.1E-03	9.9E-03	2.0E-02	---	4.0E-05	---	---	---	---	3.8E-02
Barium	1.8E-02	1.4E+00	1.7E-02	---	2.8E-03	---	---	---	---	1.5E+00
Beryllium	2.2E-03	1.3E-02	1.0E-03	---	6.4E-06	---	---	---	---	1.6E-02
Cadmium	2.7E-03	7.6E-02	2.8E-01	---	3.4E-07	---	---	---	---	3.6E-01
Chromium (Total)	5.7E-02	9.9E-02	1.8E-01	---	1.2E-05	---	---	---	---	3.4E-01
Cobalt	2.3E-02	8.2E-02	2.9E-02	---	6.5E-06	---	---	---	---	1.3E-01
Copper	2.8E-01	1.1E+00	1.1E+00	---	2.9E-05	---	---	---	---	2.4E+00
Lead	6.1E-02	1.0E-01	3.4E-01	---	5.0E-06	---	---	---	---	5.0E-01
Manganese	3.0E-02	1.9E+01	2.7E-02	---	8.0E-03	---	---	---	---	1.9E+01
Mercury	8.2E-04	9.9E-03	1.4E-02	---	1.0E-07	---	---	---	---	2.5E-02
Molybdenum	6.1E-02	3.0E-01	6.0E-01	---	4.4E-05	---	---	---	---	9.6E-01
Nickel	3.9E-02	3.1E-01	4.3E-01	---	2.5E-05	---	---	---	---	7.7E-01
Selenium	1.9E-03	9.9E-02	1.9E-02	---	4.0E-06	---	---	---	---	1.2E-01
Silver	1.2E-03	2.0E-02	2.5E-02	---	4.9E-07	---	---	---	---	4.6E-02
Strontium	1.5E-01	3.7E+00	1.4E-01	---	1.3E-02	---	---	---	---	4.0E+00
Thallium	1.4E-03	1.5E-02	6.6E-04	---	2.7E-06	---	---	---	---	1.7E-02
Uranium	3.4E-03	2.0E-03	1.2E-03	---	7.1E-06	---	---	---	---	6.5E-03
Vanadium	9.1E-02	9.9E-02	4.0E-02	---	1.5E-05	---	---	---	---	2.3E-01
Zinc	3.5E-01	1.2E+01	2.3E+01	---	1.1E-04	---	---	---	---	3.5E+01

Average Daily Doses for the American Robin (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.0E-04	1.8E-02	9.4E-03	---	1.4E-05	---	---	---	---	2.8E-02
Arsenic	8.1E-03	9.9E-03	2.0E-02	---	4.0E-05	---	---	---	---	3.8E-02
Barium	1.8E-02	1.4E+00	1.7E-02	---	2.8E-03	---	---	---	---	1.5E+00
Beryllium	2.2E-03	1.3E-02	1.0E-03	---	6.4E-06	---	---	---	---	1.6E-02
Cadmium	2.7E-03	7.6E-02	2.8E-01	---	3.4E-07	---	---	---	---	3.6E-01
Chromium (Total)	5.7E-02	9.9E-02	1.8E-01	---	1.2E-05	---	---	---	---	3.4E-01
Cobalt	2.3E-02	8.2E-02	2.9E-02	---	6.5E-06	---	---	---	---	1.3E-01
Copper	2.8E-01	1.1E+00	1.1E+00	---	2.9E-05	---	---	---	---	2.4E+00
Lead	6.1E-02	1.0E-01	3.4E-01	---	5.0E-06	---	---	---	---	5.0E-01
Manganese	3.0E-02	1.9E+01	2.7E-02	---	8.0E-03	---	---	---	---	1.9E+01
Mercury	8.2E-04	9.9E-03	1.4E-02	---	1.0E-07	---	---	---	---	2.5E-02
Molybdenum	6.1E-02	3.0E-01	6.0E-01	---	4.4E-05	---	---	---	---	9.6E-01
Nickel	3.9E-02	3.1E-01	4.3E-01	---	2.5E-05	---	---	---	---	7.7E-01
Selenium	1.9E-03	9.9E-02	1.9E-02	---	4.0E-06	---	---	---	---	1.2E-01
Silver	1.2E-03	2.0E-02	2.5E-02	---	4.9E-07	---	---	---	---	4.6E-02
Strontium	1.5E-01	3.7E+00	1.4E-01	---	1.3E-02	---	---	---	---	4.0E+00
Thallium	1.4E-03	1.5E-02	6.6E-04	---	2.7E-06	---	---	---	---	1.7E-02
Uranium	3.4E-03	2.0E-03	1.2E-03	---	7.1E-06	---	---	---	---	6.5E-03
Vanadium	9.1E-02	9.9E-02	4.0E-02	---	1.5E-05	---	---	---	---	2.3E-01
Zinc	3.5E-01	1.2E+01	2.3E+01	---	1.1E-04	---	---	---	---	3.5E+01

Average Daily Doses for the Barn Swallow Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	6.2E-04	4.0E-04	3.1E-02	---	2.3E-05	---	---	---	---	3.2E-02
Arsenic	5.6E-03	2.2E-04	6.5E-02	---	6.4E-05	---	---	---	---	7.1E-02
Barium	1.2E-02	3.2E-02	5.6E-02	---	4.5E-03	---	---	---	---	1.0E-01
Beryllium	1.5E-03	2.8E-04	3.4E-03	---	1.0E-05	---	---	---	---	5.2E-03
Cadmium	1.8E-03	1.7E-03	9.3E-01	---	5.4E-07	---	---	---	---	9.4E-01
Chromium (Total)	4.0E-02	2.2E-03	6.0E-01	---	1.9E-05	---	---	---	---	6.4E-01
Cobalt	1.6E-02	1.8E-03	9.7E-02	---	1.1E-05	---	---	---	---	1.1E-01
Copper	2.0E-01	2.4E-02	3.5E+00	---	4.7E-05	---	---	---	---	3.8E+00
Lead	4.2E-02	2.3E-03	1.1E+00	---	8.0E-06	---	---	---	---	1.2E+00
Manganese	2.0E-02	4.1E-01	8.9E-02	---	1.3E-02	---	---	---	---	5.4E-01
Mercury	5.6E-04	2.2E-04	4.7E-02	---	1.6E-07	---	---	---	---	4.8E-02
Molybdenum	4.2E-02	6.5E-03	2.0E+00	---	7.0E-05	---	---	---	---	2.0E+00
Nickel	2.7E-02	6.8E-03	1.4E+00	---	4.0E-05	---	---	---	---	1.4E+00
Selenium	1.3E-03	2.2E-03	6.3E-02	---	6.4E-06	---	---	---	---	6.6E-02
Silver	8.1E-04	4.4E-04	8.2E-02	---	7.8E-07	---	---	---	---	8.3E-02
Strontium	1.1E-01	8.2E-02	4.6E-01	---	2.1E-02	---	---	---	---	6.6E-01
Thallium	9.3E-04	3.4E-04	2.2E-03	---	4.4E-06	---	---	---	---	3.5E-03
Uranium	2.3E-03	4.4E-05	3.8E-03	---	1.1E-05	---	---	---	---	6.2E-03
Vanadium	6.2E-02	2.2E-03	1.3E-01	---	2.5E-05	---	---	---	---	1.9E-01
Zinc	2.4E-01	2.6E-01	7.7E+01	---	1.7E-04	---	---	---	---	7.7E+01

Average Daily Doses for the Barn Swallow (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	6.2E-04	4.0E-04	3.1E-02	---	2.3E-05	---	---	---	---	3.2E-02
Arsenic	5.6E-03	2.2E-04	6.5E-02	---	6.4E-05	---	---	---	---	7.1E-02
Barium	1.2E-02	3.2E-02	5.6E-02	---	4.5E-03	---	---	---	---	1.0E-01
Beryllium	1.5E-03	2.8E-04	3.4E-03	---	1.0E-05	---	---	---	---	5.2E-03
Cadmium	1.8E-03	1.7E-03	9.3E-01	---	5.4E-07	---	---	---	---	9.4E-01
Chromium (Total)	4.0E-02	2.2E-03	6.0E-01	---	1.9E-05	---	---	---	---	6.4E-01
Cobalt	1.6E-02	1.8E-03	9.7E-02	---	1.1E-05	---	---	---	---	1.1E-01
Copper	2.0E-01	2.4E-02	3.5E+00	---	4.7E-05	---	---	---	---	3.8E+00
Lead	4.2E-02	2.3E-03	1.1E+00	---	8.0E-06	---	---	---	---	1.2E+00
Manganese	2.0E-02	4.1E-01	8.9E-02	---	1.3E-02	---	---	---	---	5.4E-01
Mercury	5.6E-04	2.2E-04	4.7E-02	---	1.6E-07	---	---	---	---	4.8E-02
Molybdenum	4.2E-02	6.5E-03	2.0E+00	---	7.0E-05	---	---	---	---	2.0E+00
Nickel	2.7E-02	6.8E-03	1.4E+00	---	4.0E-05	---	---	---	---	1.4E+00
Selenium	1.3E-03	2.2E-03	6.3E-02	---	6.4E-06	---	---	---	---	6.6E-02
Silver	8.1E-04	4.4E-04	8.2E-02	---	7.8E-07	---	---	---	---	8.3E-02
Strontium	1.1E-01	8.2E-02	4.6E-01	---	2.1E-02	---	---	---	---	6.6E-01
Thallium	9.3E-04	3.4E-04	2.2E-03	---	4.4E-06	---	---	---	---	3.5E-03
Uranium	2.3E-03	4.4E-05	3.8E-03	---	1.1E-05	---	---	---	---	6.2E-03
Vanadium	6.2E-02	2.2E-03	1.3E-01	---	2.5E-05	---	---	---	---	1.9E-01
Zinc	2.4E-01	2.6E-01	7.7E+01	---	1.7E-04	---	---	---	---	7.7E+01

Average Daily Doses for the Common Loon Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	3.6E-06	1.7E-04	---	2.4E-05	5.1E-03	5.3E-03
Arsenic	---	---	---	---	1.0E-05	4.7E-03	---	3.3E-02	1.9E-02	5.6E-02
Barium	---	---	---	---	7.0E-04	1.3E-02	---	3.6E-02	3.0E-02	8.0E-02
Beryllium	---	---	---	---	1.6E-06	8.0E-04	---	2.1E-03	8.6E-04	3.8E-03
Cadmium	---	---	---	---	8.4E-08	3.7E-04	---	1.1E-02	1.3E-02	2.5E-02
Chromium (Total)	---	---	---	---	2.9E-06	4.1E-02	---	1.2E-01	4.6E-02	2.1E-01
Cobalt	---	---	---	---	1.6E-06	9.8E-03	---	4.7E-04	2.3E-02	3.3E-02
Copper	---	---	---	---	7.3E-06	1.9E-02	---	6.1E-01	2.8E+00	3.4E+00
Lead	---	---	---	---	1.2E-06	8.3E-03	---	1.8E-02	2.3E-02	4.9E-02
Manganese	---	---	---	---	2.0E-03	7.0E-02	---	2.1E-01	8.4E-02	3.7E-01
Mercury	---	---	---	---	2.5E-08	7.9E-05	---	1.9E-04	8.6E-02	8.6E-02
Molybdenum	---	---	---	---	1.1E-05	7.4E-03	---	7.8E-02	3.0E-02	1.2E-01
Nickel	---	---	---	---	6.2E-06	2.9E-02	---	7.5E-02	7.2E-02	1.8E-01
Selenium	---	---	---	---	1.0E-06	7.4E-04	---	9.3E-03	1.8E-01	1.9E-01
Silver	---	---	---	---	1.2E-07	7.9E-05	---	1.2E-04	3.0E-02	3.0E-02
Strontium	---	---	---	---	3.2E-03	2.9E-02	---	3.7E-02	1.4E+00	1.4E+00
Thallium	---	---	---	---	6.8E-07	2.3E-04	---	9.1E-04	3.7E-03	4.9E-03
Uranium	---	---	---	---	1.8E-06	3.1E-03	---	1.0E-03	8.2E-04	4.9E-03
Vanadium	---	---	---	---	3.8E-06	4.3E-02	---	1.5E-02	5.2E-02	1.1E-01
Zinc	---	---	---	---	2.7E-05	1.0E-01	---	3.2E+00	6.6E+01	6.9E+01

Average Daily Doses for the Lesser Scaup Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	7.0E-06	2.3E-04	2.6E-05	3.3E-04	---	5.9E-04
Arsenic	---	---	---	---	1.9E-05	6.6E-03	7.0E-04	4.4E-01	---	4.5E-01
Barium	---	---	---	---	1.4E-03	1.8E-02	8.0E-03	4.9E-01	---	5.1E-01
Beryllium	---	---	---	---	3.1E-06	1.1E-03	1.9E-03	2.9E-02	---	3.2E-02
Cadmium	---	---	---	---	1.6E-07	5.1E-04	1.4E-03	1.5E-01	---	1.5E-01
Chromium (Total)	---	---	---	---	5.7E-06	5.7E-02	6.7E-03	1.7E+00	---	1.7E+00
Cobalt	---	---	---	---	3.2E-06	1.4E-02	2.9E-04	6.4E-03	---	2.0E-02
Copper	---	---	---	---	1.4E-05	2.7E-02	2.4E-02	8.3E+00	---	8.3E+00
Lead	---	---	---	---	2.4E-06	1.1E-02	3.3E-03	2.5E-01	---	2.6E-01
Manganese	---	---	---	---	3.9E-03	9.7E-02	2.2E-02	2.9E+00	---	3.0E+00
Mercury	---	---	---	---	4.8E-08	1.1E-04	3.6E-04	2.6E-03	---	3.1E-03
Molybdenum	---	---	---	---	2.1E-05	1.0E-02	7.0E-03	1.1E+00	---	1.1E+00
Nickel	---	---	---	---	1.2E-05	4.1E-02	5.3E-03	1.0E+00	---	1.1E+00
Selenium	---	---	---	---	1.9E-06	1.0E-03	1.4E-03	1.3E-01	---	1.3E-01
Silver	---	---	---	---	2.4E-07	1.1E-04	1.1E-05	1.7E-03	---	1.8E-03
Strontium	---	---	---	---	6.3E-03	4.1E-02	4.6E-02	5.1E-01	---	6.0E-01
Thallium	---	---	---	---	1.3E-06	3.2E-04	2.2E-06	1.2E-02	---	1.3E-02
Uranium	---	---	---	---	3.5E-06	4.3E-03	7.1E-05	1.4E-02	---	1.8E-02
Vanadium	---	---	---	---	7.4E-06	5.9E-02	8.2E-04	2.1E-01	---	2.7E-01
Zinc	---	---	---	---	5.2E-05	1.4E-01	2.4E-01	4.3E+01	---	4.3E+01

Average Daily Doses for the Mallard Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.9E-05	3.8E-04	3.0E-04	---	5.9E-06	2.9E-04	1.4E-04	1.6E-04	---	1.3E-03
Arsenic	1.7E-04	2.1E-04	6.3E-04	---	1.6E-05	8.2E-03	3.8E-03	2.1E-01	---	2.3E-01
Barium	3.8E-04	3.0E-02	5.5E-04	---	1.1E-03	2.3E-02	4.3E-02	2.3E-01	---	3.3E-01
Beryllium	4.7E-05	2.7E-04	3.3E-05	---	2.6E-06	1.4E-03	1.0E-02	1.4E-02	---	2.6E-02
Cadmium	5.7E-05	1.6E-03	9.1E-03	---	1.4E-07	6.4E-04	7.5E-03	7.0E-02	---	8.9E-02
Chromium (Total)	1.2E-03	2.1E-03	5.8E-03	---	4.8E-06	7.2E-02	3.6E-02	7.9E-01	---	9.1E-01
Cobalt	4.9E-04	1.7E-03	9.4E-04	---	2.7E-06	1.7E-02	1.6E-03	3.1E-03	---	2.5E-02
Copper	6.0E-03	2.3E-02	3.5E-02	---	1.2E-05	3.3E-02	1.3E-01	4.0E+00	---	4.2E+00
Lead	1.3E-03	2.2E-03	1.1E-02	---	2.0E-06	1.4E-02	1.8E-02	1.2E-01	---	1.6E-01
Manganese	6.3E-04	4.0E-01	8.7E-04	---	3.2E-03	1.2E-01	1.2E-01	1.4E+00	---	2.0E+00
Mercury	1.7E-05	2.1E-04	4.6E-04	---	4.1E-08	1.4E-04	1.9E-03	1.3E-03	---	4.0E-03
Molybdenum	1.3E-03	6.3E-03	1.9E-02	---	1.8E-05	1.3E-02	3.8E-02	5.1E-01	---	5.8E-01
Nickel	8.2E-04	6.6E-03	1.4E-02	---	1.0E-05	5.1E-02	2.8E-02	4.9E-01	---	5.9E-01
Selenium	4.0E-05	2.1E-03	6.1E-04	---	1.6E-06	1.3E-03	7.8E-03	6.1E-02	---	7.3E-02
Silver	2.5E-05	4.2E-04	8.0E-04	---	2.0E-07	1.4E-04	5.8E-05	8.0E-04	---	2.2E-03
Strontium	3.3E-03	7.9E-02	4.4E-03	---	5.3E-03	5.1E-02	2.5E-01	2.4E-01	---	6.3E-01
Thallium	2.9E-05	3.3E-04	2.1E-05	---	1.1E-06	4.0E-04	1.2E-05	5.9E-03	---	6.7E-03
Uranium	7.1E-05	4.2E-05	3.7E-05	---	2.9E-06	5.3E-03	3.8E-04	6.8E-03	---	1.3E-02
Vanadium	1.9E-03	2.1E-03	1.3E-03	---	6.2E-06	7.4E-02	4.4E-03	1.0E-01	---	1.8E-01
Zinc	7.4E-03	2.5E-01	7.5E-01	---	4.4E-05	1.7E-01	1.3E+00	2.1E+01	---	2.3E+01

Average Daily Doses for the Red-tailed Hawk Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.7E-05	---	---	1.1E-03	6.0E-06	---	---	---	---	1.2E-03
Arsenic	7.0E-04	---	---	1.9E-02	1.7E-05	---	---	---	---	2.0E-02
Barium	1.6E-03	---	---	2.4E-01	1.2E-03	---	---	---	---	2.4E-01
Beryllium	1.9E-04	---	---	5.0E-04	2.7E-06	---	---	---	---	6.9E-04
Cadmium	2.3E-04	---	---	1.0E-02	1.4E-07	---	---	---	---	1.0E-02
Chromium (Total)	4.9E-03	---	---	1.4E-02	4.9E-06	---	---	---	---	1.9E-02
Cobalt	2.0E-03	---	---	6.4E-03	2.7E-06	---	---	---	---	8.4E-03
Copper	2.4E-02	---	---	5.5E-01	1.2E-05	---	---	---	---	5.7E-01
Lead	5.2E-03	---	---	6.5E-03	2.1E-06	---	---	---	---	1.2E-02
Manganese	2.5E-03	---	---	8.8E-02	3.3E-03	---	---	---	---	9.3E-02
Mercury	7.0E-05	---	---	2.9E-03	4.2E-08	---	---	---	---	3.0E-03
Molybdenum	5.2E-03	---	---	3.0E-02	1.8E-05	---	---	---	---	3.5E-02
Nickel	3.3E-03	---	---	1.5E-02	1.0E-05	---	---	---	---	1.8E-02
Selenium	1.6E-04	---	---	4.8E-02	1.7E-06	---	---	---	---	4.8E-02
Silver	1.0E-04	---	---	1.0E-03	2.0E-07	---	---	---	---	1.1E-03
Strontium	1.3E-02	---	---	6.2E-01	5.4E-03	---	---	---	---	6.4E-01
Thallium	1.2E-04	---	---	6.1E-03	1.1E-06	---	---	---	---	6.2E-03
Uranium	2.9E-04	---	---	5.4E-04	3.0E-06	---	---	---	---	8.3E-04
Vanadium	7.8E-03	---	---	1.5E-02	6.4E-06	---	---	---	---	2.3E-02
Zinc	3.0E-02	---	---	3.0E+00	4.5E-05	---	---	---	---	3.1E+00

Average Daily Doses for the Spotted Sandpiper Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.3E-04	---	1.1E-02	---	1.8E-05	3.1E-04	4.4E-05	3.7E-04	1.5E-03	1.4E-02
Arsenic	2.0E-03	---	2.4E-02	---	5.1E-05	8.9E-03	1.2E-03	5.0E-01	5.5E-03	5.5E-01
Barium	4.6E-03	---	2.1E-02	---	3.6E-03	2.4E-02	1.4E-02	5.5E-01	8.6E-03	6.3E-01
Beryllium	5.6E-04	---	1.3E-03	---	8.2E-06	1.5E-03	3.3E-03	3.3E-02	2.4E-04	4.0E-02
Cadmium	6.7E-04	---	3.4E-01	---	4.3E-07	6.9E-04	2.4E-03	1.7E-01	3.8E-03	5.2E-01
Chromium (Total)	1.4E-02	---	2.2E-01	---	1.5E-05	7.8E-02	1.1E-02	1.9E+00	1.3E-02	2.2E+00
Cobalt	5.8E-03	---	3.6E-02	---	8.4E-06	1.8E-02	4.9E-04	7.3E-03	6.6E-03	7.4E-02
Copper	7.2E-02	---	1.3E+00	---	3.8E-05	3.6E-02	4.1E-02	9.4E+00	7.9E-01	1.2E+01
Lead	1.5E-02	---	4.1E-01	---	6.4E-06	1.6E-02	5.7E-03	2.8E-01	6.6E-03	7.3E-01
Manganese	7.5E-03	---	3.3E-02	---	1.0E-02	1.3E-01	3.7E-02	3.3E+00	2.4E-02	3.5E+00
Mercury	2.1E-04	---	1.7E-02	---	1.3E-07	1.5E-04	6.1E-04	3.0E-03	2.5E-02	4.6E-02
Molybdenum	1.5E-02	---	7.3E-01	---	5.6E-05	1.4E-02	1.2E-02	1.2E+00	8.7E-03	2.0E+00
Nickel	9.8E-03	---	5.2E-01	---	3.2E-05	5.5E-02	9.0E-03	1.2E+00	2.1E-02	1.8E+00
Selenium	4.7E-04	---	2.3E-02	---	5.1E-06	1.4E-03	2.5E-03	1.4E-01	5.2E-02	2.2E-01
Silver	3.0E-04	---	3.0E-02	---	6.2E-07	1.5E-04	1.8E-05	1.9E-03	8.7E-03	4.1E-02
Strontium	3.9E-02	---	1.7E-01	---	1.7E-02	5.5E-02	7.9E-02	5.8E-01	3.9E-01	1.3E+00
Thallium	3.4E-04	---	8.0E-04	---	3.5E-06	4.3E-04	3.8E-06	1.4E-02	1.1E-03	1.7E-02
Uranium	8.5E-04	---	1.4E-03	---	9.1E-06	5.8E-03	1.2E-04	1.6E-02	2.3E-04	2.4E-02
Vanadium	2.3E-02	---	4.8E-02	---	2.0E-05	8.0E-02	1.4E-03	2.4E-01	1.5E-02	4.1E-01
Zinc	8.8E-02	---	2.8E+01	---	1.4E-04	1.9E-01	4.1E-01	4.9E+01	1.9E+01	9.7E+01

Average Daily Doses for the Spruce Grouse Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.7E-04	1.1E-02	4.5E-04	---	7.4E-06	---	---	---	---	1.2E-02
Arsenic	1.5E-03	6.0E-03	9.5E-04	---	2.0E-05	---	---	---	---	8.4E-03
Barium	3.4E-03	8.6E-01	8.2E-04	---	1.4E-03	---	---	---	---	8.7E-01
Beryllium	4.2E-04	7.6E-03	5.0E-05	---	3.3E-06	---	---	---	---	8.1E-03
Cadmium	5.0E-04	4.6E-02	1.4E-02	---	1.7E-07	---	---	---	---	6.0E-02
Chromium (Total)	1.1E-02	6.0E-02	8.7E-03	---	6.0E-06	---	---	---	---	7.9E-02
Cobalt	4.3E-03	4.9E-02	1.4E-03	---	3.4E-06	---	---	---	---	5.5E-02
Copper	5.3E-02	6.5E-01	5.2E-02	---	1.5E-05	---	---	---	---	7.5E-01
Lead	1.1E-02	6.3E-02	1.6E-02	---	2.5E-06	---	---	---	---	9.1E-02
Manganese	5.5E-03	1.1E+01	1.3E-03	---	4.1E-03	---	---	---	---	1.1E+01
Mercury	1.5E-04	6.0E-03	6.9E-04	---	5.1E-08	---	---	---	---	6.8E-03
Molybdenum	1.1E-02	1.8E-01	2.9E-02	---	2.2E-05	---	---	---	---	2.2E-01
Nickel	7.2E-03	1.9E-01	2.0E-02	---	1.3E-05	---	---	---	---	2.1E-01
Selenium	3.5E-04	6.0E-02	9.1E-04	---	2.1E-06	---	---	---	---	6.1E-02
Silver	2.2E-04	1.2E-02	1.2E-03	---	2.5E-07	---	---	---	---	1.3E-02
Strontium	2.9E-02	2.2E+00	6.6E-03	---	6.6E-03	---	---	---	---	2.3E+00
Thallium	2.5E-04	9.3E-03	3.2E-05	---	1.4E-06	---	---	---	---	9.6E-03
Uranium	6.3E-04	1.2E-03	5.5E-05	---	3.6E-06	---	---	---	---	1.9E-03
Vanadium	1.7E-02	6.0E-02	1.9E-03	---	7.8E-06	---	---	---	---	7.8E-02
Zinc	6.5E-02	7.1E+00	1.1E+00	---	5.5E-05	---	---	---	---	8.2E+00

Average Daily Doses for the American Beaver Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.9E-05	3.0E-04	---	---	2.6E-05	1.2E-04	2.5E-05	---	---	5.0E-04
Arsenic	1.8E-04	1.7E-04	---	---	4.2E-05	1.4E-03	2.6E-04	---	---	2.0E-03
Barium	3.9E-04	2.4E-02	---	---	2.5E-03	3.9E-03	3.0E-03	---	---	3.4E-02
Beryllium	4.8E-05	2.1E-04	---	---	3.9E-06	2.2E-04	6.8E-04	---	---	1.2E-03
Cadmium	5.8E-05	1.3E-03	---	---	2.0E-07	1.0E-04	4.8E-04	---	---	1.9E-03
Chromium (Total)	1.2E-03	1.7E-03	---	---	6.7E-06	1.1E-02	2.3E-03	---	---	1.6E-02
Cobalt	5.0E-04	1.4E-03	---	---	3.8E-06	2.7E-03	1.0E-04	---	---	4.6E-03
Copper	6.1E-03	1.8E-02	---	---	1.8E-05	5.2E-03	8.2E-03	---	---	3.7E-02
Lead	1.3E-03	1.8E-03	---	---	2.8E-06	2.2E-03	1.2E-03	---	---	6.5E-03
Manganese	6.4E-04	3.1E-01	---	---	4.8E-03	2.0E-02	7.8E-03	---	---	3.4E-01
Mercury	1.8E-05	1.6E-04	---	---	5.5E-08	2.1E-05	1.2E-04	---	---	3.3E-04
Molybdenum	1.3E-03	4.9E-03	---	---	5.2E-05	2.1E-03	2.5E-03	---	---	1.1E-02
Nickel	8.4E-04	5.2E-03	---	---	1.5E-05	8.0E-03	1.8E-03	---	---	1.6E-02
Selenium	4.0E-05	1.6E-03	---	---	3.3E-06	2.0E-04	5.0E-04	---	---	2.4E-03
Silver	2.5E-05	3.3E-04	---	---	2.8E-07	2.1E-05	3.7E-06	---	---	3.8E-04
Strontium	3.3E-03	6.2E-02	---	---	1.3E-02	2.1E-02	4.2E-02	---	---	1.4E-01
Thallium	2.9E-05	2.6E-04	---	---	1.7E-06	6.8E-05	8.5E-07	---	---	3.6E-04
Uranium	7.3E-05	3.3E-05	---	---	2.0E-05	1.0E-03	2.6E-05	---	---	1.2E-03
Vanadium	2.0E-03	1.6E-03	---	---	9.4E-06	1.2E-02	2.8E-04	---	---	1.5E-02
Zinc	7.5E-03	2.0E-01	---	---	6.2E-05	2.7E-02	8.3E-02	---	---	3.1E-01

Average Daily Doses for the American Mink Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.7E-05	---	---	3.9E-04	1.1E-05	2.5E-04	---	4.9E-05	9.4E-03	1.0E-02
Arsenic	2.6E-04	---	---	7.0E-03	1.8E-05	2.8E-03	---	2.5E-02	2.0E-02	5.5E-02
Barium	5.4E-04	---	---	8.4E-02	1.0E-03	7.9E-03	---	2.9E-02	2.6E-02	1.5E-01
Beryllium	6.7E-05	---	---	1.8E-04	1.6E-06	4.5E-04	---	1.6E-03	5.2E-04	2.8E-03
Cadmium	8.1E-05	---	---	3.5E-03	8.5E-08	2.0E-04	---	8.0E-03	8.2E-03	2.0E-02
Chromium (Total)	1.7E-03	---	---	4.9E-03	2.8E-06	2.3E-02	---	9.0E-02	2.6E-02	1.5E-01
Cobalt	7.0E-04	---	---	2.2E-03	1.6E-06	5.4E-03	---	3.5E-04	1.3E-02	2.2E-02
Copper	8.5E-03	---	---	1.9E-01	7.6E-06	1.1E-02	---	4.5E-01	1.6E+00	2.2E+00
Lead	1.8E-03	---	---	2.3E-03	1.2E-06	4.6E-03	---	1.3E-02	1.3E-02	3.5E-02
Manganese	8.9E-04	---	---	3.1E-02	2.0E-03	4.0E-02	---	1.6E-01	5.1E-02	2.9E-01
Mercury	2.5E-05	---	---	1.0E-03	2.3E-08	4.3E-05	---	1.4E-04	4.8E-02	4.9E-02
Molybdenum	1.8E-03	---	---	1.1E-02	2.2E-05	4.2E-03	---	5.9E-02	3.6E-02	1.1E-01
Nickel	1.2E-03	---	---	5.3E-03	6.3E-06	1.6E-02	---	5.6E-02	4.4E-02	1.2E-01
Selenium	5.6E-05	---	---	1.7E-02	1.4E-06	4.1E-04	---	6.9E-03	1.5E-01	1.7E-01
Silver	3.5E-05	---	---	3.5E-04	1.2E-07	4.4E-05	---	9.1E-05	1.8E-02	1.8E-02
Strontium	4.6E-03	---	---	2.2E-01	5.2E-03	4.3E-02	---	7.3E-02	1.3E+00	1.7E+00
Thallium	4.1E-05	---	---	2.1E-03	6.9E-07	1.4E-04	---	7.4E-04	2.3E-03	5.4E-03
Uranium	1.0E-04	---	---	1.9E-04	8.3E-06	2.1E-03	---	9.5E-04	2.3E-03	5.7E-03
Vanadium	2.7E-03	---	---	5.3E-03	3.9E-06	2.4E-02	---	1.1E-02	3.2E-02	7.5E-02
Zinc	1.0E-02	---	---	1.1E+00	2.6E-05	5.5E-02	---	2.3E+00	3.5E+01	3.9E+01

Average Daily Doses for the Black Bear Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.3E-05	3.7E-03	1.8E-04	2.1E-04	2.4E-05	2.3E-05	---	---	9.7E-04	5.2E-03
Arsenic	6.9E-04	2.2E-03	4.0E-04	3.8E-03	3.8E-05	2.5E-04	---	---	2.1E-03	9.4E-03
Barium	1.5E-03	3.0E-01	3.3E-04	4.5E-02	2.2E-03	7.1E-04	---	---	2.7E-03	3.5E-01
Beryllium	1.8E-04	2.6E-03	2.0E-05	9.4E-05	3.5E-06	4.1E-05	---	---	5.4E-05	3.0E-03
Cadmium	2.2E-04	1.6E-02	5.5E-03	1.9E-03	1.8E-07	1.8E-05	---	---	8.5E-04	2.4E-02
Chromium (Total)	4.7E-03	2.1E-02	3.6E-03	2.6E-03	6.0E-06	2.1E-03	---	---	2.7E-03	3.6E-02
Cobalt	1.9E-03	1.7E-02	5.7E-04	1.2E-03	3.4E-06	4.9E-04	---	---	1.4E-03	2.2E-02
Copper	2.3E-02	2.2E-01	2.1E-02	1.0E-01	1.6E-05	9.6E-04	---	---	1.6E-01	5.3E-01
Lead	4.9E-03	2.2E-02	6.6E-03	1.2E-03	2.5E-06	4.1E-04	---	---	1.3E-03	3.6E-02
Manganese	2.4E-03	3.9E+00	5.3E-04	1.6E-02	4.3E-03	3.6E-03	---	---	5.3E-03	3.9E+00
Mercury	6.6E-05	2.0E-03	2.8E-04	5.5E-04	4.9E-08	3.9E-06	---	---	4.9E-03	7.8E-03
Molybdenum	4.9E-03	6.1E-02	1.2E-02	5.6E-03	4.7E-05	3.8E-04	---	---	3.8E-03	8.8E-02
Nickel	3.2E-03	6.4E-02	8.4E-03	2.8E-03	1.4E-05	1.5E-03	---	---	4.6E-03	8.5E-02
Selenium	1.5E-04	2.0E-02	3.7E-04	9.0E-03	3.0E-06	3.7E-05	---	---	1.5E-02	4.5E-02
Silver	9.5E-05	4.1E-03	4.9E-04	1.9E-04	2.6E-07	3.9E-06	---	---	1.8E-03	6.7E-03
Strontium	1.2E-02	7.7E-01	2.7E-03	1.2E-01	1.1E-02	3.9E-03	---	---	1.4E-01	1.1E+00
Thallium	1.1E-04	3.2E-03	1.3E-05	1.2E-03	1.5E-06	1.2E-05	---	---	2.4E-04	4.7E-03
Uranium	2.7E-04	4.1E-04	2.2E-05	1.0E-04	1.8E-05	1.9E-04	---	---	2.4E-04	1.3E-03
Vanadium	7.3E-03	2.0E-02	7.7E-04	2.8E-03	8.5E-06	2.1E-03	---	---	3.3E-03	3.7E-02
Zinc	2.8E-02	2.4E+00	4.5E-01	5.7E-01	5.6E-05	5.0E-03	---	---	3.7E+00	7.1E+00

Average Daily Doses for the Common (Masked) Shrew Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	8.1E-04	2.6E-03	3.9E-02	---	6.2E-05	---	---	---	---	4.2E-02
Arsenic	7.7E-03	1.5E-03	8.5E-02	---	1.0E-04	---	---	---	---	9.5E-02
Barium	1.6E-02	2.1E-01	7.1E-02	---	5.8E-03	---	---	---	---	3.0E-01
Beryllium	2.0E-03	1.8E-03	4.3E-03	---	9.2E-06	---	---	---	---	8.1E-03
Cadmium	2.4E-03	1.1E-02	1.2E+00	---	4.9E-07	---	---	---	---	1.2E+00
Chromium (Total)	5.2E-02	1.4E-02	7.6E-01	---	1.6E-05	---	---	---	---	8.3E-01
Cobalt	2.1E-02	1.2E-02	1.2E-01	---	9.0E-06	---	---	---	---	1.5E-01
Copper	2.6E-01	1.5E-01	4.5E+00	---	4.3E-05	---	---	---	---	4.9E+00
Lead	5.5E-02	1.5E-02	1.4E+00	---	6.7E-06	---	---	---	---	1.5E+00
Manganese	2.7E-02	2.7E+00	1.1E-01	---	1.1E-02	---	---	---	---	2.9E+00
Mercury	7.4E-04	1.4E-03	6.0E-02	---	1.3E-07	---	---	---	---	6.2E-02
Molybdenum	5.5E-02	4.3E-02	2.5E+00	---	1.2E-04	---	---	---	---	2.6E+00
Nickel	3.5E-02	4.5E-02	1.8E+00	---	3.6E-05	---	---	---	---	1.9E+00
Selenium	1.7E-03	1.4E-02	7.9E-02	---	7.8E-06	---	---	---	---	9.5E-02
Silver	1.1E-03	2.9E-03	1.0E-01	---	6.7E-07	---	---	---	---	1.1E-01
Strontium	1.4E-01	5.4E-01	5.7E-01	---	3.0E-02	---	---	---	---	1.3E+00
Thallium	1.2E-03	2.2E-03	2.7E-03	---	4.0E-06	---	---	---	---	6.2E-03
Uranium	3.0E-03	2.9E-04	4.8E-03	---	4.7E-05	---	---	---	---	8.1E-03
Vanadium	8.2E-02	1.4E-02	1.6E-01	---	2.2E-05	---	---	---	---	2.6E-01
Zinc	3.1E-01	1.7E+00	9.7E+01	---	1.5E-04	---	---	---	---	9.9E+01

Average Daily Doses for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	8.1E-04	2.6E-03	3.9E-02	---	6.2E-05	---	---	---	---	4.2E-02
Arsenic	7.7E-03	1.5E-03	8.5E-02	---	1.0E-04	---	---	---	---	9.5E-02
Barium	1.6E-02	2.1E-01	7.1E-02	---	5.8E-03	---	---	---	---	3.0E-01
Beryllium	2.0E-03	1.8E-03	4.3E-03	---	9.2E-06	---	---	---	---	8.1E-03
Cadmium	2.4E-03	1.1E-02	1.2E+00	---	4.9E-07	---	---	---	---	1.2E+00
Chromium (Total)	5.2E-02	1.4E-02	7.6E-01	---	1.6E-05	---	---	---	---	8.3E-01
Cobalt	2.1E-02	1.2E-02	1.2E-01	---	9.0E-06	---	---	---	---	1.5E-01
Copper	2.6E-01	1.5E-01	4.5E+00	---	4.3E-05	---	---	---	---	4.9E+00
Lead	5.5E-02	1.5E-02	1.4E+00	---	6.7E-06	---	---	---	---	1.5E+00
Manganese	2.7E-02	2.7E+00	1.1E-01	---	1.1E-02	---	---	---	---	2.9E+00
Mercury	7.4E-04	1.4E-03	6.0E-02	---	1.3E-07	---	---	---	---	6.2E-02
Molybdenum	5.5E-02	4.3E-02	2.5E+00	---	1.2E-04	---	---	---	---	2.6E+00
Nickel	3.5E-02	4.5E-02	1.8E+00	---	3.6E-05	---	---	---	---	1.9E+00
Selenium	1.7E-03	1.4E-02	7.9E-02	---	7.8E-06	---	---	---	---	9.5E-02
Silver	1.1E-03	2.9E-03	1.0E-01	---	6.7E-07	---	---	---	---	1.1E-01
Strontium	1.4E-01	5.4E-01	5.7E-01	---	3.0E-02	---	---	---	---	1.3E+00
Thallium	1.2E-03	2.2E-03	2.7E-03	---	4.0E-06	---	---	---	---	6.2E-03
Uranium	3.0E-03	2.9E-04	4.8E-03	---	4.7E-05	---	---	---	---	8.1E-03
Vanadium	8.2E-02	1.4E-02	1.6E-01	---	2.2E-05	---	---	---	---	2.6E-01
Zinc	3.1E-01	1.7E+00	9.7E+01	---	1.5E-04	---	---	---	---	9.9E+01

Average Daily Doses for the Deer Mouse Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.0E-04	3.4E-03	2.6E-03	---	6.9E-05	---	---	---	---	6.1E-03
Arsenic	9.6E-04	1.9E-03	5.8E-03	---	1.1E-04	---	---	---	---	8.8E-03
Barium	2.0E-03	2.7E-01	4.8E-03	---	6.5E-03	---	---	---	---	2.8E-01
Beryllium	2.5E-04	2.3E-03	2.9E-04	---	1.0E-05	---	---	---	---	2.9E-03
Cadmium	3.0E-04	1.4E-02	7.9E-02	---	5.4E-07	---	---	---	---	9.4E-02
Chromium (Total)	6.5E-03	1.8E-02	5.1E-02	---	1.8E-05	---	---	---	---	7.6E-02
Cobalt	2.6E-03	1.5E-02	8.2E-03	---	9.9E-06	---	---	---	---	2.6E-02
Copper	3.2E-02	2.0E-01	3.0E-01	---	4.8E-05	---	---	---	---	5.3E-01
Lead	6.8E-03	2.0E-02	9.5E-02	---	7.4E-06	---	---	---	---	1.2E-01
Manganese	3.3E-03	3.5E+00	7.6E-03	---	1.3E-02	---	---	---	---	3.5E+00
Mercury	9.2E-05	1.8E-03	4.0E-03	---	1.4E-07	---	---	---	---	5.9E-03
Molybdenum	6.9E-03	5.5E-02	1.7E-01	---	1.4E-04	---	---	---	---	2.3E-01
Nickel	4.4E-03	5.8E-02	1.2E-01	---	4.0E-05	---	---	---	---	1.8E-01
Selenium	2.1E-04	1.8E-02	5.3E-03	---	8.6E-06	---	---	---	---	2.4E-02
Silver	1.3E-04	3.7E-03	7.0E-03	---	7.5E-07	---	---	---	---	1.1E-02
Strontium	1.7E-02	6.9E-01	3.9E-02	---	3.3E-02	---	---	---	---	7.8E-01
Thallium	1.5E-04	2.9E-03	1.9E-04	---	4.4E-06	---	---	---	---	3.2E-03
Uranium	3.8E-04	3.7E-04	3.2E-04	---	5.2E-05	---	---	---	---	1.1E-03
Vanadium	1.0E-02	1.8E-02	1.1E-02	---	2.5E-05	---	---	---	---	4.0E-02
Zinc	3.9E-02	2.2E+00	6.5E+00	---	1.6E-04	---	---	---	---	8.7E+00

Average Daily Doses for the Meadow Vole Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.4E-04	8.1E-03	---	---	7.6E-05	---	---	---	---	8.3E-03
Arsenic	1.3E-03	4.7E-03	---	---	1.2E-04	---	---	---	---	6.1E-03
Barium	2.8E-03	6.4E-01	---	---	7.2E-03	---	---	---	---	6.5E-01
Beryllium	3.5E-04	5.6E-03	---	---	1.1E-05	---	---	---	---	6.0E-03
Cadmium	4.2E-04	3.4E-02	---	---	6.0E-07	---	---	---	---	3.4E-02
Chromium (Total)	9.1E-03	4.4E-02	---	---	2.0E-05	---	---	---	---	5.3E-02
Cobalt	3.7E-03	3.7E-02	---	---	1.1E-05	---	---	---	---	4.0E-02
Copper	4.5E-02	4.8E-01	---	---	5.3E-05	---	---	---	---	5.2E-01
Lead	9.6E-03	4.7E-02	---	---	8.2E-06	---	---	---	---	5.7E-02
Manganese	4.7E-03	8.4E+00	---	---	1.4E-02	---	---	---	---	8.4E+00
Mercury	1.3E-04	4.4E-03	---	---	1.6E-07	---	---	---	---	4.5E-03
Molybdenum	9.6E-03	1.3E-01	---	---	1.5E-04	---	---	---	---	1.4E-01
Nickel	6.1E-03	1.4E-01	---	---	4.4E-05	---	---	---	---	1.4E-01
Selenium	2.9E-04	4.4E-02	---	---	9.6E-06	---	---	---	---	4.4E-02
Silver	1.9E-04	8.8E-03	---	---	8.3E-07	---	---	---	---	9.0E-03
Strontium	2.4E-02	1.7E+00	---	---	3.7E-02	---	---	---	---	1.7E+00
Thallium	2.1E-04	6.9E-03	---	---	4.9E-06	---	---	---	---	7.1E-03
Uranium	5.3E-04	8.8E-04	---	---	5.8E-05	---	---	---	---	1.5E-03
Vanadium	1.4E-02	4.4E-02	---	---	2.7E-05	---	---	---	---	5.9E-02
Zinc	5.5E-02	5.2E+00	---	---	1.8E-04	---	---	---	---	5.3E+00

Average Daily Doses for the Moose Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.7E-05	2.5E-03	---	---	2.0E-05	3.2E-05	6.3E-05	---	---	2.7E-03
Arsenic	3.5E-04	1.5E-03	---	---	3.2E-05	3.5E-04	6.6E-04	---	---	2.8E-03
Barium	7.4E-04	2.0E-01	---	---	1.9E-03	1.0E-03	7.8E-03	---	---	2.1E-01
Beryllium	9.1E-05	1.8E-03	---	---	2.9E-06	5.7E-05	1.7E-03	---	---	3.6E-03
Cadmium	1.1E-04	1.1E-02	---	---	1.5E-07	2.6E-05	1.2E-03	---	---	1.2E-02
Chromium (Total)	2.4E-03	1.4E-02	---	---	5.1E-06	2.9E-03	5.9E-03	---	---	2.5E-02
Cobalt	9.5E-04	1.1E-02	---	---	2.8E-06	6.9E-04	2.6E-04	---	---	1.3E-02
Copper	1.2E-02	1.5E-01	---	---	1.4E-05	1.3E-03	2.1E-02	---	---	1.8E-01
Lead	2.5E-03	1.5E-02	---	---	2.1E-06	5.8E-04	3.0E-03	---	---	2.1E-02
Manganese	1.2E-03	2.6E+00	---	---	3.6E-03	5.1E-03	2.0E-02	---	---	2.7E+00
Mercury	3.4E-05	1.4E-03	---	---	4.1E-08	5.5E-06	3.2E-04	---	---	1.7E-03
Molybdenum	2.5E-03	4.1E-02	---	---	3.9E-05	5.3E-04	6.4E-03	---	---	5.1E-02
Nickel	1.6E-03	4.3E-02	---	---	1.1E-05	2.1E-03	4.7E-03	---	---	5.2E-02
Selenium	7.6E-05	1.4E-02	---	---	2.5E-06	5.2E-05	1.3E-03	---	---	1.5E-02
Silver	4.8E-05	2.8E-03	---	---	2.1E-07	5.5E-06	9.5E-06	---	---	2.8E-03
Strontium	6.3E-03	5.2E-01	---	---	9.5E-03	5.4E-03	1.1E-01	---	---	6.5E-01
Thallium	5.6E-05	2.2E-03	---	---	1.3E-06	1.8E-05	2.2E-06	---	---	2.2E-03
Uranium	1.4E-04	2.8E-04	---	---	1.5E-05	2.7E-04	6.8E-05	---	---	7.6E-04
Vanadium	3.7E-03	1.4E-02	---	---	7.1E-06	3.0E-03	7.2E-04	---	---	2.1E-02
Zinc	1.4E-02	1.6E+00	---	---	4.7E-05	7.0E-03	2.1E-01	---	---	1.9E+00

Average Daily Doses for the Muskrat Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	3.6E-05	6.8E-04	9.1E-04	2.4E-04	2.4E-03	4.2E-03
Arsenic	---	---	---	---	5.8E-05	7.4E-03	9.5E-03	1.2E-01	5.1E-03	1.5E-01
Barium	---	---	---	---	3.4E-03	2.1E-02	1.1E-01	1.4E-01	6.7E-03	2.9E-01
Beryllium	---	---	---	---	5.3E-06	1.2E-03	2.5E-02	7.8E-03	1.3E-04	3.4E-02
Cadmium	---	---	---	---	2.8E-07	5.5E-04	1.8E-02	3.9E-02	2.1E-03	6.0E-02
Chromium (Total)	---	---	---	---	9.2E-06	6.1E-02	8.6E-02	4.4E-01	6.7E-03	6.0E-01
Cobalt	---	---	---	---	5.2E-06	1.5E-02	3.7E-03	1.7E-03	3.3E-03	2.3E-02
Copper	---	---	---	---	2.5E-05	2.9E-02	3.1E-01	2.2E+00	4.0E-01	2.9E+00
Lead	---	---	---	---	3.9E-06	1.2E-02	4.3E-02	6.6E-02	3.3E-03	1.2E-01
Manganese	---	---	---	---	6.6E-03	1.1E-01	2.9E-01	8.1E-01	1.3E-02	1.2E+00
Mercury	---	---	---	---	7.5E-08	1.2E-04	4.6E-03	7.0E-04	1.2E-02	1.7E-02
Molybdenum	---	---	---	---	7.1E-05	1.1E-02	9.2E-02	2.9E-01	9.2E-03	4.0E-01
Nickel	---	---	---	---	2.1E-05	4.4E-02	6.8E-02	2.7E-01	1.1E-02	4.0E-01
Selenium	---	---	---	---	4.5E-06	1.1E-03	1.9E-02	3.4E-02	3.8E-02	9.1E-02
Silver	---	---	---	---	3.9E-07	1.2E-04	1.4E-04	4.5E-04	4.5E-03	5.2E-03
Strontium	---	---	---	---	1.7E-02	1.2E-01	1.6E+00	3.6E-01	3.3E-01	2.4E+00
Thallium	---	---	---	---	2.3E-06	3.7E-04	3.1E-05	3.6E-03	5.8E-04	4.6E-03
Uranium	---	---	---	---	2.7E-05	5.7E-03	9.8E-04	4.7E-03	5.8E-04	1.2E-02
Vanadium	---	---	---	---	1.3E-05	6.3E-02	1.0E-02	5.6E-02	8.1E-03	1.4E-01
Zinc	---	---	---	---	8.5E-05	1.5E-01	3.1E+00	1.1E+01	8.9E+00	2.4E+01

Average Daily Doses for the Northern River Otter Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	4.6E-06	---	---	6.5E-05	2.9E-05	2.7E-04	---	6.2E-05	9.8E-03	1.0E-02
Arsenic	4.4E-05	---	---	1.2E-03	4.7E-05	3.0E-03	---	3.2E-02	2.1E-02	5.8E-02
Barium	9.2E-05	---	---	1.4E-02	2.8E-03	8.5E-03	---	3.7E-02	2.8E-02	9.0E-02
Beryllium	1.1E-05	---	---	3.0E-05	4.4E-06	4.8E-04	---	2.0E-03	5.4E-04	3.1E-03
Cadmium	1.4E-05	---	---	6.0E-04	2.3E-07	2.2E-04	---	1.0E-02	8.6E-03	2.0E-02
Chromium (Total)	3.0E-04	---	---	8.4E-04	7.5E-06	2.5E-02	---	1.1E-01	2.8E-02	1.7E-01
Cobalt	1.2E-04	---	---	3.8E-04	4.2E-06	5.8E-03	---	4.4E-04	1.4E-02	2.1E-02
Copper	1.5E-03	---	---	3.3E-02	2.0E-05	1.1E-02	---	5.7E-01	1.6E+00	2.3E+00
Lead	3.1E-04	---	---	3.9E-04	3.2E-06	4.9E-03	---	1.7E-02	1.4E-02	3.6E-02
Manganese	1.5E-04	---	---	5.2E-03	5.4E-03	4.3E-02	---	2.1E-01	5.4E-02	3.2E-01
Mercury	4.2E-06	---	---	1.7E-04	6.1E-08	4.7E-05	---	1.8E-04	5.0E-02	5.0E-02
Molybdenum	3.1E-04	---	---	1.8E-03	5.8E-05	4.5E-03	---	7.5E-02	3.8E-02	1.2E-01
Nickel	2.0E-04	---	---	9.0E-04	1.7E-05	1.8E-02	---	7.1E-02	4.6E-02	1.4E-01
Selenium	9.5E-06	---	---	2.9E-03	3.7E-06	4.4E-04	---	8.8E-03	1.6E-01	1.7E-01
Silver	6.0E-06	---	---	6.0E-05	3.2E-07	4.7E-05	---	1.2E-04	1.9E-02	1.9E-02
Strontium	7.9E-04	---	---	3.7E-02	1.4E-02	4.6E-02	---	9.3E-02	1.4E+00	1.6E+00
Thallium	6.9E-06	---	---	3.6E-04	1.9E-06	1.5E-04	---	9.4E-04	2.4E-03	3.9E-03
Uranium	1.7E-05	---	---	3.2E-05	2.2E-05	2.3E-03	---	1.2E-03	2.4E-03	6.0E-03
Vanadium	4.6E-04	---	---	9.0E-04	1.1E-05	2.5E-02	---	1.5E-02	3.4E-02	7.5E-02
Zinc	1.8E-03	---	---	1.8E-01	6.9E-05	6.0E-02	---	3.0E+00	3.7E+01	4.0E+01

Average Daily Doses for the Short-tailed Weasel Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.6E-04	---	---	3.6E-03	4.6E-05	---	---	---	---	3.9E-03
Arsenic	2.4E-03	---	---	6.6E-02	7.4E-05	---	---	---	---	6.8E-02
Barium	5.1E-03	---	---	7.9E-01	4.3E-03	---	---	---	---	8.0E-01
Beryllium	6.3E-04	---	---	1.7E-03	6.8E-06	---	---	---	---	2.3E-03
Cadmium	7.6E-04	---	---	3.3E-02	3.6E-07	---	---	---	---	3.4E-02
Chromium (Total)	1.6E-02	---	---	4.6E-02	1.2E-05	---	---	---	---	6.3E-02
Cobalt	6.6E-03	---	---	2.1E-02	6.6E-06	---	---	---	---	2.8E-02
Copper	8.1E-02	---	---	1.8E+00	3.2E-05	---	---	---	---	1.9E+00
Lead	1.7E-02	---	---	2.1E-02	4.9E-06	---	---	---	---	3.9E-02
Manganese	8.4E-03	---	---	2.9E-01	8.4E-03	---	---	---	---	3.1E-01
Mercury	2.3E-04	---	---	9.6E-03	9.6E-08	---	---	---	---	9.8E-03
Molybdenum	1.7E-02	---	---	9.9E-02	9.1E-05	---	---	---	---	1.2E-01
Nickel	1.1E-02	---	---	5.0E-02	2.7E-05	---	---	---	---	6.1E-02
Selenium	5.3E-04	---	---	1.6E-01	5.7E-06	---	---	---	---	1.6E-01
Silver	3.3E-04	---	---	3.3E-03	5.0E-07	---	---	---	---	3.6E-03
Strontium	4.4E-02	---	---	2.1E+00	2.2E-02	---	---	---	---	2.1E+00
Thallium	3.9E-04	---	---	2.0E-02	2.9E-06	---	---	---	---	2.1E-02
Uranium	9.5E-04	---	---	1.8E-03	3.5E-05	---	---	---	---	2.8E-03
Vanadium	2.6E-02	---	---	5.0E-02	1.6E-05	---	---	---	---	7.6E-02
Zinc	9.9E-02	---	---	1.0E+01	1.1E-04	---	---	---	---	1.0E+01

Average Daily Doses for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.6E-04	---	---	3.6E-03	4.6E-05	---	---	---	---	3.9E-03
Arsenic	2.4E-03	---	---	6.6E-02	7.4E-05	---	---	---	---	6.8E-02
Barium	5.1E-03	---	---	7.9E-01	4.3E-03	---	---	---	---	8.0E-01
Beryllium	6.3E-04	---	---	1.7E-03	6.8E-06	---	---	---	---	2.3E-03
Cadmium	7.6E-04	---	---	3.3E-02	3.6E-07	---	---	---	---	3.4E-02
Chromium (Total)	1.6E-02	---	---	4.6E-02	1.2E-05	---	---	---	---	6.3E-02
Cobalt	6.6E-03	---	---	2.1E-02	6.6E-06	---	---	---	---	2.8E-02
Copper	8.1E-02	---	---	1.8E+00	3.2E-05	---	---	---	---	1.9E+00
Lead	1.7E-02	---	---	2.1E-02	4.9E-06	---	---	---	---	3.9E-02
Manganese	8.4E-03	---	---	2.9E-01	8.4E-03	---	---	---	---	3.1E-01
Mercury	2.3E-04	---	---	9.6E-03	9.6E-08	---	---	---	---	9.8E-03
Molybdenum	1.7E-02	---	---	9.9E-02	9.1E-05	---	---	---	---	1.2E-01
Nickel	1.1E-02	---	---	5.0E-02	2.7E-05	---	---	---	---	6.1E-02
Selenium	5.3E-04	---	---	1.6E-01	5.7E-06	---	---	---	---	1.6E-01
Silver	3.3E-04	---	---	3.3E-03	5.0E-07	---	---	---	---	3.6E-03
Strontium	4.4E-02	---	---	2.1E+00	2.2E-02	---	---	---	---	2.1E+00
Thallium	3.9E-04	---	---	2.0E-02	2.9E-06	---	---	---	---	2.1E-02
Uranium	9.5E-04	---	---	1.8E-03	3.5E-05	---	---	---	---	2.8E-03
Vanadium	2.6E-02	---	---	5.0E-02	1.6E-05	---	---	---	---	7.6E-02
Zinc	9.9E-02	---	---	1.0E+01	1.1E-04	---	---	---	---	1.0E+01

Average Daily Doses for the Snowshoe Hare Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	4.6E-04	1.0E-02	---	---	3.5E-05	---	---	---	---	1.0E-02
Arsenic	4.3E-03	5.7E-03	---	---	5.6E-05	---	---	---	---	1.0E-02
Barium	9.2E-03	7.9E-01	---	---	3.3E-03	---	---	---	---	8.0E-01
Beryllium	1.1E-03	6.9E-03	---	---	5.2E-06	---	---	---	---	8.1E-03
Cadmium	1.4E-03	4.2E-02	---	---	2.7E-07	---	---	---	---	4.3E-02
Chromium (Total)	2.9E-02	5.5E-02	---	---	9.0E-06	---	---	---	---	8.4E-02
Cobalt	1.2E-02	4.5E-02	---	---	5.0E-06	---	---	---	---	5.7E-02
Copper	1.4E-01	5.9E-01	---	---	2.4E-05	---	---	---	---	7.3E-01
Lead	3.1E-02	5.8E-02	---	---	3.8E-06	---	---	---	---	8.9E-02
Manganese	1.5E-02	1.0E+01	---	---	6.4E-03	---	---	---	---	1.0E+01
Mercury	4.2E-04	5.4E-03	---	---	7.3E-08	---	---	---	---	5.8E-03
Molybdenum	3.1E-02	1.6E-01	---	---	7.0E-05	---	---	---	---	1.9E-01
Nickel	2.0E-02	1.7E-01	---	---	2.0E-05	---	---	---	---	1.9E-01
Selenium	9.5E-04	5.4E-02	---	---	4.4E-06	---	---	---	---	5.5E-02
Silver	6.0E-04	1.1E-02	---	---	3.8E-07	---	---	---	---	1.1E-02
Strontium	7.8E-02	2.0E+00	---	---	1.7E-02	---	---	---	---	2.1E+00
Thallium	6.9E-04	8.5E-03	---	---	2.2E-06	---	---	---	---	9.2E-03
Uranium	1.7E-03	1.1E-03	---	---	2.7E-05	---	---	---	---	2.8E-03
Vanadium	4.6E-02	5.4E-02	---	---	1.3E-05	---	---	---	---	1.0E-01
Zinc	1.8E-01	6.5E+00	---	---	8.3E-05	---	---	---	---	6.6E+00

Average Daily Doses for the Woodland Caribou Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.3E-04	1.3E-03	---	---	2.1E-05	---	---	---	---	1.4E-03
Arsenic	1.2E-03	7.4E-04	---	---	3.4E-05	---	---	---	---	2.0E-03
Barium	2.6E-03	1.0E-01	---	---	2.0E-03	---	---	---	---	1.1E-01
Beryllium	3.2E-04	8.9E-04	---	---	3.2E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	5.4E-03	---	---	1.7E-07	---	---	---	---	5.8E-03
Chromium (Total)	8.3E-03	7.0E-03	---	---	5.5E-06	---	---	---	---	1.5E-02
Cobalt	3.3E-03	5.8E-03	---	---	3.1E-06	---	---	---	---	9.1E-03
Copper	4.1E-02	7.5E-02	---	---	1.5E-05	---	---	---	---	1.2E-01
Lead	8.7E-03	7.4E-03	---	---	2.3E-06	---	---	---	---	1.6E-02
Manganese	4.3E-03	1.3E+00	---	---	3.9E-03	---	---	---	---	1.3E+00
Mercury	1.2E-04	7.0E-04	---	---	4.5E-08	---	---	---	---	8.1E-04
Molybdenum	8.8E-03	2.1E-02	---	---	4.2E-05	---	---	---	---	3.0E-02
Nickel	5.6E-03	2.2E-02	---	---	1.2E-05	---	---	---	---	2.7E-02
Selenium	2.7E-04	7.0E-03	---	---	2.7E-06	---	---	---	---	7.2E-03
Silver	1.7E-04	1.4E-03	---	---	2.3E-07	---	---	---	---	1.6E-03
Strontium	2.2E-02	2.6E-01	---	---	1.0E-02	---	---	---	---	2.9E-01
Thallium	1.9E-04	1.1E-03	---	---	1.4E-06	---	---	---	---	1.3E-03
Uranium	4.8E-04	1.4E-04	---	---	1.6E-05	---	---	---	---	6.4E-04
Vanadium	1.3E-02	7.0E-03	---	---	7.7E-06	---	---	---	---	2.0E-02
Zinc	5.0E-02	8.3E-01	---	---	5.0E-05	---	---	---	---	8.8E-01

Average Daily Doses for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.3E-04	1.3E-03	---	---	2.1E-05	---	---	---	---	1.4E-03
Arsenic	1.2E-03	7.4E-04	---	---	3.4E-05	---	---	---	---	2.0E-03
Barium	2.6E-03	1.0E-01	---	---	2.0E-03	---	---	---	---	1.1E-01
Beryllium	3.2E-04	8.9E-04	---	---	3.2E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	5.4E-03	---	---	1.7E-07	---	---	---	---	5.8E-03
Chromium (Total)	8.3E-03	7.0E-03	---	---	5.5E-06	---	---	---	---	1.5E-02
Cobalt	3.3E-03	5.8E-03	---	---	3.1E-06	---	---	---	---	9.1E-03
Copper	4.1E-02	7.5E-02	---	---	1.5E-05	---	---	---	---	1.2E-01
Lead	8.7E-03	7.4E-03	---	---	2.3E-06	---	---	---	---	1.6E-02
Manganese	4.3E-03	1.3E+00	---	---	3.9E-03	---	---	---	---	1.3E+00
Mercury	1.2E-04	7.0E-04	---	---	4.5E-08	---	---	---	---	8.1E-04
Molybdenum	8.8E-03	2.1E-02	---	---	4.2E-05	---	---	---	---	3.0E-02
Nickel	5.6E-03	2.2E-02	---	---	1.2E-05	---	---	---	---	2.7E-02
Selenium	2.7E-04	7.0E-03	---	---	2.7E-06	---	---	---	---	7.2E-03
Silver	1.7E-04	1.4E-03	---	---	2.3E-07	---	---	---	---	1.6E-03
Strontium	2.2E-02	2.6E-01	---	---	1.0E-02	---	---	---	---	2.9E-01
Thallium	1.9E-04	1.1E-03	---	---	1.4E-06	---	---	---	---	1.3E-03
Uranium	4.8E-04	1.4E-04	---	---	1.6E-05	---	---	---	---	6.4E-04
Vanadium	1.3E-02	7.0E-03	---	---	7.7E-06	---	---	---	---	2.0E-02
Zinc	5.0E-02	8.3E-01	---	---	5.0E-05	---	---	---	---	8.8E-01

Average Daily Doses for the American Robin Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.0E-04	1.8E-02	9.4E-03	---	5.0E-05	---	---	---	---	2.8E-02
Arsenic	8.6E-03	1.0E-02	2.1E-02	---	8.0E-05	---	---	---	---	4.0E-02
Barium	1.8E-02	1.4E+00	1.7E-02	---	4.6E-03	---	---	---	---	1.5E+00
Beryllium	2.2E-03	1.3E-02	1.0E-03	---	7.3E-06	---	---	---	---	1.6E-02
Cadmium	2.7E-03	7.6E-02	2.8E-01	---	3.9E-07	---	---	---	---	3.6E-01
Chromium (Total)	5.8E-02	9.9E-02	1.8E-01	---	1.3E-05	---	---	---	---	3.4E-01
Cobalt	2.3E-02	8.2E-02	3.0E-02	---	7.1E-06	---	---	---	---	1.3E-01
Copper	2.8E-01	1.1E+00	1.1E+00	---	3.5E-05	---	---	---	---	2.4E+00
Lead	6.1E-02	1.0E-01	3.4E-01	---	5.3E-06	---	---	---	---	5.1E-01
Manganese	3.0E-02	1.9E+01	2.7E-02	---	9.1E-03	---	---	---	---	1.9E+01
Mercury	8.2E-04	9.9E-03	1.4E-02	---	1.0E-07	---	---	---	---	2.5E-02
Molybdenum	6.1E-02	3.0E-01	6.0E-01	---	9.8E-05	---	---	---	---	9.6E-01
Nickel	3.9E-02	3.1E-01	4.3E-01	---	2.9E-05	---	---	---	---	7.8E-01
Selenium	1.9E-03	9.9E-02	1.9E-02	---	6.2E-06	---	---	---	---	1.2E-01
Silver	1.2E-03	2.0E-02	2.5E-02	---	5.4E-07	---	---	---	---	4.6E-02
Strontium	1.5E-01	3.7E+00	1.4E-01	---	2.4E-02	---	---	---	---	4.0E+00
Thallium	1.4E-03	1.5E-02	6.6E-04	---	3.2E-06	---	---	---	---	1.7E-02
Uranium	3.4E-03	2.0E-03	1.2E-03	---	3.8E-05	---	---	---	---	6.5E-03
Vanadium	9.1E-02	9.9E-02	4.0E-02	---	1.8E-05	---	---	---	---	2.3E-01
Zinc	3.5E-01	1.2E+01	2.3E+01	---	1.2E-04	---	---	---	---	3.5E+01

Average Daily Doses for the American Robin (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.0E-04	1.8E-02	9.4E-03	---	5.0E-05	---	---	---	---	2.8E-02
Arsenic	8.6E-03	1.0E-02	2.1E-02	---	8.0E-05	---	---	---	---	4.0E-02
Barium	1.8E-02	1.4E+00	1.7E-02	---	4.6E-03	---	---	---	---	1.5E+00
Beryllium	2.2E-03	1.3E-02	1.0E-03	---	7.3E-06	---	---	---	---	1.6E-02
Cadmium	2.7E-03	7.6E-02	2.8E-01	---	3.9E-07	---	---	---	---	3.6E-01
Chromium (Total)	5.8E-02	9.9E-02	1.8E-01	---	1.3E-05	---	---	---	---	3.4E-01
Cobalt	2.3E-02	8.2E-02	3.0E-02	---	7.1E-06	---	---	---	---	1.3E-01
Copper	2.8E-01	1.1E+00	1.1E+00	---	3.5E-05	---	---	---	---	2.4E+00
Lead	6.1E-02	1.0E-01	3.4E-01	---	5.3E-06	---	---	---	---	5.1E-01
Manganese	3.0E-02	1.9E+01	2.7E-02	---	9.1E-03	---	---	---	---	1.9E+01
Mercury	8.2E-04	9.9E-03	1.4E-02	---	1.0E-07	---	---	---	---	2.5E-02
Molybdenum	6.1E-02	3.0E-01	6.0E-01	---	9.8E-05	---	---	---	---	9.6E-01
Nickel	3.9E-02	3.1E-01	4.3E-01	---	2.9E-05	---	---	---	---	7.8E-01
Selenium	1.9E-03	9.9E-02	1.9E-02	---	6.2E-06	---	---	---	---	1.2E-01
Silver	1.2E-03	2.0E-02	2.5E-02	---	5.4E-07	---	---	---	---	4.6E-02
Strontium	1.5E-01	3.7E+00	1.4E-01	---	2.4E-02	---	---	---	---	4.0E+00
Thallium	1.4E-03	1.5E-02	6.6E-04	---	3.2E-06	---	---	---	---	1.7E-02
Uranium	3.4E-03	2.0E-03	1.2E-03	---	3.8E-05	---	---	---	---	6.5E-03
Vanadium	9.1E-02	9.9E-02	4.0E-02	---	1.8E-05	---	---	---	---	2.3E-01
Zinc	3.5E-01	1.2E+01	2.3E+01	---	1.2E-04	---	---	---	---	3.5E+01

Average Daily Doses for the Barn Swallow Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	6.2E-04	4.0E-04	3.1E-02	---	8.0E-05	---	---	---	---	3.2E-02
Arsenic	5.9E-03	2.3E-04	6.8E-02	---	1.3E-04	---	---	---	---	7.4E-02
Barium	1.2E-02	3.2E-02	5.6E-02	---	7.5E-03	---	---	---	---	1.1E-01
Beryllium	1.5E-03	2.8E-04	3.4E-03	---	1.2E-05	---	---	---	---	5.2E-03
Cadmium	1.8E-03	1.7E-03	9.3E-01	---	6.2E-07	---	---	---	---	9.4E-01
Chromium (Total)	4.0E-02	2.2E-03	6.0E-01	---	2.0E-05	---	---	---	---	6.4E-01
Cobalt	1.6E-02	1.8E-03	9.7E-02	---	1.1E-05	---	---	---	---	1.1E-01
Copper	2.0E-01	2.4E-02	3.5E+00	---	5.6E-05	---	---	---	---	3.8E+00
Lead	4.2E-02	2.3E-03	1.1E+00	---	8.5E-06	---	---	---	---	1.2E+00
Manganese	2.0E-02	4.1E-01	8.9E-02	---	1.5E-02	---	---	---	---	5.4E-01
Mercury	5.6E-04	2.2E-04	4.7E-02	---	1.7E-07	---	---	---	---	4.8E-02
Molybdenum	4.2E-02	6.5E-03	2.0E+00	---	1.6E-04	---	---	---	---	2.0E+00
Nickel	2.7E-02	6.8E-03	1.4E+00	---	4.6E-05	---	---	---	---	1.4E+00
Selenium	1.3E-03	2.2E-03	6.3E-02	---	1.0E-05	---	---	---	---	6.6E-02
Silver	8.1E-04	4.4E-04	8.2E-02	---	8.6E-07	---	---	---	---	8.4E-02
Strontium	1.1E-01	8.2E-02	4.6E-01	---	3.8E-02	---	---	---	---	6.8E-01
Thallium	9.3E-04	3.4E-04	2.2E-03	---	5.1E-06	---	---	---	---	3.5E-03
Uranium	2.3E-03	4.4E-05	3.8E-03	---	6.1E-05	---	---	---	---	6.2E-03
Vanadium	6.3E-02	2.2E-03	1.3E-01	---	2.9E-05	---	---	---	---	2.0E-01
Zinc	2.4E-01	2.6E-01	7.7E+01	---	1.9E-04	---	---	---	---	7.7E+01

Average Daily Doses for the Barn Swallow (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	6.2E-04	4.0E-04	3.1E-02	---	8.0E-05	---	---	---	---	3.2E-02
Arsenic	5.9E-03	2.3E-04	6.8E-02	---	1.3E-04	---	---	---	---	7.4E-02
Barium	1.2E-02	3.2E-02	5.6E-02	---	7.5E-03	---	---	---	---	1.1E-01
Beryllium	1.5E-03	2.8E-04	3.4E-03	---	1.2E-05	---	---	---	---	5.2E-03
Cadmium	1.8E-03	1.7E-03	9.3E-01	---	6.2E-07	---	---	---	---	9.4E-01
Chromium (Total)	4.0E-02	2.2E-03	6.0E-01	---	2.0E-05	---	---	---	---	6.4E-01
Cobalt	1.6E-02	1.8E-03	9.7E-02	---	1.1E-05	---	---	---	---	1.1E-01
Copper	2.0E-01	2.4E-02	3.5E+00	---	5.6E-05	---	---	---	---	3.8E+00
Lead	4.2E-02	2.3E-03	1.1E+00	---	8.5E-06	---	---	---	---	1.2E+00
Manganese	2.0E-02	4.1E-01	8.9E-02	---	1.5E-02	---	---	---	---	5.4E-01
Mercury	5.6E-04	2.2E-04	4.7E-02	---	1.7E-07	---	---	---	---	4.8E-02
Molybdenum	4.2E-02	6.5E-03	2.0E+00	---	1.6E-04	---	---	---	---	2.0E+00
Nickel	2.7E-02	6.8E-03	1.4E+00	---	4.6E-05	---	---	---	---	1.4E+00
Selenium	1.3E-03	2.2E-03	6.3E-02	---	1.0E-05	---	---	---	---	6.6E-02
Silver	8.1E-04	4.4E-04	8.2E-02	---	8.6E-07	---	---	---	---	8.4E-02
Strontium	1.1E-01	8.2E-02	4.6E-01	---	3.8E-02	---	---	---	---	6.8E-01
Thallium	9.3E-04	3.4E-04	2.2E-03	---	5.1E-06	---	---	---	---	3.5E-03
Uranium	2.3E-03	4.4E-05	3.8E-03	---	6.1E-05	---	---	---	---	6.2E-03
Vanadium	6.3E-02	2.2E-03	1.3E-01	---	2.9E-05	---	---	---	---	2.0E-01
Zinc	2.4E-01	2.6E-01	7.7E+01	---	1.9E-04	---	---	---	---	7.7E+01

Average Daily Doses for the Common Loon Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	1.2E-05	4.6E-04	---	6.6E-05	1.8E-02	1.8E-02
Arsenic	---	---	---	---	2.0E-05	5.0E-03	---	3.4E-02	3.8E-02	7.7E-02
Barium	---	---	---	---	1.2E-03	1.4E-02	---	3.9E-02	5.0E-02	1.0E-01
Beryllium	---	---	---	---	1.8E-06	8.2E-04	---	2.2E-03	9.8E-04	4.0E-03
Cadmium	---	---	---	---	9.6E-08	3.7E-04	---	1.1E-02	1.5E-02	2.7E-02
Chromium (Total)	---	---	---	---	3.2E-06	4.1E-02	---	1.2E-01	5.0E-02	2.1E-01
Cobalt	---	---	---	---	1.8E-06	9.8E-03	---	4.7E-04	2.5E-02	3.5E-02
Copper	---	---	---	---	8.6E-06	1.9E-02	---	6.1E-01	3.0E+00	3.6E+00
Lead	---	---	---	---	1.3E-06	8.3E-03	---	1.8E-02	2.5E-02	5.1E-02
Manganese	---	---	---	---	2.3E-03	7.3E-02	---	2.2E-01	9.6E-02	3.9E-01
Mercury	---	---	---	---	2.6E-08	7.9E-05	---	1.9E-04	8.9E-02	9.0E-02
Molybdenum	---	---	---	---	2.5E-05	7.6E-03	---	8.0E-02	6.8E-02	1.6E-01
Nickel	---	---	---	---	7.2E-06	3.0E-02	---	7.6E-02	8.3E-02	1.9E-01
Selenium	---	---	---	---	1.5E-06	7.4E-04	---	9.3E-03	2.8E-01	2.9E-01
Silver	---	---	---	---	1.3E-07	7.9E-05	---	1.2E-04	3.3E-02	3.4E-02
Strontium	---	---	---	---	6.0E-03	7.8E-02	---	9.9E-02	2.5E+00	2.7E+00
Thallium	---	---	---	---	7.9E-07	2.5E-04	---	1.0E-03	4.3E-03	5.6E-03
Uranium	---	---	---	---	9.4E-06	3.8E-03	---	1.3E-03	4.3E-03	9.5E-03
Vanadium	---	---	---	---	4.4E-06	4.3E-02	---	1.6E-02	6.0E-02	1.2E-01
Zinc	---	---	---	---	2.9E-05	1.0E-01	---	3.2E+00	6.6E+01	7.0E+01

Average Daily Doses for the Lesser Scaup Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	2.4E-05	6.4E-04	7.1E-05	9.0E-04	---	1.6E-03
Arsenic	---	---	---	---	3.9E-05	7.0E-03	7.4E-04	4.6E-01	---	4.7E-01
Barium	---	---	---	---	2.3E-03	2.0E-02	8.8E-03	5.3E-01	---	5.6E-01
Beryllium	---	---	---	---	3.6E-06	1.1E-03	2.0E-03	2.9E-02	---	3.2E-02
Cadmium	---	---	---	---	1.9E-07	5.1E-04	1.4E-03	1.5E-01	---	1.5E-01
Chromium (Total)	---	---	---	---	6.2E-06	5.7E-02	6.7E-03	1.7E+00	---	1.7E+00
Cobalt	---	---	---	---	3.5E-06	1.4E-02	2.9E-04	6.4E-03	---	2.0E-02
Copper	---	---	---	---	1.7E-05	2.7E-02	2.4E-02	8.3E+00	---	8.3E+00
Lead	---	---	---	---	2.6E-06	1.1E-02	3.3E-03	2.5E-01	---	2.6E-01
Manganese	---	---	---	---	4.4E-03	1.0E-01	2.3E-02	3.0E+00	---	3.1E+00
Mercury	---	---	---	---	5.0E-08	1.1E-04	3.6E-04	2.6E-03	---	3.1E-03
Molybdenum	---	---	---	---	4.8E-05	1.1E-02	7.2E-03	1.1E+00	---	1.1E+00
Nickel	---	---	---	---	1.4E-05	4.1E-02	5.3E-03	1.0E+00	---	1.1E+00
Selenium	---	---	---	---	3.0E-06	1.0E-03	1.4E-03	1.3E-01	---	1.3E-01
Silver	---	---	---	---	2.6E-07	1.1E-04	1.1E-05	1.7E-03	---	1.8E-03
Strontium	---	---	---	---	1.2E-02	1.1E-01	1.2E-01	1.3E+00	---	1.6E+00
Thallium	---	---	---	---	1.5E-06	3.5E-04	2.4E-06	1.4E-02	---	1.4E-02
Uranium	---	---	---	---	1.8E-05	5.3E-03	7.7E-05	1.8E-02	---	2.3E-02
Vanadium	---	---	---	---	8.6E-06	5.9E-02	8.2E-04	2.1E-01	---	2.7E-01
Zinc	---	---	---	---	5.7E-05	1.4E-01	2.4E-01	4.3E+01	---	4.3E+01

Average Daily Doses for the Mallard Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.9E-05	3.8E-04	3.0E-04	---	2.0E-05	7.9E-04	3.8E-04	4.3E-04	---	2.3E-03
Arsenic	1.8E-04	2.2E-04	6.6E-04	---	3.2E-05	8.7E-03	4.0E-03	2.2E-01	---	2.4E-01
Barium	3.8E-04	3.0E-02	5.5E-04	---	1.9E-03	2.5E-02	4.7E-02	2.6E-01	---	3.6E-01
Beryllium	4.7E-05	2.7E-04	3.3E-05	---	3.0E-06	1.4E-03	1.1E-02	1.4E-02	---	2.6E-02
Cadmium	5.7E-05	1.6E-03	9.1E-03	---	1.6E-07	6.4E-04	7.5E-03	7.1E-02	---	8.9E-02
Chromium (Total)	1.2E-03	2.1E-03	5.9E-03	---	5.2E-06	7.2E-02	3.6E-02	7.9E-01	---	9.1E-01
Cobalt	4.9E-04	1.7E-03	9.4E-04	---	2.9E-06	1.7E-02	1.6E-03	3.1E-03	---	2.5E-02
Copper	6.0E-03	2.3E-02	3.5E-02	---	1.4E-05	3.4E-02	1.3E-01	4.0E+00	---	4.2E+00
Lead	1.3E-03	2.2E-03	1.1E-02	---	2.2E-06	1.4E-02	1.8E-02	1.2E-01	---	1.6E-01
Manganese	6.3E-04	4.0E-01	8.7E-04	---	3.7E-03	1.3E-01	1.2E-01	1.4E+00	---	2.1E+00
Mercury	1.7E-05	2.1E-04	4.6E-04	---	4.2E-08	1.4E-04	1.9E-03	1.3E-03	---	4.0E-03
Molybdenum	1.3E-03	6.3E-03	1.9E-02	---	4.0E-05	1.3E-02	3.9E-02	5.2E-01	---	6.0E-01
Nickel	8.3E-04	6.6E-03	1.4E-02	---	1.2E-05	5.2E-02	2.9E-02	4.9E-01	---	5.9E-01
Selenium	4.0E-05	2.1E-03	6.1E-04	---	2.5E-06	1.3E-03	7.8E-03	6.1E-02	---	7.3E-02
Silver	2.5E-05	4.2E-04	8.0E-04	---	2.2E-07	1.4E-04	5.8E-05	8.0E-04	---	2.2E-03
Strontium	3.3E-03	7.9E-02	4.4E-03	---	9.7E-03	1.4E-01	6.6E-01	6.4E-01	---	1.5E+00
Thallium	2.9E-05	3.3E-04	2.1E-05	---	1.3E-06	4.4E-04	1.3E-05	6.5E-03	---	7.3E-03
Uranium	7.1E-05	4.2E-05	3.7E-05	---	1.5E-05	6.7E-03	4.1E-04	8.4E-03	---	1.6E-02
Vanadium	1.9E-03	2.1E-03	1.3E-03	---	7.3E-06	7.4E-02	4.4E-03	1.0E-01	---	1.8E-01
Zinc	7.4E-03	2.5E-01	7.5E-01	---	4.8E-05	1.7E-01	1.3E+00	2.1E+01	---	2.3E+01

Average Daily Doses for the Red-tailed Hawk Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.7E-05	---	---	1.1E-03	2.1E-05	---	---	---	---	1.2E-03
Arsenic	7.4E-04	---	---	2.0E-02	3.3E-05	---	---	---	---	2.1E-02
Barium	1.6E-03	---	---	2.4E-01	1.9E-03	---	---	---	---	2.4E-01
Beryllium	1.9E-04	---	---	5.0E-04	3.1E-06	---	---	---	---	6.9E-04
Cadmium	2.3E-04	---	---	1.0E-02	1.6E-07	---	---	---	---	1.0E-02
Chromium (Total)	5.0E-03	---	---	1.4E-02	5.3E-06	---	---	---	---	1.9E-02
Cobalt	2.0E-03	---	---	6.4E-03	3.0E-06	---	---	---	---	8.4E-03
Copper	2.4E-02	---	---	5.5E-01	1.4E-05	---	---	---	---	5.7E-01
Lead	5.2E-03	---	---	6.5E-03	2.2E-06	---	---	---	---	1.2E-02
Manganese	2.5E-03	---	---	8.8E-02	3.8E-03	---	---	---	---	9.4E-02
Mercury	7.0E-05	---	---	2.9E-03	4.3E-08	---	---	---	---	3.0E-03
Molybdenum	5.2E-03	---	---	3.0E-02	4.1E-05	---	---	---	---	3.5E-02
Nickel	3.4E-03	---	---	1.5E-02	1.2E-05	---	---	---	---	1.8E-02
Selenium	1.6E-04	---	---	4.8E-02	2.6E-06	---	---	---	---	4.8E-02
Silver	1.0E-04	---	---	1.0E-03	2.2E-07	---	---	---	---	1.1E-03
Strontium	1.3E-02	---	---	6.2E-01	1.0E-02	---	---	---	---	6.5E-01
Thallium	1.2E-04	---	---	6.1E-03	1.3E-06	---	---	---	---	6.2E-03
Uranium	2.9E-04	---	---	5.4E-04	1.6E-05	---	---	---	---	8.5E-04
Vanadium	7.8E-03	---	---	1.5E-02	7.5E-06	---	---	---	---	2.3E-02
Zinc	3.0E-02	---	---	3.0E+00	4.9E-05	---	---	---	---	3.1E+00

Average Daily Doses for the Spotted Sandpiper Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.3E-04	---	1.1E-02	---	6.3E-05	8.6E-04	1.2E-04	1.0E-03	5.1E-03	1.9E-02
Arsenic	2.2E-03	---	2.5E-02	---	1.0E-04	9.4E-03	1.3E-03	5.3E-01	1.1E-02	5.8E-01
Barium	4.6E-03	---	2.1E-02	---	5.9E-03	2.7E-02	1.5E-02	6.1E-01	1.4E-02	6.9E-01
Beryllium	5.6E-04	---	1.3E-03	---	9.4E-06	1.5E-03	3.3E-03	3.3E-02	2.8E-04	4.0E-02
Cadmium	6.8E-04	---	3.4E-01	---	4.9E-07	6.9E-04	2.4E-03	1.7E-01	4.4E-03	5.2E-01
Chromium (Total)	1.5E-02	---	2.2E-01	---	1.6E-05	7.8E-02	1.1E-02	1.9E+00	1.4E-02	2.2E+00
Cobalt	5.9E-03	---	3.6E-02	---	9.1E-06	1.8E-02	4.9E-04	7.3E-03	7.1E-03	7.5E-02
Copper	7.2E-02	---	1.3E+00	---	4.4E-05	3.6E-02	4.1E-02	9.4E+00	8.5E-01	1.2E+01
Lead	1.5E-02	---	4.1E-01	---	6.8E-06	1.6E-02	5.7E-03	2.8E-01	7.0E-03	7.3E-01
Manganese	7.5E-03	---	3.3E-02	---	1.2E-02	1.4E-01	3.9E-02	3.4E+00	2.8E-02	3.7E+00
Mercury	2.1E-04	---	1.7E-02	---	1.3E-07	1.5E-04	6.1E-04	3.0E-03	2.6E-02	4.7E-02
Molybdenum	1.5E-02	---	7.3E-01	---	1.3E-04	1.4E-02	1.2E-02	1.2E+00	2.0E-02	2.0E+00
Nickel	9.9E-03	---	5.2E-01	---	3.7E-05	5.6E-02	9.1E-03	1.2E+00	2.4E-02	1.8E+00
Selenium	4.7E-04	---	2.3E-02	---	7.9E-06	1.4E-03	2.5E-03	1.4E-01	8.0E-02	2.5E-01
Silver	3.0E-04	---	3.0E-02	---	6.9E-07	1.5E-04	1.8E-05	1.9E-03	9.6E-03	4.2E-02
Strontium	3.9E-02	---	1.7E-01	---	3.0E-02	1.5E-01	2.1E-01	1.5E+00	7.1E-01	2.8E+00
Thallium	3.4E-04	---	8.0E-04	---	4.0E-06	4.7E-04	4.2E-06	1.5E-02	1.2E-03	1.8E-02
Uranium	8.5E-04	---	1.4E-03	---	4.8E-05	7.2E-03	1.3E-04	2.0E-02	1.2E-03	3.1E-02
Vanadium	2.3E-02	---	4.8E-02	---	2.3E-05	8.0E-02	1.4E-03	2.4E-01	1.7E-02	4.1E-01
Zinc	8.8E-02	---	2.8E+01	---	1.5E-04	1.9E-01	4.1E-01	4.9E+01	1.9E+01	9.7E+01

Average Daily Doses for the Spruce Grouse Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.7E-04	1.1E-02	4.5E-04	---	2.5E-05	---	---	---	---	1.2E-02
Arsenic	1.6E-03	6.3E-03	9.8E-04	---	4.1E-05	---	---	---	---	8.9E-03
Barium	3.4E-03	8.6E-01	8.2E-04	---	2.4E-03	---	---	---	---	8.7E-01
Beryllium	4.2E-04	7.6E-03	5.0E-05	---	3.8E-06	---	---	---	---	8.1E-03
Cadmium	5.0E-04	4.6E-02	1.4E-02	---	2.0E-07	---	---	---	---	6.0E-02
Chromium (Total)	1.1E-02	6.0E-02	8.8E-03	---	6.5E-06	---	---	---	---	7.9E-02
Cobalt	4.3E-03	4.9E-02	1.4E-03	---	3.6E-06	---	---	---	---	5.5E-02
Copper	5.3E-02	6.5E-01	5.2E-02	---	1.8E-05	---	---	---	---	7.5E-01
Lead	1.1E-02	6.3E-02	1.6E-02	---	2.7E-06	---	---	---	---	9.1E-02
Manganese	5.5E-03	1.1E+01	1.3E-03	---	4.7E-03	---	---	---	---	1.1E+01
Mercury	1.5E-04	6.0E-03	6.9E-04	---	5.3E-08	---	---	---	---	6.8E-03
Molybdenum	1.1E-02	1.8E-01	2.9E-02	---	5.0E-05	---	---	---	---	2.2E-01
Nickel	7.3E-03	1.9E-01	2.1E-02	---	1.5E-05	---	---	---	---	2.1E-01
Selenium	3.5E-04	6.0E-02	9.1E-04	---	3.2E-06	---	---	---	---	6.1E-02
Silver	2.2E-04	1.2E-02	1.2E-03	---	2.7E-07	---	---	---	---	1.3E-02
Strontium	2.9E-02	2.2E+00	6.6E-03	---	1.2E-02	---	---	---	---	2.3E+00
Thallium	2.5E-04	9.3E-03	3.2E-05	---	1.6E-06	---	---	---	---	9.6E-03
Uranium	6.3E-04	1.2E-03	5.5E-05	---	1.9E-05	---	---	---	---	1.9E-03
Vanadium	1.7E-02	6.0E-02	1.9E-03	---	9.1E-06	---	---	---	---	7.9E-02
Zinc	6.5E-02	7.1E+00	1.1E+00	---	6.0E-05	---	---	---	---	8.3E+00

Average Daily Doses for the American Beaver Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.4E-05	3.0E-04	---	---	6.2E-06	3.2E-05	6.4E-06	---	---	3.7E-04
Arsenic	2.5E-04	1.5E-04	---	---	1.9E-05	6.9E-04	1.3E-04	---	---	1.2E-03
Barium	3.0E-04	2.3E-02	---	---	6.2E-04	2.4E-03	1.9E-03	---	---	2.8E-02
Beryllium	2.1E-05	2.4E-04	---	---	6.2E-06	1.1E-04	3.9E-04	---	---	7.7E-04
Cadmium	5.6E-05	8.0E-04	---	---	4.0E-07	1.1E-04	5.1E-04	---	---	1.5E-03
Chromium (Total)	7.8E-04	1.5E-03	---	---	1.3E-05	2.6E-02	5.3E-03	---	---	3.3E-02
Cobalt	3.3E-04	1.3E-03	---	---	1.4E-05	1.0E-02	3.8E-04	---	---	1.2E-02
Copper	1.3E-02	1.7E-02	---	---	8.0E-05	3.4E-02	1.7E-02	---	---	8.0E-02
Lead	1.3E-03	6.9E-04	---	---	4.6E-06	1.9E-03	1.0E-03	---	---	4.9E-03
Manganese	4.1E-04	3.0E-01	---	---	3.3E-03	1.7E-02	6.6E-03	---	---	3.3E-01
Mercury	3.3E-05	1.2E-04	---	---	1.0E-07	1.7E-05	1.1E-04	---	---	2.8E-04
Molybdenum	1.2E-04	4.5E-04	---	---	7.3E-06	2.0E-04	2.4E-04	---	---	1.0E-03
Nickel	5.5E-03	2.9E-02	---	---	6.5E-04	8.5E-02	1.1E-02	---	---	1.3E-01
Selenium	1.5E-04	1.5E-03	---	---	3.5E-06	1.5E-04	3.6E-04	---	---	2.1E-03
Silver	3.4E-05	2.9E-04	---	---	3.6E-07	5.5E-05	9.6E-06	---	---	3.9E-04
Strontium	2.4E-03	1.4E-01	---	---	1.2E-03	8.9E-03	1.8E-02	---	---	1.7E-01
Thallium	2.1E-05	3.2E-04	---	---	2.5E-06	4.8E-05	6.0E-07	---	---	3.9E-04
Uranium	6.4E-05	2.9E-05	---	---	3.5E-06	4.2E-04	1.9E-05	---	---	5.4E-04
Vanadium	9.0E-04	1.5E-03	---	---	1.4E-05	6.8E-03	1.7E-04	---	---	9.4E-03
Zinc	1.3E-02	2.5E-01	---	---	2.6E-04	3.9E-02	1.0E-01	---	---	4.1E-01

Average Daily Doses for the American Mink Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.4E-05	---	---	1.8E-04	2.6E-06	6.6E-05	---	1.3E-05	2.4E-03	2.7E-03
Arsenic	3.5E-04	---	---	1.6E-03	8.0E-06	1.4E-03	---	1.5E-02	4.6E-03	2.3E-02
Barium	4.2E-04	---	---	1.7E-01	2.6E-04	4.9E-03	---	1.8E-02	2.5E-02	2.2E-01
Beryllium	2.9E-05	---	---	1.8E-04	2.6E-06	2.2E-04	---	7.7E-04	4.6E-04	1.6E-03
Cadmium	7.9E-05	---	---	1.2E-02	1.7E-07	2.3E-04	---	8.7E-03	1.2E-02	3.4E-02
Chromium (Total)	1.1E-03	---	---	1.8E-03	5.3E-06	5.2E-02	---	1.2E-01	1.3E-02	1.9E-01
Cobalt	4.7E-04	---	---	2.1E-03	5.8E-06	2.1E-02	---	1.3E-03	1.1E-02	3.5E-02
Copper	1.8E-02	---	---	1.2E-01	3.3E-05	6.9E-02	---	8.8E-01	1.8E+00	2.9E+00
Lead	1.8E-03	---	---	3.1E-03	1.9E-06	3.9E-03	---	1.2E-02	1.7E-02	3.7E-02
Manganese	5.7E-04	---	---	3.0E-02	1.4E-03	3.4E-02	---	1.4E-01	6.9E-02	2.7E-01
Mercury	4.5E-05	---	---	1.5E-03	4.3E-08	3.4E-05	---	1.1E-04	3.9E-02	4.0E-02
Molybdenum	1.6E-04	---	---	6.2E-03	3.1E-06	4.0E-04	---	5.6E-03	1.5E-02	2.7E-02
Nickel	7.7E-03	---	---	5.3E-03	2.7E-04	1.7E-01	---	4.2E-01	3.6E-02	6.5E-01
Selenium	2.1E-04	---	---	1.8E-02	1.5E-06	3.0E-04	---	5.1E-03	1.2E-01	1.5E-01
Silver	4.7E-05	---	---	3.5E-04	1.5E-07	1.1E-04	---	2.3E-04	5.2E-03	6.0E-03
Strontium	3.3E-03	---	---	3.3E-01	4.8E-04	1.8E-02	---	3.1E-02	1.0E+00	1.4E+00
Thallium	2.9E-05	---	---	1.1E-04	1.1E-06	9.9E-05	---	5.2E-04	1.5E-03	2.2E-03
Uranium	9.0E-05	---	---	3.5E-05	1.5E-06	8.6E-04	---	3.9E-04	2.5E-04	1.6E-03
Vanadium	1.2E-03	---	---	1.8E-03	5.8E-06	1.4E-02	---	6.7E-03	1.9E-02	4.2E-02
Zinc	1.9E-02	---	---	1.1E+00	1.1E-04	7.9E-02	---	2.5E+00	4.0E+00	7.7E+00

Average Daily Doses for the Black Bear Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.0E-05	3.7E-03	2.3E-04	9.4E-05	5.6E-06	5.9E-06	---	---	2.4E-04	4.4E-03
Arsenic	9.5E-04	1.8E-03	5.0E-04	8.6E-04	1.7E-05	1.3E-04	---	---	4.7E-04	4.8E-03
Barium	1.1E-03	2.8E-01	2.5E-04	9.2E-02	5.6E-04	4.4E-04	---	---	2.6E-03	3.8E-01
Beryllium	7.7E-05	3.0E-03	8.7E-06	9.4E-05	5.6E-06	1.9E-05	---	---	4.7E-05	3.3E-03
Cadmium	2.1E-04	9.9E-03	5.4E-03	6.6E-03	3.6E-07	2.1E-05	---	---	1.3E-03	2.3E-02
Chromium (Total)	2.9E-03	1.8E-02	2.2E-03	9.4E-04	1.1E-05	4.7E-03	---	---	1.3E-03	3.0E-02
Cobalt	1.3E-03	1.6E-02	3.8E-04	1.1E-03	1.2E-05	1.9E-03	---	---	1.1E-03	2.1E-02
Copper	4.7E-02	2.1E-01	2.5E-02	6.3E-02	7.2E-05	6.2E-03	---	---	1.9E-01	5.4E-01
Lead	4.8E-03	8.6E-03	6.5E-03	1.7E-03	4.1E-06	3.5E-04	---	---	1.7E-03	2.4E-02
Manganese	1.5E-03	3.7E+00	3.4E-04	1.6E-02	3.0E-03	3.0E-03	---	---	7.1E-03	3.8E+00
Mercury	1.2E-04	1.5E-03	5.2E-04	8.3E-04	9.2E-08	3.1E-06	---	---	4.0E-03	7.0E-03
Molybdenum	4.4E-04	5.6E-03	1.0E-03	3.3E-03	6.6E-06	3.6E-05	---	---	1.5E-03	1.2E-02
Nickel	2.1E-02	3.6E-01	5.5E-02	2.8E-03	5.8E-04	1.6E-02	---	---	3.8E-03	4.6E-01
Selenium	5.7E-04	1.8E-02	1.4E-03	9.8E-03	3.2E-06	2.7E-05	---	---	1.3E-02	4.3E-02
Silver	1.3E-04	3.7E-03	6.5E-04	1.9E-04	3.3E-07	1.0E-05	---	---	5.4E-04	5.2E-03
Strontium	9.0E-03	1.8E+00	2.0E-03	1.7E-01	1.0E-03	1.6E-03	---	---	1.0E-01	2.1E+00
Thallium	7.8E-05	3.9E-03	9.2E-06	5.6E-05	2.3E-06	8.9E-06	---	---	1.5E-04	4.2E-03
Uranium	2.4E-04	3.7E-04	2.0E-05	1.9E-05	3.2E-06	7.7E-05	---	---	2.5E-05	7.5E-04
Vanadium	3.3E-03	1.8E-02	3.5E-04	9.4E-04	1.3E-05	1.3E-03	---	---	1.9E-03	2.6E-02
Zinc	5.0E-02	3.1E+00	5.5E-01	5.8E-01	2.3E-04	7.1E-03	---	---	4.1E-01	4.7E+00

Average Daily Doses for the Common (Masked) Shrew Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.0E-03	2.6E-03	4.8E-02	---	1.5E-05	---	---	---	---	5.2E-02
Arsenic	1.1E-02	1.3E-03	1.1E-01	---	4.6E-05	---	---	---	---	1.2E-01
Barium	1.2E-02	2.0E-01	5.4E-02	---	1.5E-03	---	---	---	---	2.7E-01
Beryllium	8.6E-04	2.1E-03	1.8E-03	---	1.5E-05	---	---	---	---	4.8E-03
Cadmium	2.4E-03	7.0E-03	1.2E+00	---	9.5E-07	---	---	---	---	1.2E+00
Chromium (Total)	3.3E-02	1.3E-02	4.8E-01	---	3.0E-05	---	---	---	---	5.2E-01
Cobalt	1.4E-02	1.1E-02	8.1E-02	---	3.3E-05	---	---	---	---	1.1E-01
Copper	5.3E-01	1.4E-01	5.4E+00	---	1.9E-04	---	---	---	---	6.1E+00
Lead	5.4E-02	6.0E-03	1.4E+00	---	1.1E-05	---	---	---	---	1.4E+00
Manganese	1.7E-02	2.6E+00	7.2E-02	---	7.9E-03	---	---	---	---	2.7E+00
Mercury	1.4E-03	1.0E-03	1.1E-01	---	2.4E-07	---	---	---	---	1.1E-01
Molybdenum	4.9E-03	3.9E-03	2.2E-01	---	1.7E-05	---	---	---	---	2.3E-01
Nickel	2.3E-01	2.5E-01	1.2E+01	---	1.5E-03	---	---	---	---	1.2E+01
Selenium	6.4E-03	1.3E-02	3.0E-01	---	8.4E-06	---	---	---	---	3.2E-01
Silver	1.4E-03	2.6E-03	1.4E-01	---	8.6E-07	---	---	---	---	1.4E-01
Strontium	1.0E-01	1.2E+00	4.2E-01	---	2.7E-03	---	---	---	---	1.8E+00
Thallium	8.7E-04	2.7E-03	2.0E-03	---	6.0E-06	---	---	---	---	5.6E-03
Uranium	2.7E-03	2.6E-04	4.2E-03	---	8.4E-06	---	---	---	---	7.2E-03
Vanadium	3.7E-02	1.3E-02	7.5E-02	---	3.3E-05	---	---	---	---	1.3E-01
Zinc	5.6E-01	2.2E+00	1.2E+02	---	6.2E-04	---	---	---	---	1.2E+02

Average Daily Doses for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.0E-03	2.6E-03	4.8E-02	---	1.5E-05	---	---	---	---	5.2E-02
Arsenic	1.1E-02	1.3E-03	1.1E-01	---	4.6E-05	---	---	---	---	1.2E-01
Barium	1.2E-02	2.0E-01	5.4E-02	---	1.5E-03	---	---	---	---	2.7E-01
Beryllium	8.6E-04	2.1E-03	1.8E-03	---	1.5E-05	---	---	---	---	4.8E-03
Cadmium	2.4E-03	7.0E-03	1.2E+00	---	9.5E-07	---	---	---	---	1.2E+00
Chromium (Total)	3.3E-02	1.3E-02	4.8E-01	---	3.0E-05	---	---	---	---	5.2E-01
Cobalt	1.4E-02	1.1E-02	8.1E-02	---	3.3E-05	---	---	---	---	1.1E-01
Copper	5.3E-01	1.4E-01	5.4E+00	---	1.9E-04	---	---	---	---	6.1E+00
Lead	5.4E-02	6.0E-03	1.4E+00	---	1.1E-05	---	---	---	---	1.4E+00
Manganese	1.7E-02	2.6E+00	7.2E-02	---	7.9E-03	---	---	---	---	2.7E+00
Mercury	1.4E-03	1.0E-03	1.1E-01	---	2.4E-07	---	---	---	---	1.1E-01
Molybdenum	4.9E-03	3.9E-03	2.2E-01	---	1.7E-05	---	---	---	---	2.3E-01
Nickel	2.3E-01	2.5E-01	1.2E+01	---	1.5E-03	---	---	---	---	1.2E+01
Selenium	6.4E-03	1.3E-02	3.0E-01	---	8.4E-06	---	---	---	---	3.2E-01
Silver	1.4E-03	2.6E-03	1.4E-01	---	8.6E-07	---	---	---	---	1.4E-01
Strontium	1.0E-01	1.2E+00	4.2E-01	---	2.7E-03	---	---	---	---	1.8E+00
Thallium	8.7E-04	2.7E-03	2.0E-03	---	6.0E-06	---	---	---	---	5.6E-03
Uranium	2.7E-03	2.6E-04	4.2E-03	---	8.4E-06	---	---	---	---	7.2E-03
Vanadium	3.7E-02	1.3E-02	7.5E-02	---	3.3E-05	---	---	---	---	1.3E-01
Zinc	5.6E-01	2.2E+00	1.2E+02	---	6.2E-04	---	---	---	---	1.2E+02

Average Daily Doses for the Deer Mouse Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.3E-04	3.4E-03	3.2E-03	---	1.6E-05	---	---	---	---	6.7E-03
Arsenic	1.3E-03	1.6E-03	7.2E-03	---	5.1E-05	---	---	---	---	1.0E-02
Barium	1.6E-03	2.5E-01	3.7E-03	---	1.6E-03	---	---	---	---	2.6E-01
Beryllium	1.1E-04	2.7E-03	1.2E-04	---	1.6E-05	---	---	---	---	2.9E-03
Cadmium	2.9E-04	8.9E-03	7.8E-02	---	1.1E-06	---	---	---	---	8.7E-02
Chromium (Total)	4.1E-03	1.6E-02	3.2E-02	---	3.4E-05	---	---	---	---	5.3E-02
Cobalt	1.7E-03	1.4E-02	5.5E-03	---	3.7E-05	---	---	---	---	2.1E-02
Copper	6.6E-02	1.9E-01	3.6E-01	---	2.1E-04	---	---	---	---	6.2E-01
Lead	6.7E-03	7.7E-03	9.3E-02	---	1.2E-05	---	---	---	---	1.1E-01
Manganese	2.1E-03	3.3E+00	4.9E-03	---	8.7E-03	---	---	---	---	3.4E+00
Mercury	1.7E-04	1.3E-03	7.4E-03	---	2.7E-07	---	---	---	---	8.9E-03
Molybdenum	6.1E-04	5.0E-03	1.5E-02	---	1.9E-05	---	---	---	---	2.1E-02
Nickel	2.9E-02	3.3E-01	7.9E-01	---	1.7E-03	---	---	---	---	1.1E+00
Selenium	8.0E-04	1.6E-02	2.0E-02	---	9.3E-06	---	---	---	---	3.7E-02
Silver	1.8E-04	3.3E-03	9.3E-03	---	9.6E-07	---	---	---	---	1.3E-02
Strontium	1.2E-02	1.6E+00	2.8E-02	---	3.0E-03	---	---	---	---	1.6E+00
Thallium	1.1E-04	3.5E-03	1.3E-04	---	6.7E-06	---	---	---	---	3.8E-03
Uranium	3.3E-04	3.3E-04	2.9E-04	---	9.3E-06	---	---	---	---	9.6E-04
Vanadium	4.7E-03	1.6E-02	5.1E-03	---	3.7E-05	---	---	---	---	2.6E-02
Zinc	6.9E-02	2.8E+00	7.9E+00	---	6.8E-04	---	---	---	---	1.1E+01

Average Daily Doses for the Meadow Vole Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.8E-04	8.1E-03	---	---	1.8E-05	---	---	---	---	8.3E-03
Arsenic	1.9E-03	4.0E-03	---	---	5.6E-05	---	---	---	---	5.9E-03
Barium	2.2E-03	6.1E-01	---	---	1.8E-03	---	---	---	---	6.2E-01
Beryllium	1.5E-04	6.5E-03	---	---	1.8E-05	---	---	---	---	6.6E-03
Cadmium	4.1E-04	2.1E-02	---	---	1.2E-06	---	---	---	---	2.2E-02
Chromium (Total)	5.7E-03	4.0E-02	---	---	3.7E-05	---	---	---	---	4.5E-02
Cobalt	2.4E-03	3.4E-02	---	---	4.0E-05	---	---	---	---	3.6E-02
Copper	9.2E-02	4.5E-01	---	---	2.3E-04	---	---	---	---	5.4E-01
Lead	9.3E-03	1.8E-02	---	---	1.3E-05	---	---	---	---	2.8E-02
Manganese	3.0E-03	8.0E+00	---	---	9.7E-03	---	---	---	---	8.1E+00
Mercury	2.4E-04	3.2E-03	---	---	3.0E-07	---	---	---	---	3.5E-03
Molybdenum	8.5E-04	1.2E-02	---	---	2.1E-05	---	---	---	---	1.3E-02
Nickel	4.0E-02	7.9E-01	---	---	1.9E-03	---	---	---	---	8.3E-01
Selenium	1.1E-03	4.0E-02	---	---	1.0E-05	---	---	---	---	4.1E-02
Silver	2.5E-04	7.9E-03	---	---	1.1E-06	---	---	---	---	8.1E-03
Strontium	1.7E-02	3.8E+00	---	---	3.4E-03	---	---	---	---	3.9E+00
Thallium	1.5E-04	8.5E-03	---	---	7.4E-06	---	---	---	---	8.6E-03
Uranium	4.7E-04	7.9E-04	---	---	1.0E-05	---	---	---	---	1.3E-03
Vanadium	6.5E-03	4.0E-02	---	---	4.1E-05	---	---	---	---	4.6E-02
Zinc	9.7E-02	6.8E+00	---	---	7.6E-04	---	---	---	---	6.9E+00

Average Daily Doses for the Moose Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	4.6E-05	2.5E-03	---	---	4.7E-06	8.3E-06	1.6E-05	---	---	2.6E-03
Arsenic	4.8E-04	1.2E-03	---	---	1.4E-05	1.8E-04	3.4E-04	---	---	2.2E-03
Barium	5.7E-04	1.9E-01	---	---	4.7E-04	6.2E-04	4.8E-03	---	---	2.0E-01
Beryllium	3.9E-05	2.0E-03	---	---	4.7E-06	2.7E-05	1.0E-03	---	---	3.1E-03
Cadmium	1.1E-04	6.7E-03	---	---	3.0E-07	2.9E-05	1.3E-03	---	---	8.2E-03
Chromium (Total)	1.5E-03	1.2E-02	---	---	9.6E-06	6.6E-03	1.4E-02	---	---	3.4E-02
Cobalt	6.4E-04	1.1E-02	---	---	1.0E-05	2.6E-03	9.8E-04	---	---	1.5E-02
Copper	2.4E-02	1.4E-01	---	---	6.1E-05	8.7E-03	4.4E-02	---	---	2.2E-01
Lead	2.4E-03	5.8E-03	---	---	3.5E-06	4.9E-04	2.7E-03	---	---	1.1E-02
Manganese	7.8E-04	2.5E+00	---	---	2.5E-03	4.3E-03	1.7E-02	---	---	2.5E+00
Mercury	6.2E-05	1.0E-03	---	---	7.7E-08	4.3E-06	2.8E-04	---	---	1.4E-03
Molybdenum	2.2E-04	3.8E-03	---	---	5.5E-06	5.1E-05	6.1E-04	---	---	4.7E-03
Nickel	1.1E-02	2.5E-01	---	---	4.9E-04	2.2E-02	2.8E-02	---	---	3.1E-01
Selenium	2.9E-04	1.2E-02	---	---	2.6E-06	3.8E-05	9.1E-04	---	---	1.4E-02
Silver	6.4E-05	2.5E-03	---	---	2.7E-07	1.4E-05	2.5E-05	---	---	2.6E-03
Strontium	4.6E-03	1.2E+00	---	---	8.7E-04	2.3E-03	4.6E-02	---	---	1.3E+00
Thallium	4.0E-05	2.7E-03	---	---	1.9E-06	1.2E-05	1.5E-06	---	---	2.7E-03
Uranium	1.2E-04	2.5E-04	---	---	2.7E-06	1.1E-04	4.9E-05	---	---	5.3E-04
Vanadium	1.7E-03	1.2E-02	---	---	1.0E-05	1.8E-03	4.3E-04	---	---	1.6E-02
Zinc	2.5E-02	2.1E+00	---	---	2.0E-04	1.0E-02	2.6E-01	---	---	2.4E+00

Average Daily Doses for the Muskrat Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	8.5E-06	1.8E-04	2.4E-04	6.2E-05	6.0E-04	1.1E-03
Arsenic	---	---	---	---	2.6E-05	3.8E-03	4.8E-03	7.4E-02	1.1E-03	8.4E-02
Barium	---	---	---	---	8.6E-04	1.3E-02	7.0E-02	8.8E-02	6.3E-03	1.8E-01
Beryllium	---	---	---	---	8.6E-06	5.8E-04	1.5E-02	3.8E-03	1.1E-04	1.9E-02
Cadmium	---	---	---	---	5.5E-07	6.2E-04	1.9E-02	4.3E-02	3.1E-03	6.6E-02
Chromium (Total)	---	---	---	---	1.8E-05	1.4E-01	2.0E-01	6.0E-01	3.2E-03	9.4E-01
Cobalt	---	---	---	---	1.9E-05	5.5E-02	1.4E-02	6.5E-03	2.7E-03	7.9E-02
Copper	---	---	---	---	1.1E-04	1.8E-01	6.4E-01	4.3E+00	4.6E-01	5.6E+00
Lead	---	---	---	---	6.3E-06	1.0E-02	3.9E-02	5.7E-02	4.2E-03	1.1E-01
Manganese	---	---	---	---	4.6E-03	9.0E-02	2.4E-01	6.7E-01	1.7E-02	1.0E+00
Mercury	---	---	---	---	1.4E-07	9.1E-05	4.0E-03	5.5E-04	9.8E-03	1.4E-02
Molybdenum	---	---	---	---	1.0E-05	1.1E-03	8.8E-03	2.7E-02	3.7E-03	4.1E-02
Nickel	---	---	---	---	8.9E-04	4.7E-01	4.0E-01	2.1E+00	9.2E-03	3.0E+00
Selenium	---	---	---	---	4.8E-06	8.1E-04	1.3E-02	2.5E-02	3.1E-02	7.0E-02
Silver	---	---	---	---	5.0E-07	3.0E-04	3.6E-04	1.2E-03	1.3E-03	3.1E-03
Strontium	---	---	---	---	1.6E-03	4.9E-02	6.6E-01	1.5E-01	2.5E-01	1.1E+00
Thallium	---	---	---	---	3.5E-06	2.6E-04	2.2E-05	2.6E-03	3.7E-04	3.2E-03
Uranium	---	---	---	---	4.9E-06	2.3E-03	7.0E-04	1.9E-03	6.2E-05	5.0E-03
Vanadium	---	---	---	---	1.9E-05	3.7E-02	6.2E-03	3.3E-02	4.7E-03	8.1E-02
Zinc	---	---	---	---	3.6E-04	2.1E-01	3.7E+00	1.2E+01	1.0E+00	1.7E+01

Average Daily Doses for the Northern River Otter Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	5.7E-06	---	---	3.0E-05	7.0E-06	7.1E-05	---	1.6E-05	2.5E-03	2.6E-03
Arsenic	6.0E-05	---	---	2.7E-04	2.2E-05	1.5E-03	---	1.9E-02	4.8E-03	2.6E-02
Barium	7.1E-05	---	---	2.9E-02	7.0E-04	5.2E-03	---	2.3E-02	2.6E-02	8.4E-02
Beryllium	4.9E-06	---	---	3.0E-05	7.0E-06	2.3E-04	---	9.8E-04	4.8E-04	1.7E-03
Cadmium	1.3E-05	---	---	2.1E-03	4.5E-07	2.5E-04	---	1.1E-02	1.3E-02	2.6E-02
Chromium (Total)	1.9E-04	---	---	3.0E-04	1.4E-05	5.6E-02	---	1.6E-01	1.3E-02	2.3E-01
Cobalt	7.9E-05	---	---	3.6E-04	1.6E-05	2.2E-02	---	1.7E-03	1.1E-02	3.6E-02
Copper	3.0E-03	---	---	2.0E-02	9.0E-05	7.4E-02	---	1.1E+00	1.9E+00	3.1E+00
Lead	3.0E-04	---	---	5.2E-04	5.2E-06	4.2E-03	---	1.5E-02	1.8E-02	3.7E-02
Manganese	9.8E-05	---	---	5.0E-03	3.7E-03	3.6E-02	---	1.7E-01	7.2E-02	2.9E-01
Mercury	7.7E-06	---	---	2.6E-04	1.2E-07	3.7E-05	---	1.4E-04	4.1E-02	4.1E-02
Molybdenum	2.8E-05	---	---	1.0E-03	8.2E-06	4.3E-04	---	7.1E-03	1.5E-02	2.4E-02
Nickel	1.3E-03	---	---	8.9E-04	7.3E-04	1.9E-01	---	5.4E-01	3.8E-02	7.7E-01
Selenium	3.6E-05	---	---	3.1E-03	3.9E-06	3.2E-04	---	6.4E-03	1.3E-01	1.4E-01
Silver	8.0E-06	---	---	6.0E-05	4.1E-07	1.2E-04	---	3.0E-04	5.5E-03	6.0E-03
Strontium	5.7E-04	---	---	5.5E-02	1.3E-03	1.9E-02	---	3.9E-02	1.0E+00	1.2E+00
Thallium	5.0E-06	---	---	1.8E-05	2.8E-06	1.1E-04	---	6.7E-04	1.5E-03	2.3E-03
Uranium	1.5E-05	---	---	6.0E-06	4.0E-06	9.3E-04	---	4.9E-04	2.6E-04	1.7E-03
Vanadium	2.1E-04	---	---	3.0E-04	1.6E-05	1.5E-02	---	8.6E-03	1.9E-02	4.4E-02
Zinc	3.2E-03	---	---	1.8E-01	2.9E-04	8.5E-02	---	3.2E+00	4.2E+00	7.6E+00

Average Daily Doses for the Short-tailed Weasel Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.2E-04	---	---	1.7E-03	1.1E-05	---	---	---	---	2.0E-03
Arsenic	3.3E-03	---	---	1.5E-02	3.4E-05	---	---	---	---	1.9E-02
Barium	3.9E-03	---	---	1.6E+00	1.1E-03	---	---	---	---	1.6E+00
Beryllium	2.7E-04	---	---	1.7E-03	1.1E-05	---	---	---	---	1.9E-03
Cadmium	7.4E-04	---	---	1.2E-01	7.0E-07	---	---	---	---	1.2E-01
Chromium (Total)	1.0E-02	---	---	1.7E-02	2.2E-05	---	---	---	---	2.7E-02
Cobalt	4.4E-03	---	---	2.0E-02	2.4E-05	---	---	---	---	2.5E-02
Copper	1.7E-01	---	---	1.1E+00	1.4E-04	---	---	---	---	1.3E+00
Lead	1.7E-02	---	---	2.9E-02	8.0E-06	---	---	---	---	4.6E-02
Manganese	5.4E-03	---	---	2.8E-01	5.8E-03	---	---	---	---	2.9E-01
Mercury	4.3E-04	---	---	1.5E-02	1.8E-07	---	---	---	---	1.5E-02
Molybdenum	1.5E-03	---	---	5.8E-02	1.3E-05	---	---	---	---	6.0E-02
Nickel	7.3E-02	---	---	5.0E-02	1.1E-03	---	---	---	---	1.2E-01
Selenium	2.0E-03	---	---	1.7E-01	6.1E-06	---	---	---	---	1.7E-01
Silver	4.4E-04	---	---	3.3E-03	6.3E-07	---	---	---	---	3.7E-03
Strontium	3.2E-02	---	---	3.1E+00	2.0E-03	---	---	---	---	3.1E+00
Thallium	2.7E-04	---	---	9.9E-04	4.4E-06	---	---	---	---	1.3E-03
Uranium	8.5E-04	---	---	3.3E-04	6.2E-06	---	---	---	---	1.2E-03
Vanadium	1.2E-02	---	---	1.7E-02	2.4E-05	---	---	---	---	2.8E-02
Zinc	1.8E-01	---	---	1.0E+01	4.5E-04	---	---	---	---	1.0E+01

Average Daily Doses for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.2E-04	---	---	1.7E-03	1.1E-05	---	---	---	---	2.0E-03
Arsenic	3.3E-03	---	---	1.5E-02	3.4E-05	---	---	---	---	1.9E-02
Barium	3.9E-03	---	---	1.6E+00	1.1E-03	---	---	---	---	1.6E+00
Beryllium	2.7E-04	---	---	1.7E-03	1.1E-05	---	---	---	---	1.9E-03
Cadmium	7.4E-04	---	---	1.2E-01	7.0E-07	---	---	---	---	1.2E-01
Chromium (Total)	1.0E-02	---	---	1.7E-02	2.2E-05	---	---	---	---	2.7E-02
Cobalt	4.4E-03	---	---	2.0E-02	2.4E-05	---	---	---	---	2.5E-02
Copper	1.7E-01	---	---	1.1E+00	1.4E-04	---	---	---	---	1.3E+00
Lead	1.7E-02	---	---	2.9E-02	8.0E-06	---	---	---	---	4.6E-02
Manganese	5.4E-03	---	---	2.8E-01	5.8E-03	---	---	---	---	2.9E-01
Mercury	4.3E-04	---	---	1.5E-02	1.8E-07	---	---	---	---	1.5E-02
Molybdenum	1.5E-03	---	---	5.8E-02	1.3E-05	---	---	---	---	6.0E-02
Nickel	7.3E-02	---	---	5.0E-02	1.1E-03	---	---	---	---	1.2E-01
Selenium	2.0E-03	---	---	1.7E-01	6.1E-06	---	---	---	---	1.7E-01
Silver	4.4E-04	---	---	3.3E-03	6.3E-07	---	---	---	---	3.7E-03
Strontium	3.2E-02	---	---	3.1E+00	2.0E-03	---	---	---	---	3.1E+00
Thallium	2.7E-04	---	---	9.9E-04	4.4E-06	---	---	---	---	1.3E-03
Uranium	8.5E-04	---	---	3.3E-04	6.2E-06	---	---	---	---	1.2E-03
Vanadium	1.2E-02	---	---	1.7E-02	2.4E-05	---	---	---	---	2.8E-02
Zinc	1.8E-01	---	---	1.0E+01	4.5E-04	---	---	---	---	1.0E+01

Average Daily Doses for the Snowshoe Hare Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	5.7E-04	1.0E-02	---	---	8.3E-06	---	---	---	---	1.1E-02
Arsenic	6.0E-03	4.9E-03	---	---	2.6E-05	---	---	---	---	1.1E-02
Barium	7.0E-03	7.5E-01	---	---	8.3E-04	---	---	---	---	7.6E-01
Beryllium	4.8E-04	8.0E-03	---	---	8.3E-06	---	---	---	---	8.5E-03
Cadmium	1.3E-03	2.6E-02	---	---	5.3E-07	---	---	---	---	2.8E-02
Chromium (Total)	1.8E-02	4.9E-02	---	---	1.7E-05	---	---	---	---	6.7E-02
Cobalt	7.9E-03	4.2E-02	---	---	1.9E-05	---	---	---	---	5.0E-02
Copper	3.0E-01	5.5E-01	---	---	1.1E-04	---	---	---	---	8.5E-01
Lead	3.0E-02	2.3E-02	---	---	6.1E-06	---	---	---	---	5.3E-02
Manganese	9.7E-03	9.9E+00	---	---	4.4E-03	---	---	---	---	9.9E+00
Mercury	7.7E-04	4.0E-03	---	---	1.4E-07	---	---	---	---	4.7E-03
Molybdenum	2.8E-03	1.5E-02	---	---	9.8E-06	---	---	---	---	1.8E-02
Nickel	1.3E-01	9.7E-01	---	---	8.7E-04	---	---	---	---	1.1E+00
Selenium	3.6E-03	4.9E-02	---	---	4.7E-06	---	---	---	---	5.2E-02
Silver	7.9E-04	9.7E-03	---	---	4.9E-07	---	---	---	---	1.1E-02
Strontium	5.6E-02	4.7E+00	---	---	1.5E-03	---	---	---	---	4.8E+00
Thallium	4.9E-04	1.0E-02	---	---	3.4E-06	---	---	---	---	1.1E-02
Uranium	1.5E-03	9.7E-04	---	---	4.7E-06	---	---	---	---	2.5E-03
Vanadium	2.1E-02	4.9E-02	---	---	1.9E-05	---	---	---	---	7.0E-02
Zinc	3.1E-01	8.3E+00	---	---	3.5E-04	---	---	---	---	8.6E+00

Average Daily Doses for the Woodland Caribou Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.6E-04	1.3E-03	---	---	5.1E-06	---	---	---	---	1.4E-03
Arsenic	1.7E-03	6.2E-04	---	---	1.6E-05	---	---	---	---	2.3E-03
Barium	2.0E-03	9.7E-02	---	---	5.1E-04	---	---	---	---	9.9E-02
Beryllium	1.4E-04	1.0E-03	---	---	5.1E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	3.4E-03	---	---	3.3E-07	---	---	---	---	3.8E-03
Chromium (Total)	5.2E-03	6.2E-03	---	---	1.0E-05	---	---	---	---	1.1E-02
Cobalt	2.2E-03	5.3E-03	---	---	1.1E-05	---	---	---	---	7.6E-03
Copper	8.4E-02	7.0E-02	---	---	6.6E-05	---	---	---	---	1.5E-01
Lead	8.5E-03	2.9E-03	---	---	3.7E-06	---	---	---	---	1.1E-02
Manganese	2.7E-03	1.3E+00	---	---	2.7E-03	---	---	---	---	1.3E+00
Mercury	2.2E-04	5.1E-04	---	---	8.4E-08	---	---	---	---	7.3E-04
Molybdenum	7.8E-04	1.9E-03	---	---	6.0E-06	---	---	---	---	2.7E-03
Nickel	3.7E-02	1.2E-01	---	---	5.3E-04	---	---	---	---	1.6E-01
Selenium	1.0E-03	6.2E-03	---	---	2.9E-06	---	---	---	---	7.2E-03
Silver	2.2E-04	1.2E-03	---	---	3.0E-07	---	---	---	---	1.5E-03
Strontium	1.6E-02	6.1E-01	---	---	9.4E-04	---	---	---	---	6.2E-01
Thallium	1.4E-04	1.3E-03	---	---	2.1E-06	---	---	---	---	1.5E-03
Uranium	4.3E-04	1.2E-04	---	---	2.9E-06	---	---	---	---	5.6E-04
Vanadium	6.0E-03	6.2E-03	---	---	1.1E-05	---	---	---	---	1.2E-02
Zinc	8.9E-02	1.1E+00	---	---	2.1E-04	---	---	---	---	1.2E+00

Average Daily Doses for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.6E-04	1.3E-03	---	---	5.1E-06	---	---	---	---	1.4E-03
Arsenic	1.7E-03	6.2E-04	---	---	1.6E-05	---	---	---	---	2.3E-03
Barium	2.0E-03	9.7E-02	---	---	5.1E-04	---	---	---	---	9.9E-02
Beryllium	1.4E-04	1.0E-03	---	---	5.1E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	3.4E-03	---	---	3.3E-07	---	---	---	---	3.8E-03
Chromium (Total)	5.2E-03	6.2E-03	---	---	1.0E-05	---	---	---	---	1.1E-02
Cobalt	2.2E-03	5.3E-03	---	---	1.1E-05	---	---	---	---	7.6E-03
Copper	8.4E-02	7.0E-02	---	---	6.6E-05	---	---	---	---	1.5E-01
Lead	8.5E-03	2.9E-03	---	---	3.7E-06	---	---	---	---	1.1E-02
Manganese	2.7E-03	1.3E+00	---	---	2.7E-03	---	---	---	---	1.3E+00
Mercury	2.2E-04	5.1E-04	---	---	8.4E-08	---	---	---	---	7.3E-04
Molybdenum	7.8E-04	1.9E-03	---	---	6.0E-06	---	---	---	---	2.7E-03
Nickel	3.7E-02	1.2E-01	---	---	5.3E-04	---	---	---	---	1.6E-01
Selenium	1.0E-03	6.2E-03	---	---	2.9E-06	---	---	---	---	7.2E-03
Silver	2.2E-04	1.2E-03	---	---	3.0E-07	---	---	---	---	1.5E-03
Strontium	1.6E-02	6.1E-01	---	---	9.4E-04	---	---	---	---	6.2E-01
Thallium	1.4E-04	1.3E-03	---	---	2.1E-06	---	---	---	---	1.5E-03
Uranium	4.3E-04	1.2E-04	---	---	2.9E-06	---	---	---	---	5.6E-04
Vanadium	6.0E-03	6.2E-03	---	---	1.1E-05	---	---	---	---	1.2E-02
Zinc	8.9E-02	1.1E+00	---	---	2.1E-04	---	---	---	---	1.2E+00

Average Daily Doses for the American Robin Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.1E-03	1.8E-02	1.2E-02	---	1.2E-05	---	---	---	---	3.1E-02
Arsenic	1.2E-02	8.8E-03	2.6E-02	---	3.6E-05	---	---	---	---	4.7E-02
Barium	1.4E-02	1.4E+00	1.3E-02	---	1.2E-03	---	---	---	---	1.4E+00
Beryllium	9.5E-04	1.4E-02	4.5E-04	---	1.2E-05	---	---	---	---	1.6E-02
Cadmium	2.6E-03	4.8E-02	2.8E-01	---	7.6E-07	---	---	---	---	3.3E-01
Chromium (Total)	3.6E-02	8.8E-02	1.2E-01	---	2.4E-05	---	---	---	---	2.4E-01
Cobalt	1.6E-02	7.6E-02	2.0E-02	---	2.6E-05	---	---	---	---	1.1E-01
Copper	5.9E-01	1.0E+00	1.3E+00	---	1.5E-04	---	---	---	---	2.9E+00
Lead	5.9E-02	4.1E-02	3.3E-01	---	8.7E-06	---	---	---	---	4.3E-01
Manganese	1.9E-02	1.8E+01	1.7E-02	---	6.3E-03	---	---	---	---	1.8E+01
Mercury	1.5E-03	7.2E-03	2.7E-02	---	1.9E-07	---	---	---	---	3.5E-02
Molybdenum	5.4E-03	2.7E-02	5.4E-02	---	1.4E-05	---	---	---	---	8.6E-02
Nickel	2.6E-01	1.8E+00	2.8E+00	---	1.2E-03	---	---	---	---	4.8E+00
Selenium	7.1E-03	8.8E-02	7.2E-02	---	6.6E-06	---	---	---	---	1.7E-01
Silver	1.6E-03	1.8E-02	3.3E-02	---	6.9E-07	---	---	---	---	5.2E-02
Strontium	1.1E-01	8.6E+00	1.0E-01	---	2.2E-03	---	---	---	---	8.8E+00
Thallium	9.7E-04	1.9E-02	4.7E-04	---	4.8E-06	---	---	---	---	2.0E-02
Uranium	3.0E-03	1.8E-03	1.0E-03	---	6.7E-06	---	---	---	---	5.8E-03
Vanadium	4.2E-02	8.8E-02	1.8E-02	---	2.6E-05	---	---	---	---	1.5E-01
Zinc	6.2E-01	1.5E+01	2.8E+01	---	4.9E-04	---	---	---	---	4.4E+01

Average Daily Doses for the American Robin (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.1E-03	1.8E-02	1.2E-02	---	1.2E-05	---	---	---	---	3.1E-02
Arsenic	1.2E-02	8.8E-03	2.6E-02	---	3.6E-05	---	---	---	---	4.7E-02
Barium	1.4E-02	1.4E+00	1.3E-02	---	1.2E-03	---	---	---	---	1.4E+00
Beryllium	9.5E-04	1.4E-02	4.5E-04	---	1.2E-05	---	---	---	---	1.6E-02
Cadmium	2.6E-03	4.8E-02	2.8E-01	---	7.6E-07	---	---	---	---	3.3E-01
Chromium (Total)	3.6E-02	8.8E-02	1.2E-01	---	2.4E-05	---	---	---	---	2.4E-01
Cobalt	1.6E-02	7.6E-02	2.0E-02	---	2.6E-05	---	---	---	---	1.1E-01
Copper	5.9E-01	1.0E+00	1.3E+00	---	1.5E-04	---	---	---	---	2.9E+00
Lead	5.9E-02	4.1E-02	3.3E-01	---	8.7E-06	---	---	---	---	4.3E-01
Manganese	1.9E-02	1.8E+01	1.7E-02	---	6.3E-03	---	---	---	---	1.8E+01
Mercury	1.5E-03	7.2E-03	2.7E-02	---	1.9E-07	---	---	---	---	3.5E-02
Molybdenum	5.4E-03	2.7E-02	5.4E-02	---	1.4E-05	---	---	---	---	8.6E-02
Nickel	2.6E-01	1.8E+00	2.8E+00	---	1.2E-03	---	---	---	---	4.8E+00
Selenium	7.1E-03	8.8E-02	7.2E-02	---	6.6E-06	---	---	---	---	1.7E-01
Silver	1.6E-03	1.8E-02	3.3E-02	---	6.9E-07	---	---	---	---	5.2E-02
Strontium	1.1E-01	8.6E+00	1.0E-01	---	2.2E-03	---	---	---	---	8.8E+00
Thallium	9.7E-04	1.9E-02	4.7E-04	---	4.8E-06	---	---	---	---	2.0E-02
Uranium	3.0E-03	1.8E-03	1.0E-03	---	6.7E-06	---	---	---	---	5.8E-03
Vanadium	4.2E-02	8.8E-02	1.8E-02	---	2.6E-05	---	---	---	---	1.5E-01
Zinc	6.2E-01	1.5E+01	2.8E+01	---	4.9E-04	---	---	---	---	4.4E+01

Average Daily Doses for the Barn Swallow Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.7E-04	4.0E-04	3.8E-02	---	1.9E-05	---	---	---	---	3.9E-02
Arsenic	8.1E-03	2.0E-04	8.5E-02	---	5.8E-05	---	---	---	---	9.3E-02
Barium	9.5E-03	3.0E-02	4.3E-02	---	1.9E-03	---	---	---	---	8.5E-02
Beryllium	6.6E-04	3.2E-04	1.5E-03	---	1.9E-05	---	---	---	---	2.5E-03
Cadmium	1.8E-03	1.1E-03	9.2E-01	---	1.2E-06	---	---	---	---	9.2E-01
Chromium (Total)	2.5E-02	2.0E-03	3.8E-01	---	3.9E-05	---	---	---	---	4.1E-01
Cobalt	1.1E-02	1.7E-03	6.5E-02	---	4.2E-05	---	---	---	---	7.7E-02
Copper	4.0E-01	2.2E-02	4.3E+00	---	2.4E-04	---	---	---	---	4.7E+00
Lead	4.1E-02	9.1E-04	1.1E+00	---	1.4E-05	---	---	---	---	1.1E+00
Manganese	1.3E-02	4.0E-01	5.7E-02	---	1.0E-02	---	---	---	---	4.8E-01
Mercury	1.0E-03	1.6E-04	8.7E-02	---	3.1E-07	---	---	---	---	8.9E-02
Molybdenum	3.7E-03	6.0E-04	1.8E-01	---	2.2E-05	---	---	---	---	1.8E-01
Nickel	1.8E-01	3.9E-02	9.3E+00	---	2.0E-03	---	---	---	---	9.5E+00
Selenium	4.9E-03	2.0E-03	2.4E-01	---	1.1E-05	---	---	---	---	2.4E-01
Silver	1.1E-03	3.9E-04	1.1E-01	---	1.1E-06	---	---	---	---	1.1E-01
Strontium	7.7E-02	1.9E-01	3.3E-01	---	3.5E-03	---	---	---	---	6.0E-01
Thallium	6.7E-04	4.2E-04	1.6E-03	---	7.7E-06	---	---	---	---	2.6E-03
Uranium	2.1E-03	3.9E-05	3.4E-03	---	1.1E-05	---	---	---	---	5.5E-03
Vanadium	2.9E-02	2.0E-03	5.9E-02	---	4.2E-05	---	---	---	---	9.0E-02
Zinc	4.3E-01	3.3E-01	9.3E+01	---	7.9E-04	---	---	---	---	9.3E+01

Average Daily Doses for the Barn Swallow (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.7E-04	4.0E-04	3.8E-02	---	1.9E-05	---	---	---	---	3.9E-02
Arsenic	8.1E-03	2.0E-04	8.5E-02	---	5.8E-05	---	---	---	---	9.3E-02
Barium	9.5E-03	3.0E-02	4.3E-02	---	1.9E-03	---	---	---	---	8.5E-02
Beryllium	6.6E-04	3.2E-04	1.5E-03	---	1.9E-05	---	---	---	---	2.5E-03
Cadmium	1.8E-03	1.1E-03	9.2E-01	---	1.2E-06	---	---	---	---	9.2E-01
Chromium (Total)	2.5E-02	2.0E-03	3.8E-01	---	3.9E-05	---	---	---	---	4.1E-01
Cobalt	1.1E-02	1.7E-03	6.5E-02	---	4.2E-05	---	---	---	---	7.7E-02
Copper	4.0E-01	2.2E-02	4.3E+00	---	2.4E-04	---	---	---	---	4.7E+00
Lead	4.1E-02	9.1E-04	1.1E+00	---	1.4E-05	---	---	---	---	1.1E+00
Manganese	1.3E-02	4.0E-01	5.7E-02	---	1.0E-02	---	---	---	---	4.8E-01
Mercury	1.0E-03	1.6E-04	8.7E-02	---	3.1E-07	---	---	---	---	8.9E-02
Molybdenum	3.7E-03	6.0E-04	1.8E-01	---	2.2E-05	---	---	---	---	1.8E-01
Nickel	1.8E-01	3.9E-02	9.3E+00	---	2.0E-03	---	---	---	---	9.5E+00
Selenium	4.9E-03	2.0E-03	2.4E-01	---	1.1E-05	---	---	---	---	2.4E-01
Silver	1.1E-03	3.9E-04	1.1E-01	---	1.1E-06	---	---	---	---	1.1E-01
Strontium	7.7E-02	1.9E-01	3.3E-01	---	3.5E-03	---	---	---	---	6.0E-01
Thallium	6.7E-04	4.2E-04	1.6E-03	---	7.7E-06	---	---	---	---	2.6E-03
Uranium	2.1E-03	3.9E-05	3.4E-03	---	1.1E-05	---	---	---	---	5.5E-03
Vanadium	2.9E-02	2.0E-03	5.9E-02	---	4.2E-05	---	---	---	---	9.0E-02
Zinc	4.3E-01	3.3E-01	9.3E+01	---	7.9E-04	---	---	---	---	9.3E+01

Average Daily Doses for the Common Loon Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	2.9E-06	1.2E-04	---	1.7E-05	4.4E-03	4.6E-03
Arsenic	---	---	---	---	9.1E-06	2.6E-03	---	2.1E-02	8.6E-03	3.2E-02
Barium	---	---	---	---	2.9E-04	8.8E-03	---	2.4E-02	4.7E-02	8.1E-02
Beryllium	---	---	---	---	2.9E-06	3.9E-04	---	1.0E-03	8.6E-04	2.3E-03
Cadmium	---	---	---	---	1.9E-07	4.2E-04	---	1.2E-02	2.3E-02	3.5E-02
Chromium (Total)	---	---	---	---	6.0E-06	9.5E-02	---	1.7E-01	2.4E-02	2.8E-01
Cobalt	---	---	---	---	6.5E-06	3.7E-02	---	1.8E-03	2.0E-02	5.9E-02
Copper	---	---	---	---	3.8E-05	1.2E-01	---	1.2E+00	3.4E+00	4.8E+00
Lead	---	---	---	---	2.2E-06	7.0E-03	---	1.6E-02	3.2E-02	5.4E-02
Manganese	---	---	---	---	1.6E-03	6.1E-02	---	1.9E-01	1.3E-01	3.8E-01
Mercury	---	---	---	---	4.8E-08	6.2E-05	---	1.5E-04	7.3E-02	7.3E-02
Molybdenum	---	---	---	---	3.5E-06	7.2E-04	---	7.6E-03	2.7E-02	3.6E-02
Nickel	---	---	---	---	3.1E-04	3.1E-01	---	5.8E-01	6.9E-02	9.6E-01
Selenium	---	---	---	---	1.7E-06	5.5E-04	---	6.9E-03	2.3E-01	2.4E-01
Silver	---	---	---	---	1.7E-07	2.0E-04	---	3.2E-04	9.8E-03	1.0E-02
Strontium	---	---	---	---	5.4E-04	3.3E-02	---	4.2E-02	1.9E+00	1.9E+00
Thallium	---	---	---	---	1.2E-06	1.8E-04	---	7.1E-04	2.8E-03	3.7E-03
Uranium	---	---	---	---	1.7E-06	1.6E-03	---	5.3E-04	4.6E-04	2.5E-03
Vanadium	---	---	---	---	6.6E-06	2.5E-02	---	9.2E-03	3.5E-02	6.9E-02
Zinc	---	---	---	---	1.2E-04	1.4E-01	---	3.4E+00	7.5E+00	1.1E+01

Average Daily Doses for the Lesser Scaup Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	5.7E-06	1.7E-04	1.9E-05	2.3E-04	---	4.2E-04
Arsenic	---	---	---	---	1.8E-05	3.6E-03	3.8E-04	2.8E-01	---	2.8E-01
Barium	---	---	---	---	5.7E-04	1.2E-02	5.4E-03	3.3E-01	---	3.5E-01
Beryllium	---	---	---	---	5.7E-06	5.4E-04	1.1E-03	1.4E-02	---	1.6E-02
Cadmium	---	---	---	---	3.7E-07	5.8E-04	1.5E-03	1.6E-01	---	1.6E-01
Chromium (Total)	---	---	---	---	1.2E-05	1.3E-01	1.5E-02	2.2E+00	---	2.4E+00
Cobalt	---	---	---	---	1.3E-05	5.2E-02	1.1E-03	2.4E-02	---	7.7E-02
Copper	---	---	---	---	7.4E-05	1.7E-01	5.0E-02	1.6E+01	---	1.6E+01
Lead	---	---	---	---	4.2E-06	9.7E-03	3.0E-03	2.1E-01	---	2.3E-01
Manganese	---	---	---	---	3.0E-03	8.5E-02	1.9E-02	2.5E+00	---	2.6E+00
Mercury	---	---	---	---	9.4E-08	8.5E-05	3.1E-04	2.1E-03	---	2.5E-03
Molybdenum	---	---	---	---	6.7E-06	1.0E-03	6.8E-04	1.0E-01	---	1.0E-01
Nickel	---	---	---	---	5.9E-04	4.4E-01	3.1E-02	7.8E+00	---	8.3E+00
Selenium	---	---	---	---	3.2E-06	7.6E-04	1.0E-03	9.3E-02	---	9.5E-02
Silver	---	---	---	---	3.3E-07	2.8E-04	2.8E-05	4.3E-03	---	4.6E-03
Strontium	---	---	---	---	1.1E-03	4.6E-02	5.2E-02	5.6E-01	---	6.6E-01
Thallium	---	---	---	---	2.3E-06	2.5E-04	1.7E-06	9.7E-03	---	9.9E-03
Uranium	---	---	---	---	3.3E-06	2.2E-03	5.5E-05	7.1E-03	---	9.4E-03
Vanadium	---	---	---	---	1.3E-05	3.5E-02	4.8E-04	1.2E-01	---	1.6E-01
Zinc	---	---	---	---	2.4E-04	2.0E-01	2.9E-01	4.6E+01	---	4.7E+01

Average Daily Doses for the Mallard Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.4E-05	3.9E-04	3.7E-04	---	4.8E-06	2.1E-04	1.0E-04	1.1E-04	---	1.2E-03
Arsenic	2.5E-04	1.9E-04	8.3E-04	---	1.5E-05	4.4E-03	2.0E-03	1.3E-01	---	1.4E-01
Barium	2.9E-04	2.9E-02	4.2E-04	---	4.8E-04	1.5E-02	2.9E-02	1.6E-01	---	2.3E-01
Beryllium	2.0E-05	3.1E-04	1.4E-05	---	4.8E-06	6.8E-04	6.2E-03	6.8E-03	---	1.4E-02
Cadmium	5.6E-05	1.0E-03	8.9E-03	---	3.1E-07	7.3E-04	8.0E-03	7.7E-02	---	9.6E-02
Chromium (Total)	7.7E-04	1.9E-03	3.7E-03	---	9.8E-06	1.6E-01	8.3E-02	1.1E+00	---	1.3E+00
Cobalt	3.3E-04	1.6E-03	6.3E-04	---	1.1E-05	6.5E-02	5.9E-03	1.2E-02	---	8.5E-02
Copper	1.2E-02	2.1E-02	4.2E-02	---	6.2E-05	2.2E-01	2.7E-01	7.8E+00	---	8.3E+00
Lead	1.3E-03	8.8E-04	1.1E-02	---	3.5E-06	1.2E-02	1.6E-02	1.0E-01	---	1.4E-01
Manganese	4.1E-04	3.8E-01	5.6E-04	---	2.6E-03	1.1E-01	1.0E-01	1.2E+00	---	1.8E+00
Mercury	3.2E-05	1.5E-04	8.5E-04	---	7.9E-08	1.1E-04	1.7E-03	9.9E-04	---	3.8E-03
Molybdenum	1.2E-04	5.8E-04	1.7E-03	---	5.7E-06	1.3E-03	3.7E-03	4.9E-02	---	5.7E-02
Nickel	5.5E-03	3.7E-02	9.0E-02	---	5.0E-04	5.5E-01	1.7E-01	3.7E+00	---	4.6E+00
Selenium	1.5E-04	1.9E-03	2.3E-03	---	2.7E-06	9.5E-04	5.6E-03	4.5E-02	---	5.6E-02
Silver	3.3E-05	3.8E-04	1.1E-03	---	2.8E-07	3.5E-04	1.5E-04	2.1E-03	---	4.0E-03
Strontium	2.4E-03	1.8E-01	3.2E-03	---	8.9E-04	5.7E-02	2.8E-01	2.7E-01	---	8.0E-01
Thallium	2.1E-05	4.0E-04	1.5E-05	---	1.9E-06	3.1E-04	9.4E-06	4.6E-03	---	5.4E-03
Uranium	6.3E-05	3.8E-05	3.3E-05	---	2.7E-06	2.7E-03	3.0E-04	3.4E-03	---	6.6E-03
Vanadium	8.8E-04	1.9E-03	5.8E-04	---	1.1E-05	4.4E-02	2.6E-03	6.0E-02	---	1.1E-01
Zinc	1.3E-02	3.2E-01	9.0E-01	---	2.0E-04	2.5E-01	1.6E+00	2.2E+01	---	2.5E+01

Average Daily Doses for the Red-tailed Hawk Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.6E-05	---	---	5.0E-04	4.9E-06	---	---	---	---	6.0E-04
Arsenic	1.0E-03	---	---	4.6E-03	1.5E-05	---	---	---	---	5.6E-03
Barium	1.2E-03	---	---	4.9E-01	4.9E-04	---	---	---	---	4.9E-01
Beryllium	8.2E-05	---	---	5.0E-04	4.9E-06	---	---	---	---	5.9E-04
Cadmium	2.2E-04	---	---	3.5E-02	3.2E-07	---	---	---	---	3.6E-02
Chromium (Total)	3.1E-03	---	---	5.0E-03	1.0E-05	---	---	---	---	8.1E-03
Cobalt	1.3E-03	---	---	6.1E-03	1.1E-05	---	---	---	---	7.4E-03
Copper	5.0E-02	---	---	3.3E-01	6.4E-05	---	---	---	---	3.8E-01
Lead	5.1E-03	---	---	8.8E-03	3.6E-06	---	---	---	---	1.4E-02
Manganese	1.6E-03	---	---	8.5E-02	2.6E-03	---	---	---	---	8.9E-02
Mercury	1.3E-04	---	---	4.4E-03	8.1E-08	---	---	---	---	4.5E-03
Molybdenum	4.7E-04	---	---	1.8E-02	5.8E-06	---	---	---	---	1.8E-02
Nickel	2.2E-02	---	---	1.5E-02	5.1E-04	---	---	---	---	3.8E-02
Selenium	6.1E-04	---	---	5.2E-02	2.8E-06	---	---	---	---	5.3E-02
Silver	1.3E-04	---	---	1.0E-03	2.9E-07	---	---	---	---	1.1E-03
Strontium	9.5E-03	---	---	9.3E-01	9.1E-04	---	---	---	---	9.4E-01
Thallium	8.3E-05	---	---	3.0E-04	2.0E-06	---	---	---	---	3.9E-04
Uranium	2.6E-04	---	---	1.0E-04	2.8E-06	---	---	---	---	3.6E-04
Vanadium	3.6E-03	---	---	5.0E-03	1.1E-05	---	---	---	---	8.6E-03
Zinc	5.3E-02	---	---	3.1E+00	2.1E-04	---	---	---	---	3.1E+00

Average Daily Doses for the Spotted Sandpiper Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.8E-04	---	1.4E-02	---	1.5E-05	2.2E-04	3.2E-05	2.7E-04	1.3E-03	1.6E-02
Arsenic	3.0E-03	---	3.1E-02	---	4.6E-05	4.8E-03	6.5E-04	3.2E-01	2.5E-03	3.6E-01
Barium	3.5E-03	---	1.6E-02	---	1.5E-03	1.7E-02	9.3E-03	3.7E-01	1.3E-02	4.4E-01
Beryllium	2.4E-04	---	5.4E-04	---	1.5E-05	7.4E-04	1.9E-03	1.6E-02	2.4E-04	2.0E-02
Cadmium	6.6E-04	---	3.4E-01	---	9.7E-07	7.9E-04	2.5E-03	1.8E-01	6.6E-03	5.3E-01
Chromium (Total)	9.2E-03	---	1.4E-01	---	3.1E-05	1.8E-01	2.6E-02	2.6E+00	6.8E-03	2.9E+00
Cobalt	3.9E-03	---	2.4E-02	---	3.3E-05	7.0E-02	1.9E-03	2.8E-02	5.8E-03	1.3E-01
Copper	1.5E-01	---	1.6E+00	---	1.9E-04	2.3E-01	8.5E-02	1.8E+01	9.9E-01	2.1E+01
Lead	1.5E-02	---	4.0E-01	---	1.1E-05	1.3E-02	5.2E-03	2.4E-01	9.0E-03	6.9E-01
Manganese	4.8E-03	---	2.1E-02	---	8.0E-03	1.1E-01	3.2E-02	2.9E+00	3.7E-02	3.1E+00
Mercury	3.8E-04	---	3.2E-02	---	2.5E-07	1.2E-04	5.3E-04	2.3E-03	2.1E-02	5.6E-02
Molybdenum	1.4E-03	---	6.5E-02	---	1.8E-05	1.4E-03	1.2E-03	1.2E-01	7.8E-03	1.9E-01
Nickel	6.5E-02	---	3.4E+00	---	1.6E-03	5.9E-01	5.3E-02	8.9E+00	2.0E-02	1.3E+01
Selenium	1.8E-03	---	8.8E-02	---	8.5E-06	1.0E-03	1.8E-03	1.1E-01	6.6E-02	2.6E-01
Silver	3.9E-04	---	4.0E-02	---	8.8E-07	3.8E-04	4.7E-05	4.9E-03	2.8E-03	4.9E-02
Strontium	2.8E-02	---	1.2E-01	---	2.8E-03	6.2E-02	8.8E-02	6.4E-01	5.4E-01	1.5E+00
Thallium	2.4E-04	---	5.7E-04	---	6.1E-06	3.4E-04	3.0E-06	1.1E-02	7.9E-04	1.3E-02
Uranium	7.5E-04	---	1.2E-03	---	8.6E-06	2.9E-03	9.4E-05	8.1E-03	1.3E-04	1.3E-02
Vanadium	1.0E-02	---	2.2E-02	---	3.4E-05	4.7E-02	8.2E-04	1.4E-01	1.0E-02	2.3E-01
Zinc	1.6E-01	---	3.4E+01	---	6.3E-04	2.7E-01	5.0E-01	5.3E+01	2.1E+00	9.0E+01

Average Daily Doses for the Spruce Grouse Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.1E-04	1.1E-02	5.5E-04	---	6.0E-06	---	---	---	---	1.2E-02
Arsenic	2.2E-03	5.3E-03	1.2E-03	---	1.9E-05	---	---	---	---	8.8E-03
Barium	2.6E-03	8.3E-01	6.3E-04	---	6.0E-04	---	---	---	---	8.3E-01
Beryllium	1.8E-04	8.7E-03	2.1E-05	---	6.0E-06	---	---	---	---	9.0E-03
Cadmium	4.9E-04	2.9E-02	1.3E-02	---	3.9E-07	---	---	---	---	4.3E-02
Chromium (Total)	6.8E-03	5.3E-02	5.5E-03	---	1.2E-05	---	---	---	---	6.6E-02
Cobalt	2.9E-03	4.6E-02	9.4E-04	---	1.3E-05	---	---	---	---	5.0E-02
Copper	1.1E-01	6.0E-01	6.2E-02	---	7.8E-05	---	---	---	---	7.7E-01
Lead	1.1E-02	2.5E-02	1.6E-02	---	4.4E-06	---	---	---	---	5.2E-02
Manganese	3.6E-03	1.1E+01	8.3E-04	---	3.2E-03	---	---	---	---	1.1E+01
Mercury	2.8E-04	4.4E-03	1.3E-03	---	9.9E-08	---	---	---	---	5.9E-03
Molybdenum	1.0E-03	1.6E-02	2.6E-03	---	7.1E-06	---	---	---	---	2.0E-02
Nickel	4.8E-02	1.1E+00	1.3E-01	---	6.3E-04	---	---	---	---	1.2E+00
Selenium	1.3E-03	5.3E-02	3.5E-03	---	3.4E-06	---	---	---	---	5.8E-02
Silver	2.9E-04	1.1E-02	1.6E-03	---	3.5E-07	---	---	---	---	1.3E-02
Strontium	2.1E-02	5.2E+00	4.8E-03	---	1.1E-03	---	---	---	---	5.2E+00
Thallium	1.8E-04	1.1E-02	2.3E-05	---	2.4E-06	---	---	---	---	1.2E-02
Uranium	5.6E-04	1.1E-03	4.9E-05	---	3.4E-06	---	---	---	---	1.7E-03
Vanadium	7.7E-03	5.3E-02	8.6E-04	---	1.3E-05	---	---	---	---	6.2E-02
Zinc	1.2E-01	9.1E+00	1.3E+00	---	2.5E-04	---	---	---	---	1.1E+01

Average Daily Doses for the American Beaver Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.4E-05	3.0E-04	---	---	1.2E-05	4.7E-05	9.2E-06	---	---	3.9E-04
Arsenic	3.3E-04	1.9E-04	---	---	4.3E-05	7.5E-04	1.4E-04	---	---	1.5E-03
Barium	3.0E-04	2.3E-02	---	---	7.1E-04	2.4E-03	1.9E-03	---	---	2.8E-02
Beryllium	2.1E-05	2.4E-04	---	---	6.4E-06	1.1E-04	4.0E-04	---	---	7.7E-04
Cadmium	5.7E-05	8.1E-04	---	---	8.4E-07	1.2E-04	5.2E-04	---	---	1.5E-03
Chromium (Total)	8.3E-04	1.5E-03	---	---	1.5E-05	2.6E-02	5.3E-03	---	---	3.3E-02
Cobalt	3.4E-04	1.3E-03	---	---	2.4E-05	1.0E-02	3.9E-04	---	---	1.2E-02
Copper	1.3E-02	1.7E-02	---	---	8.7E-05	3.4E-02	1.7E-02	---	---	8.0E-02
Lead	1.3E-03	7.0E-04	---	---	5.4E-06	1.9E-03	1.1E-03	---	---	5.0E-03
Manganese	4.1E-04	3.0E-01	---	---	3.7E-03	1.7E-02	6.7E-03	---	---	3.3E-01
Mercury	3.3E-05	1.2E-04	---	---	1.1E-07	1.7E-05	1.1E-04	---	---	2.8E-04
Molybdenum	1.2E-04	4.5E-04	---	---	1.5E-05	2.0E-04	2.5E-04	---	---	1.0E-03
Nickel	5.6E-03	2.9E-02	---	---	6.9E-04	8.6E-02	1.1E-02	---	---	1.3E-01
Selenium	1.5E-04	1.5E-03	---	---	4.2E-06	1.5E-04	3.6E-04	---	---	2.1E-03
Silver	3.4E-05	3.0E-04	---	---	4.0E-07	5.5E-05	9.6E-06	---	---	4.0E-04
Strontium	2.4E-03	1.4E-01	---	---	1.7E-03	9.7E-03	1.9E-02	---	---	1.8E-01
Thallium	2.1E-05	3.2E-04	---	---	2.6E-06	4.9E-05	6.1E-07	---	---	4.0E-04
Uranium	6.5E-05	3.0E-05	---	---	6.8E-06	4.5E-04	1.9E-05	---	---	5.7E-04
Vanadium	9.1E-04	1.5E-03	---	---	1.5E-05	6.8E-03	1.7E-04	---	---	9.4E-03
Zinc	1.4E-02	2.5E-01	---	---	2.8E-04	3.9E-02	1.0E-01	---	---	4.1E-01

Average Daily Doses for the American Mink Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.4E-05	---	---	1.8E-04	4.8E-06	9.5E-05	---	1.8E-05	4.4E-03	4.8E-03
Arsenic	4.6E-04	---	---	2.1E-03	1.8E-05	1.5E-03	---	1.6E-02	1.0E-02	3.0E-02
Barium	4.2E-04	---	---	1.7E-01	2.9E-04	4.9E-03	---	1.8E-02	2.8E-02	2.2E-01
Beryllium	2.9E-05	---	---	1.8E-04	2.7E-06	2.2E-04	---	7.8E-04	4.7E-04	1.7E-03
Cadmium	8.0E-05	---	---	1.2E-02	3.5E-07	2.3E-04	---	8.8E-03	2.3E-02	4.4E-02
Chromium (Total)	1.2E-03	---	---	1.8E-03	6.1E-06	5.2E-02	---	1.2E-01	1.5E-02	1.9E-01
Cobalt	4.8E-04	---	---	2.2E-03	9.8E-06	2.1E-02	---	1.4E-03	1.8E-02	4.3E-02
Copper	1.8E-02	---	---	1.2E-01	3.6E-05	6.9E-02	---	8.8E-01	1.9E+00	3.0E+00
Lead	1.8E-03	---	---	3.1E-03	2.3E-06	3.9E-03	---	1.2E-02	2.0E-02	4.0E-02
Manganese	5.7E-04	---	---	3.0E-02	1.5E-03	3.4E-02	---	1.4E-01	7.6E-02	2.8E-01
Mercury	4.5E-05	---	---	1.5E-03	4.4E-08	3.4E-05	---	1.1E-04	4.0E-02	4.2E-02
Molybdenum	1.6E-04	---	---	6.2E-03	6.4E-06	4.2E-04	---	5.8E-03	3.0E-02	4.3E-02
Nickel	7.8E-03	---	---	5.3E-03	2.9E-04	1.8E-01	---	4.3E-01	3.8E-02	6.6E-01
Selenium	2.1E-04	---	---	1.8E-02	1.8E-06	3.0E-04	---	5.1E-03	1.5E-01	1.7E-01
Silver	4.8E-05	---	---	3.5E-04	1.6E-07	1.1E-04	---	2.4E-04	5.7E-03	6.5E-03
Strontium	3.3E-03	---	---	3.3E-01	7.1E-04	2.0E-02	---	3.3E-02	1.5E+00	1.9E+00
Thallium	3.0E-05	---	---	1.1E-04	1.1E-06	1.0E-04	---	5.3E-04	1.5E-03	2.3E-03
Uranium	9.0E-05	---	---	3.5E-05	2.8E-06	9.1E-04	---	4.1E-04	4.7E-04	1.9E-03
Vanadium	1.3E-03	---	---	1.8E-03	6.2E-06	1.4E-02	---	6.8E-03	2.0E-02	4.4E-02
Zinc	1.9E-02	---	---	1.1E+00	1.2E-04	7.9E-02	---	2.5E+00	4.0E+00	7.7E+00

Average Daily Doses for the Black Bear Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.0E-05	3.7E-03	2.3E-04	9.4E-05	1.0E-05	8.5E-06	---	---	4.6E-04	4.6E-03
Arsenic	1.2E-03	2.4E-03	6.0E-04	1.1E-03	3.9E-05	1.4E-04	---	---	1.1E-03	6.6E-03
Barium	1.1E-03	2.8E-01	2.5E-04	9.2E-02	6.4E-04	4.4E-04	---	---	2.9E-03	3.8E-01
Beryllium	7.7E-05	3.0E-03	8.7E-06	9.4E-05	5.8E-06	2.0E-05	---	---	4.8E-05	3.3E-03
Cadmium	2.1E-04	1.0E-02	5.5E-03	6.7E-03	7.5E-07	2.1E-05	---	---	2.3E-03	2.5E-02
Chromium (Total)	3.1E-03	1.9E-02	2.4E-03	9.9E-04	1.3E-05	4.7E-03	---	---	1.5E-03	3.2E-02
Cobalt	1.3E-03	1.6E-02	3.9E-04	1.2E-03	2.1E-05	1.9E-03	---	---	1.9E-03	2.3E-02
Copper	4.7E-02	2.1E-01	2.5E-02	6.3E-02	7.9E-05	6.2E-03	---	---	2.0E-01	5.4E-01
Lead	4.9E-03	8.6E-03	6.6E-03	1.7E-03	4.9E-06	3.5E-04	---	---	2.1E-03	2.4E-02
Manganese	1.5E-03	3.7E+00	3.4E-04	1.6E-02	3.3E-03	3.1E-03	---	---	7.9E-03	3.8E+00
Mercury	1.2E-04	1.5E-03	5.2E-04	8.3E-04	9.6E-08	3.1E-06	---	---	4.2E-03	7.1E-03
Molybdenum	4.4E-04	5.6E-03	1.0E-03	3.3E-03	1.4E-05	3.7E-05	---	---	3.1E-03	1.4E-02
Nickel	2.1E-02	3.7E-01	5.5E-02	2.8E-03	6.2E-04	1.6E-02	---	---	3.9E-03	4.7E-01
Selenium	5.7E-04	1.8E-02	1.4E-03	9.8E-03	3.8E-06	2.7E-05	---	---	1.5E-02	4.5E-02
Silver	1.3E-04	3.7E-03	6.5E-04	1.9E-04	3.6E-07	1.0E-05	---	---	5.9E-04	5.3E-03
Strontium	9.0E-03	1.8E+00	2.0E-03	1.7E-01	1.5E-03	1.8E-03	---	---	1.5E-01	2.1E+00
Thallium	8.0E-05	4.0E-03	9.4E-06	5.8E-05	2.3E-06	9.0E-06	---	---	1.6E-04	4.3E-03
Uranium	2.4E-04	3.7E-04	2.0E-05	1.9E-05	6.2E-06	8.2E-05	---	---	4.9E-05	7.8E-04
Vanadium	3.4E-03	1.9E-02	3.6E-04	9.6E-04	1.3E-05	1.3E-03	---	---	2.0E-03	2.7E-02
Zinc	5.1E-02	3.2E+00	5.5E-01	5.8E-01	2.5E-04	7.1E-03	---	---	4.1E-01	4.7E+00

Average Daily Doses for the Common (Masked) Shrew Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.0E-03	2.6E-03	4.8E-02	---	2.8E-05	---	---	---	---	5.2E-02
Arsenic	1.4E-02	1.7E-03	1.3E-01	---	1.0E-04	---	---	---	---	1.4E-01
Barium	1.2E-02	2.0E-01	5.4E-02	---	1.7E-03	---	---	---	---	2.7E-01
Beryllium	8.6E-04	2.1E-03	1.8E-03	---	1.5E-05	---	---	---	---	4.8E-03
Cadmium	2.4E-03	7.0E-03	1.2E+00	---	2.0E-06	---	---	---	---	1.2E+00
Chromium (Total)	3.4E-02	1.3E-02	5.0E-01	---	3.5E-05	---	---	---	---	5.5E-01
Cobalt	1.4E-02	1.1E-02	8.3E-02	---	5.6E-05	---	---	---	---	1.1E-01
Copper	5.3E-01	1.4E-01	5.4E+00	---	2.1E-04	---	---	---	---	6.1E+00
Lead	5.5E-02	6.1E-03	1.4E+00	---	1.3E-05	---	---	---	---	1.5E+00
Manganese	1.7E-02	2.6E+00	7.2E-02	---	8.8E-03	---	---	---	---	2.7E+00
Mercury	1.4E-03	1.0E-03	1.1E-01	---	2.5E-07	---	---	---	---	1.1E-01
Molybdenum	4.9E-03	3.9E-03	2.2E-01	---	3.6E-05	---	---	---	---	2.3E-01
Nickel	2.3E-01	2.6E-01	1.2E+01	---	1.7E-03	---	---	---	---	1.2E+01
Selenium	6.4E-03	1.3E-02	3.0E-01	---	1.0E-05	---	---	---	---	3.2E-01
Silver	1.4E-03	2.6E-03	1.4E-01	---	9.4E-07	---	---	---	---	1.4E-01
Strontium	1.0E-01	1.2E+00	4.2E-01	---	4.1E-03	---	---	---	---	1.8E+00
Thallium	8.9E-04	2.8E-03	2.0E-03	---	6.1E-06	---	---	---	---	5.7E-03
Uranium	2.7E-03	2.6E-04	4.3E-03	---	1.6E-05	---	---	---	---	7.2E-03
Vanadium	3.8E-02	1.3E-02	7.6E-02	---	3.5E-05	---	---	---	---	1.3E-01
Zinc	5.6E-01	2.2E+00	1.2E+02	---	6.6E-04	---	---	---	---	1.2E+02

Average Daily Doses for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.0E-03	2.6E-03	4.8E-02	---	2.8E-05	---	---	---	---	5.2E-02
Arsenic	1.4E-02	1.7E-03	1.3E-01	---	1.0E-04	---	---	---	---	1.4E-01
Barium	1.2E-02	2.0E-01	5.4E-02	---	1.7E-03	---	---	---	---	2.7E-01
Beryllium	8.6E-04	2.1E-03	1.8E-03	---	1.5E-05	---	---	---	---	4.8E-03
Cadmium	2.4E-03	7.0E-03	1.2E+00	---	2.0E-06	---	---	---	---	1.2E+00
Chromium (Total)	3.4E-02	1.3E-02	5.0E-01	---	3.5E-05	---	---	---	---	5.5E-01
Cobalt	1.4E-02	1.1E-02	8.3E-02	---	5.6E-05	---	---	---	---	1.1E-01
Copper	5.3E-01	1.4E-01	5.4E+00	---	2.1E-04	---	---	---	---	6.1E+00
Lead	5.5E-02	6.1E-03	1.4E+00	---	1.3E-05	---	---	---	---	1.5E+00
Manganese	1.7E-02	2.6E+00	7.2E-02	---	8.8E-03	---	---	---	---	2.7E+00
Mercury	1.4E-03	1.0E-03	1.1E-01	---	2.5E-07	---	---	---	---	1.1E-01
Molybdenum	4.9E-03	3.9E-03	2.2E-01	---	3.6E-05	---	---	---	---	2.3E-01
Nickel	2.3E-01	2.6E-01	1.2E+01	---	1.7E-03	---	---	---	---	1.2E+01
Selenium	6.4E-03	1.3E-02	3.0E-01	---	1.0E-05	---	---	---	---	3.2E-01
Silver	1.4E-03	2.6E-03	1.4E-01	---	9.4E-07	---	---	---	---	1.4E-01
Strontium	1.0E-01	1.2E+00	4.2E-01	---	4.1E-03	---	---	---	---	1.8E+00
Thallium	8.9E-04	2.8E-03	2.0E-03	---	6.1E-06	---	---	---	---	5.7E-03
Uranium	2.7E-03	2.6E-04	4.3E-03	---	1.6E-05	---	---	---	---	7.2E-03
Vanadium	3.8E-02	1.3E-02	7.6E-02	---	3.5E-05	---	---	---	---	1.3E-01
Zinc	5.6E-01	2.2E+00	1.2E+02	---	6.6E-04	---	---	---	---	1.2E+02

Average Daily Doses for the Deer Mouse Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.3E-04	3.4E-03	3.2E-03	---	3.1E-05	---	---	---	---	6.8E-03
Arsenic	1.7E-03	2.1E-03	8.7E-03	---	1.1E-04	---	---	---	---	1.3E-02
Barium	1.6E-03	2.5E-01	3.7E-03	---	1.9E-03	---	---	---	---	2.6E-01
Beryllium	1.1E-04	2.7E-03	1.2E-04	---	1.7E-05	---	---	---	---	2.9E-03
Cadmium	3.0E-04	9.0E-03	7.9E-02	---	2.2E-06	---	---	---	---	8.8E-02
Chromium (Total)	4.3E-03	1.7E-02	3.4E-02	---	3.8E-05	---	---	---	---	5.6E-02
Cobalt	1.8E-03	1.4E-02	5.6E-03	---	6.2E-05	---	---	---	---	2.2E-02
Copper	6.6E-02	1.9E-01	3.7E-01	---	2.3E-04	---	---	---	---	6.2E-01
Lead	6.8E-03	7.8E-03	9.4E-02	---	1.4E-05	---	---	---	---	1.1E-01
Manganese	2.1E-03	3.3E+00	4.9E-03	---	9.7E-03	---	---	---	---	3.4E+00
Mercury	1.7E-04	1.3E-03	7.4E-03	---	2.8E-07	---	---	---	---	8.9E-03
Molybdenum	6.1E-04	5.0E-03	1.5E-02	---	4.0E-05	---	---	---	---	2.1E-02
Nickel	2.9E-02	3.3E-01	8.0E-01	---	1.8E-03	---	---	---	---	1.2E+00
Selenium	8.0E-04	1.6E-02	2.0E-02	---	1.1E-05	---	---	---	---	3.8E-02
Silver	1.8E-04	3.3E-03	9.4E-03	---	1.0E-06	---	---	---	---	1.3E-02
Strontium	1.2E-02	1.6E+00	2.8E-02	---	4.5E-03	---	---	---	---	1.6E+00
Thallium	1.1E-04	3.6E-03	1.3E-04	---	6.8E-06	---	---	---	---	3.8E-03
Uranium	3.4E-04	3.3E-04	2.9E-04	---	1.8E-05	---	---	---	---	9.7E-04
Vanadium	4.7E-03	1.7E-02	5.1E-03	---	3.9E-05	---	---	---	---	2.7E-02
Zinc	7.0E-02	2.8E+00	7.9E+00	---	7.3E-04	---	---	---	---	1.1E+01

Average Daily Doses for the Meadow Vole Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.8E-04	8.1E-03	---	---	3.4E-05	---	---	---	---	8.3E-03
Arsenic	2.4E-03	5.1E-03	---	---	1.3E-04	---	---	---	---	7.7E-03
Barium	2.2E-03	6.1E-01	---	---	2.1E-03	---	---	---	---	6.2E-01
Beryllium	1.5E-04	6.5E-03	---	---	1.9E-05	---	---	---	---	6.7E-03
Cadmium	4.2E-04	2.2E-02	---	---	2.4E-06	---	---	---	---	2.2E-02
Chromium (Total)	6.0E-03	4.2E-02	---	---	4.3E-05	---	---	---	---	4.8E-02
Cobalt	2.5E-03	3.5E-02	---	---	6.9E-05	---	---	---	---	3.7E-02
Copper	9.2E-02	4.5E-01	---	---	2.5E-04	---	---	---	---	5.4E-01
Lead	9.5E-03	1.9E-02	---	---	1.6E-05	---	---	---	---	2.8E-02
Manganese	3.0E-03	8.0E+00	---	---	1.1E-02	---	---	---	---	8.1E+00
Mercury	2.4E-04	3.2E-03	---	---	3.1E-07	---	---	---	---	3.5E-03
Molybdenum	8.5E-04	1.2E-02	---	---	4.5E-05	---	---	---	---	1.3E-02
Nickel	4.1E-02	7.9E-01	---	---	2.0E-03	---	---	---	---	8.3E-01
Selenium	1.1E-03	4.0E-02	---	---	1.2E-05	---	---	---	---	4.1E-02
Silver	2.5E-04	8.0E-03	---	---	1.2E-06	---	---	---	---	8.3E-03
Strontium	1.7E-02	3.8E+00	---	---	5.0E-03	---	---	---	---	3.9E+00
Thallium	1.6E-04	8.7E-03	---	---	7.5E-06	---	---	---	---	8.8E-03
Uranium	4.7E-04	7.9E-04	---	---	2.0E-05	---	---	---	---	1.3E-03
Vanadium	6.6E-03	4.0E-02	---	---	4.3E-05	---	---	---	---	4.7E-02
Zinc	9.8E-02	6.8E+00	---	---	8.1E-04	---	---	---	---	6.9E+00

Average Daily Doses for the Moose Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	4.6E-05	2.5E-03	---	---	8.8E-06	1.2E-05	2.4E-05	---	---	2.6E-03
Arsenic	6.3E-04	1.6E-03	---	---	3.3E-05	1.9E-04	3.6E-04	---	---	2.8E-03
Barium	5.7E-04	1.9E-01	---	---	5.3E-04	6.2E-04	4.9E-03	---	---	2.0E-01
Beryllium	3.9E-05	2.0E-03	---	---	4.8E-06	2.8E-05	1.0E-03	---	---	3.1E-03
Cadmium	1.1E-04	6.8E-03	---	---	6.3E-07	3.0E-05	1.3E-03	---	---	8.2E-03
Chromium (Total)	1.6E-03	1.3E-02	---	---	1.1E-05	6.6E-03	1.4E-02	---	---	3.5E-02
Cobalt	6.5E-04	1.1E-02	---	---	1.8E-05	2.7E-03	1.0E-03	---	---	1.5E-02
Copper	2.4E-02	1.4E-01	---	---	6.6E-05	8.7E-03	4.4E-02	---	---	2.2E-01
Lead	2.5E-03	5.8E-03	---	---	4.1E-06	4.9E-04	2.7E-03	---	---	1.2E-02
Manganese	7.8E-04	2.5E+00	---	---	2.8E-03	4.3E-03	1.7E-02	---	---	2.5E+00
Mercury	6.2E-05	1.0E-03	---	---	8.1E-08	4.3E-06	2.8E-04	---	---	1.4E-03
Molybdenum	2.2E-04	3.8E-03	---	---	1.2E-05	5.3E-05	6.3E-04	---	---	4.7E-03
Nickel	1.1E-02	2.5E-01	---	---	5.2E-04	2.2E-02	2.8E-02	---	---	3.1E-01
Selenium	2.9E-04	1.2E-02	---	---	3.2E-06	3.8E-05	9.1E-04	---	---	1.4E-02
Silver	6.5E-05	2.5E-03	---	---	3.0E-07	1.4E-05	2.5E-05	---	---	2.6E-03
Strontium	4.6E-03	1.2E+00	---	---	1.3E-03	2.5E-03	5.0E-02	---	---	1.3E+00
Thallium	4.0E-05	2.7E-03	---	---	1.9E-06	1.3E-05	1.6E-06	---	---	2.8E-03
Uranium	1.2E-04	2.5E-04	---	---	5.2E-06	1.2E-04	5.0E-05	---	---	5.4E-04
Vanadium	1.7E-03	1.3E-02	---	---	1.1E-05	1.8E-03	4.3E-04	---	---	1.7E-02
Zinc	2.6E-02	2.1E+00	---	---	2.1E-04	1.0E-02	2.6E-01	---	---	2.4E+00

Average Daily Doses for the Muskrat Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	1.6E-05	2.5E-04	3.4E-04	9.0E-05	1.1E-03	1.8E-03
Arsenic	---	---	---	---	6.0E-05	4.1E-03	5.2E-03	7.9E-02	2.6E-03	9.1E-02
Barium	---	---	---	---	9.7E-04	1.3E-02	7.0E-02	8.9E-02	7.2E-03	1.8E-01
Beryllium	---	---	---	---	8.8E-06	5.9E-04	1.5E-02	3.8E-03	1.2E-04	1.9E-02
Cadmium	---	---	---	---	1.2E-06	6.3E-04	1.9E-02	4.3E-02	5.7E-03	6.9E-02
Chromium (Total)	---	---	---	---	2.0E-05	1.4E-01	2.0E-01	6.0E-01	3.7E-03	9.4E-01
Cobalt	---	---	---	---	3.2E-05	5.7E-02	1.4E-02	6.7E-03	4.6E-03	8.2E-02
Copper	---	---	---	---	1.2E-04	1.9E-01	6.4E-01	4.3E+00	4.8E-01	5.6E+00
Lead	---	---	---	---	7.5E-06	1.0E-02	3.9E-02	5.8E-02	5.0E-03	1.1E-01
Manganese	---	---	---	---	5.1E-03	9.2E-02	2.5E-01	6.9E-01	1.9E-02	1.1E+00
Mercury	---	---	---	---	1.5E-07	9.1E-05	4.0E-03	5.5E-04	1.0E-02	1.5E-02
Molybdenum	---	---	---	---	2.1E-05	1.1E-03	9.1E-03	2.9E-02	7.7E-03	4.6E-02
Nickel	---	---	---	---	9.5E-04	4.7E-01	4.0E-01	2.1E+00	9.6E-03	3.0E+00
Selenium	---	---	---	---	5.8E-06	8.1E-04	1.3E-02	2.5E-02	3.7E-02	7.6E-02
Silver	---	---	---	---	5.4E-07	3.0E-04	3.6E-04	1.2E-03	1.4E-03	3.3E-03
Strontium	---	---	---	---	2.4E-03	5.3E-02	7.2E-01	1.6E-01	3.7E-01	1.3E+00
Thallium	---	---	---	---	3.5E-06	2.7E-04	2.3E-05	2.6E-03	3.8E-04	3.3E-03
Uranium	---	---	---	---	9.4E-06	2.4E-03	7.2E-04	2.0E-03	1.2E-04	5.3E-03
Vanadium	---	---	---	---	2.0E-05	3.7E-02	6.2E-03	3.3E-02	5.0E-03	8.2E-02
Zinc	---	---	---	---	3.8E-04	2.1E-01	3.7E+00	1.2E+01	1.0E+00	1.7E+01

Average Daily Doses for the Northern River Otter Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	5.7E-06	---	---	3.0E-05	1.3E-05	1.0E-04	---	2.3E-05	4.6E-03	4.8E-03
Arsenic	7.8E-05	---	---	3.6E-04	4.9E-05	1.6E-03	---	2.0E-02	1.1E-02	3.3E-02
Barium	7.1E-05	---	---	2.9E-02	7.9E-04	5.3E-03	---	2.3E-02	3.0E-02	8.8E-02
Beryllium	4.9E-06	---	---	3.0E-05	7.2E-06	2.4E-04	---	9.9E-04	4.9E-04	1.8E-03
Cadmium	1.4E-05	---	---	2.1E-03	9.4E-07	2.5E-04	---	1.1E-02	2.4E-02	3.7E-02
Chromium (Total)	2.0E-04	---	---	3.1E-04	1.6E-05	5.6E-02	---	1.6E-01	1.5E-02	2.3E-01
Cobalt	8.1E-05	---	---	3.7E-04	2.6E-05	2.3E-02	---	1.7E-03	1.9E-02	4.4E-02
Copper	3.0E-03	---	---	2.0E-02	9.8E-05	7.4E-02	---	1.1E+00	2.0E+00	3.2E+00
Lead	3.1E-04	---	---	5.3E-04	6.1E-06	4.2E-03	---	1.5E-02	2.1E-02	4.1E-02
Manganese	9.8E-05	---	---	5.0E-03	4.1E-03	3.7E-02	---	1.8E-01	8.0E-02	3.0E-01
Mercury	7.7E-06	---	---	2.6E-04	1.2E-07	3.7E-05	---	1.4E-04	4.2E-02	4.3E-02
Molybdenum	2.8E-05	---	---	1.0E-03	1.7E-05	4.5E-04	---	7.4E-03	3.2E-02	4.1E-02
Nickel	1.3E-03	---	---	9.0E-04	7.8E-04	1.9E-01	---	5.5E-01	4.0E-02	7.8E-01
Selenium	3.6E-05	---	---	3.1E-03	4.7E-06	3.2E-04	---	6.5E-03	1.5E-01	1.6E-01
Silver	8.1E-06	---	---	6.0E-05	4.4E-07	1.2E-04	---	3.0E-04	6.0E-03	6.5E-03
Strontium	5.7E-04	---	---	5.5E-02	1.9E-03	2.1E-02	---	4.3E-02	1.5E+00	1.7E+00
Thallium	5.1E-06	---	---	1.8E-05	2.9E-06	1.1E-04	---	6.8E-04	1.6E-03	2.4E-03
Uranium	1.5E-05	---	---	6.0E-06	7.7E-06	9.8E-04	---	5.2E-04	5.0E-04	2.0E-03
Vanadium	2.2E-04	---	---	3.0E-04	1.7E-05	1.5E-02	---	8.6E-03	2.1E-02	4.5E-02
Zinc	3.2E-03	---	---	1.8E-01	3.1E-04	8.5E-02	---	3.2E+00	4.2E+00	7.7E+00

Average Daily Doses for the Short-tailed Weasel Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.2E-04	---	---	1.7E-03	2.0E-05	---	---	---	---	2.0E-03
Arsenic	4.3E-03	---	---	2.0E-02	7.6E-05	---	---	---	---	2.4E-02
Barium	3.9E-03	---	---	1.6E+00	1.2E-03	---	---	---	---	1.6E+00
Beryllium	2.7E-04	---	---	1.7E-03	1.1E-05	---	---	---	---	1.9E-03
Cadmium	7.5E-04	---	---	1.2E-01	1.5E-06	---	---	---	---	1.2E-01
Chromium (Total)	1.1E-02	---	---	1.7E-02	2.6E-05	---	---	---	---	2.8E-02
Cobalt	4.5E-03	---	---	2.1E-02	4.1E-05	---	---	---	---	2.5E-02
Copper	1.7E-01	---	---	1.1E+00	1.5E-04	---	---	---	---	1.3E+00
Lead	1.7E-02	---	---	2.9E-02	9.5E-06	---	---	---	---	4.7E-02
Manganese	5.4E-03	---	---	2.8E-01	6.4E-03	---	---	---	---	2.9E-01
Mercury	4.3E-04	---	---	1.5E-02	1.9E-07	---	---	---	---	1.5E-02
Molybdenum	1.5E-03	---	---	5.8E-02	2.7E-05	---	---	---	---	6.0E-02
Nickel	7.4E-02	---	---	5.0E-02	1.2E-03	---	---	---	---	1.2E-01
Selenium	2.0E-03	---	---	1.7E-01	7.4E-06	---	---	---	---	1.7E-01
Silver	4.5E-04	---	---	3.3E-03	6.9E-07	---	---	---	---	3.8E-03
Strontium	3.2E-02	---	---	3.1E+00	3.0E-03	---	---	---	---	3.1E+00
Thallium	2.8E-04	---	---	1.0E-03	4.5E-06	---	---	---	---	1.3E-03
Uranium	8.5E-04	---	---	3.3E-04	1.2E-05	---	---	---	---	1.2E-03
Vanadium	1.2E-02	---	---	1.7E-02	2.6E-05	---	---	---	---	2.9E-02
Zinc	1.8E-01	---	---	1.0E+01	4.9E-04	---	---	---	---	1.0E+01

Average Daily Doses for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	3.2E-04	---	---	1.7E-03	2.0E-05	---	---	---	---	2.0E-03
Arsenic	4.3E-03	---	---	2.0E-02	7.6E-05	---	---	---	---	2.4E-02
Barium	3.9E-03	---	---	1.6E+00	1.2E-03	---	---	---	---	1.6E+00
Beryllium	2.7E-04	---	---	1.7E-03	1.1E-05	---	---	---	---	1.9E-03
Cadmium	7.5E-04	---	---	1.2E-01	1.5E-06	---	---	---	---	1.2E-01
Chromium (Total)	1.1E-02	---	---	1.7E-02	2.6E-05	---	---	---	---	2.8E-02
Cobalt	4.5E-03	---	---	2.1E-02	4.1E-05	---	---	---	---	2.5E-02
Copper	1.7E-01	---	---	1.1E+00	1.5E-04	---	---	---	---	1.3E+00
Lead	1.7E-02	---	---	2.9E-02	9.5E-06	---	---	---	---	4.7E-02
Manganese	5.4E-03	---	---	2.8E-01	6.4E-03	---	---	---	---	2.9E-01
Mercury	4.3E-04	---	---	1.5E-02	1.9E-07	---	---	---	---	1.5E-02
Molybdenum	1.5E-03	---	---	5.8E-02	2.7E-05	---	---	---	---	6.0E-02
Nickel	7.4E-02	---	---	5.0E-02	1.2E-03	---	---	---	---	1.2E-01
Selenium	2.0E-03	---	---	1.7E-01	7.4E-06	---	---	---	---	1.7E-01
Silver	4.5E-04	---	---	3.3E-03	6.9E-07	---	---	---	---	3.8E-03
Strontium	3.2E-02	---	---	3.1E+00	3.0E-03	---	---	---	---	3.1E+00
Thallium	2.8E-04	---	---	1.0E-03	4.5E-06	---	---	---	---	1.3E-03
Uranium	8.5E-04	---	---	3.3E-04	1.2E-05	---	---	---	---	1.2E-03
Vanadium	1.2E-02	---	---	1.7E-02	2.6E-05	---	---	---	---	2.9E-02
Zinc	1.8E-01	---	---	1.0E+01	4.9E-04	---	---	---	---	1.0E+01

Average Daily Doses for the Snowshoe Hare Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	5.7E-04	1.0E-02	---	---	1.6E-05	---	---	---	---	1.1E-02
Arsenic	7.8E-03	6.3E-03	---	---	5.8E-05	---	---	---	---	1.4E-02
Barium	7.0E-03	7.5E-01	---	---	9.4E-04	---	---	---	---	7.6E-01
Beryllium	4.9E-04	8.0E-03	---	---	8.6E-06	---	---	---	---	8.5E-03
Cadmium	1.3E-03	2.7E-02	---	---	1.1E-06	---	---	---	---	2.8E-02
Chromium (Total)	1.9E-02	5.1E-02	---	---	2.0E-05	---	---	---	---	7.1E-02
Cobalt	8.0E-03	4.2E-02	---	---	3.1E-05	---	---	---	---	5.1E-02
Copper	3.0E-01	5.5E-01	---	---	1.2E-04	---	---	---	---	8.5E-01
Lead	3.1E-02	2.3E-02	---	---	7.3E-06	---	---	---	---	5.4E-02
Manganese	9.7E-03	9.9E+00	---	---	4.9E-03	---	---	---	---	9.9E+00
Mercury	7.7E-04	4.0E-03	---	---	1.4E-07	---	---	---	---	4.7E-03
Molybdenum	2.8E-03	1.5E-02	---	---	2.0E-05	---	---	---	---	1.8E-02
Nickel	1.3E-01	9.7E-01	---	---	9.3E-04	---	---	---	---	1.1E+00
Selenium	3.6E-03	4.9E-02	---	---	5.7E-06	---	---	---	---	5.2E-02
Silver	8.0E-04	9.9E-03	---	---	5.3E-07	---	---	---	---	1.1E-02
Strontium	5.6E-02	4.7E+00	---	---	2.3E-03	---	---	---	---	4.8E+00
Thallium	5.0E-04	1.1E-02	---	---	3.4E-06	---	---	---	---	1.1E-02
Uranium	1.5E-03	9.8E-04	---	---	9.1E-06	---	---	---	---	2.5E-03
Vanadium	2.1E-02	5.0E-02	---	---	2.0E-05	---	---	---	---	7.1E-02
Zinc	3.2E-01	8.4E+00	---	---	3.7E-04	---	---	---	---	8.7E+00

Average Daily Doses for the Woodland Caribou Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.6E-04	1.3E-03	---	---	9.5E-06	---	---	---	---	1.4E-03
Arsenic	2.2E-03	8.1E-04	---	---	3.5E-05	---	---	---	---	3.0E-03
Barium	2.0E-03	9.7E-02	---	---	5.8E-04	---	---	---	---	9.9E-02
Beryllium	1.4E-04	1.0E-03	---	---	5.2E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	3.4E-03	---	---	6.8E-07	---	---	---	---	3.8E-03
Chromium (Total)	5.5E-03	6.6E-03	---	---	1.2E-05	---	---	---	---	1.2E-02
Cobalt	2.3E-03	5.4E-03	---	---	1.9E-05	---	---	---	---	7.7E-03
Copper	8.4E-02	7.0E-02	---	---	7.1E-05	---	---	---	---	1.5E-01
Lead	8.7E-03	2.9E-03	---	---	4.4E-06	---	---	---	---	1.2E-02
Manganese	2.7E-03	1.3E+00	---	---	3.0E-03	---	---	---	---	1.3E+00
Mercury	2.2E-04	5.1E-04	---	---	8.7E-08	---	---	---	---	7.3E-04
Molybdenum	7.8E-04	1.9E-03	---	---	1.2E-05	---	---	---	---	2.7E-03
Nickel	3.7E-02	1.2E-01	---	---	5.7E-04	---	---	---	---	1.6E-01
Selenium	1.0E-03	6.3E-03	---	---	3.4E-06	---	---	---	---	7.3E-03
Silver	2.3E-04	1.3E-03	---	---	3.2E-07	---	---	---	---	1.5E-03
Strontium	1.6E-02	6.1E-01	---	---	1.4E-03	---	---	---	---	6.2E-01
Thallium	1.4E-04	1.4E-03	---	---	2.1E-06	---	---	---	---	1.5E-03
Uranium	4.3E-04	1.2E-04	---	---	5.6E-06	---	---	---	---	5.6E-04
Vanadium	6.1E-03	6.3E-03	---	---	1.2E-05	---	---	---	---	1.2E-02
Zinc	9.0E-02	1.1E+00	---	---	2.3E-04	---	---	---	---	1.2E+00

Average Daily Doses for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.6E-04	1.3E-03	---	---	9.5E-06	---	---	---	---	1.4E-03
Arsenic	2.2E-03	8.1E-04	---	---	3.5E-05	---	---	---	---	3.0E-03
Barium	2.0E-03	9.7E-02	---	---	5.8E-04	---	---	---	---	9.9E-02
Beryllium	1.4E-04	1.0E-03	---	---	5.2E-06	---	---	---	---	1.2E-03
Cadmium	3.8E-04	3.4E-03	---	---	6.8E-07	---	---	---	---	3.8E-03
Chromium (Total)	5.5E-03	6.6E-03	---	---	1.2E-05	---	---	---	---	1.2E-02
Cobalt	2.3E-03	5.4E-03	---	---	1.9E-05	---	---	---	---	7.7E-03
Copper	8.4E-02	7.0E-02	---	---	7.1E-05	---	---	---	---	1.5E-01
Lead	8.7E-03	2.9E-03	---	---	4.4E-06	---	---	---	---	1.2E-02
Manganese	2.7E-03	1.3E+00	---	---	3.0E-03	---	---	---	---	1.3E+00
Mercury	2.2E-04	5.1E-04	---	---	8.7E-08	---	---	---	---	7.3E-04
Molybdenum	7.8E-04	1.9E-03	---	---	1.2E-05	---	---	---	---	2.7E-03
Nickel	3.7E-02	1.2E-01	---	---	5.7E-04	---	---	---	---	1.6E-01
Selenium	1.0E-03	6.3E-03	---	---	3.4E-06	---	---	---	---	7.3E-03
Silver	2.3E-04	1.3E-03	---	---	3.2E-07	---	---	---	---	1.5E-03
Strontium	1.6E-02	6.1E-01	---	---	1.4E-03	---	---	---	---	6.2E-01
Thallium	1.4E-04	1.4E-03	---	---	2.1E-06	---	---	---	---	1.5E-03
Uranium	4.3E-04	1.2E-04	---	---	5.6E-06	---	---	---	---	5.6E-04
Vanadium	6.1E-03	6.3E-03	---	---	1.2E-05	---	---	---	---	1.2E-02
Zinc	9.0E-02	1.1E+00	---	---	2.3E-04	---	---	---	---	1.2E+00

Average Daily Doses for the American Robin Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.1E-03	1.8E-02	1.2E-02	---	2.2E-05	---	---	---	---	3.1E-02
Arsenic	1.5E-02	1.1E-02	3.1E-02	---	8.2E-05	---	---	---	---	5.8E-02
Barium	1.4E-02	1.4E+00	1.3E-02	---	1.3E-03	---	---	---	---	1.4E+00
Beryllium	9.6E-04	1.5E-02	4.5E-04	---	1.2E-05	---	---	---	---	1.6E-02
Cadmium	2.7E-03	4.8E-02	2.8E-01	---	1.6E-06	---	---	---	---	3.3E-01
Chromium (Total)	3.8E-02	9.3E-02	1.2E-01	---	2.8E-05	---	---	---	---	2.5E-01
Cobalt	1.6E-02	7.7E-02	2.0E-02	---	4.4E-05	---	---	---	---	1.1E-01
Copper	5.9E-01	1.0E+00	1.3E+00	---	1.7E-04	---	---	---	---	2.9E+00
Lead	6.1E-02	4.2E-02	3.4E-01	---	1.0E-05	---	---	---	---	4.4E-01
Manganese	1.9E-02	1.8E+01	1.7E-02	---	7.0E-03	---	---	---	---	1.8E+01
Mercury	1.5E-03	7.2E-03	2.7E-02	---	2.0E-07	---	---	---	---	3.5E-02
Molybdenum	5.4E-03	2.7E-02	5.4E-02	---	2.9E-05	---	---	---	---	8.6E-02
Nickel	2.6E-01	1.8E+00	2.9E+00	---	1.3E-03	---	---	---	---	4.9E+00
Selenium	7.1E-03	8.9E-02	7.3E-02	---	8.0E-06	---	---	---	---	1.7E-01
Silver	1.6E-03	1.8E-02	3.4E-02	---	7.5E-07	---	---	---	---	5.3E-02
Strontium	1.1E-01	8.6E+00	1.0E-01	---	3.2E-03	---	---	---	---	8.8E+00
Thallium	9.9E-04	1.9E-02	4.8E-04	---	4.9E-06	---	---	---	---	2.1E-02
Uranium	3.0E-03	1.8E-03	1.0E-03	---	1.3E-05	---	---	---	---	5.8E-03
Vanadium	4.2E-02	9.0E-02	1.8E-02	---	2.8E-05	---	---	---	---	1.5E-01
Zinc	6.3E-01	1.5E+01	2.8E+01	---	5.3E-04	---	---	---	---	4.4E+01

Average Daily Doses for the American Robin (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	1.1E-03	1.8E-02	1.2E-02	---	2.2E-05	---	---	---	---	3.1E-02
Arsenic	1.5E-02	1.1E-02	3.1E-02	---	8.2E-05	---	---	---	---	5.8E-02
Barium	1.4E-02	1.4E+00	1.3E-02	---	1.3E-03	---	---	---	---	1.4E+00
Beryllium	9.6E-04	1.5E-02	4.5E-04	---	1.2E-05	---	---	---	---	1.6E-02
Cadmium	2.7E-03	4.8E-02	2.8E-01	---	1.6E-06	---	---	---	---	3.3E-01
Chromium (Total)	3.8E-02	9.3E-02	1.2E-01	---	2.8E-05	---	---	---	---	2.5E-01
Cobalt	1.6E-02	7.7E-02	2.0E-02	---	4.4E-05	---	---	---	---	1.1E-01
Copper	5.9E-01	1.0E+00	1.3E+00	---	1.7E-04	---	---	---	---	2.9E+00
Lead	6.1E-02	4.2E-02	3.4E-01	---	1.0E-05	---	---	---	---	4.4E-01
Manganese	1.9E-02	1.8E+01	1.7E-02	---	7.0E-03	---	---	---	---	1.8E+01
Mercury	1.5E-03	7.2E-03	2.7E-02	---	2.0E-07	---	---	---	---	3.5E-02
Molybdenum	5.4E-03	2.7E-02	5.4E-02	---	2.9E-05	---	---	---	---	8.6E-02
Nickel	2.6E-01	1.8E+00	2.9E+00	---	1.3E-03	---	---	---	---	4.9E+00
Selenium	7.1E-03	8.9E-02	7.3E-02	---	8.0E-06	---	---	---	---	1.7E-01
Silver	1.6E-03	1.8E-02	3.4E-02	---	7.5E-07	---	---	---	---	5.3E-02
Strontium	1.1E-01	8.6E+00	1.0E-01	---	3.2E-03	---	---	---	---	8.8E+00
Thallium	9.9E-04	1.9E-02	4.8E-04	---	4.9E-06	---	---	---	---	2.1E-02
Uranium	3.0E-03	1.8E-03	1.0E-03	---	1.3E-05	---	---	---	---	5.8E-03
Vanadium	4.2E-02	9.0E-02	1.8E-02	---	2.8E-05	---	---	---	---	1.5E-01
Zinc	6.3E-01	1.5E+01	2.8E+01	---	5.3E-04	---	---	---	---	4.4E+01

Average Daily Doses for the Barn Swallow Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.7E-04	4.0E-04	3.8E-02	---	3.5E-05	---	---	---	---	3.9E-02
Arsenic	1.1E-02	2.5E-04	1.0E-01	---	1.3E-04	---	---	---	---	1.1E-01
Barium	9.5E-03	3.0E-02	4.3E-02	---	2.1E-03	---	---	---	---	8.5E-02
Beryllium	6.6E-04	3.2E-04	1.5E-03	---	1.9E-05	---	---	---	---	2.5E-03
Cadmium	1.8E-03	1.1E-03	9.3E-01	---	2.5E-06	---	---	---	---	9.3E-01
Chromium (Total)	2.6E-02	2.1E-03	4.0E-01	---	4.4E-05	---	---	---	---	4.3E-01
Cobalt	1.1E-02	1.7E-03	6.6E-02	---	7.2E-05	---	---	---	---	7.9E-02
Copper	4.0E-01	2.2E-02	4.3E+00	---	2.7E-04	---	---	---	---	4.7E+00
Lead	4.2E-02	9.2E-04	1.1E+00	---	1.7E-05	---	---	---	---	1.2E+00
Manganese	1.3E-02	4.0E-01	5.7E-02	---	1.1E-02	---	---	---	---	4.8E-01
Mercury	1.0E-03	1.6E-04	8.7E-02	---	3.2E-07	---	---	---	---	8.9E-02
Molybdenum	3.7E-03	6.0E-04	1.8E-01	---	4.7E-05	---	---	---	---	1.8E-01
Nickel	1.8E-01	3.9E-02	9.4E+00	---	2.1E-03	---	---	---	---	9.6E+00
Selenium	4.9E-03	2.0E-03	2.4E-01	---	1.3E-05	---	---	---	---	2.5E-01
Silver	1.1E-03	4.0E-04	1.1E-01	---	1.2E-06	---	---	---	---	1.1E-01
Strontium	7.7E-02	1.9E-01	3.3E-01	---	5.2E-03	---	---	---	---	6.0E-01
Thallium	6.8E-04	4.3E-04	1.6E-03	---	7.8E-06	---	---	---	---	2.7E-03
Uranium	2.1E-03	3.9E-05	3.4E-03	---	2.1E-05	---	---	---	---	5.5E-03
Vanadium	2.9E-02	2.0E-03	6.1E-02	---	4.5E-05	---	---	---	---	9.2E-02
Zinc	4.3E-01	3.4E-01	9.3E+01	---	8.5E-04	---	---	---	---	9.4E+01

Average Daily Doses for the Barn Swallow (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	7.7E-04	4.0E-04	3.8E-02	---	3.5E-05	---	---	---	---	3.9E-02
Arsenic	1.1E-02	2.5E-04	1.0E-01	---	1.3E-04	---	---	---	---	1.1E-01
Barium	9.5E-03	3.0E-02	4.3E-02	---	2.1E-03	---	---	---	---	8.5E-02
Beryllium	6.6E-04	3.2E-04	1.5E-03	---	1.9E-05	---	---	---	---	2.5E-03
Cadmium	1.8E-03	1.1E-03	9.3E-01	---	2.5E-06	---	---	---	---	9.3E-01
Chromium (Total)	2.6E-02	2.1E-03	4.0E-01	---	4.4E-05	---	---	---	---	4.3E-01
Cobalt	1.1E-02	1.7E-03	6.6E-02	---	7.2E-05	---	---	---	---	7.9E-02
Copper	4.0E-01	2.2E-02	4.3E+00	---	2.7E-04	---	---	---	---	4.7E+00
Lead	4.2E-02	9.2E-04	1.1E+00	---	1.7E-05	---	---	---	---	1.2E+00
Manganese	1.3E-02	4.0E-01	5.7E-02	---	1.1E-02	---	---	---	---	4.8E-01
Mercury	1.0E-03	1.6E-04	8.7E-02	---	3.2E-07	---	---	---	---	8.9E-02
Molybdenum	3.7E-03	6.0E-04	1.8E-01	---	4.7E-05	---	---	---	---	1.8E-01
Nickel	1.8E-01	3.9E-02	9.4E+00	---	2.1E-03	---	---	---	---	9.6E+00
Selenium	4.9E-03	2.0E-03	2.4E-01	---	1.3E-05	---	---	---	---	2.5E-01
Silver	1.1E-03	4.0E-04	1.1E-01	---	1.2E-06	---	---	---	---	1.1E-01
Strontium	7.7E-02	1.9E-01	3.3E-01	---	5.2E-03	---	---	---	---	6.0E-01
Thallium	6.8E-04	4.3E-04	1.6E-03	---	7.8E-06	---	---	---	---	2.7E-03
Uranium	2.1E-03	3.9E-05	3.4E-03	---	2.1E-05	---	---	---	---	5.5E-03
Vanadium	2.9E-02	2.0E-03	6.1E-02	---	4.5E-05	---	---	---	---	9.2E-02
Zinc	4.3E-01	3.4E-01	9.3E+01	---	8.5E-04	---	---	---	---	9.4E+01

Average Daily Doses for the Common Loon Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	5.5E-06	1.7E-04	---	2.5E-05	8.3E-03	8.5E-03
Arsenic	---	---	---	---	2.0E-05	2.8E-03	---	2.2E-02	1.9E-02	4.4E-02
Barium	---	---	---	---	3.3E-04	8.9E-03	---	2.5E-02	5.3E-02	8.7E-02
Beryllium	---	---	---	---	3.0E-06	4.0E-04	---	1.1E-03	8.8E-04	2.3E-03
Cadmium	---	---	---	---	4.0E-07	4.2E-04	---	1.2E-02	4.2E-02	5.5E-02
Chromium (Total)	---	---	---	---	6.9E-06	9.5E-02	---	1.7E-01	2.7E-02	2.9E-01
Cobalt	---	---	---	---	1.1E-05	3.8E-02	---	1.8E-03	3.4E-02	7.4E-02
Copper	---	---	---	---	4.1E-05	1.3E-01	---	1.2E+00	3.6E+00	4.9E+00
Lead	---	---	---	---	2.6E-06	7.0E-03	---	1.6E-02	3.7E-02	6.0E-02
Manganese	---	---	---	---	1.7E-03	6.2E-02	---	1.9E-01	1.4E-01	4.0E-01
Mercury	---	---	---	---	5.0E-08	6.2E-05	---	1.5E-04	7.6E-02	7.6E-02
Molybdenum	---	---	---	---	7.2E-06	7.5E-04	---	7.9E-03	5.7E-02	6.6E-02
Nickel	---	---	---	---	3.3E-04	3.2E-01	---	5.8E-01	7.1E-02	9.7E-01
Selenium	---	---	---	---	2.0E-06	5.5E-04	---	6.9E-03	2.8E-01	2.8E-01
Silver	---	---	---	---	1.9E-07	2.0E-04	---	3.2E-04	1.1E-02	1.1E-02
Strontium	---	---	---	---	8.1E-04	3.6E-02	---	4.5E-02	2.8E+00	2.9E+00
Thallium	---	---	---	---	1.2E-06	1.8E-04	---	7.2E-04	2.8E-03	3.7E-03
Uranium	---	---	---	---	3.2E-06	1.7E-03	---	5.6E-04	8.9E-04	3.1E-03
Vanadium	---	---	---	---	7.0E-06	2.5E-02	---	9.2E-03	3.7E-02	7.2E-02
Zinc	---	---	---	---	1.3E-04	1.4E-01	---	3.4E+00	7.5E+00	1.1E+01

Average Daily Doses for the Lesser Scaup Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	---	---	---	---	1.1E-05	2.4E-04	2.7E-05	3.4E-04	---	6.1E-04
Arsenic	---	---	---	---	4.0E-05	3.8E-03	4.1E-04	3.0E-01	---	3.0E-01
Barium	---	---	---	---	6.5E-04	1.2E-02	5.5E-03	3.3E-01	---	3.5E-01
Beryllium	---	---	---	---	5.9E-06	5.5E-04	1.2E-03	1.4E-02	---	1.6E-02
Cadmium	---	---	---	---	7.7E-07	5.9E-04	1.5E-03	1.6E-01	---	1.6E-01
Chromium (Total)	---	---	---	---	1.3E-05	1.3E-01	1.5E-02	2.2E+00	---	2.4E+00
Cobalt	---	---	---	---	2.2E-05	5.3E-02	1.1E-03	2.5E-02	---	7.9E-02
Copper	---	---	---	---	8.0E-05	1.7E-01	5.0E-02	1.6E+01	---	1.6E+01
Lead	---	---	---	---	5.0E-06	9.8E-03	3.0E-03	2.2E-01	---	2.3E-01
Manganese	---	---	---	---	3.4E-03	8.6E-02	1.9E-02	2.6E+00	---	2.7E+00
Mercury	---	---	---	---	9.8E-08	8.5E-05	3.1E-04	2.1E-03	---	2.5E-03
Molybdenum	---	---	---	---	1.4E-05	1.0E-03	7.1E-04	1.1E-01	---	1.1E-01
Nickel	---	---	---	---	6.4E-04	4.4E-01	3.1E-02	7.9E+00	---	8.4E+00
Selenium	---	---	---	---	3.9E-06	7.6E-04	1.0E-03	9.3E-02	---	9.5E-02
Silver	---	---	---	---	3.6E-07	2.8E-04	2.8E-05	4.3E-03	---	4.6E-03
Strontium	---	---	---	---	1.6E-03	5.0E-02	5.6E-02	6.1E-01	---	7.2E-01
Thallium	---	---	---	---	2.4E-06	2.5E-04	1.8E-06	9.8E-03	---	1.0E-02
Uranium	---	---	---	---	6.3E-06	2.3E-03	5.6E-05	7.6E-03	---	9.9E-03
Vanadium	---	---	---	---	1.4E-05	3.5E-02	4.8E-04	1.2E-01	---	1.6E-01
Zinc	---	---	---	---	2.6E-04	2.0E-01	2.9E-01	4.6E+01	---	4.7E+01

Average Daily Doses for the Mallard Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.4E-05	3.9E-04	3.7E-04	---	9.0E-06	3.0E-04	1.4E-04	1.6E-04	---	1.4E-03
Arsenic	3.2E-04	2.4E-04	9.9E-04	---	3.3E-05	4.8E-03	2.2E-03	1.4E-01	---	1.5E-01
Barium	2.9E-04	2.9E-02	4.2E-04	---	5.4E-04	1.6E-02	3.0E-02	1.6E-01	---	2.4E-01
Beryllium	2.0E-05	3.1E-04	1.4E-05	---	4.9E-06	6.9E-04	6.2E-03	6.9E-03	---	1.4E-02
Cadmium	5.6E-05	1.0E-03	9.0E-03	---	6.5E-07	7.4E-04	8.1E-03	7.8E-02	---	9.7E-02
Chromium (Total)	8.1E-04	2.0E-03	3.9E-03	---	1.1E-05	1.6E-01	8.3E-02	1.1E+00	---	1.3E+00
Cobalt	3.4E-04	1.6E-03	6.4E-04	---	1.8E-05	6.6E-02	6.1E-03	1.2E-02	---	8.7E-02
Copper	1.2E-02	2.1E-02	4.2E-02	---	6.7E-05	2.2E-01	2.7E-01	7.8E+00	---	8.3E+00
Lead	1.3E-03	8.9E-04	1.1E-02	---	4.2E-06	1.2E-02	1.6E-02	1.0E-01	---	1.5E-01
Manganese	4.1E-04	3.8E-01	5.6E-04	---	2.8E-03	1.1E-01	1.0E-01	1.2E+00	---	1.8E+00
Mercury	3.2E-05	1.5E-04	8.5E-04	---	8.2E-08	1.1E-04	1.7E-03	9.9E-04	---	3.8E-03
Molybdenum	1.2E-04	5.8E-04	1.7E-03	---	1.2E-05	1.3E-03	3.8E-03	5.1E-02	---	5.9E-02
Nickel	5.5E-03	3.8E-02	9.1E-02	---	5.3E-04	5.5E-01	1.7E-01	3.8E+00	---	4.6E+00
Selenium	1.5E-04	1.9E-03	2.3E-03	---	3.3E-06	9.5E-04	5.6E-03	4.5E-02	---	5.6E-02
Silver	3.4E-05	3.8E-04	1.1E-03	---	3.1E-07	3.5E-04	1.5E-04	2.1E-03	---	4.1E-03
Strontium	2.4E-03	1.8E-01	3.2E-03	---	1.3E-03	6.2E-02	3.0E-01	2.9E-01	---	8.5E-01
Thallium	2.1E-05	4.1E-04	1.5E-05	---	2.0E-06	3.2E-04	9.5E-06	4.7E-03	---	5.5E-03
Uranium	6.4E-05	3.8E-05	3.3E-05	---	5.3E-06	2.9E-03	3.0E-04	3.6E-03	---	6.9E-03
Vanadium	9.0E-04	1.9E-03	5.9E-04	---	1.1E-05	4.4E-02	2.6E-03	6.0E-02	---	1.1E-01
Zinc	1.3E-02	3.2E-01	9.0E-01	---	2.1E-04	2.5E-01	1.6E+00	2.2E+01	---	2.5E+01

Average Daily Doses for the Red-tailed Hawk Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	9.6E-05	---	---	5.0E-04	9.2E-06	---	---	---	---	6.1E-04
Arsenic	1.3E-03	---	---	6.0E-03	3.4E-05	---	---	---	---	7.3E-03
Barium	1.2E-03	---	---	4.9E-01	5.6E-04	---	---	---	---	4.9E-01
Beryllium	8.2E-05	---	---	5.0E-04	5.1E-06	---	---	---	---	5.9E-04
Cadmium	2.3E-04	---	---	3.6E-02	6.6E-07	---	---	---	---	3.6E-02
Chromium (Total)	3.3E-03	---	---	5.3E-03	1.2E-05	---	---	---	---	8.6E-03
Cobalt	1.4E-03	---	---	6.2E-03	1.9E-05	---	---	---	---	7.6E-03
Copper	5.0E-02	---	---	3.3E-01	6.9E-05	---	---	---	---	3.8E-01
Lead	5.2E-03	---	---	8.9E-03	4.3E-06	---	---	---	---	1.4E-02
Manganese	1.6E-03	---	---	8.5E-02	2.9E-03	---	---	---	---	8.9E-02
Mercury	1.3E-04	---	---	4.4E-03	8.5E-08	---	---	---	---	4.5E-03
Molybdenum	4.7E-04	---	---	1.8E-02	1.2E-05	---	---	---	---	1.8E-02
Nickel	2.2E-02	---	---	1.5E-02	5.5E-04	---	---	---	---	3.8E-02
Selenium	6.1E-04	---	---	5.2E-02	3.4E-06	---	---	---	---	5.3E-02
Silver	1.4E-04	---	---	1.0E-03	3.1E-07	---	---	---	---	1.1E-03
Strontium	9.5E-03	---	---	9.3E-01	1.4E-03	---	---	---	---	9.4E-01
Thallium	8.5E-05	---	---	3.1E-04	2.0E-06	---	---	---	---	3.9E-04
Uranium	2.6E-04	---	---	1.0E-04	5.4E-06	---	---	---	---	3.6E-04
Vanadium	3.6E-03	---	---	5.1E-03	1.2E-05	---	---	---	---	8.7E-03
Zinc	5.4E-02	---	---	3.1E+00	2.2E-04	---	---	---	---	3.1E+00

Average Daily Doses for the Spotted Sandpiper Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.8E-04	---	1.4E-02	---	2.8E-05	3.2E-04	4.6E-05	3.8E-04	2.4E-03	1.8E-02
Arsenic	3.9E-03	---	3.8E-02	---	1.0E-04	5.2E-03	7.0E-04	3.4E-01	5.5E-03	3.9E-01
Barium	3.5E-03	---	1.6E-02	---	1.7E-03	1.7E-02	9.4E-03	3.8E-01	1.5E-02	4.4E-01
Beryllium	2.4E-04	---	5.4E-04	---	1.5E-05	7.5E-04	2.0E-03	1.6E-02	2.5E-04	2.0E-02
Cadmium	6.7E-04	---	3.4E-01	---	2.0E-06	8.0E-04	2.6E-03	1.8E-01	1.2E-02	5.4E-01
Chromium (Total)	9.6E-03	---	1.5E-01	---	3.5E-05	1.8E-01	2.6E-02	2.6E+00	7.8E-03	2.9E+00
Cobalt	4.0E-03	---	2.4E-02	---	5.7E-05	7.2E-02	1.9E-03	2.8E-02	9.8E-03	1.4E-01
Copper	1.5E-01	---	1.6E+00	---	2.1E-04	2.4E-01	8.5E-02	1.8E+01	1.0E+00	2.2E+01
Lead	1.5E-02	---	4.1E-01	---	1.3E-05	1.3E-02	5.2E-03	2.5E-01	1.1E-02	7.0E-01
Manganese	4.8E-03	---	2.1E-02	---	8.9E-03	1.2E-01	3.3E-02	2.9E+00	4.1E-02	3.2E+00
Mercury	3.8E-04	---	3.2E-02	---	2.6E-07	1.2E-04	5.3E-04	2.3E-03	2.2E-02	5.7E-02
Molybdenum	1.4E-03	---	6.5E-02	---	3.7E-05	1.4E-03	1.2E-03	1.2E-01	1.6E-02	2.1E-01
Nickel	6.5E-02	---	3.5E+00	---	1.7E-03	6.0E-01	5.3E-02	9.0E+00	2.0E-02	1.3E+01
Selenium	1.8E-03	---	8.8E-02	---	1.0E-05	1.0E-03	1.8E-03	1.1E-01	7.9E-02	2.8E-01
Silver	4.0E-04	---	4.1E-02	---	9.6E-07	3.8E-04	4.7E-05	4.9E-03	3.1E-03	5.0E-02
Strontium	2.8E-02	---	1.2E-01	---	4.1E-03	6.7E-02	9.6E-02	7.0E-01	8.0E-01	1.8E+00
Thallium	2.5E-04	---	5.9E-04	---	6.2E-06	3.4E-04	3.0E-06	1.1E-02	8.1E-04	1.3E-02
Uranium	7.6E-04	---	1.2E-03	---	1.7E-05	3.1E-03	9.6E-05	8.6E-03	2.5E-04	1.4E-02
Vanadium	1.1E-02	---	2.2E-02	---	3.6E-05	4.8E-02	8.2E-04	1.4E-01	1.1E-02	2.3E-01
Zinc	1.6E-01	---	3.4E+01	---	6.7E-04	2.7E-01	5.0E-01	5.3E+01	2.2E+00	9.0E+01

Average Daily Doses for the Spruce Grouse Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion	Terrestrial Plant Ingestion	Terrestrial Invertebrate Ingestion	Terrestrial Prey Ingestion	Surface Water Ingestion	Freshwater Sediment Ingestion	Freshwater Plant Ingestion	Freshwater Benthic Invertebrate Ingestion	Freshwater Fish Ingestion	Total ADD
	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Total Average Daily Dose (mg/kg-day)
Antimony	2.1E-04	1.1E-02	5.5E-04	---	1.1E-05	---	---	---	---	1.2E-02
Arsenic	2.9E-03	6.9E-03	1.5E-03	---	4.2E-05	---	---	---	---	1.1E-02
Barium	2.6E-03	8.3E-01	6.3E-04	---	6.8E-04	---	---	---	---	8.3E-01
Beryllium	1.8E-04	8.8E-03	2.1E-05	---	6.2E-06	---	---	---	---	9.0E-03
Cadmium	5.0E-04	2.9E-02	1.3E-02	---	8.1E-07	---	---	---	---	4.3E-02
Chromium (Total)	7.1E-03	5.6E-02	5.8E-03	---	1.4E-05	---	---	---	---	6.9E-02
Cobalt	3.0E-03	4.7E-02	9.6E-04	---	2.3E-05	---	---	---	---	5.1E-02
Copper	1.1E-01	6.0E-01	6.2E-02	---	8.5E-05	---	---	---	---	7.7E-01
Lead	1.1E-02	2.5E-02	1.6E-02	---	5.3E-06	---	---	---	---	5.3E-02
Manganese	3.6E-03	1.1E+01	8.3E-04	---	3.6E-03	---	---	---	---	1.1E+01
Mercury	2.8E-04	4.4E-03	1.3E-03	---	1.0E-07	---	---	---	---	5.9E-03
Molybdenum	1.0E-03	1.6E-02	2.6E-03	---	1.5E-05	---	---	---	---	2.0E-02
Nickel	4.8E-02	1.1E+00	1.4E-01	---	6.7E-04	---	---	---	---	1.3E+00
Selenium	1.3E-03	5.4E-02	3.5E-03	---	4.1E-06	---	---	---	---	5.8E-02
Silver	3.0E-04	1.1E-02	1.6E-03	---	3.8E-07	---	---	---	---	1.3E-02
Strontium	2.1E-02	5.2E+00	4.8E-03	---	1.7E-03	---	---	---	---	5.2E+00
Thallium	1.8E-04	1.2E-02	2.3E-05	---	2.5E-06	---	---	---	---	1.2E-02
Uranium	5.6E-04	1.1E-03	4.9E-05	---	6.6E-06	---	---	---	---	1.7E-03
Vanadium	7.9E-03	5.4E-02	8.8E-04	---	1.4E-05	---	---	---	---	6.3E-02
Zinc	1.2E-01	9.2E+00	1.4E+00	---	2.7E-04	---	---	---	---	1.1E+01

APPENDIX G.3
RISK QUOTIENTS

Risk Quotients for the American Beaver Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	9.5E-05	1.5E-03	---	---	3.7E-05	2.2E-04	4.3E-05	---	---	1.9E-03
Arsenic	3.6E-04	3.3E-04	---	---	4.3E-05	2.6E-03	4.9E-04	---	---	3.8E-03
Barium	7.5E-06	4.6E-04	---	---	2.9E-05	6.8E-05	5.3E-05	---	---	6.2E-04
Beryllium	2.6E-04	1.1E-03	---	---	1.8E-05	1.2E-03	3.6E-03	---	---	6.2E-03
Cadmium	3.1E-05	6.8E-04	---	---	9.5E-08	5.4E-05	2.6E-04	---	---	1.0E-03
Chromium (Total)	5.2E-04	6.8E-04	---	---	2.6E-06	4.7E-03	9.6E-04	---	---	6.8E-03
Cobalt	6.8E-05	1.9E-04	---	---	4.7E-07	3.6E-04	1.4E-05	---	---	6.3E-04
Copper	2.0E-03	5.7E-03	---	---	5.0E-06	1.7E-03	2.6E-03	---	---	1.2E-02
Lead	3.2E-05	4.3E-05	---	---	6.4E-08	5.5E-05	2.8E-05	---	---	1.6E-04
Manganese	1.2E-05	6.1E-03	---	---	8.2E-05	3.7E-04	1.5E-04	---	---	6.7E-03
Mercury	3.9E-05	3.6E-04	---	---	1.2E-07	4.7E-05	2.7E-04	---	---	7.2E-04
Molybdenum	2.7E-03	1.0E-02	---	---	4.7E-05	4.1E-03	5.0E-03	---	---	2.2E-02
Nickel	1.0E-03	6.3E-03	---	---	1.6E-05	9.8E-03	2.2E-03	---	---	1.9E-02
Selenium	3.5E-04	1.4E-02	---	---	1.8E-05	1.8E-03	4.4E-03	---	---	2.1E-02
Silver	1.6E-06	2.1E-05	---	---	1.6E-08	1.4E-06	2.4E-07	---	---	2.4E-05
Strontium	3.6E-05	6.8E-04	---	---	7.5E-05	8.7E-05	1.7E-04	---	---	1.1E-03
Thallium	3.4E-04	3.0E-03	---	---	1.7E-05	7.2E-04	9.0E-06	---	---	4.1E-03
Uranium	6.3E-05	2.9E-05	---	---	3.3E-06	7.2E-04	2.1E-05	---	---	8.4E-04
Vanadium	3.3E-03	2.8E-03	---	---	1.4E-05	2.0E-02	4.8E-04	---	---	2.6E-02
Zinc	9.9E-05	2.6E-03	---	---	7.5E-07	3.6E-04	1.1E-03	---	---	4.1E-03

Risk Quotients for the American Mink Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.7E-05	---	---	8.0E-04	6.6E-06	1.9E-04	---	3.7E-05	5.7E-03	6.8E-03
Arsenic	4.4E-04	---	---	1.2E-02	1.6E-05	4.7E-03	---	4.3E-02	1.8E-02	7.9E-02
Barium	1.0E-05	---	---	1.6E-03	1.2E-05	1.4E-04	---	5.1E-04	3.1E-04	2.6E-03
Beryllium	1.6E-04	---	---	4.1E-04	3.3E-06	1.0E-03	---	3.6E-03	1.1E-03	6.3E-03
Cadmium	4.3E-05	---	---	1.9E-03	4.0E-08	1.1E-04	---	4.3E-03	3.8E-03	1.0E-02
Chromium (Total)	7.2E-04	---	---	2.0E-03	1.1E-06	9.5E-03	---	3.7E-02	1.0E-02	6.0E-02
Cobalt	9.5E-05	---	---	3.1E-04	2.0E-07	7.4E-04	---	4.7E-05	1.7E-03	2.8E-03
Copper	2.7E-03	---	---	6.2E-02	2.1E-06	3.4E-03	---	1.4E-01	4.7E-01	6.8E-01
Lead	4.5E-05	---	---	5.6E-05	2.7E-08	1.1E-04	---	3.3E-04	3.0E-04	8.4E-04
Manganese	1.7E-05	---	---	5.9E-04	3.4E-05	7.5E-04	---	3.0E-03	8.7E-04	5.3E-03
Mercury	2.4E-05	---	---	1.0E-03	2.2E-08	4.3E-05	---	1.4E-04	4.5E-02	4.7E-02
Molybdenum	1.6E-03	---	---	9.2E-03	8.4E-06	3.6E-03	---	5.0E-02	1.4E-02	7.9E-02
Nickel	1.4E-03	---	---	6.5E-03	6.8E-06	2.0E-02	---	6.8E-02	4.7E-02	1.4E-01
Selenium	2.1E-04	---	---	6.3E-02	3.3E-06	1.5E-03	---	2.6E-02	3.6E-01	4.5E-01
Silver	1.8E-06	---	---	1.7E-05	5.3E-09	2.2E-06	---	4.5E-06	8.0E-04	8.3E-04
Strontium	2.2E-05	---	---	1.0E-03	1.3E-05	7.6E-05	---	1.3E-04	3.4E-03	4.7E-03
Thallium	2.0E-04	---	---	1.1E-02	3.0E-06	6.3E-04	---	3.4E-03	1.0E-02	2.5E-02
Uranium	3.8E-05	---	---	7.0E-05	5.8E-07	6.3E-04	---	2.9E-04	1.6E-04	1.2E-03
Vanadium	2.0E-03	---	---	3.8E-03	2.4E-06	1.7E-02	---	8.3E-03	2.0E-02	5.1E-02
Zinc	1.4E-04	---	---	1.4E-02	3.1E-07	7.3E-04	---	3.1E-02	4.6E-01	5.1E-01

Risk Quotients for the Black Bear Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.6E-04	2.4E-02	1.1E-03	1.3E-03	4.3E-05	5.2E-05	---	---	1.8E-03	2.8E-02
Arsenic	1.7E-03	5.4E-03	1.0E-03	9.4E-03	5.0E-05	6.2E-04	---	---	2.8E-03	2.1E-02
Barium	2.8E-05	5.7E-03	6.4E-06	8.7E-04	2.6E-05	1.2E-05	---	---	3.2E-05	6.7E-03
Beryllium	1.3E-03	1.8E-02	1.4E-04	6.6E-04	2.1E-05	2.8E-04	---	---	3.3E-04	2.1E-02
Cadmium	1.2E-04	8.5E-03	3.0E-03	1.0E-03	8.6E-08	9.8E-06	---	---	4.0E-04	1.3E-02
Chromium (Total)	1.9E-03	8.5E-03	1.5E-03	1.1E-03	2.3E-06	8.6E-04	---	---	1.1E-03	1.5E-02
Cobalt	2.6E-04	2.3E-03	7.8E-05	1.6E-04	4.3E-07	6.6E-05	---	---	1.7E-04	3.0E-03
Copper	7.4E-03	7.1E-02	6.7E-03	3.3E-02	4.5E-06	3.1E-04	---	---	4.9E-02	1.7E-01
Lead	1.2E-04	5.3E-04	1.6E-04	3.0E-05	5.8E-08	1.0E-05	---	---	3.1E-05	8.9E-04
Manganese	4.7E-05	7.5E-02	1.0E-05	3.2E-04	7.4E-05	6.7E-05	---	---	9.0E-05	7.6E-02
Mercury	1.9E-04	5.8E-03	8.0E-04	1.5E-03	1.3E-07	1.1E-05	---	---	1.3E-02	2.2E-02
Molybdenum	1.3E-02	1.6E-01	3.1E-02	1.5E-02	5.5E-05	9.8E-04	---	---	4.4E-03	2.3E-01
Nickel	3.9E-03	7.9E-02	1.0E-02	3.5E-03	1.5E-05	1.8E-03	---	---	4.9E-03	1.0E-01
Selenium	1.7E-03	2.3E-01	4.2E-03	1.0E-01	2.2E-05	4.2E-04	---	---	1.1E-01	4.5E-01
Silver	7.9E-06	3.4E-04	4.0E-05	1.6E-05	1.9E-08	3.2E-07	---	---	1.4E-04	5.4E-04
Strontium	1.8E-04	1.1E-02	3.8E-05	1.7E-03	8.7E-05	2.1E-05	---	---	1.1E-03	1.4E-02
Thallium	1.7E-03	4.8E-02	1.9E-04	1.7E-02	2.0E-05	1.7E-04	---	---	3.1E-03	7.1E-02
Uranium	3.1E-04	4.6E-04	2.5E-05	1.1E-04	3.8E-06	1.7E-04	---	---	5.1E-05	1.1E-03
Vanadium	1.6E-02	4.5E-02	1.7E-03	6.2E-03	1.6E-05	4.6E-03	---	---	6.2E-03	8.0E-02
Zinc	3.7E-04	3.2E-02	6.0E-03	7.5E-03	6.7E-07	6.6E-05	---	---	4.8E-02	9.4E-02

Risk Quotients for the Common (Masked) Shrew Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.4E-03	4.4E-03	6.5E-02	---	3.1E-05	---	---	---	---	7.1E-02
Arsenic	1.3E-02	2.6E-03	1.5E-01	---	9.1E-05	---	---	---	---	1.6E-01
Barium	3.1E-04	4.0E-03	1.4E-03	---	6.8E-05	---	---	---	---	5.7E-03
Beryllium	3.8E-03	3.4E-03	8.1E-03	---	1.5E-05	---	---	---	---	1.5E-02
Cadmium	1.3E-03	5.9E-03	6.3E-01	---	2.3E-07	---	---	---	---	6.4E-01
Chromium (Total)	2.2E-02	6.0E-03	3.1E-01	---	6.2E-06	---	---	---	---	3.4E-01
Cobalt	2.9E-03	1.6E-03	1.7E-02	---	1.1E-06	---	---	---	---	2.1E-02
Copper	8.2E-02	5.0E-02	**1.4E+00**	---	1.2E-05	---	---	---	---	**1.6E+00**
Lead	1.3E-03	3.7E-04	3.4E-02	---	1.5E-07	---	---	---	---	3.6E-02
Manganese	5.2E-04	5.3E-02	2.2E-03	---	1.9E-04	---	---	---	---	5.6E-02
Mercury	7.3E-04	1.4E-03	5.9E-02	---	1.2E-07	---	---	---	---	6.1E-02
Molybdenum	2.1E-02	1.6E-02	9.6E-01	---	2.1E-05	---	---	---	---	1.0E+00
Nickel	4.3E-02	5.5E-02	**2.2E+00**	---	3.9E-05	---	---	---	---	**2.3E+00**
Selenium	5.1E-03	4.3E-02	2.4E-01	---	1.5E-05	---	---	---	---	2.9E-01
Silver	5.3E-05	1.4E-04	5.2E-03	---	3.0E-08	---	---	---	---	5.3E-03
Strontium	5.3E-04	2.0E-03	2.2E-03	---	6.2E-05	---	---	---	---	4.8E-03
Thallium	5.0E-03	9.0E-03	1.1E-02	---	1.4E-05	---	---	---	---	2.5E-02
Uranium	4.9E-04	4.7E-05	7.8E-04	---	1.5E-06	---	---	---	---	1.3E-03
Vanadium	4.8E-02	8.4E-03	9.6E-02	---	1.1E-05	---	---	---	---	1.5E-01
Zinc	4.1E-03	2.2E-02	**1.3E+00**	---	1.8E-06	---	---	---	---	**1.3E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.1E-03	1.3E-02	2.0E-01	---	9.2E-05	---	---	---	---	2.1E-01
Arsenic	4.0E-02	7.7E-03	4.4E-01	---	2.7E-04	---	---	---	---	4.9E-01
Barium	3.1E-04	4.0E-03	1.4E-03	---	6.8E-05	---	---	---	---	5.7E-03
Beryllium	3.8E-03	3.4E-03	8.1E-03	---	1.5E-05	---	---	---	---	1.5E-02
Cadmium	1.3E-03	5.9E-03	6.3E-01	---	2.3E-07	---	---	---	---	6.4E-01
Chromium (Total)	2.2E-02	6.0E-03	3.1E-01	---	6.2E-06	---	---	---	---	3.4E-01
Cobalt	2.9E-03	1.6E-03	1.7E-02	---	1.1E-06	---	---	---	---	2.1E-02
Copper	2.5E-01	1.5E-01	**4.3E+00**	---	3.6E-05	---	---	---	---	**4.7E+00**
Lead	1.3E-03	3.7E-04	3.4E-02	---	1.5E-07	---	---	---	---	3.6E-02
Manganese	5.2E-04	5.3E-02	2.2E-03	---	1.9E-04	---	---	---	---	5.6E-02
Mercury	7.3E-04	1.4E-03	5.9E-02	---	1.2E-07	---	---	---	---	6.1E-02
Molybdenum	6.3E-02	4.9E-02	**2.9E+00**	---	6.3E-05	---	---	---	---	**3.0E+00**
Nickel	1.3E-01	1.7E-01	**6.5E+00**	---	1.2E-04	---	---	---	---	**6.8E+00**
Selenium	1.5E-02	1.3E-01	7.2E-01	---	4.6E-05	---	---	---	---	8.6E-01
Silver	1.6E-04	4.3E-04	1.5E-02	---	9.1E-08	---	---	---	---	1.6E-02
Strontium	5.3E-04	2.0E-03	2.2E-03	---	6.2E-05	---	---	---	---	4.8E-03
Thallium	1.5E-02	2.7E-02	3.3E-02	---	4.2E-05	---	---	---	---	7.5E-02
Uranium	1.5E-03	1.4E-04	2.3E-03	---	4.4E-06	---	---	---	---	4.0E-03
Vanadium	1.4E-01	2.5E-02	2.9E-01	---	3.4E-05	---	---	---	---	4.6E-01
Zinc	1.2E-02	6.7E-02	**3.8E+00**	---	5.3E-06	---	---	---	---	**3.9E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Deer Mouse Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.7E-04	5.7E-03	4.4E-03	---	3.4E-05	---	---	---	---	1.0E-02
Arsenic	1.6E-03	3.3E-03	1.0E-02	---	1.0E-04	---	---	---	---	1.5E-02
Barium	3.9E-05	5.1E-03	9.2E-05	---	7.6E-05	---	---	---	---	5.3E-03
Beryllium	4.7E-04	4.4E-03	5.5E-04	---	1.7E-05	---	---	---	---	5.4E-03
Cadmium	1.6E-04	7.6E-03	4.3E-02	---	2.5E-07	---	---	---	---	5.0E-02
Chromium (Total)	2.7E-03	7.6E-03	2.1E-02	---	6.8E-06	---	---	---	---	3.2E-02
Cobalt	3.6E-04	2.1E-03	1.1E-03	---	1.2E-06	---	---	---	---	3.5E-03
Copper	1.0E-02	6.4E-02	9.7E-02	---	1.3E-05	---	---	---	---	1.7E-01
Lead	1.7E-04	4.8E-04	2.3E-03	---	1.7E-07	---	---	---	---	3.0E-03
Manganese	6.5E-05	6.8E-02	1.5E-04	---	2.2E-04	---	---	---	---	6.8E-02
Mercury	9.1E-05	1.8E-03	4.0E-03	---	1.4E-07	---	---	---	---	5.9E-03
Molybdenum	2.6E-03	2.1E-02	6.5E-02	---	2.3E-05	---	---	---	---	8.9E-02
Nickel	5.4E-03	7.1E-02	1.5E-01	---	4.3E-05	---	---	---	---	2.2E-01
Selenium	6.3E-04	5.6E-02	1.6E-02	---	1.7E-05	---	---	---	---	7.2E-02
Silver	6.6E-06	1.8E-04	3.5E-04	---	3.4E-08	---	---	---	---	5.4E-04
Strontium	6.6E-05	2.6E-03	1.5E-04	---	6.9E-05	---	---	---	---	2.9E-03
Thallium	6.2E-04	1.2E-02	7.5E-04	---	1.5E-05	---	---	---	---	1.3E-02
Uranium	6.2E-05	6.0E-05	5.2E-05	---	1.6E-06	---	---	---	---	1.8E-04
Vanadium	6.0E-03	1.1E-02	6.5E-03	---	1.3E-05	---	---	---	---	2.3E-02
Zinc	5.1E-04	2.9E-02	8.6E-02	---	2.0E-06	---	---	---	---	1.2E-01

Risk Quotients for the Meadow Vole Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	2.4E-04	1.4E-02	---	---	3.7E-05	---	---	---	---	1.4E-02
Arsenic	2.3E-03	8.0E-03	---	---	1.1E-04	---	---	---	---	1.0E-02
Barium	5.5E-05	1.2E-02	---	---	8.4E-05	---	---	---	---	1.2E-02
Beryllium	6.6E-04	1.1E-02	---	---	1.9E-05	---	---	---	---	1.1E-02
Cadmium	2.3E-04	1.8E-02	---	---	2.8E-07	---	---	---	---	1.9E-02
Chromium (Total)	3.8E-03	1.8E-02	---	---	7.6E-06	---	---	---	---	2.2E-02
Cobalt	5.0E-04	5.0E-03	---	---	1.4E-06	---	---	---	---	5.5E-03
Copper	1.4E-02	1.5E-01	---	---	1.5E-05	---	---	---	---	1.7E-01
Lead	2.3E-04	1.2E-03	---	---	1.9E-07	---	---	---	---	1.4E-03
Manganese	9.0E-05	1.6E-01	---	---	2.4E-04	---	---	---	---	1.6E-01
Mercury	1.3E-04	4.4E-03	---	---	1.5E-07	---	---	---	---	4.5E-03
Molybdenum	3.8E-03	5.3E-02	---	---	2.7E-05	---	---	---	---	5.7E-02
Nickel	7.5E-03	1.7E-01	---	---	4.7E-05	---	---	---	---	1.8E-01
Selenium	8.9E-04	1.3E-01	---	---	1.9E-05	---	---	---	---	1.3E-01
Silver	9.2E-06	4.4E-04	---	---	3.7E-08	---	---	---	---	4.5E-04
Strontium	9.2E-05	6.3E-03	---	---	7.6E-05	---	---	---	---	6.5E-03
Thallium	8.6E-04	2.8E-02	---	---	1.7E-05	---	---	---	---	2.9E-02
Uranium	8.9E-05	1.5E-04	---	---	1.9E-06	---	---	---	---	2.4E-04
Vanadium	8.4E-03	2.6E-02	---	---	1.4E-05	---	---	---	---	3.4E-02
Zinc	7.2E-04	6.9E-02	---	---	2.2E-06	---	---	---	---	7.0E-02

Risk Quotients for the Moose Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.6E-04	2.5E-02	---	---	5.6E-05	1.1E-04	2.3E-04	---	---	2.6E-02
Arsenic	1.4E-03	5.7E-03	---	---	6.6E-05	1.4E-03	2.5E-03	---	---	1.1E-02
Barium	1.4E-05	3.9E-03	---	---	2.2E-05	1.8E-05	1.4E-04	---	---	4.0E-03
Beryllium	1.0E-03	1.9E-02	---	---	2.8E-05	6.1E-04	1.9E-02	---	---	4.0E-02
Cadmium	5.9E-05	5.7E-03	---	---	7.2E-08	1.4E-05	6.6E-04	---	---	6.5E-03
Chromium (Total)	9.8E-04	5.8E-03	---	---	2.0E-06	1.2E-03	2.5E-03	---	---	1.0E-02
Cobalt	1.3E-04	1.6E-03	---	---	3.6E-07	9.3E-05	3.5E-05	---	---	1.8E-03
Copper	5.3E-03	6.8E-02	---	---	5.3E-06	6.1E-04	9.6E-03	---	---	8.3E-02
Lead	6.1E-05	3.6E-04	---	---	4.9E-08	1.4E-05	7.3E-05	---	---	5.1E-04
Manganese	2.4E-05	5.1E-02	---	---	6.2E-05	9.5E-05	3.7E-04	---	---	5.1E-02
Mercury	1.5E-04	6.1E-03	---	---	1.8E-07	2.4E-05	1.4E-03	---	---	7.7E-03
Molybdenum	1.0E-02	1.7E-01	---	---	7.2E-05	2.1E-03	2.6E-02	---	---	2.1E-01
Nickel	2.0E-03	5.3E-02	---	---	1.2E-05	2.5E-03	5.8E-03	---	---	6.4E-02
Selenium	1.3E-03	2.4E-01	---	---	2.8E-05	9.1E-04	2.3E-02	---	---	2.7E-01
Silver	6.2E-06	3.6E-04	---	---	2.5E-08	7.1E-07	1.2E-06	---	---	3.6E-04
Strontium	1.4E-04	1.1E-02	---	---	1.1E-04	4.5E-05	9.1E-04	---	---	1.3E-02
Thallium	1.3E-03	5.1E-02	---	---	2.6E-05	3.8E-04	4.7E-05	---	---	5.2E-02
Uranium	2.4E-04	4.8E-04	---	---	5.0E-06	3.8E-04	1.1E-04	---	---	1.2E-03
Vanadium	1.3E-02	4.7E-02	---	---	2.1E-05	1.0E-02	2.5E-03	---	---	7.2E-02
Zinc	1.9E-04	2.2E-02	---	---	5.7E-07	9.2E-05	2.8E-03	---	---	2.5E-02

Risk Quotients for the Muskrat Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	2.3E-05	5.4E-04	7.3E-04	1.9E-04	1.5E-03	3.0E-03
Arsenic	---	---	---	---	5.2E-05	1.3E-02	1.6E-02	2.1E-01	4.6E-03	2.5E-01
Barium	---	---	---	---	3.9E-05	3.7E-04	2.0E-03	2.5E-03	7.8E-05	5.0E-03
Beryllium	---	---	---	---	1.1E-05	2.9E-03	6.0E-02	1.9E-02	2.8E-04	8.2E-02
Cadmium	---	---	---	---	1.3E-07	2.9E-04	9.5E-03	2.1E-02	9.7E-04	3.2E-02
Chromium (Total)	---	---	---	---	3.6E-06	2.5E-02	3.6E-02	1.8E-01	2.6E-03	2.5E-01
Cobalt	---	---	---	---	6.5E-07	2.0E-03	5.0E-04	2.3E-04	4.2E-04	3.1E-03
Copper	---	---	---	---	6.8E-06	9.1E-03	9.8E-02	7.1E-01	1.2E-01	9.4E-01
Lead	---	---	---	---	8.9E-08	3.0E-04	1.0E-03	1.6E-03	7.6E-05	3.0E-03
Manganese	---	---	---	---	1.1E-04	2.0E-03	5.4E-03	1.5E-02	2.2E-04	2.3E-02
Mercury	---	---	---	---	7.2E-08	1.2E-04	4.5E-03	7.0E-04	1.1E-02	1.7E-02
Molybdenum	---	---	---	---	2.9E-05	1.0E-02	8.3E-02	2.6E-01	3.8E-03	3.6E-01
Nickel	---	---	---	---	2.2E-05	5.4E-02	8.3E-02	3.4E-01	1.2E-02	4.9E-01
Selenium	---	---	---	---	1.1E-05	4.3E-03	7.3E-02	1.3E-01	9.6E-02	3.1E-01
Silver	---	---	---	---	1.8E-08	5.8E-06	6.8E-06	2.2E-05	2.0E-04	2.4E-04
Strontium	---	---	---	---	4.6E-05	2.1E-04	2.9E-03	6.7E-04	9.0E-04	4.8E-03
Thallium	---	---	---	---	1.0E-05	1.8E-03	1.5E-04	1.7E-02	2.6E-03	2.2E-02
Uranium	---	---	---	---	2.0E-06	1.8E-03	3.5E-04	1.5E-03	4.3E-05	3.7E-03
Vanadium	---	---	---	---	8.5E-06	4.8E-02	8.0E-03	4.3E-02	5.3E-03	1.0E-01
Zinc	---	---	---	---	1.0E-06	2.0E-03	4.0E-02	1.5E-01	1.2E-01	3.1E-01

Risk Quotients for the Northern River Otter Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.7E-05	---	---	2.4E-04	3.1E-05	3.6E-04	---	8.2E-05	1.0E-02	1.1E-02
Arsenic	7.5E-05	---	---	2.0E-03	4.3E-05	5.1E-03	---	5.5E-02	1.9E-02	8.2E-02
Barium	1.8E-06	---	---	2.8E-04	3.2E-05	1.5E-04	---	6.5E-04	3.2E-04	1.4E-03
Beryllium	4.6E-05	---	---	1.2E-04	1.5E-05	1.9E-03	---	8.1E-03	1.9E-03	1.2E-02
Cadmium	7.4E-06	---	---	3.2E-04	1.1E-07	1.2E-04	---	5.5E-03	4.0E-03	9.9E-03
Chromium (Total)	1.2E-04	---	---	3.5E-04	2.9E-06	1.0E-02	---	4.8E-02	1.1E-02	6.9E-02
Cobalt	1.6E-05	---	---	5.2E-05	5.3E-07	7.9E-04	---	6.0E-05	1.7E-03	2.7E-03
Copper	4.7E-04	---	---	1.0E-02	5.6E-06	3.7E-03	---	1.8E-01	4.9E-01	6.9E-01
Lead	7.6E-06	---	---	9.5E-06	7.2E-08	1.2E-04	---	4.2E-04	3.1E-04	8.7E-04
Manganese	2.9E-06	---	---	1.0E-04	9.2E-05	8.0E-04	---	3.9E-03	9.1E-04	5.8E-03
Mercury	6.9E-06	---	---	2.8E-04	9.7E-08	7.7E-05	---	3.0E-04	7.8E-02	7.9E-02
Molybdenum	4.8E-04	---	---	2.7E-03	4.0E-05	6.8E-03	---	1.1E-01	2.6E-02	1.5E-01
Nickel	2.5E-04	---	---	1.1E-03	1.8E-05	2.2E-02	---	8.7E-02	4.9E-02	1.6E-01
Selenium	6.2E-05	---	---	1.9E-02	1.6E-05	2.9E-03	---	5.7E-02	6.6E-01	7.4E-01
Silver	3.0E-07	---	---	3.0E-06	1.4E-08	2.3E-06	---	5.8E-06	8.4E-04	8.5E-04
Strontium	6.4E-06	---	---	3.0E-04	6.3E-05	1.4E-04	---	2.9E-04	6.2E-03	7.0E-03
Thallium	6.0E-05	---	---	3.2E-03	1.4E-05	1.2E-03	---	7.5E-03	1.8E-02	3.0E-02
Uranium	1.1E-05	---	---	2.1E-05	2.7E-06	1.2E-03	---	6.3E-04	3.0E-04	2.1E-03
Vanadium	5.9E-04	---	---	1.1E-03	1.1E-05	3.2E-02	---	1.8E-02	3.6E-02	8.9E-02
Zinc	2.3E-05	---	---	2.4E-03	8.4E-07	7.8E-04	---	3.9E-02	4.8E-01	5.3E-01

Risk Quotients for the Short-tailed Weasel Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.3E-04	---	---	6.1E-03	2.2E-05	---	---	---	---	6.6E-03
Arsenic	4.2E-03	---	---	1.1E-01	6.7E-05	---	---	---	---	1.2E-01
Barium	9.9E-05	---	---	1.5E-02	5.0E-05	---	---	---	---	1.5E-02
Beryllium	1.2E-03	---	---	3.1E-03	1.1E-05	---	---	---	---	4.3E-03
Cadmium	4.1E-04	---	---	1.8E-02	1.7E-07	---	---	---	---	1.8E-02
Chromium (Total)	6.8E-03	---	---	1.9E-02	4.5E-06	---	---	---	---	2.6E-02
Cobalt	9.0E-04	---	---	2.9E-03	8.3E-07	---	---	---	---	3.8E-03
Copper	2.6E-02	---	---	5.8E-01	8.7E-06	---	---	---	---	6.1E-01
Lead	4.2E-04	---	---	5.3E-04	1.1E-07	---	---	---	---	9.5E-04
Manganese	1.6E-04	---	---	5.6E-03	1.4E-04	---	---	---	---	5.9E-03
Mercury	2.3E-04	---	---	9.5E-03	9.1E-08	---	---	---	---	9.7E-03
Molybdenum	8.7E-03	---	---	5.0E-02	2.0E-05	---	---	---	---	5.9E-02
Nickel	1.4E-02	---	---	6.1E-02	2.8E-05	---	---	---	---	7.5E-02
Selenium	1.6E-03	---	---	4.8E-01	1.1E-05	---	---	---	---	4.8E-01
Silver	1.7E-05	---	---	1.6E-04	2.2E-08	---	---	---	---	1.8E-04
Strontium	1.7E-04	---	---	7.8E-03	4.6E-05	---	---	---	---	8.0E-03
Thallium	1.6E-03	---	---	8.2E-02	1.0E-05	---	---	---	---	8.3E-02
Uranium	2.0E-04	---	---	3.8E-04	1.4E-06	---	---	---	---	5.9E-04
Vanadium	1.5E-02	---	---	2.9E-02	8.3E-06	---	---	---	---	4.4E-02
Zinc	1.3E-03	---	---	1.3E-01	1.3E-06	---	---	---	---	1.3E-01

Risk Quotients for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.3E-03	---	---	1.8E-02	6.7E-05	---	---	---	---	2.0E-02
Arsenic	1.2E-02	---	---	3.4E-01	2.0E-04	---	---	---	---	3.5E-01
Barium	9.9E-05	---	---	1.5E-02	5.0E-05	---	---	---	---	1.5E-02
Beryllium	1.2E-03	---	---	3.1E-03	1.1E-05	---	---	---	---	4.3E-03
Cadmium	4.1E-04	---	---	1.8E-02	1.7E-07	---	---	---	---	1.8E-02
Chromium (Total)	6.8E-03	---	---	1.9E-02	4.5E-06	---	---	---	---	2.6E-02
Cobalt	9.0E-04	---	---	2.9E-03	8.3E-07	---	---	---	---	3.8E-03
Copper	7.8E-02	---	---	**1.7E+00**	2.6E-05	---	---	---	---	**1.8E+00**
Lead	4.2E-04	---	---	5.3E-04	1.1E-07	---	---	---	---	9.5E-04
Manganese	1.6E-04	---	---	5.6E-03	1.4E-04	---	---	---	---	5.9E-03
Mercury	2.3E-04	---	---	9.5E-03	9.1E-08	---	---	---	---	9.7E-03
Molybdenum	2.6E-02	---	---	1.5E-01	6.1E-05	---	---	---	---	1.8E-01
Nickel	4.1E-02	---	---	1.8E-01	8.5E-05	---	---	---	---	2.2E-01
Selenium	4.8E-03	---	---	**1.4E+00**	3.4E-05	---	---	---	---	**1.4E+00**
Silver	5.0E-05	---	---	4.9E-04	6.7E-08	---	---	---	---	5.4E-04
Strontium	1.7E-04	---	---	7.8E-03	4.6E-05	---	---	---	---	8.0E-03
Thallium	4.7E-03	---	---	2.5E-01	3.1E-05	---	---	---	---	2.5E-01
Uranium	6.1E-04	---	---	1.1E-03	4.2E-06	---	---	---	---	1.8E-03
Vanadium	4.5E-02	---	---	8.7E-02	2.5E-05	---	---	---	---	1.3E-01
Zinc	3.9E-03	---	---	4.0E-01	3.9E-06	---	---	---	---	4.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Snowshoe Hare Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.1E-03	2.3E-02	---	---	2.4E-05	---	---	---	---	2.4E-02
Arsenic	7.4E-03	9.8E-03	---	---	5.1E-05	---	---	---	---	1.7E-02
Barium	1.8E-04	1.5E-02	---	---	3.8E-05	---	---	---	---	1.5E-02
Beryllium	2.9E-03	1.8E-02	---	---	1.2E-05	---	---	---	---	2.1E-02
Cadmium	7.3E-04	2.3E-02	---	---	1.3E-07	---	---	---	---	2.3E-02
Chromium (Total)	1.2E-02	2.3E-02	---	---	3.5E-06	---	---	---	---	3.5E-02
Cobalt	1.6E-03	6.1E-03	---	---	6.3E-07	---	---	---	---	7.7E-03
Copper	4.6E-02	1.9E-01	---	---	6.7E-06	---	---	---	---	2.4E-01
Lead	7.6E-04	1.4E-03	---	---	8.6E-08	---	---	---	---	2.2E-03
Manganese	2.9E-04	2.0E-01	---	---	1.1E-04	---	---	---	---	2.0E-01
Mercury	4.4E-04	5.7E-03	---	---	7.4E-08	---	---	---	---	6.2E-03
Molybdenum	3.1E-02	1.6E-01	---	---	3.0E-05	---	---	---	---	1.9E-01
Nickel	2.4E-02	2.1E-01	---	---	2.2E-05	---	---	---	---	2.3E-01
Selenium	4.0E-03	2.3E-01	---	---	1.2E-05	---	---	---	---	2.3E-01
Silver	3.0E-05	5.4E-04	---	---	1.7E-08	---	---	---	---	5.7E-04
Strontium	4.1E-04	1.1E-02	---	---	4.8E-05	---	---	---	---	1.1E-02
Thallium	3.9E-03	4.8E-02	---	---	1.1E-05	---	---	---	---	5.1E-02
Uranium	7.1E-04	4.5E-04	---	---	2.1E-06	---	---	---	---	1.2E-03
Vanadium	3.7E-02	4.4E-02	---	---	8.8E-06	---	---	---	---	8.2E-02
Zinc	2.3E-03	8.5E-02	---	---	1.0E-06	---	---	---	---	8.7E-02

Risk Quotients for the Woodland Caribou Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.0E-03	1.0E-02	---	---	4.8E-05	---	---	---	---	1.1E-02
Arsenic	3.8E-03	2.3E-03	---	---	5.6E-05	---	---	---	---	6.1E-03
Barium	5.0E-05	1.9E-03	---	---	2.3E-05	---	---	---	---	2.0E-03
Beryllium	2.8E-03	7.7E-03	---	---	2.4E-05	---	---	---	---	1.1E-02
Cadmium	2.1E-04	2.9E-03	---	---	7.8E-08	---	---	---	---	3.1E-03
Chromium (Total)	3.4E-03	2.9E-03	---	---	2.1E-06	---	---	---	---	6.3E-03
Cobalt	4.5E-04	7.9E-04	---	---	3.8E-07	---	---	---	---	1.2E-03
Copper	1.5E-02	2.7E-02	---	---	4.6E-06	---	---	---	---	4.2E-02
Lead	2.1E-04	1.8E-04	---	---	5.3E-08	---	---	---	---	4.0E-04
Manganese	8.3E-05	2.6E-02	---	---	6.7E-05	---	---	---	---	2.6E-02
Mercury	4.1E-04	2.4E-03	---	---	1.5E-07	---	---	---	---	2.9E-03
Molybdenum	2.9E-02	6.9E-02	---	---	6.2E-05	---	---	---	---	9.7E-02
Nickel	6.9E-03	2.7E-02	---	---	1.3E-05	---	---	---	---	3.4E-02
Selenium	3.7E-03	9.7E-02	---	---	2.4E-05	---	---	---	---	1.0E-01
Silver	1.7E-05	1.4E-04	---	---	2.2E-08	---	---	---	---	1.6E-04
Strontium	3.9E-04	4.6E-03	---	---	9.8E-05	---	---	---	---	5.1E-03
Thallium	3.6E-03	2.0E-02	---	---	2.2E-05	---	---	---	---	2.4E-02
Uranium	6.7E-04	1.9E-04	---	---	4.3E-06	---	---	---	---	8.7E-04
Vanadium	3.5E-02	1.9E-02	---	---	1.8E-05	---	---	---	---	5.4E-02
Zinc	6.6E-04	1.1E-02	---	---	6.1E-07	---	---	---	---	1.2E-02

Risk Quotients for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.0E-03	3.0E-02	---	---	1.5E-04	---	---	---	---	3.3E-02
Arsenic	1.1E-02	6.8E-03	---	---	1.7E-04	---	---	---	---	1.8E-02
Barium	5.0E-05	1.9E-03	---	---	2.3E-05	---	---	---	---	2.0E-03
Beryllium	2.8E-03	7.7E-03	---	---	2.4E-05	---	---	---	---	1.1E-02
Cadmium	2.1E-04	2.9E-03	---	---	7.8E-08	---	---	---	---	3.1E-03
Chromium (Total)	3.4E-03	2.9E-03	---	---	2.1E-06	---	---	---	---	6.3E-03
Cobalt	4.5E-04	7.9E-04	---	---	3.8E-07	---	---	---	---	1.2E-03
Copper	4.4E-02	8.2E-02	---	---	1.4E-05	---	---	---	---	1.3E-01
Lead	2.1E-04	1.8E-04	---	---	5.3E-08	---	---	---	---	4.0E-04
Manganese	8.3E-05	2.6E-02	---	---	6.7E-05	---	---	---	---	2.6E-02
Mercury	4.1E-04	2.4E-03	---	---	1.5E-07	---	---	---	---	2.9E-03
Molybdenum	8.6E-02	2.1E-01	---	---	1.9E-04	---	---	---	---	2.9E-01
Nickel	2.1E-02	8.1E-02	---	---	4.0E-05	---	---	---	---	1.0E-01
Selenium	1.1E-02	2.9E-01	---	---	7.3E-05	---	---	---	---	3.0E-01
Silver	5.2E-05	4.3E-04	---	---	6.5E-08	---	---	---	---	4.8E-04
Strontium	3.9E-04	4.6E-03	---	---	9.8E-05	---	---	---	---	5.1E-03
Thallium	1.1E-02	6.1E-02	---	---	6.6E-05	---	---	---	---	7.2E-02
Uranium	2.0E-03	5.8E-04	---	---	1.3E-05	---	---	---	---	2.6E-03
Vanadium	1.1E-01	5.7E-02	---	---	5.4E-05	---	---	---	---	1.6E-01
Zinc	2.0E-03	3.3E-02	---	---	1.8E-06	---	---	---	---	3.5E-02

Risk Quotients for the American Robin Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	6.3E-04	7.7E-04	1.5E-03	---	3.1E-06	---	---	---	---	2.9E-03
Barium	1.3E-04	1.0E-02	1.2E-04	---	2.0E-05	---	---	---	---	1.1E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	5.2E-02	1.9E-01	---	2.3E-07	---	---	---	---	2.5E-01
Chromium (Total)	2.2E-02	3.7E-02	6.9E-02	---	4.4E-06	---	---	---	---	1.3E-01
Cobalt	9.2E-03	3.2E-02	1.2E-02	---	2.6E-06	---	---	---	---	5.3E-02
Copper	1.5E-02	5.8E-02	5.8E-02	---	1.6E-06	---	---	---	---	1.3E-01
Lead	5.6E-03	9.6E-03	3.1E-02	---	4.6E-07	---	---	---	---	4.6E-02
Manganese	1.7E-04	1.0E-01	1.5E-04	---	4.4E-05	---	---	---	---	1.0E-01
Mercury	9.1E-04	1.1E-02	1.6E-02	---	1.1E-07	---	---	---	---	2.8E-02
Molybdenum	1.7E-03	8.4E-03	1.7E-02	---	1.2E-06	---	---	---	---	2.7E-02
Nickel	5.8E-03	4.6E-02	6.4E-02	---	3.7E-06	---	---	---	---	1.2E-01
Selenium	1.9E-03	9.9E-02	1.9E-02	---	4.0E-06	---	---	---	---	1.2E-01
Silver	1.7E-04	2.9E-03	3.7E-03	---	7.2E-08	---	---	---	---	6.8E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	4.0E-03	4.6E-02	2.0E-03	---	8.1E-06	---	---	---	---	5.2E-02
Uranium	6.3E-05	3.7E-05	2.2E-05	---	1.3E-07	---	---	---	---	1.2E-04
Vanadium	4.0E-01	4.3E-01	1.7E-01	---	6.7E-05	---	---	---	---	1.0E+00
Zinc	3.9E-03	1.3E-01	2.6E-01	---	1.2E-06	---	---	---	---	4.0E-01

Risk Quotients for the American Robin (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.9E-03	2.3E-03	4.6E-03	---	9.3E-06	---	---	---	---	8.8E-03
Barium	3.9E-04	3.1E-02	3.7E-04	---	6.1E-05	---	---	---	---	3.2E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	5.2E-02	1.9E-01	---	2.3E-07	---	---	---	---	2.5E-01
Chromium (Total)	2.2E-02	3.7E-02	6.9E-02	---	4.4E-06	---	---	---	---	1.3E-01
Cobalt	9.2E-03	3.2E-02	1.2E-02	---	2.6E-06	---	---	---	---	5.3E-02
Copper	1.5E-02	5.8E-02	5.8E-02	---	1.6E-06	---	---	---	---	1.3E-01
Lead	5.6E-03	9.6E-03	3.1E-02	---	4.6E-07	---	---	---	---	4.6E-02
Manganese	1.7E-04	1.0E-01	1.5E-04	---	4.4E-05	---	---	---	---	1.0E-01
Mercury	2.7E-03	3.3E-02	4.8E-02	---	3.3E-07	---	---	---	---	8.4E-02
Molybdenum	5.2E-03	2.5E-02	5.1E-02	---	3.7E-06	---	---	---	---	8.2E-02
Nickel	5.8E-03	4.6E-02	6.4E-02	---	3.7E-06	---	---	---	---	1.2E-01
Selenium	5.6E-03	3.0E-01	5.7E-02	---	1.2E-05	---	---	---	---	3.6E-01
Silver	5.2E-04	8.8E-03	1.1E-02	---	2.2E-07	---	---	---	---	2.0E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.2E-02	1.4E-01	5.9E-03	---	2.4E-05	---	---	---	---	1.6E-01
Uranium	6.3E-05	3.7E-05	2.2E-05	---	1.3E-07	---	---	---	---	1.2E-04
Vanadium	**1.2E+00**	**1.3E+00**	5.2E-01	---	2.0E-04	---	---	---	---	**3.0E+00**
Zinc	3.9E-03	1.3E-01	2.6E-01	---	1.2E-06	---	---	---	---	4.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Barn Swallow Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	4.3E-04	1.7E-05	5.1E-03	---	5.0E-06	---	---	---	---	5.5E-03
Barium	9.0E-05	2.3E-04	4.0E-04	---	3.3E-05	---	---	---	---	7.5E-04
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.3E-03	1.1E-03	6.3E-01	---	3.7E-07	---	---	---	---	6.4E-01
Chromium (Total)	1.5E-02	8.2E-04	2.3E-01	---	7.1E-06	---	---	---	---	2.4E-01
Cobalt	6.3E-03	7.1E-04	3.8E-02	---	4.2E-06	---	---	---	---	4.5E-02
Copper	1.1E-02	1.3E-03	1.9E-01	---	2.6E-06	---	---	---	---	2.0E-01
Lead	3.8E-03	2.1E-04	1.0E-01	---	7.3E-07	---	---	---	---	1.1E-01
Manganese	1.1E-04	2.3E-03	5.0E-04	---	7.2E-05	---	---	---	---	3.0E-03
Mercury	6.3E-04	2.4E-04	5.3E-02	---	1.8E-07	---	---	---	---	5.3E-02
Molybdenum	1.2E-03	1.9E-04	5.6E-02	---	2.0E-06	---	---	---	---	5.8E-02
Nickel	4.0E-03	1.0E-03	2.1E-01	---	6.0E-06	---	---	---	---	2.1E-01
Selenium	1.3E-03	2.2E-03	6.3E-02	---	6.4E-06	---	---	---	---	6.6E-02
Silver	1.2E-04	6.5E-05	1.2E-02	---	1.2E-07	---	---	---	---	1.2E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	2.7E-03	9.8E-04	6.3E-03	---	1.3E-05	---	---	---	---	1.0E-02
Uranium	4.3E-05	8.2E-07	7.1E-05	---	2.1E-07	---	---	---	---	1.2E-04
Vanadium	2.7E-01	9.5E-03	5.7E-01	---	1.1E-04	---	---	---	---	8.5E-01
Zinc	2.7E-03	2.9E-03	8.6E-01	---	1.9E-06	---	---	---	---	8.7E-01

Risk Quotients for the Barn Swallow (SaR) Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.3E-03	5.1E-05	1.5E-02	---	1.5E-05	---	---	---	---	1.7E-02
Barium	2.7E-04	6.8E-04	1.2E-03	---	9.8E-05	---	---	---	---	2.3E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.3E-03	1.1E-03	6.3E-01	---	3.7E-07	---	---	---	---	6.4E-01
Chromium (Total)	1.5E-02	8.2E-04	2.3E-01	---	7.1E-06	---	---	---	---	2.4E-01
Cobalt	6.3E-03	7.1E-04	3.8E-02	---	4.2E-06	---	---	---	---	4.5E-02
Copper	1.1E-02	1.3E-03	1.9E-01	---	2.6E-06	---	---	---	---	2.0E-01
Lead	3.8E-03	2.1E-04	1.0E-01	---	7.3E-07	---	---	---	---	1.1E-01
Manganese	1.1E-04	2.3E-03	5.0E-04	---	7.2E-05	---	---	---	---	3.0E-03
Mercury	1.9E-03	7.3E-04	1.6E-01	---	5.3E-07	---	---	---	---	1.6E-01
Molybdenum	3.6E-03	5.6E-04	1.7E-01	---	6.0E-06	---	---	---	---	1.7E-01
Nickel	4.0E-03	1.0E-03	2.1E-01	---	6.0E-06	---	---	---	---	2.1E-01
Selenium	3.8E-03	6.5E-03	1.9E-01	---	1.9E-05	---	---	---	---	2.0E-01
Silver	3.6E-04	1.9E-04	3.7E-02	---	3.5E-07	---	---	---	---	3.7E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	8.1E-03	2.9E-03	1.9E-02	---	3.8E-05	---	---	---	---	3.0E-02
Uranium	4.3E-05	8.2E-07	7.1E-05	---	2.1E-07	---	---	---	---	1.2E-04
Vanadium	8.2E-01	2.8E-02	**1.7E+00**	---	3.2E-04	---	---	---	---	**2.5E+00**
Zinc	2.7E-03	2.9E-03	8.6E-01	---	1.9E-06	---	---	---	---	8.7E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common Loon Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	1.2E-06	5.6E-04	---	3.9E-03	2.3E-03	6.7E-03
Barium	---	---	---	---	1.3E-05	2.4E-04	---	6.6E-04	5.6E-04	1.5E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	5.7E-08	2.5E-04	---	7.4E-03	9.1E-03	1.7E-02
Chromium (Total)	---	---	---	---	1.1E-06	1.6E-02	---	4.6E-02	1.7E-02	7.9E-02
Cobalt	---	---	---	---	6.4E-07	3.9E-03	---	1.9E-04	9.0E-03	1.3E-02
Copper	---	---	---	---	4.0E-07	1.0E-03	---	3.3E-02	1.5E-01	1.8E-01
Lead	---	---	---	---	1.1E-07	7.6E-04	---	1.7E-03	2.1E-03	4.5E-03
Manganese	---	---	---	---	1.1E-05	3.9E-04	---	1.2E-03	4.7E-04	2.1E-03
Mercury	---	---	---	---	6.7E-08	2.1E-04	---	5.3E-04	2.3E-01	2.3E-01
Molybdenum	---	---	---	---	4.2E-07	2.9E-04	---	3.0E-03	1.2E-03	4.5E-03
Nickel	---	---	---	---	9.3E-07	4.4E-03	---	1.1E-02	1.1E-02	2.6E-02
Selenium	---	---	---	---	1.5E-06	1.1E-03	---	1.4E-02	2.8E-01	2.9E-01
Silver	---	---	---	---	3.0E-08	2.0E-05	---	3.1E-05	7.6E-03	7.6E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	5.8E-06	2.0E-03	---	7.8E-03	3.2E-02	4.2E-02
Uranium	---	---	---	---	4.8E-08	8.3E-05	---	2.8E-05	2.2E-05	1.3E-04
Vanadium	---	---	---	---	4.3E-05	4.8E-01	---	1.7E-01	5.8E-01	**1.2E+00**
Zinc	---	---	---	---	3.8E-07	1.4E-03	---	4.5E-02	9.4E-01	9.9E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Lesser Scaup Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	1.5E-06	5.1E-04	5.4E-05	3.4E-02	---	3.5E-02
Barium	---	---	---	---	1.5E-05	2.0E-04	8.9E-05	5.4E-03	---	5.7E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	1.1E-07	3.5E-04	9.4E-04	1.0E-01	---	1.0E-01
Chromium (Total)	---	---	---	---	2.2E-06	2.2E-02	2.5E-03	6.2E-01	---	6.5E-01
Cobalt	---	---	---	---	1.3E-06	5.3E-03	1.1E-04	2.5E-03	---	8.0E-03
Copper	---	---	---	---	7.7E-07	1.4E-03	1.3E-03	4.5E-01	---	4.5E-01
Lead	---	---	---	---	2.2E-07	1.1E-03	3.1E-04	2.2E-02	---	2.4E-02
Manganese	---	---	---	---	2.2E-05	5.4E-04	1.2E-04	1.6E-02	---	1.7E-02
Mercury	---	---	---	---	7.9E-08	1.8E-04	5.8E-04	4.3E-03	---	5.1E-03
Molybdenum	---	---	---	---	6.0E-07	2.9E-04	2.0E-04	3.0E-02	---	3.0E-02
Nickel	---	---	---	---	1.8E-06	6.1E-03	7.9E-04	1.5E-01	---	1.6E-01
Selenium	---	---	---	---	1.9E-06	1.0E-03	1.4E-03	1.3E-01	---	1.3E-01
Silver	---	---	---	---	3.6E-08	1.6E-05	1.6E-06	2.5E-04	---	2.7E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	6.8E-06	1.6E-03	1.1E-05	6.4E-02	---	6.5E-02
Uranium	---	---	---	---	6.5E-08	8.0E-05	1.3E-06	2.6E-04	---	3.5E-04
Vanadium	---	---	---	---	5.0E-05	4.0E-01	5.5E-03	**1.4E+00**	---	**1.8E+00**
Zinc	---	---	---	---	5.9E-07	1.6E-03	2.7E-03	4.8E-01	---	4.9E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Mallard Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.4E-05	1.7E-05	5.2E-05	---	1.3E-06	6.7E-04	3.1E-04	1.7E-02	---	1.8E-02
Barium	4.9E-06	3.9E-04	7.0E-06	---	1.5E-05	2.9E-04	5.5E-04	3.0E-03	---	4.2E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.9E-05	1.1E-03	6.2E-03	---	9.3E-08	4.3E-04	5.1E-03	4.8E-02	---	6.1E-02
Chromium (Total)	4.6E-04	7.9E-04	2.2E-03	---	1.8E-06	2.7E-02	1.4E-02	3.0E-01	---	3.4E-01
Cobalt	1.9E-04	6.8E-04	3.7E-04	---	1.1E-06	6.7E-03	6.1E-04	1.2E-03	---	9.8E-03
Copper	3.3E-04	1.2E-03	1.9E-03	---	6.5E-07	1.8E-03	6.9E-03	2.1E-01	---	2.3E-01
Lead	1.2E-04	2.0E-04	9.9E-04	---	1.9E-07	1.3E-03	1.6E-03	1.1E-02	---	1.5E-02
Manganese	3.5E-06	2.2E-03	4.8E-06	---	1.8E-05	6.8E-04	6.5E-04	7.7E-03	---	1.1E-02
Mercury	3.3E-05	3.9E-04	8.6E-04	---	7.6E-08	2.6E-04	3.6E-03	2.4E-03	---	7.5E-03
Molybdenum	3.7E-05	1.8E-04	5.5E-04	---	5.0E-07	3.7E-04	1.1E-03	1.4E-02	---	1.7E-02
Nickel	1.2E-04	9.8E-04	2.0E-03	---	1.5E-06	7.6E-03	4.2E-03	7.3E-02	---	8.8E-02
Selenium	4.1E-05	2.2E-03	6.4E-04	---	1.7E-06	1.3E-03	8.2E-03	6.4E-02	---	7.6E-02
Silver	4.3E-06	7.2E-05	1.4E-04	---	3.4E-08	2.3E-05	9.9E-06	1.4E-04	---	3.9E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.7E-04	1.9E-03	1.2E-04	---	6.5E-06	2.3E-03	7.1E-05	3.5E-02	---	3.9E-02
Uranium	1.3E-06	7.9E-07	6.9E-07	---	5.4E-08	1.0E-04	7.1E-06	1.3E-04	---	2.4E-04
Vanadium	1.5E-02	1.6E-02	9.8E-03	---	4.8E-05	5.7E-01	3.4E-02	7.8E-01	---	**1.4E+00**
Zinc	8.3E-05	2.8E-03	8.4E-03	---	4.9E-07	2.0E-03	1.4E-02	2.3E-01	---	2.6E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Red-tailed Hawk Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	5.6E-05	---	---	1.5E-03	1.3E-06	---	---	---	---	1.6E-03
Barium	1.9E-05	---	---	3.0E-03	1.5E-05	---	---	---	---	3.0E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.6E-04	---	---	6.8E-03	9.6E-08	---	---	---	---	7.0E-03
Chromium (Total)	1.9E-03	---	---	5.3E-03	1.9E-06	---	---	---	---	7.1E-03
Cobalt	7.9E-04	---	---	2.5E-03	1.1E-06	---	---	---	---	3.3E-03
Copper	1.3E-03	---	---	3.0E-02	6.7E-07	---	---	---	---	3.1E-02
Lead	4.8E-04	---	---	6.0E-04	1.9E-07	---	---	---	---	1.1E-03
Manganese	1.4E-05	---	---	4.9E-04	1.9E-05	---	---	---	---	5.2E-04
Mercury	1.3E-04	---	---	5.3E-03	7.6E-08	---	---	---	---	5.4E-03
Molybdenum	1.5E-04	---	---	8.5E-04	5.2E-07	---	---	---	---	1.0E-03
Nickel	5.0E-04	---	---	2.2E-03	1.6E-06	---	---	---	---	2.7E-03
Selenium	1.6E-04	---	---	4.9E-02	1.7E-06	---	---	---	---	4.9E-02
Silver	1.7E-05	---	---	1.7E-04	3.4E-08	---	---	---	---	1.9E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	6.7E-04	---	---	3.5E-02	6.6E-06	---	---	---	---	3.6E-02
Uranium	5.4E-06	---	---	1.0E-05	5.6E-08	---	---	---	---	1.6E-05
Vanadium	5.9E-02	---	---	1.1E-01	4.9E-05	---	---	---	---	1.7E-01
Zinc	3.4E-04	---	---	3.4E-02	5.1E-07	---	---	---	---	3.4E-02

Risk Quotients for the Spotted Sandpiper Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.6E-04	---	1.9E-03	---	4.0E-06	6.9E-04	9.3E-05	3.9E-02	4.3E-04	4.2E-02
Barium	3.3E-05	---	1.5E-04	---	2.6E-05	1.8E-04	9.8E-05	4.0E-03	6.2E-05	4.5E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	4.6E-04	---	2.3E-01	---	2.9E-07	4.7E-04	1.6E-03	1.1E-01	2.6E-03	3.5E-01
Chromium (Total)	5.4E-03	---	8.3E-02	---	5.7E-06	2.9E-02	4.3E-03	7.1E-01	5.0E-03	8.4E-01
Cobalt	2.3E-03	---	1.4E-02	---	3.3E-06	7.2E-03	1.9E-04	2.9E-03	2.6E-03	2.9E-02
Copper	3.9E-03	---	7.1E-02	---	2.0E-06	2.0E-03	2.2E-03	5.1E-01	4.3E-02	6.3E-01
Lead	1.4E-03	---	3.8E-02	---	5.8E-07	1.4E-03	5.2E-04	2.6E-02	6.0E-04	6.7E-02
Manganese	4.2E-05	---	1.8E-04	---	5.7E-05	7.3E-04	2.1E-04	1.8E-02	1.3E-04	2.0E-02
Mercury	2.3E-04	---	1.9E-02	---	1.4E-07	1.6E-04	6.7E-04	3.3E-03	2.7E-02	5.1E-02
Molybdenum	4.4E-04	---	2.1E-02	---	1.6E-06	4.0E-04	3.4E-04	3.4E-02	2.5E-04	5.6E-02
Nickel	1.5E-03	---	7.7E-02	---	4.8E-06	8.3E-03	1.3E-03	1.7E-01	3.1E-03	2.6E-01
Selenium	4.7E-04	---	2.3E-02	---	5.1E-06	1.4E-03	2.5E-03	1.4E-01	5.2E-02	2.2E-01
Silver	4.4E-05	---	4.5E-03	---	9.2E-08	2.2E-05	2.7E-06	2.8E-04	1.3E-03	6.1E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	9.9E-04	---	2.3E-03	---	1.0E-05	1.2E-03	1.1E-05	4.1E-02	3.1E-03	4.8E-02
Uranium	1.6E-05	---	2.6E-05	---	1.7E-07	1.1E-04	2.3E-06	3.0E-04	4.4E-06	4.6E-04
Vanadium	1.0E-01	---	2.1E-01	---	8.5E-05	3.5E-01	6.1E-03	**1.0E+00**	6.5E-02	**1.8E+00**
Zinc	9.8E-04	---	3.2E-01	---	1.5E-06	2.1E-03	4.6E-03	5.5E-01	2.1E-01	**1.1E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Spruce Grouse Exposed to Constituents of Concern at the Gordon Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.2E-04	4.6E-04	7.4E-05	---	1.6E-06	---	---	---	---	6.6E-04
Barium	3.6E-05	9.2E-03	8.8E-06	---	1.5E-05	---	---	---	---	9.3E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.4E-04	3.1E-02	9.2E-03	---	1.2E-07	---	---	---	---	4.1E-02
Chromium (Total)	4.0E-03	2.2E-02	3.3E-03	---	2.3E-06	---	---	---	---	3.0E-02
Cobalt	1.7E-03	1.9E-02	5.5E-04	---	1.3E-06	---	---	---	---	2.2E-02
Copper	2.9E-03	3.5E-02	2.8E-03	---	8.1E-07	---	---	---	---	4.1E-02
Lead	1.0E-03	5.8E-03	1.5E-03	---	2.3E-07	---	---	---	---	8.3E-03
Manganese	3.1E-05	6.3E-02	7.2E-06	---	2.3E-05	---	---	---	---	6.3E-02
Mercury	2.4E-04	9.4E-03	1.1E-03	---	8.0E-08	---	---	---	---	1.1E-02
Molybdenum	3.2E-04	5.1E-03	8.2E-04	---	6.3E-07	---	---	---	---	6.2E-03
Nickel	1.1E-03	2.8E-02	3.0E-03	---	1.9E-06	---	---	---	---	3.2E-02
Selenium	3.5E-04	6.0E-02	9.1E-04	---	2.1E-06	---	---	---	---	6.1E-02
Silver	3.3E-05	1.8E-03	1.8E-04	---	3.7E-08	---	---	---	---	2.0E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.3E-03	4.6E-02	1.6E-04	---	6.9E-06	---	---	---	---	4.7E-02
Uranium	1.2E-05	2.2E-05	1.0E-06	---	6.8E-08	---	---	---	---	3.5E-05
Vanadium	1.1E-01	3.9E-01	1.2E-02	---	5.1E-05	---	---	---	---	5.1E-01
Zinc	7.3E-04	7.9E-02	1.2E-02	---	6.2E-07	---	---	---	---	9.2E-02

Risk Quotients for the American Beaver Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	9.5E-05	1.5E-03	---	---	1.3E-04	6.0E-04	1.2E-04	---	---	2.4E-03
Arsenic	3.8E-04	3.5E-04	---	---	8.6E-05	2.8E-03	5.2E-04	---	---	4.1E-03
Barium	7.5E-06	4.6E-04	---	---	4.7E-05	7.5E-05	5.9E-05	---	---	6.5E-04
Beryllium	2.6E-04	1.1E-03	---	---	2.1E-05	1.2E-03	3.7E-03	---	---	6.3E-03
Cadmium	3.1E-05	6.8E-04	---	---	1.1E-07	5.4E-05	2.6E-04	---	---	1.0E-03
Chromium (Total)	5.2E-04	6.9E-04	---	---	2.8E-06	4.7E-03	9.6E-04	---	---	6.8E-03
Cobalt	6.9E-05	1.9E-04	---	---	5.1E-07	3.6E-04	1.4E-05	---	---	6.3E-04
Copper	2.0E-03	5.7E-03	---	---	5.9E-06	1.7E-03	2.6E-03	---	---	1.2E-02
Lead	3.2E-05	4.3E-05	---	---	6.9E-08	5.5E-05	2.8E-05	---	---	1.6E-04
Manganese	1.2E-05	6.1E-03	---	---	9.4E-05	3.8E-04	1.5E-04	---	---	6.7E-03
Mercury	3.9E-05	3.6E-04	---	---	1.2E-07	4.7E-05	2.7E-04	---	---	7.2E-04
Molybdenum	2.7E-03	1.0E-02	---	---	1.1E-04	4.2E-03	5.1E-03	---	---	2.2E-02
Nickel	1.0E-03	6.4E-03	---	---	1.9E-05	9.9E-03	2.3E-03	---	---	2.0E-02
Selenium	3.5E-04	1.4E-02	---	---	2.9E-05	1.8E-03	4.4E-03	---	---	2.1E-02
Silver	1.6E-06	2.1E-05	---	---	1.8E-08	1.4E-06	2.4E-07	---	---	2.4E-05
Strontium	3.6E-05	6.8E-04	---	---	1.4E-04	2.3E-04	4.6E-04	---	---	1.5E-03
Thallium	3.4E-04	3.0E-03	---	---	1.9E-05	8.0E-04	9.9E-06	---	---	4.2E-03
Uranium	6.3E-05	2.9E-05	---	---	1.7E-05	9.0E-04	2.3E-05	---	---	1.0E-03
Vanadium	3.3E-03	2.8E-03	---	---	1.6E-05	2.0E-02	4.8E-04	---	---	2.6E-02
Zinc	9.9E-05	2.6E-03	---	---	8.1E-07	3.6E-04	1.1E-03	---	---	4.1E-03

Risk Quotients for the American Mink Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.7E-05	---	---	8.0E-04	2.3E-05	5.3E-04	---	1.0E-04	2.0E-02	2.1E-02
Arsenic	4.7E-04	---	---	1.3E-02	3.2E-05	5.0E-03	---	4.5E-02	3.7E-02	1.0E-01
Barium	1.0E-05	---	---	1.6E-03	2.0E-05	1.5E-04	---	5.6E-04	5.1E-04	2.9E-03
Beryllium	1.6E-04	---	---	4.1E-04	3.8E-06	1.0E-03	---	3.7E-03	1.2E-03	6.5E-03
Cadmium	4.3E-05	---	---	1.9E-03	4.6E-08	1.1E-04	---	4.3E-03	4.4E-03	1.1E-02
Chromium (Total)	7.2E-04	---	---	2.1E-03	1.2E-06	9.5E-03	---	3.7E-02	1.1E-02	6.1E-02
Cobalt	9.5E-05	---	---	3.1E-04	2.1E-07	7.4E-04	---	4.8E-05	1.8E-03	3.0E-03
Copper	2.7E-03	---	---	6.2E-02	2.4E-06	3.4E-03	---	1.4E-01	5.1E-01	7.2E-01
Lead	4.5E-05	---	---	5.6E-05	2.9E-08	1.1E-04	---	3.3E-04	3.2E-04	8.6E-04
Manganese	1.7E-05	---	---	5.9E-04	3.9E-05	7.8E-04	---	3.2E-03	1.0E-03	5.6E-03
Mercury	2.4E-05	---	---	1.0E-03	2.3E-08	4.3E-05	---	1.4E-04	4.7E-02	4.8E-02
Molybdenum	1.6E-03	---	---	9.2E-03	1.9E-05	3.7E-03	---	5.2E-02	3.2E-02	9.8E-02
Nickel	1.5E-03	---	---	6.5E-03	7.8E-06	2.0E-02	---	6.9E-02	5.4E-02	1.5E-01
Selenium	2.1E-04	---	---	6.3E-02	5.1E-06	1.5E-03	---	2.6E-02	5.6E-01	6.5E-01
Silver	1.8E-06	---	---	1.7E-05	5.9E-09	2.2E-06	---	4.5E-06	8.9E-04	9.1E-04
Strontium	2.2E-05	---	---	1.0E-03	2.5E-05	2.0E-04	---	3.4E-04	6.2E-03	7.9E-03
Thallium	2.0E-04	---	---	1.1E-02	3.5E-06	7.0E-04	---	3.7E-03	1.2E-02	2.7E-02
Uranium	3.8E-05	---	---	7.1E-05	3.1E-06	7.9E-04	---	3.6E-04	8.6E-04	2.1E-03
Vanadium	2.0E-03	---	---	3.8E-03	2.8E-06	1.7E-02	---	8.3E-03	2.3E-02	5.5E-02
Zinc	1.4E-04	---	---	1.4E-02	3.4E-07	7.3E-04	---	3.1E-02	4.7E-01	5.1E-01

Risk Quotients for the Black Bear Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.6E-04	2.4E-02	1.1E-03	1.3E-03	1.5E-04	1.4E-04	---	---	6.1E-03	3.3E-02
Arsenic	1.8E-03	5.7E-03	1.1E-03	9.9E-03	1.0E-04	6.6E-04	---	---	5.5E-03	2.5E-02
Barium	2.8E-05	5.7E-03	6.4E-06	8.7E-04	4.3E-05	1.4E-05	---	---	5.3E-05	6.7E-03
Beryllium	1.3E-03	1.8E-02	1.4E-04	6.6E-04	2.5E-05	2.8E-04	---	---	3.8E-04	2.1E-02
Cadmium	1.2E-04	8.5E-03	3.0E-03	1.0E-03	9.9E-08	9.8E-06	---	---	4.6E-04	1.3E-02
Chromium (Total)	1.9E-03	8.6E-03	1.5E-03	1.1E-03	2.5E-06	8.6E-04	---	---	1.1E-03	1.5E-02
Cobalt	2.6E-04	2.3E-03	7.8E-05	1.6E-04	4.6E-07	6.7E-05	---	---	1.9E-04	3.1E-03
Copper	7.4E-03	7.1E-02	6.7E-03	3.3E-02	5.3E-06	3.1E-04	---	---	5.2E-02	1.7E-01
Lead	1.2E-04	5.3E-04	1.6E-04	3.0E-05	6.2E-08	1.0E-05	---	---	3.3E-05	8.9E-04
Manganese	4.7E-05	7.5E-02	1.0E-05	3.2E-04	8.4E-05	7.0E-05	---	---	1.0E-04	7.6E-02
Mercury	1.9E-04	5.8E-03	8.0E-04	1.5E-03	1.4E-07	1.1E-05	---	---	1.4E-02	2.2E-02
Molybdenum	1.3E-02	1.6E-01	3.1E-02	1.5E-02	1.2E-04	1.0E-03	---	---	1.0E-02	2.3E-01
Nickel	3.9E-03	7.9E-02	1.0E-02	3.5E-03	1.7E-05	1.8E-03	---	---	5.6E-03	1.0E-01
Selenium	1.7E-03	2.3E-01	4.2E-03	1.0E-01	3.3E-05	4.2E-04	---	---	1.7E-01	5.1E-01
Silver	7.9E-06	3.4E-04	4.0E-05	1.6E-05	2.1E-08	3.2E-07	---	---	1.5E-04	5.6E-04
Strontium	1.8E-04	1.1E-02	3.8E-05	1.7E-03	1.6E-04	5.5E-05	---	---	1.9E-03	1.5E-02
Thallium	1.7E-03	4.8E-02	1.9E-04	1.7E-02	2.3E-05	1.9E-04	---	---	3.6E-03	7.1E-02
Uranium	3.1E-04	4.6E-04	2.5E-05	1.1E-04	2.0E-05	2.1E-04	---	---	2.7E-04	1.4E-03
Vanadium	1.6E-02	4.5E-02	1.7E-03	6.2E-03	1.9E-05	4.7E-03	---	---	7.3E-03	8.1E-02
Zinc	3.7E-04	3.2E-02	6.0E-03	7.5E-03	7.3E-07	6.6E-05	---	---	4.8E-02	9.4E-02

Risk Quotients for the Common (Masked) Shrew Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.4E-03	4.4E-03	6.5E-02	---	1.1E-04	---	---	---	---	7.1E-02
Arsenic	1.4E-02	2.7E-03	1.5E-01	---	1.8E-04	---	---	---	---	1.7E-01
Barium	3.1E-04	4.0E-03	1.4E-03	---	1.1E-04	---	---	---	---	5.8E-03
Beryllium	3.8E-03	3.4E-03	8.1E-03	---	1.7E-05	---	---	---	---	1.5E-02
Cadmium	1.3E-03	5.9E-03	6.3E-01	---	2.6E-07	---	---	---	---	6.4E-01
Chromium (Total)	2.2E-02	6.0E-03	3.2E-01	---	6.7E-06	---	---	---	---	3.4E-01
Cobalt	2.9E-03	1.6E-03	1.7E-02	---	1.2E-06	---	---	---	---	2.1E-02
Copper	8.2E-02	5.0E-02	**1.4E+00**	---	1.4E-05	---	---	---	---	**1.6E+00**
Lead	1.3E-03	3.7E-04	3.4E-02	---	1.6E-07	---	---	---	---	3.6E-02
Manganese	5.2E-04	5.3E-02	2.2E-03	---	2.2E-04	---	---	---	---	5.6E-02
Mercury	7.3E-04	1.4E-03	5.9E-02	---	1.3E-07	---	---	---	---	6.1E-02
Molybdenum	2.1E-02	1.6E-02	9.6E-01	---	4.8E-05	---	---	---	---	1.0E+00
Nickel	4.3E-02	5.5E-02	**2.2E+00**	---	4.5E-05	---	---	---	---	**2.3E+00**
Selenium	5.1E-03	4.3E-02	2.4E-01	---	2.4E-05	---	---	---	---	2.9E-01
Silver	5.3E-05	1.4E-04	5.2E-03	---	3.4E-08	---	---	---	---	5.4E-03
Strontium	5.3E-04	2.0E-03	2.2E-03	---	1.1E-04	---	---	---	---	4.9E-03
Thallium	5.0E-03	9.0E-03	1.1E-02	---	1.6E-05	---	---	---	---	2.5E-02
Uranium	4.9E-04	4.7E-05	7.8E-04	---	7.7E-06	---	---	---	---	1.3E-03
Vanadium	4.8E-02	8.4E-03	9.6E-02	---	1.3E-05	---	---	---	---	1.5E-01
Zinc	4.1E-03	2.2E-02	**1.3E+00**	---	1.9E-06	---	---	---	---	**1.3E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.1E-03	1.3E-02	2.0E-01	---	3.2E-04	---	---	---	---	2.1E-01
Arsenic	4.2E-02	8.2E-03	4.6E-01	---	5.4E-04	---	---	---	---	5.1E-01
Barium	3.1E-04	4.0E-03	1.4E-03	---	1.1E-04	---	---	---	---	5.8E-03
Beryllium	3.8E-03	3.4E-03	8.1E-03	---	1.7E-05	---	---	---	---	1.5E-02
Cadmium	1.3E-03	5.9E-03	6.3E-01	---	2.6E-07	---	---	---	---	6.4E-01
Chromium (Total)	2.2E-02	6.0E-03	3.2E-01	---	6.7E-06	---	---	---	---	3.4E-01
Cobalt	2.9E-03	1.6E-03	1.7E-02	---	1.2E-06	---	---	---	---	2.1E-02
Copper	2.5E-01	1.5E-01	**4.3E+00**	---	4.2E-05	---	---	---	---	**4.7E+00**
Lead	1.3E-03	3.7E-04	3.4E-02	---	1.6E-07	---	---	---	---	3.6E-02
Manganese	5.2E-04	5.3E-02	2.2E-03	---	2.2E-04	---	---	---	---	5.6E-02
Mercury	7.3E-04	1.4E-03	5.9E-02	---	1.3E-07	---	---	---	---	6.1E-02
Molybdenum	6.3E-02	4.9E-02	**2.9E+00**	---	1.4E-04	---	---	---	---	**3.0E+00**
Nickel	1.3E-01	1.7E-01	**6.6E+00**	---	1.3E-04	---	---	---	---	**6.9E+00**
Selenium	1.5E-02	1.3E-01	7.2E-01	---	7.1E-05	---	---	---	---	8.6E-01
Silver	1.6E-04	4.3E-04	1.5E-02	---	1.0E-07	---	---	---	---	1.6E-02
Strontium	5.3E-04	2.0E-03	2.2E-03	---	1.1E-04	---	---	---	---	4.9E-03
Thallium	1.5E-02	2.7E-02	3.3E-02	---	4.8E-05	---	---	---	---	7.5E-02
Uranium	1.5E-03	1.4E-04	2.3E-03	---	2.3E-05	---	---	---	---	4.0E-03
Vanadium	1.4E-01	2.5E-02	2.9E-01	---	3.9E-05	---	---	---	---	4.6E-01
Zinc	1.2E-02	6.7E-02	**3.8E+00**	---	5.8E-06	---	---	---	---	**3.9E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Deer Mouse Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.7E-04	5.7E-03	4.4E-03	---	1.2E-04	---	---	---	---	1.0E-02
Arsenic	1.7E-03	3.5E-03	1.0E-02	---	2.0E-04	---	---	---	---	1.6E-02
Barium	3.9E-05	5.1E-03	9.2E-05	---	1.3E-04	---	---	---	---	5.4E-03
Beryllium	4.7E-04	4.4E-03	5.5E-04	---	1.9E-05	---	---	---	---	5.4E-03
Cadmium	1.6E-04	7.6E-03	4.3E-02	---	2.9E-07	---	---	---	---	5.0E-02
Chromium (Total)	2.7E-03	7.7E-03	2.1E-02	---	7.4E-06	---	---	---	---	3.2E-02
Cobalt	3.6E-04	2.1E-03	1.1E-03	---	1.4E-06	---	---	---	---	3.6E-03
Copper	1.0E-02	6.4E-02	9.7E-02	---	1.5E-05	---	---	---	---	1.7E-01
Lead	1.7E-04	4.8E-04	2.3E-03	---	1.8E-07	---	---	---	---	3.0E-03
Manganese	6.5E-05	6.8E-02	1.5E-04	---	2.5E-04	---	---	---	---	6.8E-02
Mercury	9.1E-05	1.8E-03	4.0E-03	---	1.4E-07	---	---	---	---	5.9E-03
Molybdenum	2.6E-03	2.1E-02	6.5E-02	---	5.3E-05	---	---	---	---	8.9E-02
Nickel	5.4E-03	7.1E-02	1.5E-01	---	5.0E-05	---	---	---	---	2.2E-01
Selenium	6.4E-04	5.6E-02	1.6E-02	---	2.6E-05	---	---	---	---	7.2E-02
Silver	6.6E-06	1.8E-04	3.5E-04	---	3.7E-08	---	---	---	---	5.4E-04
Strontium	6.6E-05	2.6E-03	1.5E-04	---	1.3E-04	---	---	---	---	3.0E-03
Thallium	6.2E-04	1.2E-02	7.5E-04	---	1.8E-05	---	---	---	---	1.3E-02
Uranium	6.2E-05	6.0E-05	5.3E-05	---	8.6E-06	---	---	---	---	1.8E-04
Vanadium	6.0E-03	1.1E-02	6.5E-03	---	1.5E-05	---	---	---	---	2.3E-02
Zinc	5.2E-04	2.9E-02	8.6E-02	---	2.1E-06	---	---	---	---	1.2E-01

Risk Quotients for the Meadow Vole Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	2.4E-04	1.4E-02	---	---	1.3E-04	---	---	---	---	1.4E-02
Arsenic	2.4E-03	8.4E-03	---	---	2.2E-04	---	---	---	---	1.1E-02
Barium	5.5E-05	1.2E-02	---	---	1.4E-04	---	---	---	---	1.3E-02
Beryllium	6.6E-04	1.1E-02	---	---	2.1E-05	---	---	---	---	1.1E-02
Cadmium	2.3E-04	1.8E-02	---	---	3.2E-07	---	---	---	---	1.9E-02
Chromium (Total)	3.8E-03	1.8E-02	---	---	8.1E-06	---	---	---	---	2.2E-02
Cobalt	5.0E-04	5.0E-03	---	---	1.5E-06	---	---	---	---	5.5E-03
Copper	1.4E-02	1.5E-01	---	---	1.7E-05	---	---	---	---	1.7E-01
Lead	2.3E-04	1.2E-03	---	---	2.0E-07	---	---	---	---	1.4E-03
Manganese	9.0E-05	1.6E-01	---	---	2.7E-04	---	---	---	---	1.6E-01
Mercury	1.3E-04	4.4E-03	---	---	1.6E-07	---	---	---	---	4.5E-03
Molybdenum	3.8E-03	5.3E-02	---	---	6.1E-05	---	---	---	---	5.7E-02
Nickel	7.6E-03	1.7E-01	---	---	5.5E-05	---	---	---	---	1.8E-01
Selenium	8.9E-04	1.3E-01	---	---	2.9E-05	---	---	---	---	1.3E-01
Silver	9.2E-06	4.4E-04	---	---	4.1E-08	---	---	---	---	4.5E-04
Strontium	9.2E-05	6.3E-03	---	---	1.4E-04	---	---	---	---	6.5E-03
Thallium	8.6E-04	2.8E-02	---	---	2.0E-05	---	---	---	---	2.9E-02
Uranium	9.0E-05	1.5E-04	---	---	9.8E-06	---	---	---	---	2.5E-04
Vanadium	8.4E-03	2.6E-02	---	---	1.6E-05	---	---	---	---	3.4E-02
Zinc	7.2E-04	6.9E-02	---	---	2.4E-06	---	---	---	---	7.0E-02

Risk Quotients for the Moose Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.6E-04	2.5E-02	---	---	1.9E-04	3.1E-04	6.2E-04	---	---	2.6E-02
Arsenic	1.4E-03	6.0E-03	---	---	1.3E-04	1.4E-03	2.7E-03	---	---	1.2E-02
Barium	1.4E-05	3.9E-03	---	---	3.6E-05	1.9E-05	1.5E-04	---	---	4.1E-03
Beryllium	1.0E-03	1.9E-02	---	---	3.2E-05	6.2E-04	1.9E-02	---	---	4.0E-02
Cadmium	5.9E-05	5.7E-03	---	---	8.3E-08	1.4E-05	6.6E-04	---	---	6.5E-03
Chromium (Total)	9.9E-04	5.8E-03	---	---	2.1E-06	1.2E-03	2.5E-03	---	---	1.0E-02
Cobalt	1.3E-04	1.6E-03	---	---	3.9E-07	9.4E-05	3.5E-05	---	---	1.8E-03
Copper	5.3E-03	6.8E-02	---	---	6.3E-06	6.1E-04	9.6E-03	---	---	8.3E-02
Lead	6.1E-05	3.6E-04	---	---	5.2E-08	1.4E-05	7.3E-05	---	---	5.1E-04
Manganese	2.4E-05	5.1E-02	---	---	7.1E-05	9.9E-05	3.9E-04	---	---	5.1E-02
Mercury	1.5E-04	6.1E-03	---	---	1.8E-07	2.4E-05	1.4E-03	---	---	7.7E-03
Molybdenum	1.0E-02	1.7E-01	---	---	1.6E-04	2.2E-03	2.6E-02	---	---	2.1E-01
Nickel	2.0E-03	5.4E-02	---	---	1.4E-05	2.6E-03	5.8E-03	---	---	6.4E-02
Selenium	1.3E-03	2.4E-01	---	---	4.4E-05	9.1E-04	2.3E-02	---	---	2.7E-01
Silver	6.2E-06	3.6E-04	---	---	2.8E-08	7.1E-07	1.2E-06	---	---	3.7E-04
Strontium	1.4E-04	1.1E-02	---	---	2.1E-04	1.2E-04	2.4E-03	---	---	1.4E-02
Thallium	1.3E-03	5.1E-02	---	---	3.0E-05	4.1E-04	5.1E-05	---	---	5.3E-02
Uranium	2.4E-04	4.8E-04	---	---	2.6E-05	4.7E-04	1.2E-04	---	---	1.3E-03
Vanadium	1.3E-02	4.7E-02	---	---	2.4E-05	1.0E-02	2.5E-03	---	---	7.3E-02
Zinc	1.9E-04	2.2E-02	---	---	6.1E-07	9.2E-05	2.8E-03	---	---	2.5E-02

Risk Quotients for the Muskrat Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	7.9E-05	1.5E-03	2.0E-03	5.3E-04	5.2E-03	9.3E-03
Arsenic	---	---	---	---	1.0E-04	1.3E-02	1.7E-02	2.2E-01	9.3E-03	2.6E-01
Barium	---	---	---	---	6.5E-05	4.1E-04	2.2E-03	2.7E-03	1.3E-04	5.5E-03
Beryllium	---	---	---	---	1.3E-05	2.9E-03	6.1E-02	1.9E-02	3.2E-04	8.4E-02
Cadmium	---	---	---	---	1.5E-07	2.9E-04	9.5E-03	2.1E-02	1.1E-03	3.2E-02
Chromium (Total)	---	---	---	---	3.8E-06	2.5E-02	3.6E-02	1.8E-01	2.8E-03	2.5E-01
Cobalt	---	---	---	---	7.0E-07	2.0E-03	5.1E-04	2.3E-04	4.6E-04	3.2E-03
Copper	---	---	---	---	8.1E-06	9.2E-03	9.8E-02	7.1E-01	1.3E-01	9.5E-01
Lead	---	---	---	---	9.5E-08	3.0E-04	1.0E-03	1.6E-03	8.1E-05	3.0E-03
Manganese	---	---	---	---	1.3E-04	2.1E-03	5.6E-03	1.6E-02	2.5E-04	2.4E-02
Mercury	---	---	---	---	7.4E-08	1.2E-04	4.5E-03	7.0E-04	1.2E-02	1.7E-02
Molybdenum	---	---	---	---	6.6E-05	1.0E-02	8.5E-02	2.7E-01	8.5E-03	3.7E-01
Nickel	---	---	---	---	2.6E-05	5.4E-02	8.4E-02	3.4E-01	1.4E-02	4.9E-01
Selenium	---	---	---	---	1.8E-05	4.3E-03	7.3E-02	1.3E-01	1.5E-01	3.6E-01
Silver	---	---	---	---	1.9E-08	5.8E-06	6.9E-06	2.2E-05	2.2E-04	2.6E-04
Strontium	---	---	---	---	8.6E-05	5.7E-04	7.8E-03	1.8E-03	1.7E-03	1.2E-02
Thallium	---	---	---	---	1.2E-05	2.0E-03	1.7E-04	1.9E-02	3.1E-03	2.4E-02
Uranium	---	---	---	---	1.1E-05	2.2E-03	3.8E-04	1.8E-03	2.3E-04	4.7E-03
Vanadium	---	---	---	---	9.9E-06	4.8E-02	8.0E-03	4.3E-02	6.2E-03	1.1E-01
Zinc	---	---	---	---	1.1E-06	2.0E-03	4.0E-02	1.5E-01	1.2E-01	3.1E-01

Risk Quotients for the Northern River Otter Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.7E-05	---	---	2.4E-04	1.1E-04	9.9E-04	---	2.3E-04	3.6E-02	3.7E-02
Arsenic	7.9E-05	---	---	2.1E-03	8.5E-05	5.4E-03	---	5.8E-02	3.8E-02	1.0E-01
Barium	1.8E-06	---	---	2.8E-04	5.3E-05	1.6E-04	---	7.1E-04	5.4E-04	1.7E-03
Beryllium	4.6E-05	---	---	1.2E-04	1.8E-05	2.0E-03	---	8.2E-03	2.2E-03	1.3E-02
Cadmium	7.4E-06	---	---	3.2E-04	1.2E-07	1.2E-04	---	5.5E-03	4.6E-03	1.1E-02
Chromium (Total)	1.2E-04	---	---	3.5E-04	3.1E-06	1.0E-02	---	4.8E-02	1.2E-02	7.0E-02
Cobalt	1.6E-05	---	---	5.2E-05	5.8E-07	8.0E-04	---	6.1E-05	1.9E-03	2.8E-03
Copper	4.7E-04	---	---	1.0E-02	6.6E-06	3.7E-03	---	1.8E-01	5.3E-01	7.3E-01
Lead	7.7E-06	---	---	9.5E-06	7.7E-08	1.2E-04	---	4.2E-04	3.4E-04	8.9E-04
Manganese	2.9E-06	---	---	1.0E-04	1.1E-04	8.4E-04	---	4.1E-03	1.0E-03	6.1E-03
Mercury	6.9E-06	---	---	2.8E-04	1.0E-07	7.7E-05	---	3.0E-04	8.2E-02	8.2E-02
Molybdenum	4.8E-04	---	---	2.7E-03	8.9E-05	6.9E-03	---	1.1E-01	5.8E-02	1.8E-01
Nickel	2.5E-04	---	---	1.1E-03	2.1E-05	2.2E-02	---	8.8E-02	5.7E-02	1.7E-01
Selenium	6.2E-05	---	---	1.9E-02	2.4E-05	2.9E-03	---	5.7E-02	**1.0E+00**	**1.1E+00**
Silver	3.0E-07	---	---	3.0E-06	1.6E-08	2.3E-06	---	5.8E-06	9.3E-04	9.4E-04
Strontium	6.4E-06	---	---	3.0E-04	1.2E-04	3.8E-04	---	7.6E-04	1.1E-02	1.3E-02
Thallium	6.1E-05	---	---	3.2E-03	1.6E-05	1.3E-03	---	8.2E-03	2.1E-02	3.4E-02
Uranium	1.1E-05	---	---	2.1E-05	1.4E-05	1.5E-03	---	7.9E-04	1.6E-03	3.9E-03
Vanadium	5.9E-04	---	---	1.1E-03	1.3E-05	3.2E-02	---	1.8E-02	4.2E-02	9.5E-02
Zinc	2.3E-05	---	---	2.4E-03	9.1E-07	7.8E-04	---	3.9E-02	4.9E-01	5.3E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Short-tailed Weasel Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.3E-04	---	---	6.1E-03	7.7E-05	---	---	---	---	6.6E-03
Arsenic	4.4E-03	---	---	1.2E-01	1.3E-04	---	---	---	---	1.2E-01
Barium	9.9E-05	---	---	1.5E-02	8.3E-05	---	---	---	---	1.5E-02
Beryllium	1.2E-03	---	---	3.1E-03	1.3E-05	---	---	---	---	4.3E-03
Cadmium	4.1E-04	---	---	1.8E-02	1.9E-07	---	---	---	---	1.8E-02
Chromium (Total)	6.8E-03	---	---	1.9E-02	4.9E-06	---	---	---	---	2.6E-02
Cobalt	9.0E-04	---	---	2.9E-03	9.0E-07	---	---	---	---	3.8E-03
Copper	2.6E-02	---	---	5.8E-01	1.0E-05	---	---	---	---	6.1E-01
Lead	4.2E-04	---	---	5.3E-04	1.2E-07	---	---	---	---	9.5E-04
Manganese	1.6E-04	---	---	5.6E-03	1.6E-04	---	---	---	---	5.9E-03
Mercury	2.3E-04	---	---	9.5E-03	9.5E-08	---	---	---	---	9.7E-03
Molybdenum	8.7E-03	---	---	5.0E-02	4.6E-05	---	---	---	---	5.9E-02
Nickel	1.4E-02	---	---	6.1E-02	3.3E-05	---	---	---	---	7.5E-02
Selenium	1.6E-03	---	---	4.8E-01	1.7E-05	---	---	---	---	4.8E-01
Silver	1.7E-05	---	---	1.6E-04	2.5E-08	---	---	---	---	1.8E-04
Strontium	1.7E-04	---	---	7.8E-03	8.4E-05	---	---	---	---	8.1E-03
Thallium	1.6E-03	---	---	8.2E-02	1.2E-05	---	---	---	---	8.4E-02
Uranium	2.0E-04	---	---	3.8E-04	7.4E-06	---	---	---	---	5.9E-04
Vanadium	1.5E-02	---	---	2.9E-02	9.7E-06	---	---	---	---	4.4E-02
Zinc	1.3E-03	---	---	1.3E-01	1.4E-06	---	---	---	---	1.3E-01

Risk Quotients for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.3E-03	---	---	1.8E-02	2.3E-04	---	---	---	---	2.0E-02
Arsenic	1.3E-02	---	---	3.6E-01	4.0E-04	---	---	---	---	3.7E-01
Barium	9.9E-05	---	---	1.5E-02	8.3E-05	---	---	---	---	1.5E-02
Beryllium	1.2E-03	---	---	3.1E-03	1.3E-05	---	---	---	---	4.3E-03
Cadmium	4.1E-04	---	---	1.8E-02	1.9E-07	---	---	---	---	1.8E-02
Chromium (Total)	6.8E-03	---	---	1.9E-02	4.9E-06	---	---	---	---	2.6E-02
Cobalt	9.0E-04	---	---	2.9E-03	9.0E-07	---	---	---	---	3.8E-03
Copper	7.8E-02	---	---	**1.7E+00**	3.1E-05	---	---	---	---	**1.8E+00**
Lead	4.2E-04	---	---	5.3E-04	1.2E-07	---	---	---	---	9.5E-04
Manganese	1.6E-04	---	---	5.6E-03	1.6E-04	---	---	---	---	5.9E-03
Mercury	2.3E-04	---	---	9.5E-03	9.5E-08	---	---	---	---	9.7E-03
Molybdenum	2.6E-02	---	---	1.5E-01	1.4E-04	---	---	---	---	1.8E-01
Nickel	4.1E-02	---	---	1.8E-01	9.9E-05	---	---	---	---	2.3E-01
Selenium	4.8E-03	---	---	**1.4E+00**	5.2E-05	---	---	---	---	**1.4E+00**
Silver	5.0E-05	---	---	4.9E-04	7.4E-08	---	---	---	---	5.4E-04
Strontium	1.7E-04	---	---	7.8E-03	8.4E-05	---	---	---	---	8.1E-03
Thallium	4.7E-03	---	---	2.5E-01	3.5E-05	---	---	---	---	2.5E-01
Uranium	6.1E-04	---	---	1.1E-03	2.2E-05	---	---	---	---	1.8E-03
Vanadium	4.5E-02	---	---	8.8E-02	2.9E-05	---	---	---	---	1.3E-01
Zinc	3.9E-03	---	---	4.0E-01	4.3E-06	---	---	---	---	4.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Snowshoe Hare Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.1E-03	2.3E-02	---	---	8.2E-05	---	---	---	---	2.5E-02
Arsenic	7.9E-03	1.0E-02	---	---	1.0E-04	---	---	---	---	1.8E-02
Barium	1.8E-04	1.5E-02	---	---	6.3E-05	---	---	---	---	1.5E-02
Beryllium	3.0E-03	1.8E-02	---	---	1.4E-05	---	---	---	---	2.1E-02
Cadmium	7.3E-04	2.3E-02	---	---	1.5E-07	---	---	---	---	2.3E-02
Chromium (Total)	1.2E-02	2.3E-02	---	---	3.7E-06	---	---	---	---	3.5E-02
Cobalt	1.6E-03	6.1E-03	---	---	6.9E-07	---	---	---	---	7.8E-03
Copper	4.6E-02	1.9E-01	---	---	7.8E-06	---	---	---	---	2.4E-01
Lead	7.6E-04	1.4E-03	---	---	9.2E-08	---	---	---	---	2.2E-03
Manganese	2.9E-04	2.0E-01	---	---	1.3E-04	---	---	---	---	2.0E-01
Mercury	4.4E-04	5.7E-03	---	---	7.7E-08	---	---	---	---	6.2E-03
Molybdenum	3.1E-02	1.6E-01	---	---	6.9E-05	---	---	---	---	1.9E-01
Nickel	2.4E-02	2.1E-01	---	---	2.5E-05	---	---	---	---	2.4E-01
Selenium	4.0E-03	2.3E-01	---	---	1.8E-05	---	---	---	---	2.3E-01
Silver	3.0E-05	5.4E-04	---	---	1.9E-08	---	---	---	---	5.7E-04
Strontium	4.1E-04	1.1E-02	---	---	8.9E-05	---	---	---	---	1.1E-02
Thallium	3.9E-03	4.8E-02	---	---	1.3E-05	---	---	---	---	5.1E-02
Uranium	7.1E-04	4.5E-04	---	---	1.1E-05	---	---	---	---	1.2E-03
Vanadium	3.8E-02	4.4E-02	---	---	1.0E-05	---	---	---	---	8.2E-02
Zinc	2.3E-03	8.5E-02	---	---	1.1E-06	---	---	---	---	8.7E-02

Risk Quotients for the Woodland Caribou Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.0E-03	1.0E-02	---	---	1.7E-04	---	---	---	---	1.1E-02
Arsenic	4.0E-03	2.4E-03	---	---	1.1E-04	---	---	---	---	6.5E-03
Barium	5.0E-05	1.9E-03	---	---	3.9E-05	---	---	---	---	2.0E-03
Beryllium	2.8E-03	7.7E-03	---	---	2.7E-05	---	---	---	---	1.1E-02
Cadmium	2.1E-04	2.9E-03	---	---	9.0E-08	---	---	---	---	3.1E-03
Chromium (Total)	3.5E-03	2.9E-03	---	---	2.3E-06	---	---	---	---	6.4E-03
Cobalt	4.6E-04	7.9E-04	---	---	4.2E-07	---	---	---	---	1.2E-03
Copper	1.5E-02	2.7E-02	---	---	5.4E-06	---	---	---	---	4.2E-02
Lead	2.1E-04	1.8E-04	---	---	5.6E-08	---	---	---	---	4.0E-04
Manganese	8.3E-05	2.6E-02	---	---	7.6E-05	---	---	---	---	2.6E-02
Mercury	4.1E-04	2.4E-03	---	---	1.6E-07	---	---	---	---	2.9E-03
Molybdenum	2.9E-02	6.9E-02	---	---	1.4E-04	---	---	---	---	9.8E-02
Nickel	6.9E-03	2.7E-02	---	---	1.5E-05	---	---	---	---	3.4E-02
Selenium	3.8E-03	9.8E-02	---	---	3.7E-05	---	---	---	---	1.0E-01
Silver	1.7E-05	1.4E-04	---	---	2.4E-08	---	---	---	---	1.6E-04
Strontium	3.9E-04	4.6E-03	---	---	1.8E-04	---	---	---	---	5.2E-03
Thallium	3.7E-03	2.0E-02	---	---	2.5E-05	---	---	---	---	2.4E-02
Uranium	6.7E-04	1.9E-04	---	---	2.3E-05	---	---	---	---	8.9E-04
Vanadium	3.5E-02	1.9E-02	---	---	2.1E-05	---	---	---	---	5.4E-02
Zinc	6.6E-04	1.1E-02	---	---	6.6E-07	---	---	---	---	1.2E-02

Risk Quotients for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.0E-03	3.0E-02	---	---	5.0E-04	---	---	---	---	3.3E-02
Arsenic	1.2E-02	7.2E-03	---	---	3.4E-04	---	---	---	---	2.0E-02
Barium	5.0E-05	1.9E-03	---	---	3.9E-05	---	---	---	---	2.0E-03
Beryllium	2.8E-03	7.7E-03	---	---	2.7E-05	---	---	---	---	1.1E-02
Cadmium	2.1E-04	2.9E-03	---	---	9.0E-08	---	---	---	---	3.1E-03
Chromium (Total)	3.5E-03	2.9E-03	---	---	2.3E-06	---	---	---	---	6.4E-03
Cobalt	4.6E-04	7.9E-04	---	---	4.2E-07	---	---	---	---	1.2E-03
Copper	4.4E-02	8.2E-02	---	---	1.6E-05	---	---	---	---	1.3E-01
Lead	2.1E-04	1.8E-04	---	---	5.6E-08	---	---	---	---	4.0E-04
Manganese	8.3E-05	2.6E-02	---	---	7.6E-05	---	---	---	---	2.6E-02
Mercury	4.1E-04	2.4E-03	---	---	1.6E-07	---	---	---	---	2.9E-03
Molybdenum	8.6E-02	2.1E-01	---	---	4.2E-04	---	---	---	---	2.9E-01
Nickel	2.1E-02	8.1E-02	---	---	4.6E-05	---	---	---	---	1.0E-01
Selenium	1.1E-02	2.9E-01	---	---	1.1E-04	---	---	---	---	3.0E-01
Silver	5.2E-05	4.3E-04	---	---	7.1E-08	---	---	---	---	4.8E-04
Strontium	3.9E-04	4.6E-03	---	---	1.8E-04	---	---	---	---	5.2E-03
Thallium	1.1E-02	6.1E-02	---	---	7.6E-05	---	---	---	---	7.2E-02
Uranium	2.0E-03	5.8E-04	---	---	6.8E-05	---	---	---	---	2.7E-03
Vanadium	1.1E-01	5.7E-02	---	---	6.2E-05	---	---	---	---	1.6E-01
Zinc	2.0E-03	3.3E-02	---	---	2.0E-06	---	---	---	---	3.5E-02

Risk Quotients for the American Robin Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	6.7E-04	8.1E-04	1.6E-03	---	6.2E-06	---	---	---	---	3.1E-03
Barium	1.3E-04	1.0E-02	1.2E-04	---	3.3E-05	---	---	---	---	1.1E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	5.2E-02	1.9E-01	---	2.6E-07	---	---	---	---	2.5E-01
Chromium (Total)	2.2E-02	3.7E-02	6.9E-02	---	4.8E-06	---	---	---	---	1.3E-01
Cobalt	9.2E-03	3.2E-02	1.2E-02	---	2.8E-06	---	---	---	---	5.3E-02
Copper	1.5E-02	5.8E-02	5.8E-02	---	1.9E-06	---	---	---	---	1.3E-01
Lead	5.6E-03	9.6E-03	3.1E-02	---	4.9E-07	---	---	---	---	4.6E-02
Manganese	1.7E-04	1.0E-01	1.5E-04	---	5.1E-05	---	---	---	---	1.0E-01
Mercury	9.1E-04	1.1E-02	1.6E-02	---	1.1E-07	---	---	---	---	2.8E-02
Molybdenum	1.7E-03	8.4E-03	1.7E-02	---	2.8E-06	---	---	---	---	2.7E-02
Nickel	5.8E-03	4.6E-02	6.4E-02	---	4.3E-06	---	---	---	---	1.2E-01
Selenium	1.9E-03	9.9E-02	1.9E-02	---	6.2E-06	---	---	---	---	1.2E-01
Silver	1.8E-04	2.9E-03	3.7E-03	---	8.0E-08	---	---	---	---	6.8E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	4.0E-03	4.6E-02	2.0E-03	---	9.4E-06	---	---	---	---	5.2E-02
Uranium	6.3E-05	3.7E-05	2.2E-05	---	7.1E-07	---	---	---	---	1.2E-04
Vanadium	4.0E-01	4.3E-01	1.7E-01	---	7.8E-05	---	---	---	---	**1.0E+00**
Zinc	3.9E-03	1.3E-01	2.6E-01	---	1.3E-06	---	---	---	---	4.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the American Robin (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.0E-03	2.4E-03	4.8E-03	---	1.9E-05	---	---	---	---	9.3E-03
Barium	3.9E-04	3.1E-02	3.7E-04	---	1.0E-04	---	---	---	---	3.2E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	5.2E-02	1.9E-01	---	2.6E-07	---	---	---	---	2.5E-01
Chromium (Total)	2.2E-02	3.7E-02	6.9E-02	---	4.8E-06	---	---	---	---	1.3E-01
Cobalt	9.2E-03	3.2E-02	1.2E-02	---	2.8E-06	---	---	---	---	5.3E-02
Copper	1.5E-02	5.8E-02	5.8E-02	---	1.9E-06	---	---	---	---	1.3E-01
Lead	5.6E-03	9.6E-03	3.1E-02	---	4.9E-07	---	---	---	---	4.6E-02
Manganese	1.7E-04	1.0E-01	1.5E-04	---	5.1E-05	---	---	---	---	1.0E-01
Mercury	2.7E-03	3.3E-02	4.8E-02	---	3.4E-07	---	---	---	---	8.4E-02
Molybdenum	5.2E-03	2.5E-02	5.1E-02	---	8.4E-06	---	---	---	---	8.2E-02
Nickel	5.8E-03	4.6E-02	6.4E-02	---	4.3E-06	---	---	---	---	1.2E-01
Selenium	5.6E-03	3.0E-01	5.7E-02	---	1.9E-05	---	---	---	---	3.6E-01
Silver	5.3E-04	8.8E-03	1.1E-02	---	2.4E-07	---	---	---	---	2.0E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.2E-02	1.4E-01	5.9E-03	---	2.8E-05	---	---	---	---	1.6E-01
Uranium	6.3E-05	3.7E-05	2.2E-05	---	7.1E-07	---	---	---	---	1.2E-04
Vanadium	**1.2E+00**	**1.3E+00**	5.2E-01	---	2.3E-04	---	---	---	---	**3.0E+00**
Zinc	3.9E-03	1.3E-01	2.6E-01	---	1.3E-06	---	---	---	---	4.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Barn Swallow Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	4.6E-04	1.8E-05	5.3E-03	---	1.0E-05	---	---	---	---	5.8E-03
Barium	9.0E-05	2.3E-04	4.0E-04	---	5.4E-05	---	---	---	---	7.7E-04
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.3E-03	1.1E-03	6.3E-01	---	4.2E-07	---	---	---	---	6.4E-01
Chromium (Total)	1.5E-02	8.2E-04	2.3E-01	---	7.7E-06	---	---	---	---	2.4E-01
Cobalt	6.3E-03	7.1E-04	3.8E-02	---	4.5E-06	---	---	---	---	4.5E-02
Copper	1.1E-02	1.3E-03	1.9E-01	---	3.0E-06	---	---	---	---	2.0E-01
Lead	3.8E-03	2.1E-04	1.0E-01	---	7.8E-07	---	---	---	---	1.1E-01
Manganese	1.1E-04	2.3E-03	5.0E-04	---	8.2E-05	---	---	---	---	3.0E-03
Mercury	6.3E-04	2.4E-04	5.3E-02	---	1.8E-07	---	---	---	---	5.3E-02
Molybdenum	1.2E-03	1.9E-04	5.6E-02	---	4.5E-06	---	---	---	---	5.8E-02
Nickel	4.0E-03	1.0E-03	2.1E-01	---	6.9E-06	---	---	---	---	2.2E-01
Selenium	1.3E-03	2.2E-03	6.3E-02	---	1.0E-05	---	---	---	---	6.6E-02
Silver	1.2E-04	6.5E-05	1.2E-02	---	1.3E-07	---	---	---	---	1.2E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	2.7E-03	9.8E-04	6.3E-03	---	1.5E-05	---	---	---	---	1.0E-02
Uranium	4.3E-05	8.2E-07	7.1E-05	---	1.1E-06	---	---	---	---	1.2E-04
Vanadium	2.7E-01	9.5E-03	5.7E-01	---	1.2E-04	---	---	---	---	8.5E-01
Zinc	2.7E-03	2.9E-03	8.6E-01	---	2.1E-06	---	---	---	---	8.7E-01

Risk Quotients for the Barn Swallow (SaR) Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.4E-03	5.4E-05	1.6E-02	---	3.0E-05	---	---	---	---	1.7E-02
Barium	2.7E-04	6.8E-04	1.2E-03	---	1.6E-04	---	---	---	---	2.3E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.3E-03	1.1E-03	6.3E-01	---	4.2E-07	---	---	---	---	6.4E-01
Chromium (Total)	1.5E-02	8.2E-04	2.3E-01	---	7.7E-06	---	---	---	---	2.4E-01
Cobalt	6.3E-03	7.1E-04	3.8E-02	---	4.5E-06	---	---	---	---	4.5E-02
Copper	1.1E-02	1.3E-03	1.9E-01	---	3.0E-06	---	---	---	---	2.0E-01
Lead	3.8E-03	2.1E-04	1.0E-01	---	7.8E-07	---	---	---	---	1.1E-01
Manganese	1.1E-04	2.3E-03	5.0E-04	---	8.2E-05	---	---	---	---	3.0E-03
Mercury	1.9E-03	7.3E-04	1.6E-01	---	5.5E-07	---	---	---	---	1.6E-01
Molybdenum	3.6E-03	5.6E-04	1.7E-01	---	1.3E-05	---	---	---	---	1.7E-01
Nickel	4.0E-03	1.0E-03	2.1E-01	---	6.9E-06	---	---	---	---	2.2E-01
Selenium	3.9E-03	6.5E-03	1.9E-01	---	3.0E-05	---	---	---	---	2.0E-01
Silver	3.6E-04	1.9E-04	3.7E-02	---	3.8E-07	---	---	---	---	3.7E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	8.1E-03	2.9E-03	1.9E-02	---	4.4E-05	---	---	---	---	3.0E-02
Uranium	4.3E-05	8.2E-07	7.1E-05	---	1.1E-06	---	---	---	---	1.2E-04
Vanadium	8.2E-01	2.9E-02	**1.7E+00**	---	3.7E-04	---	---	---	---	**2.6E+00**
Zinc	2.7E-03	2.9E-03	8.6E-01	---	2.1E-06	---	---	---	---	8.7E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common Loon Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	2.3E-06	5.9E-04	---	4.0E-03	4.5E-03	9.1E-03
Barium	---	---	---	---	2.1E-05	2.6E-04	---	7.3E-04	9.2E-04	1.9E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	6.6E-08	2.5E-04	---	7.4E-03	1.1E-02	1.8E-02
Chromium (Total)	---	---	---	---	1.2E-06	1.6E-02	---	4.6E-02	1.9E-02	8.0E-02
Cobalt	---	---	---	---	7.0E-07	3.9E-03	---	1.9E-04	9.8E-03	1.4E-02
Copper	---	---	---	---	4.7E-07	1.0E-03	---	3.3E-02	1.6E-01	1.9E-01
Lead	---	---	---	---	1.2E-07	7.6E-04	---	1.7E-03	2.2E-03	4.7E-03
Manganese	---	---	---	---	1.3E-05	4.1E-04	---	1.2E-03	5.4E-04	2.2E-03
Mercury	---	---	---	---	7.0E-08	2.1E-04	---	5.3E-04	2.4E-01	2.4E-01
Molybdenum	---	---	---	---	9.5E-07	3.0E-04	---	3.1E-03	2.7E-03	6.0E-03
Nickel	---	---	---	---	1.1E-06	4.4E-03	---	1.1E-02	1.2E-02	2.8E-02
Selenium	---	---	---	---	2.3E-06	1.1E-03	---	1.4E-02	4.3E-01	4.4E-01
Silver	---	---	---	---	3.3E-08	2.0E-05	---	3.1E-05	8.3E-03	8.4E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	6.7E-06	2.1E-03	---	8.5E-03	3.7E-02	4.8E-02
Uranium	---	---	---	---	2.5E-07	1.0E-04	---	3.5E-05	1.2E-04	2.5E-04
Vanadium	---	---	---	---	5.0E-05	4.8E-01	---	1.7E-01	6.8E-01	**1.3E+00**
Zinc	---	---	---	---	4.2E-07	1.4E-03	---	4.5E-02	9.5E-01	1.0E+00

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Lesser Scaup Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	3.0E-06	5.4E-04	5.8E-05	3.6E-02	---	3.7E-02
Barium	---	---	---	---	2.5E-05	2.2E-04	9.8E-05	6.0E-03	---	6.3E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	1.3E-07	3.5E-04	9.4E-04	1.0E-01	---	1.0E-01
Chromium (Total)	---	---	---	---	2.3E-06	2.2E-02	2.5E-03	6.2E-01	---	6.5E-01
Cobalt	---	---	---	---	1.4E-06	5.4E-03	1.1E-04	2.5E-03	---	8.0E-03
Copper	---	---	---	---	9.1E-07	1.4E-03	1.3E-03	4.5E-01	---	4.5E-01
Lead	---	---	---	---	2.4E-07	1.1E-03	3.1E-04	2.3E-02	---	2.4E-02
Manganese	---	---	---	---	2.5E-05	5.7E-04	1.3E-04	1.7E-02	---	1.8E-02
Mercury	---	---	---	---	8.2E-08	1.8E-04	5.8E-04	4.3E-03	---	5.1E-03
Molybdenum	---	---	---	---	1.4E-06	3.0E-04	2.0E-04	3.1E-02	---	3.1E-02
Nickel	---	---	---	---	2.1E-06	6.1E-03	7.9E-04	1.5E-01	---	1.6E-01
Selenium	---	---	---	---	3.0E-06	1.0E-03	1.4E-03	1.3E-01	---	1.3E-01
Silver	---	---	---	---	3.9E-08	1.7E-05	1.6E-06	2.5E-04	---	2.7E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	7.9E-06	1.8E-03	1.3E-05	7.0E-02	---	7.2E-02
Uranium	---	---	---	---	3.4E-07	1.0E-04	1.4E-06	3.3E-04	---	4.3E-04
Vanadium	---	---	---	---	5.9E-05	4.0E-01	5.5E-03	**1.4E+00**	---	**1.8E+00**
Zinc	---	---	---	---	6.3E-07	1.6E-03	2.7E-03	4.8E-01	---	4.9E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Mallard Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.5E-05	1.8E-05	5.4E-05	---	2.6E-06	7.1E-04	3.3E-04	1.8E-02	---	1.9E-02
Barium	4.9E-06	3.9E-04	7.0E-06	---	2.4E-05	3.2E-04	6.0E-04	3.3E-03	---	4.6E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.9E-05	1.1E-03	6.2E-03	---	1.1E-07	4.4E-04	5.1E-03	4.8E-02	---	6.1E-02
Chromium (Total)	4.6E-04	7.9E-04	2.2E-03	---	1.9E-06	2.7E-02	1.4E-02	3.0E-01	---	3.4E-01
Cobalt	1.9E-04	6.9E-04	3.7E-04	---	1.1E-06	6.7E-03	6.2E-04	1.2E-03	---	9.8E-03
Copper	3.3E-04	1.2E-03	1.9E-03	---	7.6E-07	1.8E-03	7.0E-03	2.1E-01	---	2.3E-01
Lead	1.2E-04	2.1E-04	9.9E-04	---	2.0E-07	1.3E-03	1.6E-03	1.1E-02	---	1.5E-02
Manganese	3.5E-06	2.2E-03	4.8E-06	---	2.1E-05	7.1E-04	6.8E-04	8.1E-03	---	1.2E-02
Mercury	3.3E-05	3.9E-04	8.6E-04	---	7.9E-08	2.6E-04	3.6E-03	2.4E-03	---	7.5E-03
Molybdenum	3.7E-05	1.8E-04	5.5E-04	---	1.1E-06	3.7E-04	1.1E-03	1.5E-02	---	1.7E-02
Nickel	1.2E-04	9.8E-04	2.0E-03	---	1.7E-06	7.7E-03	4.3E-03	7.3E-02	---	8.8E-02
Selenium	4.1E-05	2.2E-03	6.4E-04	---	2.6E-06	1.3E-03	8.2E-03	6.4E-02	---	7.6E-02
Silver	4.3E-06	7.2E-05	1.4E-04	---	3.8E-08	2.4E-05	1.0E-05	1.4E-04	---	3.9E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.7E-04	1.9E-03	1.2E-04	---	7.6E-06	2.6E-03	7.8E-05	3.8E-02	---	4.3E-02
Uranium	1.3E-06	7.9E-07	6.9E-07	---	2.9E-07	1.2E-04	7.7E-06	1.6E-04	---	2.9E-04
Vanadium	1.5E-02	1.6E-02	9.8E-03	---	5.6E-05	5.7E-01	3.4E-02	7.8E-01	---	**1.4E+00**
Zinc	8.3E-05	2.8E-03	8.4E-03	---	5.3E-07	2.0E-03	1.4E-02	2.3E-01	---	2.6E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Red-tailed Hawk Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	5.9E-05	---	---	1.6E-03	2.7E-06	---	---	---	---	1.7E-03
Barium	1.9E-05	---	---	3.0E-03	2.4E-05	---	---	---	---	3.0E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.6E-04	---	---	6.8E-03	1.1E-07	---	---	---	---	7.0E-03
Chromium (Total)	1.9E-03	---	---	5.3E-03	2.0E-06	---	---	---	---	7.2E-03
Cobalt	7.9E-04	---	---	2.5E-03	1.2E-06	---	---	---	---	3.3E-03
Copper	1.3E-03	---	---	3.0E-02	7.8E-07	---	---	---	---	3.1E-02
Lead	4.8E-04	---	---	6.0E-04	2.0E-07	---	---	---	---	1.1E-03
Manganese	1.4E-05	---	---	4.9E-04	2.1E-05	---	---	---	---	5.2E-04
Mercury	1.3E-04	---	---	5.3E-03	7.9E-08	---	---	---	---	5.4E-03
Molybdenum	1.5E-04	---	---	8.5E-04	1.2E-06	---	---	---	---	1.0E-03
Nickel	5.0E-04	---	---	2.2E-03	1.8E-06	---	---	---	---	2.7E-03
Selenium	1.6E-04	---	---	4.9E-02	2.7E-06	---	---	---	---	4.9E-02
Silver	1.7E-05	---	---	1.7E-04	3.8E-08	---	---	---	---	1.9E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	6.7E-04	---	---	3.5E-02	7.6E-06	---	---	---	---	3.6E-02
Uranium	5.4E-06	---	---	1.0E-05	3.0E-07	---	---	---	---	1.6E-05
Vanadium	5.9E-02	---	---	1.1E-01	5.7E-05	---	---	---	---	1.7E-01
Zinc	3.4E-04	---	---	3.4E-02	5.5E-07	---	---	---	---	3.4E-02

Risk Quotients for the Spotted Sandpiper Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.7E-04	---	1.9E-03	---	7.9E-06	7.3E-04	9.8E-05	4.1E-02	8.5E-04	4.5E-02
Barium	3.3E-05	---	1.5E-04	---	4.3E-05	1.9E-04	1.1E-04	4.4E-03	1.0E-04	5.0E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	4.6E-04	---	2.3E-01	---	3.4E-07	4.7E-04	1.6E-03	1.1E-01	3.0E-03	3.5E-01
Chromium (Total)	5.5E-03	---	8.4E-02	---	6.1E-06	2.9E-02	4.3E-03	7.1E-01	5.3E-03	8.4E-01
Cobalt	2.3E-03	---	1.4E-02	---	3.6E-06	7.3E-03	2.0E-04	2.9E-03	2.8E-03	3.0E-02
Copper	3.9E-03	---	7.1E-02	---	2.4E-06	2.0E-03	2.2E-03	5.1E-01	4.6E-02	6.3E-01
Lead	1.4E-03	---	3.8E-02	---	6.2E-07	1.4E-03	5.2E-04	2.6E-02	6.4E-04	6.7E-02
Manganese	4.2E-05	---	1.8E-04	---	6.5E-05	7.7E-04	2.2E-04	1.9E-02	1.5E-04	2.1E-02
Mercury	2.3E-04	---	1.9E-02	---	1.5E-07	1.6E-04	6.7E-04	3.3E-03	2.8E-02	5.2E-02
Molybdenum	4.4E-04	---	2.1E-02	---	3.6E-06	4.1E-04	3.5E-04	3.5E-02	5.5E-04	5.7E-02
Nickel	1.5E-03	---	7.8E-02	---	5.5E-06	8.3E-03	1.3E-03	1.7E-01	3.5E-03	2.7E-01
Selenium	4.7E-04	---	2.3E-02	---	7.9E-06	1.4E-03	2.5E-03	1.4E-01	8.0E-02	2.5E-01
Silver	4.4E-05	---	4.5E-03	---	1.0E-07	2.2E-05	2.7E-06	2.8E-04	1.4E-03	6.3E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	9.9E-04	---	2.3E-03	---	1.2E-05	1.4E-03	1.2E-05	4.5E-02	3.6E-03	5.3E-02
Uranium	1.6E-05	---	2.6E-05	---	9.0E-07	1.4E-04	2.4E-06	3.7E-04	2.3E-05	5.8E-04
Vanadium	1.0E-01	---	2.1E-01	---	9.9E-05	3.5E-01	6.1E-03	**1.0E+00**	7.5E-02	**1.8E+00**
Zinc	9.9E-04	---	3.2E-01	---	1.7E-06	2.1E-03	4.6E-03	5.5E-01	2.1E-01	**1.1E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Spruce Grouse Exposed to Constituents of Concern at the Gordon Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.2E-04	4.9E-04	7.7E-05	---	3.2E-06	---	---	---	---	6.9E-04
Barium	3.6E-05	9.2E-03	8.8E-06	---	2.6E-05	---	---	---	---	9.3E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.4E-04	3.1E-02	9.2E-03	---	1.3E-07	---	---	---	---	4.1E-02
Chromium (Total)	4.1E-03	2.3E-02	3.3E-03	---	2.4E-06	---	---	---	---	3.0E-02
Cobalt	1.7E-03	1.9E-02	5.5E-04	---	1.4E-06	---	---	---	---	2.2E-02
Copper	2.9E-03	3.5E-02	2.8E-03	---	9.6E-07	---	---	---	---	4.1E-02
Lead	1.0E-03	5.8E-03	1.5E-03	---	2.5E-07	---	---	---	---	8.3E-03
Manganese	3.1E-05	6.3E-02	7.2E-06	---	2.6E-05	---	---	---	---	6.3E-02
Mercury	2.4E-04	9.4E-03	1.1E-03	---	8.3E-08	---	---	---	---	1.1E-02
Molybdenum	3.2E-04	5.1E-03	8.2E-04	---	1.4E-06	---	---	---	---	6.2E-03
Nickel	1.1E-03	2.8E-02	3.1E-03	---	2.2E-06	---	---	---	---	3.2E-02
Selenium	3.5E-04	6.0E-02	9.1E-04	---	3.2E-06	---	---	---	---	6.1E-02
Silver	3.3E-05	1.8E-03	1.8E-04	---	4.1E-08	---	---	---	---	2.0E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.3E-03	4.6E-02	1.6E-04	---	8.0E-06	---	---	---	---	4.7E-02
Uranium	1.2E-05	2.2E-05	1.0E-06	---	3.6E-07	---	---	---	---	3.6E-05
Vanadium	1.1E-01	3.9E-01	1.2E-02	---	5.9E-05	---	---	---	---	5.1E-01
Zinc	7.3E-04	7.9E-02	1.3E-02	---	6.7E-07	---	---	---	---	9.3E-02

Risk Quotients for the American Beaver Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.2E-04	1.5E-03	---	---	3.0E-05	1.6E-04	3.1E-05	---	---	1.8E-03
Arsenic	5.2E-04	3.0E-04	---	---	3.9E-05	1.4E-03	2.7E-04	---	---	2.5E-03
Barium	5.8E-06	4.4E-04	---	---	1.2E-05	4.6E-05	3.6E-05	---	---	5.4E-04
Beryllium	1.1E-04	1.3E-03	---	---	3.4E-05	5.7E-04	2.1E-03	---	---	4.2E-03
Cadmium	3.0E-05	4.3E-04	---	---	2.1E-07	6.1E-05	2.8E-04	---	---	8.0E-04
Chromium (Total)	3.3E-04	6.1E-04	---	---	5.3E-06	1.1E-02	2.2E-03	---	---	1.4E-02
Cobalt	4.6E-05	1.7E-04	---	---	1.9E-06	1.4E-03	5.2E-05	---	---	1.7E-03
Copper	4.1E-03	5.3E-03	---	---	2.6E-05	1.1E-02	5.5E-03	---	---	2.6E-02
Lead	3.2E-05	1.7E-05	---	---	1.1E-07	4.7E-05	2.6E-05	---	---	1.2E-04
Manganese	8.0E-06	5.8E-03	---	---	6.4E-05	3.2E-04	1.3E-04	---	---	6.3E-03
Mercury	7.2E-05	2.6E-04	---	---	2.2E-07	3.7E-05	2.4E-04	---	---	6.1E-04
Molybdenum	2.4E-04	9.2E-04	---	---	1.5E-05	4.0E-04	4.8E-04	---	---	2.1E-03
Nickel	6.8E-03	3.6E-02	---	---	8.0E-04	1.1E-01	1.3E-02	---	---	1.6E-01
Selenium	1.3E-03	1.3E-02	---	---	3.1E-05	1.3E-03	3.1E-03	---	---	1.9E-02
Silver	2.2E-06	1.9E-05	---	---	2.3E-08	3.5E-06	6.1E-07	---	---	2.5E-05
Strontium	2.6E-05	1.6E-03	---	---	1.3E-05	9.7E-05	2.0E-04	---	---	1.9E-03
Thallium	2.4E-04	3.7E-03	---	---	2.9E-05	5.7E-04	7.0E-06	---	---	4.5E-03
Uranium	5.6E-05	2.6E-05	---	---	3.1E-06	3.7E-04	1.6E-05	---	---	4.7E-04
Vanadium	1.5E-03	2.5E-03	---	---	2.3E-05	1.2E-02	2.8E-04	---	---	1.6E-02
Zinc	1.8E-04	3.3E-03	---	---	3.4E-06	5.1E-04	1.3E-03	---	---	5.3E-03

Risk Quotients for the American Mink Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	7.0E-05	---	---	3.7E-04	5.4E-06	1.4E-04	---	2.7E-05	4.9E-03	5.5E-03
Arsenic	6.4E-04	---	---	2.9E-03	1.4E-05	2.6E-03	---	2.7E-02	8.2E-03	4.2E-02
Barium	8.0E-06	---	---	3.3E-03	5.0E-06	9.4E-05	---	3.5E-04	4.8E-04	4.2E-03
Beryllium	6.7E-05	---	---	4.1E-04	6.0E-06	5.0E-04	---	1.8E-03	1.1E-03	3.8E-03
Cadmium	4.2E-05	---	---	6.6E-03	8.9E-08	1.2E-04	---	4.7E-03	6.6E-03	1.8E-02
Chromium (Total)	4.6E-04	---	---	7.3E-04	2.2E-06	2.2E-02	---	5.1E-02	5.3E-03	7.9E-02
Cobalt	6.4E-05	---	---	2.9E-04	7.9E-07	2.8E-03	---	1.8E-04	1.5E-03	4.8E-03
Copper	5.7E-03	---	---	3.8E-02	1.1E-05	2.2E-02	---	2.8E-01	5.9E-01	9.4E-01
Lead	4.4E-05	---	---	7.6E-05	4.7E-08	9.5E-05	---	2.9E-04	4.1E-04	9.1E-04
Manganese	1.1E-05	---	---	5.8E-04	2.7E-05	6.5E-04	---	2.7E-03	1.3E-03	5.3E-03
Mercury	4.5E-05	---	---	1.5E-03	4.2E-08	3.4E-05	---	1.1E-04	3.8E-02	4.0E-02
Molybdenum	1.4E-04	---	---	5.4E-03	2.7E-06	3.5E-04	---	4.9E-03	1.3E-02	2.4E-02
Nickel	9.5E-03	---	---	6.5E-03	3.3E-04	2.1E-01	---	5.2E-01	4.5E-02	8.0E-01
Selenium	8.0E-04	---	---	6.8E-02	5.5E-06	1.1E-03	---	1.9E-02	4.6E-01	5.5E-01
Silver	2.3E-06	---	---	1.7E-05	7.5E-09	5.6E-06	---	1.2E-05	2.6E-04	3.0E-04
Strontium	1.6E-05	---	---	1.5E-03	2.3E-06	8.5E-05	---	1.4E-04	4.7E-03	6.5E-03
Thallium	1.5E-04	---	---	5.3E-04	5.3E-06	5.0E-04	---	2.6E-03	7.4E-03	1.1E-02
Uranium	3.3E-05	---	---	1.3E-05	5.5E-07	3.2E-04	---	1.4E-04	9.2E-05	6.0E-04
Vanadium	9.1E-04	---	---	1.3E-03	4.2E-06	1.0E-02	---	4.9E-03	1.3E-02	3.1E-02
Zinc	2.4E-04	---	---	1.4E-02	1.4E-06	1.0E-03	---	3.3E-02	5.2E-02	1.0E-01

Risk Quotients for the Black Bear Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.7E-04	2.4E-02	1.4E-03	5.9E-04	3.5E-05	3.7E-05	---	---	1.5E-03	2.8E-02
Arsenic	2.5E-03	4.8E-03	1.3E-03	2.3E-03	4.6E-05	3.4E-04	---	---	1.2E-03	1.3E-02
Barium	2.2E-05	5.5E-03	4.9E-06	1.8E-03	1.1E-05	8.5E-06	---	---	5.0E-05	7.3E-03
Beryllium	5.4E-04	2.1E-02	6.1E-05	6.6E-04	3.9E-05	1.4E-04	---	---	3.3E-04	2.3E-02
Cadmium	1.1E-04	5.3E-03	2.9E-03	3.6E-03	1.9E-07	1.1E-05	---	---	6.8E-04	1.3E-02
Chromium (Total)	1.2E-03	7.6E-03	9.4E-04	3.9E-04	4.8E-06	2.0E-03	---	---	5.5E-04	1.3E-02
Cobalt	1.7E-04	2.1E-03	5.2E-05	1.6E-04	1.7E-06	2.5E-04	---	---	1.5E-04	2.9E-03
Copper	1.5E-02	6.6E-02	8.2E-03	2.0E-02	2.3E-05	2.0E-03	---	---	6.1E-02	1.7E-01
Lead	1.2E-04	2.1E-04	1.6E-04	4.1E-05	1.0E-07	8.5E-06	---	---	4.3E-05	5.8E-04
Manganese	3.0E-05	7.2E-02	6.6E-06	3.1E-04	5.8E-05	5.9E-05	---	---	1.4E-04	7.3E-02
Mercury	3.5E-04	4.2E-03	1.5E-03	2.4E-03	2.6E-07	8.7E-06	---	---	1.1E-02	2.0E-02
Molybdenum	1.2E-03	1.5E-02	2.8E-03	8.8E-03	1.8E-05	9.5E-05	---	---	4.0E-03	3.2E-02
Nickel	2.6E-02	4.5E-01	6.8E-02	3.5E-03	7.2E-04	1.9E-02	---	---	4.7E-03	5.7E-01
Selenium	6.5E-03	2.1E-01	1.6E-02	1.1E-01	3.6E-05	3.1E-04	---	---	1.4E-01	4.8E-01
Silver	1.0E-05	3.0E-04	5.4E-05	1.6E-05	2.7E-08	8.4E-07	---	---	4.5E-05	4.3E-04
Strontium	1.3E-04	2.5E-02	2.8E-05	2.5E-03	1.5E-05	2.3E-05	---	---	1.5E-03	2.9E-02
Thallium	1.2E-03	5.9E-02	1.4E-04	8.5E-04	3.4E-05	1.3E-04	---	---	2.3E-03	6.4E-02
Uranium	2.7E-04	4.1E-04	2.2E-05	2.1E-05	3.6E-06	8.7E-05	---	---	2.9E-05	8.5E-04
Vanadium	7.3E-03	4.0E-02	7.7E-04	2.1E-03	2.7E-05	2.7E-03	---	---	4.2E-03	5.7E-02
Zinc	6.6E-04	4.1E-02	7.2E-03	7.6E-03	3.1E-06	9.4E-05	---	---	5.4E-03	6.2E-02

Risk Quotients for the Common (Masked) Shrew Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.7E-03	4.4E-03	8.1E-02	---	2.5E-05	---	---	---	---	8.7E-02
Arsenic	1.9E-02	2.3E-03	1.9E-01	---	8.3E-05	---	---	---	---	2.1E-01
Barium	2.4E-04	3.8E-03	1.0E-03	---	2.9E-05	---	---	---	---	5.1E-03
Beryllium	1.6E-03	3.9E-03	3.5E-03	---	2.8E-05	---	---	---	---	9.1E-03
Cadmium	1.3E-03	3.7E-03	6.2E-01	---	5.1E-07	---	---	---	---	6.2E-01
Chromium (Total)	1.4E-02	5.3E-03	2.0E-01	---	1.3E-05	---	---	---	---	2.2E-01
Cobalt	1.9E-03	1.5E-03	1.1E-02	---	4.5E-06	---	---	---	---	1.4E-02
Copper	1.7E-01	4.6E-02	**1.7E+00**	---	6.1E-05	---	---	---	---	**2.0E+00**
Lead	1.3E-03	1.5E-04	3.4E-02	---	2.7E-07	---	---	---	---	3.5E-02
Manganese	3.3E-04	5.1E-02	1.4E-03	---	1.5E-04	---	---	---	---	5.2E-02
Mercury	1.3E-03	1.0E-03	1.1E-01	---	2.4E-07	---	---	---	---	1.1E-01
Molybdenum	1.9E-03	1.5E-03	8.5E-02	---	6.7E-06	---	---	---	---	8.9E-02
Nickel	2.9E-01	3.1E-01	**1.4E+01**	---	1.9E-03	---	---	---	---	**1.5E+01**
Selenium	1.9E-02	3.9E-02	9.1E-01	---	2.5E-05	---	---	---	---	9.7E-01
Silver	7.0E-05	1.3E-04	6.8E-03	---	4.3E-08	---	---	---	---	7.0E-03
Strontium	3.8E-04	4.7E-03	1.6E-03	---	1.0E-05	---	---	---	---	6.7E-03
Thallium	3.5E-03	1.1E-02	7.9E-03	---	2.4E-05	---	---	---	---	2.3E-02
Uranium	4.4E-04	4.2E-05	6.9E-04	---	1.4E-06	---	---	---	---	1.2E-03
Vanadium	2.2E-02	7.5E-03	4.4E-02	---	1.9E-05	---	---	---	---	7.3E-02
Zinc	7.3E-03	2.9E-02	**1.5E+00**	---	8.1E-06	---	---	---	---	**1.6E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.1E-03	1.3E-02	2.4E-01	---	7.5E-05	---	---	---	---	2.6E-01
Arsenic	5.8E-02	6.9E-03	5.8E-01	---	2.5E-04	---	---	---	---	6.4E-01
Barium	2.4E-04	3.8E-03	1.0E-03	---	2.9E-05	---	---	---	---	5.1E-03
Beryllium	1.6E-03	3.9E-03	3.5E-03	---	2.8E-05	---	---	---	---	9.1E-03
Cadmium	1.3E-03	3.7E-03	6.2E-01	---	5.1E-07	---	---	---	---	6.2E-01
Chromium (Total)	1.4E-02	5.3E-03	2.0E-01	---	1.3E-05	---	---	---	---	2.2E-01
Cobalt	1.9E-03	1.5E-03	1.1E-02	---	4.5E-06	---	---	---	---	1.4E-02
Copper	5.1E-01	1.4E-01	**5.2E+00**	---	1.8E-04	---	---	---	---	**5.9E+00**
Lead	1.3E-03	1.5E-04	3.4E-02	---	2.7E-07	---	---	---	---	3.5E-02
Manganese	3.3E-04	5.1E-02	1.4E-03	---	1.5E-04	---	---	---	---	5.2E-02
Mercury	1.3E-03	1.0E-03	1.1E-01	---	2.4E-07	---	---	---	---	1.1E-01
Molybdenum	5.6E-03	4.5E-03	2.6E-01	---	2.0E-05	---	---	---	---	2.7E-01
Nickel	8.6E-01	9.4E-01	**4.3E+01**	---	5.7E-03	---	---	---	---	**4.5E+01**
Selenium	5.8E-02	1.2E-01	**2.7E+00**	---	7.6E-05	---	---	---	---	**2.9E+00**
Silver	2.1E-04	3.8E-04	2.1E-02	---	1.3E-07	---	---	---	---	2.1E-02
Strontium	3.8E-04	4.7E-03	1.6E-03	---	1.0E-05	---	---	---	---	6.7E-03
Thallium	1.1E-02	3.3E-02	2.4E-02	---	7.3E-05	---	---	---	---	6.8E-02
Uranium	1.3E-03	1.3E-04	2.1E-03	---	4.1E-06	---	---	---	---	3.5E-03
Vanadium	6.6E-02	2.3E-02	1.3E-01	---	5.8E-05	---	---	---	---	2.2E-01
Zinc	2.2E-02	8.7E-02	**4.6E+00**	---	2.4E-05	---	---	---	---	**4.7E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Deer Mouse Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	2.1E-04	5.7E-03	5.5E-03	---	2.8E-05	---	---	---	---	1.1E-02
Arsenic	2.4E-03	3.0E-03	1.3E-02	---	9.1E-05	---	---	---	---	1.8E-02
Barium	3.0E-05	4.9E-03	7.1E-05	---	3.2E-05	---	---	---	---	5.0E-03
Beryllium	2.0E-04	5.1E-03	2.3E-04	---	3.1E-05	---	---	---	---	5.5E-03
Cadmium	1.6E-04	4.8E-03	4.2E-02	---	5.7E-07	---	---	---	---	4.7E-02
Chromium (Total)	1.7E-03	6.8E-03	1.3E-02	---	1.4E-05	---	---	---	---	2.2E-02
Cobalt	2.4E-04	1.9E-03	7.5E-04	---	5.0E-06	---	---	---	---	2.9E-03
Copper	2.1E-02	5.9E-02	1.2E-01	---	6.8E-05	---	---	---	---	2.0E-01
Lead	1.6E-04	1.9E-04	2.3E-03	---	3.0E-07	---	---	---	---	2.6E-03
Manganese	4.2E-05	6.5E-02	9.5E-05	---	1.7E-04	---	---	---	---	6.5E-02
Mercury	1.7E-04	1.3E-03	7.3E-03	---	2.7E-07	---	---	---	---	8.8E-03
Molybdenum	2.3E-04	1.9E-03	5.8E-03	---	7.4E-06	---	---	---	---	7.9E-03
Nickel	3.6E-02	4.0E-01	9.7E-01	---	2.1E-03	---	---	---	---	**1.4E+00**
Selenium	2.4E-03	5.0E-02	6.1E-02	---	2.8E-05	---	---	---	---	1.1E-01
Silver	8.8E-06	1.6E-04	4.6E-04	---	4.8E-08	---	---	---	---	6.3E-04
Strontium	4.7E-05	6.1E-03	1.1E-04	---	1.2E-05	---	---	---	---	6.2E-03
Thallium	4.4E-04	1.4E-02	5.4E-04	---	2.7E-05	---	---	---	---	1.5E-02
Uranium	5.5E-05	5.4E-05	4.7E-05	---	1.5E-06	---	---	---	---	1.6E-04
Vanadium	2.7E-03	9.6E-03	3.0E-03	---	2.2E-05	---	---	---	---	1.5E-02
Zinc	9.2E-04	3.7E-02	1.0E-01	---	9.0E-06	---	---	---	---	1.4E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Meadow Vole Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.0E-04	1.4E-02	---	---	3.1E-05	---	---	---	---	1.4E-02
Arsenic	3.3E-03	7.1E-03	---	---	1.0E-04	---	---	---	---	1.1E-02
Barium	4.2E-05	1.2E-02	---	---	3.5E-05	---	---	---	---	1.2E-02
Beryllium	2.8E-04	1.2E-02	---	---	3.4E-05	---	---	---	---	1.2E-02
Cadmium	2.2E-04	1.2E-02	---	---	6.3E-07	---	---	---	---	1.2E-02
Chromium (Total)	2.4E-03	1.6E-02	---	---	1.5E-05	---	---	---	---	1.9E-02
Cobalt	3.3E-04	4.6E-03	---	---	5.5E-06	---	---	---	---	5.0E-03
Copper	3.0E-02	1.4E-01	---	---	7.5E-05	---	---	---	---	1.7E-01
Lead	2.3E-04	4.5E-04	---	---	3.3E-07	---	---	---	---	6.8E-04
Manganese	5.8E-05	1.6E-01	---	---	1.9E-04	---	---	---	---	1.6E-01
Mercury	2.4E-04	3.2E-03	---	---	3.0E-07	---	---	---	---	3.4E-03
Molybdenum	3.4E-04	4.8E-03	---	---	8.5E-06	---	---	---	---	5.2E-03
Nickel	5.0E-02	9.7E-01	---	---	2.3E-03	---	---	---	---	**1.0E+00**
Selenium	3.4E-03	1.2E-01	---	---	3.1E-05	---	---	---	---	1.2E-01
Silver	1.2E-05	3.9E-04	---	---	5.3E-08	---	---	---	---	4.1E-04
Strontium	6.6E-05	1.5E-02	---	---	1.3E-05	---	---	---	---	1.5E-02
Thallium	6.2E-04	3.4E-02	---	---	3.0E-05	---	---	---	---	3.5E-02
Uranium	7.9E-05	1.3E-04	---	---	1.8E-06	---	---	---	---	2.1E-04
Vanadium	3.8E-03	2.3E-02	---	---	2.4E-05	---	---	---	---	2.7E-02
Zinc	1.3E-03	8.9E-02	---	---	1.0E-05	---	---	---	---	9.0E-02

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Moose Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.5E-04	2.5E-02	---	---	4.6E-05	8.2E-05	1.6E-04	---	---	2.6E-02
Arsenic	2.0E-03	5.1E-03	---	---	5.9E-05	7.3E-04	1.4E-03	---	---	9.2E-03
Barium	1.1E-05	3.7E-03	---	---	9.1E-06	1.2E-05	9.3E-05	---	---	3.8E-03
Beryllium	4.3E-04	2.2E-02	---	---	5.1E-05	3.0E-04	1.1E-02	---	---	3.4E-02
Cadmium	5.8E-05	3.6E-03	---	---	1.6E-07	1.6E-05	7.1E-04	---	---	4.4E-03
Chromium (Total)	6.2E-04	5.2E-03	---	---	4.0E-06	2.8E-03	5.7E-03	---	---	1.4E-02
Cobalt	8.7E-05	1.4E-03	---	---	1.4E-06	3.6E-04	1.3E-04	---	---	2.0E-03
Copper	1.1E-02	6.3E-02	---	---	2.8E-05	4.0E-03	2.0E-02	---	---	9.8E-02
Lead	6.0E-05	1.4E-04	---	---	8.5E-08	1.2E-05	6.6E-05	---	---	2.8E-04
Manganese	1.5E-05	4.9E-02	---	---	4.9E-05	8.3E-05	3.3E-04	---	---	4.9E-02
Mercury	2.7E-04	4.5E-03	---	---	3.4E-07	1.9E-05	1.2E-03	---	---	6.0E-03
Molybdenum	9.2E-04	1.6E-02	---	---	2.3E-05	2.1E-04	2.5E-03	---	---	1.9E-02
Nickel	1.3E-02	3.0E-01	---	---	6.0E-04	2.7E-02	3.4E-02	---	---	3.8E-01
Selenium	5.1E-03	2.2E-01	---	---	4.7E-05	6.7E-04	1.6E-02	---	---	2.4E-01
Silver	8.3E-06	3.2E-04	---	---	3.5E-08	1.8E-06	3.2E-06	---	---	3.3E-04
Strontium	1.0E-04	2.7E-02	---	---	1.9E-05	5.1E-05	1.0E-03	---	---	2.8E-02
Thallium	9.3E-04	6.3E-02	---	---	4.5E-05	2.9E-04	3.6E-05	---	---	6.4E-02
Uranium	2.1E-04	4.3E-04	---	---	4.7E-06	1.9E-04	8.5E-05	---	---	9.3E-04
Vanadium	5.8E-03	4.2E-02	---	---	3.6E-05	6.0E-03	1.5E-03	---	---	5.6E-02
Zinc	3.3E-04	2.8E-02	---	---	2.6E-06	1.3E-04	3.4E-03	---	---	3.2E-02

Risk Quotients for the Muskrat Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	1.9E-05	3.9E-04	5.2E-04	1.4E-04	1.3E-03	2.4E-03
Arsenic	---	---	---	---	4.8E-05	6.8E-03	8.8E-03	1.3E-01	2.1E-03	1.5E-01
Barium	---	---	---	---	1.7E-05	2.5E-04	1.3E-03	1.7E-03	1.2E-04	3.4E-03
Beryllium	---	---	---	---	2.1E-05	1.4E-03	3.6E-02	9.2E-03	2.8E-04	4.7E-02
Cadmium	---	---	---	---	3.0E-07	3.3E-04	1.0E-02	2.3E-02	1.7E-03	3.5E-02
Chromium (Total)	---	---	---	---	7.3E-06	5.8E-02	8.2E-02	2.5E-01	1.3E-03	3.9E-01
Cobalt	---	---	---	---	2.6E-06	7.5E-03	1.9E-03	8.9E-04	3.7E-04	1.1E-02
Copper	---	---	---	---	3.5E-05	5.9E-02	2.0E-01	**1.4E+00**	1.5E-01	**1.8E+00**
Lead	---	---	---	---	1.5E-07	2.5E-04	9.5E-04	1.4E-03	1.0E-04	2.7E-03
Manganese	---	---	---	---	8.8E-05	1.8E-03	4.7E-03	1.3E-02	3.4E-04	2.0E-02
Mercury	---	---	---	---	1.4E-07	9.0E-05	3.9E-03	5.4E-04	9.7E-03	1.4E-02
Molybdenum	---	---	---	---	9.3E-06	9.9E-04	8.1E-03	2.5E-02	3.4E-03	3.8E-02
Nickel	---	---	---	---	1.1E-03	5.7E-01	4.9E-01	**2.6E+00**	1.1E-02	**3.7E+00**
Selenium	---	---	---	---	1.9E-05	3.2E-03	5.2E-02	9.8E-02	1.2E-01	2.7E-01
Silver	---	---	---	---	2.5E-08	1.5E-05	1.8E-05	5.8E-05	6.6E-05	1.6E-04
Strontium	---	---	---	---	7.8E-06	2.4E-04	3.3E-03	7.5E-04	1.2E-03	5.5E-03
Thallium	---	---	---	---	1.8E-05	1.4E-03	1.2E-04	1.4E-02	2.0E-03	1.7E-02
Uranium	---	---	---	---	1.9E-06	9.0E-04	2.8E-04	7.5E-04	2.4E-05	2.0E-03
Vanadium	---	---	---	---	1.5E-05	2.8E-02	4.7E-03	2.5E-02	3.6E-03	6.2E-02
Zinc	---	---	---	---	4.7E-06	2.8E-03	4.9E-02	1.6E-01	1.3E-02	2.3E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Northern River Otter Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	2.1E-05	---	---	1.1E-04	2.5E-05	2.6E-04	---	5.9E-05	9.0E-03	9.5E-03
Arsenic	1.1E-04	---	---	4.9E-04	3.9E-05	2.7E-03	---	3.5E-02	8.6E-03	4.7E-02
Barium	1.4E-06	---	---	5.6E-04	1.4E-05	1.0E-04	---	4.4E-04	5.1E-04	1.6E-03
Beryllium	2.0E-05	---	---	1.2E-04	2.8E-05	9.4E-04	---	4.0E-03	1.9E-03	7.0E-03
Cadmium	7.2E-06	---	---	1.1E-03	2.4E-07	1.3E-04	---	6.0E-03	6.9E-03	1.4E-02
Chromium (Total)	7.7E-05	---	---	1.2E-04	6.0E-06	2.3E-02	---	6.5E-02	5.6E-03	9.4E-02
Cobalt	1.1E-05	---	---	5.0E-05	2.1E-06	3.0E-03	---	2.3E-04	1.5E-03	4.9E-03
Copper	9.6E-04	---	---	6.4E-03	2.9E-05	2.4E-02	---	3.6E-01	6.2E-01	**1.0E+00**
Lead	7.5E-06	---	---	1.3E-05	1.3E-07	1.0E-04	---	3.6E-04	4.3E-04	9.2E-04
Manganese	1.9E-06	---	---	9.8E-05	7.2E-05	7.0E-04	---	3.4E-03	1.4E-03	5.7E-03
Mercury	1.3E-05	---	---	4.3E-04	1.9E-07	6.0E-05	---	2.3E-04	6.6E-02	6.7E-02
Molybdenum	4.2E-05	---	---	1.6E-03	1.3E-05	6.6E-04	---	1.1E-02	2.3E-02	3.6E-02
Nickel	1.6E-03	---	---	1.1E-03	9.0E-04	2.3E-01	---	6.7E-01	4.7E-02	9.5E-01
Selenium	2.4E-04	---	---	2.0E-02	2.6E-05	2.1E-03	---	4.2E-02	8.4E-01	9.0E-01
Silver	4.0E-07	---	---	3.0E-06	2.0E-08	6.0E-06	---	1.5E-05	2.7E-04	3.0E-04
Strontium	4.6E-06	---	---	4.5E-04	1.1E-05	1.6E-04	---	3.2E-04	8.5E-03	9.5E-03
Thallium	4.3E-05	---	---	1.6E-04	2.5E-05	9.3E-04	---	5.8E-03	1.3E-02	2.0E-02
Uranium	9.9E-06	---	---	3.9E-06	2.6E-06	6.0E-04	---	3.2E-04	1.7E-04	1.1E-03
Vanadium	2.7E-04	---	---	3.8E-04	2.0E-05	1.9E-02	---	1.1E-02	2.5E-02	5.5E-02
Zinc	4.2E-05	---	---	2.4E-03	3.8E-06	1.1E-03	---	4.2E-02	5.5E-02	1.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Short-tailed Weasel Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.4E-04	---	---	2.8E-03	1.8E-05	---	---	---	---	3.3E-03
Arsenic	6.0E-03	---	---	2.7E-02	6.1E-05	---	---	---	---	3.4E-02
Barium	7.6E-05	---	---	3.1E-02	2.1E-05	---	---	---	---	3.1E-02
Beryllium	5.1E-04	---	---	3.1E-03	2.0E-05	---	---	---	---	3.6E-03
Cadmium	4.0E-04	---	---	6.3E-02	3.8E-07	---	---	---	---	6.3E-02
Chromium (Total)	4.3E-03	---	---	6.9E-03	9.3E-06	---	---	---	---	1.1E-02
Cobalt	6.0E-04	---	---	2.7E-03	3.3E-06	---	---	---	---	3.4E-03
Copper	5.3E-02	---	---	3.5E-01	4.5E-05	---	---	---	---	4.1E-01
Lead	4.1E-04	---	---	7.1E-04	2.0E-07	---	---	---	---	1.1E-03
Manganese	1.1E-04	---	---	5.4E-03	1.1E-04	---	---	---	---	5.7E-03
Mercury	4.2E-04	---	---	1.4E-02	1.8E-07	---	---	---	---	1.5E-02
Molybdenum	7.8E-04	---	---	2.9E-02	6.5E-06	---	---	---	---	3.0E-02
Nickel	9.0E-02	---	---	6.1E-02	1.4E-03	---	---	---	---	1.5E-01
Selenium	6.1E-03	---	---	5.2E-01	1.9E-05	---	---	---	---	5.3E-01
Silver	2.2E-05	---	---	1.6E-04	3.2E-08	---	---	---	---	1.9E-04
Strontium	1.2E-04	---	---	1.2E-02	7.7E-06	---	---	---	---	1.2E-02
Thallium	1.1E-03	---	---	4.0E-03	1.8E-05	---	---	---	---	5.1E-03
Uranium	1.8E-04	---	---	7.1E-05	1.3E-06	---	---	---	---	2.5E-04
Vanadium	6.9E-03	---	---	9.7E-03	1.4E-05	---	---	---	---	1.7E-02
Zinc	2.3E-03	---	---	1.3E-01	6.0E-06	---	---	---	---	1.4E-01

Risk Quotients for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.6E-03	---	---	8.4E-03	5.5E-05	---	---	---	---	1.0E-02
Arsenic	1.8E-02	---	---	8.2E-02	1.8E-04	---	---	---	---	1.0E-01
Barium	7.6E-05	---	---	3.1E-02	2.1E-05	---	---	---	---	3.1E-02
Beryllium	5.1E-04	---	---	3.1E-03	2.0E-05	---	---	---	---	3.6E-03
Cadmium	4.0E-04	---	---	6.3E-02	3.8E-07	---	---	---	---	6.3E-02
Chromium (Total)	4.3E-03	---	---	6.9E-03	9.3E-06	---	---	---	---	1.1E-02
Cobalt	6.0E-04	---	---	2.7E-03	3.3E-06	---	---	---	---	3.4E-03
Copper	1.6E-01	---	---	**1.1E+00**	1.4E-04	---	---	---	---	**1.2E+00**
Lead	4.1E-04	---	---	7.1E-04	2.0E-07	---	---	---	---	1.1E-03
Manganese	1.1E-04	---	---	5.4E-03	1.1E-04	---	---	---	---	5.7E-03
Mercury	4.2E-04	---	---	1.4E-02	1.8E-07	---	---	---	---	1.5E-02
Molybdenum	2.3E-03	---	---	8.8E-02	1.9E-05	---	---	---	---	9.0E-02
Nickel	2.7E-01	---	---	1.8E-01	4.2E-03	---	---	---	---	4.6E-01
Selenium	1.8E-02	---	---	**1.6E+00**	5.6E-05	---	---	---	---	**1.6E+00**
Silver	6.6E-05	---	---	4.9E-04	9.5E-08	---	---	---	---	5.6E-04
Strontium	1.2E-04	---	---	1.2E-02	7.7E-06	---	---	---	---	1.2E-02
Thallium	3.3E-03	---	---	1.2E-02	5.4E-05	---	---	---	---	1.5E-02
Uranium	5.4E-04	---	---	2.1E-04	4.0E-06	---	---	---	---	7.6E-04
Vanadium	2.1E-02	---	---	2.9E-02	4.3E-05	---	---	---	---	5.0E-02
Zinc	6.9E-03	---	---	4.0E-01	1.8E-05	---	---	---	---	4.1E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Snowshoe Hare Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.3E-03	2.3E-02	---	---	1.9E-05	---	---	---	---	2.5E-02
Arsenic	1.1E-02	8.8E-03	---	---	4.6E-05	---	---	---	---	2.0E-02
Barium	1.4E-04	1.5E-02	---	---	1.6E-05	---	---	---	---	1.5E-02
Beryllium	1.3E-03	2.1E-02	---	---	2.2E-05	---	---	---	---	2.2E-02
Cadmium	7.1E-04	1.4E-02	---	---	2.9E-07	---	---	---	---	1.5E-02
Chromium (Total)	7.7E-03	2.0E-02	---	---	7.1E-06	---	---	---	---	2.8E-02
Cobalt	1.1E-03	5.7E-03	---	---	2.5E-06	---	---	---	---	6.8E-03
Copper	9.5E-02	1.8E-01	---	---	3.5E-05	---	---	---	---	2.7E-01
Lead	7.4E-04	5.6E-04	---	---	1.5E-07	---	---	---	---	1.3E-03
Manganese	1.9E-04	1.9E-01	---	---	8.6E-05	---	---	---	---	1.9E-01
Mercury	8.1E-04	4.2E-03	---	---	1.4E-07	---	---	---	---	5.0E-03
Molybdenum	2.7E-03	1.5E-02	---	---	9.7E-06	---	---	---	---	1.7E-02
Nickel	1.6E-01	**1.2E+00**	---	---	1.1E-03	---	---	---	---	**1.4E+00**
Selenium	1.5E-02	2.0E-01	---	---	2.0E-05	---	---	---	---	2.2E-01
Silver	4.0E-05	4.8E-04	---	---	2.4E-08	---	---	---	---	5.2E-04
Strontium	3.0E-04	2.5E-02	---	---	8.1E-06	---	---	---	---	2.5E-02
Thallium	2.8E-03	5.9E-02	---	---	1.9E-05	---	---	---	---	6.2E-02
Uranium	6.3E-04	4.1E-04	---	---	2.0E-06	---	---	---	---	1.0E-03
Vanadium	1.7E-02	4.0E-02	---	---	1.5E-05	---	---	---	---	5.7E-02
Zinc	4.1E-03	1.1E-01	---	---	4.6E-06	---	---	---	---	1.1E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Woodland Caribou Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.3E-03	1.0E-02	---	---	3.9E-05	---	---	---	---	1.1E-02
Arsenic	5.5E-03	2.0E-03	---	---	5.1E-05	---	---	---	---	7.6E-03
Barium	3.8E-05	1.9E-03	---	---	9.8E-06	---	---	---	---	1.9E-03
Beryllium	1.2E-03	8.9E-03	---	---	4.4E-05	---	---	---	---	1.0E-02
Cadmium	2.0E-04	1.8E-03	---	---	1.8E-07	---	---	---	---	2.0E-03
Chromium (Total)	2.2E-03	2.6E-03	---	---	4.3E-06	---	---	---	---	4.8E-03
Cobalt	3.0E-04	7.3E-04	---	---	1.5E-06	---	---	---	---	1.0E-03
Copper	3.0E-02	2.5E-02	---	---	2.4E-05	---	---	---	---	5.6E-02
Lead	2.1E-04	7.2E-05	---	---	9.2E-08	---	---	---	---	2.8E-04
Manganese	5.3E-05	2.5E-02	---	---	5.3E-05	---	---	---	---	2.5E-02
Mercury	7.6E-04	1.8E-03	---	---	2.9E-07	---	---	---	---	2.6E-03
Molybdenum	2.6E-03	6.3E-03	---	---	2.0E-05	---	---	---	---	8.8E-03
Nickel	4.6E-02	1.5E-01	---	---	6.5E-04	---	---	---	---	2.0E-01
Selenium	1.4E-02	8.7E-02	---	---	4.0E-05	---	---	---	---	1.0E-01
Silver	2.3E-05	1.3E-04	---	---	3.0E-08	---	---	---	---	1.5E-04
Strontium	2.8E-04	1.1E-02	---	---	1.7E-05	---	---	---	---	1.1E-02
Thallium	2.6E-03	2.5E-02	---	---	3.9E-05	---	---	---	---	2.8E-02
Uranium	6.0E-04	1.7E-04	---	---	4.0E-06	---	---	---	---	7.7E-04
Vanadium	1.6E-02	1.7E-02	---	---	3.1E-05	---	---	---	---	3.3E-02
Zinc	1.2E-03	1.4E-02	---	---	2.8E-06	---	---	---	---	1.5E-02

Risk Quotients for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.8E-03	3.0E-02	---	---	1.2E-04	---	---	---	---	3.4E-02
Arsenic	1.7E-02	6.1E-03	---	---	1.5E-04	---	---	---	---	2.3E-02
Barium	3.8E-05	1.9E-03	---	---	9.8E-06	---	---	---	---	1.9E-03
Beryllium	1.2E-03	8.9E-03	---	---	4.4E-05	---	---	---	---	1.0E-02
Cadmium	2.0E-04	1.8E-03	---	---	1.8E-07	---	---	---	---	2.0E-03
Chromium (Total)	2.2E-03	2.6E-03	---	---	4.3E-06	---	---	---	---	4.8E-03
Cobalt	3.0E-04	7.3E-04	---	---	1.5E-06	---	---	---	---	1.0E-03
Copper	9.1E-02	7.6E-02	---	---	7.1E-05	---	---	---	---	1.7E-01
Lead	2.1E-04	7.2E-05	---	---	9.2E-08	---	---	---	---	2.8E-04
Manganese	5.3E-05	2.5E-02	---	---	5.3E-05	---	---	---	---	2.5E-02
Mercury	7.6E-04	1.8E-03	---	---	2.9E-07	---	---	---	---	2.6E-03
Molybdenum	7.7E-03	1.9E-02	---	---	5.9E-05	---	---	---	---	2.7E-02
Nickel	1.4E-01	4.6E-01	---	---	2.0E-03	---	---	---	---	6.0E-01
Selenium	4.3E-02	2.6E-01	---	---	1.2E-04	---	---	---	---	3.0E-01
Silver	6.9E-05	3.8E-04	---	---	9.1E-08	---	---	---	---	4.5E-04
Strontium	2.8E-04	1.1E-02	---	---	1.7E-05	---	---	---	---	1.1E-02
Thallium	7.8E-03	7.5E-02	---	---	1.2E-04	---	---	---	---	8.3E-02
Uranium	1.8E-03	5.2E-04	---	---	1.2E-05	---	---	---	---	2.3E-03
Vanadium	4.9E-02	5.1E-02	---	---	9.2E-05	---	---	---	---	9.9E-02
Zinc	3.5E-03	4.2E-02	---	---	8.4E-06	---	---	---	---	4.6E-02

Risk Quotients for the American Robin Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	9.2E-04	6.9E-04	2.0E-03	---	2.8E-06	---	---	---	---	3.6E-03
Barium	1.0E-04	9.9E-03	9.4E-05	---	8.5E-06	---	---	---	---	1.0E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	3.3E-02	1.9E-01	---	5.1E-07	---	---	---	---	2.2E-01
Chromium (Total)	1.4E-02	3.3E-02	4.3E-02	---	9.1E-06	---	---	---	---	9.0E-02
Cobalt	6.1E-03	3.0E-02	7.8E-03	---	1.0E-05	---	---	---	---	4.4E-02
Copper	3.2E-02	5.4E-02	7.1E-02	---	8.2E-06	---	---	---	---	1.6E-01
Lead	5.5E-03	3.8E-03	3.1E-02	---	8.0E-07	---	---	---	---	4.0E-02
Manganese	1.1E-04	1.0E-01	9.8E-05	---	3.5E-05	---	---	---	---	1.0E-01
Mercury	1.7E-03	8.0E-03	3.0E-02	---	2.2E-07	---	---	---	---	3.9E-02
Molybdenum	1.5E-04	7.7E-04	1.5E-03	---	3.9E-07	---	---	---	---	2.4E-03
Nickel	3.8E-02	2.6E-01	4.2E-01	---	1.8E-04	---	---	---	---	7.2E-01
Selenium	7.1E-03	8.8E-02	7.2E-02	---	6.6E-06	---	---	---	---	1.7E-01
Silver	2.3E-04	2.6E-03	4.9E-03	---	1.0E-07	---	---	---	---	7.8E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	2.9E-03	5.6E-02	1.4E-03	---	1.4E-05	---	---	---	---	6.1E-02
Uranium	5.6E-05	3.3E-05	1.9E-05	---	1.3E-07	---	---	---	---	1.1E-04
Vanadium	1.8E-01	3.8E-01	7.9E-02	---	1.1E-04	---	---	---	---	6.4E-01
Zinc	6.9E-03	1.7E-01	3.2E-01	---	5.5E-06	---	---	---	---	4.9E-01

Risk Quotients for the American Robin (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.8E-03	2.1E-03	6.0E-03	---	8.5E-06	---	---	---	---	1.1E-02
Barium	3.0E-04	3.0E-02	2.8E-04	---	2.5E-05	---	---	---	---	3.0E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	3.3E-02	1.9E-01	---	5.1E-07	---	---	---	---	2.2E-01
Chromium (Total)	1.4E-02	3.3E-02	4.3E-02	---	9.1E-06	---	---	---	---	9.0E-02
Cobalt	6.1E-03	3.0E-02	7.8E-03	---	1.0E-05	---	---	---	---	4.4E-02
Copper	3.2E-02	5.4E-02	7.1E-02	---	8.2E-06	---	---	---	---	1.6E-01
Lead	5.5E-03	3.8E-03	3.1E-02	---	8.0E-07	---	---	---	---	4.0E-02
Manganese	1.1E-04	1.0E-01	9.8E-05	---	3.5E-05	---	---	---	---	1.0E-01
Mercury	5.0E-03	2.4E-02	8.9E-02	---	6.5E-07	---	---	---	---	1.2E-01
Molybdenum	4.6E-04	2.3E-03	4.6E-03	---	1.2E-06	---	---	---	---	7.3E-03
Nickel	3.8E-02	2.6E-01	4.2E-01	---	1.8E-04	---	---	---	---	7.2E-01
Selenium	2.1E-02	2.6E-01	2.2E-01	---	2.0E-05	---	---	---	---	5.0E-01
Silver	7.0E-04	7.9E-03	1.5E-02	---	3.1E-07	---	---	---	---	2.3E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	8.7E-03	1.7E-01	4.2E-03	---	4.3E-05	---	---	---	---	1.8E-01
Uranium	5.6E-05	3.3E-05	1.9E-05	---	1.3E-07	---	---	---	---	1.1E-04
Vanadium	5.4E-01	**1.2E+00**	2.4E-01	---	3.4E-04	---	---	---	---	**1.9E+00**
Zinc	6.9E-03	1.7E-01	3.2E-01	---	5.5E-06	---	---	---	---	4.9E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Barn Swallow Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	6.3E-04	1.5E-05	6.6E-03	---	4.6E-06	---	---	---	---	7.3E-03
Barium	6.9E-05	2.2E-04	3.1E-04	---	1.4E-05	---	---	---	---	6.1E-04
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.2E-03	7.2E-04	6.2E-01	---	8.3E-07	---	---	---	---	6.2E-01
Chromium (Total)	9.4E-03	7.3E-04	1.4E-01	---	1.5E-05	---	---	---	---	1.5E-01
Cobalt	4.2E-03	6.6E-04	2.5E-02	---	1.7E-05	---	---	---	---	3.0E-02
Copper	2.2E-02	1.2E-03	2.3E-01	---	1.3E-05	---	---	---	---	2.6E-01
Lead	3.8E-03	8.4E-05	1.0E-01	---	1.3E-06	---	---	---	---	1.0E-01
Manganese	7.4E-05	2.2E-03	3.2E-04	---	5.6E-05	---	---	---	---	2.7E-03
Mercury	1.2E-03	1.8E-04	9.7E-02	---	3.5E-07	---	---	---	---	9.8E-02
Molybdenum	1.1E-04	1.7E-05	5.0E-03	---	6.3E-07	---	---	---	---	5.1E-03
Nickel	2.6E-02	5.8E-03	**1.4E+00**	---	2.9E-04	---	---	---	---	**1.4E+00**
Selenium	4.9E-03	2.0E-03	2.4E-01	---	1.1E-05	---	---	---	---	2.4E-01
Silver	1.6E-04	5.8E-05	1.6E-02	---	1.6E-07	---	---	---	---	1.6E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.9E-03	1.2E-03	4.5E-03	---	2.2E-05	---	---	---	---	7.6E-03
Uranium	3.8E-05	7.3E-07	6.3E-05	---	2.0E-07	---	---	---	---	1.0E-04
Vanadium	1.2E-01	8.5E-03	2.6E-01	---	1.8E-04	---	---	---	---	3.9E-01
Zinc	4.8E-03	3.7E-03	**1.0E+00**	---	8.9E-06	---	---	---	---	**1.0E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Barn Swallow (SaR) Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.9E-03	4.6E-05	2.0E-02	---	1.4E-05	---	---	---	---	2.2E-02
Barium	2.1E-04	6.5E-04	9.3E-04	---	4.1E-05	---	---	---	---	1.8E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.2E-03	7.2E-04	6.2E-01	---	8.3E-07	---	---	---	---	6.2E-01
Chromium (Total)	9.4E-03	7.3E-04	1.4E-01	---	1.5E-05	---	---	---	---	1.5E-01
Cobalt	4.2E-03	6.6E-04	2.5E-02	---	1.7E-05	---	---	---	---	3.0E-02
Copper	2.2E-02	1.2E-03	2.3E-01	---	1.3E-05	---	---	---	---	2.6E-01
Lead	3.8E-03	8.4E-05	1.0E-01	---	1.3E-06	---	---	---	---	1.0E-01
Manganese	7.4E-05	2.2E-03	3.2E-04	---	5.6E-05	---	---	---	---	2.7E-03
Mercury	3.5E-03	5.3E-04	2.9E-01	---	1.0E-06	---	---	---	---	3.0E-01
Molybdenum	3.2E-04	5.1E-05	1.5E-02	---	1.9E-06	---	---	---	---	1.5E-02
Nickel	2.6E-02	5.8E-03	**1.4E+00**	---	2.9E-04	---	---	---	---	**1.4E+00**
Selenium	1.5E-02	5.9E-03	7.1E-01	---	3.2E-05	---	---	---	---	7.3E-01
Silver	4.8E-04	1.7E-04	4.9E-02	---	4.9E-07	---	---	---	---	4.9E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	5.8E-03	3.6E-03	1.3E-02	---	6.7E-05	---	---	---	---	2.3E-02
Uranium	3.8E-05	7.3E-07	6.3E-05	---	2.0E-07	---	---	---	---	1.0E-04
Vanadium	3.7E-01	2.6E-02	7.8E-01	---	5.5E-04	---	---	---	---	**1.2E+00**
Zinc	4.8E-03	3.7E-03	**1.0E+00**	---	8.9E-06	---	---	---	---	**1.0E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common Loon Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	1.1E-06	3.0E-04	---	2.4E-03	1.0E-03	3.7E-03
Barium	---	---	---	---	5.4E-06	1.6E-04	---	4.5E-04	8.7E-04	1.5E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	1.3E-07	2.9E-04	---	8.1E-03	1.6E-02	2.4E-02
Chromium (Total)	---	---	---	---	2.3E-06	3.6E-02	---	6.2E-02	9.0E-03	1.1E-01
Cobalt	---	---	---	---	2.6E-06	1.5E-02	---	7.1E-04	8.0E-03	2.3E-02
Copper	---	---	---	---	2.1E-06	6.8E-03	---	6.5E-02	1.9E-01	2.6E-01
Lead	---	---	---	---	2.0E-07	6.4E-04	---	1.4E-03	2.9E-03	5.0E-03
Manganese	---	---	---	---	8.8E-06	3.4E-04	---	1.0E-03	7.2E-04	2.1E-03
Mercury	---	---	---	---	1.3E-07	1.7E-04	---	4.1E-04	2.0E-01	2.0E-01
Molybdenum	---	---	---	---	1.3E-07	2.8E-05	---	2.9E-04	1.1E-03	1.4E-03
Nickel	---	---	---	---	4.6E-05	4.7E-02	---	8.6E-02	1.0E-02	1.4E-01
Selenium	---	---	---	---	2.5E-06	8.3E-04	---	1.0E-02	3.5E-01	3.6E-01
Silver	---	---	---	---	4.3E-08	5.1E-05	---	8.0E-05	2.5E-03	2.6E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	1.0E-05	1.5E-03	---	6.1E-03	2.4E-02	3.1E-02
Uranium	---	---	---	---	4.5E-08	4.2E-05	---	1.4E-05	1.2E-05	6.9E-05
Vanadium	---	---	---	---	7.4E-05	2.8E-01	---	1.0E-01	3.9E-01	7.8E-01
Zinc	---	---	---	---	1.8E-06	2.1E-03	---	4.9E-02	1.1E-01	1.6E-01

Risk Quotients for the Lesser Scaup Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	1.4E-06	2.8E-04	2.9E-05	2.2E-02	---	2.2E-02
Barium	---	---	---	---	6.4E-06	1.4E-04	6.1E-05	3.7E-03	---	3.9E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	2.5E-07	4.0E-04	1.0E-03	1.1E-01	---	1.1E-01
Chromium (Total)	---	---	---	---	4.4E-06	4.9E-02	5.8E-03	8.4E-01	---	9.0E-01
Cobalt	---	---	---	---	5.0E-06	2.0E-02	4.3E-04	9.6E-03	---	3.0E-02
Copper	---	---	---	---	4.0E-06	9.4E-03	2.7E-03	8.8E-01	---	8.9E-01
Lead	---	---	---	---	3.9E-07	8.9E-04	2.8E-04	2.0E-02	---	2.1E-02
Manganese	---	---	---	---	1.7E-05	4.7E-04	1.1E-04	1.4E-02	---	1.5E-02
Mercury	---	---	---	---	1.5E-07	1.4E-04	5.1E-04	3.4E-03	---	4.0E-03
Molybdenum	---	---	---	---	1.9E-07	2.8E-05	1.9E-05	2.9E-03	---	3.0E-03
Nickel	---	---	---	---	8.8E-05	6.5E-02	4.6E-03	**1.2E+00**	---	**1.2E+00**
Selenium	---	---	---	---	3.2E-06	7.6E-04	1.0E-03	9.3E-02	---	9.5E-02
Silver	---	---	---	---	5.0E-08	4.3E-05	4.2E-06	6.5E-04	---	7.0E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	1.2E-05	1.3E-03	9.0E-06	5.0E-02	---	5.1E-02
Uranium	---	---	---	---	6.1E-08	4.1E-05	1.0E-06	1.3E-04	---	1.8E-04
Vanadium	---	---	---	---	8.7E-05	2.4E-01	3.3E-03	8.4E-01	---	**1.1E+00**
Zinc	---	---	---	---	2.7E-06	2.2E-03	3.3E-03	5.2E-01	---	5.2E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Mallard Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.0E-05	1.5E-05	6.7E-05	---	1.2E-06	3.6E-04	1.7E-04	1.1E-02	---	1.2E-02
Barium	3.8E-06	3.7E-04	5.3E-06	---	6.1E-06	2.0E-04	3.7E-04	2.0E-03	---	3.0E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.8E-05	6.9E-04	6.1E-03	---	2.1E-07	5.0E-04	5.5E-03	5.3E-02	---	6.5E-02
Chromium (Total)	2.9E-04	7.1E-04	1.4E-03	---	3.7E-06	6.2E-02	3.1E-02	4.0E-01	---	5.0E-01
Cobalt	1.3E-04	6.3E-04	2.5E-04	---	4.2E-06	2.6E-02	2.3E-03	4.6E-03	---	3.4E-02
Copper	6.7E-04	1.1E-03	2.3E-03	---	3.3E-06	1.2E-02	1.5E-02	4.2E-01	---	4.5E-01
Lead	1.2E-04	8.1E-05	9.8E-04	---	3.2E-07	1.1E-03	1.5E-03	9.4E-03	---	1.3E-02
Manganese	2.3E-06	2.1E-03	3.1E-06	---	1.4E-05	5.9E-04	5.7E-04	6.8E-03	---	1.0E-02
Mercury	6.0E-05	2.9E-04	1.6E-03	---	1.5E-07	2.0E-04	3.1E-03	1.8E-03	---	7.1E-03
Molybdenum	3.3E-06	1.6E-05	4.9E-05	---	1.6E-07	3.6E-05	1.0E-04	1.4E-03	---	1.6E-03
Nickel	8.1E-04	5.6E-03	1.3E-02	---	7.4E-05	8.1E-02	2.5E-02	5.6E-01	---	6.8E-01
Selenium	1.6E-04	2.0E-03	2.4E-03	---	2.8E-06	9.9E-04	5.8E-03	4.7E-02	---	5.8E-02
Silver	5.7E-06	6.5E-05	1.8E-04	---	4.8E-08	6.1E-05	2.6E-05	3.6E-04	---	7.0E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.2E-04	2.4E-03	8.9E-05	---	1.1E-05	1.8E-03	5.5E-05	2.7E-02	---	3.2E-02
Uranium	1.2E-06	7.0E-07	6.1E-07	---	5.1E-08	5.1E-05	5.5E-06	6.4E-05	---	1.2E-04
Vanadium	6.8E-03	1.5E-02	4.5E-03	---	8.3E-05	3.4E-01	2.0E-02	4.6E-01	---	8.5E-01
Zinc	1.5E-04	3.6E-03	1.0E-02	---	2.2E-06	2.8E-03	1.8E-02	2.5E-01	---	2.8E-01

Risk Quotients for the Red-tailed Hawk Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	8.1E-05	---	---	3.7E-04	1.2E-06	---	---	---	---	4.5E-04
Barium	1.5E-05	---	---	6.1E-03	6.2E-06	---	---	---	---	6.1E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.5E-04	---	---	2.4E-02	2.2E-07	---	---	---	---	2.4E-02
Chromium (Total)	1.2E-03	---	---	1.9E-03	3.8E-06	---	---	---	---	3.1E-03
Cobalt	5.3E-04	---	---	2.4E-03	4.3E-06	---	---	---	---	2.9E-03
Copper	2.7E-03	---	---	1.8E-02	3.4E-06	---	---	---	---	2.1E-02
Lead	4.7E-04	---	---	8.1E-04	3.3E-07	---	---	---	---	1.3E-03
Manganese	9.2E-06	---	---	4.7E-04	1.5E-05	---	---	---	---	5.0E-04
Mercury	2.4E-04	---	---	8.0E-03	1.5E-07	---	---	---	---	8.3E-03
Molybdenum	1.3E-05	---	---	5.0E-04	1.6E-07	---	---	---	---	5.1E-04
Nickel	3.3E-03	---	---	2.2E-03	7.6E-05	---	---	---	---	5.6E-03
Selenium	6.2E-04	---	---	5.3E-02	2.9E-06	---	---	---	---	5.4E-02
Silver	2.3E-05	---	---	1.7E-04	4.9E-08	---	---	---	---	1.9E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	4.8E-04	---	---	1.7E-03	1.2E-05	---	---	---	---	2.2E-03
Uranium	4.8E-06	---	---	1.9E-06	5.3E-08	---	---	---	---	6.7E-06
Vanadium	2.7E-02	---	---	3.8E-02	8.4E-05	---	---	---	---	6.5E-02
Zinc	6.0E-04	---	---	3.4E-02	2.3E-06	---	---	---	---	3.5E-02

Risk Quotients for the Spotted Sandpiper Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.3E-04	---	2.4E-03	---	3.6E-06	3.8E-04	5.0E-05	2.5E-02	1.9E-04	2.8E-02
Barium	2.5E-05	---	1.1E-04	---	1.1E-05	1.2E-04	6.7E-05	2.7E-03	9.7E-05	3.1E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	4.5E-04	---	2.3E-01	---	6.6E-07	5.4E-04	1.7E-03	1.2E-01	4.5E-03	3.6E-01
Chromium (Total)	3.4E-03	---	5.3E-02	---	1.2E-05	6.7E-02	9.8E-03	9.6E-01	2.6E-03	**1.1E+00**
Cobalt	1.5E-03	---	9.4E-03	---	1.3E-05	2.8E-02	7.4E-04	1.1E-02	2.3E-03	5.3E-02
Copper	8.0E-03	---	8.6E-02	---	1.1E-05	1.3E-02	4.6E-03	1.0E+00	5.3E-02	**1.2E+00**
Lead	1.4E-03	---	3.7E-02	---	1.0E-06	1.2E-03	4.7E-04	2.2E-02	8.3E-04	6.3E-02
Manganese	2.7E-05	---	1.2E-04	---	4.5E-05	6.4E-04	1.8E-04	1.6E-02	2.1E-04	1.7E-02
Mercury	4.2E-04	---	3.6E-02	---	2.8E-07	1.3E-04	5.9E-04	2.6E-03	2.3E-02	6.3E-02
Molybdenum	3.9E-05	---	1.8E-03	---	5.0E-07	3.9E-05	3.3E-05	3.3E-03	2.2E-04	5.5E-03
Nickel	9.6E-03	---	5.1E-01	---	2.3E-04	8.8E-02	7.9E-03	**1.3E+00**	2.9E-03	**1.9E+00**
Selenium	1.8E-03	---	8.8E-02	---	8.5E-06	1.0E-03	1.8E-03	1.1E-01	6.6E-02	2.6E-01
Silver	5.9E-05	---	6.0E-03	---	1.3E-07	5.7E-05	7.0E-06	7.3E-04	4.2E-04	7.3E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	7.1E-04	---	1.7E-03	---	1.8E-05	9.7E-04	8.6E-06	3.2E-02	2.3E-03	3.7E-02
Uranium	1.4E-05	---	2.3E-05	---	1.6E-07	5.5E-05	1.8E-06	1.5E-04	2.5E-06	2.5E-04
Vanadium	4.6E-02	---	9.6E-02	---	1.5E-04	2.1E-01	3.6E-03	6.2E-01	4.4E-02	**1.0E+00**
Zinc	1.7E-03	---	3.8E-01	---	7.0E-06	3.0E-03	5.6E-03	5.9E-01	2.4E-02	**1.0E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Spruce Grouse Exposed to Constituents of Concern at the MacLellan Region - Baseline Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.7E-04	4.2E-04	9.6E-05	---	1.4E-06	---	---	---	---	6.8E-04
Barium	2.8E-05	8.9E-03	6.7E-06	---	6.5E-06	---	---	---	---	8.9E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.3E-04	2.0E-02	9.1E-03	---	2.6E-07	---	---	---	---	2.9E-02
Chromium (Total)	2.6E-03	2.0E-02	2.1E-03	---	4.6E-06	---	---	---	---	2.5E-02
Cobalt	1.1E-03	1.8E-02	3.7E-04	---	5.3E-06	---	---	---	---	2.0E-02
Copper	5.9E-03	3.3E-02	3.4E-03	---	4.2E-06	---	---	---	---	4.2E-02
Lead	1.0E-03	2.3E-03	1.5E-03	---	4.1E-07	---	---	---	---	4.8E-03
Manganese	2.0E-05	6.1E-02	4.7E-06	---	1.8E-05	---	---	---	---	6.1E-02
Mercury	4.4E-04	6.8E-03	2.0E-03	---	1.6E-07	---	---	---	---	9.3E-03
Molybdenum	2.9E-05	4.6E-04	7.3E-05	---	2.0E-07	---	---	---	---	5.6E-04
Nickel	7.1E-03	1.6E-01	2.0E-02	---	9.3E-05	---	---	---	---	1.9E-01
Selenium	1.3E-03	5.3E-02	3.5E-03	---	3.4E-06	---	---	---	---	5.8E-02
Silver	4.3E-05	1.6E-03	2.4E-04	---	5.2E-08	---	---	---	---	1.9E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	8.9E-04	5.7E-02	1.1E-04	---	1.2E-05	---	---	---	---	5.8E-02
Uranium	1.0E-05	2.0E-05	9.1E-07	---	6.4E-08	---	---	---	---	3.1E-05
Vanadium	5.0E-02	3.5E-01	5.6E-03	---	8.8E-05	---	---	---	---	4.0E-01
Zinc	1.3E-03	1.0E-01	1.5E-02	---	2.8E-06	---	---	---	---	1.2E-01

Risk Quotients for the American Beaver Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.2E-04	1.5E-03	---	---	5.7E-05	2.3E-04	4.5E-05	---	---	1.9E-03
Arsenic	6.7E-04	3.9E-04	---	---	8.8E-05	1.5E-03	2.9E-04	---	---	3.0E-03
Barium	5.8E-06	4.4E-04	---	---	1.4E-05	4.7E-05	3.7E-05	---	---	5.4E-04
Beryllium	1.1E-04	1.3E-03	---	---	3.5E-05	5.8E-04	2.2E-03	---	---	4.2E-03
Cadmium	3.1E-05	4.3E-04	---	---	4.5E-07	6.2E-05	2.8E-04	---	---	8.0E-04
Chromium (Total)	3.4E-04	6.5E-04	---	---	6.1E-06	1.1E-02	2.2E-03	---	---	1.4E-02
Cobalt	4.7E-05	1.8E-04	---	---	3.2E-06	1.4E-03	5.3E-05	---	---	1.7E-03
Copper	4.1E-03	5.3E-03	---	---	2.8E-05	1.1E-02	5.5E-03	---	---	2.6E-02
Lead	3.2E-05	1.7E-05	---	---	1.3E-07	4.7E-05	2.6E-05	---	---	1.2E-04
Manganese	8.0E-06	5.8E-03	---	---	7.1E-05	3.3E-04	1.3E-04	---	---	6.4E-03
Mercury	7.2E-05	2.6E-04	---	---	2.3E-07	3.7E-05	2.4E-04	---	---	6.1E-04
Molybdenum	2.4E-04	9.2E-04	---	---	3.1E-05	4.2E-04	5.0E-04	---	---	2.1E-03
Nickel	6.9E-03	3.6E-02	---	---	8.6E-04	1.1E-01	1.3E-02	---	---	1.6E-01
Selenium	1.3E-03	1.3E-02	---	---	3.7E-05	1.3E-03	3.1E-03	---	---	1.9E-02
Silver	2.2E-06	1.9E-05	---	---	2.5E-08	3.5E-06	6.1E-07	---	---	2.5E-05
Strontium	2.6E-05	1.6E-03	---	---	1.9E-05	1.1E-04	2.1E-04	---	---	1.9E-03
Thallium	2.5E-04	3.8E-03	---	---	3.0E-05	5.7E-04	7.1E-06	---	---	4.6E-03
Uranium	5.6E-05	2.6E-05	---	---	5.9E-06	3.9E-04	1.7E-05	---	---	4.9E-04
Vanadium	1.5E-03	2.5E-03	---	---	2.5E-05	1.2E-02	2.8E-04	---	---	1.6E-02
Zinc	1.8E-04	3.3E-03	---	---	3.7E-06	5.1E-04	1.3E-03	---	---	5.4E-03

Risk Quotients for the American Mink Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	7.0E-05	---	---	3.7E-04	1.0E-05	2.0E-04	---	3.8E-05	9.3E-03	1.0E-02
Arsenic	8.3E-04	---	---	3.8E-03	3.3E-05	2.8E-03	---	2.9E-02	1.9E-02	5.5E-02
Barium	8.0E-06	---	---	3.3E-03	5.7E-06	9.5E-05	---	3.5E-04	5.5E-04	4.3E-03
Beryllium	6.7E-05	---	---	4.1E-04	6.2E-06	5.1E-04	---	1.8E-03	1.1E-03	3.9E-03
Cadmium	4.3E-05	---	---	6.7E-03	1.9E-07	1.3E-04	---	4.7E-03	1.2E-02	2.4E-02
Chromium (Total)	4.8E-04	---	---	7.7E-04	2.5E-06	2.2E-02	---	5.1E-02	6.1E-03	8.0E-02
Cobalt	6.5E-05	---	---	3.0E-04	1.3E-06	2.9E-03	---	1.9E-04	2.5E-03	5.9E-03
Copper	5.7E-03	---	---	3.8E-02	1.2E-05	2.2E-02	---	2.8E-01	6.1E-01	9.6E-01
Lead	4.5E-05	---	---	7.6E-05	5.6E-08	9.6E-05	---	2.9E-04	4.9E-04	9.9E-04
Manganese	1.1E-05	---	---	5.8E-04	3.0E-05	6.7E-04	---	2.7E-03	1.5E-03	5.5E-03
Mercury	4.5E-05	---	---	1.5E-03	4.4E-08	3.4E-05	---	1.1E-04	4.0E-02	4.2E-02
Molybdenum	1.4E-04	---	---	5.4E-03	5.6E-06	3.7E-04	---	5.1E-03	2.7E-02	3.8E-02
Nickel	9.6E-03	---	---	6.5E-03	3.6E-04	2.2E-01	---	5.3E-01	4.7E-02	8.1E-01
Selenium	8.0E-04	---	---	6.8E-02	6.6E-06	1.1E-03	---	1.9E-02	5.5E-01	6.4E-01
Silver	2.4E-06	---	---	1.8E-05	8.2E-09	5.6E-06	---	1.2E-05	2.9E-04	3.2E-04
Strontium	1.6E-05	---	---	1.5E-03	3.4E-06	9.3E-05	---	1.6E-04	7.0E-03	8.8E-03
Thallium	1.5E-04	---	---	5.4E-04	5.4E-06	5.0E-04	---	2.7E-03	7.5E-03	1.1E-02
Uranium	3.4E-05	---	---	1.3E-05	1.1E-06	3.4E-04	---	1.5E-04	1.8E-04	7.2E-04
Vanadium	9.2E-04	---	---	1.3E-03	4.5E-06	1.0E-02	---	4.9E-03	1.4E-02	3.2E-02
Zinc	2.5E-04	---	---	1.4E-02	1.5E-06	1.0E-03	---	3.3E-02	5.3E-02	1.0E-01

Risk Quotients for the Black Bear Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.7E-04	2.4E-02	1.4E-03	5.9E-04	6.6E-05	5.4E-05	---	---	2.9E-03	2.9E-02
Arsenic	3.3E-03	6.3E-03	1.6E-03	3.0E-03	1.0E-04	3.6E-04	---	---	2.8E-03	1.7E-02
Barium	2.2E-05	5.5E-03	4.9E-06	1.8E-03	1.2E-05	8.6E-06	---	---	5.7E-05	7.3E-03
Beryllium	5.4E-04	2.1E-02	6.1E-05	6.6E-04	4.0E-05	1.4E-04	---	---	3.4E-04	2.3E-02
Cadmium	1.2E-04	5.4E-03	2.9E-03	3.6E-03	4.1E-07	1.1E-05	---	---	1.3E-03	1.3E-02
Chromium (Total)	1.3E-03	8.0E-03	9.8E-04	4.1E-04	5.5E-06	2.0E-03	---	---	6.3E-04	1.3E-02
Cobalt	1.7E-04	2.2E-03	5.3E-05	1.6E-04	2.9E-06	2.6E-04	---	---	2.6E-04	3.1E-03
Copper	1.5E-02	6.6E-02	8.2E-03	2.0E-02	2.5E-05	2.0E-03	---	---	6.3E-02	1.7E-01
Lead	1.2E-04	2.1E-04	1.6E-04	4.1E-05	1.2E-07	8.6E-06	---	---	5.1E-05	5.9E-04
Manganese	3.0E-05	7.2E-02	6.6E-06	3.1E-04	6.4E-05	6.0E-05	---	---	1.5E-04	7.3E-02
Mercury	3.5E-04	4.2E-03	1.5E-03	2.4E-03	2.7E-07	8.7E-06	---	---	1.2E-02	2.0E-02
Molybdenum	1.2E-03	1.5E-02	2.8E-03	8.8E-03	3.7E-05	9.9E-05	---	---	8.3E-03	3.6E-02
Nickel	2.6E-02	4.5E-01	6.8E-02	3.5E-03	7.7E-04	2.0E-02	---	---	4.8E-03	5.7E-01
Selenium	6.5E-03	2.1E-01	1.6E-02	1.1E-01	4.3E-05	3.1E-04	---	---	1.7E-01	5.1E-01
Silver	1.1E-05	3.1E-04	5.4E-05	1.6E-05	3.0E-08	8.4E-07	---	---	4.9E-05	4.4E-04
Strontium	1.3E-04	2.5E-02	2.8E-05	2.5E-03	2.2E-05	2.5E-05	---	---	2.2E-03	3.0E-02
Thallium	1.2E-03	6.1E-02	1.4E-04	8.7E-04	3.5E-05	1.4E-04	---	---	2.4E-03	6.5E-02
Uranium	2.7E-04	4.1E-04	2.2E-05	2.1E-05	6.9E-06	9.2E-05	---	---	5.5E-05	8.8E-04
Vanadium	7.5E-03	4.1E-02	7.9E-04	2.1E-03	2.9E-05	2.7E-03	---	---	4.5E-03	5.8E-02
Zinc	6.7E-04	4.2E-02	7.2E-03	7.6E-03	3.3E-06	9.4E-05	---	---	5.4E-03	6.3E-02

Risk Quotients for the Common (Masked) Shrew Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.7E-03	4.4E-03	8.1E-02	---	4.7E-05	---	---	---	---	8.7E-02
Arsenic	2.5E-02	3.0E-03	2.3E-01	---	1.9E-04	---	---	---	---	2.6E-01
Barium	2.4E-04	3.8E-03	1.0E-03	---	3.2E-05	---	---	---	---	5.2E-03
Beryllium	1.6E-03	4.0E-03	3.5E-03	---	2.9E-05	---	---	---	---	9.1E-03
Cadmium	1.3E-03	3.8E-03	6.3E-01	---	1.1E-06	---	---	---	---	6.3E-01
Chromium (Total)	1.4E-02	5.6E-03	2.1E-01	---	1.4E-05	---	---	---	---	2.3E-01
Cobalt	1.9E-03	1.5E-03	1.1E-02	---	7.6E-06	---	---	---	---	1.5E-02
Copper	1.7E-01	4.6E-02	**1.7E+00**	---	6.7E-05	---	---	---	---	**2.0E+00**
Lead	1.3E-03	1.5E-04	3.4E-02	---	3.2E-07	---	---	---	---	3.6E-02
Manganese	3.3E-04	5.1E-02	1.4E-03	---	1.7E-04	---	---	---	---	5.2E-02
Mercury	1.3E-03	1.0E-03	1.1E-01	---	2.5E-07	---	---	---	---	1.1E-01
Molybdenum	1.9E-03	1.5E-03	8.6E-02	---	1.4E-05	---	---	---	---	8.9E-02
Nickel	2.9E-01	3.2E-01	**1.5E+01**	---	2.0E-03	---	---	---	---	**1.5E+01**
Selenium	1.9E-02	3.9E-02	9.1E-01	---	3.0E-05	---	---	---	---	9.7E-01
Silver	7.1E-05	1.3E-04	6.9E-03	---	4.7E-08	---	---	---	---	7.1E-03
Strontium	3.8E-04	4.7E-03	1.6E-03	---	1.6E-05	---	---	---	---	6.7E-03
Thallium	3.6E-03	1.1E-02	8.1E-03	---	2.5E-05	---	---	---	---	2.3E-02
Uranium	4.4E-04	4.2E-05	6.9E-04	---	2.7E-06	---	---	---	---	1.2E-03
Vanadium	2.2E-02	7.7E-03	4.5E-02	---	2.1E-05	---	---	---	---	7.5E-02
Zinc	7.4E-03	2.9E-02	**1.5E+00**	---	8.7E-06	---	---	---	---	**1.6E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common (Masked) Shrew (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.1E-03	1.3E-02	2.4E-01	---	1.4E-04	---	---	---	---	2.6E-01
Arsenic	7.5E-02	9.0E-03	7.0E-01	---	5.6E-04	---	---	---	---	7.8E-01
Barium	2.4E-04	3.8E-03	1.0E-03	---	3.2E-05	---	---	---	---	5.2E-03
Beryllium	1.6E-03	4.0E-03	3.5E-03	---	2.9E-05	---	---	---	---	9.1E-03
Cadmium	1.3E-03	3.8E-03	6.3E-01	---	1.1E-06	---	---	---	---	6.3E-01
Chromium (Total)	1.4E-02	5.6E-03	2.1E-01	---	1.4E-05	---	---	---	---	2.3E-01
Cobalt	1.9E-03	1.5E-03	1.1E-02	---	7.6E-06	---	---	---	---	1.5E-02
Copper	5.1E-01	1.4E-01	**5.2E+00**	---	2.0E-04	---	---	---	---	**5.9E+00**
Lead	1.3E-03	1.5E-04	3.4E-02	---	3.2E-07	---	---	---	---	3.6E-02
Manganese	3.3E-04	5.1E-02	1.4E-03	---	1.7E-04	---	---	---	---	5.2E-02
Mercury	1.3E-03	1.0E-03	1.1E-01	---	2.5E-07	---	---	---	---	1.1E-01
Molybdenum	5.7E-03	4.5E-03	2.6E-01	---	4.2E-05	---	---	---	---	2.7E-01
Nickel	8.6E-01	9.5E-01	**4.4E+01**	---	6.1E-03	---	---	---	---	**4.5E+01**
Selenium	5.8E-02	1.2E-01	**2.7E+00**	---	9.1E-05	---	---	---	---	**2.9E+00**
Silver	2.1E-04	3.9E-04	2.1E-02	---	1.4E-07	---	---	---	---	2.1E-02
Strontium	3.8E-04	4.7E-03	1.6E-03	---	1.6E-05	---	---	---	---	6.7E-03
Thallium	1.1E-02	3.4E-02	2.4E-02	---	7.5E-05	---	---	---	---	6.9E-02
Uranium	1.3E-03	1.3E-04	2.1E-03	---	8.0E-06	---	---	---	---	3.5E-03
Vanadium	6.7E-02	2.3E-02	1.3E-01	---	6.2E-05	---	---	---	---	2.2E-01
Zinc	2.2E-02	8.7E-02	**4.6E+00**	---	2.6E-05	---	---	---	---	**4.7E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Deer Mouse Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	2.1E-04	5.7E-03	5.5E-03	---	5.2E-05	---	---	---	---	1.1E-02
Arsenic	3.1E-03	3.8E-03	1.6E-02	---	2.1E-04	---	---	---	---	2.3E-02
Barium	3.0E-05	4.9E-03	7.1E-05	---	3.6E-05	---	---	---	---	5.1E-03
Beryllium	2.0E-04	5.1E-03	2.3E-04	---	3.2E-05	---	---	---	---	5.5E-03
Cadmium	1.6E-04	4.8E-03	4.2E-02	---	1.2E-06	---	---	---	---	4.7E-02
Chromium (Total)	1.8E-03	7.2E-03	1.4E-02	---	1.6E-05	---	---	---	---	2.3E-02
Cobalt	2.4E-04	2.0E-03	7.6E-04	---	8.5E-06	---	---	---	---	3.0E-03
Copper	2.1E-02	6.0E-02	1.2E-01	---	7.4E-05	---	---	---	---	2.0E-01
Lead	1.7E-04	1.9E-04	2.3E-03	---	3.5E-07	---	---	---	---	2.7E-03
Manganese	4.2E-05	6.5E-02	9.5E-05	---	1.9E-04	---	---	---	---	6.5E-02
Mercury	1.7E-04	1.3E-03	7.4E-03	---	2.8E-07	---	---	---	---	8.8E-03
Molybdenum	2.4E-04	1.9E-03	5.8E-03	---	1.6E-05	---	---	---	---	8.0E-03
Nickel	3.6E-02	4.1E-01	9.8E-01	---	2.3E-03	---	---	---	---	**1.4E+00**
Selenium	2.4E-03	5.0E-02	6.1E-02	---	3.4E-05	---	---	---	---	1.1E-01
Silver	8.9E-06	1.7E-04	4.7E-04	---	5.2E-08	---	---	---	---	6.4E-04
Strontium	4.7E-05	6.1E-03	1.1E-04	---	1.7E-05	---	---	---	---	6.2E-03
Thallium	4.5E-04	1.5E-02	5.5E-04	---	2.8E-05	---	---	---	---	1.6E-02
Uranium	5.5E-05	5.4E-05	4.7E-05	---	2.9E-06	---	---	---	---	1.6E-04
Vanadium	2.8E-03	9.8E-03	3.0E-03	---	2.3E-05	---	---	---	---	1.6E-02
Zinc	9.3E-04	3.7E-02	1.0E-01	---	9.7E-06	---	---	---	---	1.4E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Meadow Vole Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.0E-04	1.4E-02	---	---	5.7E-05	---	---	---	---	1.4E-02
Arsenic	4.3E-03	9.3E-03	---	---	2.3E-04	---	---	---	---	1.4E-02
Barium	4.2E-05	1.2E-02	---	---	4.0E-05	---	---	---	---	1.2E-02
Beryllium	2.8E-04	1.2E-02	---	---	3.5E-05	---	---	---	---	1.3E-02
Cadmium	2.2E-04	1.2E-02	---	---	1.3E-06	---	---	---	---	1.2E-02
Chromium (Total)	2.5E-03	1.7E-02	---	---	1.8E-05	---	---	---	---	2.0E-02
Cobalt	3.4E-04	4.7E-03	---	---	9.3E-06	---	---	---	---	5.1E-03
Copper	3.0E-02	1.4E-01	---	---	8.2E-05	---	---	---	---	1.7E-01
Lead	2.3E-04	4.6E-04	---	---	3.9E-07	---	---	---	---	6.9E-04
Manganese	5.8E-05	1.6E-01	---	---	2.1E-04	---	---	---	---	1.6E-01
Mercury	2.4E-04	3.2E-03	---	---	3.1E-07	---	---	---	---	3.4E-03
Molybdenum	3.4E-04	4.8E-03	---	---	1.8E-05	---	---	---	---	5.2E-03
Nickel	5.0E-02	9.8E-01	---	---	2.5E-03	---	---	---	---	**1.0E+00**
Selenium	3.4E-03	1.2E-01	---	---	3.7E-05	---	---	---	---	1.2E-01
Silver	1.2E-05	4.0E-04	---	---	5.8E-08	---	---	---	---	4.1E-04
Strontium	6.6E-05	1.5E-02	---	---	1.9E-05	---	---	---	---	1.5E-02
Thallium	6.3E-04	3.5E-02	---	---	3.0E-05	---	---	---	---	3.6E-02
Uranium	8.0E-05	1.3E-04	---	---	3.4E-06	---	---	---	---	2.2E-04
Vanadium	3.9E-03	2.4E-02	---	---	2.5E-05	---	---	---	---	2.8E-02
Zinc	1.3E-03	9.0E-02	---	---	1.1E-05	---	---	---	---	9.1E-02

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Moose Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	4.5E-04	2.5E-02	---	---	8.6E-05	1.2E-04	2.3E-04	---	---	2.6E-02
Arsenic	2.6E-03	6.6E-03	---	---	1.3E-04	7.9E-04	1.5E-03	---	---	1.2E-02
Barium	1.1E-05	3.7E-03	---	---	1.0E-05	1.2E-05	9.4E-05	---	---	3.8E-03
Beryllium	4.3E-04	2.2E-02	---	---	5.3E-05	3.0E-04	1.1E-02	---	---	3.4E-02
Cadmium	5.8E-05	3.6E-03	---	---	3.4E-07	1.6E-05	7.1E-04	---	---	4.4E-03
Chromium (Total)	6.5E-04	5.4E-03	---	---	4.6E-06	2.8E-03	5.7E-03	---	---	1.4E-02
Cobalt	8.8E-05	1.5E-03	---	---	2.4E-06	3.6E-04	1.4E-04	---	---	2.1E-03
Copper	1.1E-02	6.3E-02	---	---	3.0E-05	4.0E-03	2.0E-02	---	---	9.8E-02
Lead	6.1E-05	1.4E-04	---	---	1.0E-07	1.2E-05	6.6E-05	---	---	2.8E-04
Manganese	1.5E-05	4.9E-02	---	---	5.4E-05	8.4E-05	3.3E-04	---	---	4.9E-02
Mercury	2.7E-04	4.5E-03	---	---	3.6E-07	1.9E-05	1.2E-03	---	---	6.0E-03
Molybdenum	9.2E-04	1.6E-02	---	---	4.8E-05	2.2E-04	2.6E-03	---	---	1.9E-02
Nickel	1.3E-02	3.1E-01	---	---	6.5E-04	2.7E-02	3.4E-02	---	---	3.8E-01
Selenium	5.1E-03	2.2E-01	---	---	5.6E-05	6.7E-04	1.6E-02	---	---	2.4E-01
Silver	8.4E-06	3.2E-04	---	---	3.9E-08	1.8E-06	3.2E-06	---	---	3.4E-04
Strontium	1.0E-04	2.7E-02	---	---	2.9E-05	5.5E-05	1.1E-03	---	---	2.8E-02
Thallium	9.5E-04	6.4E-02	---	---	4.6E-05	3.0E-04	3.7E-05	---	---	6.5E-02
Uranium	2.2E-04	4.3E-04	---	---	9.0E-06	2.0E-04	8.7E-05	---	---	9.5E-04
Vanadium	5.9E-03	4.3E-02	---	---	3.8E-05	6.0E-03	1.5E-03	---	---	5.6E-02
Zinc	3.4E-04	2.8E-02	---	---	2.8E-06	1.3E-04	3.4E-03	---	---	3.2E-02

Risk Quotients for the Muskrat Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	3.5E-05	5.6E-04	7.5E-04	2.0E-04	2.5E-03	4.0E-03
Arsenic	---	---	---	---	1.1E-04	7.4E-03	9.5E-03	1.4E-01	4.7E-03	1.6E-01
Barium	---	---	---	---	1.9E-05	2.6E-04	1.4E-03	1.7E-03	1.4E-04	3.5E-03
Beryllium	---	---	---	---	2.2E-05	1.4E-03	3.6E-02	9.3E-03	2.9E-04	4.7E-02
Cadmium	---	---	---	---	6.2E-07	3.4E-04	1.0E-02	2.3E-02	3.1E-03	3.7E-02
Chromium (Total)	---	---	---	---	8.4E-06	5.8E-02	8.2E-02	2.5E-01	1.5E-03	3.9E-01
Cobalt	---	---	---	---	4.4E-06	7.7E-03	2.0E-03	9.1E-04	6.3E-04	1.1E-02
Copper	---	---	---	---	3.8E-05	5.9E-02	2.1E-01	**1.4E+00**	1.5E-01	**1.8E+00**
Lead	---	---	---	---	1.8E-07	2.6E-04	9.6E-04	1.4E-03	1.2E-04	2.8E-03
Manganese	---	---	---	---	9.8E-05	1.8E-03	4.8E-03	1.3E-02	3.7E-04	2.0E-02
Mercury	---	---	---	---	1.5E-07	9.0E-05	3.9E-03	5.4E-04	1.0E-02	1.5E-02
Molybdenum	---	---	---	---	1.9E-05	1.0E-03	8.4E-03	2.6E-02	7.1E-03	4.3E-02
Nickel	---	---	---	---	1.2E-03	5.8E-01	5.0E-01	**2.6E+00**	1.2E-02	**3.7E+00**
Selenium	---	---	---	---	2.3E-05	3.2E-03	5.2E-02	9.8E-02	1.5E-01	3.0E-01
Silver	---	---	---	---	2.7E-08	1.5E-05	1.8E-05	5.8E-05	7.2E-05	1.6E-04
Strontium	---	---	---	---	1.2E-05	2.6E-04	3.6E-03	8.1E-04	1.8E-03	6.5E-03
Thallium	---	---	---	---	1.9E-05	1.4E-03	1.2E-04	1.4E-02	2.0E-03	1.7E-02
Uranium	---	---	---	---	3.7E-06	9.6E-04	2.8E-04	7.9E-04	4.7E-05	2.1E-03
Vanadium	---	---	---	---	1.6E-05	2.9E-02	4.7E-03	2.5E-02	3.8E-03	6.2E-02
Zinc	---	---	---	---	5.0E-06	2.8E-03	4.9E-02	1.6E-01	1.3E-02	2.3E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Northern River Otter Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	2.1E-05	---	---	1.1E-04	4.7E-05	3.7E-04	---	8.5E-05	1.7E-02	1.8E-02
Arsenic	1.4E-04	---	---	6.4E-04	8.8E-05	3.0E-03	---	3.7E-02	1.9E-02	6.0E-02
Barium	1.4E-06	---	---	5.6E-04	1.5E-05	1.0E-04	---	4.5E-04	5.7E-04	1.7E-03
Beryllium	2.0E-05	---	---	1.2E-04	2.9E-05	9.5E-04	---	4.0E-03	2.0E-03	7.1E-03
Cadmium	7.3E-06	---	---	1.1E-03	5.1E-07	1.4E-04	---	6.0E-03	1.3E-02	2.0E-02
Chromium (Total)	8.2E-05	---	---	1.3E-04	6.8E-06	2.3E-02	---	6.5E-02	6.4E-03	9.5E-02
Cobalt	1.1E-05	---	---	5.1E-05	3.6E-06	3.1E-03	---	2.4E-04	2.6E-03	6.0E-03
Copper	9.6E-04	---	---	6.4E-03	3.1E-05	2.4E-02	---	3.6E-01	6.4E-01	**1.0E+00**
Lead	7.6E-06	---	---	1.3E-05	1.5E-07	1.0E-04	---	3.7E-04	5.1E-04	1.0E-03
Manganese	1.9E-06	---	---	9.8E-05	8.0E-05	7.2E-04	---	3.5E-03	1.6E-03	5.9E-03
Mercury	1.3E-05	---	---	4.3E-04	2.0E-07	6.0E-05	---	2.3E-04	6.9E-02	7.0E-02
Molybdenum	4.3E-05	---	---	1.6E-03	2.6E-05	6.8E-04	---	1.1E-02	4.9E-02	6.2E-02
Nickel	1.6E-03	---	---	1.1E-03	9.6E-04	2.3E-01	---	6.8E-01	4.9E-02	9.6E-01
Selenium	2.4E-04	---	---	2.0E-02	3.1E-05	2.1E-03	---	4.2E-02	**1.0E+00**	**1.1E+00**
Silver	4.0E-07	---	---	3.0E-06	2.2E-08	6.0E-06	---	1.5E-05	3.0E-04	3.2E-04
Strontium	4.6E-06	---	---	4.5E-04	1.6E-05	1.7E-04	---	3.5E-04	1.3E-02	1.4E-02
Thallium	4.4E-05	---	---	1.6E-04	2.5E-05	9.4E-04	---	5.9E-03	1.4E-02	2.1E-02
Uranium	1.0E-05	---	---	3.9E-06	5.0E-06	6.4E-04	---	3.4E-04	3.2E-04	1.3E-03
Vanadium	2.7E-04	---	---	3.8E-04	2.1E-05	1.9E-02	---	1.1E-02	2.6E-02	5.7E-02
Zinc	4.2E-05	---	---	2.4E-03	4.1E-06	1.1E-03	---	4.2E-02	5.5E-02	1.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Short-tailed Weasel Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	5.4E-04	---	---	2.8E-03	3.4E-05	---	---	---	---	3.4E-03
Arsenic	7.8E-03	---	---	3.6E-02	1.4E-04	---	---	---	---	4.4E-02
Barium	7.6E-05	---	---	3.1E-02	2.4E-05	---	---	---	---	3.1E-02
Beryllium	5.1E-04	---	---	3.1E-03	2.1E-05	---	---	---	---	3.6E-03
Cadmium	4.1E-04	---	---	6.3E-02	7.9E-07	---	---	---	---	6.4E-02
Chromium (Total)	4.5E-03	---	---	7.2E-03	1.1E-05	---	---	---	---	1.2E-02
Cobalt	6.1E-04	---	---	2.8E-03	5.6E-06	---	---	---	---	3.4E-03
Copper	5.3E-02	---	---	3.5E-01	4.9E-05	---	---	---	---	4.1E-01
Lead	4.2E-04	---	---	7.2E-04	2.3E-07	---	---	---	---	1.1E-03
Manganese	1.1E-04	---	---	5.4E-03	1.2E-04	---	---	---	---	5.7E-03
Mercury	4.3E-04	---	---	1.4E-02	1.8E-07	---	---	---	---	1.5E-02
Molybdenum	7.8E-04	---	---	2.9E-02	1.4E-05	---	---	---	---	3.0E-02
Nickel	9.1E-02	---	---	6.1E-02	1.5E-03	---	---	---	---	1.5E-01
Selenium	6.1E-03	---	---	5.2E-01	2.2E-05	---	---	---	---	5.3E-01
Silver	2.2E-05	---	---	1.7E-04	3.5E-08	---	---	---	---	1.9E-04
Strontium	1.2E-04	---	---	1.2E-02	1.1E-05	---	---	---	---	1.2E-02
Thallium	1.1E-03	---	---	4.1E-03	1.8E-05	---	---	---	---	5.3E-03
Uranium	1.8E-04	---	---	7.1E-05	2.6E-06	---	---	---	---	2.6E-04
Vanadium	7.0E-03	---	---	9.9E-03	1.5E-05	---	---	---	---	1.7E-02
Zinc	2.3E-03	---	---	1.3E-01	6.4E-06	---	---	---	---	1.4E-01

Risk Quotients for the Short-tailed Weasel (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.6E-03	---	---	8.4E-03	1.0E-04	---	---	---	---	1.0E-02
Arsenic	2.4E-02	---	---	1.1E-01	4.1E-04	---	---	---	---	1.3E-01
Barium	7.6E-05	---	---	3.1E-02	2.4E-05	---	---	---	---	3.1E-02
Beryllium	5.1E-04	---	---	3.1E-03	2.1E-05	---	---	---	---	3.6E-03
Cadmium	4.1E-04	---	---	6.3E-02	7.9E-07	---	---	---	---	6.4E-02
Chromium (Total)	4.5E-03	---	---	7.2E-03	1.1E-05	---	---	---	---	1.2E-02
Cobalt	6.1E-04	---	---	2.8E-03	5.6E-06	---	---	---	---	3.4E-03
Copper	1.6E-01	---	---	**1.1E+00**	1.5E-04	---	---	---	---	**1.2E+00**
Lead	4.2E-04	---	---	7.2E-04	2.3E-07	---	---	---	---	1.1E-03
Manganese	1.1E-04	---	---	5.4E-03	1.2E-04	---	---	---	---	5.7E-03
Mercury	4.3E-04	---	---	1.4E-02	1.8E-07	---	---	---	---	1.5E-02
Molybdenum	2.3E-03	---	---	8.8E-02	4.1E-05	---	---	---	---	9.1E-02
Nickel	2.7E-01	---	---	1.8E-01	4.5E-03	---	---	---	---	4.6E-01
Selenium	1.8E-02	---	---	**1.6E+00**	6.7E-05	---	---	---	---	**1.6E+00**
Silver	6.7E-05	---	---	5.0E-04	1.0E-07	---	---	---	---	5.7E-04
Strontium	1.2E-04	---	---	1.2E-02	1.1E-05	---	---	---	---	1.2E-02
Thallium	3.4E-03	---	---	1.2E-02	5.5E-05	---	---	---	---	1.6E-02
Uranium	5.5E-04	---	---	2.1E-04	7.7E-06	---	---	---	---	7.7E-04
Vanadium	2.1E-02	---	---	3.0E-02	4.6E-05	---	---	---	---	5.1E-02
Zinc	7.0E-03	---	---	4.0E-01	1.9E-05	---	---	---	---	4.1E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Snowshoe Hare Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.3E-03	2.3E-02	---	---	3.7E-05	---	---	---	---	2.5E-02
Arsenic	1.4E-02	1.1E-02	---	---	1.0E-04	---	---	---	---	2.6E-02
Barium	1.4E-04	1.5E-02	---	---	1.8E-05	---	---	---	---	1.5E-02
Beryllium	1.3E-03	2.1E-02	---	---	2.2E-05	---	---	---	---	2.2E-02
Cadmium	7.2E-04	1.4E-02	---	---	6.0E-07	---	---	---	---	1.5E-02
Chromium (Total)	8.1E-03	2.1E-02	---	---	8.1E-06	---	---	---	---	2.9E-02
Cobalt	1.1E-03	5.8E-03	---	---	4.3E-06	---	---	---	---	6.9E-03
Copper	9.6E-02	1.8E-01	---	---	3.7E-05	---	---	---	---	2.7E-01
Lead	7.6E-04	5.7E-04	---	---	1.8E-07	---	---	---	---	1.3E-03
Manganese	1.9E-04	1.9E-01	---	---	9.6E-05	---	---	---	---	1.9E-01
Mercury	8.1E-04	4.2E-03	---	---	1.5E-07	---	---	---	---	5.0E-03
Molybdenum	2.7E-03	1.5E-02	---	---	2.0E-05	---	---	---	---	1.7E-02
Nickel	1.6E-01	**1.2E+00**	---	---	1.1E-03	---	---	---	---	**1.4E+00**
Selenium	1.5E-02	2.1E-01	---	---	2.4E-05	---	---	---	---	2.2E-01
Silver	4.0E-05	4.9E-04	---	---	2.6E-08	---	---	---	---	5.3E-04
Strontium	3.0E-04	2.5E-02	---	---	1.2E-05	---	---	---	---	2.5E-02
Thallium	2.8E-03	6.0E-02	---	---	1.9E-05	---	---	---	---	6.3E-02
Uranium	6.4E-04	4.1E-04	---	---	3.8E-06	---	---	---	---	1.0E-03
Vanadium	1.7E-02	4.0E-02	---	---	1.6E-05	---	---	---	---	5.8E-02
Zinc	4.2E-03	1.1E-01	---	---	4.9E-06	---	---	---	---	1.1E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Woodland Caribou Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	1.3E-03	1.0E-02	---	---	7.4E-05	---	---	---	---	1.1E-02
Arsenic	7.2E-03	2.6E-03	---	---	1.2E-04	---	---	---	---	9.9E-03
Barium	3.8E-05	1.9E-03	---	---	1.1E-05	---	---	---	---	1.9E-03
Beryllium	1.2E-03	8.9E-03	---	---	4.5E-05	---	---	---	---	1.0E-02
Cadmium	2.0E-04	1.8E-03	---	---	3.7E-07	---	---	---	---	2.0E-03
Chromium (Total)	2.3E-03	2.7E-03	---	---	5.0E-06	---	---	---	---	5.0E-03
Cobalt	3.1E-04	7.4E-04	---	---	2.6E-06	---	---	---	---	1.1E-03
Copper	3.0E-02	2.5E-02	---	---	2.6E-05	---	---	---	---	5.6E-02
Lead	2.1E-04	7.2E-05	---	---	1.1E-07	---	---	---	---	2.9E-04
Manganese	5.3E-05	2.5E-02	---	---	5.8E-05	---	---	---	---	2.5E-02
Mercury	7.6E-04	1.8E-03	---	---	3.1E-07	---	---	---	---	2.6E-03
Molybdenum	2.6E-03	6.3E-03	---	---	4.1E-05	---	---	---	---	8.9E-03
Nickel	4.6E-02	1.5E-01	---	---	7.0E-04	---	---	---	---	2.0E-01
Selenium	1.4E-02	8.8E-02	---	---	4.8E-05	---	---	---	---	1.0E-01
Silver	2.3E-05	1.3E-04	---	---	3.3E-08	---	---	---	---	1.5E-04
Strontium	2.8E-04	1.1E-02	---	---	2.5E-05	---	---	---	---	1.1E-02
Thallium	2.7E-03	2.6E-02	---	---	3.9E-05	---	---	---	---	2.8E-02
Uranium	6.0E-04	1.7E-04	---	---	7.8E-06	---	---	---	---	7.8E-04
Vanadium	1.6E-02	1.7E-02	---	---	3.3E-05	---	---	---	---	3.4E-02
Zinc	1.2E-03	1.4E-02	---	---	3.0E-06	---	---	---	---	1.5E-02

Risk Quotients for the Woodland Caribou (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	3.8E-03	3.0E-02	---	---	2.2E-04	---	---	---	---	3.4E-02
Arsenic	2.2E-02	7.9E-03	---	---	3.5E-04	---	---	---	---	3.0E-02
Barium	3.8E-05	1.9E-03	---	---	1.1E-05	---	---	---	---	1.9E-03
Beryllium	1.2E-03	8.9E-03	---	---	4.5E-05	---	---	---	---	1.0E-02
Cadmium	2.0E-04	1.8E-03	---	---	3.7E-07	---	---	---	---	2.0E-03
Chromium (Total)	2.3E-03	2.7E-03	---	---	5.0E-06	---	---	---	---	5.0E-03
Cobalt	3.1E-04	7.4E-04	---	---	2.6E-06	---	---	---	---	1.1E-03
Copper	9.1E-02	7.6E-02	---	---	7.7E-05	---	---	---	---	1.7E-01
Lead	2.1E-04	7.2E-05	---	---	1.1E-07	---	---	---	---	2.9E-04
Manganese	5.3E-05	2.5E-02	---	---	5.8E-05	---	---	---	---	2.5E-02
Mercury	7.6E-04	1.8E-03	---	---	3.1E-07	---	---	---	---	2.6E-03
Molybdenum	7.7E-03	1.9E-02	---	---	1.2E-04	---	---	---	---	2.7E-02
Nickel	1.4E-01	4.6E-01	---	---	2.1E-03	---	---	---	---	6.0E-01
Selenium	4.3E-02	2.6E-01	---	---	1.4E-04	---	---	---	---	3.1E-01
Silver	7.0E-05	3.9E-04	---	---	9.9E-08	---	---	---	---	4.6E-04
Strontium	2.8E-04	1.1E-02	---	---	2.5E-05	---	---	---	---	1.1E-02
Thallium	8.0E-03	7.7E-02	---	---	1.2E-04	---	---	---	---	8.5E-02
Uranium	1.8E-03	5.2E-04	---	---	2.3E-05	---	---	---	---	2.3E-03
Vanadium	4.9E-02	5.2E-02	---	---	9.9E-05	---	---	---	---	1.0E-01
Zinc	3.5E-03	4.2E-02	---	---	9.0E-06	---	---	---	---	4.6E-02

Risk Quotients for the American Robin Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.2E-03	8.9E-04	2.4E-03	---	6.4E-06	---	---	---	---	4.5E-03
Barium	1.0E-04	9.9E-03	9.4E-05	---	9.6E-06	---	---	---	---	1.0E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	3.3E-02	1.9E-01	---	1.1E-06	---	---	---	---	2.3E-01
Chromium (Total)	1.4E-02	3.5E-02	4.6E-02	---	1.0E-05	---	---	---	---	9.5E-02
Cobalt	6.2E-03	3.0E-02	7.9E-03	---	1.8E-05	---	---	---	---	4.5E-02
Copper	3.2E-02	5.4E-02	7.1E-02	---	8.9E-06	---	---	---	---	1.6E-01
Lead	5.6E-03	3.8E-03	3.1E-02	---	9.4E-07	---	---	---	---	4.0E-02
Manganese	1.1E-04	1.0E-01	9.8E-05	---	3.9E-05	---	---	---	---	1.0E-01
Mercury	1.7E-03	8.0E-03	3.0E-02	---	2.2E-07	---	---	---	---	3.9E-02
Molybdenum	1.5E-04	7.7E-04	1.5E-03	---	8.2E-07	---	---	---	---	2.4E-03
Nickel	3.9E-02	2.6E-01	4.3E-01	---	2.0E-04	---	---	---	---	7.3E-01
Selenium	7.1E-03	8.9E-02	7.3E-02	---	8.0E-06	---	---	---	---	1.7E-01
Silver	2.4E-04	2.7E-03	5.0E-03	---	1.1E-07	---	---	---	---	7.9E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	2.9E-03	5.8E-02	1.4E-03	---	1.5E-05	---	---	---	---	6.2E-02
Uranium	5.6E-05	3.3E-05	1.9E-05	---	2.4E-07	---	---	---	---	1.1E-04
Vanadium	1.8E-01	3.9E-01	8.0E-02	---	1.2E-04	---	---	---	---	6.6E-01
Zinc	7.0E-03	1.7E-01	3.2E-01	---	5.9E-06	---	---	---	---	5.0E-01

Risk Quotients for the American Robin (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	3.6E-03	2.7E-03	7.3E-03	---	1.9E-05	---	---	---	---	1.4E-02
Barium	3.0E-04	3.0E-02	2.8E-04	---	2.9E-05	---	---	---	---	3.0E-02
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.8E-03	3.3E-02	1.9E-01	---	1.1E-06	---	---	---	---	2.3E-01
Chromium (Total)	1.4E-02	3.5E-02	4.6E-02	---	1.0E-05	---	---	---	---	9.5E-02
Cobalt	6.2E-03	3.0E-02	7.9E-03	---	1.8E-05	---	---	---	---	4.5E-02
Copper	3.2E-02	5.4E-02	7.1E-02	---	8.9E-06	---	---	---	---	1.6E-01
Lead	5.6E-03	3.8E-03	3.1E-02	---	9.4E-07	---	---	---	---	4.0E-02
Manganese	1.1E-04	1.0E-01	9.8E-05	---	3.9E-05	---	---	---	---	1.0E-01
Mercury	5.0E-03	2.4E-02	8.9E-02	---	6.7E-07	---	---	---	---	1.2E-01
Molybdenum	4.6E-04	2.3E-03	4.6E-03	---	2.5E-06	---	---	---	---	7.3E-03
Nickel	3.9E-02	2.6E-01	4.3E-01	---	2.0E-04	---	---	---	---	7.3E-01
Selenium	2.1E-02	2.7E-01	2.2E-01	---	2.4E-05	---	---	---	---	5.1E-01
Silver	7.1E-04	8.0E-03	1.5E-02	---	3.3E-07	---	---	---	---	2.4E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	8.8E-03	1.7E-01	4.3E-03	---	4.4E-05	---	---	---	---	1.9E-01
Uranium	5.6E-05	3.3E-05	1.9E-05	---	2.4E-07	---	---	---	---	1.1E-04
Vanadium	5.5E-01	**1.2E+00**	2.4E-01	---	3.7E-04	---	---	---	---	**2.0E+00**
Zinc	7.0E-03	1.7E-01	3.2E-01	---	5.9E-06	---	---	---	---	5.0E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Barn Swallow Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	8.2E-04	2.0E-05	7.9E-03	---	1.0E-05	---	---	---	---	8.8E-03
Barium	6.9E-05	2.2E-04	3.1E-04	---	1.5E-05	---	---	---	---	6.1E-04
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.2E-03	7.3E-04	6.3E-01	---	1.7E-06	---	---	---	---	6.3E-01
Chromium (Total)	9.9E-03	7.7E-04	1.5E-01	---	1.7E-05	---	---	---	---	1.6E-01
Cobalt	4.3E-03	6.7E-04	2.6E-02	---	2.8E-05	---	---	---	---	3.1E-02
Copper	2.2E-02	1.2E-03	2.3E-01	---	1.4E-05	---	---	---	---	2.6E-01
Lead	3.8E-03	8.5E-05	1.0E-01	---	1.5E-06	---	---	---	---	1.1E-01
Manganese	7.4E-05	2.2E-03	3.2E-04	---	6.3E-05	---	---	---	---	2.7E-03
Mercury	1.2E-03	1.8E-04	9.7E-02	---	3.6E-07	---	---	---	---	9.8E-02
Molybdenum	1.1E-04	1.7E-05	5.0E-03	---	1.3E-06	---	---	---	---	5.1E-03
Nickel	2.7E-02	5.8E-03	**1.4E+00**	---	3.1E-04	---	---	---	---	**1.4E+00**
Selenium	4.9E-03	2.0E-03	2.4E-01	---	1.3E-05	---	---	---	---	2.5E-01
Silver	1.6E-04	5.9E-05	1.6E-02	---	1.8E-07	---	---	---	---	1.7E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	2.0E-03	1.2E-03	4.6E-03	---	2.3E-05	---	---	---	---	7.8E-03
Uranium	3.9E-05	7.3E-07	6.3E-05	---	3.9E-07	---	---	---	---	1.0E-04
Vanadium	1.3E-01	8.7E-03	2.6E-01	---	2.0E-04	---	---	---	---	4.0E-01
Zinc	4.8E-03	3.8E-03	**1.0E+00**	---	9.5E-06	---	---	---	---	**1.1E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Barn Swallow (SaR) Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.5E-03	5.9E-05	2.4E-02	---	3.1E-05	---	---	---	---	2.6E-02
Barium	2.1E-04	6.5E-04	9.3E-04	---	4.6E-05	---	---	---	---	1.8E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.2E-03	7.3E-04	6.3E-01	---	1.7E-06	---	---	---	---	6.3E-01
Chromium (Total)	9.9E-03	7.7E-04	1.5E-01	---	1.7E-05	---	---	---	---	1.6E-01
Cobalt	4.3E-03	6.7E-04	2.6E-02	---	2.8E-05	---	---	---	---	3.1E-02
Copper	2.2E-02	1.2E-03	2.3E-01	---	1.4E-05	---	---	---	---	2.6E-01
Lead	3.8E-03	8.5E-05	1.0E-01	---	1.5E-06	---	---	---	---	1.1E-01
Manganese	7.4E-05	2.2E-03	3.2E-04	---	6.3E-05	---	---	---	---	2.7E-03
Mercury	3.5E-03	5.3E-04	2.9E-01	---	1.1E-06	---	---	---	---	3.0E-01
Molybdenum	3.2E-04	5.1E-05	1.5E-02	---	4.0E-06	---	---	---	---	1.5E-02
Nickel	2.7E-02	5.8E-03	**1.4E+00**	---	3.1E-04	---	---	---	---	**1.4E+00**
Selenium	1.5E-02	5.9E-03	7.2E-01	---	3.9E-05	---	---	---	---	7.4E-01
Silver	4.9E-04	1.8E-04	4.9E-02	---	5.4E-07	---	---	---	---	5.0E-02
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	5.9E-03	3.7E-03	1.4E-02	---	6.8E-05	---	---	---	---	2.3E-02
Uranium	3.9E-05	7.3E-07	6.3E-05	---	3.9E-07	---	---	---	---	1.0E-04
Vanadium	3.8E-01	2.6E-02	7.9E-01	---	5.9E-04	---	---	---	---	**1.2E+00**
Zinc	4.8E-03	3.8E-03	**1.0E+00**	---	9.5E-06	---	---	---	---	**1.1E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Common Loon Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	2.4E-06	3.3E-04	---	2.6E-03	2.3E-03	5.2E-03
Barium	---	---	---	---	6.2E-06	1.7E-04	---	4.5E-04	9.9E-04	1.6E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	2.7E-07	2.9E-04	---	8.1E-03	2.9E-02	3.7E-02
Chromium (Total)	---	---	---	---	2.6E-06	3.6E-02	---	6.2E-02	1.0E-02	1.1E-01
Cobalt	---	---	---	---	4.4E-06	1.5E-02	---	7.3E-04	1.4E-02	2.9E-02
Copper	---	---	---	---	2.2E-06	6.8E-03	---	6.5E-02	1.9E-01	2.6E-01
Lead	---	---	---	---	2.4E-07	6.5E-04	---	1.5E-03	3.4E-03	5.5E-03
Manganese	---	---	---	---	9.7E-06	3.5E-04	---	1.1E-03	8.0E-04	2.2E-03
Mercury	---	---	---	---	1.4E-07	1.7E-04	---	4.1E-04	2.1E-01	2.1E-01
Molybdenum	---	---	---	---	2.8E-07	2.9E-05	---	3.1E-04	2.2E-03	2.6E-03
Nickel	---	---	---	---	4.9E-05	4.7E-02	---	8.7E-02	1.1E-02	1.4E-01
Selenium	---	---	---	---	3.0E-06	8.3E-04	---	1.0E-02	4.2E-01	4.3E-01
Silver	---	---	---	---	4.7E-08	5.1E-05	---	8.0E-05	2.7E-03	2.8E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	1.0E-05	1.6E-03	---	6.2E-03	2.4E-02	3.2E-02
Uranium	---	---	---	---	8.7E-08	4.5E-05	---	1.5E-05	2.4E-05	8.4E-05
Vanadium	---	---	---	---	7.9E-05	2.8E-01	---	1.0E-01	4.2E-01	8.0E-01
Zinc	---	---	---	---	1.9E-06	2.1E-03	---	4.9E-02	1.1E-01	1.6E-01

Risk Quotients for the Lesser Scaup Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	---	---	---	---	3.1E-06	3.0E-04	3.2E-05	2.3E-02	---	2.3E-02
Barium	---	---	---	---	7.2E-06	1.4E-04	6.1E-05	3.7E-03	---	3.9E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	---	---	---	5.2E-07	4.0E-04	1.0E-03	1.1E-01	---	1.1E-01
Chromium (Total)	---	---	---	---	5.0E-06	4.9E-02	5.8E-03	8.4E-01	---	9.0E-01
Cobalt	---	---	---	---	8.5E-06	2.1E-02	4.4E-04	9.9E-03	---	3.1E-02
Copper	---	---	---	---	4.3E-06	9.4E-03	2.7E-03	8.8E-01	---	8.9E-01
Lead	---	---	---	---	4.6E-07	9.0E-04	2.8E-04	2.0E-02	---	2.1E-02
Manganese	---	---	---	---	1.9E-05	4.8E-04	1.1E-04	1.4E-02	---	1.5E-02
Mercury	---	---	---	---	1.6E-07	1.4E-04	5.1E-04	3.4E-03	---	4.0E-03
Molybdenum	---	---	---	---	4.0E-07	3.0E-05	2.0E-05	3.0E-03	---	3.1E-03
Nickel	---	---	---	---	9.5E-05	6.6E-02	4.7E-03	**1.2E+00**	---	**1.2E+00**
Selenium	---	---	---	---	3.9E-06	7.6E-04	1.0E-03	9.3E-02	---	9.5E-02
Silver	---	---	---	---	5.5E-08	4.3E-05	4.2E-06	6.5E-04	---	7.0E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	---	---	---	---	1.2E-05	1.3E-03	9.1E-06	5.1E-02	---	5.2E-02
Uranium	---	---	---	---	1.2E-07	4.3E-05	1.1E-06	1.4E-04	---	1.9E-04
Vanadium	---	---	---	---	9.2E-05	2.4E-01	3.3E-03	8.4E-01	---	**1.1E+00**
Zinc	---	---	---	---	2.9E-06	2.2E-03	3.3E-03	5.2E-01	---	5.2E-01

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Mallard Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.6E-05	2.0E-05	8.1E-05	---	2.7E-06	3.9E-04	1.8E-04	1.2E-02	---	1.2E-02
Barium	3.8E-06	3.7E-04	5.3E-06	---	6.9E-06	2.0E-04	3.8E-04	2.0E-03	---	3.0E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.8E-05	7.0E-04	6.1E-03	---	4.4E-07	5.0E-04	5.5E-03	5.3E-02	---	6.6E-02
Chromium (Total)	3.1E-04	7.4E-04	1.5E-03	---	4.2E-06	6.2E-02	3.1E-02	4.0E-01	---	5.0E-01
Cobalt	1.3E-04	6.5E-04	2.5E-04	---	7.1E-06	2.6E-02	2.4E-03	4.7E-03	---	3.4E-02
Copper	6.7E-04	1.1E-03	2.3E-03	---	3.6E-06	1.2E-02	1.5E-02	4.2E-01	---	4.5E-01
Lead	1.2E-04	8.2E-05	9.9E-04	---	3.8E-07	1.1E-03	1.5E-03	9.5E-03	---	1.3E-02
Manganese	2.3E-06	2.1E-03	3.1E-06	---	1.6E-05	6.0E-04	5.8E-04	6.9E-03	---	1.0E-02
Mercury	6.0E-05	2.9E-04	1.6E-03	---	1.5E-07	2.0E-04	3.1E-03	1.8E-03	---	7.1E-03
Molybdenum	3.3E-06	1.6E-05	4.9E-05	---	3.3E-07	3.7E-05	1.1E-04	1.5E-03	---	1.7E-03
Nickel	8.2E-04	5.6E-03	1.4E-02	---	8.0E-05	8.2E-02	2.5E-02	5.7E-01	---	6.9E-01
Selenium	1.6E-04	2.0E-03	2.4E-03	---	3.4E-06	9.9E-04	5.8E-03	4.7E-02	---	5.8E-02
Silver	5.8E-06	6.6E-05	1.9E-04	---	5.3E-08	6.1E-05	2.6E-05	3.6E-04	---	7.0E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	1.2E-04	2.4E-03	9.1E-05	---	1.2E-05	1.9E-03	5.6E-05	2.8E-02	---	3.2E-02
Uranium	1.2E-06	7.1E-07	6.2E-07	---	9.9E-08	5.4E-05	5.7E-06	6.8E-05	---	1.3E-04
Vanadium	6.9E-03	1.5E-02	4.6E-03	---	8.9E-05	3.4E-01	2.0E-02	4.6E-01	---	8.5E-01
Zinc	1.5E-04	3.6E-03	1.0E-02	---	2.4E-06	2.8E-03	1.8E-02	2.5E-01	---	2.8E-01

Risk Quotients for the Red-tailed Hawk Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	1.0E-04	---	---	4.8E-04	2.7E-06	---	---	---	---	5.8E-04
Barium	1.5E-05	---	---	6.1E-03	7.0E-06	---	---	---	---	6.1E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	1.6E-04	---	---	2.4E-02	4.5E-07	---	---	---	---	2.4E-02
Chromium (Total)	1.2E-03	---	---	2.0E-03	4.4E-06	---	---	---	---	3.2E-03
Cobalt	5.4E-04	---	---	2.5E-03	7.4E-06	---	---	---	---	3.0E-03
Copper	2.7E-03	---	---	1.8E-02	3.7E-06	---	---	---	---	2.1E-02
Lead	4.8E-04	---	---	8.1E-04	4.0E-07	---	---	---	---	1.3E-03
Manganese	9.2E-06	---	---	4.7E-04	1.6E-05	---	---	---	---	5.0E-04
Mercury	2.4E-04	---	---	8.0E-03	1.5E-07	---	---	---	---	8.3E-03
Molybdenum	1.3E-05	---	---	5.0E-04	3.4E-07	---	---	---	---	5.1E-04
Nickel	3.3E-03	---	---	2.2E-03	8.2E-05	---	---	---	---	5.6E-03
Selenium	6.2E-04	---	---	5.3E-02	3.4E-06	---	---	---	---	5.4E-02
Silver	2.3E-05	---	---	1.7E-04	5.3E-08	---	---	---	---	1.9E-04
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	4.9E-04	---	---	1.8E-03	1.2E-05	---	---	---	---	2.3E-03
Uranium	4.8E-06	---	---	1.9E-06	1.0E-07	---	---	---	---	6.8E-06
Vanadium	2.7E-02	---	---	3.9E-02	8.9E-05	---	---	---	---	6.6E-02
Zinc	6.0E-04	---	---	3.4E-02	2.5E-06	---	---	---	---	3.5E-02

Risk Quotients for the Spotted Sandpiper Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	3.0E-04	---	2.9E-03	---	8.2E-06	4.1E-04	5.4E-05	2.6E-02	4.3E-04	3.0E-02
Barium	2.5E-05	---	1.1E-04	---	1.2E-05	1.2E-04	6.7E-05	2.7E-03	1.1E-04	3.2E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	4.6E-04	---	2.3E-01	---	1.4E-06	5.4E-04	1.7E-03	1.3E-01	8.3E-03	3.7E-01
Chromium (Total)	3.6E-03	---	5.5E-02	---	1.3E-05	6.7E-02	9.8E-03	9.6E-01	2.9E-03	**1.1E+00**
Cobalt	1.6E-03	---	9.6E-03	---	2.2E-05	2.8E-02	7.6E-04	1.1E-02	3.9E-03	5.5E-02
Copper	8.0E-03	---	8.6E-02	---	1.1E-05	1.3E-02	4.6E-03	1.0E+00	5.5E-02	**1.2E+00**
Lead	1.4E-03	---	3.8E-02	---	1.2E-06	1.2E-03	4.8E-04	2.3E-02	9.8E-04	6.4E-02
Manganese	2.7E-05	---	1.2E-04	---	5.0E-05	6.5E-04	1.8E-04	1.6E-02	2.3E-04	1.8E-02
Mercury	4.2E-04	---	3.6E-02	---	2.9E-07	1.3E-04	5.9E-04	2.6E-03	2.4E-02	6.4E-02
Molybdenum	3.9E-05	---	1.9E-03	---	1.0E-06	4.0E-05	3.4E-05	3.4E-03	4.6E-04	5.9E-03
Nickel	9.7E-03	---	5.2E-01	---	2.5E-04	8.9E-02	8.0E-03	**1.3E+00**	3.0E-03	**2.0E+00**
Selenium	1.8E-03	---	8.8E-02	---	1.0E-05	1.0E-03	1.8E-03	1.1E-01	7.9E-02	2.8E-01
Silver	5.9E-05	---	6.1E-03	---	1.4E-07	5.7E-05	7.0E-06	7.3E-04	4.6E-04	7.4E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	7.2E-04	---	1.7E-03	---	1.8E-05	9.9E-04	8.7E-06	3.2E-02	2.3E-03	3.8E-02
Uranium	1.4E-05	---	2.3E-05	---	3.1E-07	5.8E-05	1.8E-06	1.6E-04	4.8E-06	2.6E-04
Vanadium	4.6E-02	---	9.8E-02	---	1.6E-04	2.1E-01	3.6E-03	6.2E-01	4.6E-02	**1.0E+00**
Zinc	1.8E-03	---	3.9E-01	---	7.5E-06	3.0E-03	5.6E-03	5.9E-01	2.4E-02	**1.0E+00**

Notes:
Red highlight with white text indicates that the RQ is greater than 1.

Risk Quotients for the Spruce Grouse Exposed to Constituents of Concern at the MacLellan Region - Future Case

Constituent	Surface Soil Ingestion RQ	Terrestrial Plant Ingestion RQ	Terrestrial Invertebrate Ingestion RQ	Terrestrial Mammal Ingestion RQ	Surface Water Ingestion RQ	Freshwater Sediment Ingestion RQ	Freshwater Aquatic Plant Ingestion RQ	Freshwater Benthic Invertebrate Ingestion RQ	Freshwater Fish Ingestion RQ	Total Risk Quotient
Antimony	---	---	---	---	---	---	---	---	---	---
Arsenic	2.2E-04	5.4E-04	1.2E-04	---	3.3E-06	---	---	---	---	8.8E-04
Barium	2.8E-05	8.9E-03	6.7E-06	---	7.3E-06	---	---	---	---	8.9E-03
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	3.4E-04	2.0E-02	9.2E-03	---	5.5E-07	---	---	---	---	2.9E-02
Chromium (Total)	2.7E-03	2.1E-02	2.2E-03	---	5.3E-06	---	---	---	---	2.6E-02
Cobalt	1.2E-03	1.8E-02	3.8E-04	---	9.0E-06	---	---	---	---	2.0E-02
Copper	5.9E-03	3.3E-02	3.4E-03	---	4.6E-06	---	---	---	---	4.2E-02
Lead	1.0E-03	2.3E-03	1.5E-03	---	4.8E-07	---	---	---	---	4.8E-03
Manganese	2.0E-05	6.1E-02	4.7E-06	---	2.0E-05	---	---	---	---	6.1E-02
Mercury	4.4E-04	6.8E-03	2.0E-03	---	1.6E-07	---	---	---	---	9.3E-03
Molybdenum	2.9E-05	4.6E-04	7.3E-05	---	4.2E-07	---	---	---	---	5.7E-04
Nickel	7.2E-03	1.6E-01	2.0E-02	---	1.0E-04	---	---	---	---	1.9E-01
Selenium	1.3E-03	5.4E-02	3.5E-03	---	4.1E-06	---	---	---	---	5.8E-02
Silver	4.4E-05	1.6E-03	2.4E-04	---	5.7E-08	---	---	---	---	1.9E-03
Strontium	---	---	---	---	---	---	---	---	---	---
Thallium	9.1E-04	5.8E-02	1.1E-04	---	1.2E-05	---	---	---	---	5.9E-02
Uranium	1.0E-05	2.0E-05	9.2E-07	---	1.2E-07	---	---	---	---	3.2E-05
Vanadium	5.1E-02	3.5E-01	5.7E-03	---	9.4E-05	---	---	---	---	4.1E-01
Zinc	1.3E-03	1.0E-01	1.5E-02	---	3.0E-06	---	---	---	---	1.2E-01